CHAPTER

78

EXHAUST

(GE90-100 SERIES ENGINES)

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-EFFECTIVE PAGES		
1 thru 12	SEP 05/2018	
78-CONTENTS		
1	Sep 05/2017	
2	Sep 05/2017	
3	Sep 05/2017	
4	Sep 05/2017	
O 5	Sep 05/2018	
6	Jan 05/2017	
7	Sep 05/2017	
8	May 05/2017	
9	Sep 05/2017	
10	May 05/2017	
11	May 05/2017	
12	Sep 05/2017	
13	May 05/2017	
14	Sep 05/2017	
15	May 05/2017	
16	May 05/2017	
78-00-00		
601	Jan 05/2016	
602	Sep 05/2017	
603	Sep 05/2017	
604	Sep 05/2017	
605	Sep 05/2017	
606	Jan 05/2015	
78-00-00		
901	Jan 05/2015	
902	Jan 05/2016	
903	Sep 05/2017	
904	Jan 05/2015	
905	Sep 05/2015	
906	Jan 05/2015	
907	Sep 05/2017	
908	Sep 05/2017	
909	Sep 05/2017	
910	Sep 05/2017	

Subject/Page	Date	COC
78-00-00 (cont)		
911	Jan 05/2016	
912	Sep 05/2017	
913	Jan 05/2015	
914	Jan 05/2015	
915	Jan 05/2015	
916	BLANK	
78-11-00		
601	Jan 05/2016	
602	Sep 05/2017	
603	Jan 05/2015	
604	Sep 05/2017	
605	Jan 05/2016	
606	Sep 05/2017	
607	Sep 05/2017	
608	Sep 05/2017	
609	Sep 05/2017	
610	Sep 05/2017	
611	Sep 05/2017	
612	Sep 05/2017	
613	Sep 05/2017	
614	BLANK	
78-11-01		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	Sep 05/2017	
414	Sep 05/2017	

Subject/Page	Date	COC
78-11-01 (cont)		
415	Sep 05/2017	
416	Sep 05/2017	
417	Sep 05/2017	
418	Sep 05/2017	
419	Sep 05/2017	
420	Sep 05/2017	
78-11-02		
401	Sep 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2016	
405	May 05/2017	
406	May 05/2015	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2015	
410	Sep 05/2015	
78-11-03		
401	Sep 05/2017	
402	Jan 05/2015	
403	Sep 05/2017	
404	Sep 05/2017	
405	Jan 05/2015	
406	BLANK	
78-31-00		
201	Jan 05/2015	
202	May 05/2016	
203	Jan 05/2016	
204	Sep 05/2017	
205	Sep 05/2017	
206	Sep 05/2017	
207	Sep 05/2017	
208	Sep 05/2017	
209	Sep 05/2017	
210	Sep 05/2017	
211	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-00 (cont)		
212	Sep 05/2017	
213	Sep 05/2017	
214	Sep 05/2017	
215	Sep 05/2017	
216	Sep 05/2017	
217	Sep 05/2017	
218	Sep 05/2017	
219	Sep 05/2017	
220	Sep 05/2017	
221	Sep 05/2017	
222	Sep 05/2017	
223	Sep 05/2017	
224	Jan 05/2015	
225	Sep 05/2017	
226	Sep 05/2017	
227	Jan 05/2015	
228	Sep 05/2017	
229	Sep 05/2017	
230	Sep 05/2017	
231	May 05/2017	
232	Jan 05/2015	
233	Jan 05/2016	
234	Sep 05/2017	
235	Sep 05/2017	
236	Sep 05/2017	
237	Sep 05/2017	
238	Sep 05/2017	
239	Sep 05/2017	
240	Sep 05/2017	
241	Sep 05/2017	
242	Sep 05/2017	
243	Sep 05/2017	
244	Sep 05/2017	
245	Sep 05/2017	
246	Sep 05/2017	
247	Sep 05/2017	
78-31-00 (cont)		
248	Sep 05/2017	
249	Sep 05/2017	
250	Sep 05/2017	
251	Sep 05/2017	
252	Sep 05/2017	
253	Sep 05/2017	
254	Sep 05/2017	
255	Jan 05/2015	
256	Sep 05/2017	
257	Sep 05/2017	
258	Sep 05/2017	
259	Sep 05/2017	
260	Sep 05/2017	
261	Sep 05/2017	
262	Sep 05/2017	
263	Sep 05/2017	
264	Sep 05/2017	
265	Sep 05/2017	
266	Sep 05/2017	
267	Sep 05/2017	
268	Sep 05/2017	
269	Sep 05/2017	
270	Sep 05/2017	
271	Sep 05/2017	
272	Sep 05/2017	
273	Sep 05/2017	
274	Sep 05/2017	
275	Sep 05/2017	
276	Sep 05/2017	
277	Sep 05/2017	
278	Sep 05/2017	
279	Sep 05/2017	
280	Sep 05/2017	
281	Sep 05/2017	
282	Sep 05/2017	
283	Sep 05/2017	
78-31-00 (cont)		
284	Sep 05/2017	
285	Sep 05/2017	
286	Sep 05/2017	
287	Sep 05/2017	
288	Sep 05/2017	
289	Sep 05/2017	
290	Sep 05/2017	
291	Sep 05/2017	
292	Sep 05/2017	
293	Sep 05/2017	
294	Sep 05/2017	
295	Sep 05/2017	
296	Sep 05/2017	
297	Sep 05/2017	
298	Sep 05/2017	
298.1	Sep 05/2017	
298.2	Sep 05/2017	
298.3	Sep 05/2017	
298.4	Sep 05/2017	
298.5	Sep 05/2017	
298.6	Sep 05/2017	
298.7	Sep 05/2017	
298.8	Sep 05/2017	
298.9	Sep 05/2017	
298.10	Sep 05/2017	
298.11	Sep 05/2017	
298.12	Sep 05/2017	
298.13	Sep 05/2017	
298.14	Sep 05/2017	
298.15	Sep 05/2017	
298.16	Sep 05/2017	
298.17	Sep 05/2017	
298.18	Sep 05/2017	
298.19	Sep 05/2017	
298.20	Sep 05/2017	
298.21	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-00 (cont)		
298.22	Sep 05/2017	
298.23	Sep 05/2017	
298.24	Sep 05/2017	
298.25	Sep 05/2017	
298.26	Sep 05/2017	
298.27	Sep 05/2017	
298.28	Sep 05/2017	
298.29	Sep 05/2017	
298.30	Sep 05/2017	
298.31	Sep 05/2017	
298.32	Sep 05/2017	
298.33	Sep 05/2017	
298.34	Sep 05/2017	
298.35	Sep 05/2017	
298.36	Sep 05/2017	
298.37	Sep 05/2017	
298.38	Sep 05/2017	
298.39	Sep 05/2017	
298.40	Sep 05/2017	
298.41	Sep 05/2017	
298.42	Sep 05/2017	
298.43	Sep 05/2017	
298.44	Sep 05/2017	
298.45	Sep 05/2017	
298.46	Sep 05/2017	
298.47	Sep 05/2017	
298.48	Sep 05/2017	
298.49	Sep 05/2017	
298.50	Sep 05/2017	
298.51	Jan 05/2018	
298.52	Sep 05/2017	
298.53	Sep 05/2017	
298.54	Sep 05/2017	
298.55	Sep 05/2017	
298.56	Sep 05/2017	
298.57	Sep 05/2017	
78-31-00 (cont)		
298.58	Sep 05/2017	
298.59	Sep 05/2017	
298.60	Sep 05/2017	
298.61	Sep 05/2017	
298.62	Sep 05/2017	
298.63	Sep 05/2017	
298.64	Sep 05/2017	
298.65	Sep 05/2017	
298.66	Sep 05/2017	
298.67	Sep 05/2017	
298.68	Sep 05/2017	
298.69	Sep 05/2017	
298.70	Sep 05/2017	
298.71	Sep 05/2017	
298.72	Sep 05/2017	
298.73	Sep 05/2017	
298.74	Sep 05/2017	
298.75	Sep 05/2017	
298.76	Sep 05/2017	
298.77	Sep 05/2017	
298.78	Sep 05/2017	
78-31-00		
501	Jan 05/2015	
502	Jan 05/2016	
503	Sep 05/2017	
504	Sep 05/2017	
505	Sep 05/2017	
506	Sep 05/2017	
507	May 05/2016	
508	Sep 05/2015	
509	Sep 05/2017	
510	May 05/2016	
511	Jan 05/2016	
512	Sep 05/2015	
513	Sep 05/2017	
514	Sep 05/2017	
78-31-00 (cont)		
515	Sep 05/2017	
516	Sep 05/2015	
517	Sep 05/2015	
518	Sep 05/2015	
519	Sep 05/2017	
520	Sep 05/2017	
521	Sep 05/2017	
522	Jan 05/2016	
523	Sep 05/2017	
524	Sep 05/2017	
525	Sep 05/2017	
526	Sep 05/2017	
527	Sep 05/2017	
528	Sep 05/2017	
529	Sep 05/2017	
530	Sep 05/2017	
531	Sep 05/2017	
532	Sep 05/2015	
R 533	Sep 05/2018	
O 534	Sep 05/2018	
535	Sep 05/2015	
536	Sep 05/2015	
537	Sep 05/2015	
538	BLANK	
78-31-00		
601	Jan 05/2015	
602	Jan 05/2015	
603	Jan 05/2015	
604	Jan 05/2016	
78-31-01		
401	Jan 05/2016	
402	Jan 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-01 (cont)		
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	Sep 05/2017	
414	Sep 05/2017	
415	Sep 05/2017	
416	Sep 05/2017	
417	Sep 05/2017	
418	Sep 05/2017	
419	Sep 05/2017	
420	Sep 05/2017	
421	Sep 05/2017	
422	Sep 05/2017	
423	Sep 05/2017	
424	Sep 05/2017	
425	Sep 05/2017	
426	Sep 05/2017	
427	Sep 05/2017	
428	Sep 05/2017	
429	Sep 05/2017	
430	Sep 05/2017	
431	Sep 05/2017	
432	Sep 05/2017	
433	Sep 05/2017	
434	Sep 05/2017	
435	Sep 05/2017	
436	Sep 05/2017	
437	Sep 05/2017	
438	Sep 05/2017	
439	Sep 05/2017	
440	Sep 05/2017	
441	Sep 05/2017	
442	Sep 05/2017	
78-31-01 (cont)		
443	Sep 05/2017	
444	Sep 05/2017	
78-31-01		
501	Sep 05/2015	
R 502	Sep 05/2018	
O 503	Sep 05/2018	
O 504	Sep 05/2018	
O 505	Sep 05/2018	
506	Sep 05/2015	
507	Sep 05/2015	
508	Jan 05/2016	
509	Sep 05/2017	
510	Sep 05/2015	
511	Sep 05/2015	
512	Sep 05/2017	
513	Sep 05/2017	
514	Sep 05/2017	
515	Sep 05/2017	
516	Sep 05/2017	
517	Sep 05/2017	
518	Sep 05/2017	
519	Sep 05/2017	
520	Sep 05/2017	
521	Sep 05/2017	
522	Sep 05/2017	
523	Sep 05/2017	
524	Sep 05/2017	
525	Sep 05/2015	
526	Jan 05/2016	
527	Jan 05/2016	
528	Sep 05/2017	
529	Sep 05/2017	
530	May 05/2017	
R 531	Sep 05/2018	
532	Sep 05/2015	
533	Sep 05/2017	
78-31-01 (cont)		
534	Sep 05/2017	
535	Sep 05/2017	
536	Sep 05/2017	
537	Sep 05/2017	
538	Sep 05/2017	
539	Sep 05/2017	
540	Sep 05/2017	
541	May 05/2017	
542	Sep 05/2017	
543	Sep 05/2017	
544	Sep 05/2017	
545	Sep 05/2017	
546	Sep 05/2017	
547	Sep 05/2017	
548	Sep 05/2017	
549	Sep 05/2017	
550	May 05/2017	
551	May 05/2017	
552	May 05/2017	
553	May 05/2017	
554	May 05/2017	
555	Sep 05/2017	
556	Sep 05/2017	
557	Sep 05/2017	
558	Sep 05/2017	
559	Sep 05/2017	
560	Sep 05/2017	
561	Sep 05/2017	
562	Sep 05/2017	
563	May 05/2017	
564	May 05/2017	
565	Sep 05/2015	
566	Sep 05/2015	
567	Sep 05/2017	
568	Sep 05/2017	
569	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-01 (cont)		
570	Sep 05/2017	
571	Sep 05/2017	
572	May 05/2016	
573	May 05/2017	
574	Sep 05/2017	
575	Sep 05/2017	
576	Sep 05/2017	
577	Sep 05/2017	
578	Sep 05/2017	
579	Sep 05/2017	
580	Sep 05/2017	
581	Sep 05/2017	
582	May 05/2017	
583	May 05/2017	
584	BLANK	
78-31-01		
601	Jan 05/2016	
602	Jan 05/2016	
603	May 05/2017	
604	Sep 05/2017	
605	Sep 05/2017	
606	Sep 05/2017	
607	Jan 05/2016	
608	Sep 05/2017	
609	Jan 05/2016	
610	Sep 05/2017	
611	Sep 05/2017	
612	Sep 05/2017	
613	Sep 05/2017	
614	Sep 05/2017	
615	Sep 05/2015	
616	Jan 05/2016	
617	May 05/2017	
618	Sep 05/2017	
619	Sep 05/2017	
620	Sep 05/2017	

Subject/Page	Date	COC
78-31-01 (cont)		
621	May 05/2017	
622	May 05/2017	
623	May 05/2017	
624	May 05/2017	
625	May 05/2017	
626	May 05/2017	
627	May 05/2017	
628	May 05/2017	
629	May 05/2017	
630	May 05/2017	
631	Jan 05/2017	
632	Jan 05/2017	
633	May 05/2017	
634	May 05/2017	
635	Jan 05/2017	
636	Jan 05/2017	
637	Sep 05/2017	
638	Sep 05/2017	
639	Sep 05/2017	
640	BLANK	
78-31-01		
801	Jan 05/2016	
802	Sep 05/2015	
803	Sep 05/2017	
804	Sep 05/2017	
805	Sep 05/2017	
806	Sep 05/2017	
807	Sep 05/2017	
808	Sep 05/2017	
809	Sep 05/2017	
810	Sep 05/2017	
811	Sep 05/2017	
812	Sep 05/2017	
813	Sep 05/2017	
814	Sep 05/2017	
815	Jul 25/2018	

Subject/Page	Date	COC
78-31-01 (cont)		
816	Sep 05/2017	
817	Sep 05/2017	
818	Sep 05/2017	
819	Sep 05/2017	
820	Sep 05/2017	
821	Sep 05/2017	
822	Sep 05/2017	
823	Sep 05/2017	
824	Sep 05/2017	
825	Sep 05/2017	
826	Sep 05/2017	
827	Sep 05/2017	
828	Sep 05/2017	
829	Sep 05/2017	
830	Sep 05/2017	
831	Sep 05/2017	
832	Sep 05/2017	
833	Sep 05/2017	
834	Sep 05/2017	
835	Sep 05/2017	
836	Sep 05/2017	
837	Sep 05/2017	
838	Sep 05/2017	
839	Sep 05/2017	
840	Sep 05/2017	
841	Sep 05/2017	
842	Sep 05/2017	
843	Sep 05/2017	
844	Sep 05/2017	
845	Sep 05/2017	
846	BLANK	
78-31-02		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-02 (cont)		
405	Sep 05/2017	
406	Jan 05/2015	
R 407	Sep 05/2018	
R 408	Sep 05/2018	
O 409	Sep 05/2018	
410	BLANK	
78-31-02		
R 501	Sep 05/2018	
502	Sep 05/2017	
503	Sep 05/2017	
504	Sep 05/2017	
505	Sep 05/2017	
506	Sep 05/2017	
78-31-04		
401	Jan 05/2015	
402	Sep 05/2017	
403	Jan 05/2015	
404	Jan 05/2015	
405	Jan 05/2015	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	Sep 05/2017	
414	Sep 05/2017	
415	Sep 05/2017	
416	Sep 05/2015	
417	Jan 05/2015	
418	May 05/2016	
419	Jan 05/2015	
420	Jan 05/2015	
421	Sep 05/2017	
422	BLANK	

Subject/Page	Date	COC
78-31-04		
R 501	Sep 05/2018	
502	Sep 05/2017	
R 503	Sep 05/2018	
R 504	Sep 05/2018	
505	Sep 05/2017	
506	Sep 05/2017	
507	Sep 05/2017	
508	Sep 05/2017	
509	Sep 05/2017	
510	BLANK	
78-31-05		
401	Jan 05/2016	
402	Sep 05/2017	
403	Jan 05/2015	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2015	
409	Jan 05/2015	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	Sep 05/2017	
414	Sep 05/2017	
415	Sep 05/2017	
416	Sep 05/2017	
417	Sep 05/2017	
418	Sep 05/2017	
419	Jan 05/2015	
420	Sep 05/2017	
421	Jan 05/2015	
422	BLANK	
78-31-05		
601	Jan 05/2016	
602	Sep 05/2017	

Subject/Page	Date	COC
78-31-05 (cont)		
603	Jan 05/2015	
604	Sep 05/2017	
605	Sep 05/2017	
606	Sep 05/2017	
607	Sep 05/2017	
608	Sep 05/2017	
609	Sep 05/2017	
610	BLANK	
78-31-05		
801	Sep 05/2015	
802	Sep 05/2017	
803	Sep 05/2017	
804	Sep 05/2017	
805	Sep 05/2017	
806	Sep 05/2017	
807	Sep 05/2017	
808	Sep 05/2017	
809	May 05/2017	
810	May 05/2017	
78-31-06		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Jan 05/2015	
408	Sep 05/2017	
409	Jan 05/2015	
410	Sep 05/2017	
411	Sep 05/2017	
412	Jan 05/2015	
413	Sep 05/2017	
414	Jan 05/2015	
415	Sep 05/2017	
416	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-06 (cont)		
417	May 05/2015	
418	Jan 05/2016	
419	May 05/2015	
420	May 05/2015	
421	Sep 05/2017	
422	Sep 05/2017	
423	Sep 05/2017	
424	Sep 05/2017	
425	Sep 05/2017	
426	Sep 05/2017	
427	Sep 05/2017	
428	Sep 05/2017	
429	Sep 05/2017	
430	Sep 05/2017	
431	Sep 05/2017	
432	Jan 05/2015	
433	Jan 05/2015	
434	Sep 05/2017	
435	Sep 05/2017	
436	Sep 05/2017	
437	Sep 05/2017	
438	Sep 05/2017	
78-31-06		
601	Jan 05/2016	
602	May 05/2015	
603	Sep 05/2017	
604	May 05/2015	
605	May 05/2015	
606	Jan 05/2015	
607	Sep 05/2017	
608	Jan 05/2015	
609	Sep 05/2017	
610	Sep 05/2017	
611	Sep 05/2017	
612	Sep 05/2017	
613	Sep 05/2017	

Subject/Page	Date	COC
78-31-06 (cont)		
614	BLANK	
78-31-08		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2015	
410	Jan 05/2015	
411	Jan 05/2015	
412	Jan 05/2016	
413	Sep 05/2017	
414	Jan 05/2015	
415	Sep 05/2017	
416	Sep 05/2017	
417	Sep 05/2017	
418	Sep 05/2015	
419	May 05/2016	
420	Jan 05/2015	
78-31-09		
401	Jan 05/2016	
402	Sep 05/2017	
403	Jan 05/2015	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2015	
410	Jan 05/2015	
411	Jan 05/2015	
412	Jan 05/2015	
413	Jan 05/2015	

Subject/Page	Date	COC
78-31-09 (cont)		
414	Jan 05/2015	
415	Sep 05/2017	
416	BLANK	
78-31-10		
401	Jan 05/2017	
402	Jan 05/2016	
403	Sep 05/2017	
404	Sep 05/2017	
405	Jan 05/2015	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Jan 05/2017	
410	Jan 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	May 05/2017	
414	May 05/2017	
415	Sep 05/2017	
416	Sep 05/2017	
417	May 05/2017	
418	Jan 05/2017	
419	May 05/2015	
420	May 05/2015	
421	Sep 05/2017	
422	Sep 05/2017	
423	Sep 05/2017	
424	Sep 05/2017	
425	Sep 05/2017	
426	BLANK	
78-31-11		
401	Jan 05/2015	
402	Sep 05/2017	
403	Jan 05/2015	
404	Sep 05/2017	
405	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-11 (cont)		
406	Sep 05/2017	
407	Jan 05/2015	
408	Jan 05/2015	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	BLANK	
78-31-13		
401	Jan 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Jul 25/2018	
405	Jan 05/2015	
406	BLANK	
78-31-14		
401	May 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	BLANK	
78-31-14		
601	May 05/2017	
602	Sep 05/2017	
603	Sep 05/2017	
604	Sep 05/2017	
605	Sep 05/2017	
606	Sep 05/2017	
607	Sep 05/2017	
608	May 05/2017	

Subject/Page	Date	COC
78-31-14 (cont)		
609	May 05/2017	
610	May 05/2017	
611	Sep 05/2017	
612	May 05/2017	
613	Sep 05/2017	
614	May 05/2017	
615	Sep 05/2017	
616	Sep 05/2017	
617	Sep 05/2017	
618	May 05/2017	
619	Sep 05/2017	
620	May 05/2017	
621	May 05/2017	
622	May 05/2017	
623	May 05/2017	
624	May 05/2017	
625	Jul 25/2018	
626	BLANK	
78-31-15		
401	Jan 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Jan 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Jul 25/2018	
408	Sep 05/2017	
409	Jan 05/2017	
410	Jan 05/2017	
411	Jul 25/2018	
412	Jan 05/2015	
78-31-15		
601	May 05/2017	
602	Sep 05/2017	
603	Sep 05/2017	
604	May 05/2017	

Subject/Page	Date	COC
78-31-15 (cont)		
605	Jul 25/2018	
606	May 05/2017	
607	Jul 25/2018	
608	BLANK	
78-31-16		
401	Sep 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2015	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	Sep 05/2017	
414	Sep 05/2017	
78-31-16		
601	Jan 05/2016	
602	Sep 05/2017	
603	Jan 05/2015	
604	Jan 05/2015	
78-31-17		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Jan 05/2015	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2015	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-17 (cont)		
412	Jan 05/2015	
78-31-17		
501	May 05/2015	
502	Sep 05/2017	
503	Jan 05/2015	
504	Sep 05/2017	
505	Sep 05/2017	
506	BLANK	
78-31-18		
401	Jan 05/2015	
402	Sep 05/2017	
403	Sep 05/2015	
404	Jan 05/2015	
78-31-18		
601	Jan 05/2016	
602	Sep 05/2017	
603	Sep 05/2017	
604	Sep 05/2017	
78-31-18		
801	Jan 05/2017	
802	Sep 05/2017	
803	Sep 05/2017	
804	Sep 05/2017	
78-31-19		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2015	
404	May 05/2015	
405	Jan 05/2015	
406	Jan 05/2015	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	

Subject/Page	Date	COC
78-31-19 (cont)		
413	Sep 05/2017	
414	May 05/2017	
78-31-20		
401	Jan 05/2015	
402	Jan 05/2016	
403	Jan 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	May 05/2015	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Jan 05/2016	
413	Jan 05/2017	
414	May 05/2015	
415	Sep 05/2017	
416	Sep 05/2017	
417	Sep 05/2017	
418	Sep 05/2017	
419	Sep 05/2017	
420	May 05/2015	
421	May 05/2015	
422	Sep 05/2017	
423	May 05/2017	
424	May 05/2017	
425	May 05/2017	
426	Sep 05/2017	
427	May 05/2015	
428	May 05/2015	
429	Sep 05/2017	
430	Sep 05/2017	
431	Sep 05/2017	
432	May 05/2015	
433	Sep 05/2015	

Subject/Page	Date	COC
78-31-20 (cont)		
434	May 05/2015	
435	May 05/2015	
436	May 05/2015	
437	Jan 05/2017	
438	Sep 05/2017	
439	Sep 05/2017	
440	May 05/2015	
441	Jan 05/2017	
442	May 05/2017	
443	Sep 05/2017	
444	Sep 05/2017	
445	Sep 05/2017	
446	Sep 05/2017	
447	Sep 05/2017	
448	Sep 05/2017	
449	Sep 05/2017	
450	Sep 05/2017	
451	May 05/2015	
452	May 05/2015	
453	Sep 05/2017	
454	May 05/2015	
78-31-20		
501	Jan 05/2016	
502	Sep 05/2017	
503	Sep 05/2017	
504	Sep 05/2017	
505	Sep 05/2017	
506	Sep 05/2017	
507	Sep 05/2017	
508	Jan 05/2017	
509	Sep 05/2017	
510	Sep 05/2017	
511	Sep 05/2017	
512	Sep 05/2017	
513	Sep 05/2017	
514	BLANK	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-31-21		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	May 05/2015	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	May 05/2017	
414	May 05/2017	
415	Sep 05/2017	
416	BLANK	
78-31-21		
501	May 05/2017	
502	Sep 05/2017	
503	Sep 05/2017	
504	Sep 05/2017	
505	Sep 05/2017	
506	Sep 05/2017	
507	Sep 05/2017	
508	Sep 05/2017	
509	Jan 05/2017	
510	Sep 05/2017	
511	Jan 05/2017	
512	Sep 05/2017	
513	Sep 05/2017	
514	Sep 05/2017	
515	Sep 05/2017	
516	Sep 05/2017	
78-31-22		
401	May 05/2018	
402	May 05/2018	

Subject/Page	Date	COC
78-31-22 (cont)		
403	May 05/2018	
404	Sep 05/2016	
405	Sep 05/2016	
406	Sep 05/2016	
407	Jan 05/2017	
408	May 05/2018	
409	May 05/2018	
410	BLANK	
78-31-99		
401	Sep 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Jan 05/2015	
78-31-99		
601	Sep 05/2017	
602	Sep 05/2017	
603	Sep 05/2017	
604	BLANK	
78-34-01		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	BLANK	
78-34-02		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	

Subject/Page	Date	COC
78-34-02 (cont)		
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
78-34-05		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	May 05/2017	
410	May 05/2018	
411	May 05/2018	
412	May 05/2018	
413	May 05/2018	
414	May 05/2018	
415	May 05/2018	
416	May 05/2018	
78-34-06		
401	Sep 05/2017	
402	Jan 05/2015	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	May 05/2017	
409	May 05/2017	
410	May 05/2017	
411	May 05/2017	
412	BLANK	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-34-10		
401	May 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2015	
413	Jan 05/2016	
414	Jan 05/2015	
415	Sep 05/2017	
416	Sep 05/2017	
417	Sep 05/2017	
418	Sep 05/2017	
419	Sep 05/2017	
420	Sep 05/2017	
421	Sep 05/2017	
422	Sep 05/2017	
78-34-11		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	May 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
78-34-12		
301	Jan 05/2016	
302	Sep 05/2017	
303	May 05/2015	
304	Sep 05/2017	
305	Sep 05/2017	
306	Sep 05/2017	
78-34-12		
401	Jan 05/2016	
402	May 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	
407	Sep 05/2017	
408	Jan 05/2015	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Jan 05/2016	
413	Sep 05/2017	
414	Sep 05/2017	
415	May 05/2016	
416	Sep 05/2017	
417	Sep 05/2017	
418	Jan 05/2015	
419	Jan 05/2015	
420	May 05/2017	
421	Sep 05/2017	
422	Sep 05/2017	
423	Sep 05/2017	
424	Sep 05/2017	
425	Sep 05/2017	
426	Sep 05/2017	
427	Sep 05/2017	
428	Sep 05/2017	
429	Sep 05/2017	
430	Jan 05/2016	
431	Sep 05/2017	
432	Sep 05/2017	
433	Jan 05/2015	
434	Sep 05/2017	
435	Sep 05/2017	
436	Sep 05/2017	
437	Sep 05/2017	
438	Sep 05/2017	
439	Sep 05/2017	
440	Sep 05/2017	
441	Sep 05/2017	
442	Sep 05/2017	
443	Sep 05/2017	
444	Sep 05/2017	
445	Sep 05/2017	
446	Sep 05/2017	
447	Sep 05/2017	
448	Sep 05/2017	
449	Jan 05/2016	
450	Sep 05/2017	
451	Sep 05/2017	
452	Sep 05/2017	
453	Sep 05/2017	
454	Sep 05/2017	
455	Sep 05/2017	
456	Sep 05/2017	
457	Sep 05/2017	
458	Sep 05/2017	
459	Sep 05/2017	
460	Sep 05/2017	
461	Sep 05/2017	
462	Sep 05/2017	
463	Sep 05/2017	
464	Sep 05/2017	
465	Sep 05/2017	
466	Sep 05/2017	
467	Sep 05/2017	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

Subject/Page	Date	COC
78-34-12 (cont)		
468	Sep 05/2017	
78-34-13		
401	May 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Jan 05/2015	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2015	
413	Sep 05/2017	
414	Sep 05/2017	
415	Sep 05/2017	
416	Sep 05/2017	
417	Sep 05/2017	
418	Sep 05/2017	
419	Sep 05/2017	
420	BLANK	
78-34-14		
401	Jan 05/2015	
402	Sep 05/2017	
403	May 05/2017	
404	May 05/2017	
405	Sep 05/2017	
406	Jan 05/2015	
78-34-15		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	May 05/2017	
405	Sep 05/2017	
406	Sep 05/2017	

Subject/Page	Date	COC
78-34-15 (cont)		
407	Sep 05/2017	
408	BLANK	
78-34-16		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Jan 05/2016	
405	Jan 05/2015	
406	BLANK	
78-34-17		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Jan 05/2016	
405	Jan 05/2015	
406	BLANK	
78-34-18		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	May 05/2016	
405	Jan 05/2018	
406	BLANK	
78-36-01		
401	Jan 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Jan 05/2015	
405	Sep 05/2017	
406	BLANK	
78-36-02		
401	May 05/2015	
402	Sep 05/2017	
403	Sep 05/2017	
404	Jan 05/2016	
405	Sep 05/2017	

Subject/Page	Date	COC
78-36-02 (cont)		
406	BLANK	
78-36-03		
401	May 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	Sep 05/2016	
407	Sep 05/2017	
408	Sep 05/2017	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
78-36-04		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Jan 05/2015	
406	Sep 05/2017	
407	Sep 05/2017	
408	BLANK	
78-36-05		
401	Sep 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	BLANK	

A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

78-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
THRUST REVERSER EXHAUST - INSPECTION/CHECK	78-00-00		601	ARO ALL
Thrust Reverser Hinge Inspection TASK 78-00-00-210-801-H01			601	ARO ALL
Paint Appearance on the Thrust Reverser Cowl TASK 78-00-00-210-802-H01			605	ARO ALL
EXHAUST - DDG MAINTENANCE PROCEDURES	78-00-00		901	ARO ALL
MMEL 78-31-1 (DDG) Preparation - Thrust Reversers Inoperative TASK 78-00-00-040-801-H01			901	ARO ALL
MMEL 78-31-1 (DDG) Restoration - Thrust Reversers Inoperative TASK 78-00-00-440-801-H01			911	ARO ALL
TURBINE EXHAUST SYSTEM - INSPECTION/CHECK	78-11-00		601	ARO ALL
Turbine Exhaust System Visual Inspection TASK 78-11-00-210-801-H01			601	ARO ALL
Turbine Exhaust System Detailed Inspection TASK 78-11-00-220-801-H01			605	ARO ALL
Turbine Fireseal Inspection TASK 78-11-00-210-802-H01			611	ARO ALL
PRIMARY NOZZLE - REMOVAL/INSTALLATION	78-11-01		401	ARO ALL
Primary Nozzle Removal TASK 78-11-01-000-801-H01			401	ARO ALL
Primary Nozzle Installation TASK 78-11-01-400-801-H01			415	ARO ALL
FORWARD AND AFT CENTERBODY - REMOVAL/INSTALLATION	78-11-02		401	ARO ALL
Aft Centerbody Removal TASK 78-11-02-000-801-H01			401	ARO ALL
Aft Centerbody Installation TASK 78-11-02-400-801-H01			406	ARO ALL
Forward Centerbody Removal TASK 78-11-02-000-802-H01			408	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Forward Centerbody Installation TASK 78-11-02-400-802-H01			409	ARO ALL
CENTER VENT TUBE EXTENSION - REMOVAL/INSTALLATION	78-11-03		401	ARO ALL
Center Vent Tube Extension Removal TASK 78-11-03-000-801-H01			401	ARO ALL
Center Vent Tube Extension Installation TASK 78-11-03-400-801-H01			404	ARO ALL
THRUST REVERSER SYSTEM - MAINTENANCE PRACTICES	78-31-00		201	ARO ALL
Open the Thrust Reverser (Selection) TASK 78-31-00-010-816-H00			201	ARO ALL
Close the Thrust Reverser (Selection) TASK 78-31-00-410-816-H00			202	ARO ALL
Open the Thrust Reverser (Power Method) TASK 78-31-00-010-802-H01			202	ARO ALL
Close the Thrust Reverser (Power Method) TASK 78-31-00-410-802-H01			224	ARO ALL
Open the Thrust Reverser (Manual Method) TASK 78-31-00-010-803-H01			232	ARO ALL
Close the Thrust Reverser (Manual Method) TASK 78-31-00-410-803-H01			255	ARO ALL
Open the Thrust Reverser (Sling Method) TASK 78-31-00-010-804-H01			261	ARO ALL
Close the Thrust Reverser (Sling Method) TASK 78-31-00-410-804-H01			289	ARO ALL
Open the Thrust Reverser (Hand Pump Method) TASK 78-31-00-010-806-H01			295	ARO ALL
Close the Thrust Reverser (Hand Pump Method) TASK 78-31-00-410-806-H01			298.23	ARO ALL
Thrust Reverser Operation - Extend (Selection) TASK 78-31-00-860-819-H00			298.29	ARO ALL
Thrust Reverser Operation - Retract (Selection) TASK 78-31-00-860-818-H00			298.29	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Thrust Reverser Operation - Extend (Power Method) TASK 78-31-00-981-801-H01			298.30	ARO ALL
Thrust Reverser Operation - Retract (Power Method) TASK 78-31-00-981-802-H01			298.37	ARO ALL
Thrust Reverser Operation - Extend (Manual Method) TASK 78-31-00-980-801-H01			298.39	ARO ALL
Thrust Reverser Operation - Retract (Manual Method) TASK 78-31-00-980-802-H01			298.46	ARO ALL
Thrust Reverser Deactivation For Ground Maintenance TASK 78-31-00-040-806-H00			298.49	ARO ALL
Thrust Reverser Activation After Ground Maintenance TASK 78-31-00-440-805-H00			298.51	ARO ALL
Thrust Reverser Blocker Door Access Platform TASK 78-31-00-800-801-H01			298.56	ARO ALL
Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Open the Thrust Reverser TASK 78-31-00-980-803-H01			298.61	ARO ALL
Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Close the Thrust Reverser TASK 78-31-00-980-804-H00			298.70	ARO ALL
THRUST REVERSER SYSTEM - ADJUSTMENT/TEST	78-31-00		501	ARO ALL
Thrust Reverser - Operational Test (Selection) TASK 78-31-00-710-820-H00			501	ARO ALL
Thrust Reverser - Operational Test (Engine Not In Operation) TASK 78-31-00-710-821-H00			501	ARO ALL
Thrust Reverser - Operational Test (Engine In Operation) TASK 78-31-00-710-823-H00			510	ARO ALL
Thrust Reverser Actuator Locks - Operational Test TASK 78-31-00-710-803-H01			511	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Thrust Reverser Sync Lock - Operational Test TASK 78-31-00-710-804-H01			522	ARO ALL
Thrust Reverser Proximity Sensors - Operational Test TASK 78-31-00-710-805-H01			532	ARO ALL
Thrust Reverser Hydraulic Actuator Rod End - Adjustment TASK 78-31-00-820-801-H00			536	ARO ALL
THRUST REVERSER SYSTEM - INSPECTION/CHECK	78-31-00		601	ARO ALL
Thrust Reverser to EEC Electrical Connector Examination For Lightening Protection TASK 78-31-00-200-801-H00			601	ARO ALL
THRUST REVERSER - REMOVAL/INSTALLATION	78-31-01		401	ARO ALL
Thrust Reverser Removal TASK 78-31-01-000-801-H01			401	ARO ALL
Thrust Reverser Installation TASK 78-31-01-400-801-H01			430	ARO ALL
THRUST REVERSER - ADJUSTMENT/TEST	78-31-01		501	ARO ALL
Thrust Reverser Adjustment TASK 78-31-01-830-801-H01			501	ARO ALL
Thrust Reverser Compression Rod Adjustment TASK 78-31-01-820-802-H00			572	ARO ALL
THRUST REVERSER - INSPECTION/CHECK	78-31-01		601	ARO ALL
Thrust Reverser Inspection TASK 78-31-01-200-802-H01			601	ARO ALL
THRUST REVERSER - REPAIRS	78-31-01		801	ARO ALL
Temporary Repair of the Thrust Reverser Metal-Faced Thermal Insulation Blankets TASK 78-31-01-300-823-H00			801	ARO ALL
Permanent Repair of the Thrust Reverser Metal-faced Thermal Insulation Blankets TASK 78-31-01-300-824-H00			808	ARO ALL
Click-Bond Stud Replacement TASK 78-31-01-300-804-H01			833	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Enamel Paint Touch-up for Cracks in the Paint on the Thrust Reverser Cowl TASK 78-31-01-300-805-H01			840	ARO ALL
Bond the Seal Pad to the Thermal Insulation Blanket TASK 78-31-01-350-801-H01			841	ARO ALL
THRUST REVERSER V-GROOVE LATCH BANDS - REMOVAL/INSTALLATION	78-31-02		401	ARO ALL
Thrust Reverser V-Groove Latch Bands Removal TASK 78-31-02-000-801-H01			401	ARO ALL
Thrust Reverser V-Groove Latch Bands Installation TASK 78-31-02-400-801-H01			407	ARO ALL
THRUST REVERSER V-GROOVE LATCH BANDS - ADJUSTMENT/TEST	78-31-02		501	ARO ALL
Thrust Reverser V-Band Latch Adjustment TASK 78-31-02-820-801-H01			501	ARO ALL
THRUST REVERSER TENSION LATCHES - REMOVAL/INSTALLATION	78-31-04		401	ARO ALL
Thrust Reverser Tension Latches Removal TASK 78-31-04-000-801-H01			401	ARO ALL
Thrust Reverser Tension Latches Installation TASK 78-31-04-400-801-H01			416	ARO ALL
THRUST REVERSER TENSION LATCHES - ADJUSTMENT/TEST	78-31-04		501	ARO ALL
Thrust Reverser Tension Latches Adjustment TASK 78-31-04-820-801-H01			501	ARO ALL
THRUST REVERSER FIRE SEALS - REMOVAL/INSTALLATION	78-31-05		401	ARO ALL
Thrust Reverser Fire Seal Removal TASK 78-31-05-000-801-H01			401	ARO ALL
Thrust Reverser Fire Seal Installation TASK 78-31-05-400-801-H01			408	ARO ALL
Aft Cowl Fire Seal Removal TASK 78-31-05-000-802-H01			415	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Aft Cowl Fire Seal Installation TASK 78-31-05-400-802-H01			419	ARO ALL
THRUST REVERSER FIRE SEALS - INSPECTION/CHECK	78-31-05		601	ARO ALL
Thrust Reverser Fire Seal Inspection TASK 78-31-05-200-801-H01			601	ARO ALL
THRUST REVERSER FIRE SEALS - REPAIRS	78-31-05		801	ARO ALL
Thrust Reverser Fire Seal End Plug Repair TASK 78-31-05-300-801-H00			801	ARO ALL
Thrust Reverser Bulb Seal Repair TASK 78-31-05-300-802-H00			802	ARO ALL
THRUST REVERSER THERMAL INSULATION BLANKETS - REMOVAL/INSTALLATION	78-31-06		401	ARO ALL
Thrust Reverser Thermal Insulation Blanket Removal TASK 78-31-06-000-801-H01			401	ARO ALL
Thrust Reverser Thermal Insulation Blanket Installation TASK 78-31-06-400-802-H01			417	ARO ALL
THRUST REVERSER THERMAL INSULATION BLANKETS - INSPECTION/CHECK	78-31-06		601	ARO ALL
Thrust Reverser Thermal Insulation Blanket Inspection TASK 78-31-06-200-801-H01			601	ARO ALL
THRUST REVERSER RUB STRIPS - REMOVAL/INSTALLATION	78-31-08		401	ARO ALL
Thrust Reverser Torque Box Rub Strip Removal TASK 78-31-08-000-801-H01			401	ARO ALL
Thrust Reverser Torque Box Rub Strip Installation TASK 78-31-08-400-801-H01			409	ARO ALL
Thrust Reverser Translating Sleeve Rub Strip Removal TASK 78-31-08-000-802-H00			412	ARO ALL
Thrust Reverser Translating Sleeve Rub Strip Installation TASK 78-31-08-400-802-H00			418	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
THRUST REVERSER PRESSURE SEALS, MISCELLANEOUS SEALS AND BUMPERS - REMOVAL/INSTALLATION	78-31-09		401	ARO ALL
Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers Removal TASK 78-31-09-000-801-H01			401	ARO ALL
Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers Installation TASK 78-31-09-400-801-H01			409	ARO ALL
THRUST REVERSER SLEEVE - REMOVAL/INSTALLATION	78-31-10		401	ARO ALL
Thrust Reverser Sleeve Removal TASK 78-31-10-000-801-H01			401	ARO ALL
Thrust Reverser Sleeve Installation TASK 78-31-10-400-801-H01			418	ARO ALL
THRUST REVERSER TRACK LINERS - REMOVAL/INSTALLATION	78-31-11		401	ARO ALL
Thrust Reverser Track Liners Removal TASK 78-31-11-000-801-H01			401	ARO ALL
Thrust Reverser Track Liners Installation TASK 78-31-11-400-801-H01			409	ARO ALL
THRUST REVERSER AUXILIARY SLIDERS - REMOVAL/INSTALLATION	78-31-13		401	ARO ALL
Thrust Reverser Auxiliary Sliders Removal TASK 78-31-13-000-801-H01			401	ARO ALL
Thrust Reverser Auxiliary Sliders Installation TASK 78-31-13-400-801-H01			404	ARO ALL
THRUST REVERSER BLOCKER DOORS - REMOVAL/INSTALLATION	78-31-14		401	ARO ALL
Thrust Reverser Blocker Doors Removal TASK 78-31-14-000-801-H01			401	ARO ALL
Thrust Reverser Blocker Doors Installation TASK 78-31-14-400-801-H01			407	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
THRUST REVERSER BLOCKER DOORS - INSPECTION/CHECK	78-31-14		601	ARO ALL
Thrust Reverser Blocker Door Detailed Inspection TASK 78-31-14-200-801-H01			601	ARO ALL
Thrust Reverser Blocker Door Inspection - Aerodynamic Smoothness TASK 78-31-14-200-802-H01			610	ARO ALL
Thrust Reverser Blocker Door and Drag Link Inspection TASK 78-31-14-200-803-H00			614	ARO ALL
THRUST REVERSER BLOCKER DOOR DRAG LINKS - REMOVAL/INSTALLATION	78-31-15		401	ARO ALL
Thrust Reverser Blocker Door Drag Links Removal TASK 78-31-15-000-801-H01			401	ARO ALL
Thrust Reverser Blocker Door Drag Links Installation TASK 78-31-15-400-801-H01			409	ARO ALL
THRUST REVERSER BLOCKER DOOR DRAG LINKS - INSPECTION/CHECK	78-31-15		601	ARO ALL
Thrust Reverser Blocker Door Drag Link Detailed Inspection TASK 78-31-15-200-801-H01			601	ARO ALL
THRUST REVERSER CASCADE SEGMENTS - REMOVAL/INSTALLATION	78-31-16		401	ARO ALL
Thrust Reverser Cascade Segments Removal TASK 78-31-16-000-801-H01			401	ARO ALL
Thrust Reverser Cascade Segments Installation TASK 78-31-16-400-801-H01			404	ARO ALL
THRUST REVERSER CASCADE SEGMENTS - INSPECTION/CHECK	78-31-16		601	ARO ALL
Thrust Reverser Cascade Segments Examination TASK 78-31-16-200-801-H01			601	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
THRUST REVERSER PRESSURE RELIEF DOORS - REMOVAL/INSTALLATION	78-31-17		401	ARO ALL
Thrust Reverser Pressure Relief Door Removal TASK 78-31-17-000-801-H01			401	ARO ALL
Thrust Reverser Pressure Relief Door Installation TASK 78-31-17-400-801-H01			403	ARO ALL
Replace the Thrust Reverser Pressure Relief Door Latch TASK 78-31-17-900-801-H01			411	ARO ALL
THRUST REVERSER PRESSURE RELIEF DOORS - ADJUSTMENT/TEST	78-31-17		501	ARO ALL
Thrust Reverser Pressure Relief Door Latch Test TASK 78-31-17-720-801-H01			501	ARO ALL
THRUST REVERSER BULLNOSE SEAL - REMOVAL/INSTALLATION	78-31-18		401	ARO ALL
Thrust Reverser Bullnose Seal Removal TASK 78-31-18-000-801-H01			401	ARO ALL
Thrust Reverser Bullnose Seal Installation TASK 78-31-18-400-801-H01			403	ARO ALL
THRUST REVERSER BULLNOSE SEAL - INSPECTION/CHECK	78-31-18		601	ARO ALL
Thrust Reverser Bullnose Seal Inspection TASK 78-31-18-200-801-H01			601	ARO ALL
THRUST REVERSER BULLNOSE SEAL - REPAIRS	78-31-18		801	ARO ALL
Thrust Reverser Bullnose Seal Repair TASK 78-31-18-300-801-H01			801	ARO ALL
THRUST REVERSER LATCH ACCESS DOORS - REMOVAL/INSTALLATION	78-31-19		401	ARO ALL
Thrust Reverser Latch Access Doors Removal TASK 78-31-19-000-801-H01			401	ARO ALL
Thrust Reverser Latch Access Doors Installation TASK 78-31-19-400-801-H01			403	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
THRUST REVERSER UPPER BIFURCATION T-HOOK LATCH, GEARBOX, CABLE AND HANDLE AND RECEIVER - REMOVAL/INSTALLATION	78-31-20		401	ARO ALL
Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Assembly Removal (Selections) TASK 78-31-20-000-801-H01			401	ARO ALL
Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Assembly Installation (Selections) TASK 78-31-20-400-801-H01			401	ARO ALL
T-Hook, Gearbox, Cable and Handle Assembly Removal TASK 78-31-20-000-806-H00			402	ARO ALL
T-Hook, Gearbox, Cable and Handle Assembly Installation TASK 78-31-20-400-806-H00			412	ARO ALL
Gearbox Assembly Removal TASK 78-31-20-000-805-H00			419	ARO ALL
Gearbox Assembly Installation TASK 78-31-20-400-805-H00			423	ARO ALL
Handle Latch Control Assembly and Push-Pull Cable Removal TASK 78-31-20-000-803-H00			425	ARO ALL
Handle Latch Control Assembly and Push-Pull Cable Installation TASK 78-31-20-400-803-H00			432	ARO ALL
T-Hook Removal TASK 78-31-20-000-804-H00			436	ARO ALL
T-Hook Installation TASK 78-31-20-400-804-H00			440	ARO ALL
T-Hook Latch Receiver Removal TASK 78-31-20-000-802-H01			446	ARO ALL
T-Hook Latch Receiver Installation TASK 78-31-20-400-802-H01			451	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
THRUST REVERSER UPPER BIFURCATION T-HOOK LATCH, GEARBOX, CABLE AND HANDLE AND RECEIVER - ADJUSTMENT/TEST	78-31-20		501	ARO ALL
Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment TASK 78-31-20-820-801-H01			501	ARO ALL
Thrust Reverser Upper Bifurcation T-Hook Latch Receiver Adjustment TASK 78-31-20-820-802-H01			508	ARO ALL
THRUST REVERSER LOWER BIFURCATION INTERLOCK PIN AND FITTING - REMOVAL/INSTALLATION	78-31-21		401	ARO ALL
Thrust Reverser Lower Bifurcation Interlock Pin Removal TASK 78-31-21-000-801-H01			401	ARO ALL
Thrust Reverser Lower Bifurcation Interlock Pin Installation TASK 78-31-21-400-801-H01			406	ARO ALL
Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal TASK 78-31-21-000-802-H01			408	ARO ALL
Thrust Reverser Lower Bifurcation Interlock Pin Fitting Installation TASK 78-31-21-400-802-H01			413	ARO ALL
THRUST REVERSER LOWER BIFURCATION INTERLOCK PIN AND FITTING - ADJUSTMENT/TEST	78-31-21		501	ARO ALL
Thrust Reverser Lower Bifurcation Interlock Pin Adjustment TASK 78-31-21-820-801-H01			501	ARO ALL
Thrust Reverser Lower Bifurcation Interlock Pin Fitting Adjustment TASK 78-31-21-820-802-H01			509	ARO ALL
HINGE BEAM ACCESS DOOR - REMOVAL/INSTALLATION	78-31-22		401	ARO ALL
Hinge Beam Access Door Removal TASK 78-31-22-000-801-H00			401	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Hinge Beam Access Door Installation TASK 78-31-22-400-801-H00			408	ARO ALL
THRUST REVERSER PRECOOLER KISS SEAL - REMOVAL/INSTALLATION	78-31-99		401	ARO ALL
Thrust Reverser Precooler Kiss Seal Removal TASK 78-31-99-000-801-H01			401	ARO ALL
Thrust Reverser Precooler Kiss Seal Installation TASK 78-31-99-400-801-H01			405	ARO ALL
THRUST REVERSER PRECOOLER KISS SEAL - INSPECTION/CHECK	78-31-99		601	ARO ALL
Thrust Reverser Precooler Kiss Seal - Inspection TASK 78-31-99-200-801-H01			601	ARO ALL
THRUST REVERSER DIRECTIONAL CONTROL VALVE - REMOVAL/INSTALLATION	78-34-01		401	ARO ALL
Thrust Reverser Directional Control Valve Removal TASK 78-34-01-000-801-H01			401	ARO ALL
Thrust Reverser Directional Control Valve Installation TASK 78-34-01-400-801-H01			406	ARO ALL
THRUST REVERSER FLOW CONTROL TEES - REMOVAL/INSTALLATION	78-34-02		401	ARO ALL
Thrust Reverser Flow Control Tees Removal TASK 78-34-02-000-801-H01			401	ARO ALL
Thrust Reverser Flow Control Tees Installation TASK 78-34-02-400-801-H01			407	ARO ALL
THRUST REVERSER ISOLATION VALVE - REMOVAL/INSTALLATION	78-34-05		401	ARO ALL
Thrust Reverser Isolation Valve Removal TASK 78-34-05-000-804-H00			401	ARO ALL
Thrust Reverser Isolation Valve Installation TASK 78-34-05-400-801-H01			409	ARO ALL
THRUST REVERSER SYNC LOCK SWITCH - REMOVAL/INSTALLATION	78-34-06		401	ARO ALL
Thrust Reverser Sync Lock Switch Removal TASK 78-34-06-000-801-H01			401	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Thrust Reverser Sync Lock Switch Installation TASK 78-34-06-400-801-H01			408	ARO ALL
THRUST REVERSER SYNC LOCK/MANUAL DRIVE UNIT - REMOVAL/INSTALLATION	78-34-10		401	ARO ALL
Thrust Reverser Sync Lock/Manual Drive Unit Removal TASK 78-34-10-000-801-H01			401	ARO ALL
Thrust Reverser Sync Lock/Manual Drive Unit Installation TASK 78-34-10-400-801-H01			412	ARO ALL
THRUST REVERSER SYNC LOCK VALVE - REMOVAL/INSTALLATION	78-34-11		401	ARO ALL
Thrust Reverser Sync Lock Valve Removal TASK 78-34-11-000-801-H01			401	ARO ALL
Thrust Reverser Sync Lock Valve Installation TASK 78-34-11-400-801-H01			406	ARO ALL
THRUST REVERSER HYDRAULIC ACTUATORS - SERVICING	78-34-12		301	ARO ALL
Thrust Reverser Locking Actuator Servicing TASK 78-34-12-600-801-H01			301	ARO ALL
THRUST REVERSER HYDRAULIC ACTUATORS - REMOVAL/INSTALLATION	78-34-12		401	ARO ALL
Thrust Reverser Lower Actuator Removal TASK 78-34-12-000-801-H01			401	ARO ALL
Thrust Reverser Lower Actuator Installation TASK 78-34-12-400-801-H01			412	ARO ALL
Thrust Reverser Center Actuator Removal TASK 78-34-12-000-802-H01			420	ARO ALL
Thrust Reverser Center Actuator Installation TASK 78-34-12-400-802-H01			430	ARO ALL
Thrust Reverser Upper Actuator Removal TASK 78-34-12-000-803-H01			438	ARO ALL
Thrust Reverser Upper Actuator Installation TASK 78-34-12-400-803-H01			449	ARO ALL

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Thrust Reverser Hydraulic Actuator Flexhoses (Extend, Retract and Sync Lock) Removal TASK 78-34-12-000-804-H01			457	ARO ALL
Thrust Reverser Hydraulic Actuator Flexhoses (Extend, Retract and Sync Lock) Installation TASK 78-34-12-400-804-H01			464	ARO ALL
THRUST REVERSER SYNC SHAFT AND TUBING - REMOVAL/INSTALLATION	78-34-13		401	ARO ALL
Thrust Reverser Sync Shaft and Tubing Removal TASK 78-34-13-000-801-H01			401	ARO ALL
Thrust Reverser Sync Shaft and Tubing Installation TASK 78-34-13-400-801-H01			412	ARO ALL
REVERSE THRUST LEVER INTERLOCK ACTUATOR - REMOVAL/INSTALLATION	78-34-14		401	ARO ALL
Reverse Thrust Lever Interlock Actuator Removal TASK 78-34-14-000-801-H01			401	ARO ALL
Reverse Thrust Lever Interlock Actuator Installation TASK 78-34-14-400-801-H01			405	ARO ALL
THRUST REVERSER TEST ENABLE SWITCH ASSEMBLY- REMOVAL/INSTALLATION	78-34-15		401	ARO ALL
Thrust Reverser Test Enable Switch Assembly Removal TASK 78-34-15-000-801-H01			401	ARO ALL
Thrust Reverser Test Enable Switch Assembly Installation TASK 78-34-15-400-801-H01			404	ARO ALL
THRUST REVERSER SYNC LOCK SOLENOID VALVE - REMOVAL/INSTALLATION	78-34-16		401	ARO ALL
Thrust Reverser Sync Lock Solenoid Valve Removal TASK 78-34-16-000-801-H01			401	ARO ALL
Thrust Reverser Sync Lock Solenoid Valve Installation TASK 78-34-16-400-801-H01			404	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
THRUST REVERSER DIRECTIONAL CONTROL SOLENOID VALVE - REMOVAL/INSTALLATION	78-34-17		401	ARO ALL
Thrust Reverser Directional Control Solenoid Valve Removal TASK 78-34-17-000-801-H01			401	ARO ALL
Thrust Reverser Directional Control Solenoid Valve Installation TASK 78-34-17-400-801-H01			404	ARO ALL
THRUST REVERSER ISOLATION SOLENOID VALVE - REMOVAL/INSTALLATION	78-34-18		401	ARO ALL
Thrust Reverser Isolation Solenoid Valve Removal TASK 78-34-18-000-801-H01			401	ARO ALL
Thrust Reverser Isolation Solenoid Valve Installation TASK 78-34-18-400-801-H01			404	ARO ALL
THRUST REVERSER ACTUATOR LOCK PROXIMITY SENSOR - REMOVAL/INSTALLATION	78-36-01		401	ARO ALL
Thrust Reverser Actuator Lock Proximity Sensor Removal TASK 78-36-01-000-801-H01			401	ARO ALL
Thrust Reverser Actuator Lock Proximity Sensor Installation TASK 78-36-01-400-801-H01			404	ARO ALL
THRUST REVERSER HYDRAULIC PRESSURE SWITCH - REMOVAL/INSTALLATION	78-36-02		401	ARO ALL
Thrust Reverser Hydraulic Pressure Switch Removal TASK 78-36-02-000-801-H01			401	ARO ALL
Thrust Reverser Hydraulic Pressure Switch Installation TASK 78-36-02-400-801-H01			404	ARO ALL
THRUST REVERSER POSITION TRANSDUCER (RVDT) - REMOVAL/INSTALLATION	78-36-03		401	ARO ALL
Thrust Reverser Position Transducer (RVDT) Removal TASK 78-36-03-000-801-H01			401	ARO ALL

78-CONTENTS

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 78
EXHAUST

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Thrust Reverser Position Transducer (RVDT) Installation TASK 78-36-03-400-801-H01			406	ARO ALL
THRUST REVERSER SYNC LOCK PROXIMITY SENSOR - REMOVAL/INSTALLATION	78-36-04		401	ARO ALL
Thrust Reverser Sync Lock Proximity Sensor Removal TASK 78-36-04-000-801-H01			401	ARO ALL
Thrust Reverser Sync Lock Proximity Sensor Installation TASK 78-36-04-400-801-H01			405	ARO ALL
THRUST REVERSER DIRECTIONAL CONTROL VALVE PROXIMITY SENSOR - REMOVAL/INSTALLATION	78-36-05		401	ARO ALL
Thrust Reverser Directional Control Valve Proximity Sensor Removal TASK 78-36-05-000-801-H01			401	ARO ALL
Thrust Reverser Directional Control Valve Proximity Sensor Installation TASK 78-36-05-400-801-H01			404	ARO ALL

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER EXHAUST - INSPECTION/CHECK

1. General

A. This procedure has these tasks:

(1) An inspection of the thrust reverser hinges.

(2) A check of the paint appearance on the thrust reverser cowl.

TASK 78-00-00-210-801-H01

2. Thrust Reverser Hinge Inspection

(Figure 601)

A. General

(1) You must open the thrust reverser to get access the hinges.

(2) This inspection is for the structural hinges. There are four thrust reverser hinges. The #2 and #3 hinges are the structural hinges.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-600	Mirror - Inspection

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
426AR	Right Thrust Reverser, Right Engine

F. Prepare for the Inspection

SUBTASK 78-00-00-010-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Procedure

SUBTASK 78-00-00-212-001-H01

(1) From under the thrust reverser, look between the strut and the upper bifurcation of the thrust reverser at the #2 and #3 hinges (Figure 601).

NOTE: The #2 and #3 hinges are the large structural hinges near the center of the thrust reverser.

(a) Look for obvious signs of damage with a inspection mirror, STD-600.

1) Look for material on the hinge that is missing.

2) Look for cracks in the hinge.

3) Make sure that the nut on the bolt is not loose.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-00-00-410-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

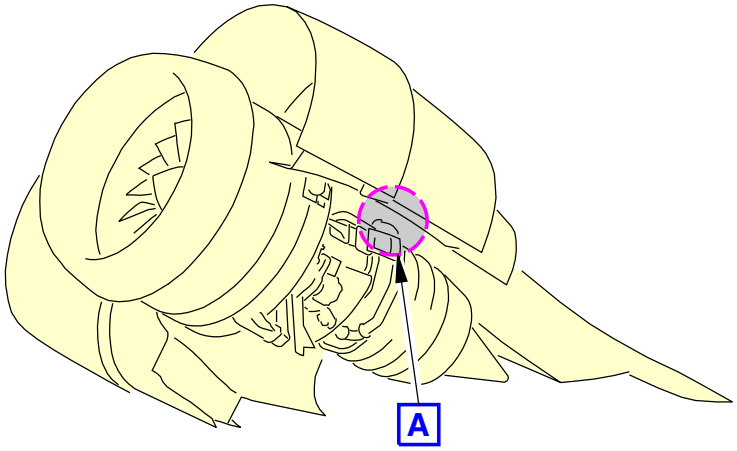
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

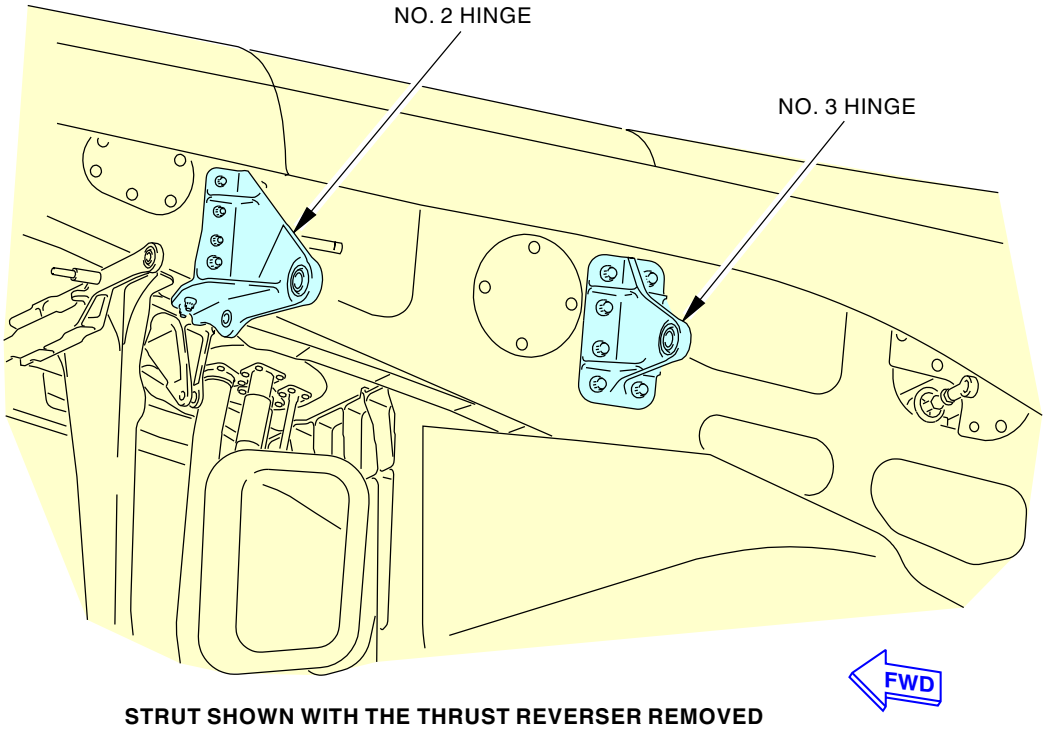
(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





STRUT SHOWN WITH THE THRUST REVERSER REMOVED

A

NOTE:

THIS INSPECTION IS FOR THE STRUCTURAL HINGES.
THE NO. 2 AND 3 HINGES ARE STRUCTURAL.

M07220 S0004286192_V2

Thrust Reverser Hinge Inspection
Figure 601/78-00-00-990-805-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-00-00-210-802-H01

3. Paint Appearance on the Thrust Reverser Cowl

A. General

(1) This task gives the procedure to do a check of the paint appearance on the thrust reverser cowl.

B. References

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-01-300-805-H01	Enamel Paint Touch-up for Cracks in the Paint on the Thrust Reverser Cowl (P/B 801)

C. Consumable Materials

Reference	Description	Specification
A00436	Sealant - Fuel Tank	BMS5-45 (Supersedes BMS5-26)

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Prepare for the Check

SUBTASK 78-00-00-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

F. Procedure

SUBTASK 78-00-00-211-001-H01

(1) Do a check for cracks in the paint on the thrust reverser cowl.

(a) Cracks in the paint on the thrust reverser cowl are acceptable if there is no damage to the composite structure under the paint.

1) If it is necessary, do a visual check and use the Non-Destructive Test (NDT) Manual, Part 1-General, Resonance Frequency, Tap Test Inspection of Honeycomb Sandwich Structure to find damage to the composite structure.

NOTE: The tap test instructions in the NDT Part 1 51-05-01 gives the tap test tool specification, reference standards to calibrate the sound you hear for different kinds of damage, and general steps for the examination and analysis of the tap test results.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Cracks in the paint that covers the soft and flexible sealant on the thrust reverser cowl are acceptable.

NOTE: On the thrust reverser sleeve, approximately 19 inches (483 millimeters) from the aft edge of the sleeve, the outer cowl panel meets the inner acoustic panel. Use sealant, A00436 to form a aerodynamic seal between the panels. The sealant is covered with a surfacer to smooth the sealant surface and a top coat of paint. The surfacer and paint are brittle materials. The sealant will move and flex over time and make a crack in the surfacer and through the top coat of paint.

(c) If it is necessary, apply a gloss enamel coating to the cracks in the paint surface.

1) Do this task: Enamel Paint Touch-up for Cracks in the Paint on the Thrust Reverser Cowl, TASK 78-31-01-300-805-H01.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-00-00-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

EXHAUST - DDG MAINTENANCE PROCEDURES

1. General

A. This procedure has the maintenance tasks for the Master Minimum Equipment List (MMEL) maintenance requirements as shown in the Dispatch Deviations Guide (DDG). These tasks prepare the airplane for flight with certain systems/components inoperative.

B. This procedure also has the tasks that put the airplane back to its usual condition.

C. These are the tasks for the components in the exhaust system:

(1) DDG 78-31-1 Preparation - Thrust Reversers Inoperative

(2) DDG 78-31-1 Restoration - Thrust Reversers Inoperative

TASK 78-00-00-040-801-H01

2. MMEL 78-31-1 (DDG) Preparation - Thrust Reversers Inoperative

(Figure 901/Figure 902/Figure 903/Figure 904)

A. General

(1) This task gives the maintenance steps which prepare the airplane for flight with the Thrust Reversers Inoperative.

(2) EICAS Status Messages:

(a) ENG REVERSER L

(b) ENG REVERSER R

(3) These are the conditions for this task:

(a) One reverser may be inoperative provided the inoperative reverser is secured in the forward thrust position:

1) You must do the steps that follow to secure the inoperative thrust reverser in the forward thrust position:

a) Open the circuit breaker and attach a collar.

NOTE: When the circuit breaker is opened for flight, the ENG REV LIMITED (Advisory and Status) message will show on EICAS.

b) Install the lock pin without the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the shutoff valve spool on the isolation valve and safety with the hitch pin.

NOTE: Keep the ground maintenance lock pin with the red streamer, for the bypass valve, in the pin container.

c) Install the deactivation pin (one in each thrust reverser sleeve) in the left and right thrust reverser sleeves.

d) Make sure that the sync lock and a minimum of one of the actuator locks on each thrust reverser sleeve have the manual unlock handles in the locked position with hydraulic power applied.

e) Make sure that the indication of the thrust reverser sleeves is in the limits.

NOTE: If the indication is not in the limits, disconnect and put a cap on the electrical connector for the applicable RVDT. Only one RVDT is permitted to be deactivated.

f) Attach an INOP tag on the reverse thrust lever.

(4) The part number for the thrust reverser deactivation pin is 315W3702-2.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
31-61-00-800-804	Showing a Maintenance Page (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Consumable Materials

Reference	Description	Specification
G00002	Tape - Lacing And Tying (Polyester)	A-A-52081

E. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

G. Procedure

SUBTASK 78-00-00-860-001-H01

(1) Make sure the applicable FUEL CONTROL switch is in the CUTOFF position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-00-00-860-002-H01

(2) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

SUBTASK 78-00-00-860-003-H01

(3) Make sure the reverse thrust levers are in the fully forward and down position and attach DO-NOT-OPERATE tags.

SUBTASK 78-00-00-865-001-H01

(4) Open these circuit breakers and install safety locks:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

NOTE: When these circuit breakers are opened for flight, the ENG REV LIMITED (Advisory and Status) message will shown on EICAS.

SUBTASK 78-00-00-010-002-H01

(5) Open the strut access door to the applicable isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-00-00-040-002-H01

(6) Install the lock pin without the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the shutoff valve spool on the isolation valve (Figure 901):

NOTE: Keep the ground maintenance lock pin with the red streamer, for the bypass valve, in the pin container.

(a) Push the shutoff valve spool in.

(b) Install the lock pin through the hole in the shutoff valve body to hold the shutoff valve spool in.

(c) Install the hitch pin through the end of the lock pin.

SUBTASK 78-00-00-866-001-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(7) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-00-00-040-003-H01

(8) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-00-00-010-003-H01

(9) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-00-00-980-001-H01

(10) If it is necessary, do these steps to manually retract the thrust reverser sleeve to the fully retracted position :

(a) Install the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the bypass valve handle and the clevis on the isolation valve.

1) Turn the bypass valve handle to align the hole with the clevis.

2) Install the lock pin through the clevis and bypass valve handle.

3) Install the hitch pin through the end of the lock pin.

(b) Make sure the red streamer shows out of the access door.

(c) Install a 3/8-inch square drive into the sync lock/manual drive unit.

NOTE: It is OK to use a 3/8 inch pneumatic wrench (nut runner).

(d) Push-in and continue to push-in the 3/8-inch square drive while you turn the manual drive to retract the thrust reverser sleeve.

NOTE: You must push-in the 3/8-inch square drive to engage the pinion gear with the bevel gear in the sync lock while you turn the drive.

NOTE: The pinion gear in the manual drive unit is spring loaded to disengage from an internal sync lock bevel gear.

NOTE: The clutch in the manual drive unit has a torque limit of 125-130 inch-pounds (14.1-14.7 Newton-meters) to prevent damage to the sync shaft system.

(e) Remove the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, from the bypass valve handle and clevis on the isolation valve:

1) Remove the hitch pin from the end of the lock pin.

2) Remove the lock pin from the clevis and bypass valve handle.

3) Make sure the bypass valve handle moves out to the usual position.

(f) Store the lock pin with the red streamer in the pin container.

SUBTASK 78-00-00-410-002-H01

(11) Close the strut access door to the isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-00-00-040-004-H01

(12) Install the deactivation pin in the left and right thrust reverser sleeves as follows (Figure 903):

NOTE: You must install a deactivation pin in each of the two thrust reverser sleeves on the applicable engine.

(a) Remove the deactivation pin from the stowage bracket on the torque box.

(b) Install the deactivation pin in the outer surface of the thrust reverser sleeve (near the center actuator):

1) Make sure that the deactivation pin is installed through the thrust reverser sleeve and into the torque box structure.

2) Tighten the deactivation pin to 135-165 pound-inches (15.3-18.6 newton-meters).

SUBTASK 78-00-00-863-001-H01

(13) For the applicable (left or right) hydraulic system and reservoir, do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-00-00-860-004-H01

(14) Make sure that the manual unlock handle on the sync lock on each thrust reverser sleeve is in the locked position (Figure 902).

SUBTASK 78-00-00-860-005-H01

(15) Make sure that a minimum of one of the manual unlock handles on the locking actuators on each thrust reverser sleeve is in the locked position.

SUBTASK 78-00-00-864-001-H01

(16) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-00-00-860-006-H01

(17) Make sure that the indication of the thrust reverser sleeve position is in the limits:

NOTE: If the indication is not in the limits, disconnect and put a cap on the electrical connectors for the applicable RVDT. Only one RVDT is permitted to be deactivated.

(a) Set the applicable EEC MAINT L (R) ENG POWER switch on the Overhead Maintenance Panel, P61, to the TEST position.

(b) Show the 71 EPCS maintenance page 1.

1) Do this task: Showing a Maintenance Page, TASK 31-61-00-800-804.

(c) If the thrust reverser (T/R L and T/R R) sleeve values for channel A and B are not between -07.0 and +07.0 (-7 and +7 percent), deactivate the applicable rotary variable differential transducer (RVDT) :

NOTE: Only one RVDT can be deactivated.

1) Set the applicable EEC MAINT L (R) ENG POWER switch on the Overhead Maintenance Panel, P61, to the NORM position.

2) For the applicable thrust reverser sleeve, disconnect the electrical connector from the RVDT (Figure 904):

a) For the left sleeve, disconnect the electrical connector DM78002 from the RVDT (M78002).

b) For the right sleeve, disconnect the electrical connector DM78003 from the RVDT (M78003).

3) Install a conductive protective cap on the electrical connector.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

4) Attach the electrical connector to the adjacent structure on the thrust reverser with wire tie tape, G00002.

5) Install a protection cap on the RVDT electrical receptacle.

6) Do a functional test as follows:

a) Set the applicable EEC MAINT L (R) ENG POWER switch on the Overhead Maintenance Panel, P61, to the TEST position.

b) Show the 71 EPCS maintenance page on EICAS display.

<1> Do this task: Showing a Maintenance Page, TASK 31-61-00-800-804.

c) Make sure the disabled thrust reverser sleeve position values (T/R L or T/R R) are blank.

d) Make sure the remaining thrust reverser (T/R L or T/R R) sleeve position values for channel A and B are between -07.0 and +07.0 (-7 and +7 percent).

e) Continue with the procedure.

(d) If the thrust reverser (T/R L and T/R R) sleeve values for channel A and B are in the limits, continue with the procedure.

(e) Set the applicable EEC MAINT L (R) ENG POWER switch on the Overhead Maintenance Panel, P61, to the NORM position.

SUBTASK 78-00-00-410-003-H01

(18) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-00-00-440-002-H01

(19) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-00-00-860-007-H01

(20) Remove the DO-NOT-OPERATE tags from the forward thrust levers.

SUBTASK 78-00-00-860-008-H01

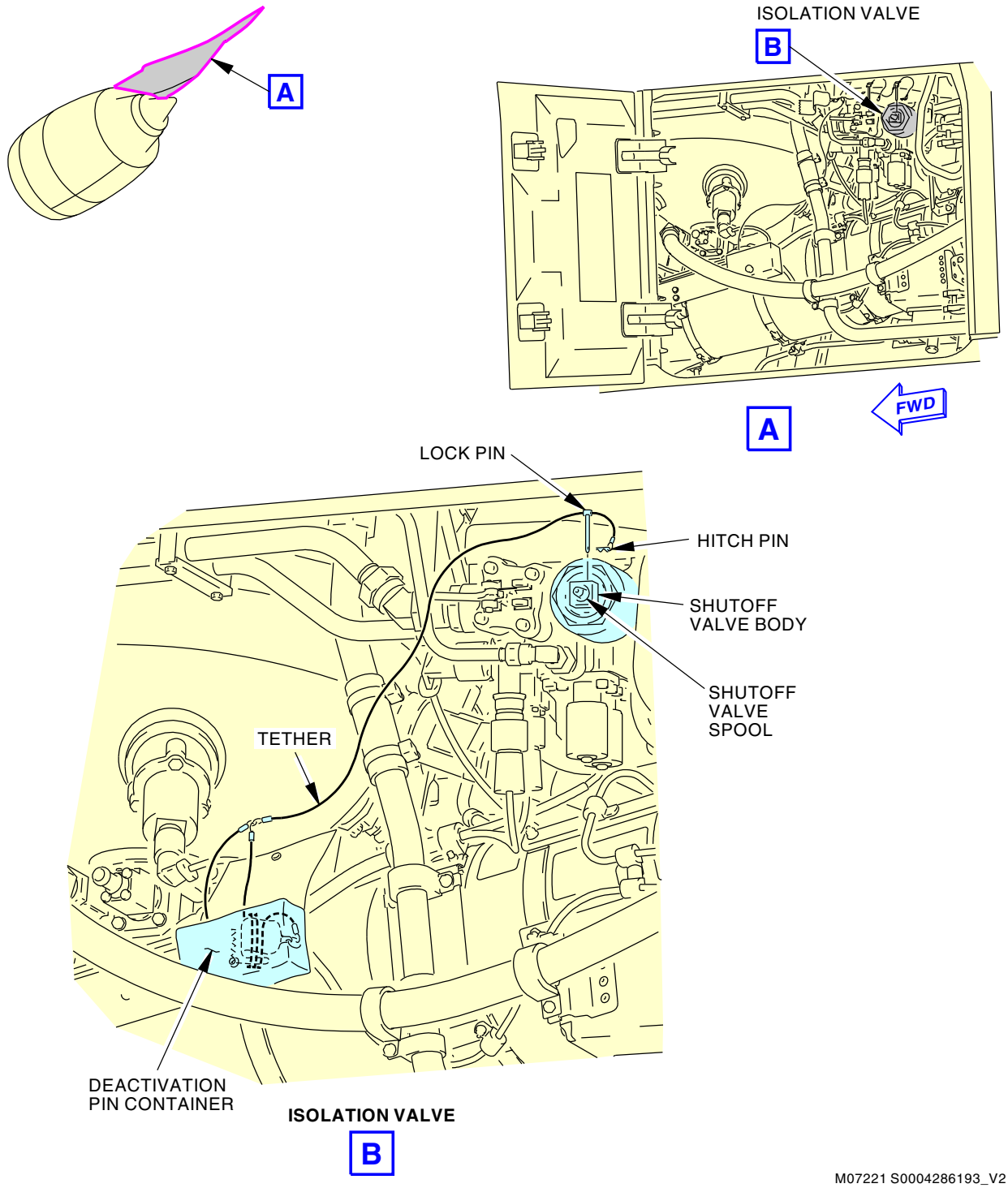
(21) Remove the DO-NOT-OPERATE tags from the reverse thrust levers.

SUBTASK 78-00-00-860-009-H01

(22) Attach an INOP tag on the applicable reverse thrust lever.

END OF TASK

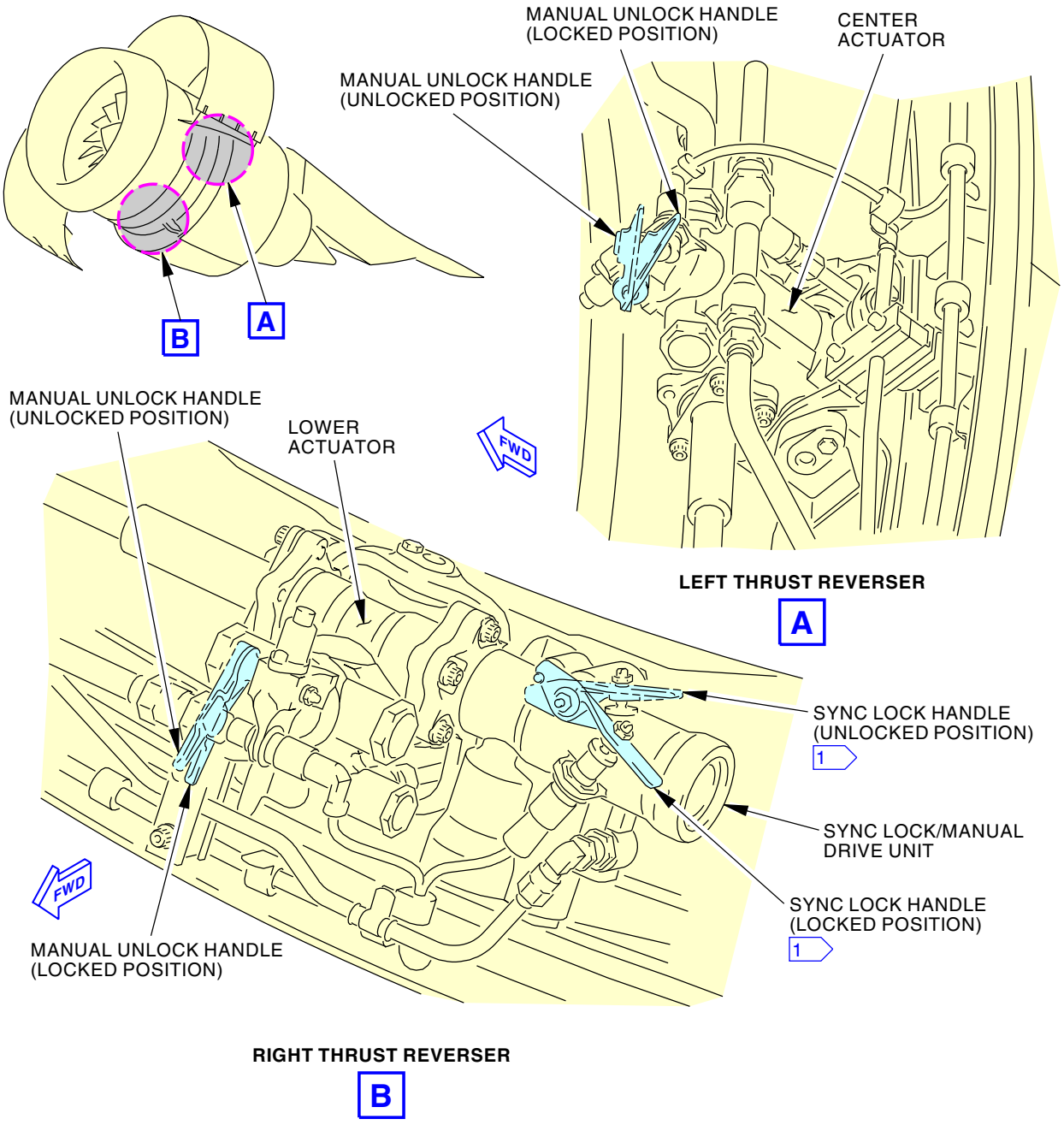
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07221 S0004286193_V2

Thrust Reverser Isolation Valve Deactivation for Flight Dispatch
Figure 901/78-00-00-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

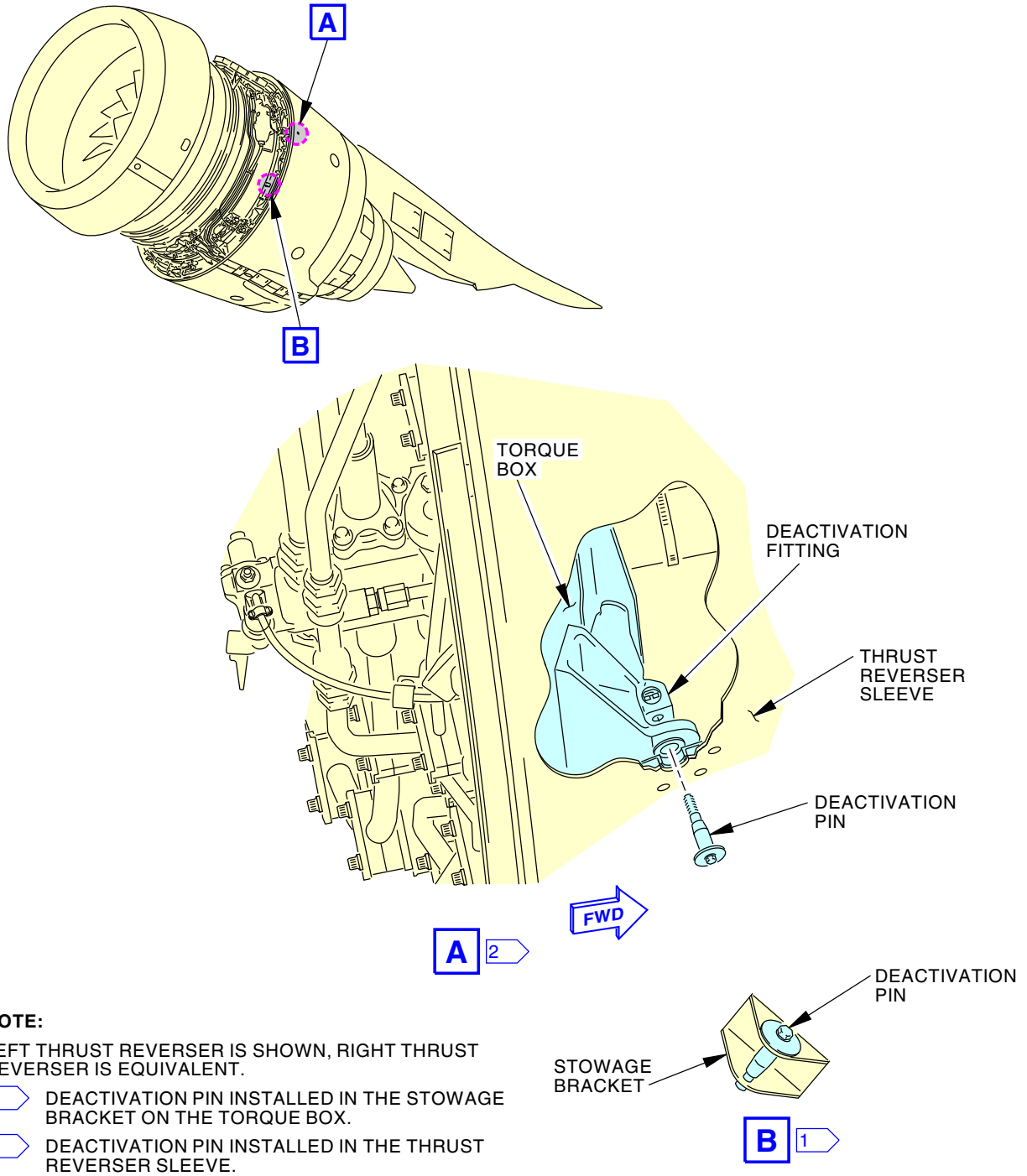
THE LEFT AND RIGHT THRUST REVERSERS ARE THE SAME EXCEPT AS NOTED.

1 THE MANUAL UNLOCK HANDLE ON THE LEFT THRUST REVERSER IS BETWEEN THE SYNC LOCK AND THE THRUST REVERSER TORQUE BOX.

M07222 S0004286194_V3

Thrust Reverser Locks
Figure 902/78-00-00-990-810-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

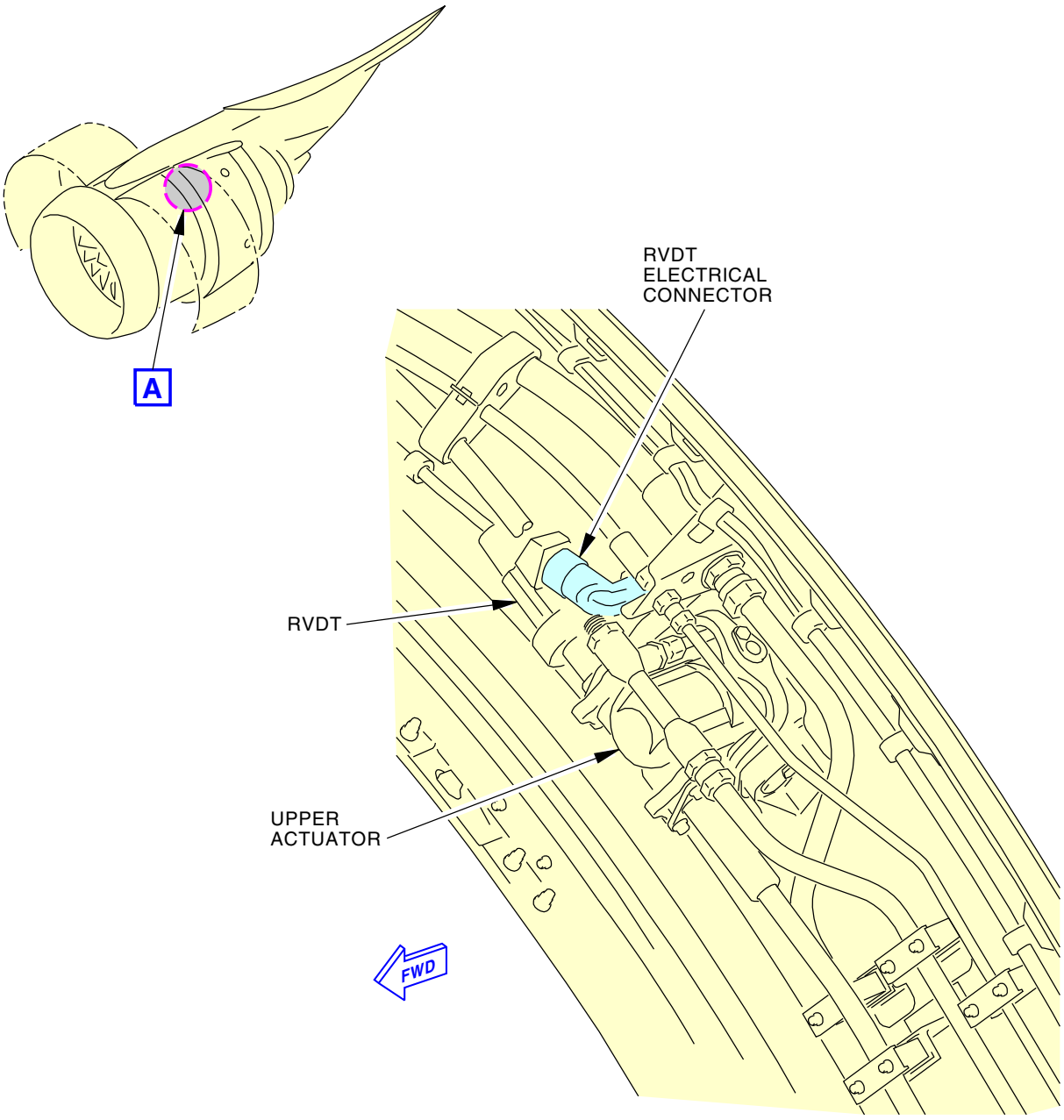
LEFT THRUST REVERSER IS SHOWN, RIGHT THRUST REVERSER IS EQUIVALENT.

1. DEACTIVATION PIN INSTALLED IN THE STOWAGE BRACKET ON THE TORQUE BOX.
2. DEACTIVATION PIN INSTALLED IN THE THRUST REVERSER SLEEVE.

M07223 S0004286195_V2

Thrust Reverser Sleeve Deactivation Pin
Figure 903/78-00-00-990-807-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Position Transducer (RVDT) Connector
Figure 904/78-00-00-990-808-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-00-00-440-801-H01

3. MMEL 78-31-1 (DDG) Restoration - Thrust Reversers Inoperative

(Figure 901/Figure 903/Figure 904)

A. General

(1) This task puts the airplane back to its usual condition after operation with the Thrust Reversers Inoperative.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
31-61-00-800-804	Showing a Maintenance Page (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-36-03-000-801-H01	Thrust Reverser Position Transducer (RVDT) Removal (P/B 401)
78-36-03-400-801-H01	Thrust Reverser Position Transducer (RVDT) Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-00-00-010-004-H01

(1) Open the access door to the applicable isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-00-00-440-003-H01

(2) Do these steps to activate the isolation valve (Figure 901):

(a) Remove the lock pin without the red streamer, from the thrust reverser isolation valve lock, SPL-2591, from the shutoff valve spool on the isolation valve:

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the shutoff valve body.

3) Make sure the shutoff valve spool moves out to the usual position.

(b) Store the two lock pins and red streamer in the pin container.

SUBTASK 78-00-00-410-004-H01

(3) Close the access door to the isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-00-00-866-002-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(4) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-00-00-040-005-H01

(5) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-00-00-010-005-H01

(6) For the applicable fan cowl panels, do this task: Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Open the applicable access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-00-00-440-004-H01

(7) Remove the deactivation pins from the left and right thrust reverser sleeves as follows (Figure 903):

NOTE: You must remove the deactivation pin from each of the two thrust reverser sleeves on the applicable engine.

(a) Remove the deactivation pin from the outer surface of the thrust reverser sleeve.

(b) Install the deactivation pin in the stowage bracket on the torque box.

1) Tighten the deactivation pin to 135-165 pound-inches (15.3-18.6 newton-meters).

SUBTASK 78-00-00-860-010-H01

(8) If the deactivation of the RVDT was necessary, do these steps for the activation of the RVDT (Figure 904):

(a) Make sure the applicable EEC MAINT L (R) ENG POWER switch on the Overhead Maintenance Panel, P61, is set to the NORM position.

(b) Remove the tape that holds the electrical connector to the adjacent structure.

(c) Remove the protection caps from the wire bundle electrical connector and receptacle on the RVDT.

(d) For the applicable thrust reverser sleeve, connect the electrical connector to the RVDT:

1) For the left sleeve, connect the electrical connector DM78002 to the RVDT (M78002).

2) For the right sleeve, connect the electrical connector DM78003 to the RVDT (M78003).

(e) Do a functional test to make sure the RVDT is adjusted correctly:

1) Set the applicable EEC MAINT L (R) ENG POWER switch on the Overhead Maintenance Panel, P61, to the TEST position.

2) Look at the 71 EPCS maintenance page 1.

a) Do this task: Showing a Maintenance Page, TASK 31-61-00-800-804.

3) Make sure the thrust reverser (T/R L and T/R R) sleeve values shown for channel A and B are between -07.0 and +07.0 (-7 and +7 percent).

4) If the indications are not in the limits, adjust the RVDT:

a) Remove the RVDT from the upper actuator.

<1> Do this task: Thrust Reverser Position Transducer (RVDT) Removal, TASK 78-36-03-000-801-H01.

b) Turn the shaft on the gearhead until the thrust reverser sleeve values are in the limits.

c) Install the RVDT to the upper actuator.

<1> Do this task: Thrust Reverser Position Transducer (RVDT) Installation, TASK 78-36-03-400-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

5) Set the applicable EEC MAINT L (R) ENG POWER switch on the Overhead Maintenance Panel, P61, to the NORM position.

SUBTASK 78-00-00-410-005-H01

(9) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close the applicable access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-00-00-440-005-H01

(10) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-00-00-865-002-H01

(11) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-00-00-860-011-H01

(12) Remove the INOP tag from the reverse thrust lever.

SUBTASK 78-00-00-741-002-H01

(13) Go to the MAT and find the EICAS status message L ENG REVERSER or R ENG REVERSER.

(a) Find the fault code and the correlated maintenance message numbers on the MAT.

SUBTASK 78-00-00-741-001-H01

(14) Go to the Fault Code Index in the FIM and find the fault code (the first two digits of the fault code are the FIM chapter).

(a) For each correlated maintenance message, find the maintenance message number to the right side of the fault code.

(b) Find the task number on the same line as the maintenance message number.

SUBTASK 78-00-00-741-003-H01

(15) Go to the task in the FIM and do the steps in the task to correct the problem.

SUBTASK 78-00-00-741-004-H01

(16) After repair of the problem:

(a) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

1) You must stop for 20 seconds with the thrust reverser extended (deployed) for the MAT to show ACTIVE for the maintenance message.

a) If the MAT shows ACTIVE for the maintenance message (with the thrust reverser extended (deployed)), then continue with the Fault Isolation Procedure.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) If the MAT shows NOT ACTIVE for the maintenance message, then you have corrected the fault.

<1> If the MAT shows LATCHED for the EICAS message, then you must erase it from the EICAS status display.

<a> To erase it, do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TURBINE EXHAUST SYSTEM - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has three tasks:

(1) A visual inspection of the exhaust system

(2) A detailed inspection of the exhaust system

(3) A visual inspection of the turbine fireseal.

TASK 78-11-00-210-801-H01

2. Turbine Exhaust System Visual Inspection

(Figure 601)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task visually examines the primary nozzle, forward and aft centerbody, and the center vent tube extension.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Turbine Exhaust System Visual Inspection

SUBTASK 78-11-00-010-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-11-00-210-001-H01

(2) Visually examine these components of the turbine exhaust system for cracks, dents, loose components, or other obvious signs of damage (Figure 601):

(a) Primary Nozzle

(b) Forward Centerbody

(c) Aft Centerbody.

(d) If you find damage, do a detailed inspection of the turbine exhaust system.

1) Do this task: Turbine Exhaust System Detailed Inspection, TASK 78-11-00-220-801-H01.

SUBTASK 78-11-00-410-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

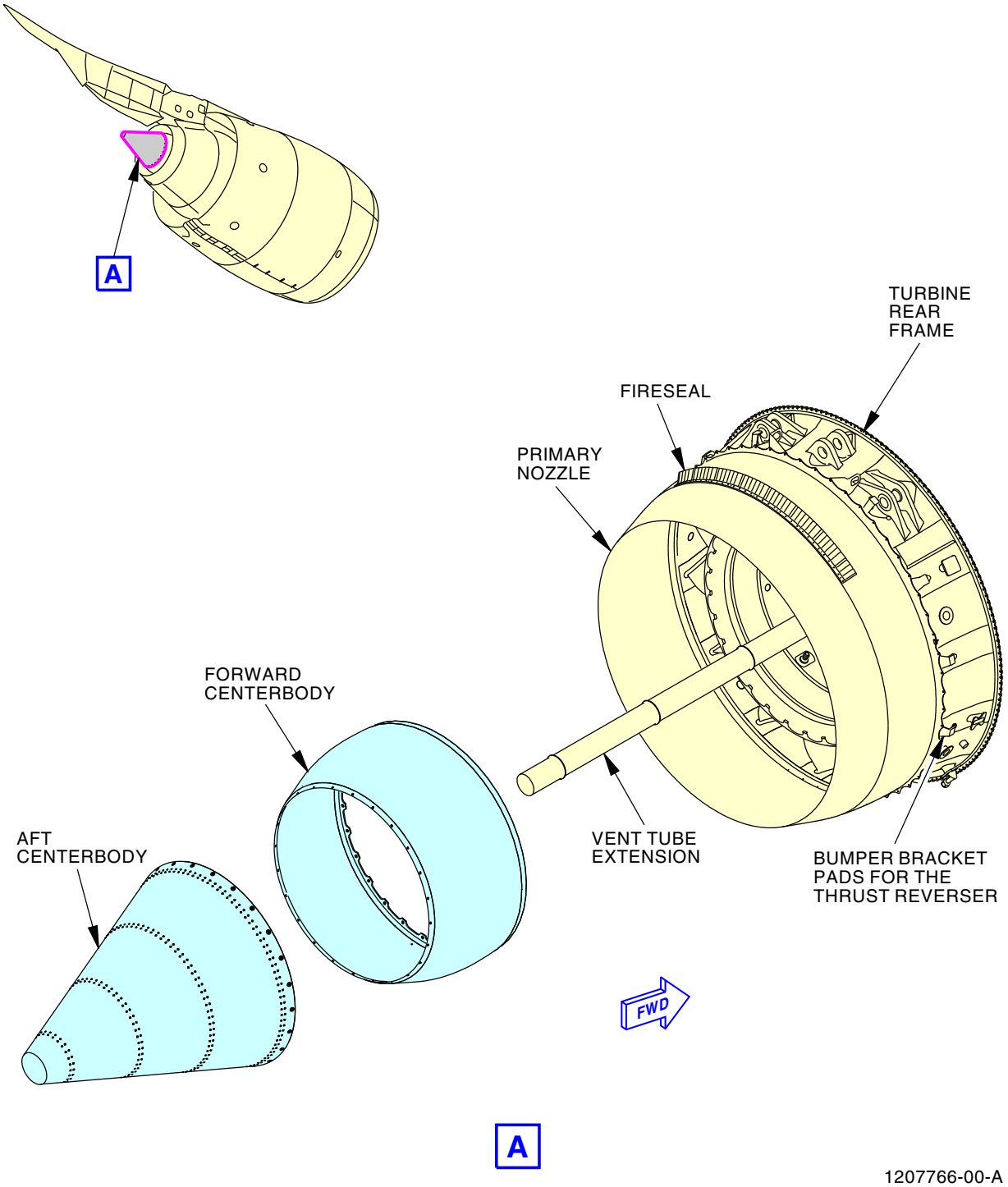
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Turbine Exhaust System Inspection
Figure 601/78-11-00-990-802-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-11-00-220-801-H01

3. Turbine Exhaust System Detailed Inspection

(Figure 602)

A. General

(1) This procedure examines the primary nozzle, the forward and aft centerbody, and the center vent tube extension.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-11-01-000-801-H01	Primary Nozzle Removal (P/B 401)
78-11-01-400-801-H01	Primary Nozzle Installation (P/B 401)
78-11-02-000-801-H01	Aft Centerbody Removal (P/B 401)
78-11-02-000-802-H01	Forward Centerbody Removal (P/B 401)
78-11-02-400-801-H01	Aft Centerbody Installation (P/B 401)
78-11-02-400-802-H01	Forward Centerbody Installation (P/B 401)
78-11-03-000-801-H01	Center Vent Tube Extension Removal (P/B 401)
78-11-03-400-801-H01	Center Vent Tube Extension Installation (P/B 401)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Turbine Exhaust System Detailed Inspection

SUBTASK 78-11-00-010-002-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-11-00-212-004-H01

(2) Examine the primary nozzle (Figure 602):

(a) Cracks

1) Replace the primary nozzle.

a) Do this task: Primary Nozzle Removal, TASK 78-11-01-000-801-H01.

b) Do this task: Primary Nozzle Installation, TASK 78-11-01-400-801-H01.

(b) Missing rivets

1) Replace the primary nozzle.

a) Do this task: Primary Nozzle Removal, TASK 78-11-01-000-801-H01.

b) Do this task: Primary Nozzle Installation, TASK 78-11-01-400-801-H01.

(c) Dents

1) There is no limit to the number of dents that are less than 0.25 inch (6.4 mm) in depth.

2) For dents that are more than 0.25 inch (6.4 mm) in depth, make the contour smooth.

(d) Discoloration

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) There is no limit to the quantity of discoloration.

(e) Security of the primary nozzle

1) Tighten the nuts if they are loose.

a) Do this task: Primary Nozzle Installation, TASK 78-11-01-400-801-H01.

(f) Missing material or other obvious signs of damage to the turbine fireseal.

1) No missing material or other obvious damage is permitted.

(g) Gaps between the fan side and core side skins at the trailing edge location.

1) Any amount permitted.

(h) Buckling

1) Replace the primary nozzle.

a) Do this task: Primary Nozzle Removal, TASK 78-11-01-000-801-H01

b) Do this task: Primary Nozzle Installation, TASK 78-11-01-400-801-H01

(i) Wear on the outer skin:

1) There is no limit to the amount of worn area that is less than 0.005 in. (0.127 mm) in depth with no high metal.

SUBTASK 78-11-00-212-006-H01

(3) Examine the aft centerbody:

(a) Cracks

1) Replace the aft centerbody.

a) Do this task: Aft Centerbody Removal, TASK 78-11-02-000-801-H01.

b) Do this task: Aft Centerbody Installation, TASK 78-11-02-400-801-H01.

(b) Missing rivets

1) Replace the aft centerbody.

a) Do this task: Aft Centerbody Removal, TASK 78-11-02-000-801-H01.

b) Do this task: Aft Centerbody Installation, TASK 78-11-02-400-801-H01.

(c) Dents

1) There is no limit to the number of dents that are less than 0.25 inch (6.4 mm) in depth.

2) For dents that are more than 0.25 inch (6.4 mm) in depth, make the contour smooth.

(d) Discoloration

1) There is no limit to the amount of discoloration.

(e) Security of the aft centerbody

1) Tighten the bolts if they are loose.

a) Do this task: Aft Centerbody Installation, TASK 78-11-02-400-801-H01

SUBTASK 78-11-00-212-007-H01

(4) Examine the center vent tube extension:

(a) Remove the forward and aft centerbody.

1) Do this task: Aft Centerbody Removal, TASK 78-11-02-000-801-H01.

2) Do this task: Forward Centerbody Removal, TASK 78-11-02-000-802-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Wear at the aft centerbody interface

1) Replace the center vent tube extension if it is worn through.

a) Do this task: Center Vent Tube Extension Removal, TASK 78-11-03-000-801-H01.

b) Do this task: Center Vent Tube Extension Installation, TASK 78-11-03-400-801-H01.

(c) Cracks at the mounting bolt holes

1) Replace the center vent tube extension.

a) Do this task: Center Vent Tube Extension Removal, TASK 78-11-03-000-801-H01.

b) Do this task: Center Vent Tube Extension Installation, TASK 78-11-03-400-801-H01.

(d) Cracks in all other areas of the center vent tube extension

1) Replace the center vent tube extension.

a) Do this task: Center Vent Tube Extension Removal, TASK 78-11-03-000-801-H01.

b) Do this task: Center Vent Tube Extension Installation, TASK 78-11-03-400-801-H01.

(e) Security of the center vent tube extension

1) Tighten the bolts if they are loose.

a) Do this task: Center Vent Tube Extension Installation, TASK 78-11-03-400-801-H01.

SUBTASK 78-11-00-212-008-H01

(5) Examine the forward centerbody:

(a) Make sure that the aft centerbody is removed.

1) Do this task: Aft Centerbody Removal, TASK 78-11-02-000-801-H01.

(b) Cracks in the mounting flange

1) Replace the forward centerbody.

a) Do this task: Forward Centerbody Removal, TASK 78-11-02-000-802-H01.

b) Do this task: Forward Centerbody Installation, TASK 78-11-02-400-802-H01.

(c) Cracks or tears in all other areas of the forward centerbody:

1) Cracks or tears that are less than 1.0 inch (25.4 mm) are permitted.

2) Stop drill the ends of all cracks or tears that are in the limits with a 0.078 inch (2.0 mm) diameter drill.

3) The distance between the cracks and tears must be a minimum of four times the length of the longest crack or tear.

4) The total length of all cracks and tears must be no more than 6.0 inches (152.4 mm).

5) If the cracks are more than the specified limits, replace the forward centerbody.

a) Do this task: Forward Centerbody Removal, TASK 78-11-02-000-802-H01.

b) Do this task: Forward Centerbody Installation, TASK 78-11-02-400-802-H01.

(d) Dents

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) There is no limit to the number of dents that are less than 0.25 inch (6.4 mm) in depth.

2) For dents that are more than 0.25 inch (6.4 mm) in depth, make the contour smooth.

(e) Discoloration

1) There is no limit to the quantity of discoloration.

(f) Security of the forward centerbody

1) Tighten the bolts if they are loose.

a) Do this task: Forward Centerbody Installation, TASK 78-11-02-400-802-H01.

(g) Install the forward and aft centerbody.

1) Do this task: Forward Centerbody Installation, TASK 78-11-02-400-802-H01.

2) Do this task: Aft Centerbody Installation, TASK 78-11-02-400-801-H01.

SUBTASK 78-11-00-212-009-H01

(6) Examine the bumper bracket pads for the thrust reverser:

(a) Surface wear on the pads

1) The minimum permitted thickness is 0.080 inch (2.03 mm).

2) 25% of the surface area is permitted to be missing.

SUBTASK 78-11-00-410-002-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(7) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

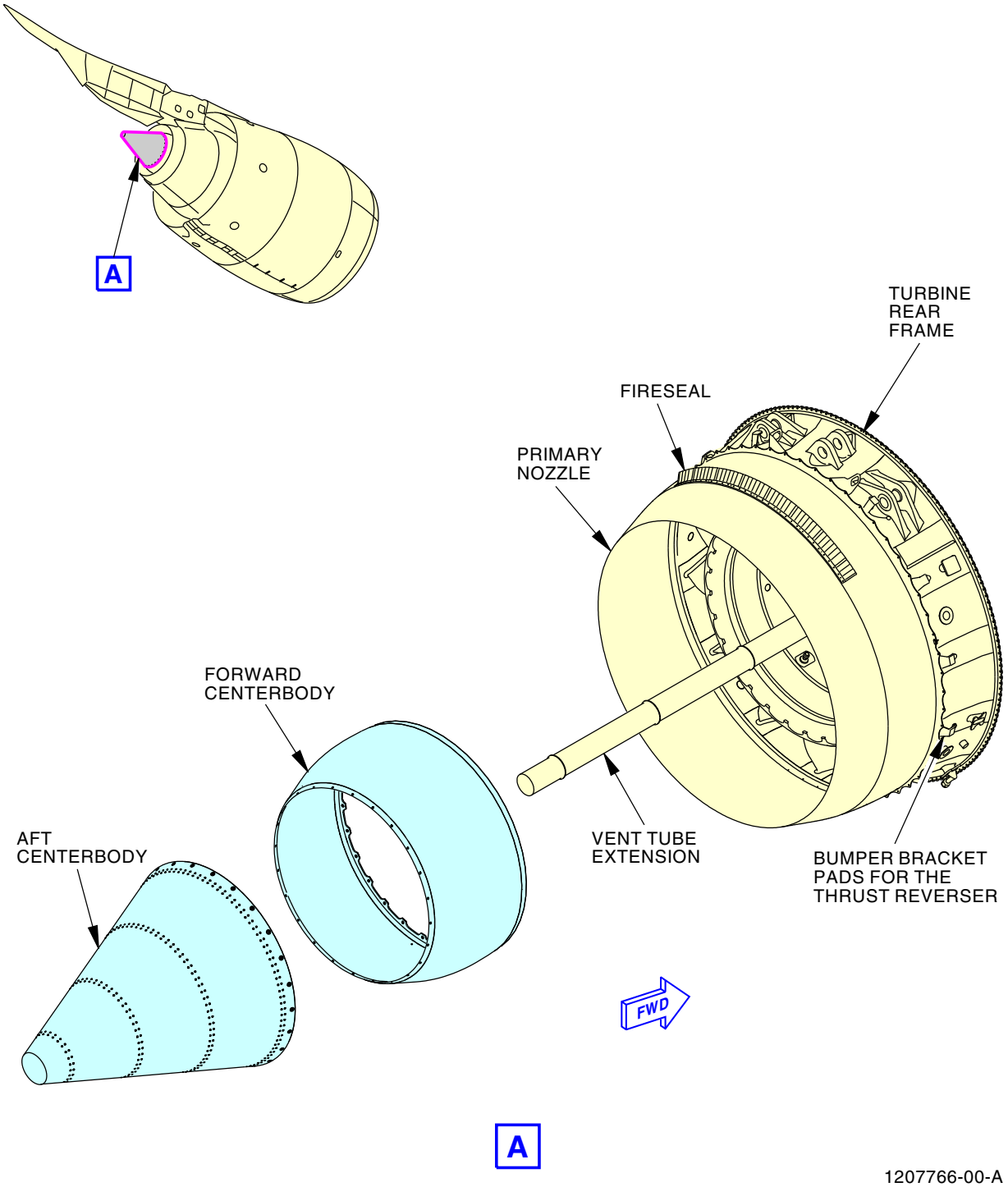
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Turbine Exhaust System Inspection
Figure 602/78-11-00-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-11-00-210-802-H01

4. Turbine Fireseal Inspection

A. General

(1) This task visually examines the fireseal on the primary nozzle.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-11-01-000-801-H01	Primary Nozzle Removal (P/B 401)
78-11-01-400-801-H01	Primary Nozzle Installation (P/B 401)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

E. Turbine Fireseal Visual Inspection

SUBTASK 78-11-00-010-003-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-11-00-212-010-H01

(2) Visually examine the fireseal for missing material, missing rivets, or other obvious signs of damage Figure 602.

(a) Wear/Missing hardcoat

1) Any amount if the minimum thickness of the remaining hardcoat on the fireshield is 0.002 inch (0.06 mm).

2) No missing hardcoat permitted.

(b) No missing material, missing rivets, or other obvious damage is permitted.

1) Replace the primary nozzle.

a) Do this task: Primary Nozzle Removal, TASK 78-11-01-000-801-H01 .

b) Do this task: Primary Nozzle Installation, TASK 78-11-01-400-801-H01.

SUBTASK 78-11-00-410-003-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

PRIMARY NOZZLE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the primary nozzle from the turbine rear frame

(2) An installation of the primary nozzle to the turbine rear frame.

TASK 78-11-01-000-801-H01

2. Primary Nozzle Removal

(Figure 401/Figure 402)

A. General

(1) This task is the removal procedure for the primary nozzle from the turbine rear frame.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-7856	Stand - Exhaust Nozzle, Removal and Installation Part #: 9C1209G02 Supplier: 06083
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Consumable Materials

Reference	Description	Specification
G02061	Marker - Permanent, Felt Tip Pen	

E. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Removal

SUBTASK 78-11-01-010-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-11-01-490-001-H01

(2) Position the equipment to remove the primary nozzle.

(a) Get a exhaust nozzle removal and installation stand, SPL-7856 to handle the primary nozzle when it is removed, or

(b) Get a 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment for the two people that are necessary to handle the primary nozzle when it is removed.

H. Primary Nozzle Removal

ARO ALL PRE SB 777-GE100-78-0002

SUBTASK 78-11-01-030-001-H01

(1) Disconnect the two tension straps [35] for the aft deflection limiter from the cross tie rod (Figure 402).

(a) Remove the bolts [31], bushings [32], bushings [33] and nuts [34] which attach the tension straps [35] to the cross tie rod.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ARO ALL PRE SB 777-GE100-78-0002 (Continued)

SUBTASK 78-11-01-930-001-H01

(2) Make a mark with a marker, G02061 each of the bracket locations at the turbine rear frame [8].

SUBTASK 78-11-01-030-002-H01

(3) Remove the bracket [3] and bracket [6] with the cross tie rod [2] from the turbine rear frame [8] (Figure 401).

(a) Remove the four bolts [1], nuts [4] and spacers [5] from bracket [3] and bracket [6].

(b) Do not change the length of the cross tie rod [2].

SUBTASK 78-11-01-030-003-H01

(4) Remove the upper bumper bracket [7] and upper bumper bracket [9] at the 10 and 2 o'clock positions from the mount flange of the turbine rear frame [8].

(a) Remove the four bolts [1], nuts [4] and spacers [5] from the upper bumper bracket [7] and upper bumper bracket [9].

(b) Remove the upper bumper bracket [7] and upper bumper bracket [9] from the turbine rear frame [8].

SUBTASK 78-11-01-030-004-H01

(5) Remove the ten lower bumper brackets [10] from the mount flange of the turbine rear frame [8].

(a) Remove the 20 bolts [1], nuts [4] and spacers [5] (2 per location) from the ten lower bumper brackets [10].

(b) Remove the ten lower bumper brackets [10] from the turbine rear frame [8].

SUBTASK 78-11-01-030-005-H01

(6) Remove the drain tube [22] at the 4:30 o'clock position of the primary nozzle [15].

(a) Disconnect the B-nut [21] of the drain tube [22] at the 4:30 o'clock position of the turbine rear frame [8].

(b) Remove the bolt [24] from the loop clamp [23] on the bracket [19].

(c) Remove the two bolts [27] on the inner side of the primary nozzle [15] from the two nuts [26] at the two loop clamps [25] on the outer side of the primary nozzle.

(d) Remove the drain tube [22].

SUBTASK 78-11-01-030-006-H01

(7) Remove the bracket [19] from the mount flange of the primary nozzle [15].

(a) Remove the two bolts [1], nuts [4] and spacers [5] from the bracket [19].

(b) Remove the bracket [19] from the primary nozzle [15].

SUBTASK 78-11-01-030-007-H01

(8) Remove the drain tube [29] at the 6:00 o'clock position of the primary nozzle [15]

(a) Disconnect the B-nut [28] of the drain tube [29] at the 6:00 o'clock position of the turbine rear frame [8].

(b) Remove the bolt [30] from the loop clamp [36] on the bracket [20]

(c) Remove the two bolts [39] on the inner sided of the primary nozzle [15] from the two nuts [38] at the two loop clamps [37] on the outer side of the primary nozzle.

(d) Remove the drain tube [29].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ARO ALL PRE SB 777-GE100-78-0002 (Continued)

SUBTASK 78-11-01-030-008-H01

(9) Remove the bracket [20] from the mount flange of the primary nozzle [15].

(a) Remove the two bolts [1], nuts [4], and spacers [5] from the bracket [20].

(b) Remove the bracket [20] from the primary nozzle and remove the primary nozzle [15].

SUBTASK 78-11-01-020-001-H01

WARNING MAKE SURE THAT THE FULL WEIGHT OF THE PRIMARY NOZZLE IS HELD BEFORE YOU REMOVE THE SHEAR BOLTS. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR IF THE PRIMARY NOZZLE MOVES OR FALLS.

WARNING MOVE THE PRIMARY NOZZLE CAREFULLY. THE PRIMARY NOZZLE WEIGHS 69.7 POUNDS (31.7 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(10) Remove the primary nozzle [15] from the turbine rear frame.

(a) Make sure two people hold the primary nozzle [15] while you remove the bolts from the mount flange of the primary nozzle.

(b) Remove the remaining bolts [1], nuts [4] and spacers [5] from the mount flange of the primary nozzle [15].

ARO ALL POST SB 777-GE100-78-0002

SUBTASK 78-11-01-020-002-H00

(11) Disconnect the two tension straps [35] for the aft deflection limiter from the cross tie rod (Figure 402).

(a) Remove the bolts [31], bushings [32], bushings [33] and nuts [34] which attach the tension straps [35] to the cross tie rod.

SUBTASK 78-11-01-930-002-H00

(12) Make a mark with a marker, G02061 each of the bracket locations at the turbine rear frame [8].

SUBTASK 78-11-01-020-003-H00

(13) Remove the bracket [3] and bracket [6] with the cross tie rod [2] from the turbine rear frame [8] (Figure 401).

(a) Remove the four bolts [1], and nuts [4] from bracket [3] and bracket [6].

(b) Do not change the length of the cross tie rod [2].

SUBTASK 78-11-01-020-004-H00

(14) Remove the upper bumper bracket [7] and upper bumper bracket [9] at the 10 and 2 o'clock positions from the mount flange of the turbine rear frame [8].

(a) Remove the four bolts [1], and nuts [4] from the upper bumper bracket [7] and upper bumper bracket [9].

(b) Remove the upper bumper bracket [7] and upper bumper bracket [9] from the turbine rear frame [8].

SUBTASK 78-11-01-020-005-H00

(15) Remove the ten lower bumper brackets [10] from the mount flange of the turbine rear frame [8].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ARO ALL POST SB 777-GE100-78-0002 (Continued)

(a) Remove the 20 bolts [1], and nuts [4] (2 per location) from the ten lower bumper brackets [10].

(b) Remove the ten lower bumper brackets [10] from the turbine rear frame [8].

SUBTASK 78-11-01-020-006-H00

(16) Remove the drain tube [22] at the 4:30 o'clock position of the primary nozzle [15].

(a) Disconnect the B-nut [21] of the drain tube [22] at the 4:30 o'clock position of the turbine rear frame [8].

(b) Remove the bolt [24] from the loop clamp [23] on the bracket [19].

(c) Remove the two bolts [27] on the inner side of the primary nozzle [15] from the two nuts [26] at the two loop clamps [25] on the outer side of the primary nozzle.

(d) Remove the drain tube [22].

SUBTASK 78-11-01-020-007-H00

(17) Remove the bracket [19] from the mount flange of the primary nozzle [15].

(a) Remove the two bolts [1], and nuts [4] from the bracket [19].

(b) Remove the bracket [19] from the primary nozzle [15].

SUBTASK 78-11-01-020-008-H00

(18) Remove the drain tube [29] at the 6:00 o'clock position of the primary nozzle [15]

(a) Disconnect the B-nut [28] of the drain tube [29] at the 6:00 o'clock position of the turbine rear frame [8].

(b) Remove the bolt [30] from the loop clamp [36] on the bracket [20]

(c) Remove the two bolts [39] on the inner sided of the primary nozzle [15] from the two nuts [38] at the two loop clamps [37] on the outer side of the primary nozzle.

(d) Remove the drain tube [29].

SUBTASK 78-11-01-020-009-H00

(19) Remove the bracket [20] from the mount flange of the primary nozzle [15].

(a) Remove the two bolts [1], and nuts [4], from the bracket [20].

(b) Remove the bracket [20] from the primary nozzle and remove the primary nozzle [15].

SUBTASK 78-11-01-020-010-H00

WARNING MAKE SURE THAT THE FULL WEIGHT OF THE PRIMARY NOZZLE IS HELD BEFORE YOU REMOVE THE SHEAR BOLTS. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR IF THE PRIMARY NOZZLE MOVES OR FALLS.

WARNING MOVE THE PRIMARY NOZZLE CAREFULLY. THE PRIMARY NOZZLE WEIGHS 69.7 POUNDS (31.7 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(20) Remove the primary nozzle [15] from the turbine rear frame.

(a) Make sure two people hold the primary nozzle [15] while you remove the bolts from the mount flange of the primary nozzle.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

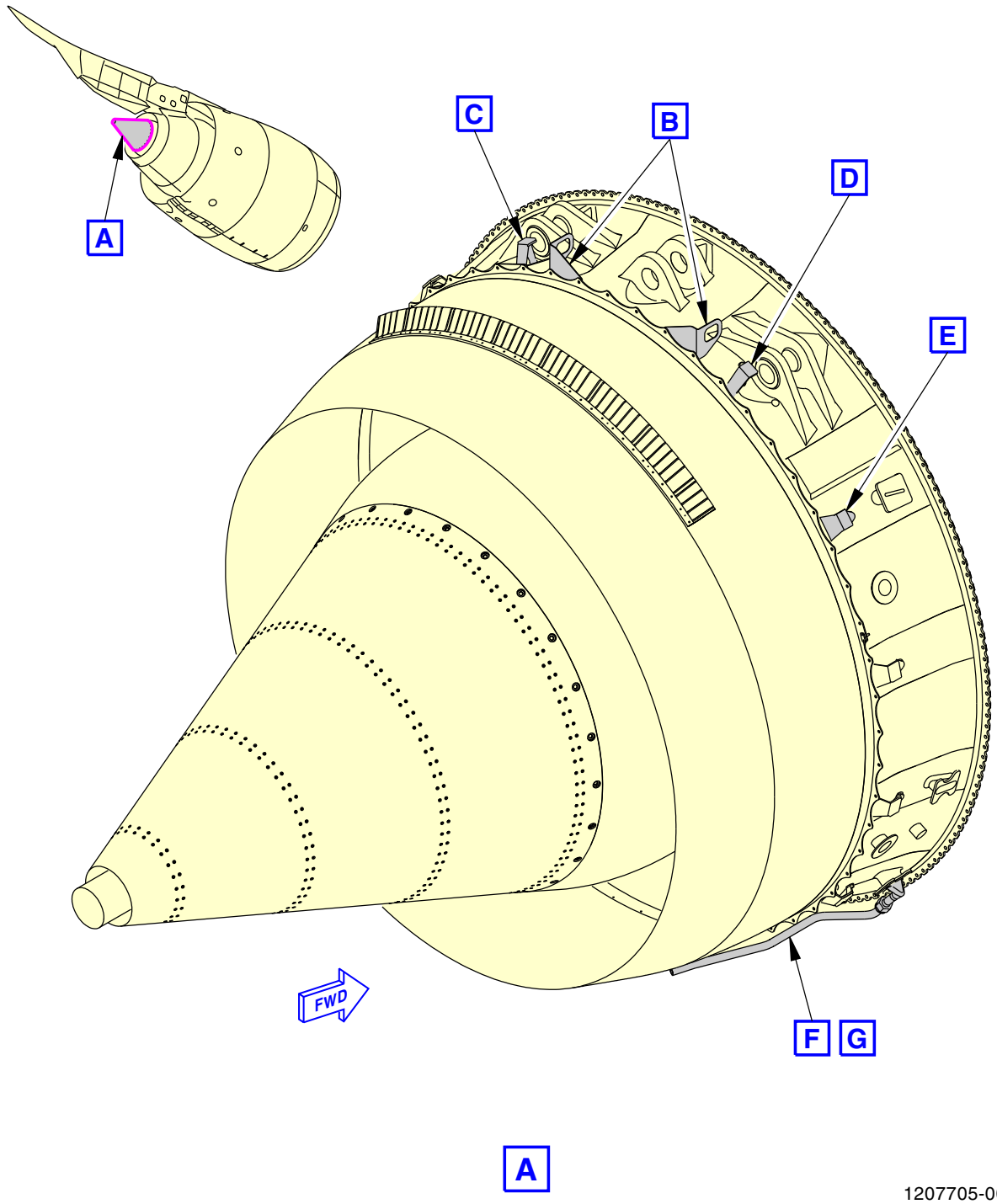
ARO ALL POST SB 777-GE100-78-0002 (Continued)

(b) Remove the remaining bolts [1], and nuts [4] from the mount flange of the primary nozzle [15].

ARO ALL

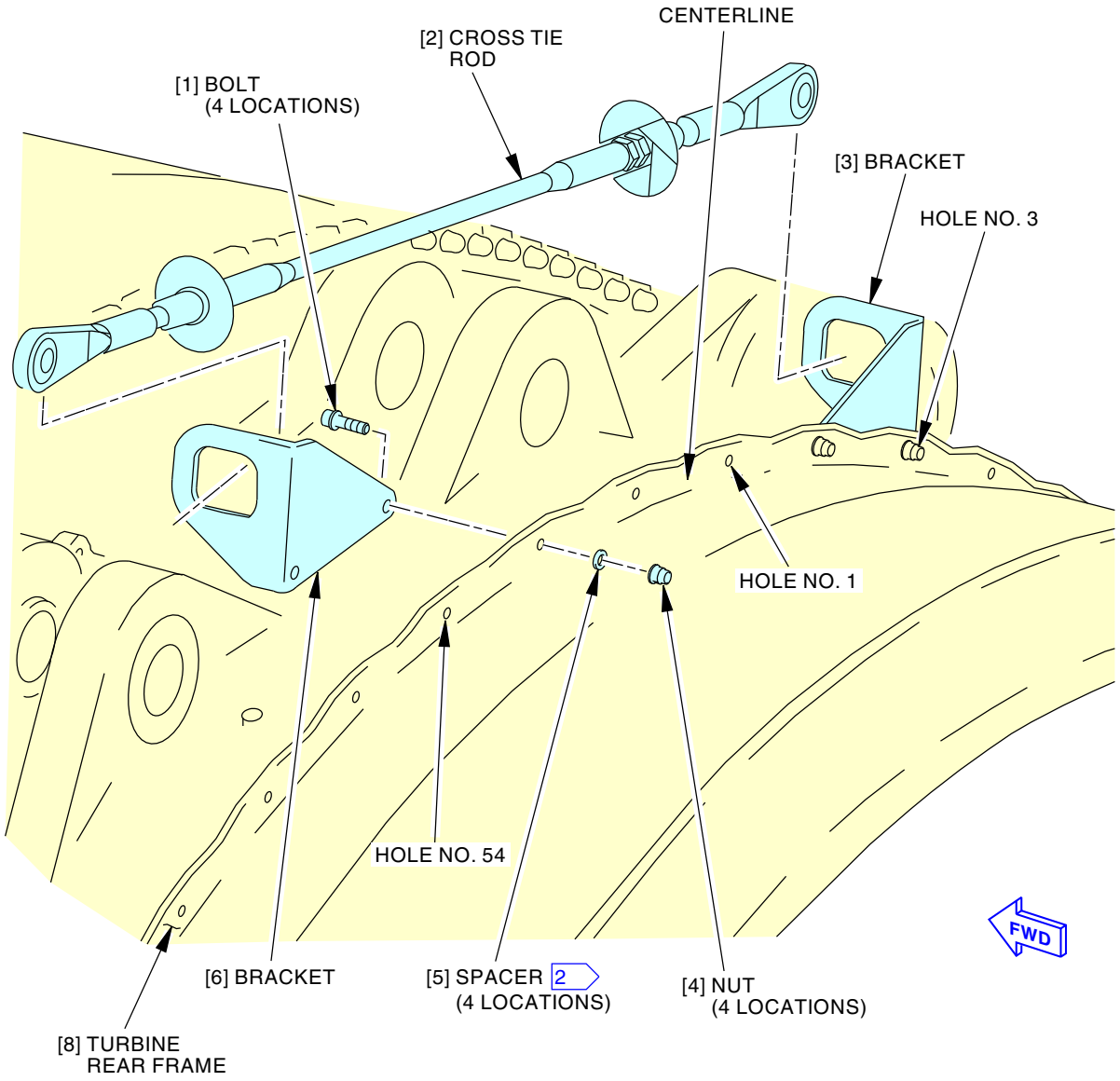
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



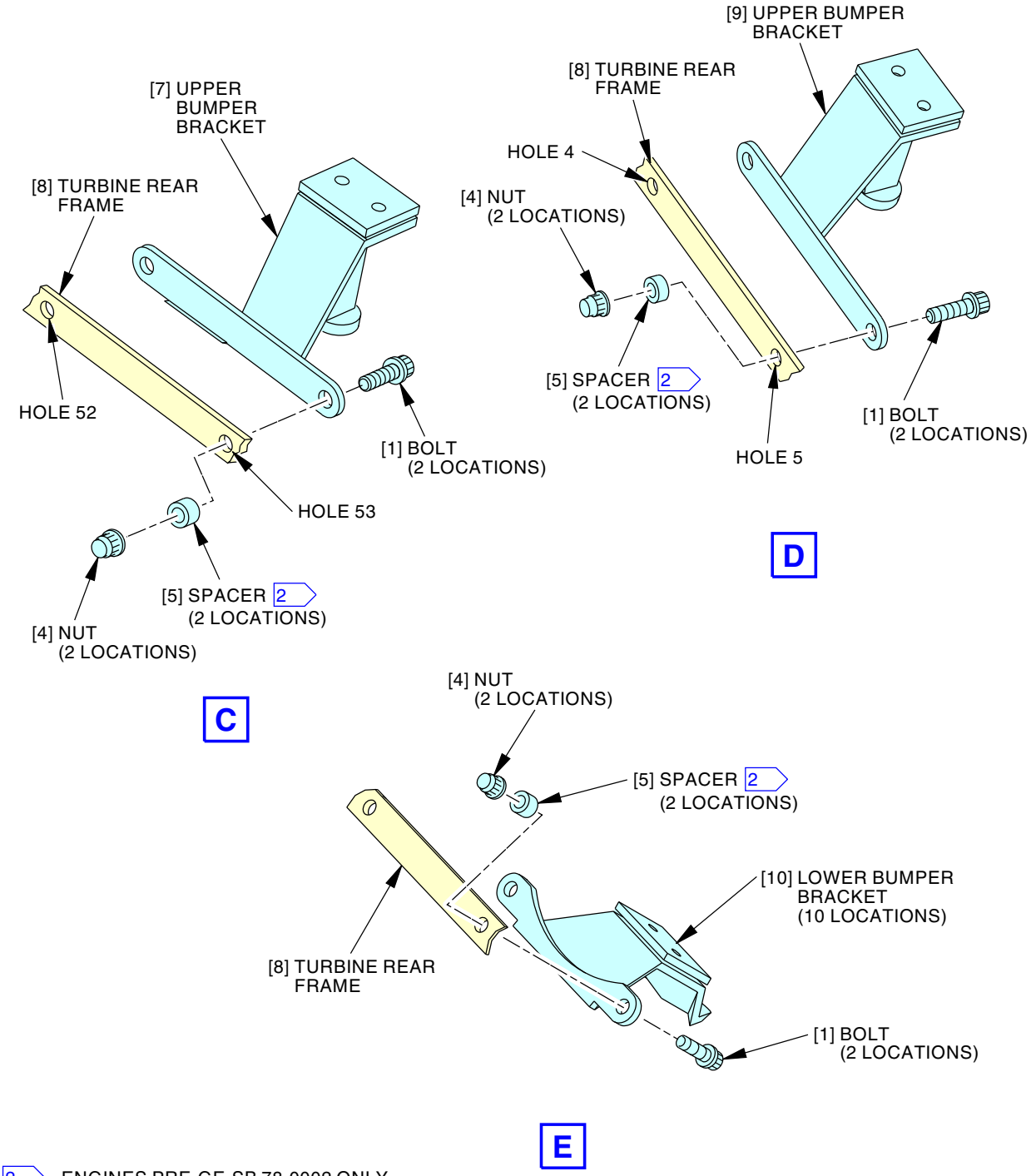
Primary Nozzle Installation
Figure 401/78-11-01-990-801-H01 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Primary Nozzle Installation
Figure 401/78-11-01-990-801-H01 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

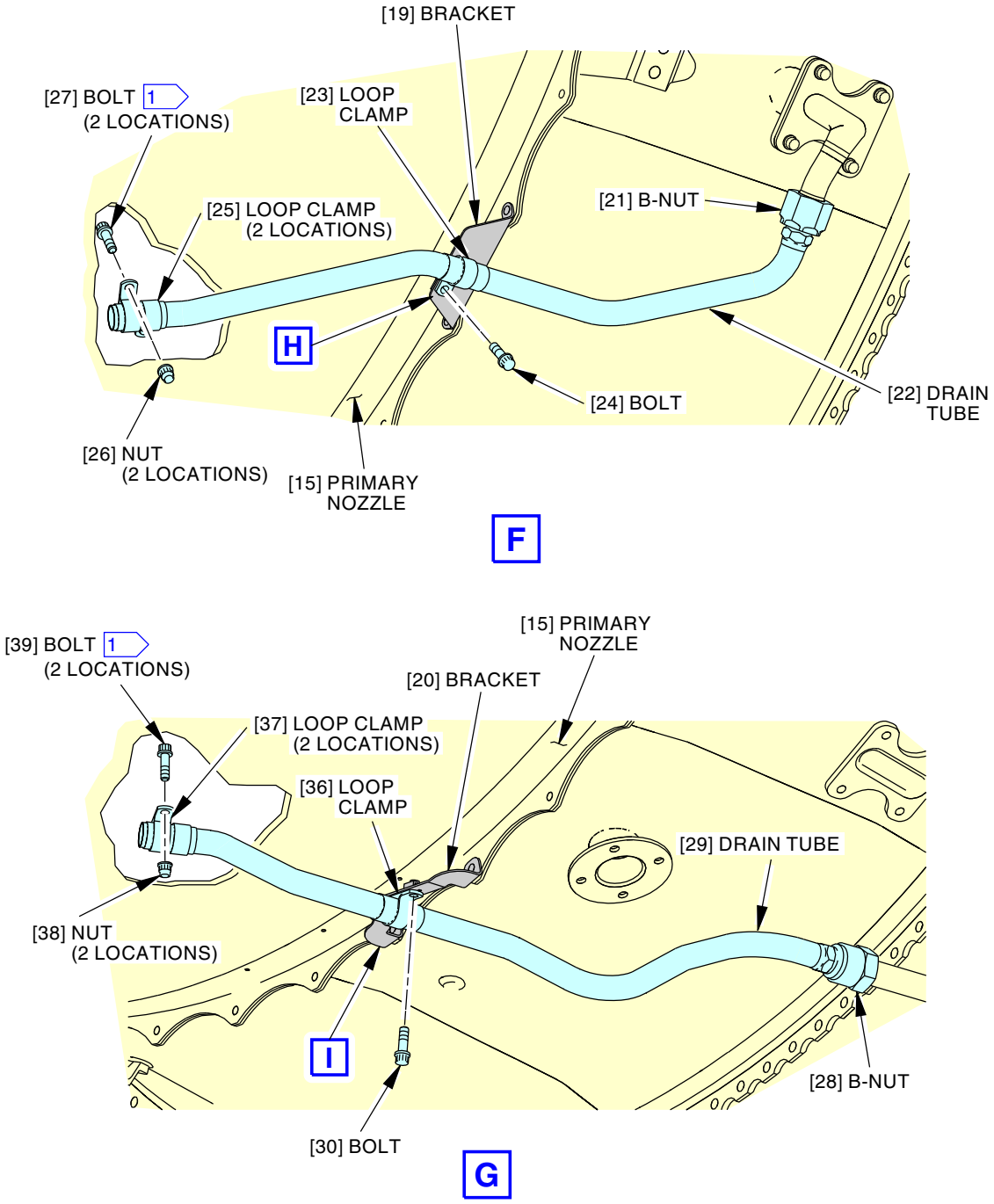


2 ENGINES PRE-GE-SB 78-0002 ONLY.

1207717-00-A
M07230 S0004286202_V3

Primary Nozzle Installation
Figure 401/78-11-01-990-801-H01 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

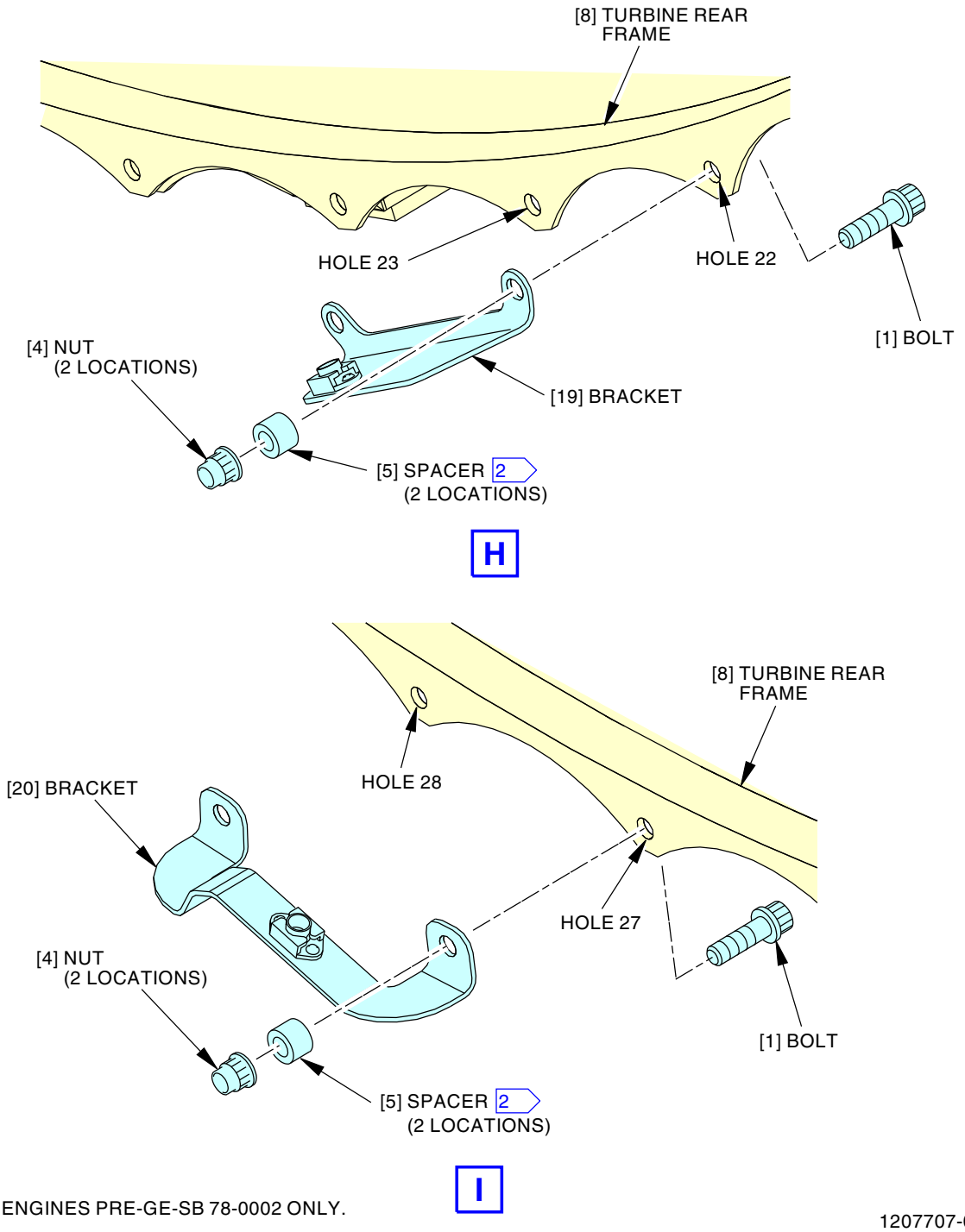


1 THE BOLT IS ON THE INNER SIDE OF THE PRIMARY NOZZLE.

1207706-00-A
M07231 S0004286203_V2

Primary Nozzle Installation
Figure 401/78-11-01-990-801-H01 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

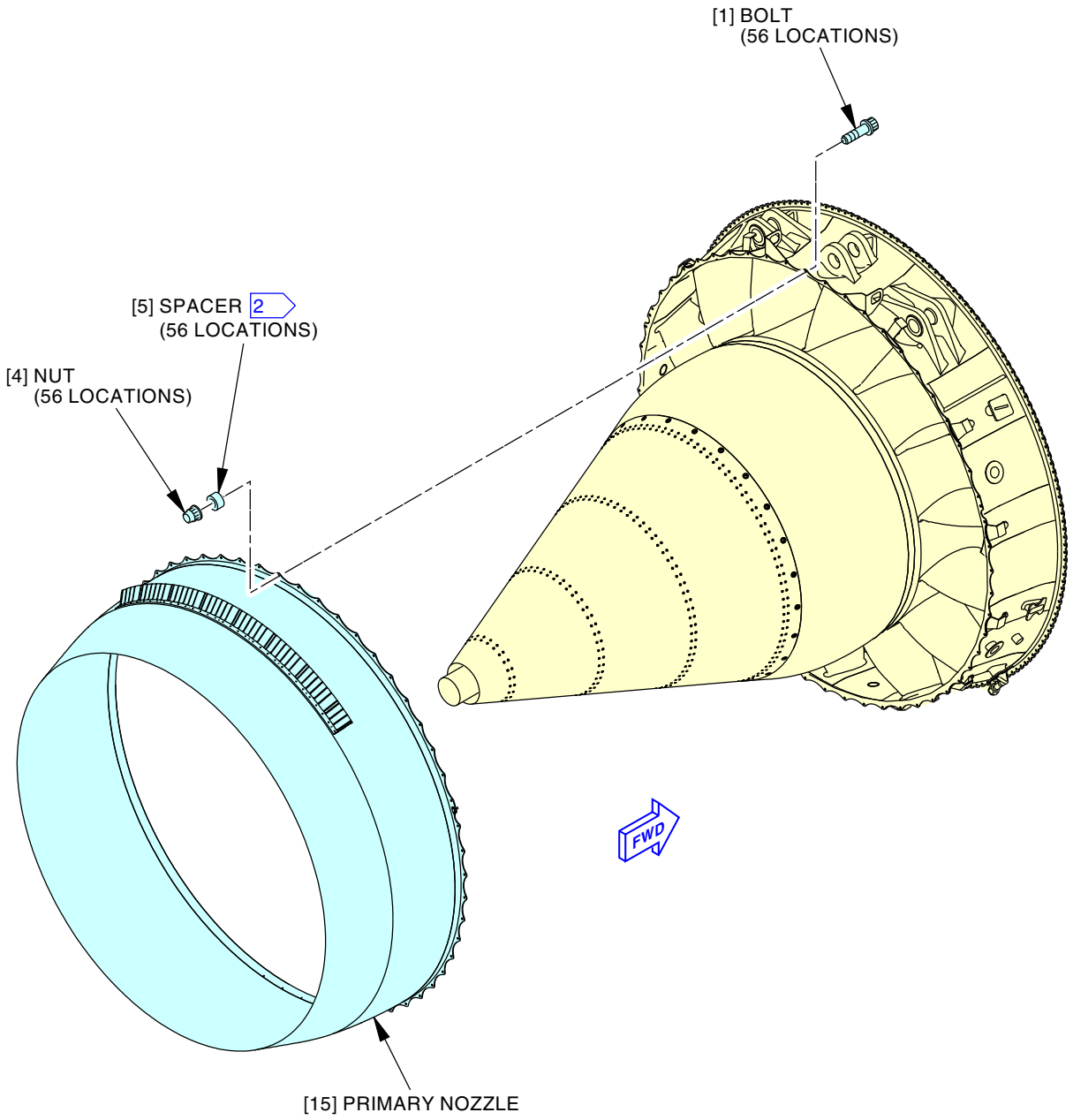


2 ENGINES PRE-GE-SB 78-0002 ONLY.

1207707-00-A
M07232 S0004286204_V3

Primary Nozzle Installation
Figure 401/78-11-01-990-801-H01 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



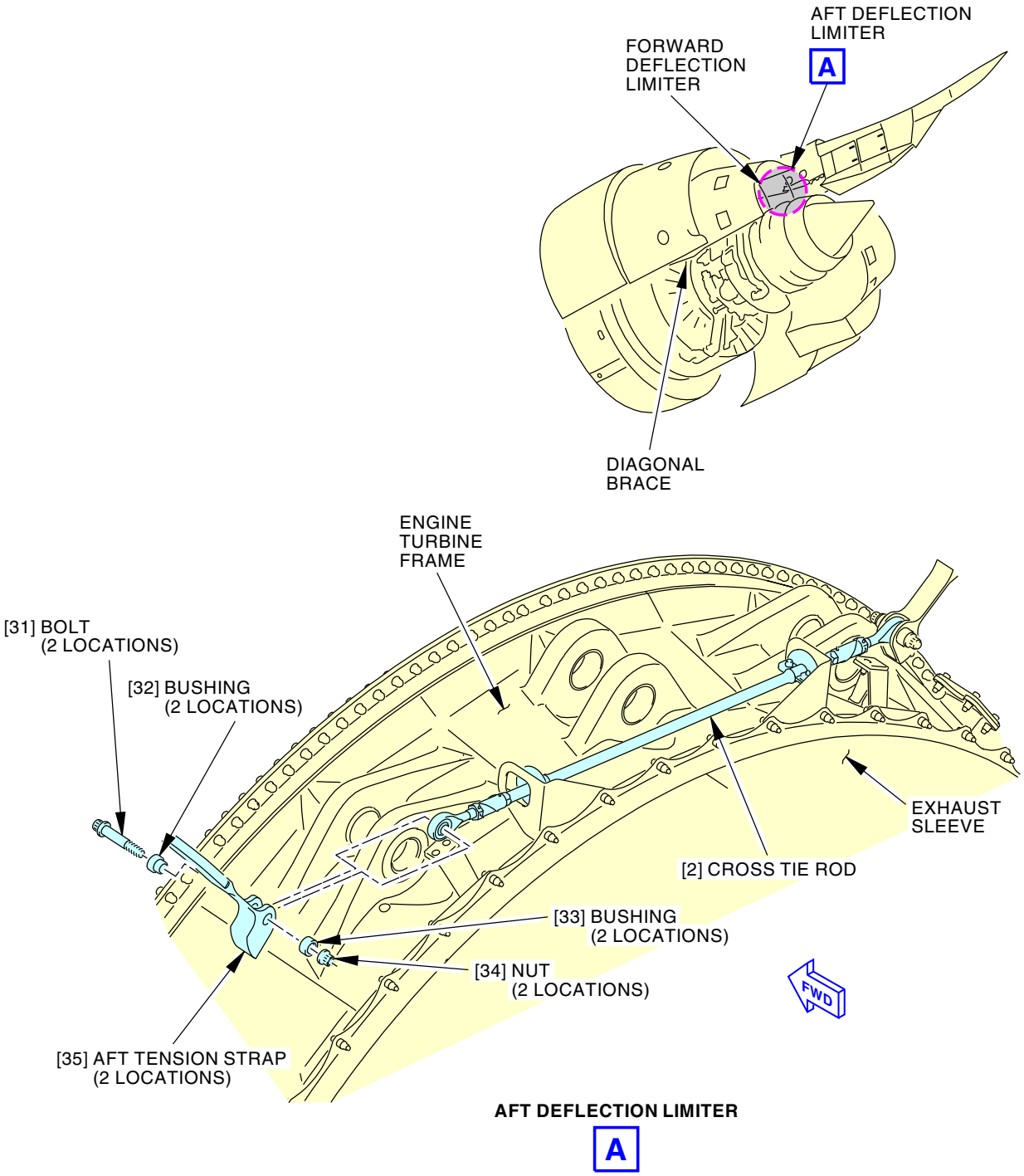
H

2 ENGINES PRE-GE-SB 78-0002 ONLY.

1207684-00-A
N64306 S0000109060_V3

Primary Nozzle Installation
Figure 401/78-11-01-990-801-H01 (Sheet 6 of 6)

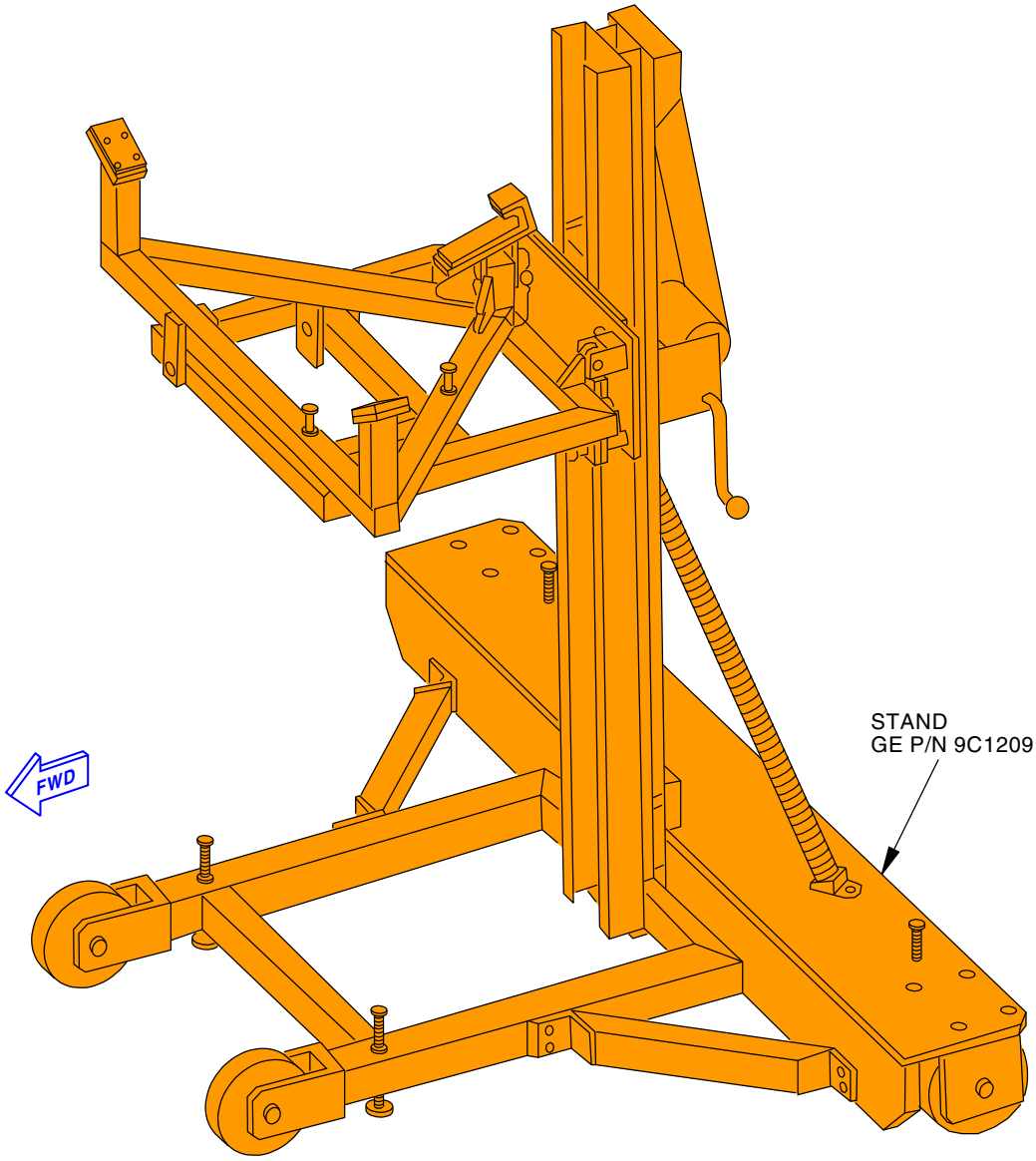
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07233 S0004286205_V2

Aft Deflection Limiter Installation
Figure 402/78-11-01-990-803-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1350975 S0000241398_V2

Exhaust Nozzle and Centerbody Removal/Installation Stand
Figure 403/78-11-01-990-804-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-11-01-400-801-H01

3. Primary Nozzle Installation

(Figure 401/Figure 402)

A. General

(1) This task is the installation procedure for the primary nozzle to the turbine rear frame.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-51-00-910-801-H01	Instruction for Torque (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-7856	Stand - Exhaust Nozzle, Removal and Installation Part #: 9C1209G02 Supplier: 06083
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
15	Primary nozzle	78-11-01-04-020	ARO ALL

F. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

G. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Primary Nozzle Installation

SUBTASK 78-11-01-160-001-H01

(1) Clean the mount flanges of the turbine rear frame and the primary nozzle [15].

(a) Use a cotton wiper, G00034 damp with alcohol, B00130.

(b) Clean the aft flange of the turbine rear frame and the mount flange of the primary nozzle [15].

SUBTASK 78-11-01-490-002-H00

(2) Put the equipment in position to install the primary nozzle.

(a) Get a exhaust nozzle removal and installation stand, SPL-7856 to handle the primary nozzle during the installation, or

(b) Get a 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment for the two people that are necessary to handle the primary nozzle during the installation.

ARO ALL PRE SB 777-GE100-78-0002

SUBTASK 78-11-01-420-001-H01

WARNING MOVE THE PRIMARY NOZZLE CAREFULLY. THE PRIMARY NOZZLE WEIGHS 69.7 POUNDS (31.7 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Install the primary nozzle [15] to the outer flange of the turbine rear frame (Figure 401).

(a) Apply the antiseize compound, Acheson GP460 to the threads of the bolts [1].

(b) Align the guide pins between bolt hole number 11 and 12, 46 and 47.

NOTE: Do not count the guide pins holes as bolt holes. The primary nozzle fire shield will be across the 12 o'clock position.

(c) Push the primary nozzle [15] against the turbine rear frame.

1) Make sure the clamp bolt hole in the primary nozzle [15] is at approximately the 8 o'clock position.

(d) Install eight bolts [1] (bolt heads forward) to the turbine rear frame with spacers [5] and nuts [4] at the primary nozzle [15].

NOTE: Put two bolts each at the 12, 3, 6, and 9 o'clock positions of the primary nozzle.

(e) Tighten the nuts [4] in pairs 180 degrees across from each other around the circumference of the bolt flanges.

1) Make sure there is some clearance between the bolt and the flange, so you can move the primary nozzle [15] to align all the bolts [1] with bolt holes.

SUBTASK 78-11-01-430-001-H01

(4) Install the bracket [20] to the mount flange of the primary nozzle [15] at the bolt holes 27 and 28.

(a) Install the bolts [1] (bolt heads forward) to the bracket [20] with spacers [5] and nuts [4].

(b) Tighten the nuts [4] to hold the bracket [20] in position.

NOTE: Do not fully tighten the nuts [4] to the bolts at this time.

SUBTASK 78-11-01-430-006-H01

(5) Install the bracket [19] to the mount flange of the primary nozzle [15] at the bolt holes 22 and 23.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ARO ALL PRE SB 777-GE100-78-0002 (Continued)

(a) Install the bolts [1] (bolt heads forward) to the bracket [19] with spacers [5] and nuts [4].

(b) Tighten the nuts [4] to hold the bracket [19] in position.

NOTE: Do not fully tighten the nuts [4] to the bolts at this time.

SUBTASK 78-11-01-430-002-H01

(6) Install the ten lower bumper brackets [10] to the forward side of the rear flange at the turbine rear frame.

(a) Move the ten lower bumper brackets [10] to the center above the dimple point on the turbine rear frame [8].

(b) Install the bolts [1] (bolt heads forward) to the lower bumper brackets [10] with the spacers [5] and nuts [4].

NOTE: Do not fully tighten the nuts [4] at this time.

SUBTASK 78-11-01-430-003-H01

(7) Install upper bumper bracket [7] and upper bumper bracket [9] to the forward side of the rear flange of the turbine rear frame.

(a) Install the upper bumper bracket [7] at bolts holes 52 and 53.

(b) Install the upper bumper bracket [9] at bolts holes 4 and 5.

(c) Install the bolts [1] (bolt heads forward) to the upper bumper bracket [7] and upper bumper bracket [9] with the spacers [5] and nuts [4].

NOTE: Do not fully tighten the nuts [4] at this time.

SUBTASK 78-11-01-430-004-H01

(8) Install the bracket [3] and bracket [6] to the rear mount flange of the turbine rear frame [8].

(a) Install the cross tie rod [2] between the bracket [3] and bracket [6].

1) Install bracket [3] at bolt hole number 2 and 3.

2) Install bracket [6] at bolt hole number 54 and 55.

(b) Install the bolts [1] (bolt heads forward) to the bracket [3] and bracket [6] with the spacers [5] and nuts [4].

NOTE: Do not fully tighten the nuts [4] at this time.

ARO ALL POST SB 777-GE100-78-0002

SUBTASK 78-11-01-440-001-H00

WARNING MOVE THE PRIMARY NOZZLE CAREFULLY. THE PRIMARY NOZZLE WEIGHS 69.7 POUNDS (31.7 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(9) Install the primary nozzle [15] to the outer flange of the turbine rear frame (Figure 401).

(a) Apply the antiseize compound, Acheson GP460 to the threads of the bolts [1].

(b) Align the guide pins between bolt hole number 11 and 12, 46 and 47.

NOTE: Do not count the guide pins holes as bolt holes. The primary nozzle fire shield will be across the 12 o'clock position.

(c) Push the primary nozzle [15] against the turbine rear frame.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ARO ALL POST SB 777-GE100-78-0002 (Continued)

1) Make sure the clamp bolt hole in the primary nozzle [15] is at approximately the 8 o'clock position.

(d) Install eight bolts [1] (bolt heads forward) to the turbine rear frame with nuts [4] at the primary nozzle [15].

NOTE: Put two bolts each at the 12, 3, 6, and 9 o'clock positions of the primary nozzle.

(e) Tighten the nuts [4] in pairs 180 degrees across from each other around the circumference of the bolt flanges.

1) Make sure there is some clearance between the bolt and the flange, so you can move the primary nozzle [15] to align all the bolts [1] with bolt holes.

SUBTASK 78-11-01-440-002-H00

(10) Install the bracket [20] to the mount flange of the primary nozzle [15] at the bolt holes 27 and 28.

(a) Install the bolts [1] (bolt heads forward) to the bracket [20] with nuts [4].

(b) Tighten the nuts [4] to hold the bracket [20] in position.

NOTE: Do not fully tighten the nuts [4] to the bolts at this time.

SUBTASK 78-11-01-440-003-H00

(11) Install the bracket [19] to the mount flange of the primary nozzle [15] at the bolt holes 22 and 23.

(a) Install the bolts [1] (bolt heads forward) to the bracket [19] with nuts [4].

(b) Tighten the nuts [4] to hold the bracket [19] in position.

NOTE: Do not fully tighten the nuts [4] to the bolts at this time.

SUBTASK 78-11-01-440-004-H00

(12) Install the ten lower bumper brackets [10] to the forward side of the rear flange at the turbine rear frame.

(a) Move the ten lower bumper brackets [10] to the center above the dimple point on the turbine rear frame [8].

(b) Install the bolts [1] (bolt heads forward) to the lower bumper brackets [10] with the nuts [4].

NOTE: Do not fully tighten the nuts [4] at this time.

SUBTASK 78-11-01-440-005-H00

(13) Install upper bumper bracket [7] and upper bumper bracket [9] to the forward side of the rear flange of the turbine rear frame.

(a) Install the upper bumper bracket [7] at bolts holes 52 and 53.

(b) Install the upper bumper bracket [9] at bolts holes 4 and 5.

(c) Install the bolts [1] (bolt heads forward) to the upper bumper bracket [7] and upper bumper bracket [9] with the nuts [4].

NOTE: Do not fully tighten the nuts [4] at this time.

SUBTASK 78-11-01-440-006-H00

(14) Install the bracket [3] and bracket [6] to the rear mount flange of the turbine rear frame [8].

(a) Install the cross tie rod [2] between the bracket [3] and bracket [6].

1) Install bracket [3] at bolt hole number 2 and 3.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ARO ALL POST SB 777-GE100-78-0002 (Continued)

2) Install bracket [6] at bolt hole number 54 and 55.

(b) Install the bolts [1] (bolt heads forward) to the bracket [3] and bracket [6] with the nuts [4].

NOTE: Do not fully tighten the nuts [4] at this time.

ARO ALL

SUBTASK 78-11-01-420-002-H01

(15) Tighten the nuts [4] in pairs 180 degrees across from each other around the circumference of the bolt flanges.

(a) Tighten the nuts [4] in pairs to 75-90 pound-inches (8.5-10.2 newton-meters).

(b) Tighten the nuts [4] again in pairs to 100-120 pound-inches (11.3-13.6 newton-meters).

SUBTASK 78-11-01-430-005-H01

(16) Install the drain tube [29] to the bracket [20] at the 6:00 o'clock position of the primary nozzle [15].

(a) Apply the antiseize compound, Acheson GP460 to the threads of the bolt [30] and bolts [39].

(b) Connect the B-nut [28] of the drain tube [29] to the drain tube at the turbine rear frame (Instruction for Torque, TASK 70-51-00-910-801-H01).

(c) Install the bolt [30] and loop clamp [36] to the bracket [20] that attach the drain tube [29] to the primary nozzle [15].

1) Tighten the bolt [30] to 55-70 pound-inches (6.2-7.9 Newton-meters).

(d) Install the two bolts [39] from the inner side of the primary nozzle [15].

1) Make sure the bolt threads come out of the primary nozzle [15].

(e) Install the two loop clamps [37] and nuts [38] to the drain tube [29] and bolts [39] at the primary nozzle [15].

1) Tighten the nuts [38] to 55-70 pound-inches (6.2-7.9 newton-meters).

SUBTASK 78-11-01-430-007-H01

(17) Install the drain tube [22] to the bracket [19] at the 4:30 o'clock position of the primary nozzle [15].

(a) Apply the antiseize compound, Acheson GP460 to the threads of the bolt [24] and bolts [27].

(b) Connect the B-nut [21] of the drain tube [22] to the drain tube at the turbine rear frame (Instruction for Torque, TASK 70-51-00-910-801-H01).

(c) Install the bolt [24] and loop clamp [23] to the bracket [19] that attach the drain tube [22] to the primary nozzle [15].

1) Tighten the bolt [24] to 55-70 pound-inches (6.2-7.9 Newton-meters).

(d) Install the two bolts [27] from the inner side of the primary nozzle [15].

1) Make sure the bolt threads come out of the primary nozzle [15].

(e) Install the two loop clamps [25] and nuts [26] to the drain tube [22] and bolts [27] at the primary nozzle [15].

1) Tighten the nuts [26] to 55-70 pound-inches (6.2-7.9 newton-meters).

SUBTASK 78-11-01-410-001-H01

(18) Install the tension straps [35] for the aft deflection limiter to the cross tie rod (Figure 402).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Apply grease, D00633 to the shanks of the bolts [31].

NOTE: Do not put grease on the threads of the bolt.

(b) Align the two tension straps [35] with the cross-tie rod.

(c) Install the bolts [31], bushings [32], bushings [33] and nuts [34].

1) Tighten the nuts to 480-790 pound-inches (54.2-89.3 newton-meters).

I. Put the Airplane Back to its Usual Condition.

SUBTASK 78-11-01-090-001-H01

(1) Make sure the work area is clean and clear of tools and other items.

SUBTASK 78-11-01-090-002-H00

(2) Remove the work platform or similar equipment.

(a) Remove the exhaust nozzle removal and installation stand, SPL-7856, or

(b) Remove the 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660.

SUBTASK 78-11-01-410-002-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

FORWARD AND AFT CENTERBODY - REMOVAL/INSTALLATION

1. General

A. This procedure has four tasks:

(1) A removal of the aft centerbody from the forward centerbody at the turbine rear frame.

(2) An installation of the aft centerbody to the forward centerbody at the turbine rear frame.

(3) A removal of the forward centerbody from the turbine rear frame.

(4) An installation of the forward centerbody to the turbine rear frame.

TASK 78-11-02-000-801-H01

2. Aft Centerbody Removal

(Figure 401)

A. General

(1) This task is the removal procedure for the aft centerbody from the forward centerbody of the turbine rear frame.

B. References

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-7856	Stand - Exhaust Nozzle, Removal and Installation Part #: 9C1209G02 Supplier: 06083
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

E. Prepare for the Removal

SUBTASK 78-11-02-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-11-02-490-001-H01

(2) Position the equipment to remove the aft centerbody.

(a) Get a exhaust nozzle removal and installation stand, SPL-7856 to handle the aft centerbody when it is removed, or

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Get a 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment for two people which is necessary to handle the aft centerbody when it is removed.

F. Aft Centerbody Removal

SUBTASK 78-11-02-020-001-H01

(1) Remove the aft centerbody [1] from the mounting flange of the forward centerbody (Figure 401):

(a) Remove the bolts [2] that attach the aft centerbody [1] to the forward centerbody [8].

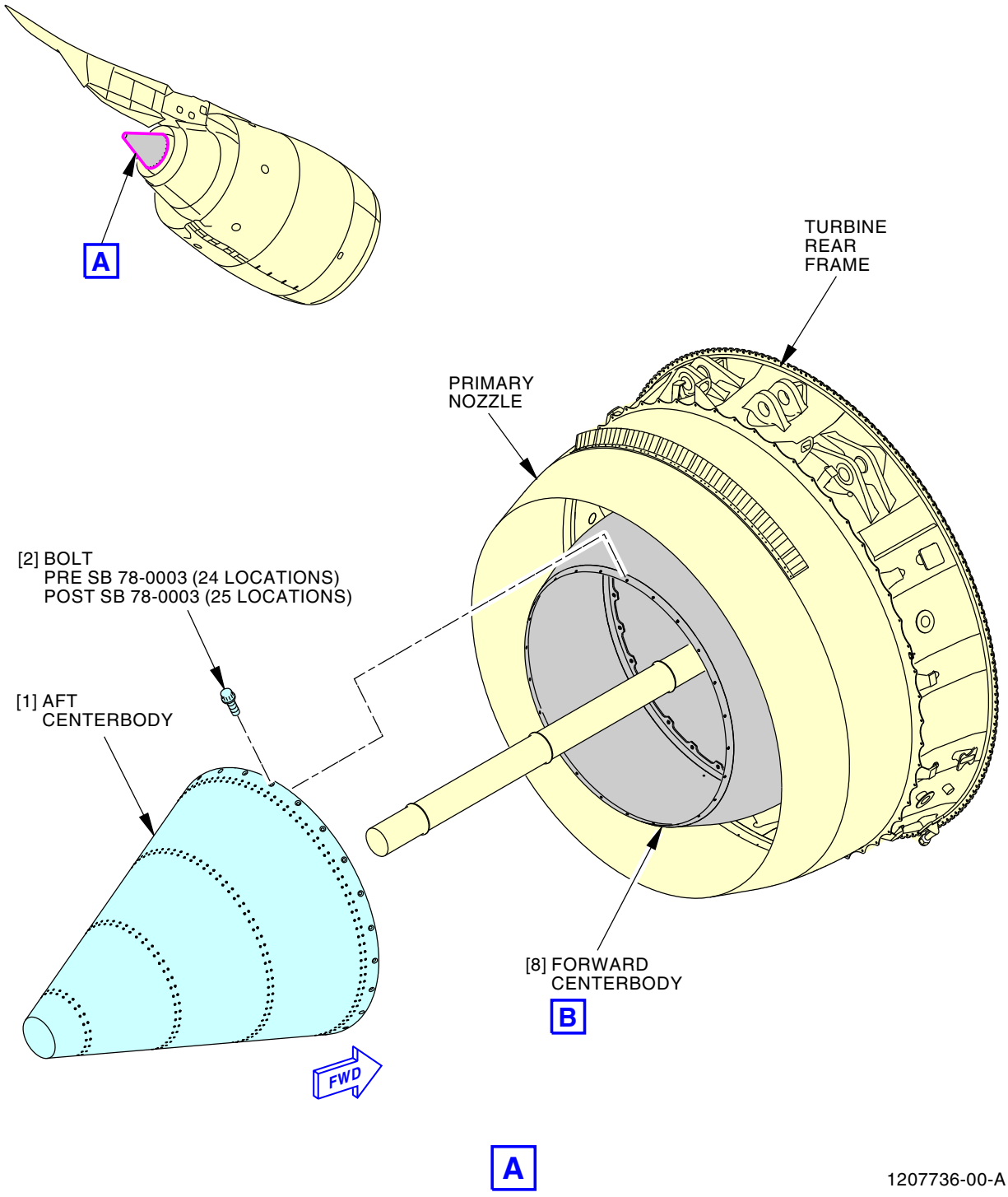
WARNING MOVE THE AFT CENTERBODY CAREFULLY. THE AFT CENTERBODY WEIGHS 39.7 POUNDS (18.0 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION MAKE SURE THAT THE TUBE EXTENSION ON THE CENTER VENT DOES NOT HOLD THE WEIGHT OF THE CENTERBODY. DAMAGE TO THE TUBE EXTENSION CAN OCCUR.

(b) Move the aft centerbody [1] aft to disengage it from the forward centerbody [8] and the center vent tube extension.

END OF TASK

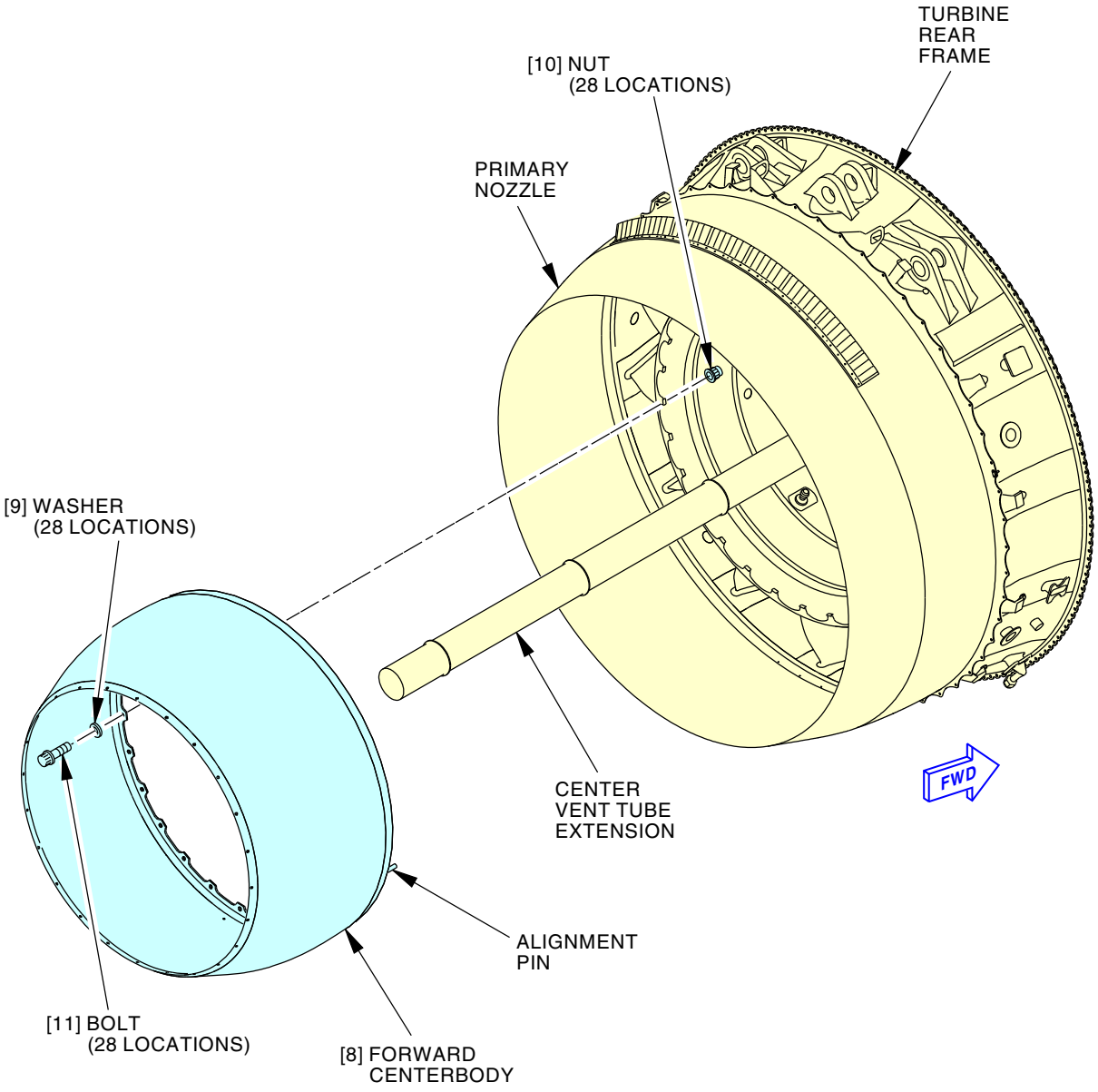
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207736-00-A
M07234 S0004286206_V3

Forward and Aft Centerbody Installation
Figure 401/78-11-02-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



FORWARD CENTERBODY

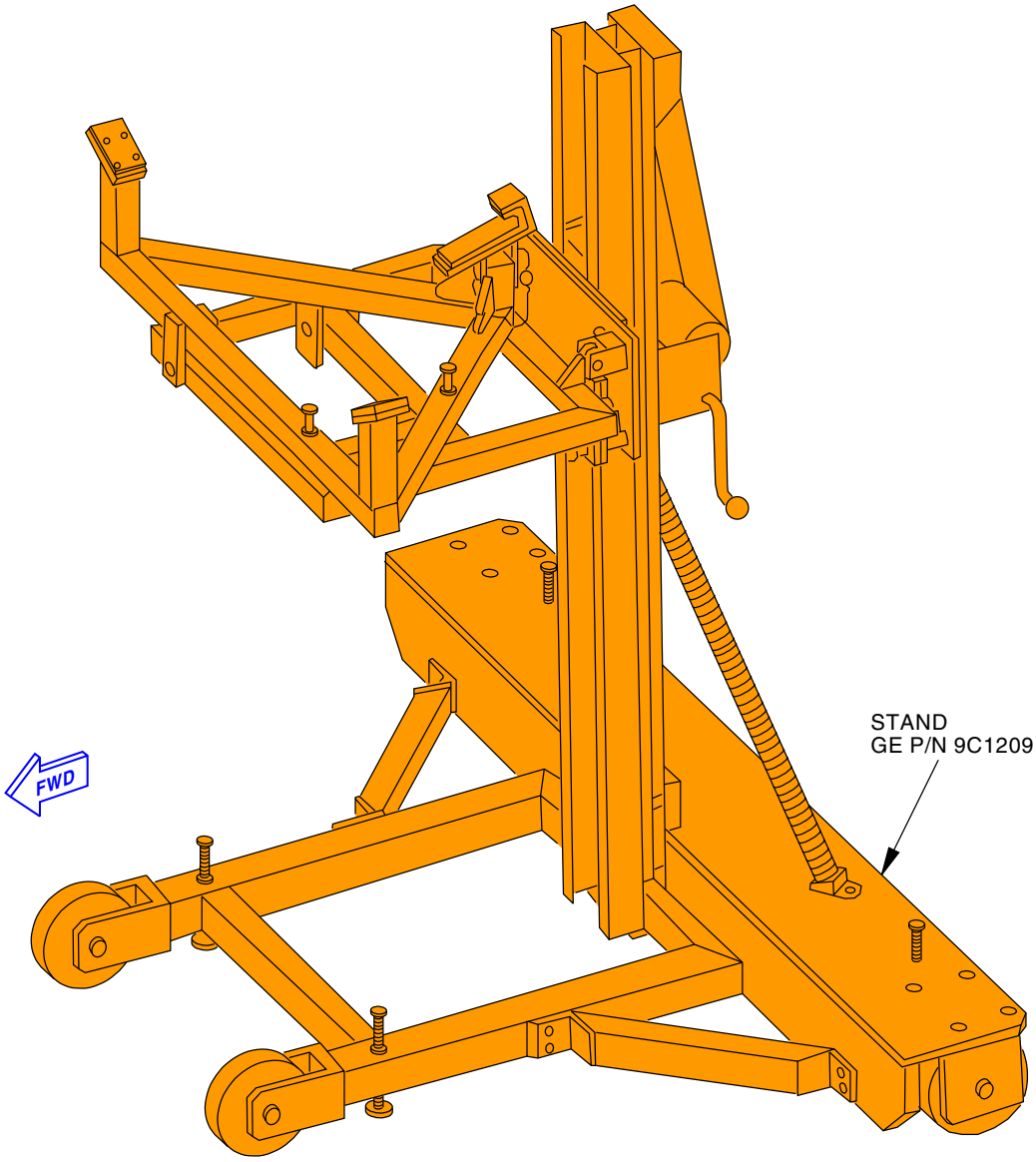
B

1207737-00-A

M07235 S0004286207_V2

Forward and Aft Centerbody Installation
Figure 401/78-11-02-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1350975 S0000241398_V2

Exhaust Nozzle and Centerbody Removal/Installation Stand
Figure 402/78-11-02-990-802-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-11-02-400-801-H01

3. Aft Centerbody Installation

(Figure 401)

A. General

(1) This task is the installation procedure of the aft centerbody to the forward centerbody.

B. References

Reference	Title
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-7856	Stand - Exhaust Nozzle, Removal and Installation Part #: 9C1209G02 Supplier: 06083
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
D50043 [C02-058]	Compound - Antiseize, Acheson GP460 (For Threaded Fasteners 0.250 Inches Diameter Or Larger, C02-079 Is An Alternative)	GE A50TF201 Class A
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

F. Aft Centerbody Installation

SUBTASK 78-11-02-160-001-H01

(1) Clean the mating surfaces of the aft centerbody [1] (Figure 401):

(a) Dampen a cotton wiper, G00034 with alcohol, B00130.

(b) Clean the mounting surfaces of the aft centerbody [1] and the forward centerbody [8].

SUBTASK 78-11-02-420-001-H01

(2) Apply the Acheson GP460 compound, D50043 [C02-058] to the threads and under the heads of the 24 bolts [2].

SUBTASK 78-11-02-490-003-H00

(3) Position the equipment to install the aft centerbody.

(a) Get a exhaust nozzle removal and installation stand, SPL-7856 to handle the aft centerbody during the installation, or

(b) Get a 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment for the two people that are necessary to handle the aft centerbody during the installation.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ARO ALL; PRE GE SB 78-0003

SUBTASK 78-11-02-420-002-H01

WARNING MOVE THE AFT CENTERBODY CAREFULLY. THE AFT CENTERBODY WEIGHS 39.7 POUNDS (18.0 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION MAKE SURE THAT THE TUBE EXTENSION ON THE CENTER VENT DOES NOT HOLD THE WEIGHT OF THE CENTERBODY. DAMAGE TO THE TUBE EXTENSION CAN OCCUR.

(4) Install the aft centerbody [1] over the center vent tube extension and to the mount flange of the forward centerbody [8] with the 24 bolts [2].

(a) Tighten the bolts [2] in pairs, 180 degrees across from each other, around the circumference of the mount flange.

1) Tighten the bolts [2] to 191 in-lb (21.6 N·m)-206 in-lb (23.3 N·m).

(b) Tighten the bolts [2] again in pairs, 180 degrees across from each other, around the circumference of the mount flange.

1) Tighten the bolts [2] to 244 in-lb (28 N·m)-286 in-lb (32 N·m).

ARO ALL; POST GE SB 78-0003

SUBTASK 78-11-02-420-004-H00

WARNING MOVE THE AFT CENTERBODY CAREFULLY. THE AFT CENTERBODY WEIGHS 39.7 POUNDS (18.0 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION MAKE SURE THAT THE TUBE EXTENSION ON THE CENTER VENT DOES NOT HOLD THE WEIGHT OF THE CENTERBODY. DAMAGE TO THE TUBE EXTENSION CAN OCCUR.

(5) Install the aft centerbody [1] over the center vent tube extension and to the mount flange of the forward centerbody [8] with the 25 bolts [2].

(a) Tighten the bolts [2] starting from the top centerline, CW aft looking forward, every ninth bolt around the circumference of the mount flange.

1) Tighten the bolts [2] to 191 in-lb (21.6 N·m)-206 in-lb (23.3 N·m).

(b) Tighten the bolts [2] again, starting from the top centerline, CW aft looking forward, every ninth bolt around the circumference of the mount flange.

1) Tighten the bolts [2] to 244 in-lb (28 N·m)-286 in-lb (32 N·m).

ARO ALL

G. Put the Airplane Back to Its Usual Condition.

SUBTASK 78-11-02-090-001-H01

(1) Make sure that the work area is clean of all tools and other items.

SUBTASK 78-11-02-090-003-H00

(2) Remove the work platform or similar equipment.

(a) Remove the exhaust nozzle removal and installation stand, SPL-7856, or

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Remove the 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660.

SUBTASK 78-11-02-440-001-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

——— END OF TASK ———

TASK 78-11-02-000-802-H01

4. Forward Centerbody Removal

(Figure 401)

A. General

(1) This task is a removal procedure of the forward centerbody from the turbine rear frame.

B. References

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-7856	Stand - Exhaust Nozzle, Removal and Installation Part #: 9C1209G02 Supplier: 06083
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

E. Prepare for the Removal

SUBTASK 78-11-02-040-002-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-11-02-030-001-H01

(2) Do this task: Aft Centerbody Removal, TASK 78-11-02-000-801-H01.

SUBTASK 78-11-02-490-002-H01

(3) Position the equipment to remove the forward centerbody.

(a) Get a exhaust nozzle removal and installation stand, SPL-7856 to handle the forward centerbody when it is removed, or

(b) Get a 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment for two people which is necessary to handle the forward centerbody when it is removed.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Forward Centerbody Removal

SUBTASK 78-11-02-020-002-H01

(1) Remove the forward centerbody [8] from the inner flange of the turbine rear frame flange (Figure 401).

(a) Remove the 28 nuts [10], washers [9], and bolts [11] from around the circumference of the bolt flange at the rear flange of the turbine rear frame.

(b) Remove the forward centerbody [8] from the turbine rear frame.

——— END OF TASK ———

TASK 78-11-02-400-802-H01

5. Forward Centerbody Installation

(Figure 401)

A. General

(1) This task is the installation procedure for the forward centerbody to the turbine rear frame.

B. References

Reference	Title
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-7856	Stand - Exhaust Nozzle, Removal and Installation Part #: 9C1209G02 Supplier: 06083
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
D50043 [C02-058]	Compound - Antiseize, Acheson GP460 (For Threaded Fasteners 0.250 Inches Diameter Or Larger, C02-079 Is An Alternative)	GE A50TF201 Class A
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

F. Forward Centerbody Installation

SUBTASK 78-11-02-490-004-H00

(1) Position the equipment to install the forward centerbody.

(a) Get a exhaust nozzle removal and installation stand, SPL-7856 to handle the forward centerbody during the installation, or

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Get a 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment for the two people that are necessary to handle the forward centerbody during the installation.

SUBTASK 78-11-02-420-003-H01

(2) Install the forward centerbody [8] to the turbine rear frame (Figure 401).

(a) Clean the mount flanges of the turbine rear frame and the forward centerbody [8]:

1) Dampen a cotton wiper, G00034 with alcohol, B00130.

2) Clean the mount flanges of the turbine rear frame and the forward centerbody [8] .

(b) Apply Acheson GP460 compound, D50043 [C02-058] to the threads and washer faces of the 28 nuts [10] and bolts [11].

(c) Install the forward centerbody [8] to the inner flange of the turbine rear frame with the 28 bolts [11], washers [9] and nuts [10] (Figure 401).

1) Make sure the alignment pin is engaged in the slot in the turbine rear frame.

2) Install the 28 bolts [11], washers [9]and nuts [10] to attach the forward centerbody [8] to the turbine rear frame flange. Make sure you install the 28 nuts [10] on the inner side of the turbine rear frame flange.

3) Tighten the nuts [10] to 398-467 pound-inches (45-53 Newton-meters) the first time.

4) Tighten the 28 nuts [10] in pairs 180 degrees across from each other around the circumference of the bolt flange to 543–637 pound-inches (61.4–72.0 Newton-meters).

SUBTASK 78-11-02-430-001-H01

(3) Do this task: Aft Centerbody Installation, TASK 78-11-02-400-801-H01.

G. Put the Airplane Back to Its Usual Condition.

SUBTASK 78-11-02-090-002-H01

(1) Make sure that the work area is clean of all tools and other items.

SUBTASK 78-11-02-090-004-H00

(2) Remove the work platform or similar equipment.

(a) Remove the exhaust nozzle removal and installation stand, SPL-7856, or

(b) Remove the 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment.

SUBTASK 78-11-02-440-002-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CENTER VENT TUBE EXTENSION - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) The removal of the center vent tube extension

(2) The installation of the center vent tube extension.

TASK 78-11-03-000-801-H01

2. Center Vent Tube Extension Removal

(Figure 401)

A. General

(1) This task is the removal procedure for the center vent tube extension.

(2) The center vent tube extension is on the No. 5 bearing sump cover.

B. References

Reference	Title
78-11-02-000-801-H01	Aft Centerbody Removal (P/B 401)
78-11-02-000-802-H01	Forward Centerbody Removal (P/B 401)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-653	Platform - Engine and Strut Access
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

E. Prepare for the Removal

SUBTASK 78-11-03-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

F. Center Vent Tube Extension Removal

SUBTASK 78-11-03-030-001-H01

(1) Do this task: Aft Centerbody Removal, TASK 78-11-02-000-801-H01.

SUBTASK 78-11-03-030-002-H01

(2) Do this task: Forward Centerbody Removal, TASK 78-11-02-000-802-H01.

SUBTASK 78-11-03-490-001-H01

(3) Use a engine and strut access platform, STD-653 or 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 for the two people necessary to remove the center vent tube extension.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-11-03-020-002-H01

(4) Remove the center vent tube extension (Figure 401):

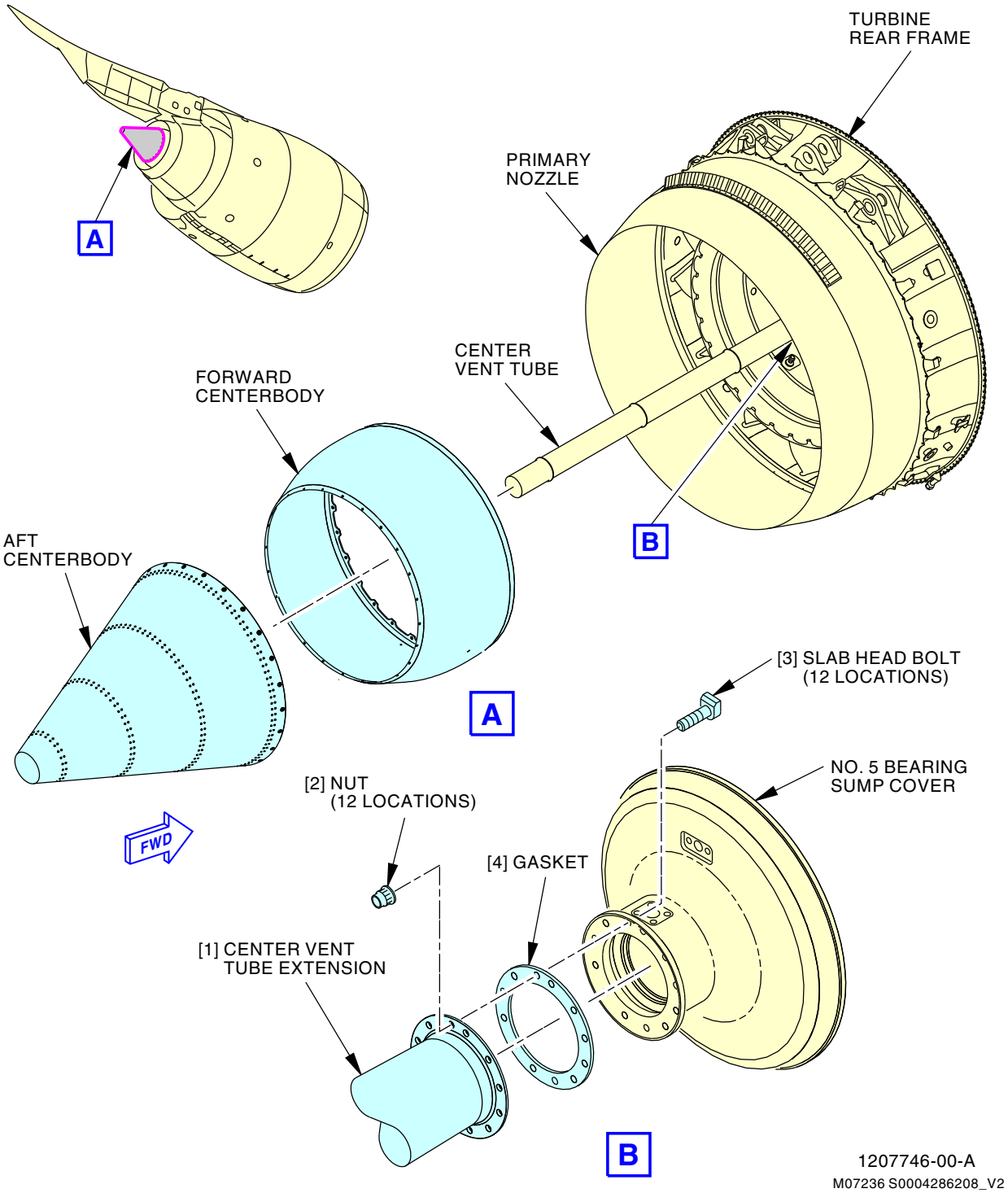
(a) Remove the twelve nuts [2] that attach the center vent tube extension [1] to the No. 5 bearing sump cover.

(b) Remove the center vent tube extension [1].

(c) Remove and discard the gasket [4].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Center Vent Tube Extension Installation
Figure 401/78-11-03-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-11-03-400-801-H01

3. Center Vent Tube Extension Installation

(Figure 401)

A. General

(1) This task is the installation procedure for the center vent tube extension.

B. References

Reference	Title
78-11-02-400-801-H01	Aft Centerbody Installation (P/B 401)
78-11-02-400-802-H01	Forward Centerbody Installation (P/B 401)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-653	Platform - Engine and Strut Access
STD-660	Platform - Maintenance, 4 to 8 ft (1.2 to 2.4 m) High

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
419	Primary Exhaust Nozzle and Plug - Left Engine
429	Primary Exhaust Nozzle and Plug - Right Engine

F. Center Vent Tube Extension Installation

SUBTASK 78-11-03-160-001-H01

(1) Clean the mount flange of the No.5 bearing sump cover and the center vent tube.

(a) Make a cotton wiper, G00034 moist with alcohol, B00130.

(b) Clean the mount flange of the No.5 bearing sump cover and the center vent tube extension.

SUBTASK 78-11-03-420-002-H01

CAUTION

DO NOT INSTALL A CENTER VENT TUBE (6-BOLT FLANGE) ON THE SUMP COVER OF A NO. BEARING (12-BOLT FLANGE). THIS WILL PREVENT VIBRATION DAMAGE TO THE FLOATING NUTS.

(2) Install the center vent tube extension to the No.5 bearing sump cover (Figure 401).

(a) Apply compound, Acheson GP460 to the threads and washer faces of the twelve slab head bolts [3].

(b) Install the gasket [4] to the mating flange of the No.5 bearing sump cover.

(c) Install the center vent tube extension [1] to the No.5 bearing sump cover with the twelve nuts [2].

1) Tighten the twelve nuts [2] to 75-90 pound-inches (8.5-10.2 newton-meters) in pairs, 180 degrees across from each other, around the circumference of the bolt flanges.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Tighten the twelve nuts [2] to 100-120 pound-inches (11.3-13.6 newton-meters) in pairs, 180 degrees across from each other, around the circumference of the bolt flanges.

SUBTASK 78-11-03-430-001-H01

(3) Do this task: Forward Centerbody Installation, TASK 78-11-02-400-802-H01.

SUBTASK 78-11-03-430-002-H01

(4) Do this task: Aft Centerbody Installation, TASK 78-11-02-400-801-H01.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-11-03-090-001-H01

(1) Make sure that the work area is clean of all tools and other items.

(a) Remove the engine and strut access platform, STD-653 or 4 to 8 ft (1.2 to 2.4 m) high maintenance platform, STD-660 or similar equipment.

SUBTASK 78-11-03-440-001-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYSTEM - MAINTENANCE PRACTICES

1. General

A. This procedure has these tasks to operate the thrust reverser system or get access the engine and thrust reverser components:

(1) Open the Thrust Reverser (Selection)
(2) Close the Thrust Reverser (Selection)
(3) Open the Thrust Reverser (Power Method)
(4) Close the Thrust Reverser (Power Method)
(5) Open the Thrust Reverser (Manual Method)
(6) Close the Thrust Reverser (Manual Method)
(7) Open the Thrust Reverser (Sling Method)
(8) Close the Thrust Reverser (Sling Method)
(9) Open the Thrust Reverser (Hand Pump Method)
(10) Close the Thrust Reverser (Hand Pump Method)
(11) Thrust Reverser Operation - Extend (Selection)
(12) Thrust Reverser Operation - Retract (Selection)
(13) Thrust Reverser Operation - Extend (Power Method)
(14) Thrust Reverser Operation - Retract (Power Method)
(15) Thrust Reverser Operation - Extend (Manual Method)
(16) Thrust Reverser Operation - Retract (Manual Method)
(17) Thrust Reverser Deactivation for Ground Maintenance
(18) Thrust Reverser Activation after Ground Maintenance.
(19) Thrust Reverser Blocker Door Access Platform
(20) Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Open the Thrust Reverser
(21) Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Close the Thrust Reverser

TASK 78-31-00-010-816-H00

2. Open the Thrust Reverser (Selection)

A. Procedure

SUBTASK 78-31-00-010-001-H01

(1) Do one of these tasks to open the thrust reverser:
(a) Open the Thrust Reverser (Power Method), TASK 78-31-00-010-802-H01.
(b) Open the Thrust Reverser (Manual Method), TASK 78-31-00-010-803-H01.
(c) Open the Thrust Reverser (Sling Method), TASK 78-31-00-010-804-H01.
(d) Open the Thrust Reverser (Hand Pump Method), TASK 78-31-00-010-806-H01.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-410-816-H00

3. Close the Thrust Reverser (Selection)

A. Procedure

SUBTASK 78-31-00-410-001-H01

(1) Do one of these tasks to close the thrust reverser:

(a) Close the Thrust Reverser (Power Method), TASK 78-31-00-410-802-H01.

1) Use this procedure to close the thrust reverser with the PDOS unit that is electrically operational.

(b) Close the Thrust Reverser (Manual Method), TASK 78-31-00-410-803-H01.

1) Use this procedure to close a thrust reverser if the PDOS unit is not electrically operational.

(c) Close the Thrust Reverser (Sling Method), TASK 78-31-00-410-804-H01.

(d) Close the Thrust Reverser (Hand Pump Method), TASK 78-31-00-410-806-H01.

1) Use this procedure to close a thrust reverser if the PDOS unit is not electrically or mechanically operational.

——— END OF TASK ———

TASK 78-31-00-010-802-H01

4. Open the Thrust Reverser (Power Method)

(Figure 201, Figure 202, Figure 203, and Figure 204)

A. General

(1) This is the usual procedure to open the thrust reverser with the power door opening system (PDOS).

(2) In this procedure, you operate the inlet-mounted thrust reverser control switches which sets the electric solenoid valves on the PDOS unit to the correct position to open the thrust reverser and operates the pump in the PDOS unit. The PDOS electric pump forces oil from the PDOS unit reservoir to extend the PDOS actuators to open the thrust reverser.

(3) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(4) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the wing and the thrust reverser sleeves could occur.

(5) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(6) If it is necessary to open the thrust reverser to do maintenance on the PDOS equipment, use the sling method to open the thrust reversers.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(7) Pressure build-up from thermal expansion of the oil in the PDOS actuators can cause a pre-load on the tension latches. The tension latches cannot be opened on the thrust reverser. The thermal expansion of the oil is cause by heat from the sun when the airplane is parked in the sun. Press the PDOS DOWN button for 10-30 seconds to relieve the pressure for each actuator.

(8) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the left and right down button on PDOS unit for 10-30 seconds to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
425KB	Forward Thrust Reverser Latch Panel, Right Engine

E. Procedure

SUBTASK 78-31-00-860-002-H01

CAUTION RETRACT THE LEADING EDGE SLATS. DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS BEFORE YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DAMAGE TO THE LEADING EDGE SLATS AND THRUST REVERSERS CAN OCCUR.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-002-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-040-003-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-00-010-003-H01

(4) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-864-001-H01

(5) Press the PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches (Figure 203).

SUBTASK 78-31-00-010-036-H01

(6) Open the latch beam access doors on the applicable engine:

(a) Open these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-010-051-H00

CAUTION

OPEN ALL LATCHES ON THE THRUST REVERSER HALVES BEFORE YOU OPEN A THRUST REVERSER HALF. IF A LATCH HOOK STAYS ENGAGED, DAMAGE TO THE THRUST REVERSER, THE STRUT LIMITER RODS, AND BRACKETS CAN OCCUR.

(7) Disengage and open the latches on the thrust reverser in the sequence that follows (Figure 201, Figure 202):

NOTE: The latch location numbers are shown in brackets.

NOTE: Open the upper T-hook latch [12]. Open the No. 2 centerline tension latch [11] to disengage the lower interlock pin. Disengage the aft cowl deflection limiter latches [1], [2], [3] and [4] from aft to forward. Next, open the aft cowl centerline latches [5], [6] and [7] from aft to forward. Open the No. 5 [8], No. 4 [9] and No. 3 [10] centerline tension latches. Open the No. 1 tension latch [13] . Open the V-band latch [14] last.

NOTE: The No.1 tension latch and the No. 5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the right side thrust reverser.

(a) Open the upper bifurcation T-hook latch [12] on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down to the fully extended position to keep the T-hook in the vertical (open) position.

2) Push the T-handle button in and pull down the handle to the fully extended position to keep the T-hook in the vertical (open) position.

3) If the T-hook latch does not operate, refer to the task: Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Open the Thrust Reverser, TASK 78-31-00-980-803-H01.

(b) Open the No.2 centerline latch beam tension latch [11].

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

3) Make sure the bracket assembly for the interlock pin has moved down to the open position to disengage the interlock pin.

NOTE: The spring loaded interlock pin should move downward and move the bracket assembly downward to show that the interlock pin has disengaged from the serrated fitting on the right side thrust reverser. When you close the No. 2 tension latch, the latch body pushes the bracket assembly upward which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(c) Open the four deflection limiter latches [1], [2], [3] and [4] on the aft cowls.

NOTE: There are two deflection limiter latches for each aft cowl. All four deflection limiter latch hooks must be disengaged if the left or right thrust reverser is opened.

1) Open the two aft latches first, before you open the two forward latches.
2) Push on the secondary lock to open the spring loaded latch handle.
3) Pull the handle to the full open position to release the hook from the tension strap keeper.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(d) Open the three aft cowl centerline latches [5], [6] and [7] from the aft latch to the forward latch.

1) Push on the secondary lock to open the spring loaded latch handle.
2) Pull the handle to the full open position to release the hook from the latch keeper eyebolt.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(e) Open the No. 5 tension latch [8], the No. 4 tension latch [9] and the No. 3 tension latch [10] on the centerline latch beam from the aft latch to the forward latch.

NOTE: At the No. 5 tension latch, use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle. At the No.4 and No.3 tension latches, because of the small access space to the latches, a small wire hook (local manufacture) can be used to help open the latch handle.

1) Push on the secondary lock to open the spring loaded latch handle.
2) Pull the handle to the full open position to release the hook from the latch bolt.

(f) Open the No.1 tension latch [13].

1) Move the small, unlock lever down.
2) Move the latch handle downward to the open position.
3) Disengage the No.1 latch T-bolt from the latch keeper hook.

WARNING

MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(g) Open the V-band latch [14].

1) Hold the latch handle firmly against the force you will feel when you release the trigger A latch and move the latch handle.

NOTE: The force on the handle will be 50-55 pounds (222-245 newtons).

2) Push upward on the end of the latch handle to release trigger A lock pin.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Slide trigger A toward the end of the handle.

4) Move the handle downward and to the left until the handle locks in the vertical position.

NOTE: This is the unlock stroke.

5) Hold the latch handle firmly against the force you will feel when you release the trigger B latch and move the latch handle.

6) Move the handle to the left to relieve the preload on trigger B.

7) Slide trigger B away from the handle pivot points.

8) Move the handle from the vertical to the horizontal position.

NOTE: This is the release stroke.

9) Make sure the latch hook is disengaged from the T-bolt receiver.

10) Put the v-band latch in the stowed position.

SUBTASK 78-31-00-010-005-H01

WARNING

DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER UNTIL YOU LOCK THE HOLD-OPEN ROD. THE THRUST REVERSER IS HEAVY. IT WILL CLOSE QUICKLY IF THE PRESSURE IS REMOVED FROM THE PDOS. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

CAUTION

DO NOT OPEN THE THRUST REVERSER IF THE TRANSLATING SLEEVES ARE EXTENDED. THE EXTENDED SLEEVES CAN HIT THE STRUT PANELS. DAMAGE TO EQUIPMENT CAN OCCUR.

(8) Open the thrust reverser.

(a) Find the PDOS switch for the left thrust reverser at the 8 o'clock position and the right thrust reverser at the 4 o'clock position on the aft bulkhead of the inlet cowl.

(b) Push and hold the UP (top) button on the PDOS switch until the thrust reverser is fully open and the hold-open rod locks (Figure 204).

NOTE: A yellow safety band on the upper side of the lock collar is the indication for the locked position. A red safety band on the lower side of the lock collar is the indication for the unlocked position. An audible click or snap is also an indication when you extend the hold-open rod to the locked position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING KEEP HANDS CLEAR OF MATING SURFACES WHEN YOU OPEN THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS CAN OCCUR.

(c) Watch the clearances as you open the thrust reverser to make sure the outer v-groove blade smoothly disengages with the outer v-groove on the engine fan case.

NOTE: While the thrust reverser starts to open, it can be necessary to apply hand pressure aft on the thrust reverser cowl to smoothly disengage the outer v-grooves and to prevent interference between the Thrust Reverser Cowl and Engine Fan Case.

(d) Push the DOWN (bottom) button on the PDOS switch to lower the thrust reverser to put the weight on the hold-open rod.

F. Thrust Reversers - Tryout

NOTE: This tryout is to make sure that the thrust reversers are in the fully open position.

SUBTASK 78-31-00-210-008-H00

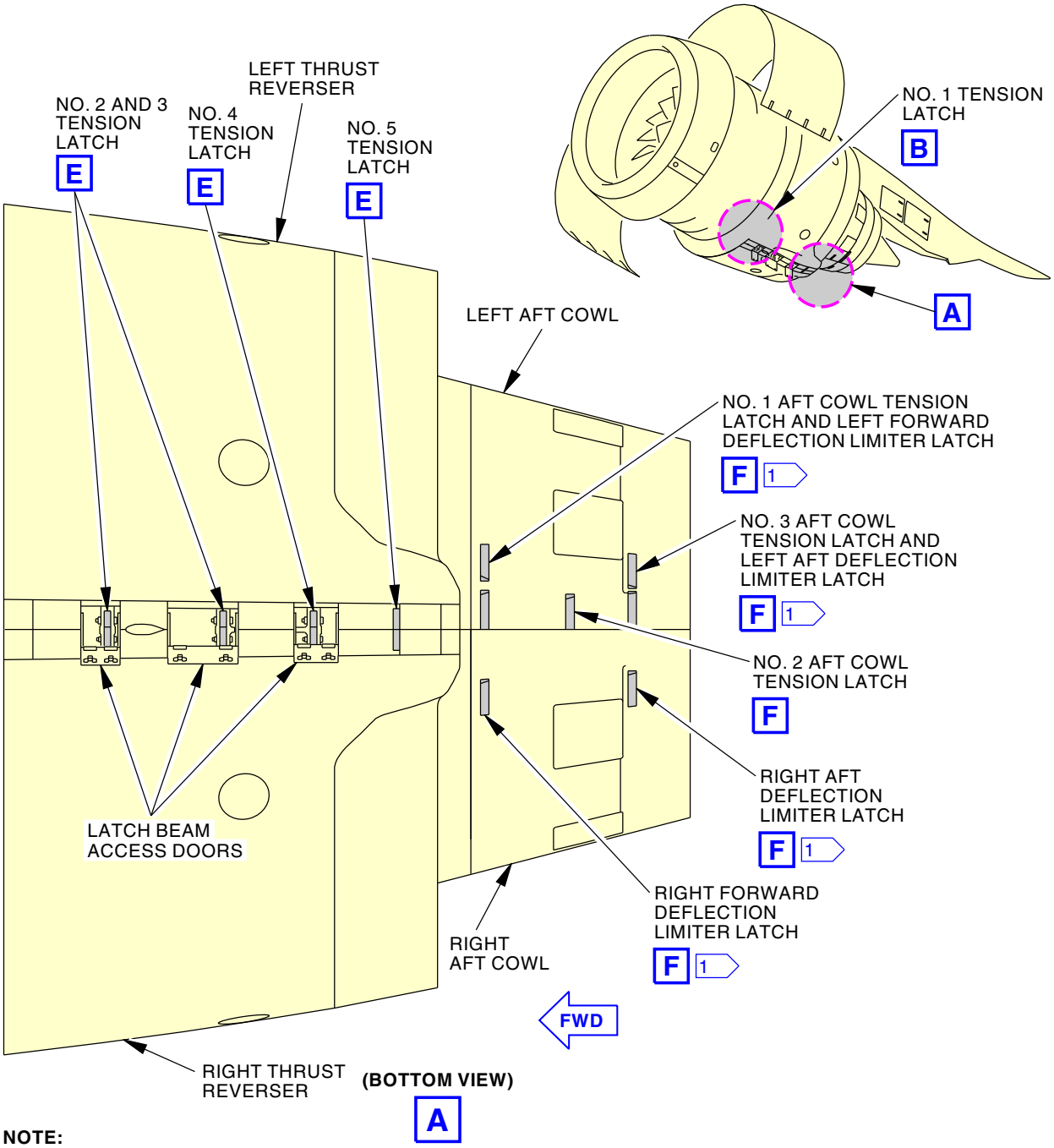
(1) Make sure that the yellow safety stripe on the lower side of the lock collar is seen.

SUBTASK 78-31-00-210-009-H00

(2) Make sure that the red safety stripe on the lower side of the lock collar is not seen.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

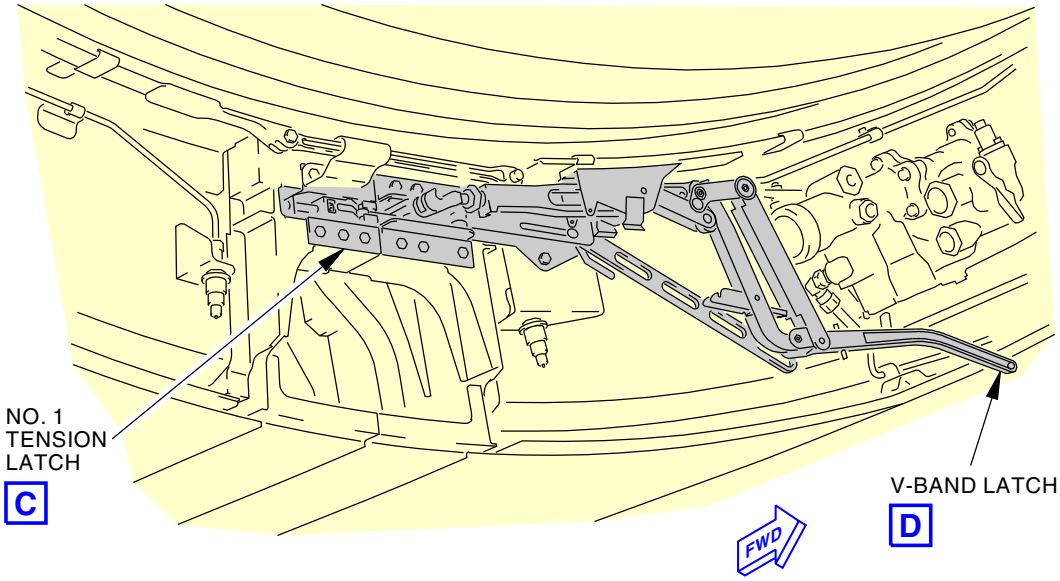
THE STENCIL NUMBERS THAT IDENTIFY THE LATCHES ON THE THRUST REVERSER AND AFT COWL ARE NOT OPEN/CLOSE SEQUENCE NUMBERS.

1 ALL 4 DEFLECTION LIMITER LATCH HOOKS MUST BE DISENGAGED WHEN THE LEFT OR RIGHT THRUST REVERSER HALF IS OPENED

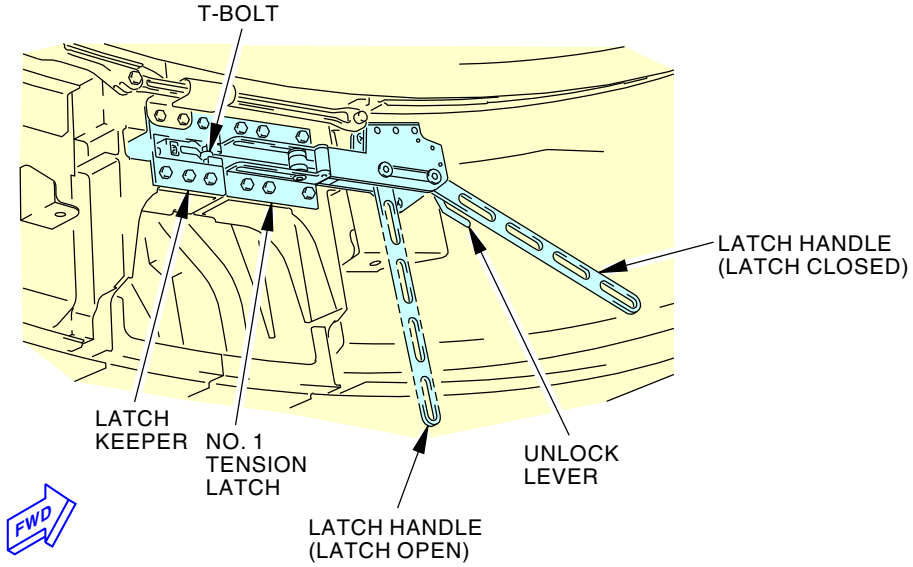
M07238 S0004286216_V5

Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 1 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(HARTWELL HA277-3)
V-BAND LATCH
B

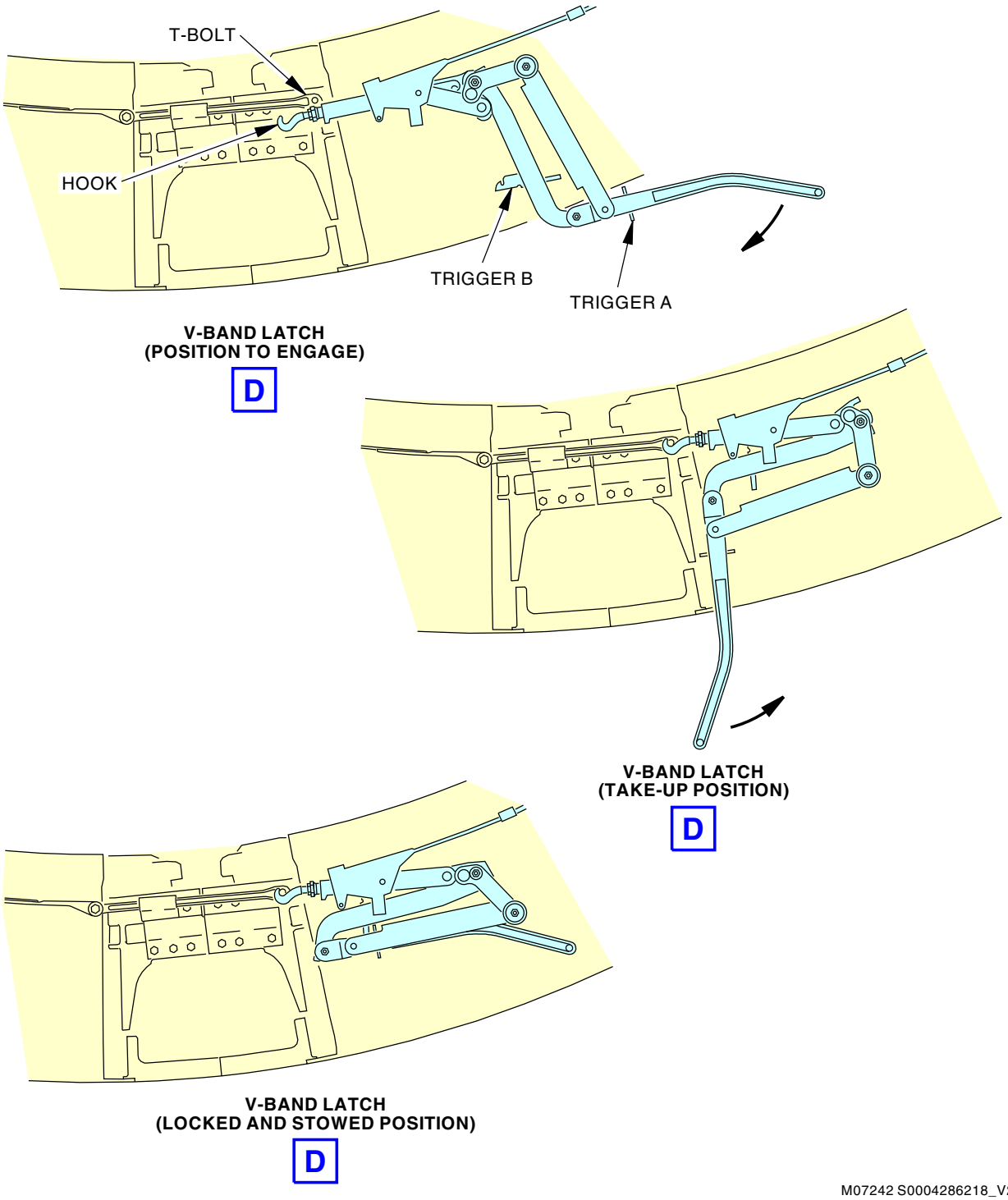


THRUST REVERSER NO. 1 TENSION LATCH
(V-BAND LATCH REMOVED FOR CLARITY)
C

M07240 S0004286217_V3

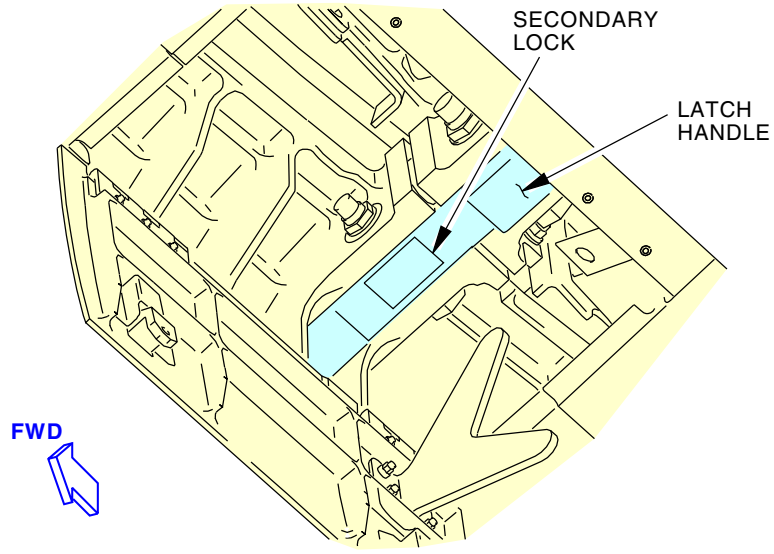
Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 2 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



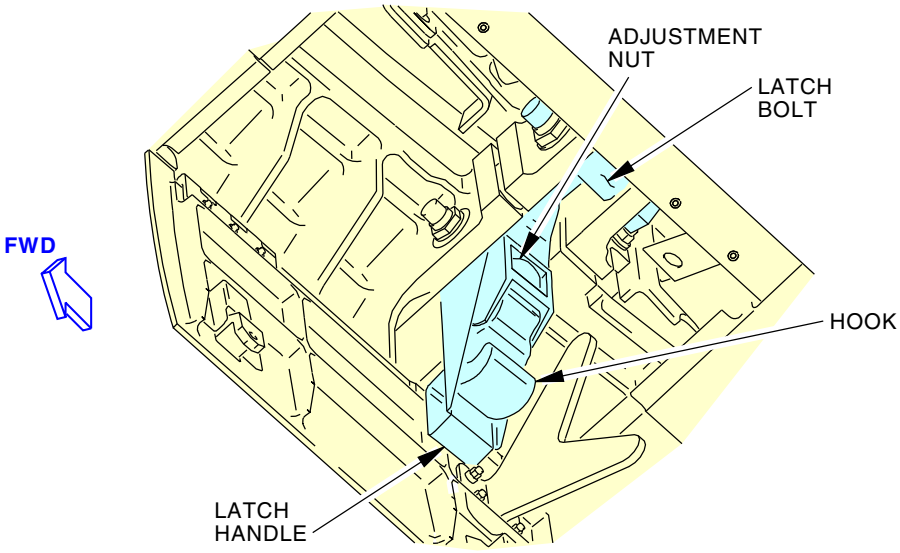
Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 3 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER NO. 2-5 TENSION LATCH
(CLOSED POSITION)
(EXAMPLE, 4 LOCATIONS)

E



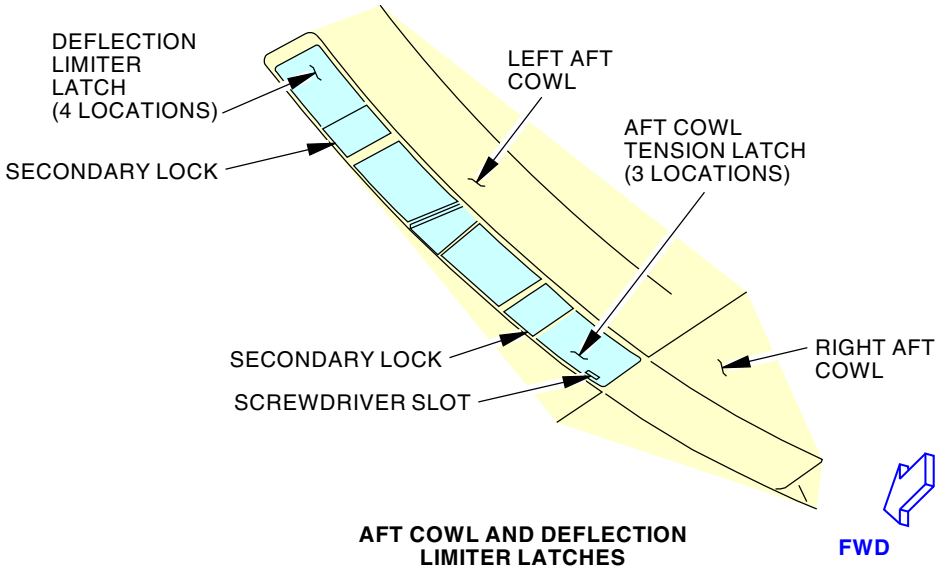
THRUST REVERSER NO. 2-5 TENSION LATCH
(OPEN POSITION)
(EXAMPLE, 4 LOCATIONS)

E

M07244 S0004286219_V3

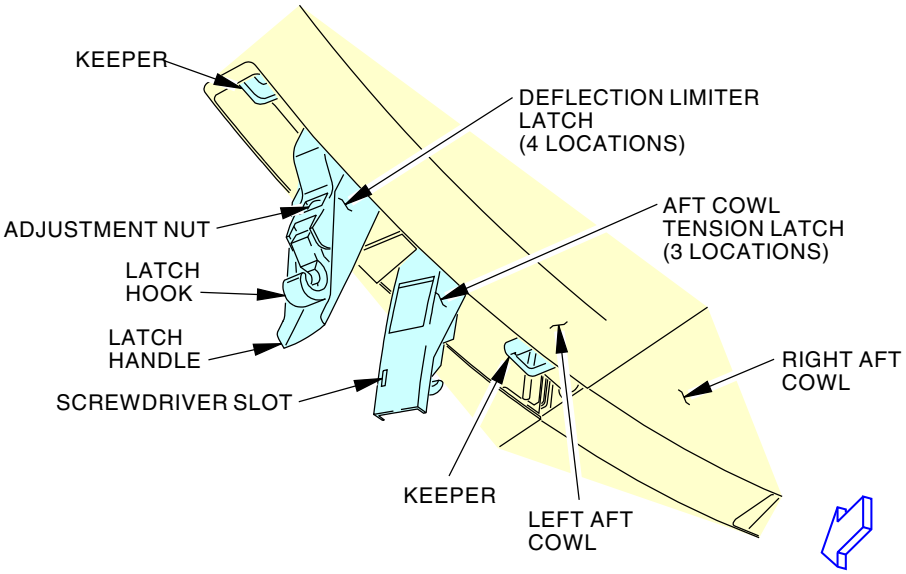
Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 4 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL AND DEFLECTION LIMITER LATCHES (CLOSED POSITION) (EXAMPLE)

F



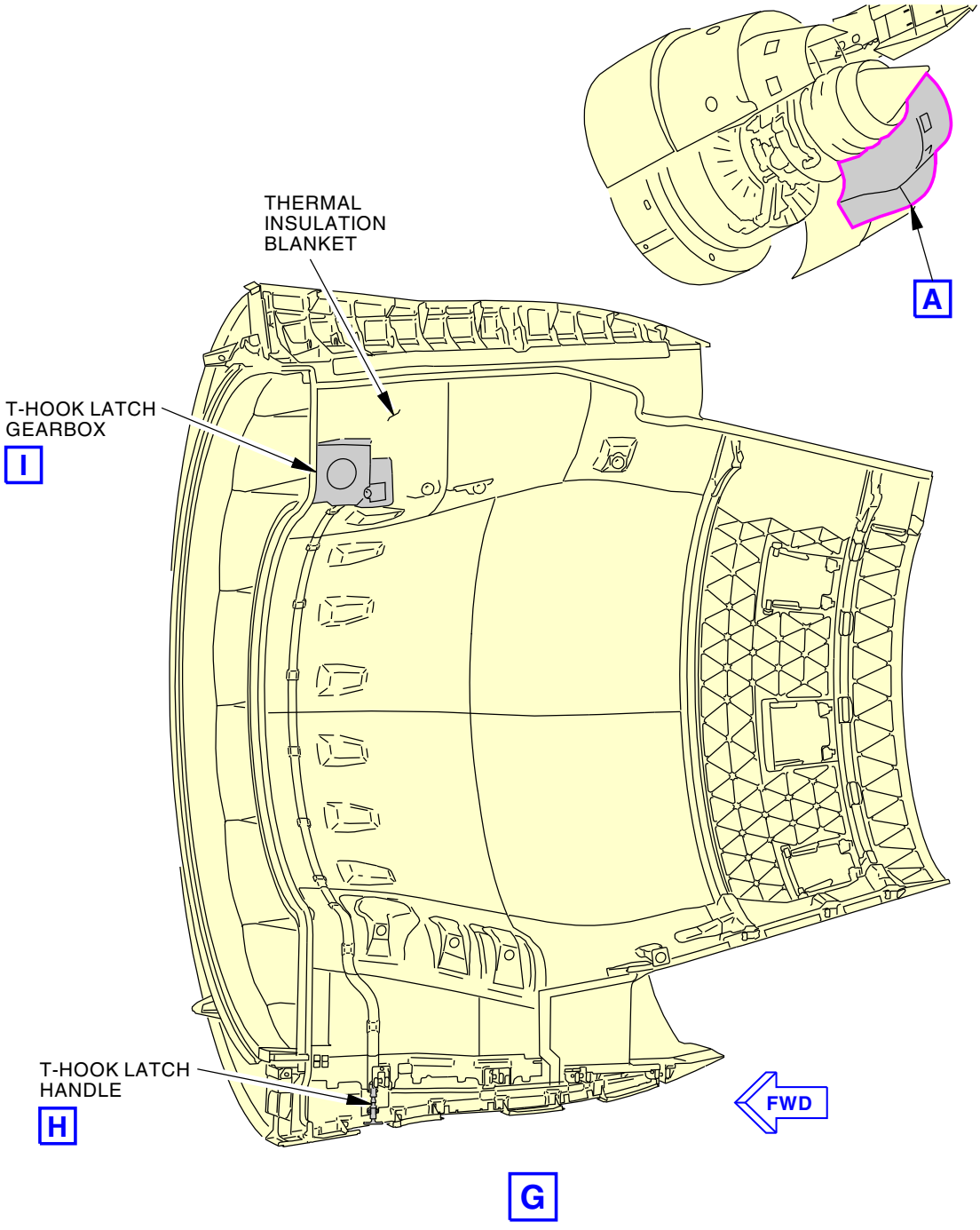
AFT COWL AND DEFLECTION LIMITER LATCHES (OPEN POSITION) (EXAMPLE)

F

M07246 S0004286220_V2

Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 5 of 11)

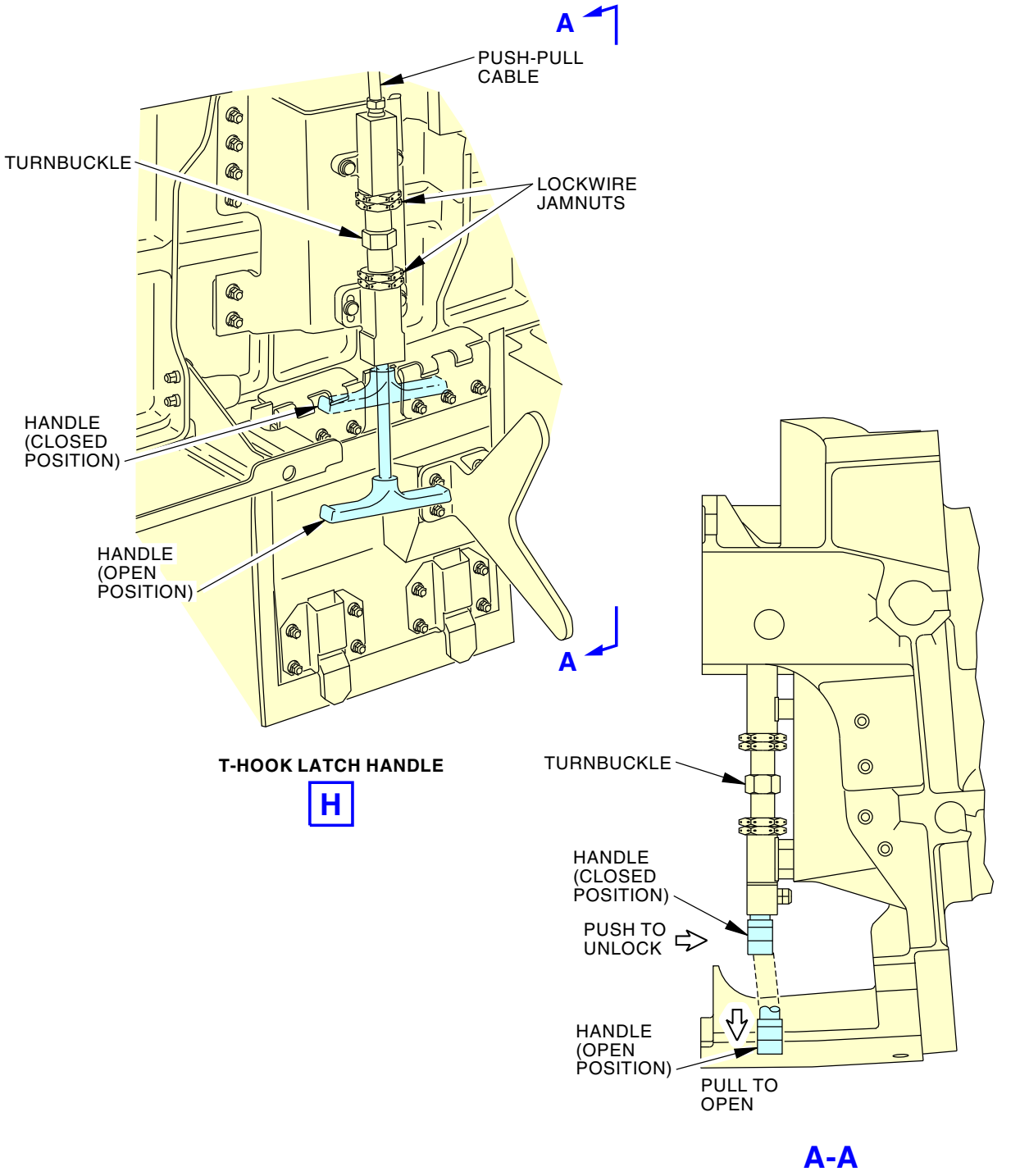
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



W85447 S0000131586_V3

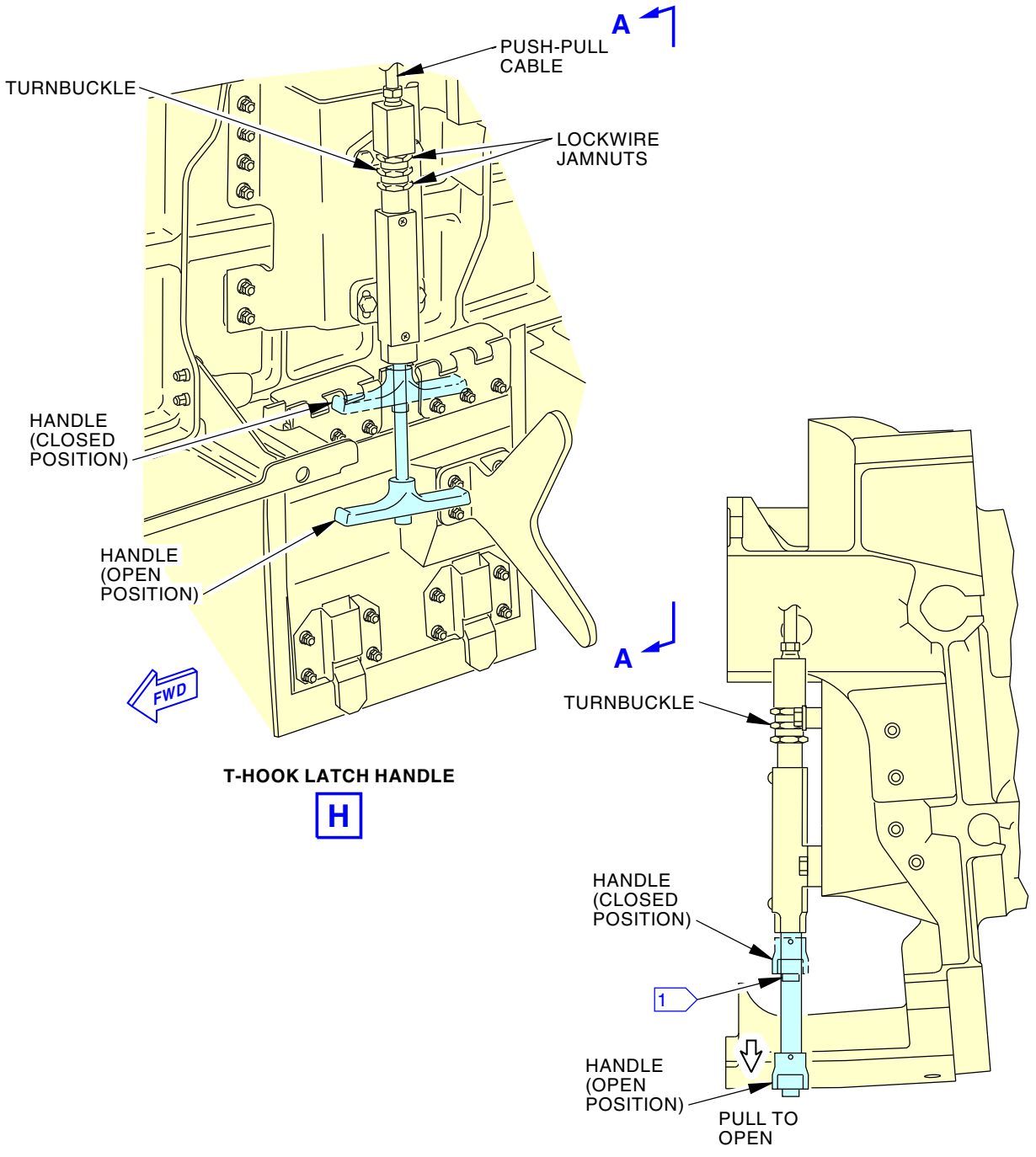
Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 6 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



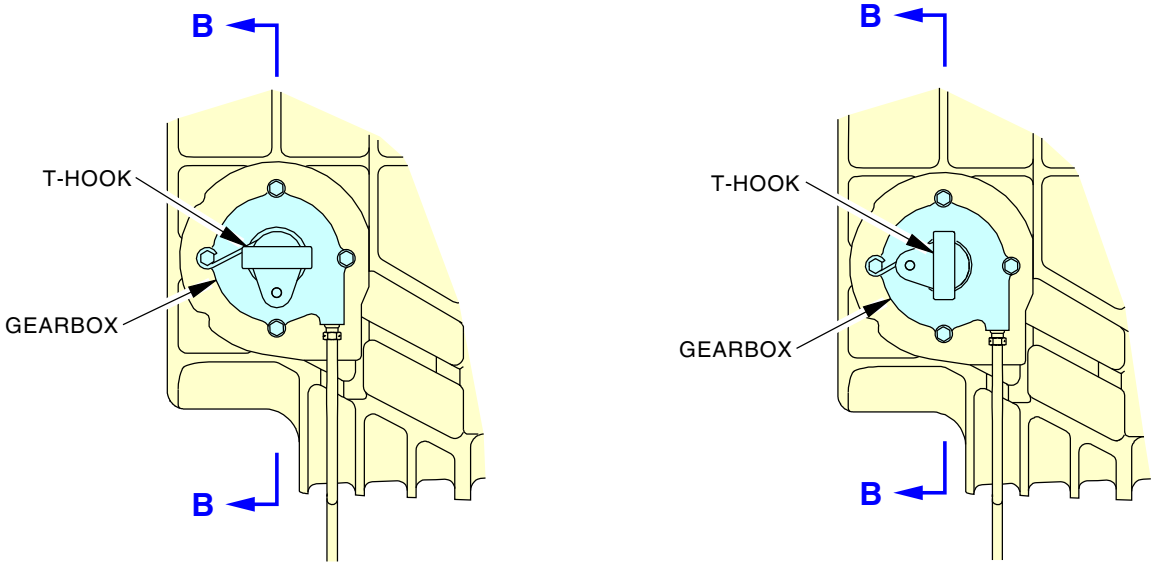
Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 7 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 8 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

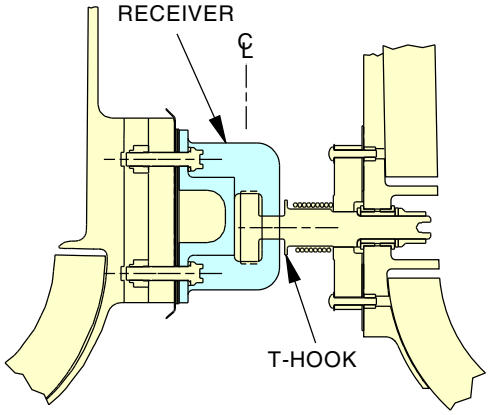


T-HOOK LATCH (CLOSED POSITION)

I

T-HOOK LATCH (OPEN POSITION)

I



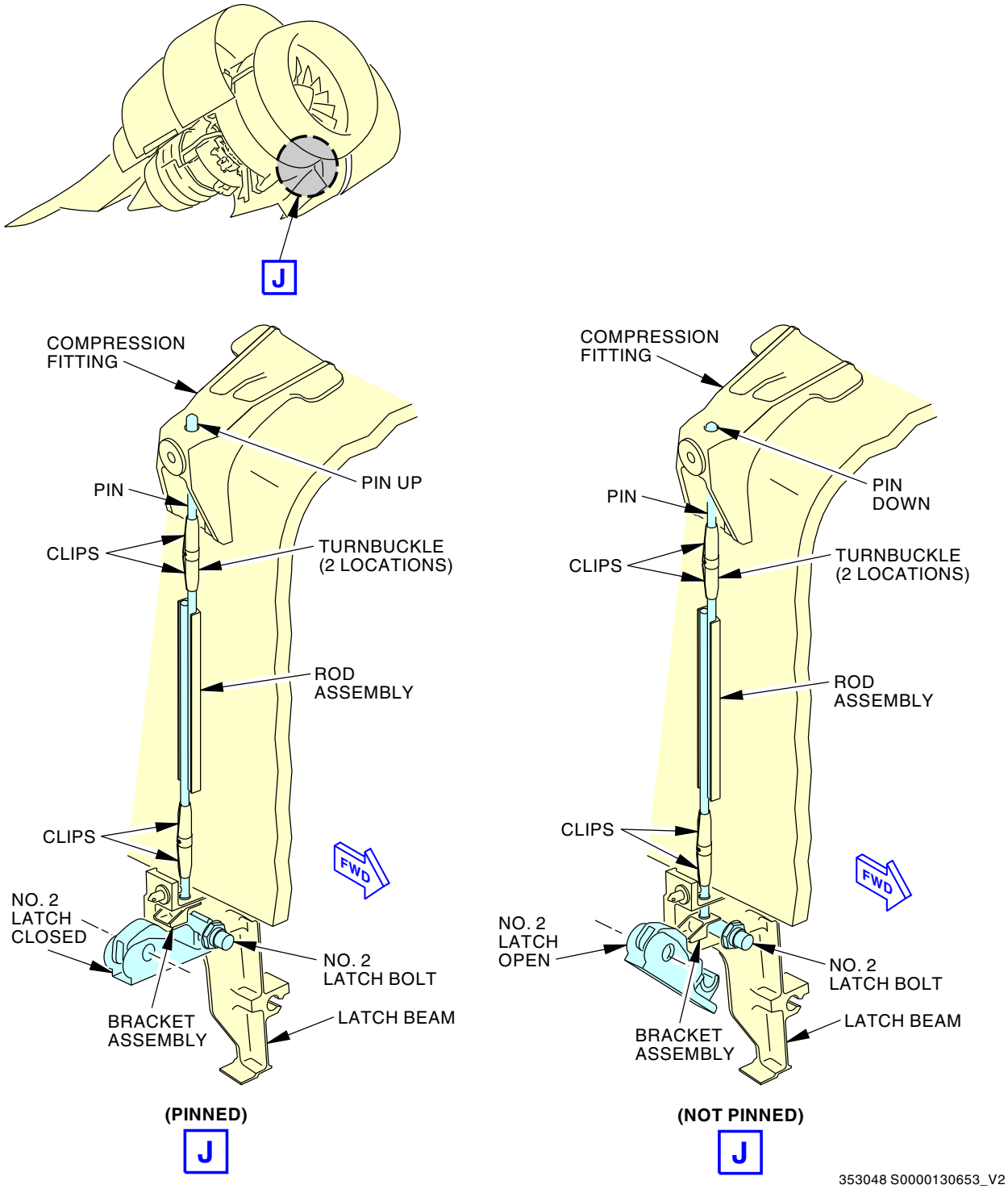
THRUST REVERSER CLOSED

B-B

D80010 S0000165142_V3

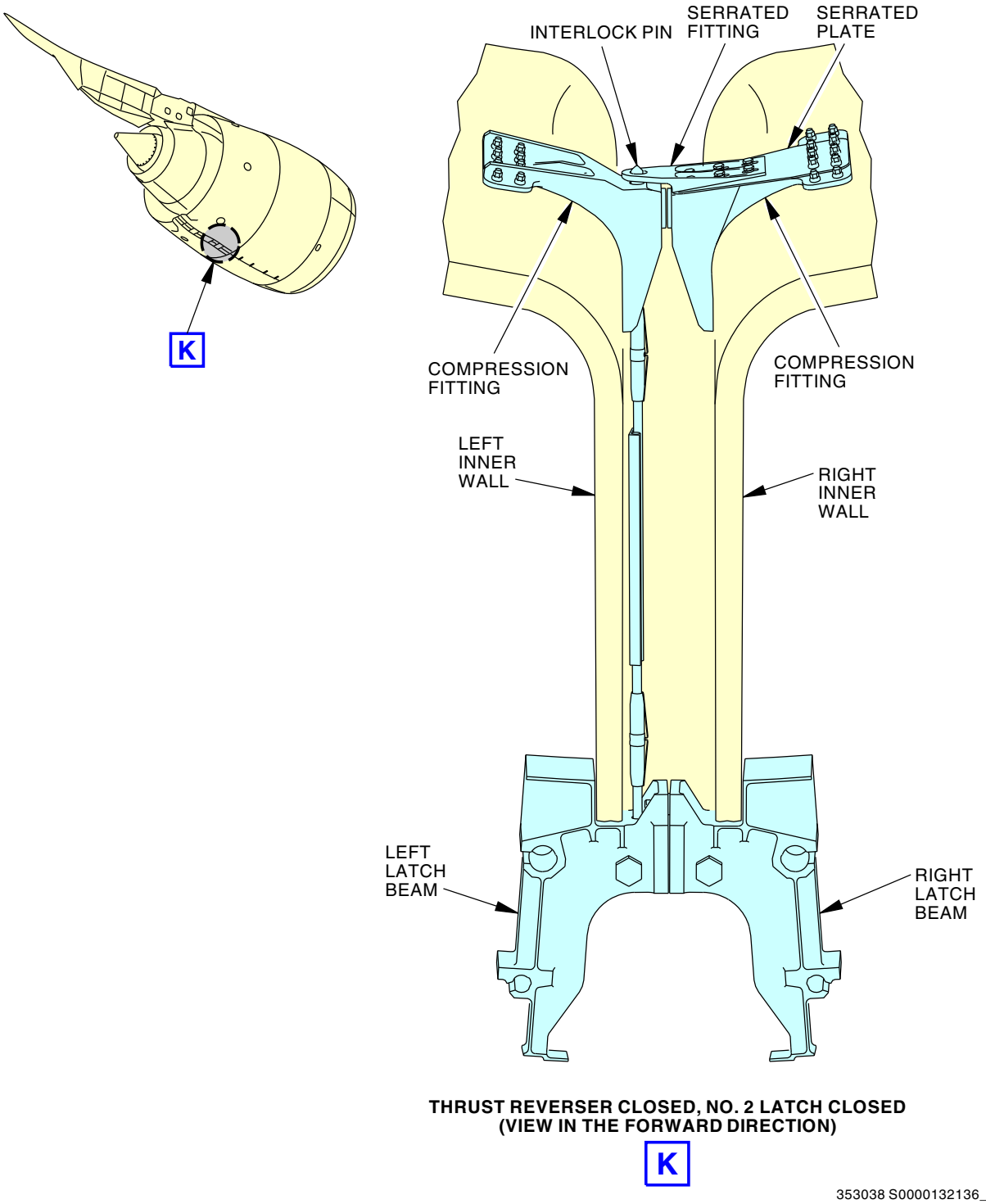
Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 9 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 10 of 11)

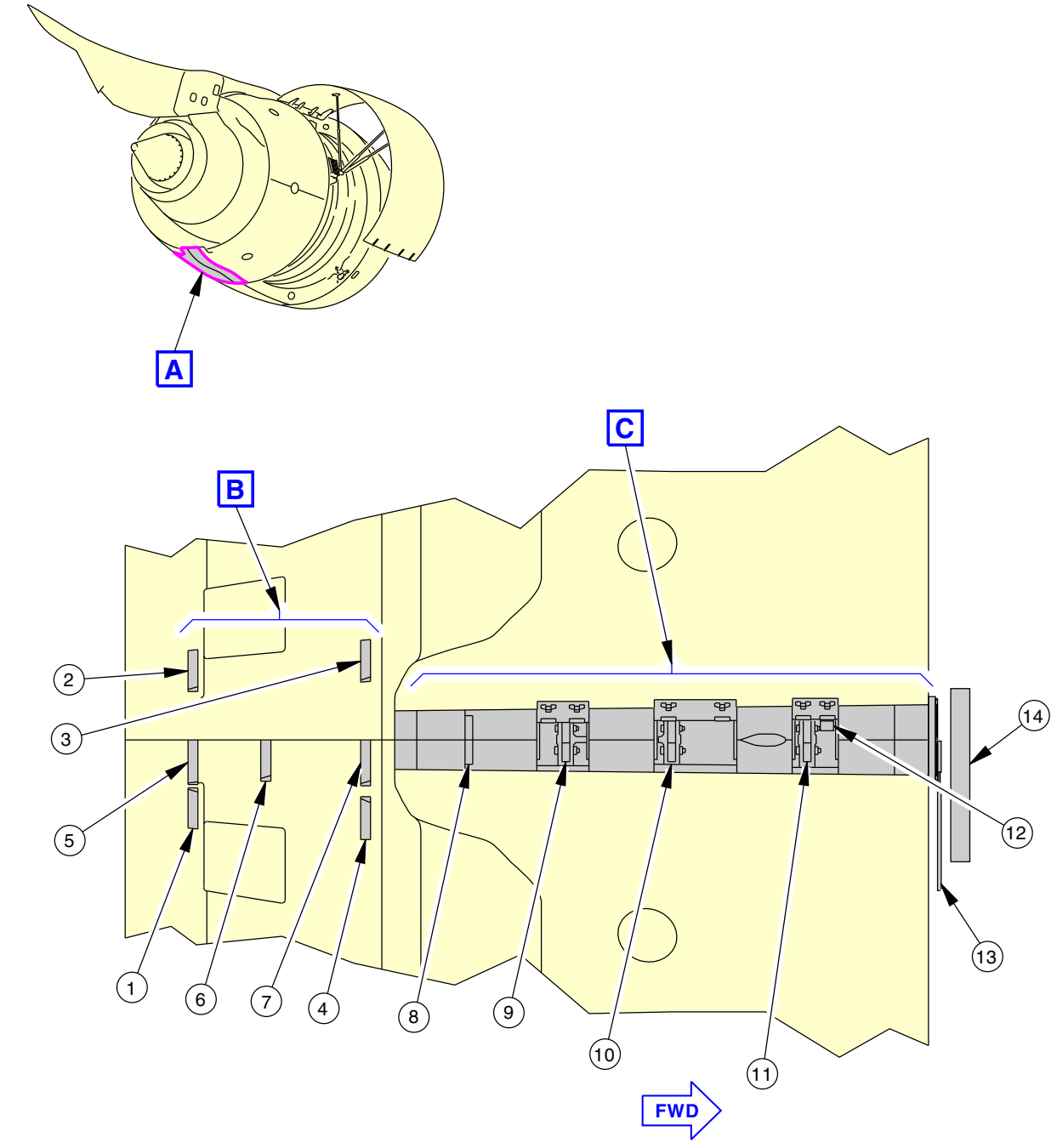
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER CLOSED, NO. 2 LATCH CLOSED
(VIEW IN THE FORWARD DIRECTION)

Thrust Reverser Latches
Figure 201/78-31-00-990-809-H01 (Sheet 11 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



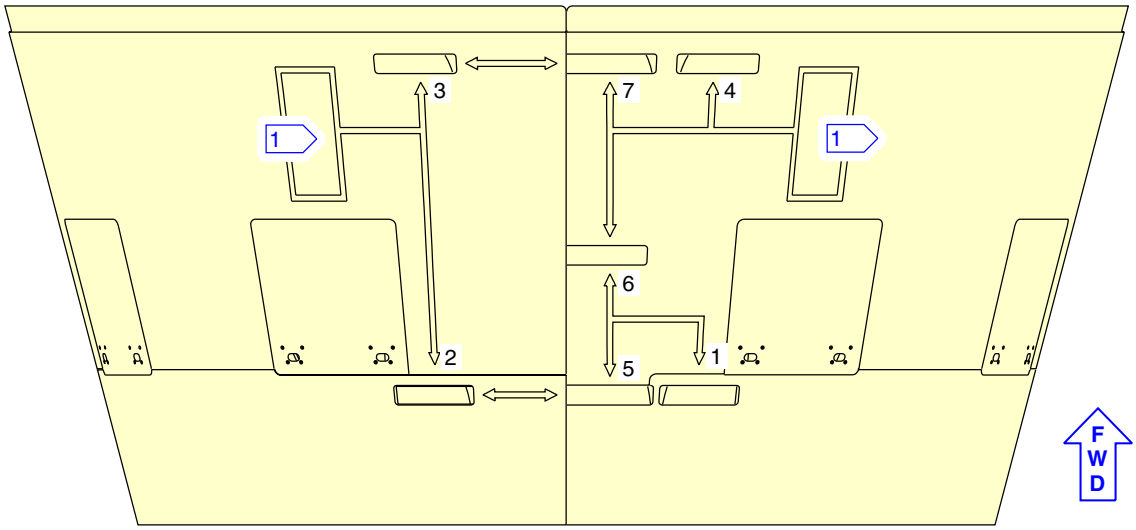
LEGEND:
◯ = LATCH LOCATION NUMBERS

A

D63535 S0000162243_V4

Thrust Reverser Latch Location Numbers
Figure 202/78-31-00-990-832-H00 (Sheet 1 of 2)

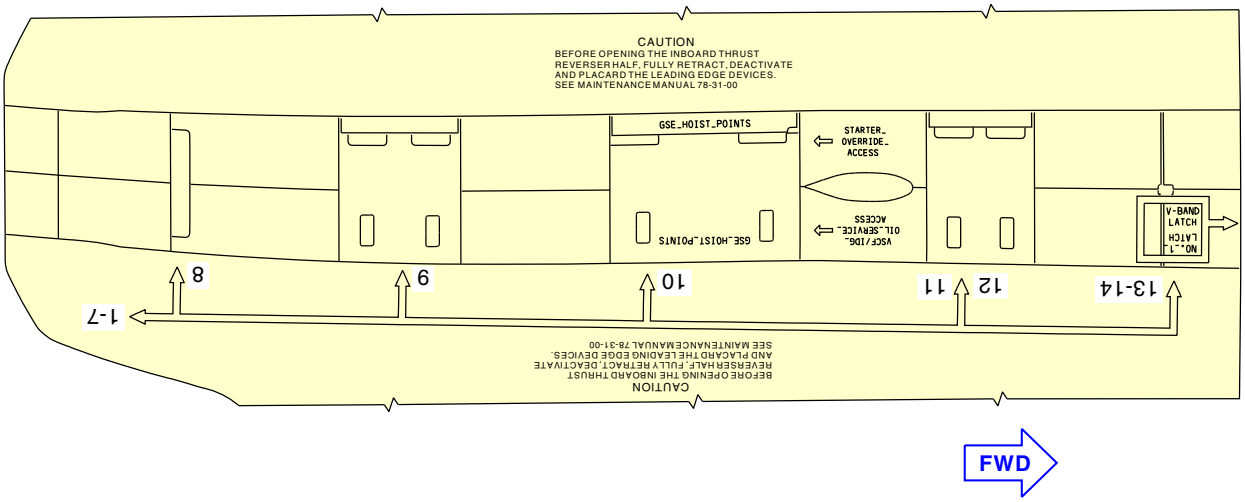
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 OPEN ALL 14 LATCHES ON BOTH T/R HALVES PRIOR TO OPENING EITHER T/R HALF

(VIEW IN THE UP DIRECTION)

B



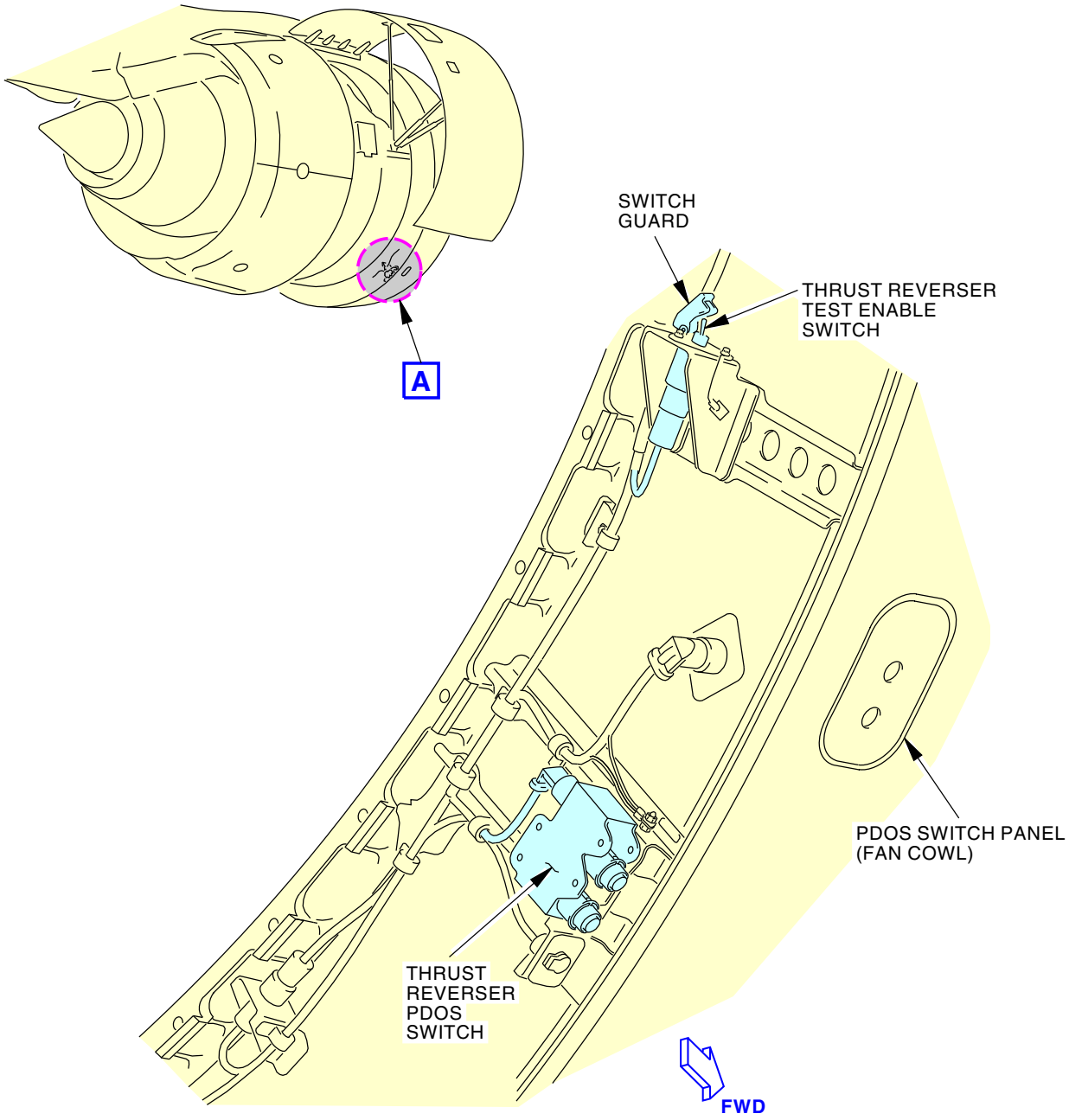
(VIEW IN THE UP DIRECTION)

C

J66085 S0000174744_V2

Thrust Reverser Latch Location Numbers
Figure 202/78-31-00-990-832-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



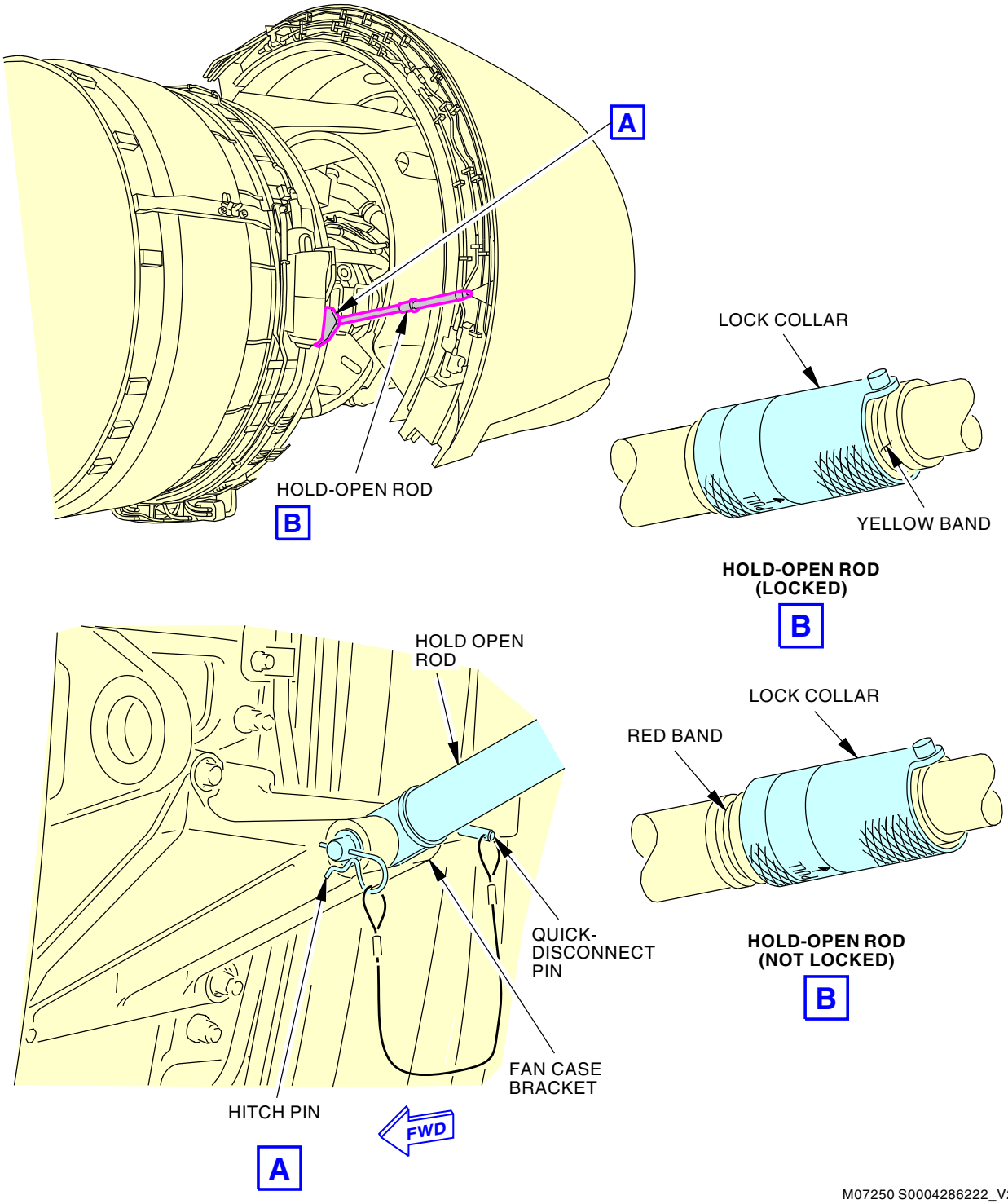
(RIGHT SIDE IS SHOWN, LEFT SIDE IS EQUIVALENT)

A

M07249 S0004286221_V2

Thrust Reverser PDOS - Power Method
Figure 203/78-31-00-990-822-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Hold Open Rod
Figure 204/78-31-00-990-823-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-410-802-H01

5. Close the Thrust Reverser (Power Method)

(Figure 201, Figure 202, Figure 203, and Figure 204)

A. General

(1) This is the usual procedure to close the thrust reverser with the power door opening system (PDOS).

(2) In this procedure, you operate the inlet-mounted thrust reverser control switches which sets the electric solenoid valves on the PDOS unit to the correct position to close the thrust reverser. The weight of the thrust reverser causes the thrust reverser to close and forces the oil in the PDOS actuators to return to the reservoir in the PDOS unit.

(3) You must not extend or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(4) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(5) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(6) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the down button on PDOS unit to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-19-000-801-H01	Thrust Reverser Latch Access Doors Removal (P/B 401)
78-31-19-400-801-H01	Thrust Reverser Latch Access Doors Installation (P/B 401)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

E. Procedure

SUBTASK 78-31-00-410-003-H01

(1) Close the thrust reverser:

(a) Push and hold the UP button on the PDOS switch until the thrust reverser fully opens and removes the weight from the hold-open rod (Figure 203).

(b) Pull the collar on the hold-open rod to the unlocked position (Figure 204).

NOTE: The collar will stay in the unlocked position.

(c) Push and hold the DOWN button on the PDOS switch until the thrust reverser is fully closed.

WARNING KEEP HANDS CLEAR OF MATING SURFACES WHEN YOU CLOSE THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS CAN OCCUR.

CAUTION MAKE SURE THAT THE T-HANDLE IS IN THE FULL OPEN POSITION BEFORE YOU CLOSE THE THRUST REVERSER. DAMAGE CAN OCCUR AT THE T-HOOK LATCH.

1) Watch the clearances as you close the thrust reverser to make sure the outer v-groove blade aligns with and fully engages the outer v-groove on the engine fan case.

NOTE: While the thrust reverser nears the closed position it can be necessary to apply hand pressure aft on the thrust reverser cowl to align the outer v-grooves and prevent interference between the thrust reverser cowl and the engine fan case.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-410-041-H00

(2) Engage and close the latches on the thrust reverser in the sequence that follows (Figure 201):

NOTE: The latch location numbers are shown in brackets.

NOTE: Close the V-band latch [14] first. Close the No.1 tension latch [13]. Close the No.3 [10], No. 4 [9] and No.5 [8] centerline tension latches from forward to aft. Close the aft cowl centerline tension latches [7], [6] and [5] from forward to aft. Close the aft cowl deflection limiter latches [3], [4] then [2] and [1] from forward to aft . Close the No.2 centerline tension latch [11] to engage the lower interlock pin. Engage the upper T-hook latch [12] last.

NOTE: The No.1 tension latch and the No.5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the thrust reverser sleeve.

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

(b) Close the v-band latch [14].

1) Open the v-band latch handle from the stowed position.

CAUTION MAKE SURE THAT THE HOOK IN THE V-BAND LATCH ASSEMBLY IS CORRECTLY ENGAGED IN THE T-BOLT RECEIVER BEFORE YOU CLOSE THE V-BAND LATCH. DAMAGE TO THE HOOK OR THE T-BOLT RECEIVER ON THE V-GROOVE LATCH BAND CAN OCCUR.

2) Push the latch hook upward to engage the hook in the T-bolt receiver.

WARNING DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

3) With the handle horizontal to the right side of the latch, pull the handle down to the vertical position until trigger B latch engages.

NOTE: This is the take-up stroke.

4) Pull down on the trigger A to release the lock pin in the handle.

5) Move the handle up from the vertical to the horizontal position until the lock pin engages.

NOTE: The force to lock and stow the v-band latch is 50- 55 pounds (222-245 newtons).

(c) Close the No.1 tension latch [13].

1) Engage the No.1 latch T-bolt into the latch keeper hook.

2) Move the latch handle upward to the closed position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Close the No.3 tension latch [10], the No.4 tension latch [9] and then the No.5 tension latch [8].

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the latch bolt.
3) Push the latch handle to the closed position.

(e) Close the three aft cowl centerline latches [7], [6] and [5] from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the latch keeper eyebolt.
3) Push the latch handle to the closed position.

(f) Close the four deflection limiter latches [3], [4] then [2] and [1] on the aft cowl from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the tension strap keeper.
3) Push the latch handle to the closed position.

(g) Close the No.2 tension latch [11] to engage the lower interlock pin.

NOTE: When you close the No. 2 tension latch, the body of the latch hook pushes the bracket assembly which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) If it is necessary, push the lower interlock pin upward to engage the serrated fitting on the lower bifurcation.
2) Open the latch handle away from the body of the latch hook.
3) Engage the latch hook on the latch bolt.
4) Push the latch handle to the closed position.

(h) Close the upper bifurcation T-hook latch [12] on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and push the T-hook latch handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

2) Push the T-handle button and push the handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

NOTE: The force to push the T-handle to the closed position is not more than 35 pounds (157 newtons).

SUBTASK 78-31-00-410-034-H01

(3) Push and hold the DOWN button on each PDOS switch for the left and right thrust reversers for a minimum of 60 seconds.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-410-030-H01

CAUTION

DO A CHECK OF THE FIT AND FLUSHNESS OF THE CLOSED LATCH ACCESS DOORS TO THE FAIRINGS AROUND THE DOOR OPENINGS. IF THE FIT AND FLUSHNESS ARE NOT CORRECT, DAMAGE TO THE DOORS CAN OCCUR.

(1) Close the latch beam access doors:

Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

(a) Make sure that the latch access door closes smoothly and without excess force to engage the door latches.

1) Make sure that all of the latch bolts have properly engaged the latch trigger and that the latch bolt is fully engaged with the door (Figure 205).

a) Apply hand pressure to the exterior surface of the door adjacent to each door latch as you latch all of the door latches.

b) Apply firm finger pressure to each latch bolt to make sure the bolt is fully engaged.

2) If the latch access door will not close, make sure that the tension latches are closed and latched.

NOTE: The latch access doors have fittings which will prevent the closure of the access door if the tension latches are not closed and latched.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) If the closed latch access door is loose and not flush to the structure, adjust the screw on the latch bolt; adjust both access door latches.

4) Look for bent or damaged latch door hinges.

5) If damage is found, replace the hinges or replace the latch access door.

NOTE: Damage to the door hinge can cause the latch access door to open and depart in flight.

a) Do this task: Thrust Reverser Latch Access Doors Removal, TASK 78-31-19-000-801-H01.

b) Do this task: Thrust Reverser Latch Access Doors Installation, TASK 78-31-19-400-801-H01.

SUBTASK 78-31-00-410-005-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-440-002-H01

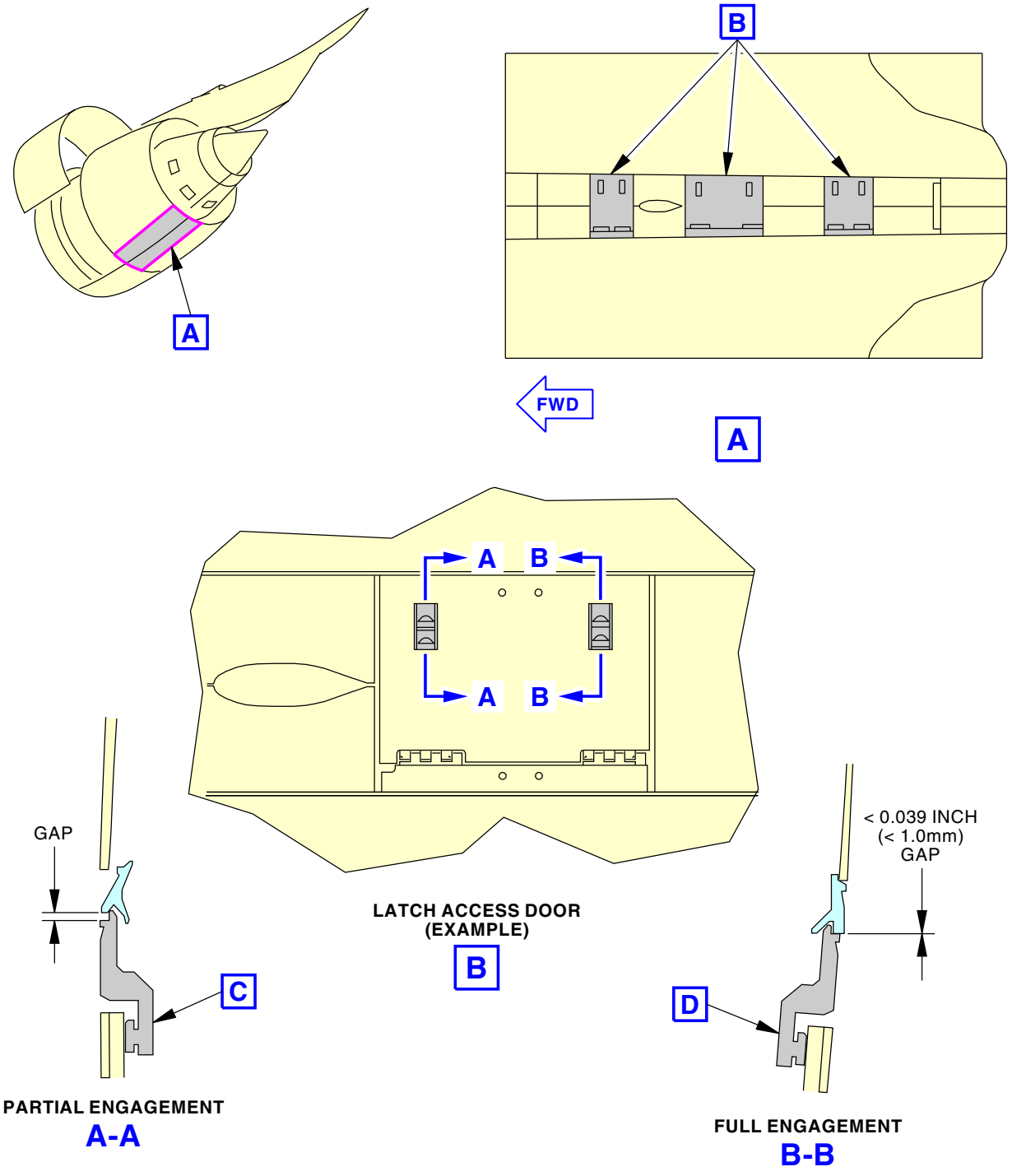
(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-00-440-003-H01

(4) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

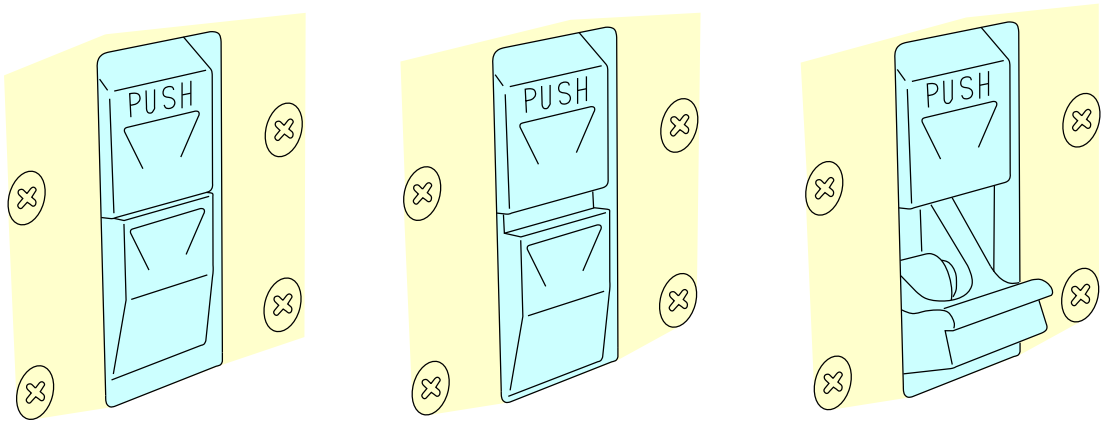
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Latch Closure
Figure 205/78-31-00-990-836-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



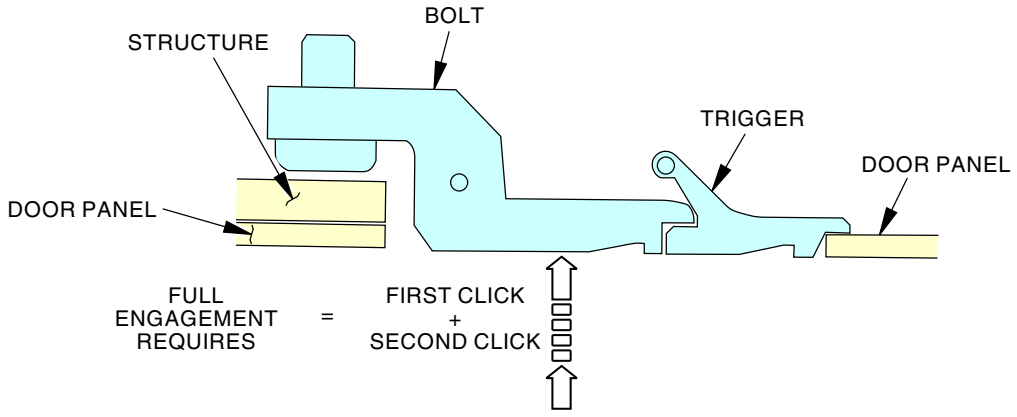
FULLY CLOSED
< 0.039 INCH GAP
(< 1.0 mm GAP)

PARTIALLY CLOSED

FULLY OPEN

LATCH SEQUENCE

C



CLOSE LATCH OPERATION

D

1547651 S0000283394_V3

Latch Closure
Figure 205/78-31-00-990-836-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-010-803-H01

6. Open the Thrust Reverser (Manual Method)

(Figure 206, Figure 207, Figure 208, and Figure 209)

A. General

(1) This alternate procedure is used to open the thrust reverser when there is a problem with the power door opening system (PDOS) unit's electric pump or valves, the control circuit, or the inlet mounted control switches.

(2) This alternate procedure can be used if there are no indications of oil leakage from the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser.

(3) In this procedure, you manually set the valves on the PDOS unit to the correct position to open the thrust reverser and manually operate the pump in the PDOS unit through the manual drive. You can turn the manual drive with a hand or power tool. The instructions for the operation of the valves are on a placard on the PDOS unit. Access to the PDOS manual controls are under the No.1 fairing on the fan cowl support beam.

(4) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(5) You must remove the access door in the strut thumbnail fairing to get access to the PDOS unit.

(6) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(7) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(8) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(9) If it is necessary to open the thrust reverser to do maintenance on the PDOS equipment, use the sling method to open the thrust reversers.

(10) Pressure build-up from thermal expansion of the oil in the PDOS actuators can cause a pre-load on the tension latches. The tension latches cannot be opened on the thrust reverser. The thermal expansion of the oil is cause by heat from the sun when the airplane is parked in the sun. Press the PDOS DOWN button for 10-30 seconds to relieve the pressure for each actuator.

(11) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the left and right down button on PDOS unit for 10-30 seconds to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-4751	Speed Wrench - Pneumatic, 600 rpm, 15 in-lbs max

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
431	Forward Strut Fairing - Left Nacelle Strut
434	Aft Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine
431AB	PDOS Access Door, Left Strut
441AB	PDOS Access Door, Right Strut

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Procedure

SUBTASK 78-31-00-860-003-H01

CAUTION

RETRACT THE LEADING EDGE SLATS. DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS BEFORE YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DAMAGE TO THE LEADING EDGE SLATS AND THRUST REVERSERS CAN OCCUR.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-004-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-040-005-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-00-490-003-H01

WARNING

USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(4) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-00-010-006-H01

(5) Remove the PDOS access panel in the thumbnail fairing on the applicable fan cowl support beam (Figure 208).

(a) Open the applicable access panels:

Number	Name/Location
431AB	PDOS Access Door, Left Strut
441AB	PDOS Access Door, Right Strut

(b) Remove 17 countersunk bolts to remove the access panel.

(c) Move the panel to the side of the access hole; there is a lanyard that connects the access panel to the thumbnail fairing.

SUBTASK 78-31-00-010-007-H01

(6) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-864-006-H00

(7) Press the PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches (Figure 208).

SUBTASK 78-31-00-010-037-H01

(8) Open the latch beam access doors on the applicable engine:

Open these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-00-010-052-H00

CAUTION

OPEN ALL LATCHES ON THE THRUST REVERSER HALVES BEFORE YOU OPEN A THRUST REVERSER HALF. IF A LATCH HOOK STAYS ENGAGED, DAMAGE TO THE THRUST REVERSER, THE STRUT LIMITER RODS, AND BRACKETS CAN OCCUR.

(9) Disengage and open the latches on the thrust reverser in the sequence that follows (Figure 206, Figure 207):

NOTE: The latch location numbers are shown in brackets.

NOTE: Open the upper T-hook latch [12]. Open the No. 2 centerline tension latch [11] to disengage the lower interlock pin. Disengage the aft cowl deflection limiter latches [1], [2], [3] and [4] from aft to forward. Next, open the aft cowl centerline latches [5], [6] and [7] from aft to forward. Open the No. 5 [8], No. 4 [9] and No. 3 [10] centerline tension latches. Open the No. 1 tension latch [13]. Open the V-band latch [14] last.

NOTE: The No.1 tension latch and the No. 5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the right side thrust reverser.

(a) Open the upper bifurcation T-hook latch [12] on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down to the fully extended position to keep the T-hook in the vertical (open) position.

2) Push the T-handle button in and pull down the handle to the fully extended position to keep the T-hook in the vertical (open) position.

3) If the T-hook latch does not operate, refer to the task: Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Open the Thrust Reverser, TASK 78-31-00-980-803-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Open the No.2 centerline latch beam tension latch [11].

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

3) Make sure the bracket assembly for the interlock pin has moved down to the open position to disengage the interlock pin.

NOTE: The spring loaded interlock pin should move downward and move the bracket assembly downward to show that the interlock pin has disengaged from the serrated fitting on the right side thrust reverser. When you close the No. 2 tension latch, the latch body pushes the bracket assembly upward which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(c) Open the four deflection limiter latches [1], [2], [3] and [4] on the aft cowls.

NOTE: There are two deflection limiter latches for each aft cowl. All four deflection limiter latch hooks must be disengaged if the left or right thrust reverser is opened.

1) Open the two aft latches first, before you open the two forward latches.

2) Push on the secondary lock to open the spring loaded latch handle.

3) Pull the handle to the full open position to release the hook from the tension strap keeper.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(d) Open the three aft cowl centerline latches [5], [6] and [7] from the aft latch to the forward latch.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch keeper eyebolt.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(e) Open the No. 5 tension latch [8], the No. 4 tension latch [9] and the No. 3 tension latch [10] on the centerline latch beam from the aft latch to the forward latch.

NOTE: At the No. 5 tension latch, use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle. At the No.4 and No.3 tension latches, because of the small access space to the latches, a small wire hook (local manufacture) can be used to help open the latch handle.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

(f) Open the No.1 tension latch [13].

1) Move the small, unlock lever down.

2) Move the latch handle downward to the open position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Disengage the No.1 latch T-bolt from the latch keeper hook.

WARNING MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(g) Open the V-band latch [14].

1) Hold the latch handle firmly against the force you will feel when you release the trigger A latch and move the latch handle.

NOTE: The force on the handle will be 50-55 pounds (222-245 newtons).

2) Push upward on the end of the latch handle to release trigger A lock pin.

3) Slide trigger A toward the end of the handle.

4) Move the handle downward and to the left until the handle locks in the vertical position.

NOTE: This is the unlock stroke.

5) Hold the latch handle firmly against the force you will feel when you release the trigger B latch and move the latch handle.

6) Move the handle to the left to relieve the preload on trigger B.

7) Slide trigger B away from the handle pivot points.

8) Move the handle from the vertical to the horizontal position.

NOTE: This is the release stroke.

9) Make sure the latch hook is disengaged from the T-bolt receiver.

10) Put the v-band latch in the stowed position.

SUBTASK 78-31-00-010-009-H01

WARNING DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER UNTIL YOU LOCK THE HOLD-OPEN ROD. THE THRUST REVERSER IS HEAVY. IT WILL CLOSE QUICKLY IF THE PRESSURE IS REMOVED FROM THE PDOS. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

CAUTION MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

CAUTION DO NOT OPEN THE THRUST REVERSER IF THE TRANSLATING SLEEVES ARE EXTENDED. THE EXTENDED SLEEVES CAN HIT THE STRUT PANELS. DAMAGE TO EQUIPMENT CAN OCCUR.

(10) Open the thrust reverser:

(a) Put the PDOS controls on the PDOS manual drive unit to the T/R open position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Turn the manual drive shaft on the PDOS clockwise with a 3/8-inch square drive wrench or pneumatic speed wrench, STD-4751 until the hold-open rod locks (Figure 209).

NOTE: A yellow safety band on the upper side of the lock collar is the indication for the locked position. A red safety band on the lower side of the lock collar is the indication for the unlocked position. An audible click or snap is also an indication when you extend the hold-open rod to the locked position.

WARNING KEEP HANDS CLEAR OF MATING SURFACES WHEN YOU OPEN THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS CAN OCCUR.

(c) Watch the clearances as you open the thrust reverser to make sure the outer v-groove blade smoothly disengages with the outer v-groove on the engine fan case.

NOTE: While the thrust reverser starts to open, it can be necessary to apply hand pressure aft on the thrust reverser cowl to smoothly disengage the outer v-grooves and to prevent interference between the Thrust Reverser Cowl and Engine Fan Case.

(d) Put the PDOS controls on the PDOS manual drive unit to the T/R close position.

(e) Push the CLOSE button on the power unit until the thrust reverser weight is on the hold-open rod.

G. Thrust Reversers - Tryout

NOTE: This tryout is to make sure that the thrust reversers are in the fully open position.

SUBTASK 78-31-00-210-002-H00

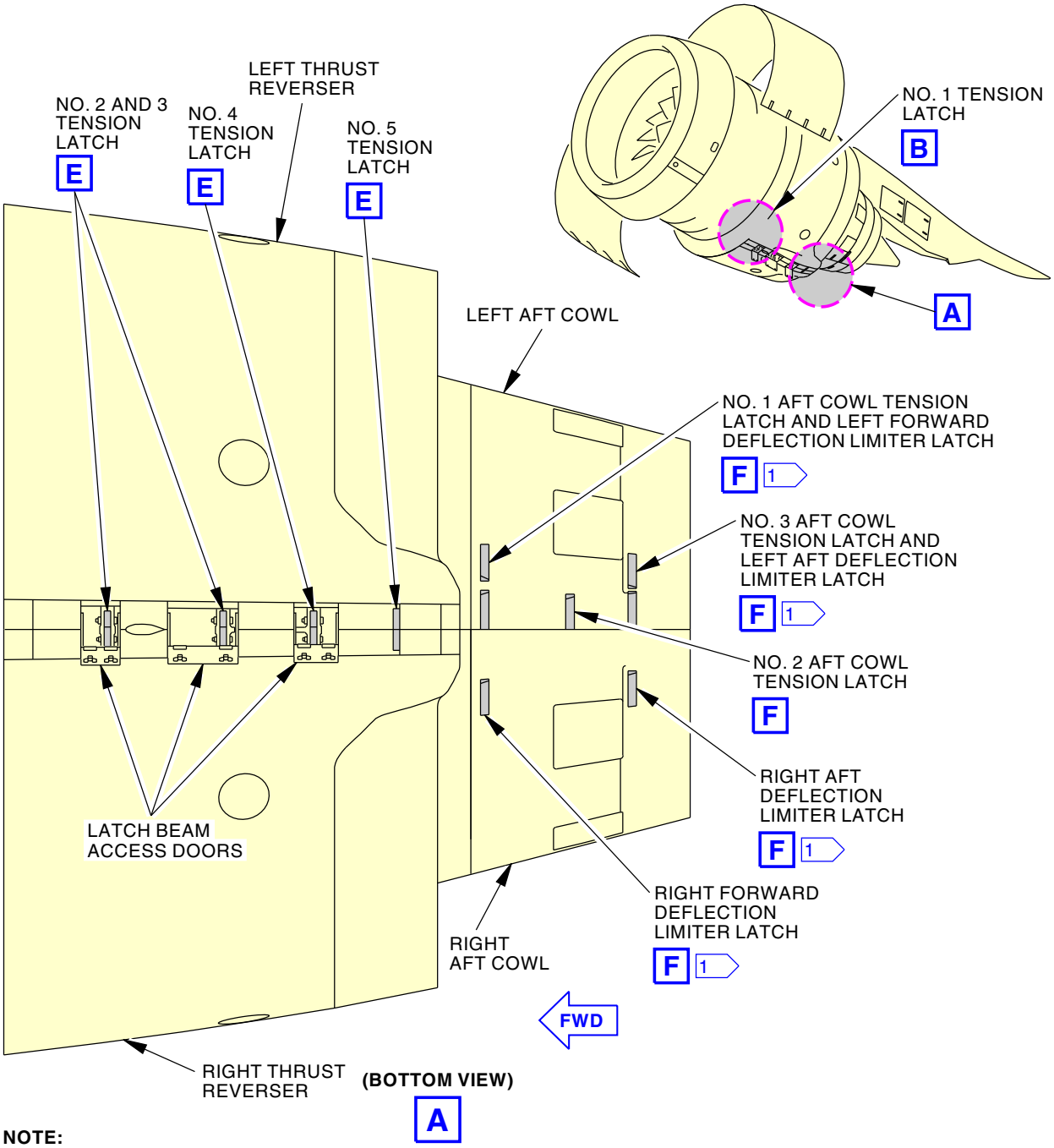
(1) Make sure that the yellow safety stripe on the lower side of the lock collar is seen.

SUBTASK 78-31-00-210-003-H00

(2) Make sure that the red safety stripe on the lower side of the lock collar is not seen.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

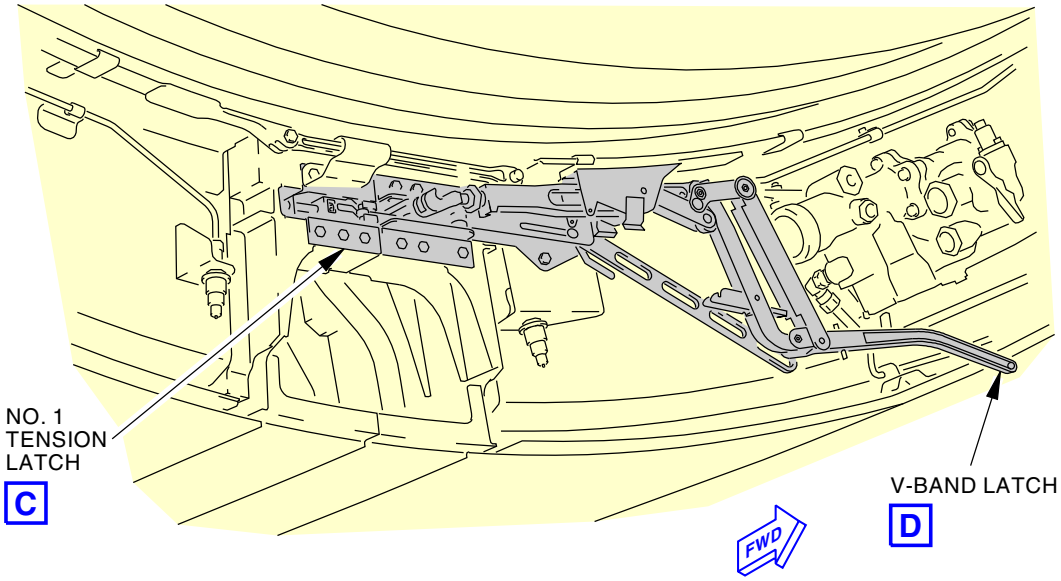
THE STENCIL NUMBERS THAT IDENTIFY THE LATCHES ON THE THRUST REVERSER AND AFT COWL ARE NOT OPEN/CLOSE SEQUENCE NUMBERS.

1 ALL 4 DEFLECTION LIMITER LATCH HOOKS MUST BE DISENGAGED WHEN THE LEFT OR RIGHT THRUST REVERSER HALF IS OPENED

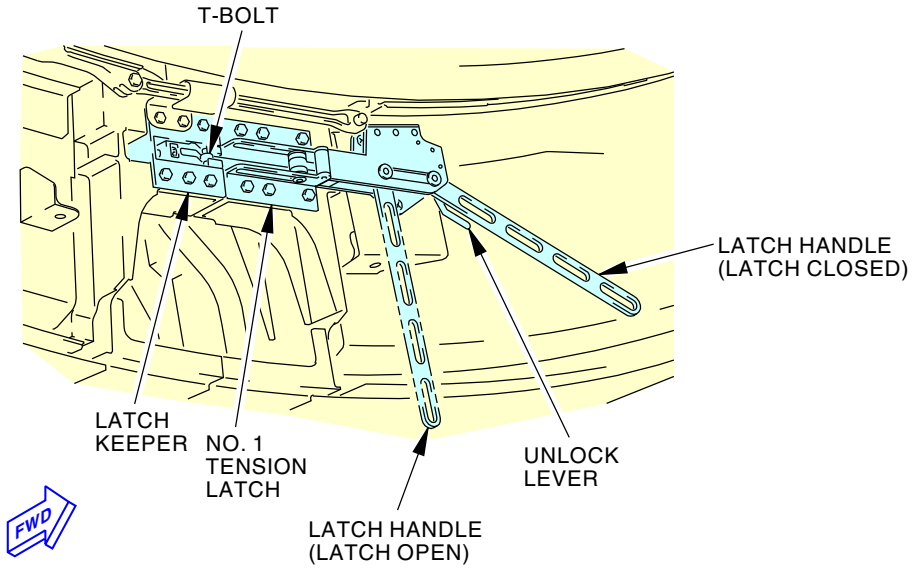
M07238 S0004286216_V5

Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 1 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(HARTWELL HA277-3)
V-BAND LATCH
B

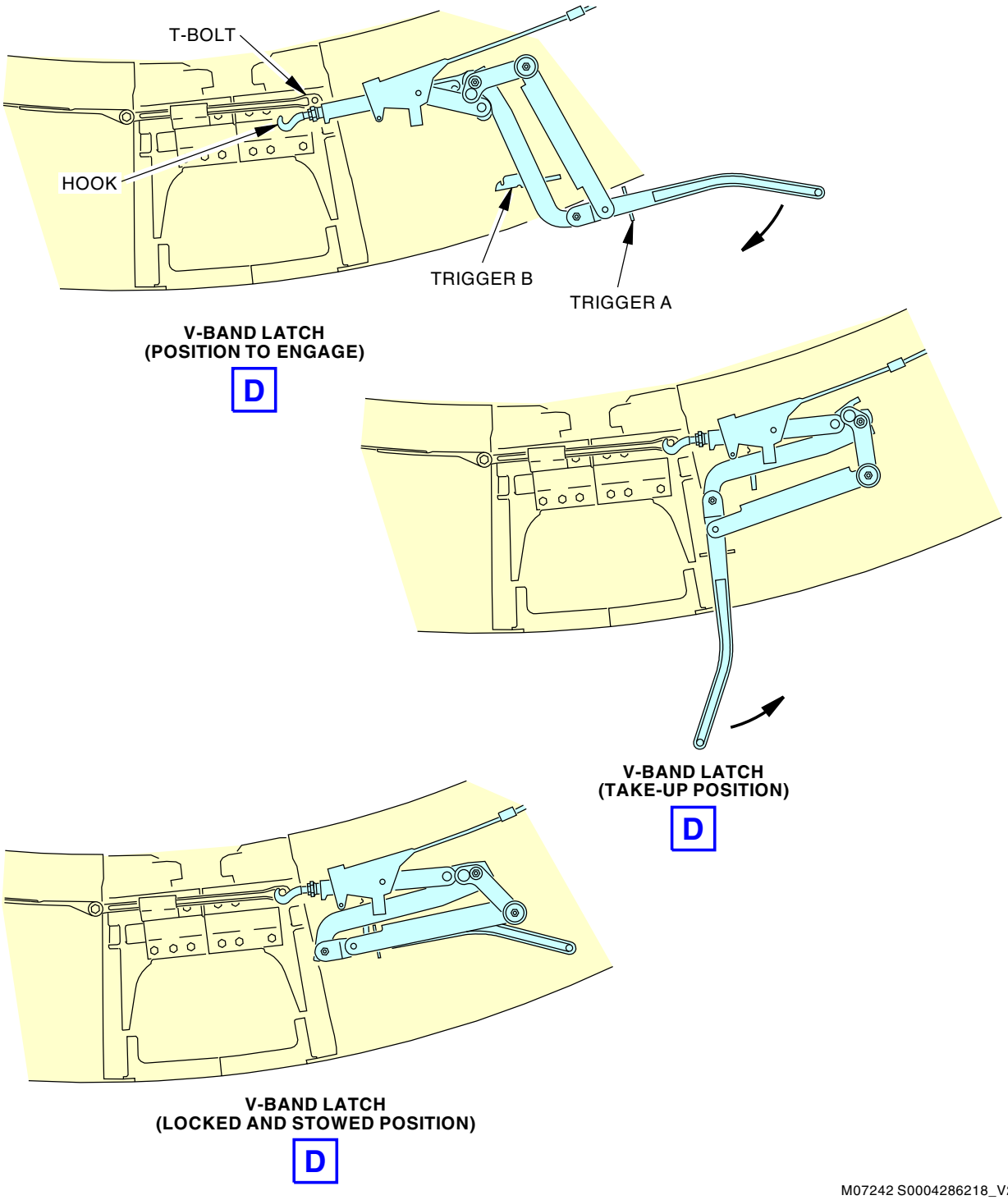


THRUST REVERSER NO. 1 TENSION LATCH
(V-BAND LATCH REMOVED FOR CLARITY)
C

M07240 S0004286217_V3

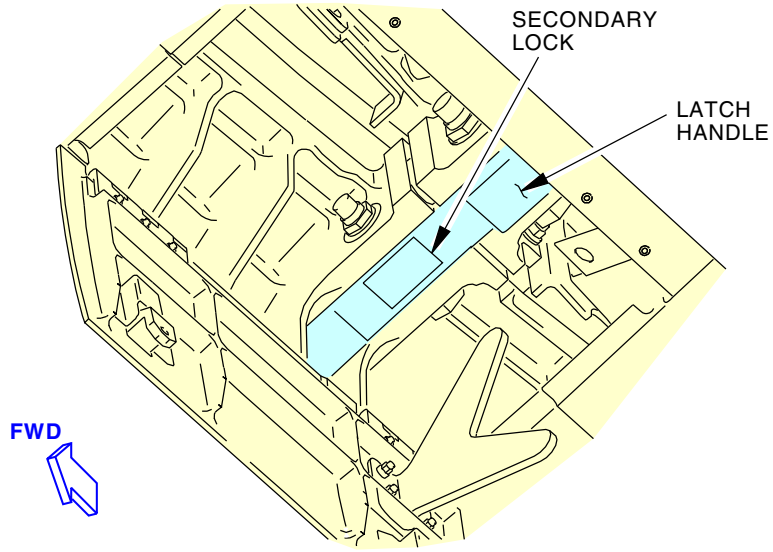
Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 2 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



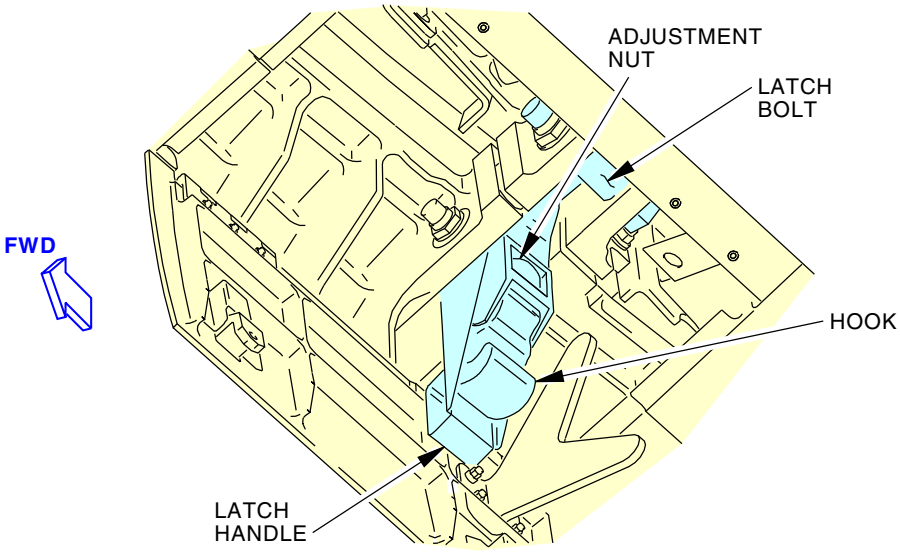
Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 3 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER NO. 2-5 TENSION LATCH
(CLOSED POSITION)
(EXAMPLE, 4 LOCATIONS)

E



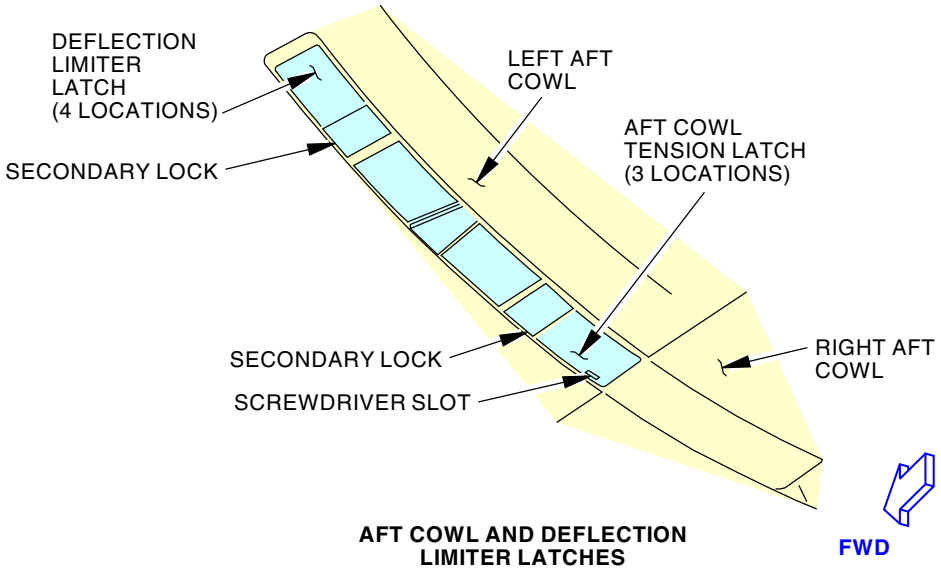
THRUST REVERSER NO. 2-5 TENSION LATCH
(OPEN POSITION)
(EXAMPLE, 4 LOCATIONS)

E

M07244 S0004286219_V3

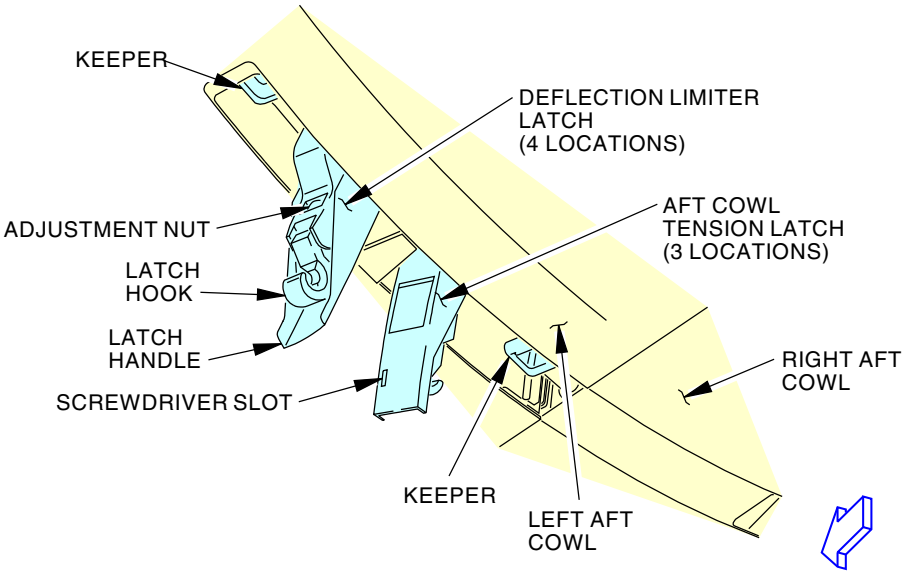
Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 4 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL AND DEFLECTION LIMITER LATCHES (CLOSED POSITION) (EXAMPLE)

F



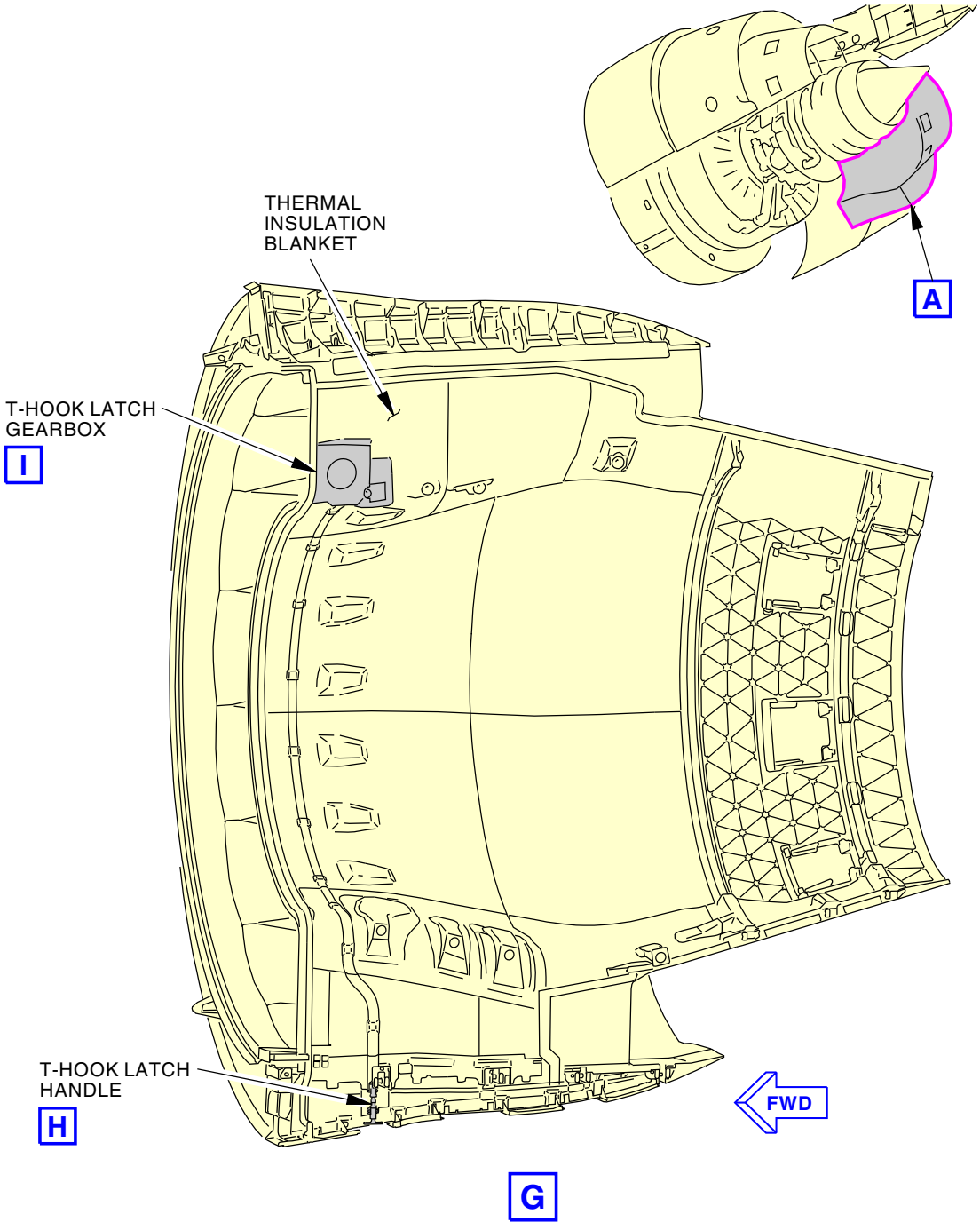
AFT COWL AND DEFLECTION LIMITER LATCHES (OPEN POSITION) (EXAMPLE)

F

M07246 S0004286220_V2

Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 5 of 11)

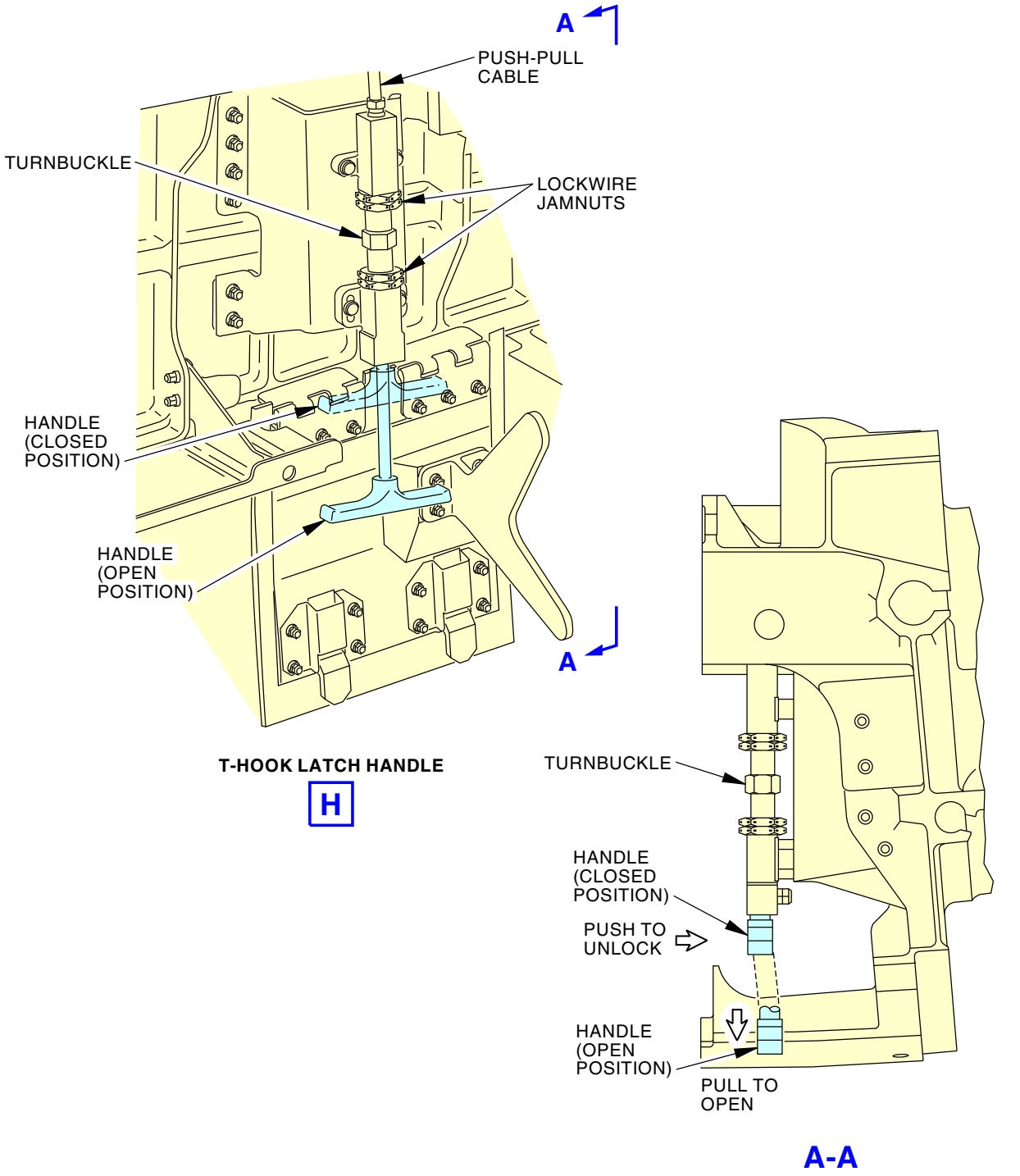
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



W85447 S0000131586_V3

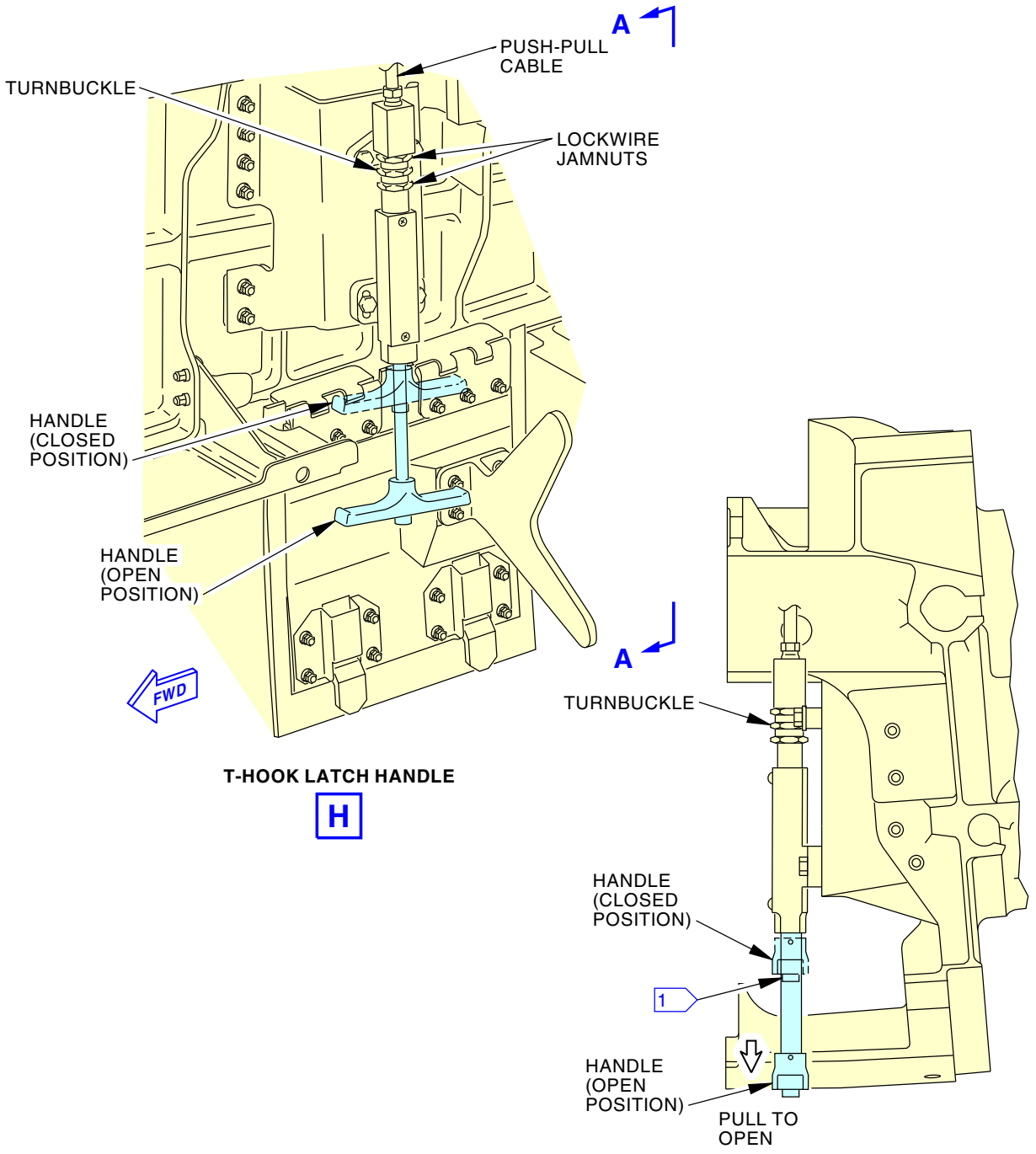
Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 6 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



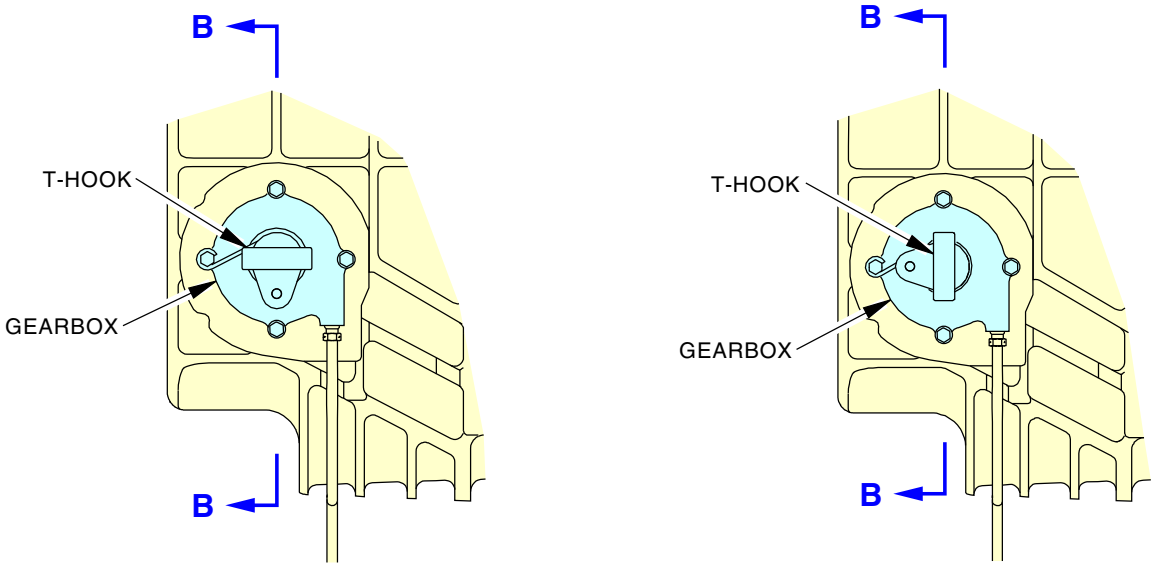
Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 7 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 8 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

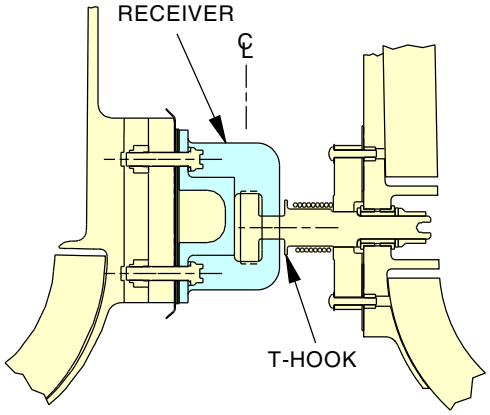


T-HOOK LATCH (CLOSED POSITION)

I

T-HOOK LATCH (OPEN POSITION)

I



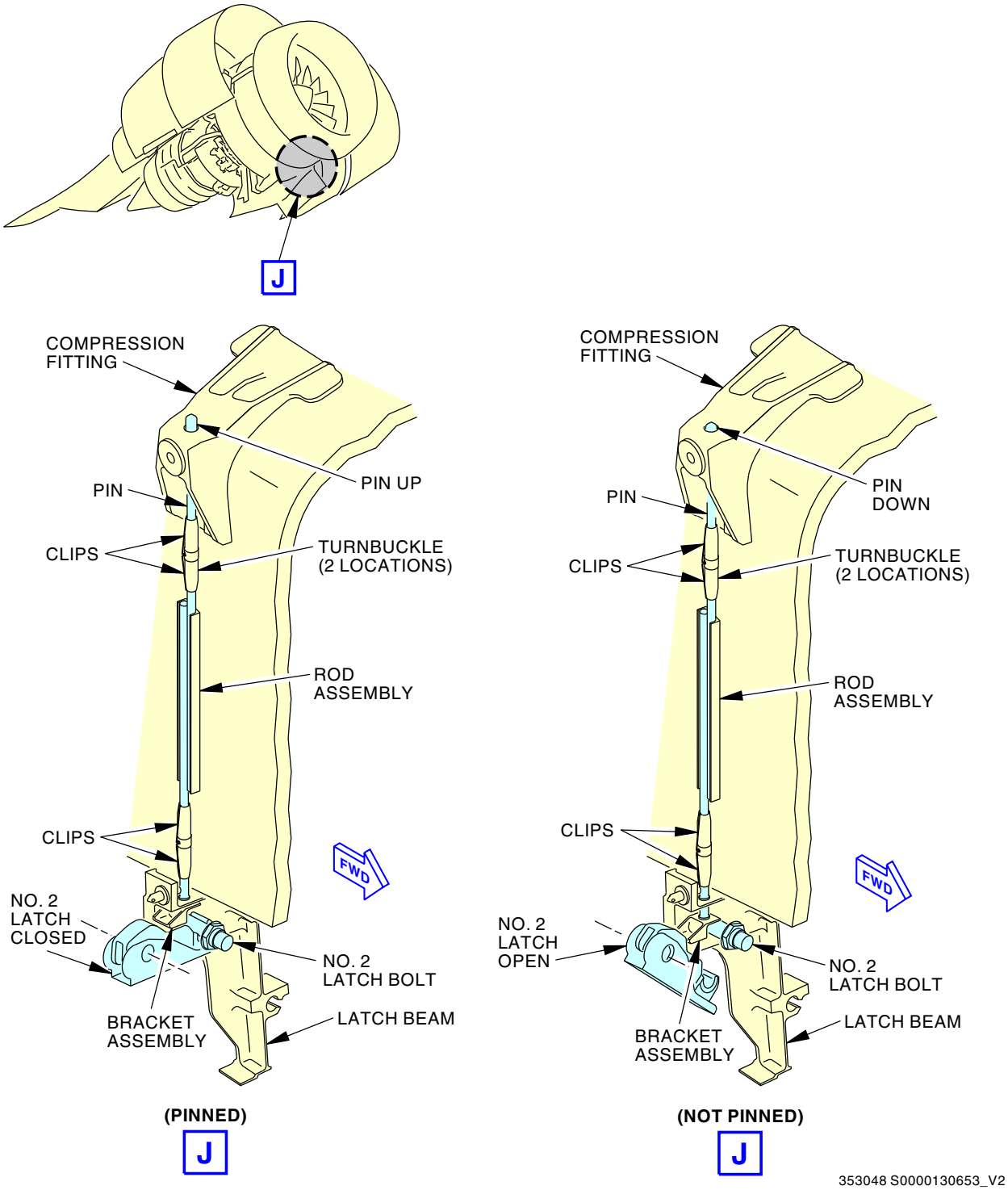
THRUST REVERSER CLOSED

B-B

D80010 S0000165142_V3

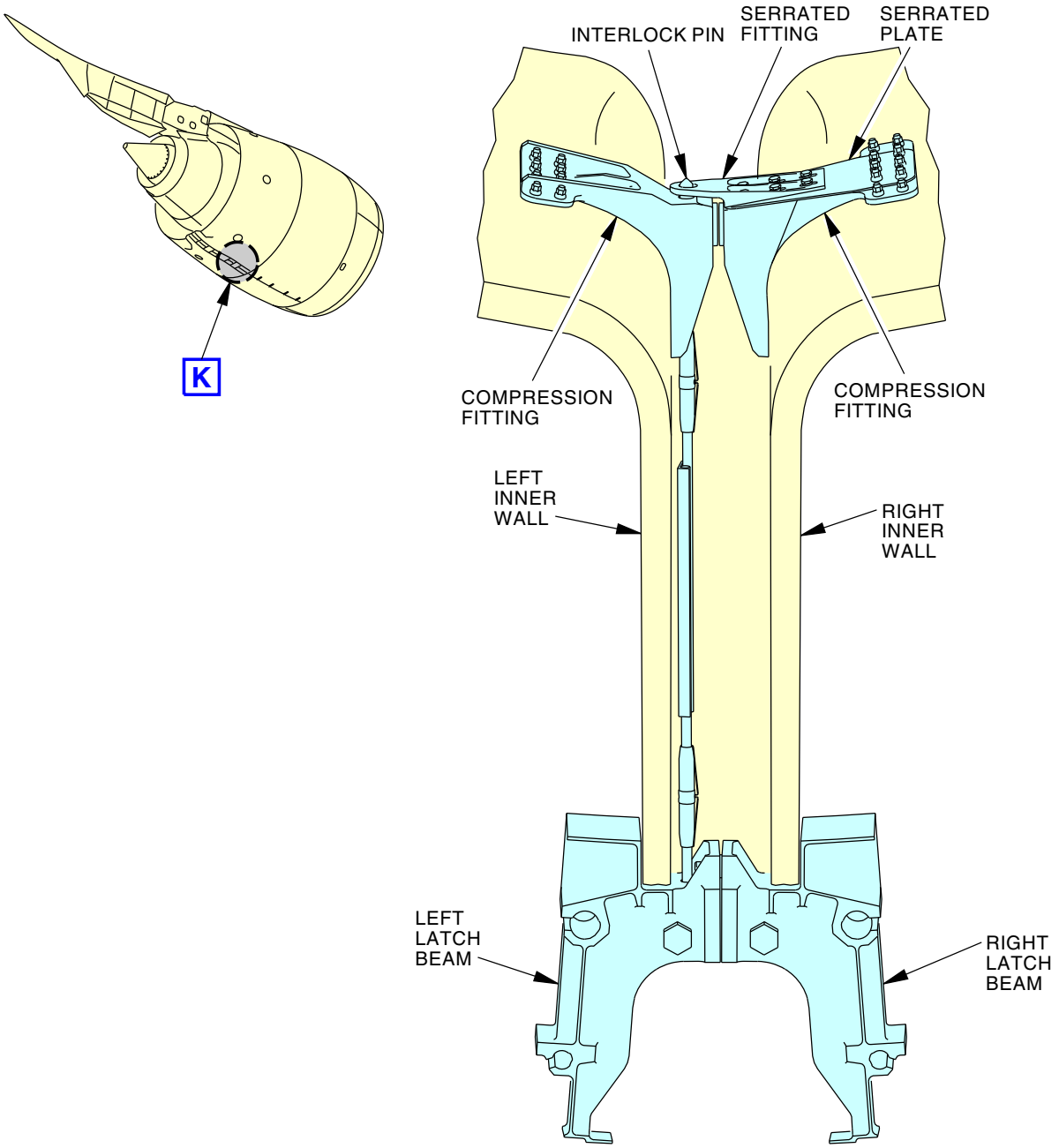
Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 9 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 10 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



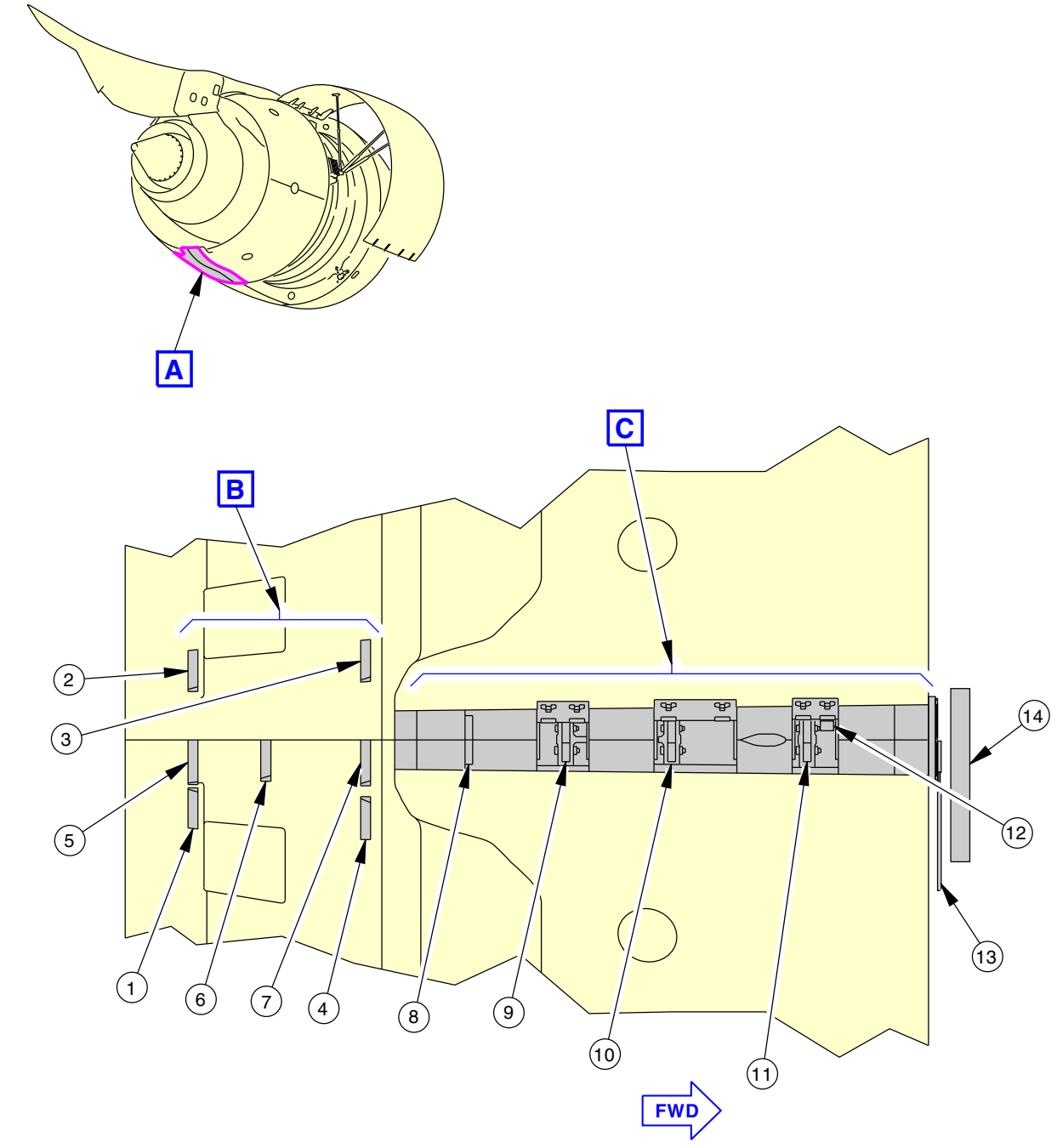
THRUST REVERSER CLOSED, NO. 2 LATCH CLOSED
(VIEW IN THE FORWARD DIRECTION)

K

353038 S0000132136_V2

Thrust Reverser Latches
Figure 206/78-31-00-990-816-H01 (Sheet 11 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



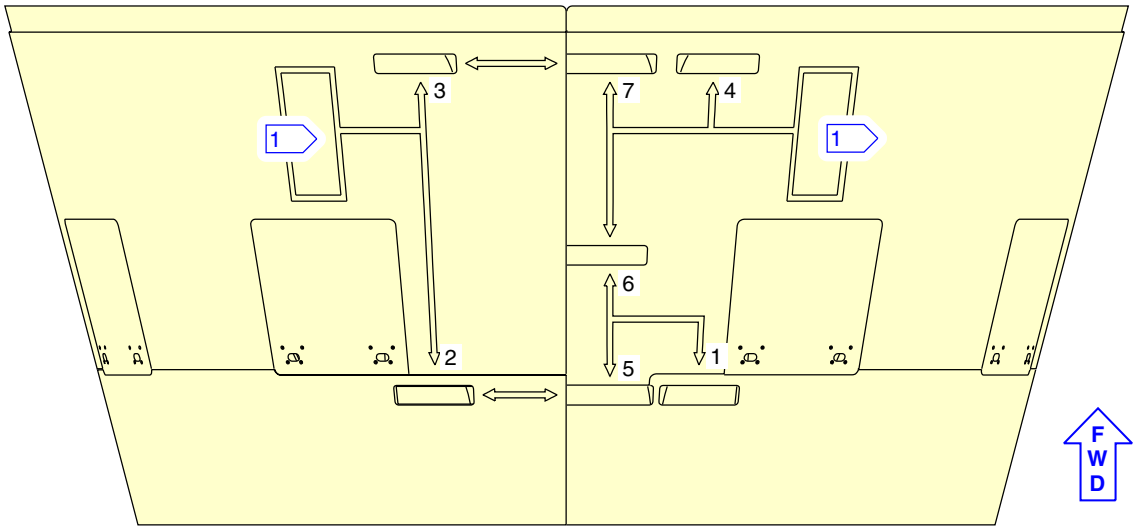
LEGEND:
◯ = LATCH LOCATION NUMBERS

A

D63535 S0000162243_V4

Thrust Reverser Latch Location Numbers
Figure 207/78-31-00-990-833-H00 (Sheet 1 of 2)

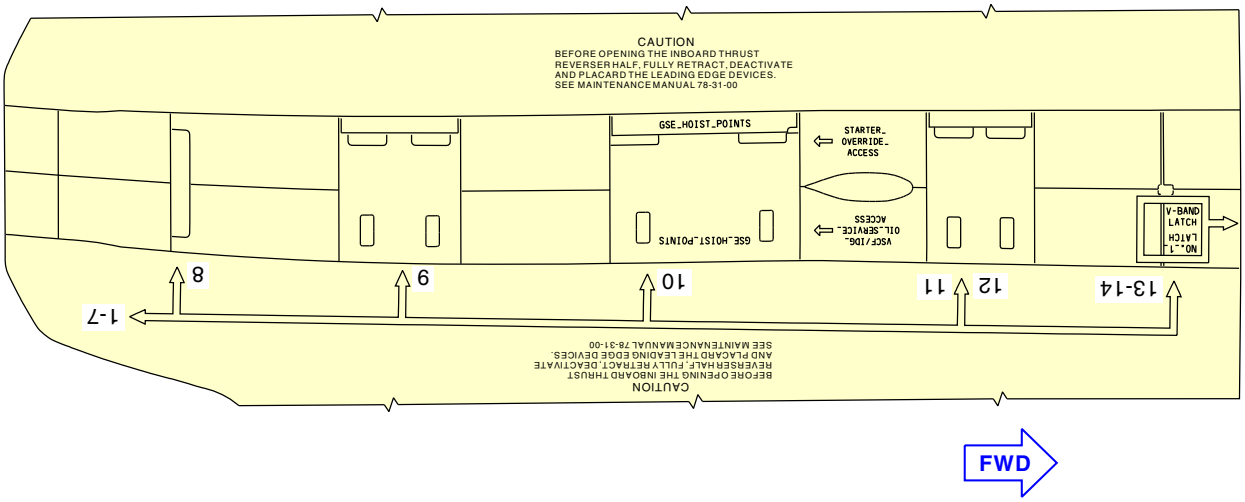
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 OPEN ALL 14 LATCHES ON BOTH T/R HALVES PRIOR TO OPENING EITHER T/R HALF

(VIEW IN THE UP DIRECTION)

B



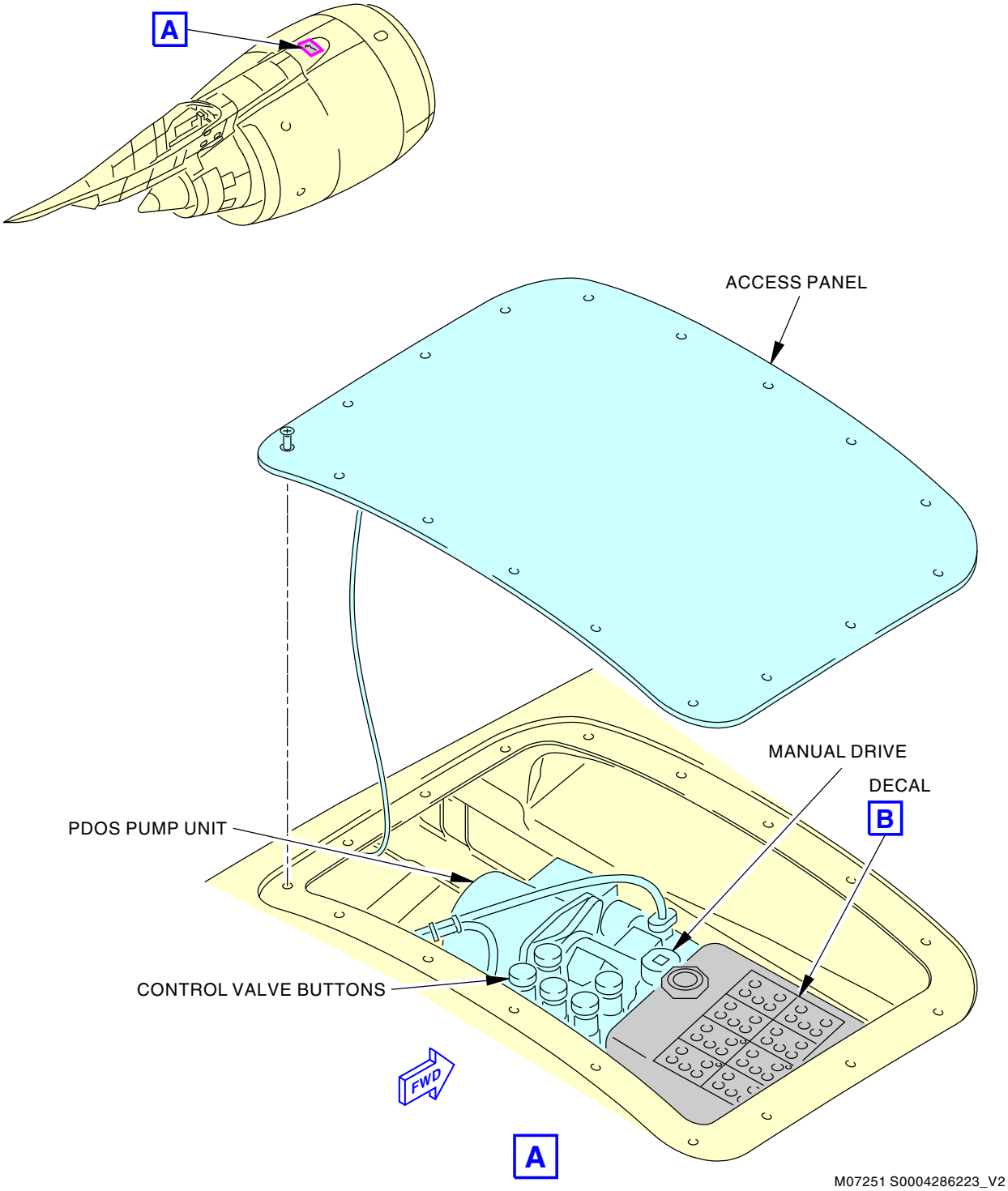
(VIEW IN THE UP DIRECTION)

C

J66085 S0000174744_V2

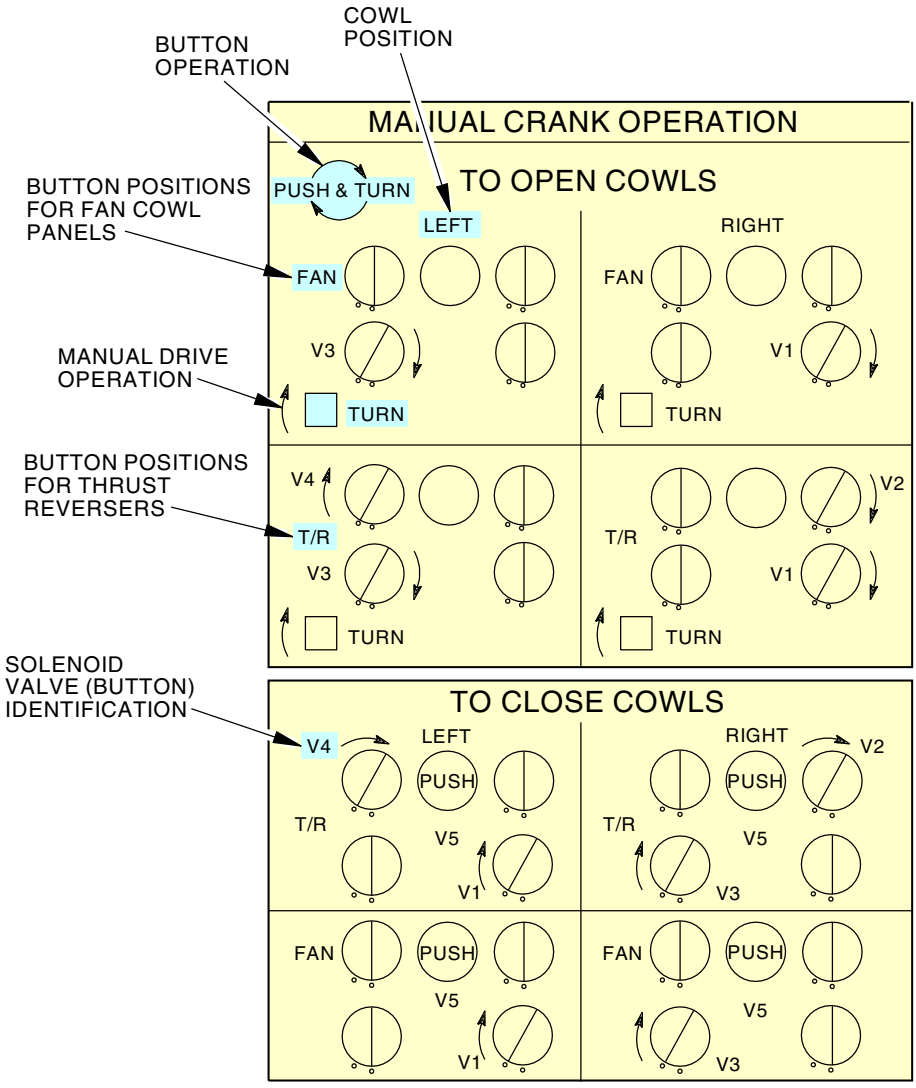
Thrust Reverser Latch Location Numbers
Figure 207/78-31-00-990-833-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser PDOS - Manual Method
Figure 208/78-31-00-990-812-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



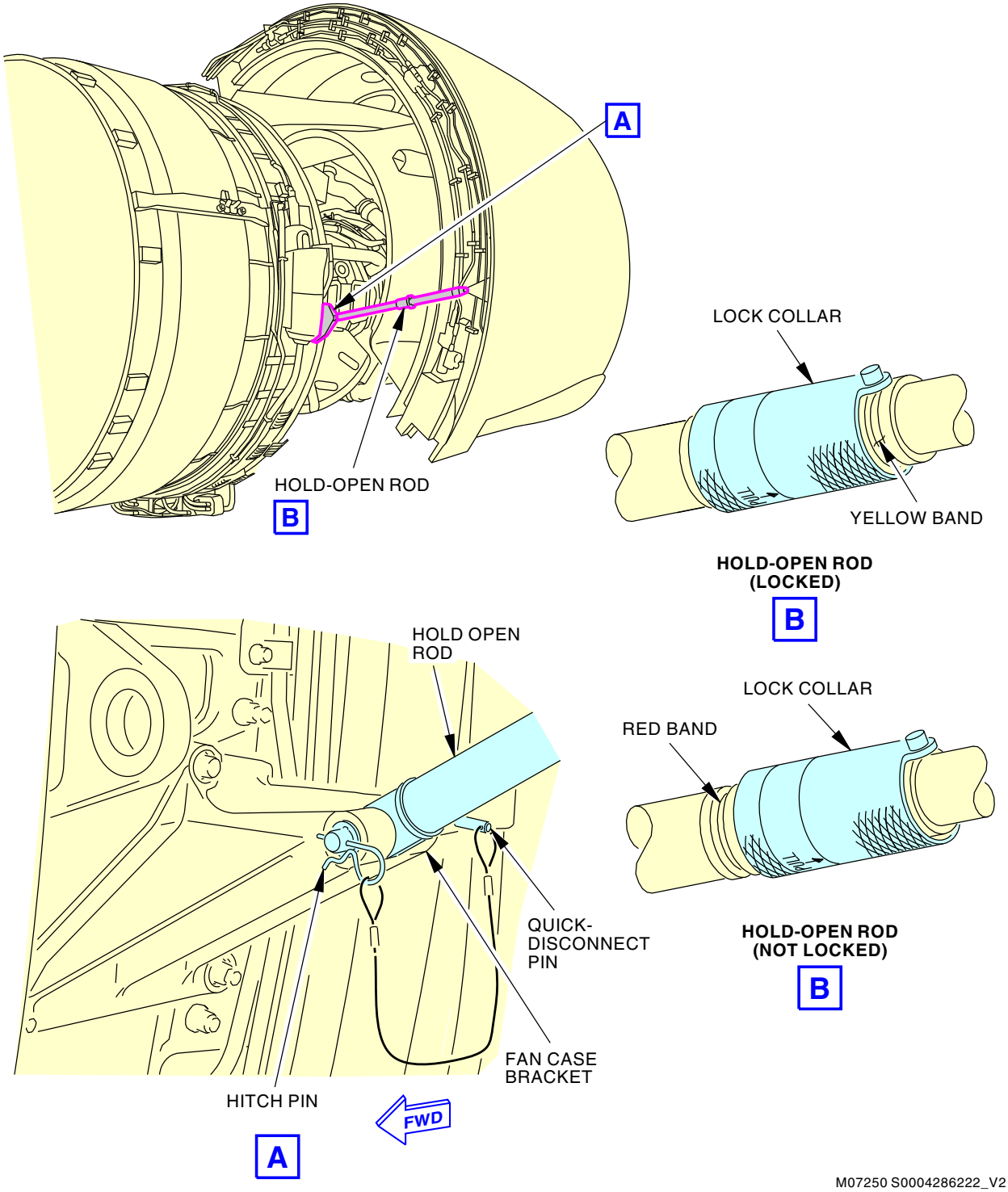
DECAL - PDOS

B

M07252 S0004286224_V2

Thrust Reverser PDOS - Manual Method
Figure 208/78-31-00-990-812-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Hold-Open Rod
Figure 209/78-31-00-990-817-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-410-803-H01

7. Close the Thrust Reverser (Manual Method)

(Figure 206, Figure 207, Figure 208, and Figure 209)

A. General

(1) This alternate procedure is used to close the thrust reverser when there is a problem with the power door opening system (PDOS) unit's electric pump or valves, the control circuit, or the inlet mounted control switches.

(2) This alternate procedure can be used if there are no indications of oil leakage from the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser.

(3) In this procedure, you manually set the valves on the PDOS unit to the correct position to close the thrust reverser. The weight of the thrust reverser causes the thrust reverser to close and forces the oil in the PDOS actuators to return to the reservoir in the PDOS unit.

(4) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(5) You must not extend or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(6) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(7) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(8) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the down button on PDOS unit to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-19-000-801-H01	Thrust Reverser Latch Access Doors Removal (P/B 401)
78-31-19-400-801-H01	Thrust Reverser Latch Access Doors Installation (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

Reference	Description
STD-4751	Speed Wrench - Pneumatic, 600 rpm, 15 in-lbs max

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
431	Forward Strut Fairing - Left Nacelle Strut
434	Aft Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine
431AB	PDOS Access Door, Left Strut
441AB	PDOS Access Door, Right Strut

F. Procedure

SUBTASK 78-31-00-490-004-H01



WARNING

USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(1) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-410-006-H01

WARNING DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER. THE THRUST REVERSER IS HEAVY AND CAN CLOSE QUICKLY IF THE PDOS HAS A FAILURE. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(2) Close the thrust reverser:

(a) Put the PDOS controls on the PDOS manual drive unit to the T/R open position (Figure 208).

(b) Turn the manual drive shaft on the PDOS clockwise with a 3/8-inch square drive wrench or pneumatic speed wrench, STD-4751 to open the thrust reverser to take the weight off the hold-open rod.

(c) Pull the collar on the hold-open rod to the unlocked position (Figure 209).

NOTE: The collar will stay in the unlocked position.

(d) Put the PDOS controls on the PDOS manual drive unit to the T/R close position.

(e) Push the CLOSE button on the power unit until the thrust reverser is in the closed position.

WARNING KEEP HANDS CLEAR OF MATING SURFACES WHEN YOU CLOSE THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS CAN OCCUR.

CAUTION MAKE SURE THAT THE T-HANDLE IS IN THE FULL OPEN POSITION BEFORE YOU CLOSE THE THRUST REVERSER. DAMAGE CAN OCCUR AT THE T-HOOK LATCH.

1) Watch the clearances as you close the thrust reverser to make sure the outer v-groove blade aligns with and fully engages the outer v-groove on the engine fan case.

NOTE: While the thrust reverser nears the closed position it can be necessary to apply hand pressure aft on the thrust reverser cowl to align the outer v-grooves and prevent interference between the thrust reverser cowl and the engine fan case.

SUBTASK 78-31-00-410-042-H00

(3) Engage and close the latches on the thrust reverser in the sequence that follows (Figure 206):

NOTE: The latch location numbers are shown in brackets.

NOTE: Close the V-band latch [14] first. Close the No.1 tension latch [13]. Close the No.3 [10], No. 4 [9] and No.5 [8] centerline tension latches from forward to aft. Close the aft cowl centerline tension latches [7], [6] and [5] from forward to aft. Close the aft cowl deflection limiter latches from forward to aft [3], [4] then [2] and [1]. Close the No.2 centerline tension latch [11] to engage the lower interlock pin. Engage the upper T-hook latch [12] last.

NOTE: The No.1 tension latch and the No.5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the thrust reverser sleeve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

(b) Close the v-band latch [14].

1) Open the v-band latch handle from the stowed position.

CAUTION MAKE SURE THAT THE HOOK IN THE V-BAND LATCH ASSEMBLY IS CORRECTLY ENGAGED IN THE T-BOLT RECEIVER BEFORE YOU CLOSE THE V-BAND LATCH. DAMAGE TO THE HOOK OR THE T-BOLT RECEIVER ON THE V-GROOVE LATCH BAND CAN OCCUR.

2) Push the latch hook upward to engage the hook in the T-bolt receiver.

WARNING DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

3) With the handle horizontal to the right side of the latch, pull the handle down to the vertical position until trigger B latch engages.

NOTE: This is the take-up stroke.

4) Pull down on the trigger A to release the lock pin in the handle.

5) Move the handle up from the vertical to the horizontal position until the lock pin engages.

NOTE: The force to lock and stow the v-band latch is 50- 55 pounds (222-245 newtons).

(c) Close the No.1 tension latch [13].

1) Engage the No.1 latch T-bolt into the latch keeper hook.

2) Move the latch handle upward to the closed position.

(d) Close the No.3 tension latch [10], the No.4 tension latch [9] and then the No.5 tension latch [8].

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.

2) Engage the latch hook on the latch bolt.

3) Push the latch handle to the closed position.

(e) Close the three aft cowl centerline latches [7], [6] and [5] from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the latch keeper eyebolt.
3) Push the latch handle to the closed position.

(f) Close the four deflection limiter latches [3], [4] then [2] and [1] on the aft cowl from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the tension strap keeper.
3) Push the latch handle to the closed position.

(g) Close the No.2 tension latch [11] to engage the lower interlock pin.

NOTE: When you close the No. 2 tension latch, the body of the latch hook pushes the bracket assembly which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) If it is necessary, push the lower interlock pin upward to engage the serrated fitting on the lower bifurcation.
2) Open the latch handle away from the body of the latch hook.
3) Engage the latch hook on the latch bolt.
4) Push the latch handle to the closed position.

(h) Close the upper bifurcation T-hook latch [12] on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and push the T-hook latch handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.
2) Push the T-handle button and push the handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

NOTE: The force to push the T-handle to the closed position is not more than 35 pounds (157 newtons).

SUBTASK 78-31-00-410-035-H01

(4) Push and hold the DOWN button on each PDOS switch for the left and right thrust reversers for a minimum of 60 seconds.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-410-031-H01

CAUTION DO A CHECK OF THE FIT AND FLUSHNESS OF THE CLOSED LATCH ACCESS DOORS TO THE FAIRINGS AROUND THE DOOR OPENINGS. IF THE FIT AND FLUSHNESS ARE NOT CORRECT, DAMAGE TO THE DOORS CAN OCCUR.

(1) Close the latch beam access doors:

Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

(a) Make sure that the latch access door closes smoothly and without excess force to engage the door latches.

1) Make sure that all latch bolts have properly engaged the latch trigger and that the latch bolt is fully engaged with the door (Figure 205).

a) Apply hand pressure to the exterior surface of the door adjacent to each door latch as you latch all of the door latches.

b) Apply firm finger pressure to each latch bolt to make sure the bolt is fully engaged.

2) If the latch access door will not close, make sure that the tension latches are closed and latched.

NOTE: The latch access doors have fittings which will prevent the closure of the access door if the tension latches are not closed and latched.

3) If the closed latch access door is not tight and flush to the structure, adjust the screw on the latch bolt; adjust both access door latches.

4) Look for bent or damaged latch door hinges.

5) If damage is found, replace the hinges or replace the latch access door.

NOTE: Damage to the door hinge can cause the latch access door to open and depart in flight.

a) Do this task: Thrust Reverser Latch Access Doors Removal, TASK 78-31-19-000-801-H01.

b) Do this task: Thrust Reverser Latch Access Doors Installation, TASK 78-31-19-400-801-H01.

SUBTASK 78-31-00-410-008-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-410-009-H01

(3) Install the PDOS access panel in the thumbnail fairing on the applicable fan cowl support beam:

(a) Close the applicable access panels:

Number	Name/Location
431AB	PDOS Access Door, Left Strut
441AB	PDOS Access Door, Right Strut

(b) Position the access panel in the access hole with the beveled edge forward; make sure the lanyard is not caught between the access panel and the fairing.

(c) Install 17 countersunk bolts to install the access panel.

SUBTASK 78-31-00-090-003-H01

(4) Remove the fall arrest equipment; do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-00-440-004-H01

(5) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-00-440-005-H01

(6) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 78-31-00-010-804-H01

8. Open the Thrust Reverser (Sling Method)

(Figure 210, Figure 211, Figure 212, Figure 213, and Figure 214)

A. General

(1) This alternate procedure is used to open the thrust reverser when there is a problem with the power door opening system (PDOS) unit, the inlet-mounted PDOS control switches or control circuit, the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser.

(2) This alternate procedure is used if there are indications of oil leakage from the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser.

(3) In this procedure, you open the thrust reverser with the sling equipment and a overhead crane, hoist or equivalent equipment.

(4) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(5) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(6) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(7) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(8) If it is necessary to open the thrust reverser to do maintenance on the PDOS equipment, do this procedure to open the thrust reversers.

(9) Pressure build-up from thermal expansion of the oil in the PDOS actuators can cause a pre-load on the tension latches. The tension latches cannot be opened on the thrust reverser. The thermal expansion of the oil is cause by heat from the sun when the airplane is parked in the sun. Press the PDOS DOWN button for 10-30 seconds to relieve the pressure for each actuator.

(10) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the down button on PDOS unit for 10-30 seconds to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-000-802-001	Fan Cowl Support Beam Fairings Removal (P/B 401)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-19-000-801-H01	Thrust Reverser Latch Access Doors Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2594	Equipment - Sling, GE90 Fan Thrust Reverser Part #: J78004-123 Supplier: 81205 Opt Part #: J78004-89 Supplier: 81205
STD-469	Hoist - Lever, 2000 lb (907 kg) capacity
STD-589	Mat - Protective Cover

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Consumable Materials

Reference	Description	Specification
A50464	Tape - Vinyl, Adhesive Coated	BMS5-179
G02129	Tape - 223S (use until stock depleted)	

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

G. Procedure

SUBTASK 78-31-00-860-004-H01

CAUTION

RETRACT THE LEADING EDGE SLATS. DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS BEFORE YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DAMAGE TO THE LEADING EDGE SLATS AND THRUST REVERSERS CAN OCCUR.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-006-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-040-007-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-00-490-005-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(4) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-00-490-012-H01

(5) For the inboard thrust reverser half, install a protective cover mat, STD-589 on the leading edge of the wing.

NOTE: For the inboard thrust reverser half, the overhead crane/hoist, and the strap of the sling assembly will interfere and rub against the wing leading edge as you pull open the inboard thrust reverser. In addition, the thrust reverser will come very close to the underside of the wing. The protective cover mat should be several overlapped pieces or one continuous piece, cover a minimum length of 7 feet of the leading edge and should wrap around the leading edge a minimum of 2 feet. A carpet or heavy canvas fabric or rubber mat could be used.

NOTE: On the outboard thrust reverser half, the overhead crane/hoist and sling will not interfere and rub against the wing leading edge as you pull open the inboard thrust reverser. The crane/hoist and sling cannot touch the leading edge because of the back sweep of the wing's leading edge is away from the thrust reverser.

(a) Install the protective cover mat, STD-589 with adhesive Nitto 223S Tape, G02129, tape, A50464 or equivalent local product.

SUBTASK 78-31-00-010-010-H01

(6) Remove the PDOS access panel in the thumbnail fairing on the applicable fan cowl support beam (Figure 214).

NOTE: You must remove the PDOS access panel to get access to the PDOS unit controls when you close the thrust reverser.

(a) Do this task: Fan Cowl Support Beam Fairings Removal, TASK 54-52-01-000-802-001.

(b) Remove 17 countersunk bolts to remove the access panel.

(c) Move the panel to the side of the access hole; there is a lanyard that connects the access panel to the fairing.

SUBTASK 78-31-00-010-011-H01

(7) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-864-005-H00

(8) Press the PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the tension latches.

SUBTASK 78-31-00-010-038-H01

(9) Open the latch beam access doors on the applicable engine:

Open these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-00-010-053-H00

CAUTION

OPEN ALL LATCHES ON THE THRUST REVERSER HALVES BEFORE YOU OPEN A THRUST REVERSER HALF. IF A LATCH HOOK STAYS ENGAGED, DAMAGE TO THE THRUST REVERSER, THE STRUT LIMITER RODS, AND BRACKETS CAN OCCUR.

(10) Disengage and open the latches on the thrust reverser in the sequence that follows (Figure 210, Figure 211):

NOTE: The latch location numbers are shown in brackets.

NOTE: Open the upper T-hook latch [12]. Open the No. 2 centerline tension latch [11] to disengage the lower interlock pin. Disengage the aft cowl deflection limiter latches [1], [2], [3] and [4] from aft to forward. Next, open the aft cowl centerline latches [5], [6] and [7] from aft to forward. Open the No. 5 [8], No. 4 [9] and No. 3 [10] centerline tension latches. Open the No. 1 tension latch [13]. Open the V-band latch [14] last.

NOTE: The No.1 tension latch and the No. 5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the right side thrust reverser.

(a) Open the upper bifurcation T-hook latch [12] on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down to the fully extended position to keep the T-hook in the vertical (open) position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Push the T-handle button in and pull down the handle to the fully extended position to keep the T-hook in the vertical (open) position.

3) If the T-hook latch does not operate, refer to the task: Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Open the Thrust Reverser, TASK 78-31-00-980-803-H01.

(b) Open the No.2 centerline latch beam tension latch [11].

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

3) Make sure the bracket assembly for the interlock pin has moved down to the open position to disengage the interlock pin.

NOTE: The spring loaded interlock pin should move downward and move the bracket assembly downward to show that the interlock pin has disengaged from the serrated fitting on the right side thrust reverser. When you close the No. 2 tension latch, the latch body pushes the bracket assembly upward which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(c) Open the four deflection limiter latches [1], [2], [3] and [4] on the aft cowls.

NOTE: There are two deflection limiter latches for each aft cowl. All four deflection limiter latch hooks must be disengaged if the left or right thrust reverser is opened.

1) Open the two aft latches first, before you open the two forward latches.

2) Push on the secondary lock to open the spring loaded latch handle.

3) Pull the handle to the full open position to release the hook from the tension strap keeper.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(d) Open the three aft cowl centerline latches [5], [6] and [7] from the aft latch to the forward latch.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch keeper eyebolt.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(e) Open the No. 5 tension latch [8], the No. 4 tension latch [9] and the No. 3 tension latch [10] on the centerline latch beam from the aft latch to the forward latch.

NOTE: At the No. 5 tension latch, use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle. At the No.4 and No.3 tension latches, because of the small access space to the latches, a small wire hook (local manufacture) can be used to help open the latch handle.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Push on the secondary lock to open the spring loaded latch handle.
2) Pull the handle to the full open position to release the hook from the latch bolt.

(f) Open the No.1 tension latch [13].
1) Move the small, unlock lever down.
2) Move the latch handle downward to the open position.
3) Disengage the No.1 latch T-bolt from the latch keeper hook.

WARNING MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(g) Open the V-band latch [14].
1) Hold the latch handle firmly against the force you will feel when you release the trigger A latch and move the latch handle.

NOTE: The force on the handle will be 50-55 pounds (222-245 newtons).

2) Push upward on the end of the latch handle to release trigger A lock pin.
3) Slide trigger A toward the end of the handle.
4) Move the handle downward and to the left until the handle locks in the vertical position.

NOTE: This is the unlock stroke.

5) Hold the latch handle firmly against the force you will feel when you release the trigger B latch and move the latch handle.
6) Move the handle to the left to relieve the preload on trigger B.
7) Slide trigger B away from the handle pivot points.
8) Move the handle from the vertical to the horizontal position.

NOTE: This is the release stroke.

9) Make sure the latch hook is disengaged from the T-bolt receiver.
10) Put the v-band latch in the stowed position.

SUBTASK 78-31-00-020-001-H01

(11) If the right thrust reverser is to be opened, remove the middle latch access door to get access to the sling attachment point.

(a) Do this task: Thrust Reverser Latch Access Doors Removal, TASK 78-31-19-000-801-H01.

SUBTASK 78-31-00-490-006-H01

(12) Attach the lower sling assembly of the GE90 fan thrust reverser sling equipment, SPL-2594 to the thrust reverser latch beam with the attach fitting (Figure 212).

NOTE: The lower sling assembly fitting is the storage location for the bolts and washers that are used to attach the fitting to the latch beam. The part numbers for these bolts are printed on the fitting.

(a) Install two bolts and washers through the fitting and tighten.

(b) Attach an overhead crane/2000 lb (907 kg) capacity lever hoist, STD-469 or equivalent equipment to the lower sling assembly.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-010-013-H01

WARNING DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER UNTIL YOU LOCK THE HOLD-OPEN ROD. THE THRUST REVERSER IS HEAVY. IT WILL CLOSE QUICKLY IF THE PRESSURE IS REMOVED FROM THE PDOS. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

CAUTION MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

CAUTION DO NOT OPEN THE THRUST REVERSER IF THE TRANSLATING SLEEVES ARE EXTENDED. THE EXTENDED SLEEVES CAN HIT THE STRUT PANELS. DAMAGE TO EQUIPMENT CAN OCCUR.

(13) Open the thrust reverser:

(a) Make your crane lift movements slow and small to keep control of the thrust reverser and sling.

NOTE: This instruction applies to factory or hanger, overhead crane/hoists with fine motor controls and to self-propelled, rubber tire, hydraulic extension beam cranes which may not have fine hydraulic controls. Because of the size and mass of this thrust reverser (inertia), it will be difficult to start the movement of the thrust reverser and sling and it will be difficult to stop the movement and the direction of the movement if the lift movements are too fast.

(b) Use the overhead crane/hoist to slowly pull open the thrust reverser and stop when the hold open rod is fully extended and locked and you hear an audible click or snap (Figure 213).

NOTE: The weight for the left thrust reverser half is 1703 lb (772 kg). The weight for the right thrust reverser half is 1620 lb (735 kg). The thrust reverser for the GE90-100 series engine is lighter than the GE90-70/-80/-90 series engine.

NOTE: A yellow safety band on the upper side of the lock collar is the indication for the locked position. A red safety band on the lower side of the lock collar is the indication for the unlocked position. An audible click or snap is also an indication when you extend the hold-open rod to the locked position.

NOTE: The thrust reverser should be supported in the open position by two devices, the hold open rod, the PDOS actuator in the extended position or the overhead crane/hoist and sling.

WARNING DO NOT REMOVE THE SLING EQUIPMENT. DO NOT RELEASE THE TENSION IN THE SLING EQUIPMENT. IF A HOLD-OPEN ROD BREAKS, THE THRUST REVERSER WILL FALL. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(c) Lower the thrust reverser to put the weight of the thrust reverser on the hold-open rod.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) If you do maintenance under the open thrust reverser with the PDOS actuator disconnected from the inner wall or you do maintenance to the PDOS system, the sling and crane/hoist should remain connected to the thrust reverser half and you must keep tension on the sling equipment.

H. Thrust Reversers - Tryout

NOTE: This tryout is to make sure that the thrust reversers are in the fully open position.

SUBTASK 78-31-00-210-004-H00

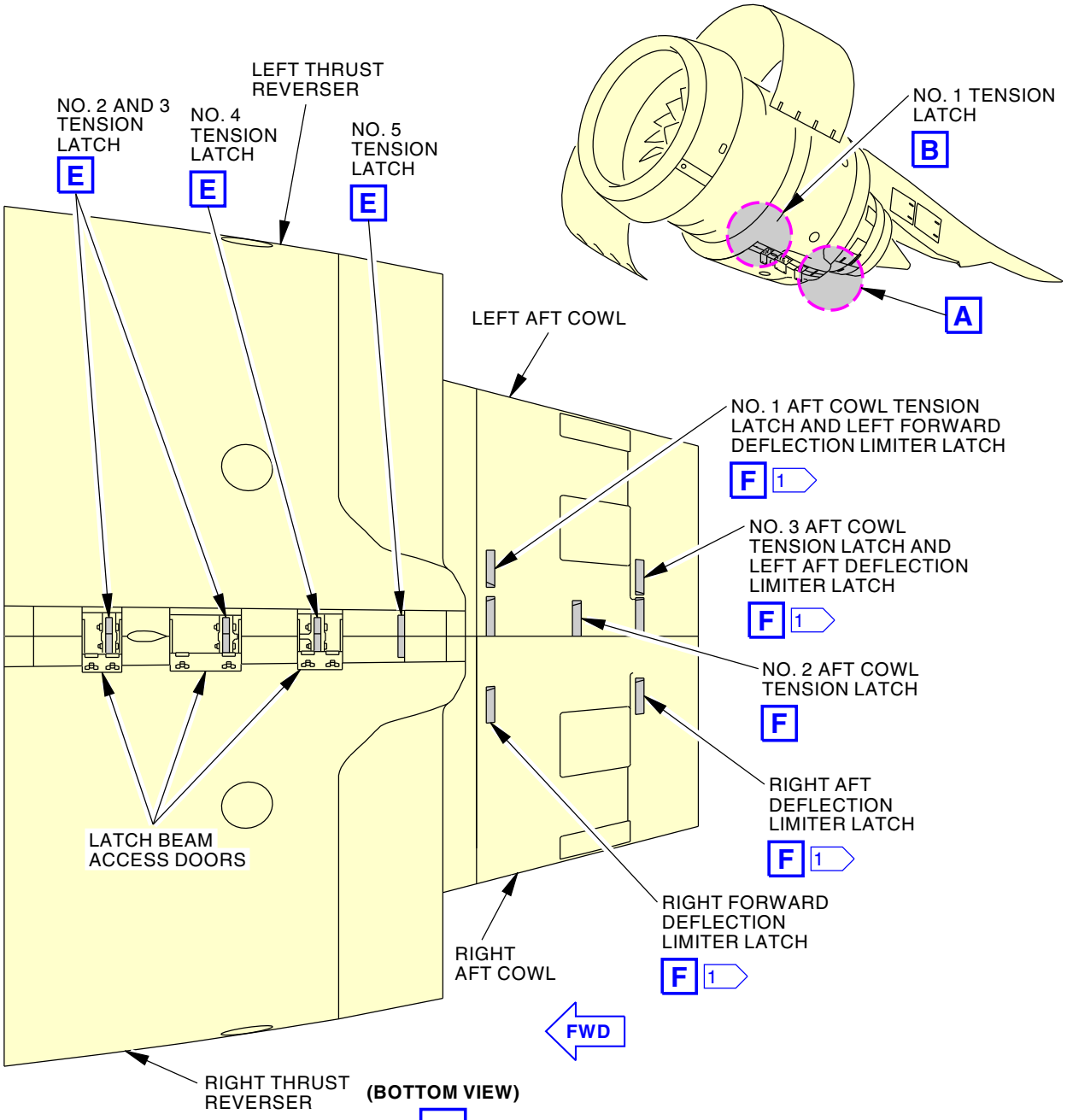
(1) Make sure that the yellow safety stripe on the lower side of the lock collar is seen.

SUBTASK 78-31-00-210-005-H00

(2) Make sure that the red safety stripe on the lower side of the lock collar is not seen.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

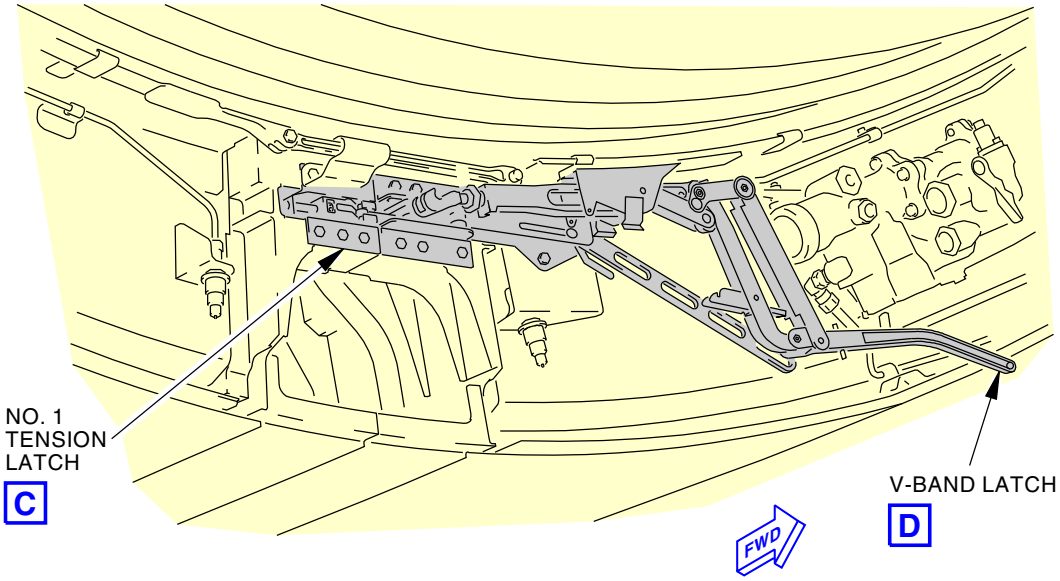
THE STENCIL NUMBERS THAT IDENTIFY THE LATCHES ON THE THRUST REVERSER AND AFT COWL ARE NOT OPEN/CLOSE SEQUENCE NUMBERS.

1 ALL 4 DEFLECTION LIMITER LATCH HOOKS MUST BE DISENGAGED WHEN THE LEFT OR RIGHT THRUST REVERSER HALF IS OPENED

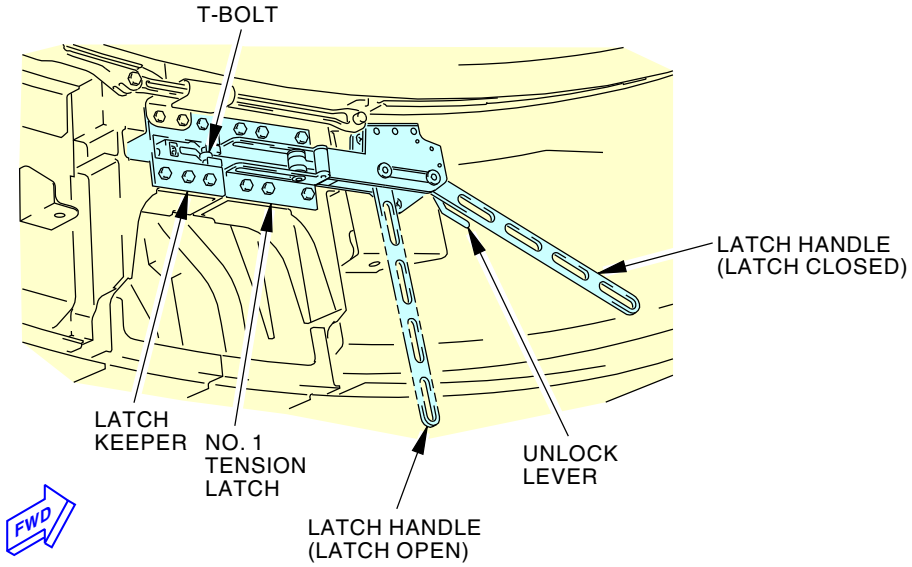
M07238 S0004286216_V5

Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 1 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(HARTWELL HA277-3)
V-BAND LATCH
B

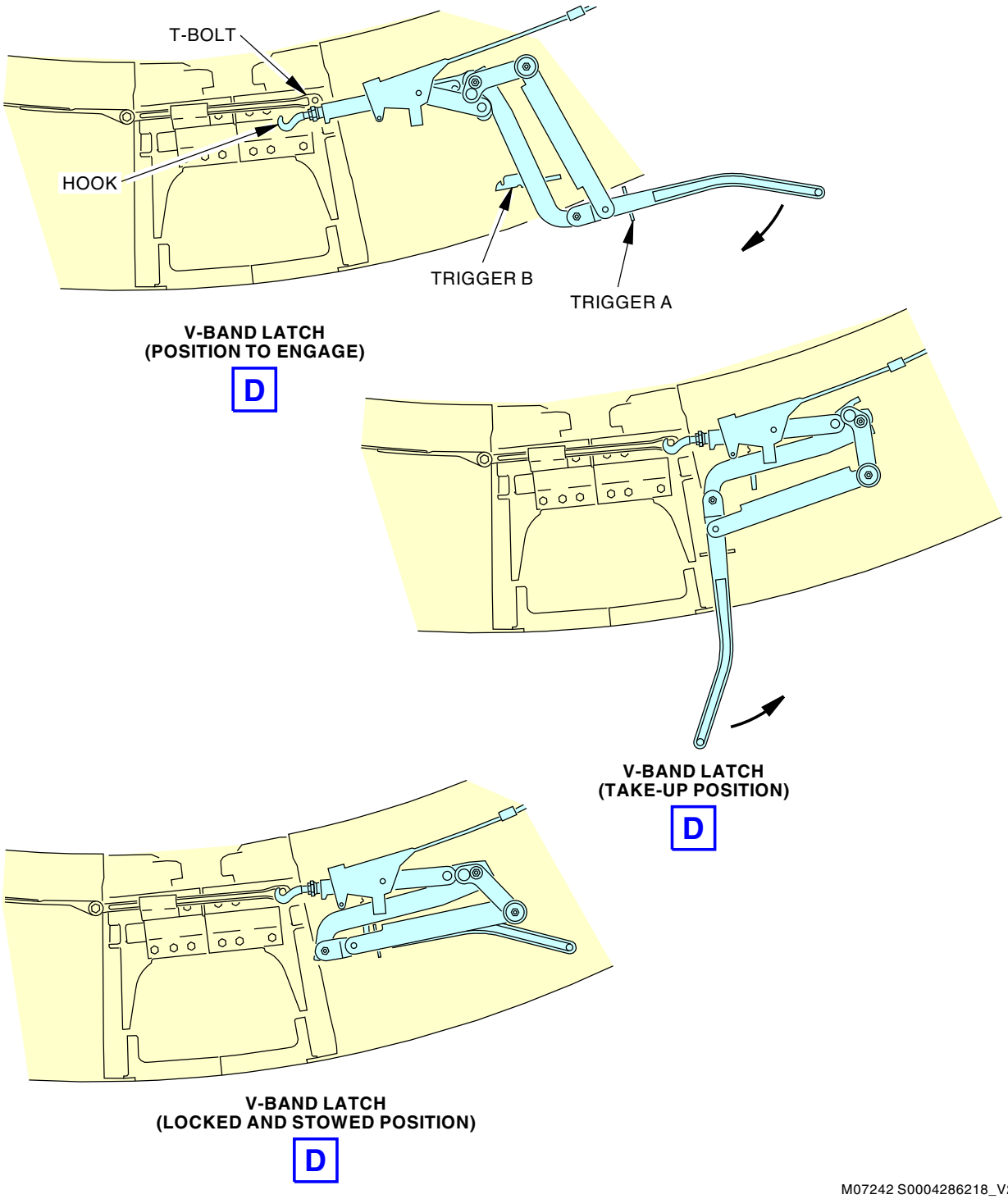


THRUST REVERSER NO. 1 TENSION LATCH
(V-BAND LATCH REMOVED FOR CLARITY)
C

M07240 S0004286217_V3

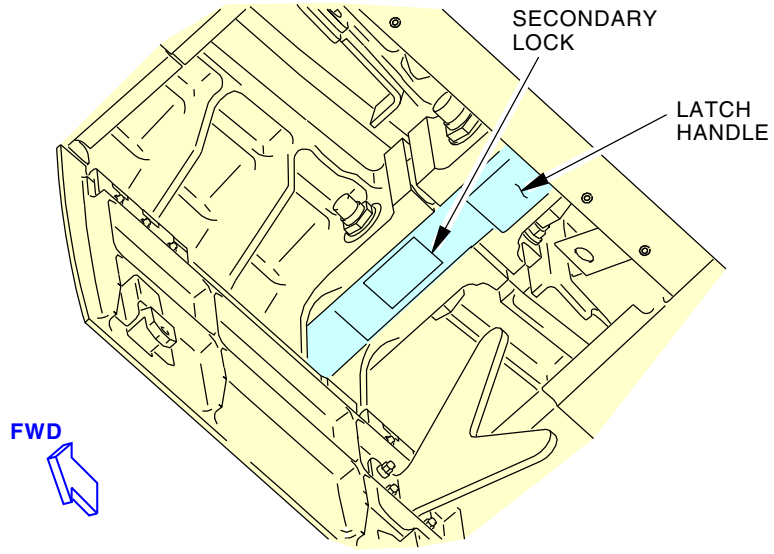
Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 2 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



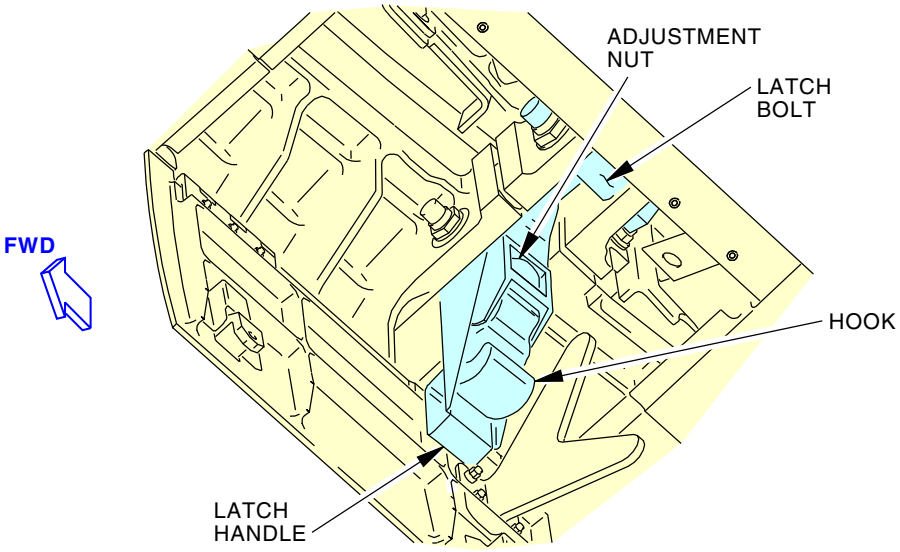
Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 3 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER NO. 2-5 TENSION LATCH
(CLOSED POSITION)
(EXAMPLE, 4 LOCATIONS)

E



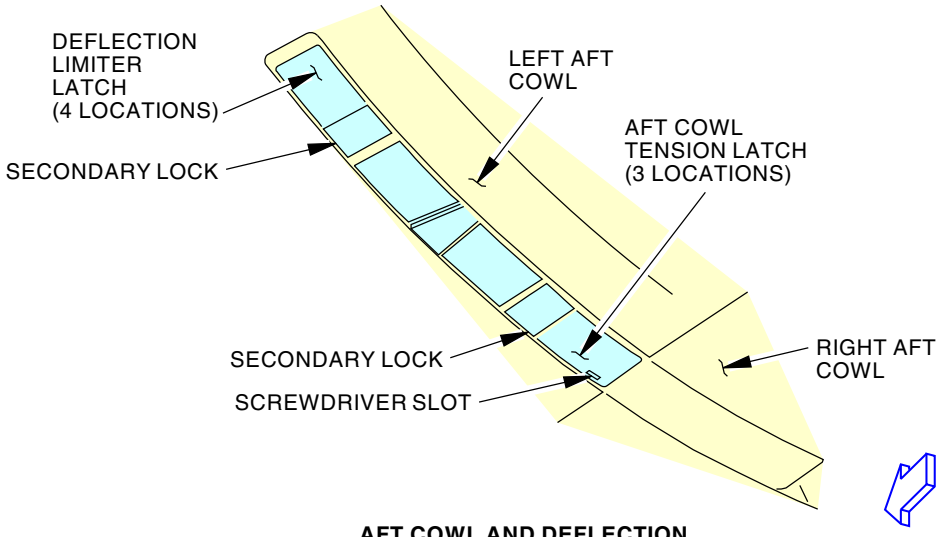
THRUST REVERSER NO. 2-5 TENSION LATCH
(OPEN POSITION)
(EXAMPLE, 4 LOCATIONS)

E

M07244 S0004286219_V3

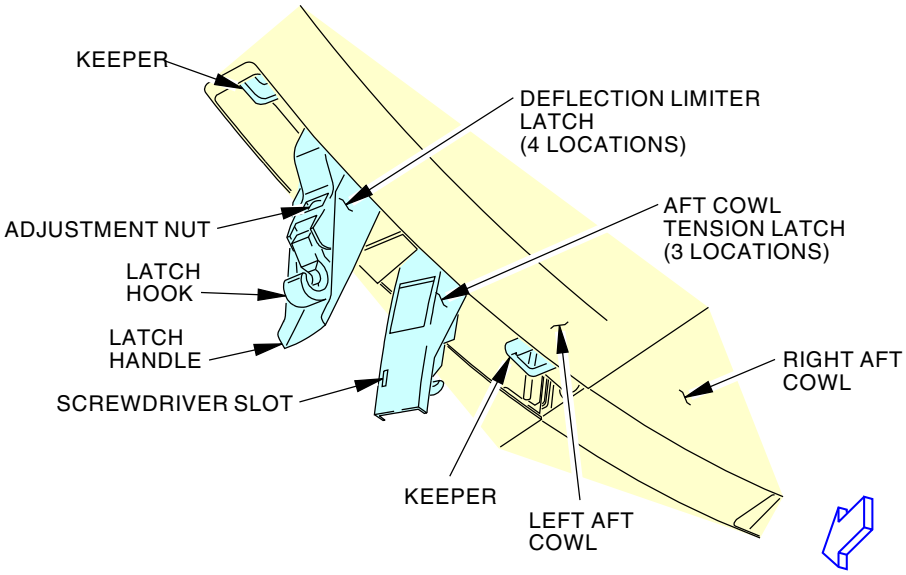
Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 4 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL AND DEFLECTION LIMITER LATCHES (CLOSED POSITION) (EXAMPLE)

F



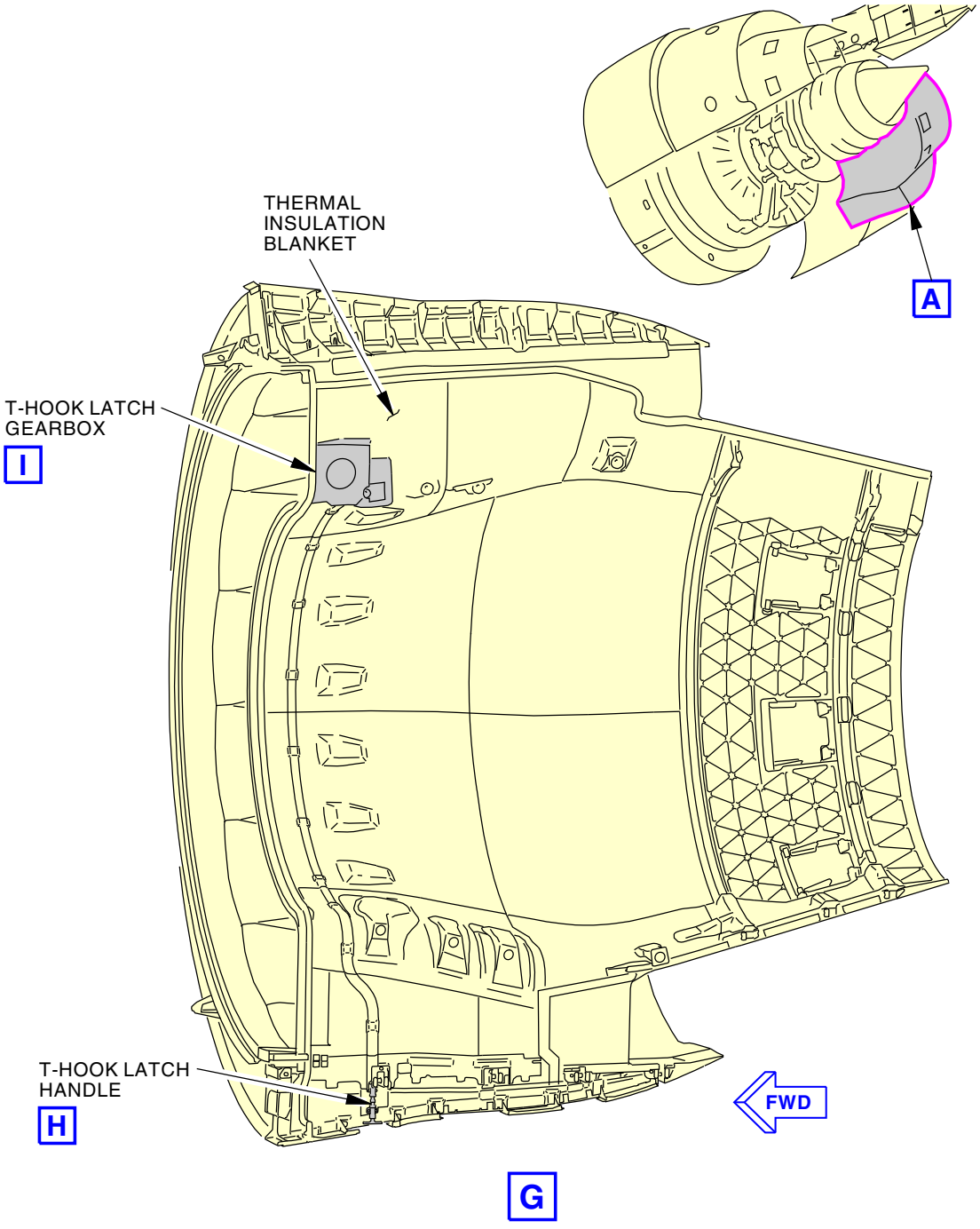
AFT COWL AND DEFLECTION LIMITER LATCHES (OPEN POSITION) (EXAMPLE)

F

M07246 S0004286220_V2

Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 5 of 12)

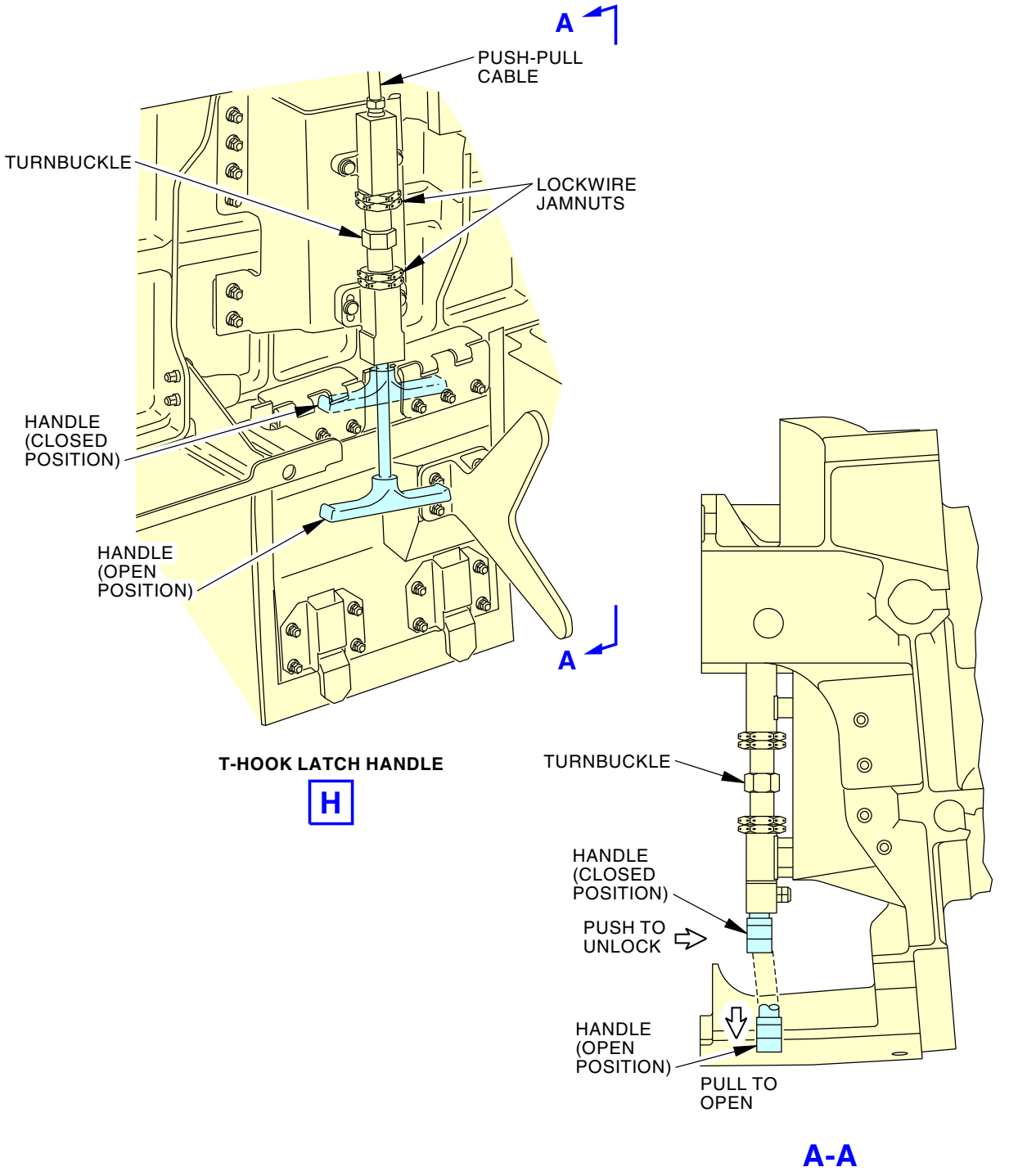
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



W85447 S0000131586_V3

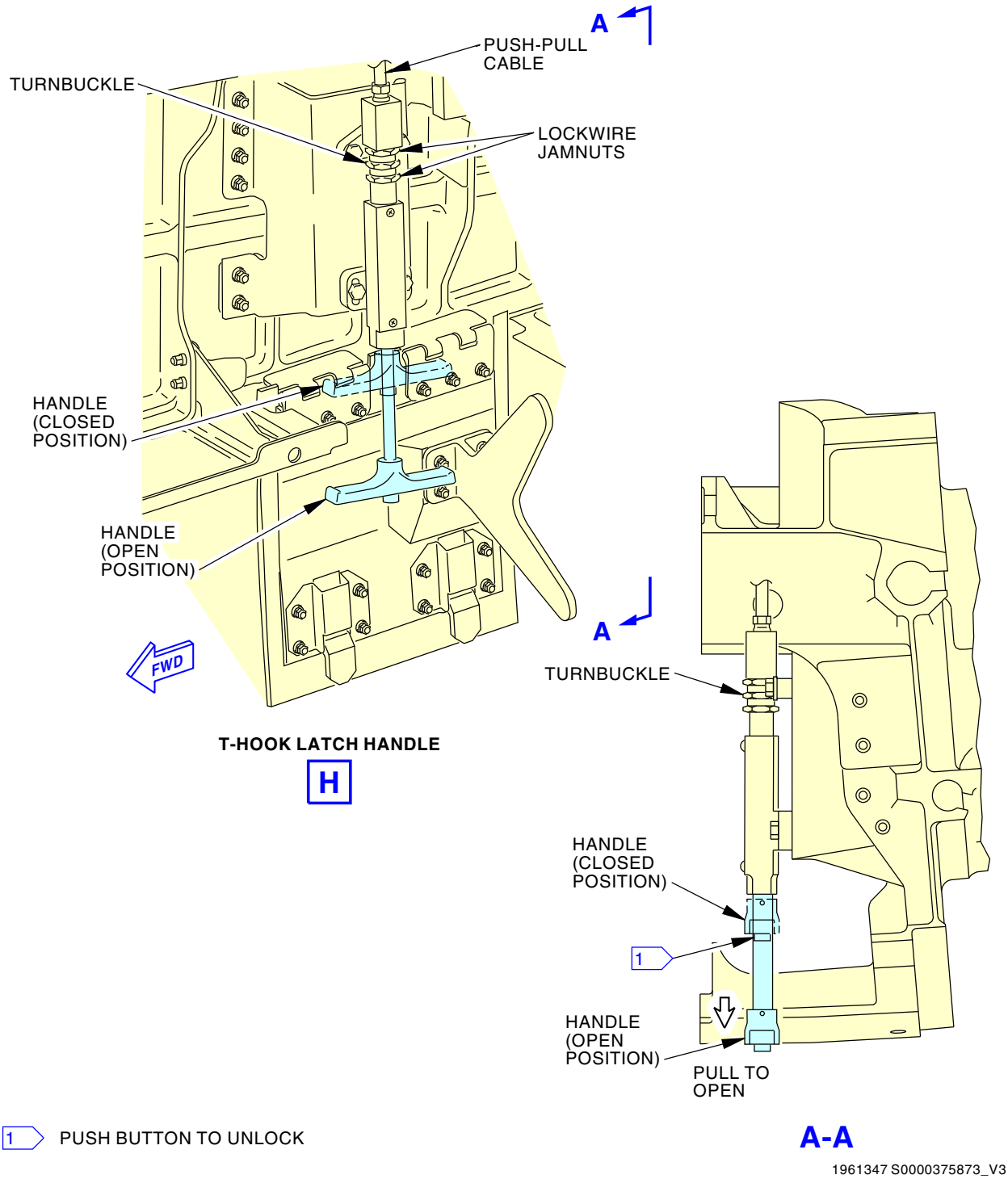
Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 6 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



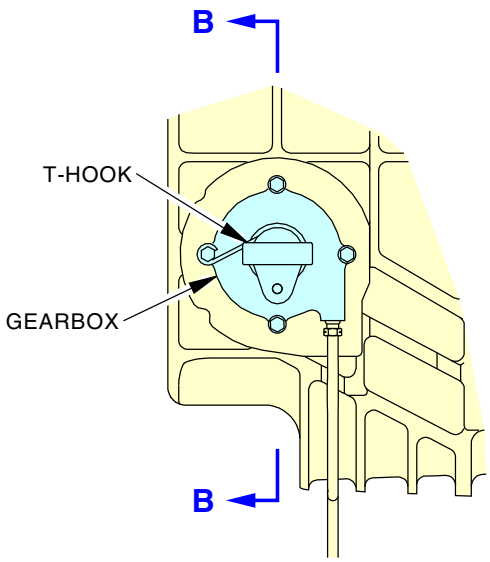
Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 7 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



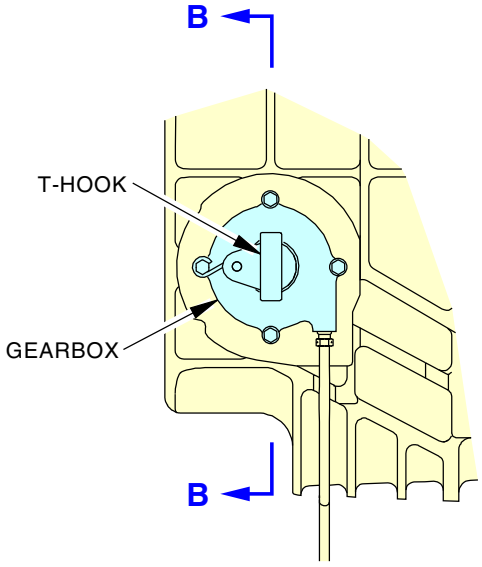
Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 8 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



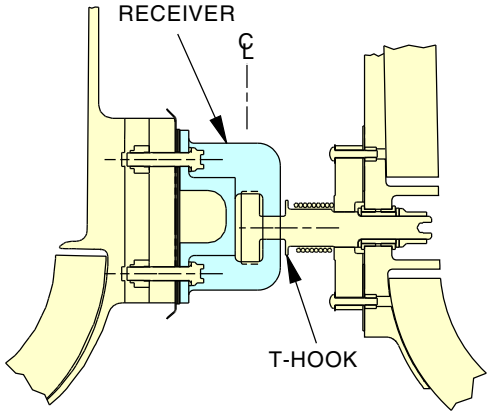
T-HOOK LATCH
(CLOSED POSITION)

I



T-HOOK LATCH
(OPEN POSITION)

I



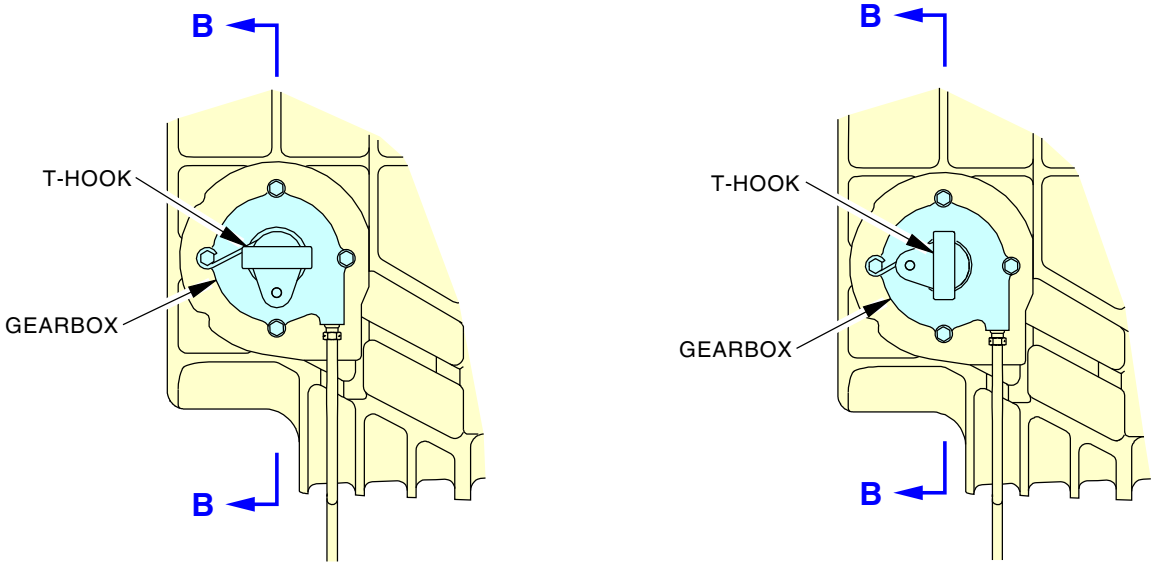
THRUST REVERSER CLOSED

B-B

D80010 S0000165142_V3

Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 9 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

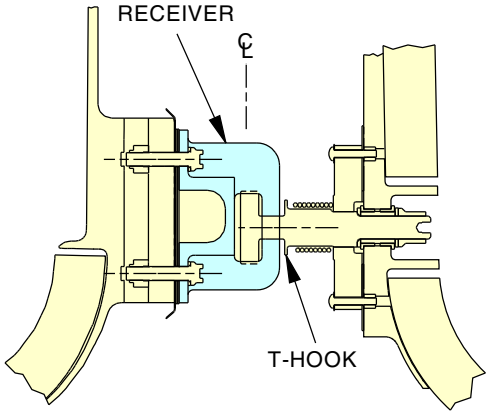


T-HOOK LATCH (CLOSED POSITION)

I

T-HOOK LATCH (OPEN POSITION)

I



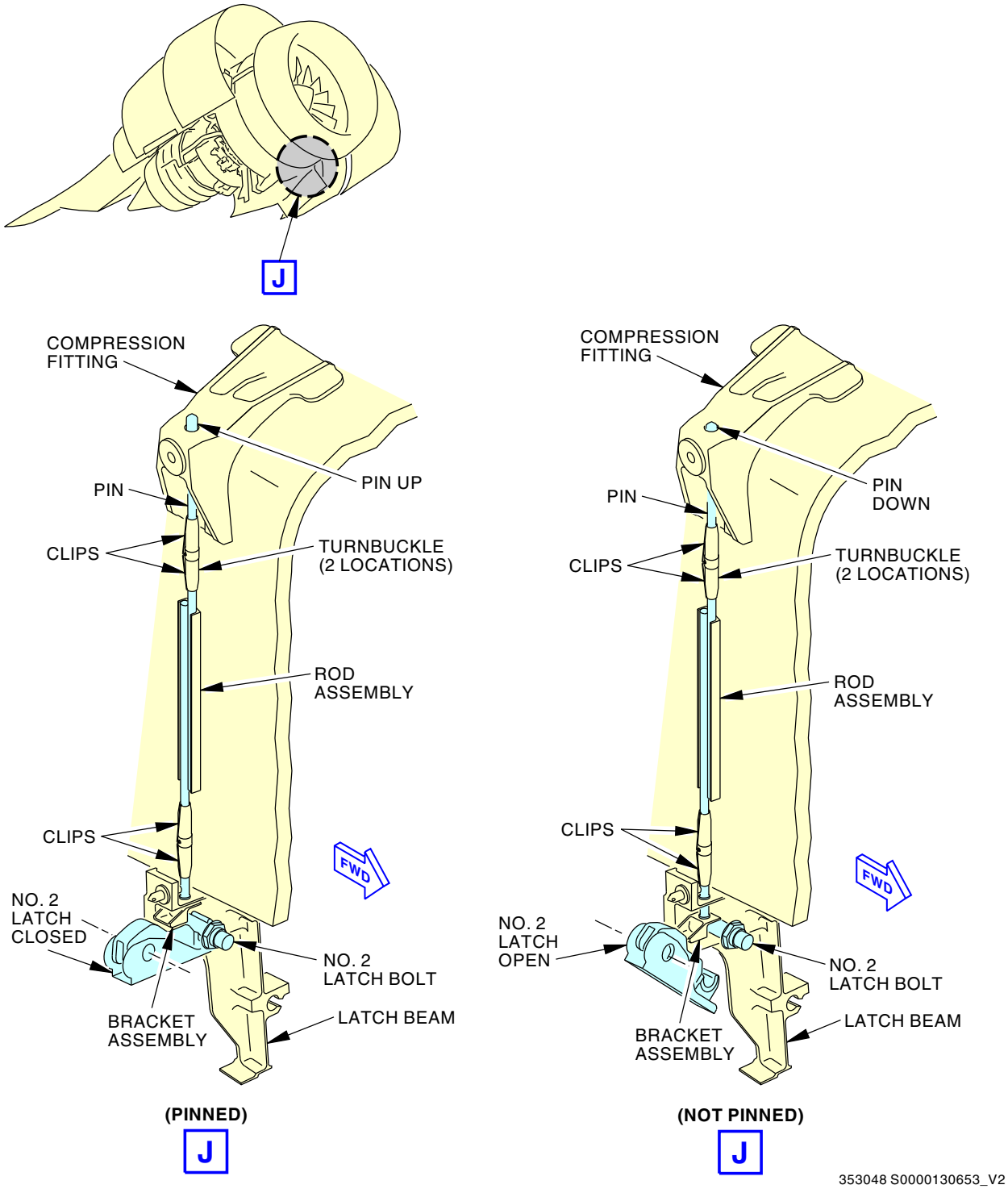
THRUST REVERSER CLOSED

B-B

D80010 S0000165142_V3

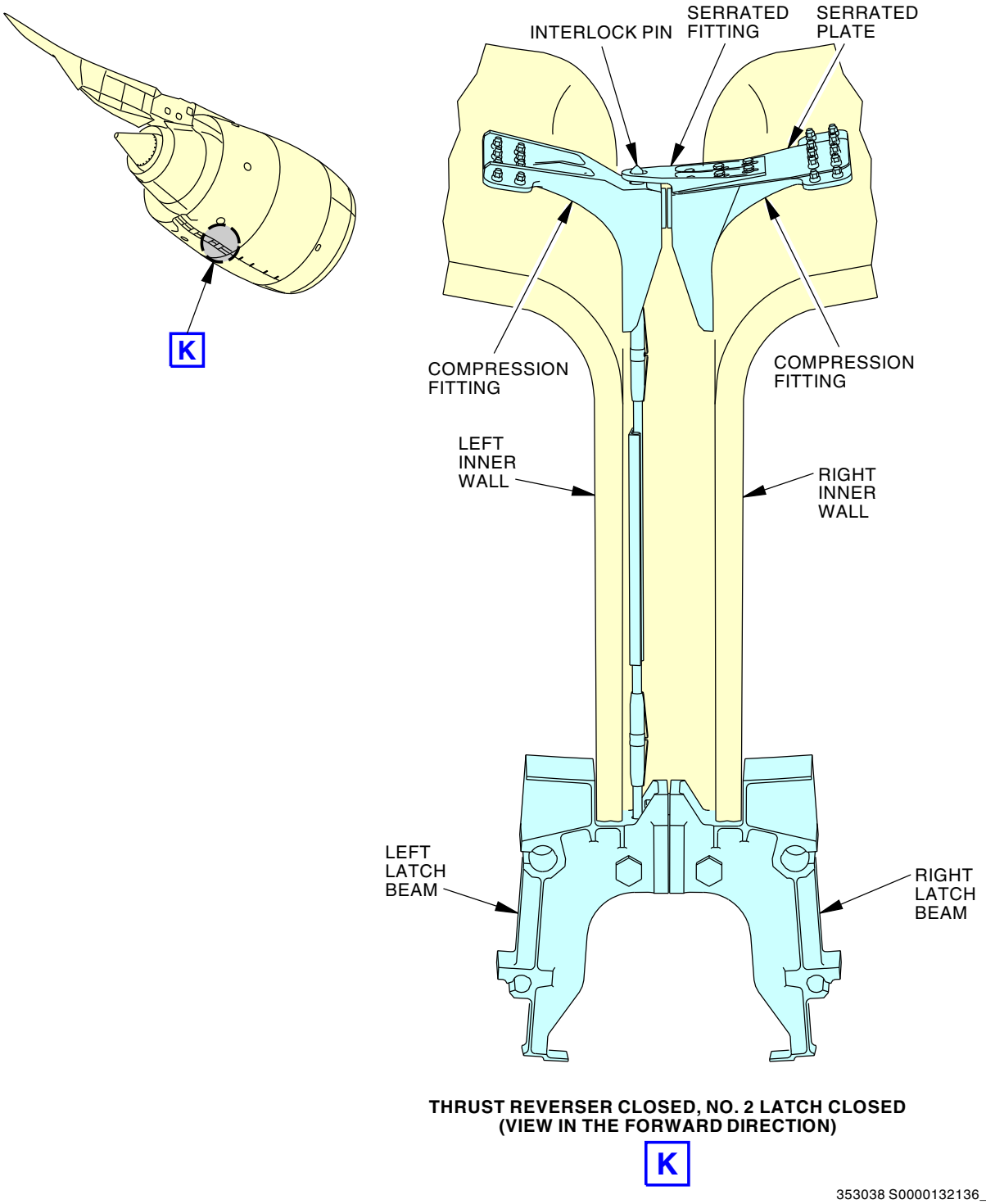
Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 10 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 11 of 12)

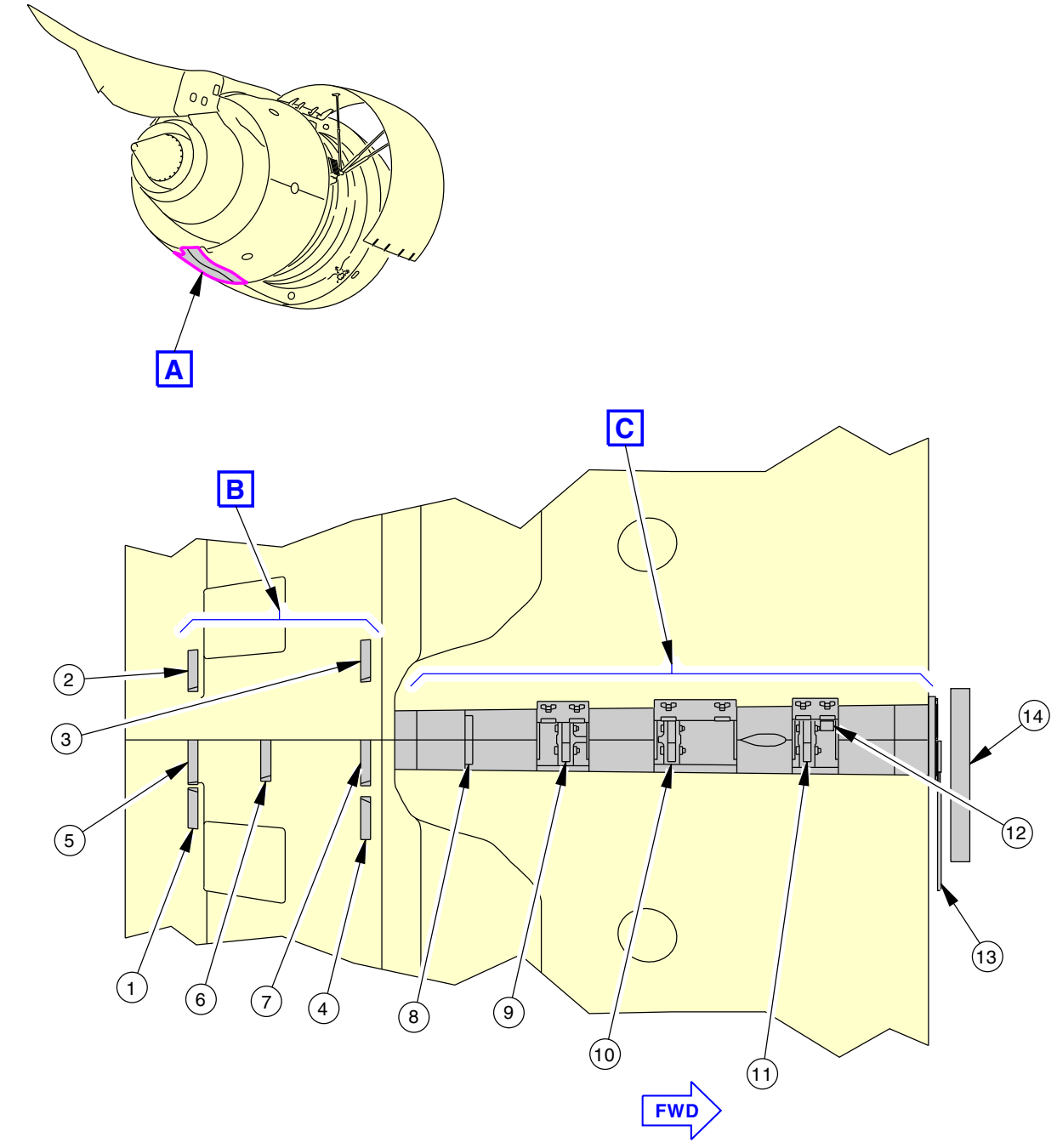
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER CLOSED, NO. 2 LATCH CLOSED
(VIEW IN THE FORWARD DIRECTION)

Thrust Reverser Latches
Figure 210/78-31-00-990-818-H01 (Sheet 12 of 12)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



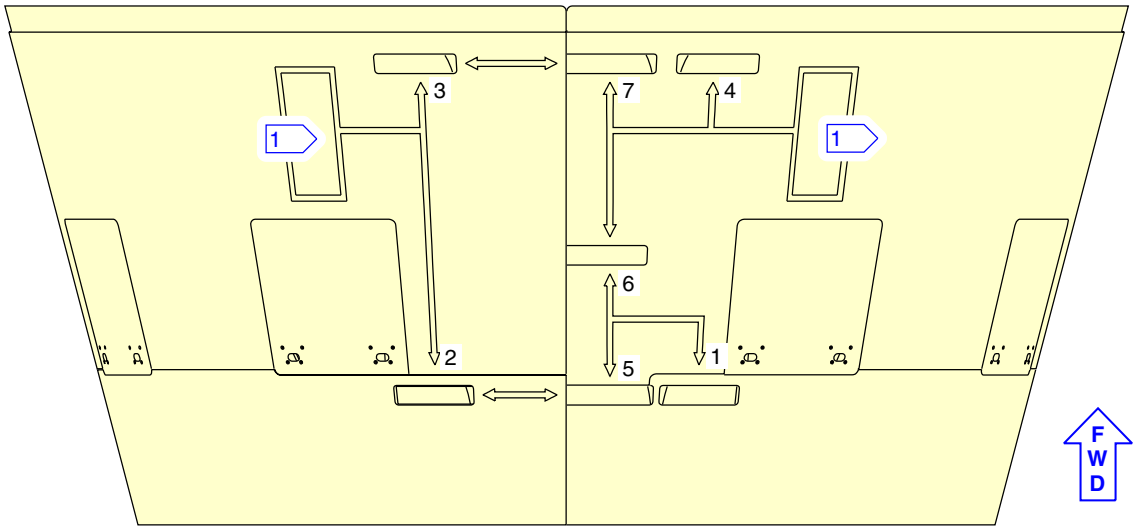
LEGEND:
◯ = LATCH LOCATION NUMBERS

A

D63535 S0000162243_V4

Thrust Reverser Latch Location Numbers
Figure 211/78-31-00-990-834-H00 (Sheet 1 of 2)

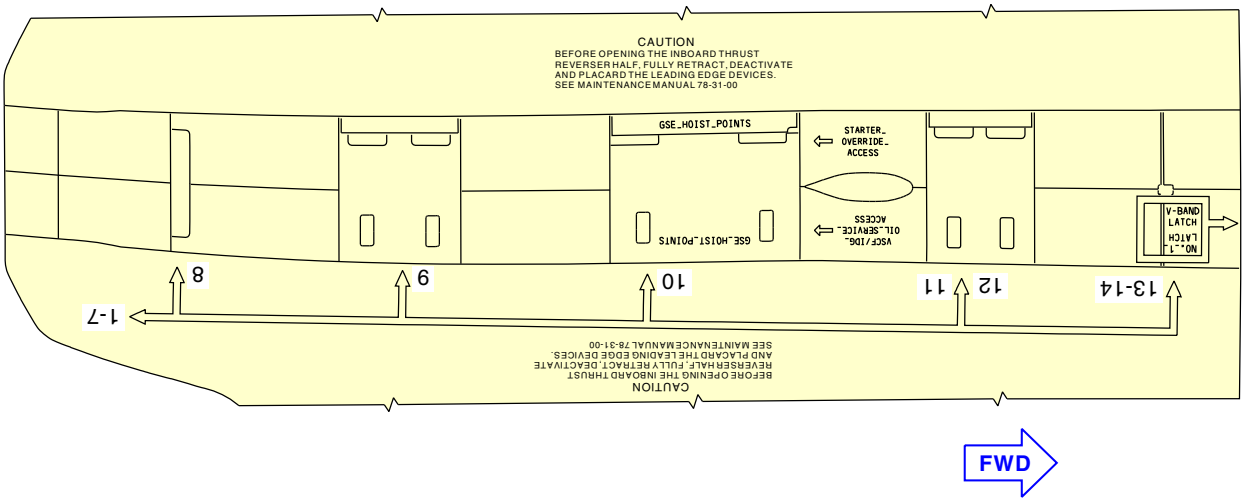
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 OPEN ALL 14 LATCHES ON BOTH T/R HALVES PRIOR TO OPENING EITHER T/R HALF

(VIEW IN THE UP DIRECTION)

B



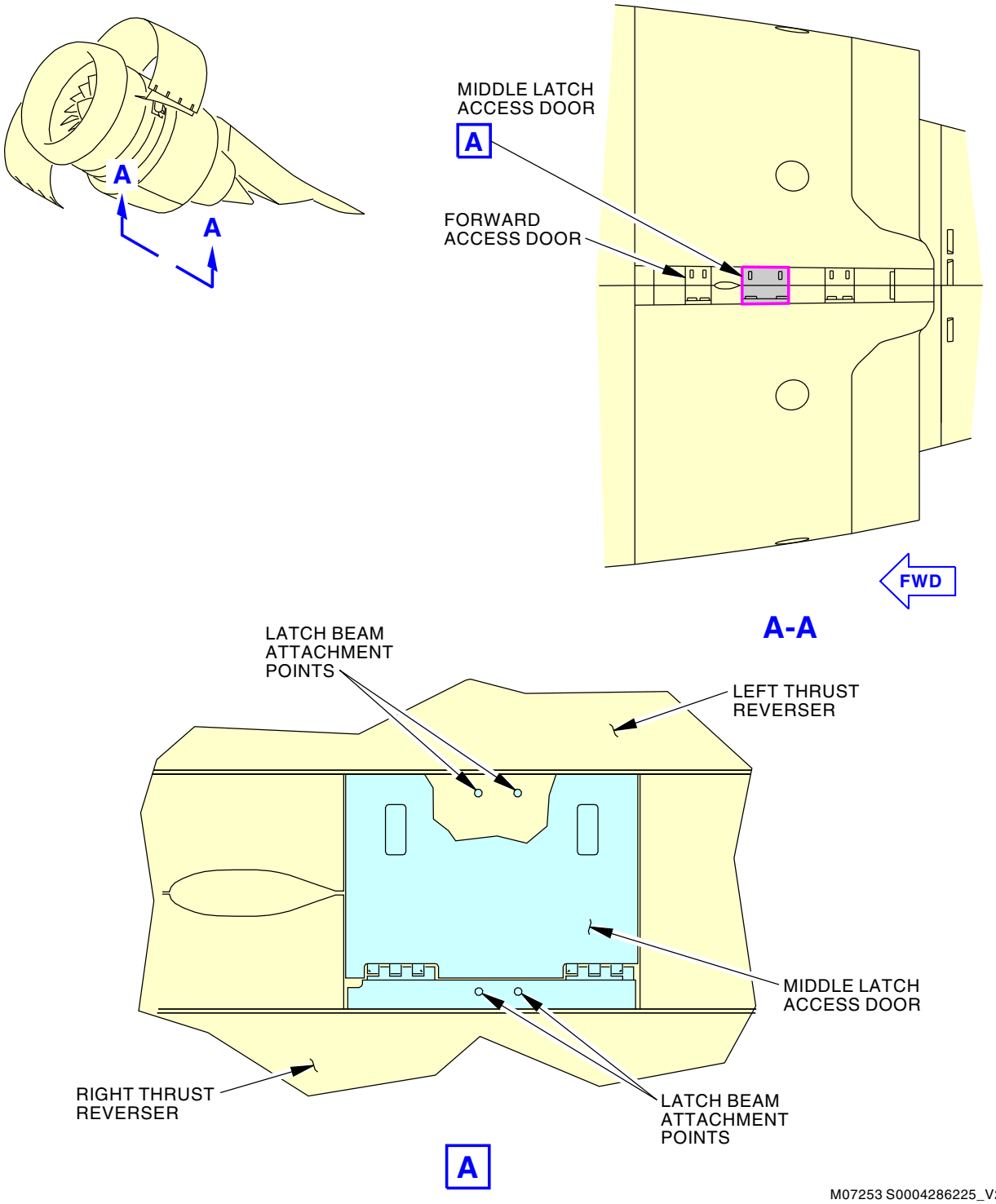
(VIEW IN THE UP DIRECTION)

C

J66085 S0000174744_V2

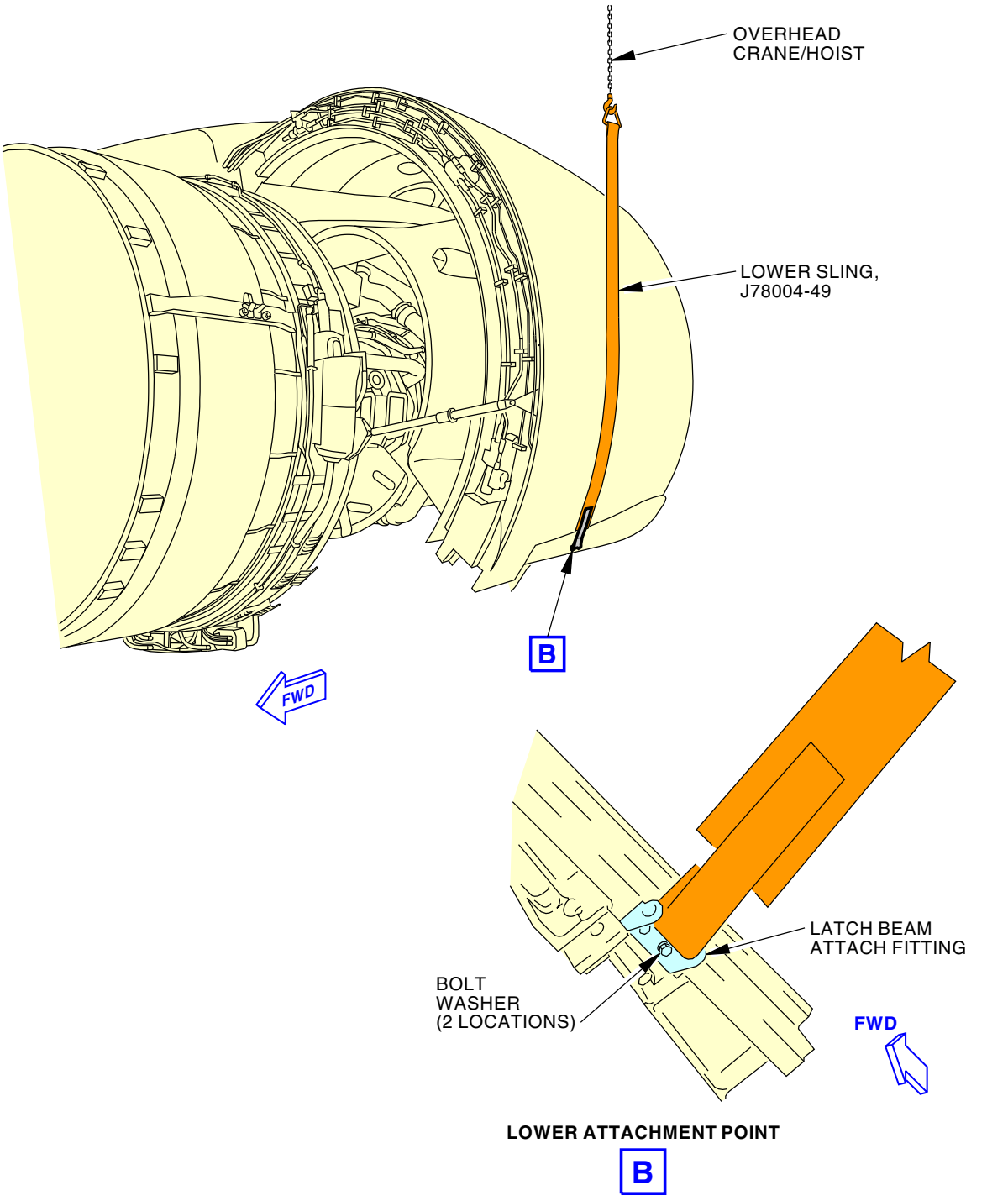
Thrust Reverser Latch Location Numbers
Figure 211/78-31-00-990-834-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



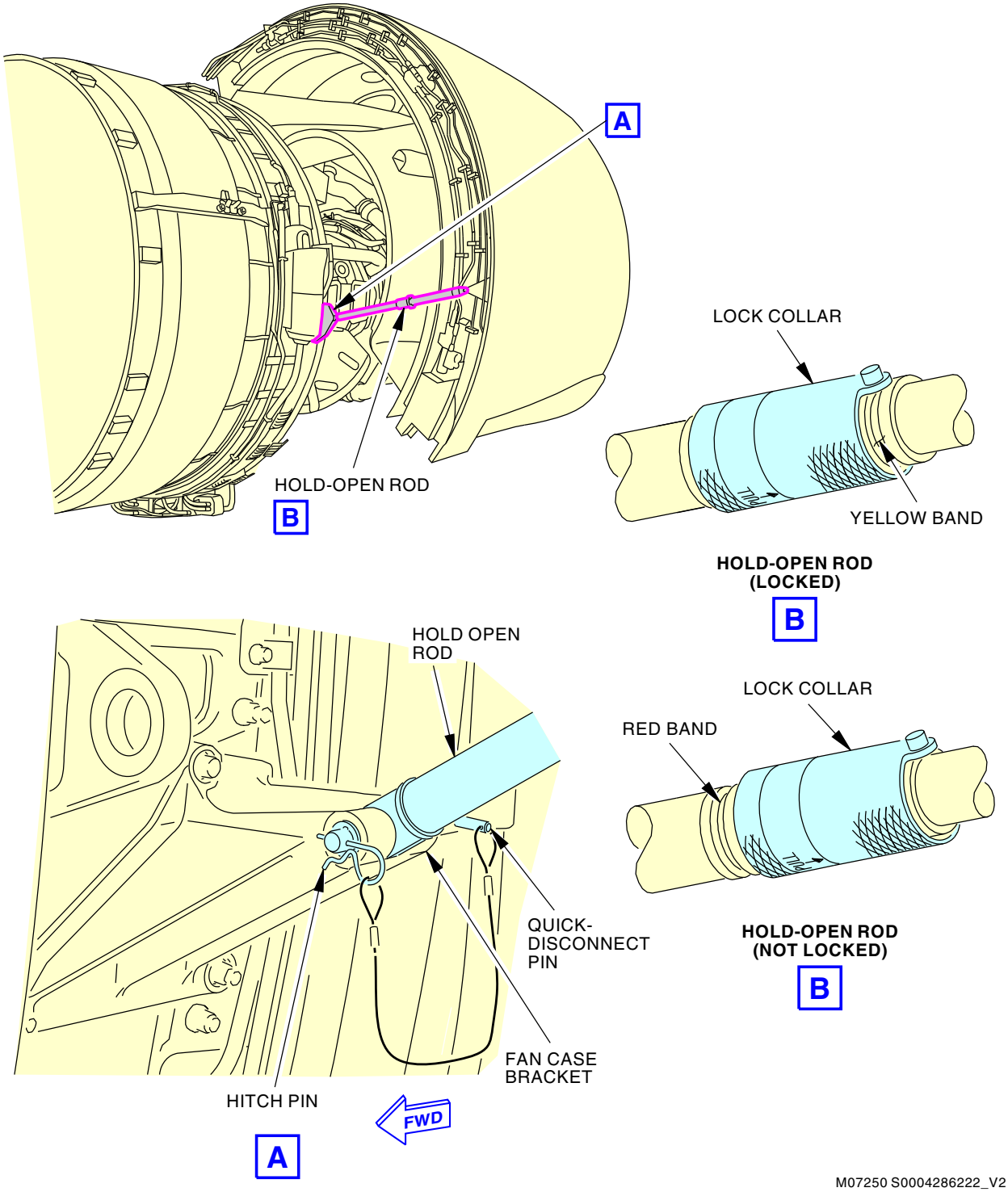
Open/Close Thrust Reverser With Sling J78004
Figure 212/78-31-00-990-813-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



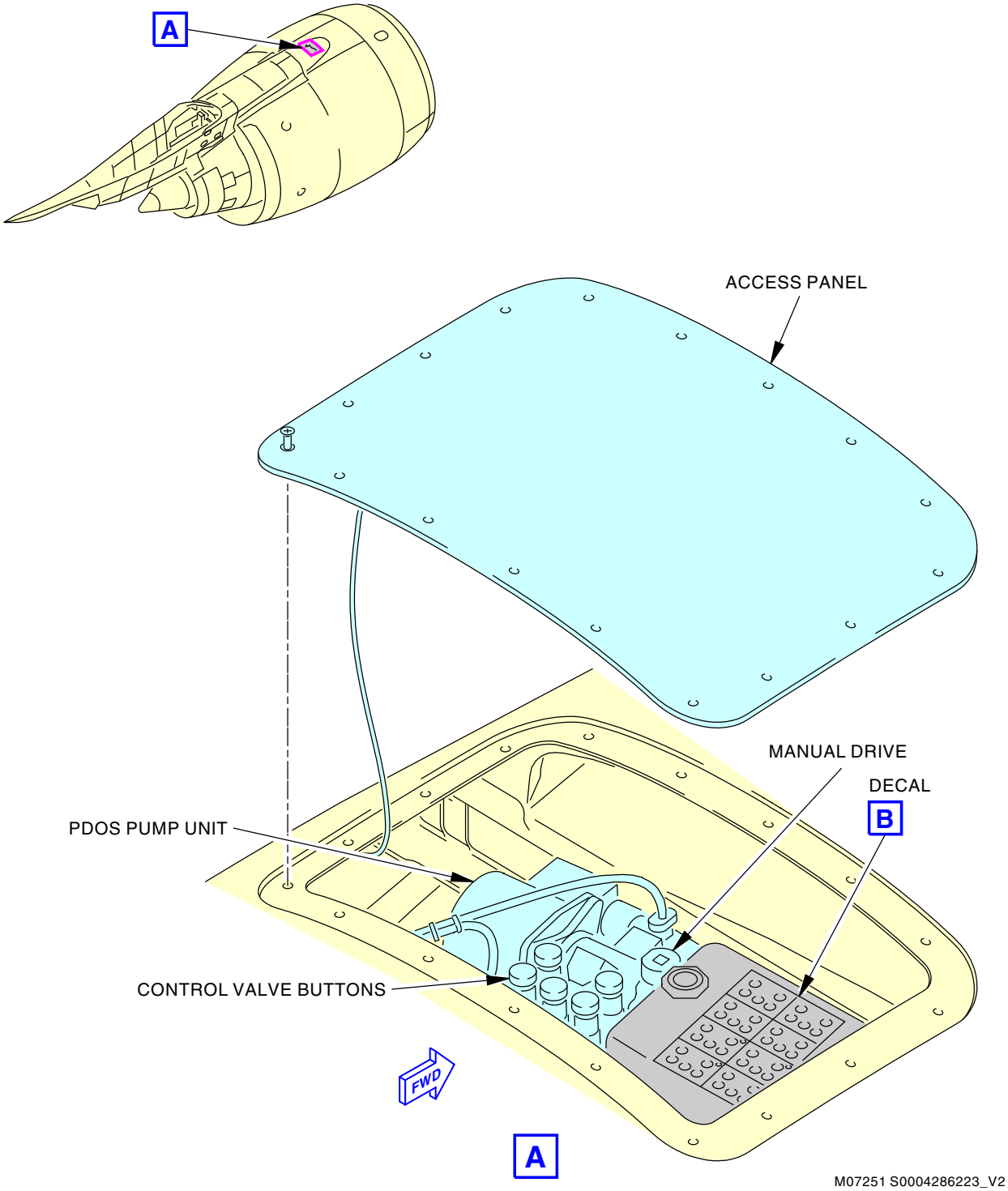
Open/Close Thrust Reverser With Sling J78004
Figure 212/78-31-00-990-813-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



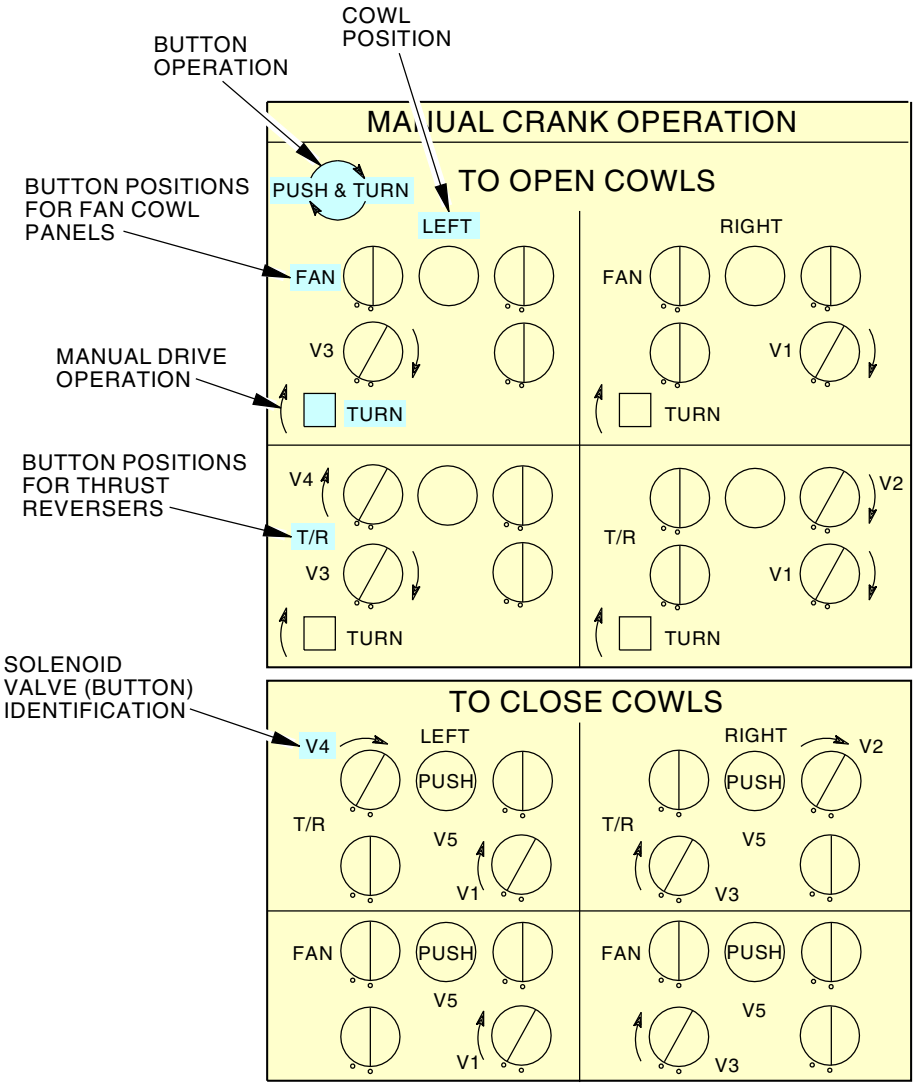
Thrust Reverser Hold-Open Rod
Figure 213/78-31-00-990-819-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser PDOS - Manual Method
Figure 214/78-31-00-990-826-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



DECAL - PDOS

B

M07252 S0004286224_V2

Thrust Reverser PDOS - Manual Method
Figure 214/78-31-00-990-826-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-410-804-H01

9. Close the Thrust Reverser (Sling Method)

(Figure 210, Figure 211, Figure 212, Figure 213, and Figure 214)

A. General

(1) This alternate procedure is used to close the thrust reverser when there is a problem with the power door opening system (PDOS) unit, the inlet-mounted PDOS control switches or control circuit, the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser.

(2) This alternate procedure can be used after oil leakage from the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser was repaired.

(3) In this procedure, you close the thrust reverser with the sling equipment and a overhead crane or hoist. To prevent any hydraulic lock, you must manually set the valves on the PDOS unit to allow any oil from the PDOS actuator to return to the PDOS unit reservoir.

(4) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(5) You must not close, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(6) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(7) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(8) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the down button on PDOS unit to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-19-000-801-H01	Thrust Reverser Latch Access Doors Removal (P/B 401)
78-31-19-400-801-H01	Thrust Reverser Latch Access Doors Installation (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2594	Equipment - Sling, GE90 Fan Thrust Reverser Part #: J78004-123 Supplier: 81205 Opt Part #: J78004-89 Supplier: 81205
STD-469	Hoist - Lever, 2000 lb (907 kg) capacity

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

F. Procedure

SUBTASK 78-31-00-490-007-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(1) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-410-010-H01

WARNING DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER WHEN THE HOLD-OPEN ROD IS UNLOCKED. THE THRUST REVERSER IS HEAVY AND CAN CLOSE QUICKLY. THIS CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(2) Close the thrust reverser:

(a) Make sure the lower sling assembly of the GE90 fan thrust reverser sling equipment, SPL-2594, is installed (Figure 212).

(b) With the overhead crane/2000 lb (907 kg) capacity lever hoist, STD-469, slowly lift the thrust reverser open until the weight is not on the hold-open rod.

NOTE: The weight for the left thrust reverser half is 1703 lb (772 kg). The weight for the right thrust reverser half is 1620 lb (735 kg). The thrust reverser for the GE90-100 series engine is lighter than the GE90-70/-80/-90 series engine.

(c) Pull the collar on the hold-open rod to the unlocked position (Figure 213).

NOTE: The collar will stay in the unlocked position.

(d) Put the PDOS controls on the PDOS unit to the T/R close position (Figure 214).

(e) Push and hold the CLOSE button on the PDOS unit until the thrust reverser is in the closed position.

NOTE: This will permit the hydraulic fluid to move from the PDOS actuator to the PDOS unit reservoir when the thrust reverser is lowered by the sling.

(f) Slowly lower the thrust reverser to the closed position with the sling.

1) Watch the clearances as you close the thrust reverser to make sure the outer v-groove blade aligns with and fully engages the outer v-groove on the engine fan case.

SUBTASK 78-31-00-090-004-H01

(3) Remove the lower sling assembly of the GE90 fan thrust reverser sling equipment, SPL-2594 from the thrust reverser.

(a) Disconnect the overhead crane/2000 lb (907 kg) capacity lever hoist, STD-469 or equivalent equipment.

(b) Remove the two washers and bolts that attaches the fitting to the lower latch beam.

(c) Store the two washers and bolts on the fitting of the lower sling assembly.

SUBTASK 78-31-00-420-001-H01

(4) If the right thrust reverser was opened, install the middle latch access door.

(a) Do this task: Thrust Reverser Latch Access Doors Installation, TASK 78-31-19-400-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-410-043-H00

(5) Engage and close the latches on the thrust reverser in the sequence that follows (Figure 210):

NOTE: The latch location numbers are shown in brackets.

NOTE: Close the V-band latch [14] first. Close the No.1 tension latch [13]. Close the No.3 [10], No. 4 [9] and No.5 [8] centerline tension latches from forward to aft. Close the aft cowl centerline tension latches [7], [6] and [5] from forward to aft. Close the aft cowl deflection limiter latches from forward to aft [3], [4] then [2] and [1]. Close the No.2 centerline tension latch [11] to engage the lower interlock pin. Engage the upper T-hook latch [12] last.

NOTE: The No.1 tension latch and the No.5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the thrust reverser sleeve.

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

(b) Close the v-band latch [14].

1) Open the v-band latch handle from the stowed position.

CAUTION MAKE SURE THAT THE HOOK IN THE V-BAND LATCH ASSEMBLY IS CORRECTLY ENGAGED IN THE T-BOLT RECEIVER BEFORE YOU CLOSE THE V-BAND LATCH. DAMAGE TO THE HOOK OR THE T-BOLT RECEIVER ON THE V-GROOVE LATCH BAND CAN OCCUR.

2) Push the latch hook upward to engage the hook in the T-bolt receiver.

WARNING DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

3) With the handle horizontal to the right side of the latch, pull the handle down to the vertical position until trigger B latch engages.

NOTE: This is the take-up stroke.

4) Pull down on the trigger A to release the lock pin in the handle.

5) Move the handle up from the vertical to the horizontal position until the lock pin engages.

NOTE: The force to lock and stow the v-band latch is 50- 55 pounds (222-245 newtons).

(c) Close the No.1 tension latch [13].

1) Engage the No.1 latch T-bolt into the latch keeper hook.

2) Move the latch handle upward to the closed position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Close the No.3 tension latch [10], the No.4 tension latch [9] and then the No.5 tension latch [8].

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the latch bolt.
3) Push the latch handle to the closed position.

(e) Close the three aft cowl centerline latches [7], [6] and [5] from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the latch keeper eyebolt.
3) Push the latch handle to the closed position.

(f) Close the four deflection limiter latches [3], [4] then [2] and [1] on the aft cowl from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the tension strap keeper.
3) Push the latch handle to the closed position.

(g) Close the No.2 tension latch [11] to engage the lower interlock pin.

NOTE: When you close the No. 2 tension latch, the body of the latch hook pushes the bracket assembly which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) If it is necessary, push the lower interlock pin upward to engage the serrated fitting on the lower bifurcation.
2) Open the latch handle away from the body of the latch hook.
3) Engage the latch hook on the latch bolt.
4) Push the latch handle to the closed position.

(h) Close the upper bifurcation T-hook latch [12] on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and push the T-hook latch handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

2) Push the T-handle button and push the handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

NOTE: The force to push the T-handle to the closed position is not more than 35 pounds (157 newtons).

SUBTASK 78-31-00-410-036-H01

(6) Set the valves and push and hold the DOWN button on the PDOS power unit for the left and right thrust reversers for a minimum of 60 seconds.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-410-032-H01

CAUTION

DO A CHECK OF THE FIT AND FLUSHNESS OF THE CLOSED LATCH ACCESS DOORS TO THE FAIRINGS AROUND THE DOOR OPENINGS. IF THE FIT AND FLUSHNESS ARE NOT CORRECT, DAMAGE TO THE DOORS CAN OCCUR.

(1) Close the latch beam access doors:

Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

(a) Make sure that the latch access door closes smoothly and without excess force to engage the door latches.

1) Make sure that all latch bolts have properly engaged the latch trigger and that the latch bolt is fully engaged with the door (Figure 205).

a) Apply hand pressure to the exterior surface of the door adjacent to each door latch as you latch all of the door latches.

b) Apply firm finger pressure to each latch bolt to make sure the bolt is fully engaged.

2) If the latch access door will not close, make sure that the tension latches are closed and latched.

NOTE: The latch access doors have fittings which will prevent the closure of the access door if the tension latches are not closed and latched.

3) If the closed latch access door is not tight and flush to the structure, adjust the screw on the latch bolt; adjust both access door latches.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

4) Look for bent or damaged latch door hinges.

5) If damage is found, replace the hinges or replace the latch access door.

NOTE: Damage to the door hinge can cause the latch access door to open and depart in flight.

a) Do this task: Thrust Reverser Latch Access Doors Removal, TASK 78-31-19-000-801-H01.

b) Do this task: Thrust Reverser Latch Access Doors Installation, TASK 78-31-19-400-801-H01.

SUBTASK 78-31-00-410-012-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-410-013-H01

(3) Install the PDOS access panel in the thumbnail fairing on the applicable fan cowl support beam.

(a) Position the access panel in the access hole with the beveled edge forward; make sure the lanyard is not caught between the access panel and the fairing.

(b) Install 17 countersunk bolts to install the access panel.

SUBTASK 78-31-00-090-009-H01

(4) For the inboard thrust reverser half, remove the protective mat and tape from the wing leading edge.

SUBTASK 78-31-00-090-005-H01

(5) Remove the fall arrest equipment; do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-00-440-006-H01

(6) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-00-440-007-H01

(7) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 78-31-00-010-806-H01

10. Open the Thrust Reverser (Hand Pump Method)

(Figure 215, Figure 216, Figure 217, Figure 218, and Figure 219)

A. General

(1) This alternate procedure is used to open the thrust reverser when there is a problem with the power door opening system (PDOS) unit's electric pump or valves, the control circuit, or the inlet-mounted PDOS control switches are inoperative.

(2) This alternate procedure can be used if there are no indications of oil leakage from the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(3) In this procedure, you use an external hand pump to bypass the PDOS unit and extend the PDOS actuators to open the thrust reverser. The strut mounted quick disconnect fittings are aft of the PDOS pump.

(4) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(5) To open the thrust reverser with the hand pump and the strut-mounted quick disconnect fittings, you must have removed the thumbnail fairing on the fan cowl support beam before you opened the fan cowl panels. With the fan cowl panels in the open position, the fan cowl panels interfere with the removal of the thumbnail fairing.

(6) A Tool Change Bulletin was sent to all operators that use the cowl opening hand pump, SPL-2417. The condition of the actuator oil in the pump becomes highly acidic over time. This highly acidic oil causes seal damage in the thrust reverser power door opening actuators, leakage and unscheduled maintenance. The bulletin recommends the actuator oil in the pump is changed on a periodic basis to reduce the high acid oil and increase the service life of the thrust reverser PDOS actuators.

(7) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(8) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(9) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(10) If it is necessary to open the thrust reverser to do maintenance on the PDOS equipment, do the sling method to open the thrust reversers.

(11) Pressure build-up from thermal expansion of the oil in the PDOS actuators can cause a pre-load on the tension latches. The tension latches cannot be opened on the thrust reverser. The thermal expansion of the oil is cause by heat from the sun when the airplane is parked in the sun. Press the PDOS DOWN button for 10-30 seconds to relieve the pressure for each actuator.

(12) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the down button on PDOS unit for 10-30 seconds to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2417	Pump - Hand, Cowl opening Part #: A78019-29 Supplier: 81205 Opt Part #: A78019-27 Supplier: 81205

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
431	Forward Strut Fairing - Left Nacelle Strut
434	Aft Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine
431AB	PDOS Access Door, Left Strut

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
441AB	PDOS Access Door, Right Strut

F. Procedure

SUBTASK 78-31-00-040-008-H01

CAUTION RETRACT THE LEADING EDGE SLATS. DO THE DEACTIVATION PROCEDURE FOR THE LEADING EDGE SLATS BEFORE YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DAMAGE TO THE LEADING EDGE SLATS AND THRUST REVERSERS CAN OCCUR.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-010-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-040-009-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-00-490-008-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(4) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-00-010-014-H01

(5) Remove the PDOS access panel in the thumbnail fairing on the applicable fan cowl support beam (Figure 217).

(a) Open the applicable access panels:

Number	Name/Location
431AB	PDOS Access Door, Left Strut
441AB	PDOS Access Door, Right Strut

(b) Remove 17 countersunk bolts to remove the access panel.

(c) Move the panel to the side of the access hole; there is a lanyard that connects the access panel to the thumbnail fairing.

SUBTASK 78-31-00-010-015-H01

(6) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-864-004-H00

(7) Press the PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches (Figure 217).

SUBTASK 78-31-00-010-039-H01

(8) Open the latch beam access doors on the applicable engine.

Open these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-00-010-054-H00

CAUTION

OPEN ALL LATCHES ON THE THRUST REVERSER HALVES BEFORE YOU OPEN A THRUST REVERSER HALF. IF A LATCH HOOK STAYS ENGAGED, DAMAGE TO THE THRUST REVERSER, THE STRUT LIMITER RODS, AND BRACKETS CAN OCCUR.

(9) Disengage and open the latches on the thrust reverser in the sequence that follows (Figure 215, Figure 216):

NOTE: Open the upper T-hook latch. Open the No. 2 centerline tension latch to disengage the lower interlock pin. Disengage the aft cowl deflection limiter latches from aft to forward. Next, open the aft cowl centerline latches from aft to forward. Open the No. 5, No. 4, No. 3 centerline tension latches. Open the No. 1 tension latch. Open the V-band latch last.

NOTE: The No.1 tension latch and the No. 5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the right side thrust reverser.

(a) Open the upper bifurcation T-hook latch on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down to the fully extended position to keep the T-hook in the vertical (open) position.

2) Push the T-handle button in and pull down the handle to the fully extended position to keep the T-hook in the vertical (open) position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) If the T-hook latch does not operate, refer to the task: Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Open the Thrust Reverser, TASK 78-31-00-980-803-H01.

(b) Open the No.2 centerline latch beam tension latch.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

3) Make sure the bracket assembly for the interlock pin has moved down to the open position to disengage the interlock pin.

NOTE: The spring loaded interlock pin should move downward and move the bracket assembly downward to show that the interlock pin has disengaged from the serrated fitting on the right side thrust reverser. When you close the No. 2 tension latch, the latch body pushes the bracket assembly upward which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(c) Open the four deflection limiter latches on the aft cowls.

NOTE: There are two deflection limiter latches for each aft cowl. All four deflection limiter latch hooks must be disengaged if the left or right thrust reverser is opened.

1) Open the two aft latches first, before you open the two forward latches.

2) Push on the secondary lock to open the spring loaded latch handle.

3) Pull the handle to the full open position to release the hook from the tension strap keeper.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(d) Open the three aft cowl centerline latches from the aft latch to the forward latch.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch keeper eyebolt.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(e) Open the No. 5 tension latch, the No. 4 tension latch and the No. 3 tension latch on the centerline latch beam from the aft latch to the forward latch.

NOTE: At the No. 5 tension latch, use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle. At the No.4 and No.3 tension latches, because of the small access space to the latches, a small wire hook (local manufacture) can be used to help open the latch handle.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

(f) Open the No.1 tension latch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Move the small, unlock lever down.
2) Move the latch handle downward to the open position.
3) Disengage the No.1 latch T-bolt from the latch keeper hook.

WARNING MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(g) Open the V-band latch.

NOTE: This is the HARTWELL HA277-3 (BOEING S315W113-6) v-band latch.

1) Hold the latch handle firmly against the force you will feel when you release the trigger A latch and move the latch handle.

NOTE: The force on the handle will be 50-55 pounds (222-245 newtons).

2) Push upward on the end of the latch handle to release trigger A lock pin.
3) Slide trigger A toward the end of the handle.
4) Move the handle downward and to the left until the handle locks in the vertical position.

NOTE: This is the unlock stroke.

5) Hold the latch handle firmly against the force you will feel when you release the trigger B latch and move the latch handle.
6) Move the handle to the left to relieve the preload on trigger B.
7) Slide trigger B away from the handle pivot points.
8) Move the handle from the vertical to the horizontal position.

NOTE: This is the release stroke.

9) Make sure the latch hook is disengaged from the T-bolt receiver.
10) Put the v-band latch in the stowed position.

SUBTASK 78-31-00-010-017-H01

(10) Connect the cowl opening hand pump, SPL-2417 to the quick disconnect fitting on the strut (Figure 218).

(a) Disconnect the PDOS hose from the quick disconnect fitting on the strut for the applicable thrust reverser half.

(b) Connect the hand pump socket/filter and hose to the quick disconnect fitting.

NOTE: The filter housing on the end of the hose can turn around the socket and interfere with the strut and fan cowl panels.

SUBTASK 78-31-00-010-018-H01

WARNING DO NOT MOVE BETWEEN THE ENGINE AND THE OPEN THRUST REVERSER UNTIL YOU LOCK THE HOLD-OPEN ROD. THE THRUST REVERSER IS HEAVY. IT WILL CLOSE QUICKLY IF THE PRESSURE IS REMOVED FROM THE HAND PUMP. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(WARNING PRECEDES)

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

CAUTION

DO NOT OPEN THE THRUST REVERSER IF THE TRANSLATING SLEEVES ARE EXTENDED. THE EXTENDED SLEEVES CAN HIT THE STRUT PANELS. DAMAGE TO EQUIPMENT CAN OCCUR.

(11) Open the thrust reverser with the cowl opening hand pump, SPL-2417:

(a) Operate the hand pump to slowly lift the thrust reverser open until the collar on the hold-open rod moves to the locked position (Figure 219).

NOTE: A yellow safety band on the upper side of the lock collar is the indication for the locked position. A red safety band on the lower side of the lock collar is the indication for the unlocked position. An audible click or snap is also an indication when you extend the hold-open rod to the locked position.

(b) Open the return valve on the hand pump slowly to let the weight of the thrust reverser rest on the hold-open rod.

(c) Close the return valve on the hand pump.

G. Thrust Reversers - Tryout

NOTE: This tryout is to make sure that the thrust reversers are in the fully open position.

SUBTASK 78-31-00-210-006-H00

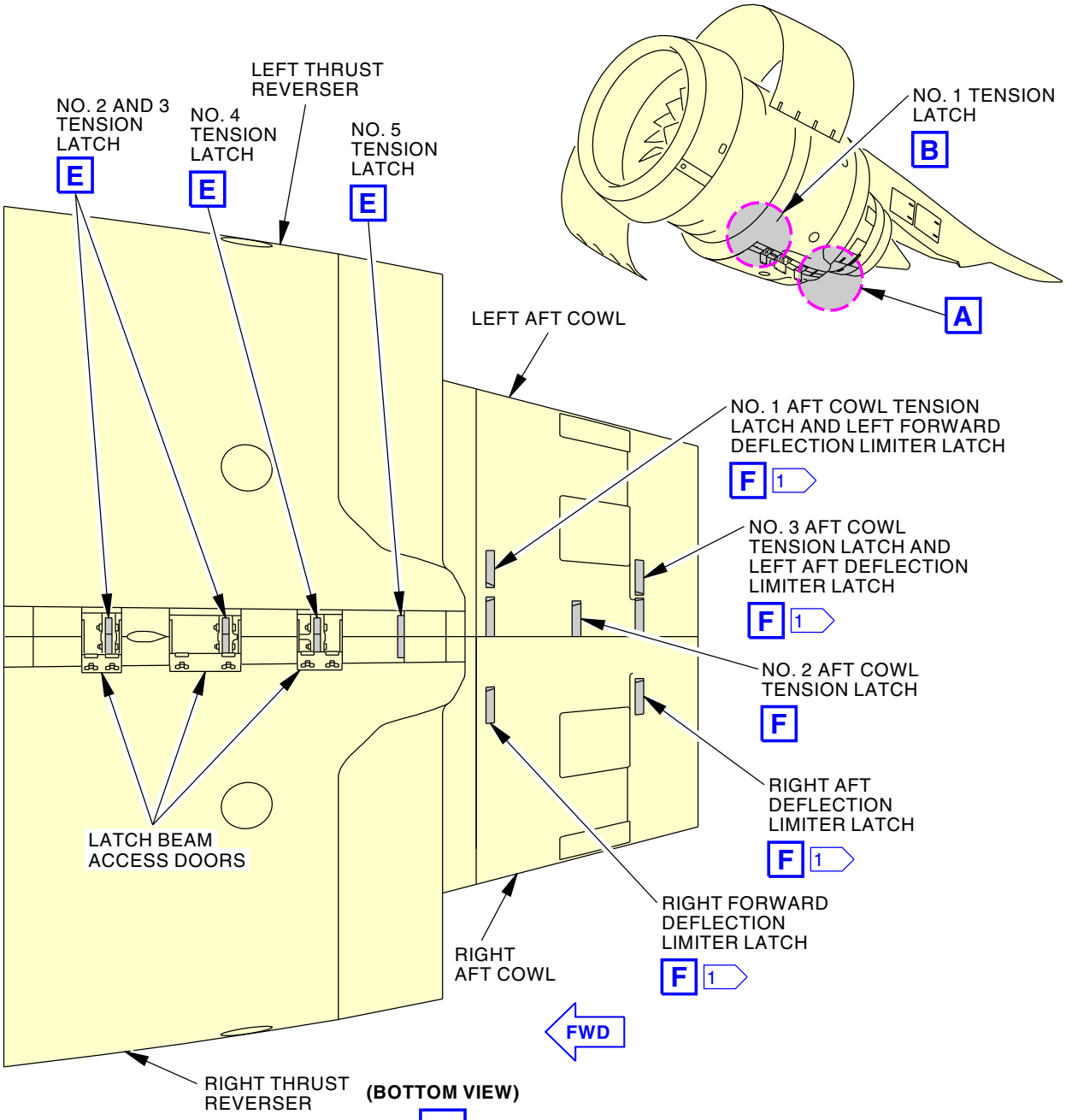
(1) Make sure that the yellow safety stripe on the lower side of the lock collar is seen.

SUBTASK 78-31-00-210-007-H00

(2) Make sure that the red safety stripe on the lower side of the lock collar is not seen.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

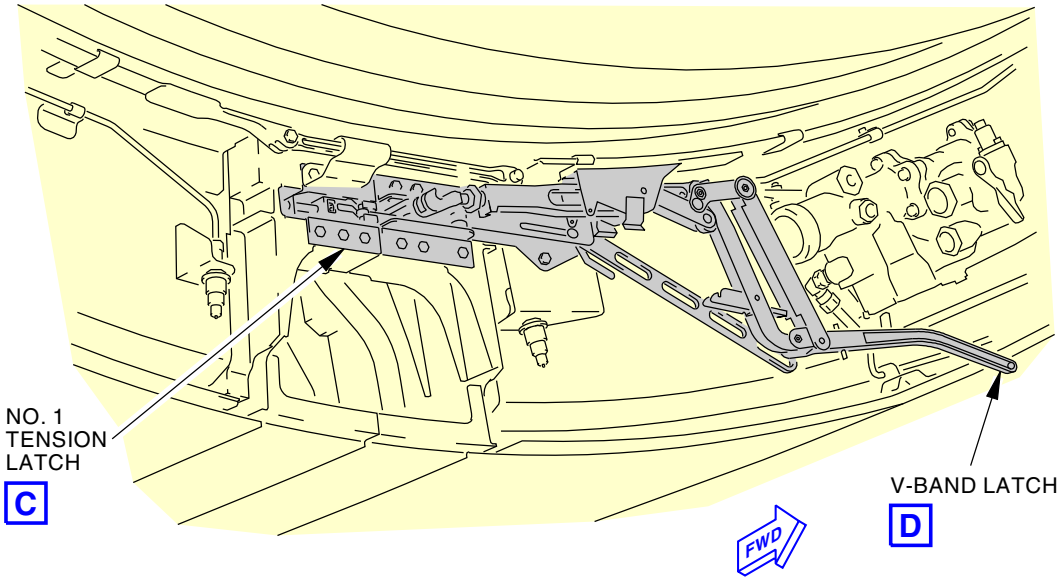
THE STENCIL NUMBERS THAT IDENTIFY THE LATCHES ON THE THRUST REVERSER AND AFT COWL ARE NOT OPEN/CLOSE SEQUENCE NUMBERS.

1 ALL 4 DEFLECTION LIMITER LATCH HOOKS MUST BE DISENGAGED WHEN THE LEFT OR RIGHT THRUST REVERSER HALF IS OPENED

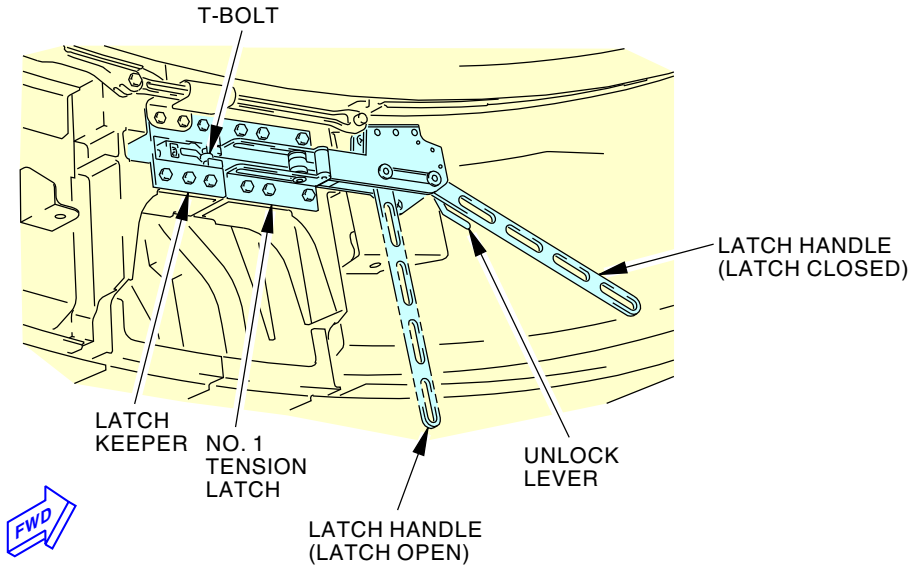
M07238 S0004286216_V5

Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 1 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(HARTWELL HA277-3)
V-BAND LATCH
B

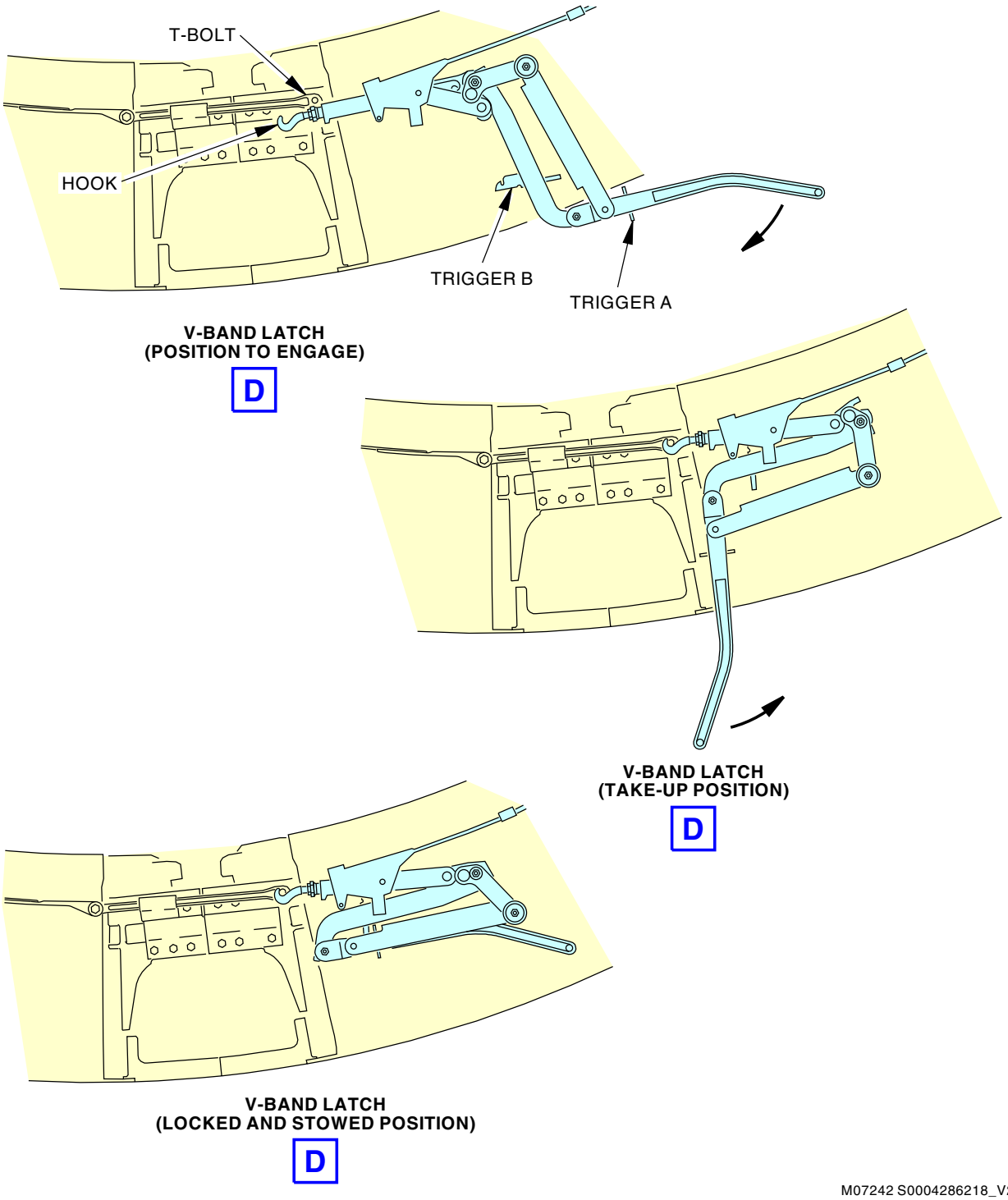


THRUST REVERSER NO. 1 TENSION LATCH
(V-BAND LATCH REMOVED FOR CLARITY)
C

M07240 S0004286217_V3

Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 2 of 11)

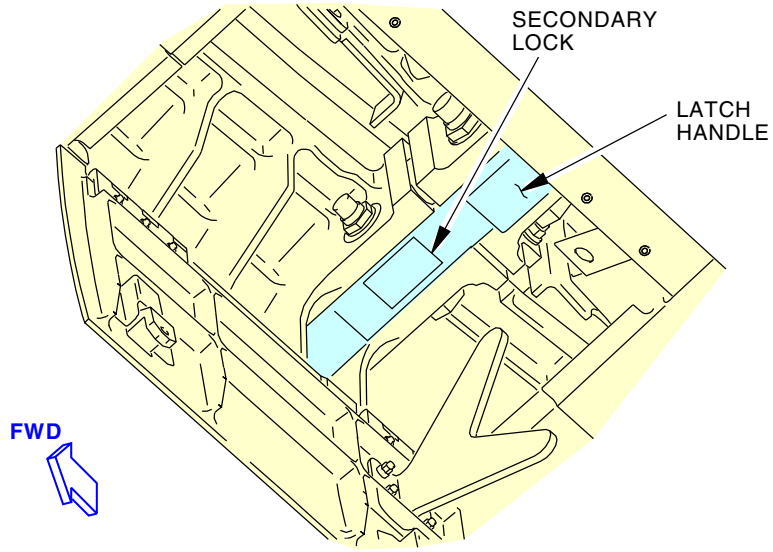
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07242 S0004286218_V2

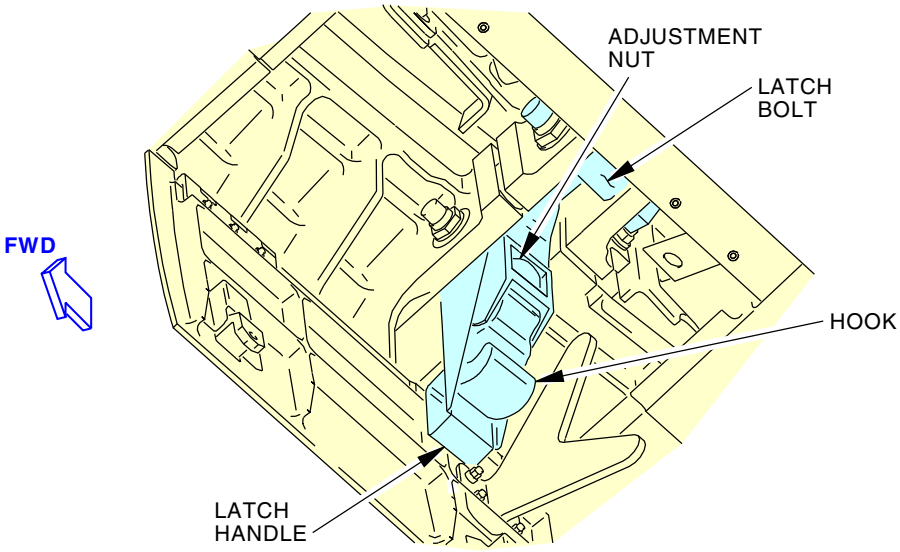
Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 3 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER NO. 2-5 TENSION LATCH
(CLOSED POSITION)
(EXAMPLE, 4 LOCATIONS)

E



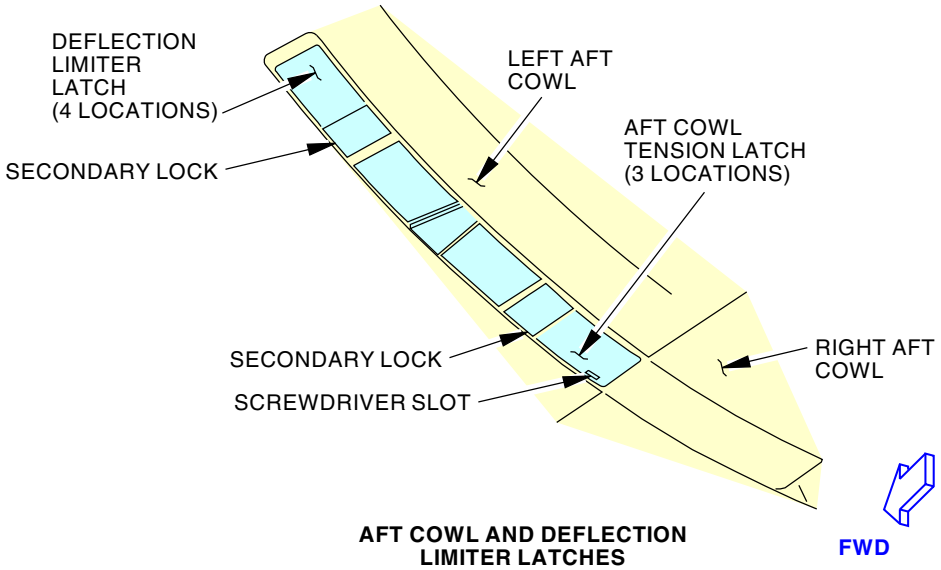
THRUST REVERSER NO. 2-5 TENSION LATCH
(OPEN POSITION)
(EXAMPLE, 4 LOCATIONS)

E

M07244 S0004286219_V3

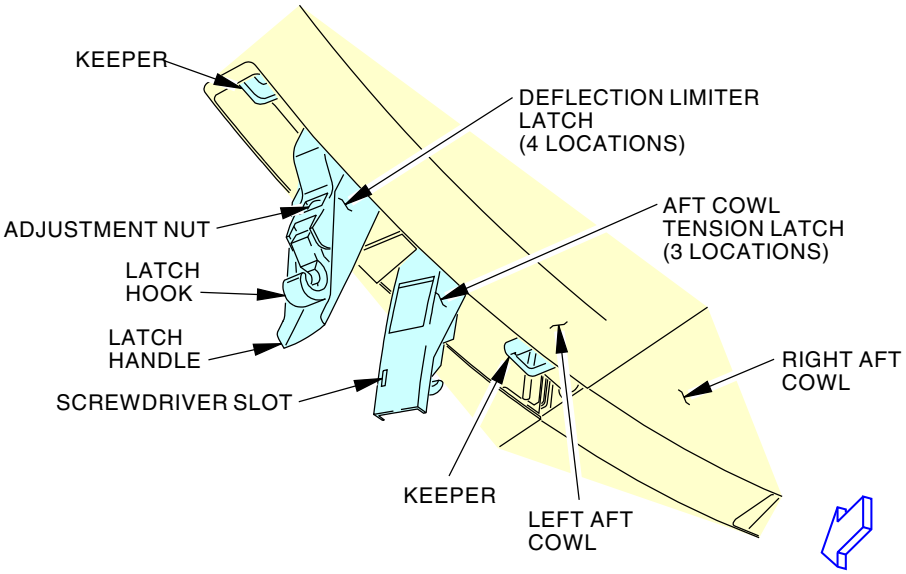
Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 4 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL AND DEFLECTION LIMITER LATCHES (CLOSED POSITION) (EXAMPLE)

F



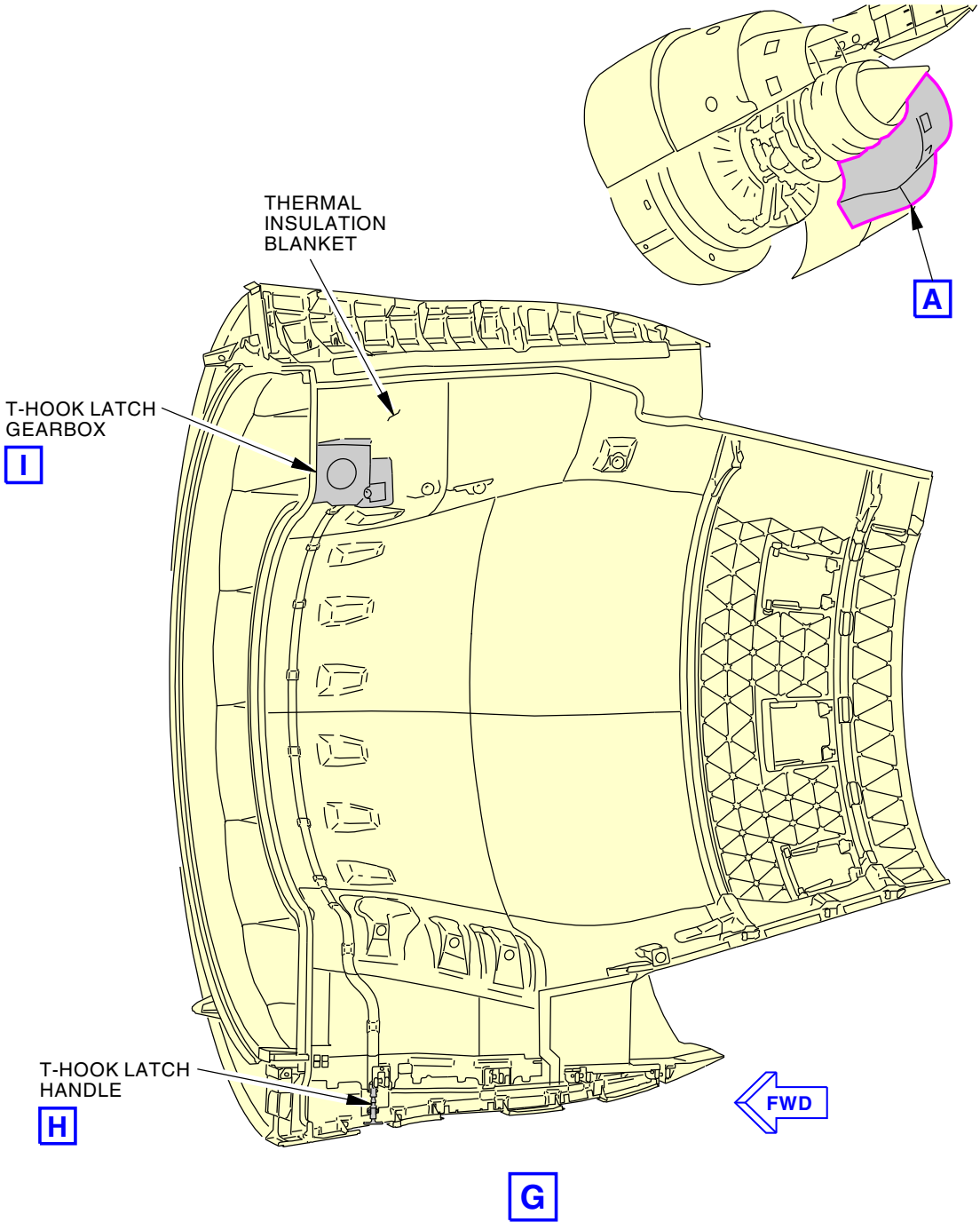
AFT COWL AND DEFLECTION LIMITER LATCHES (OPEN POSITION) (EXAMPLE)

F

M07246 S0004286220_V2

Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 5 of 11)

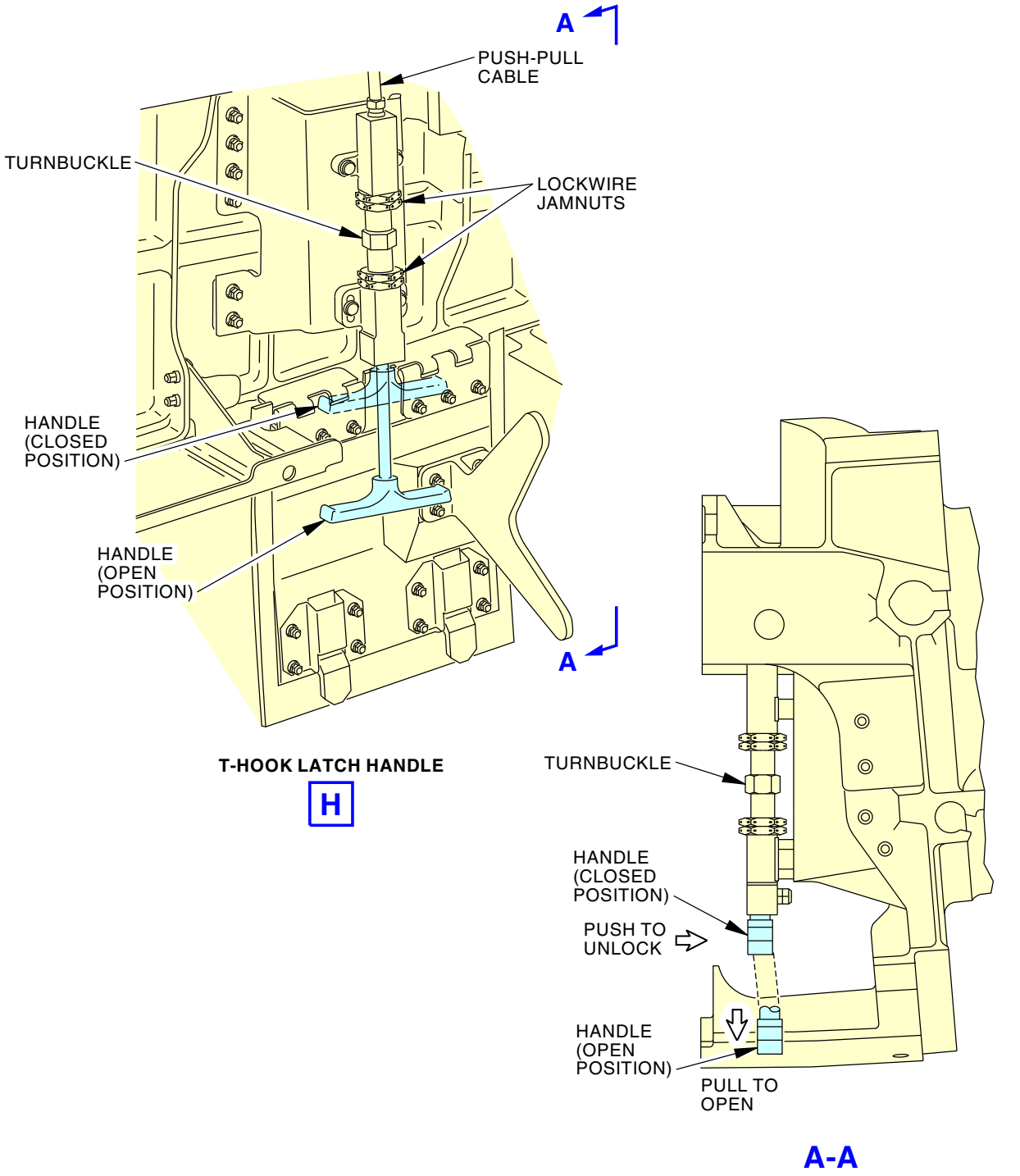
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



W85447 S0000131586_V3

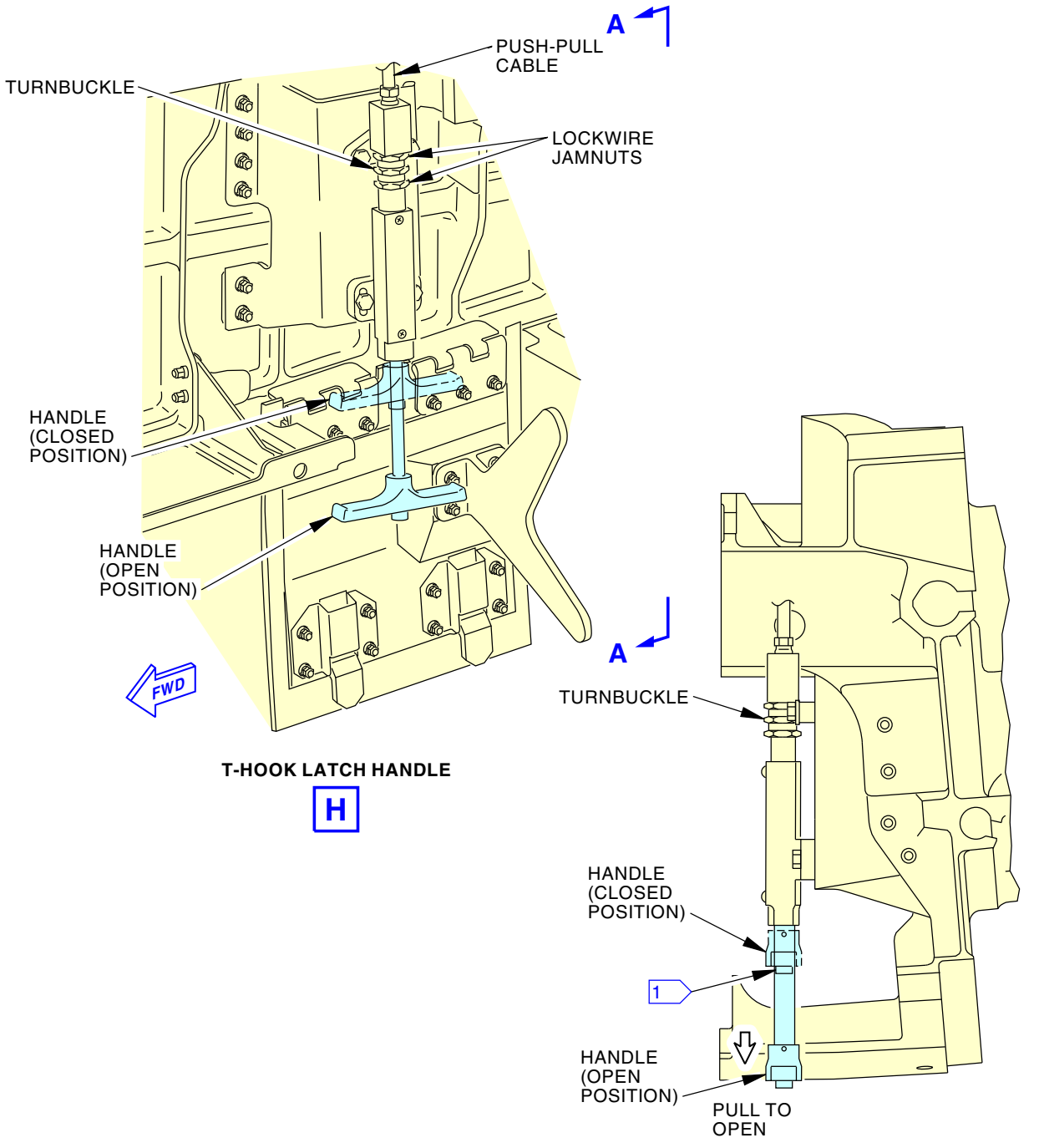
Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 6 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



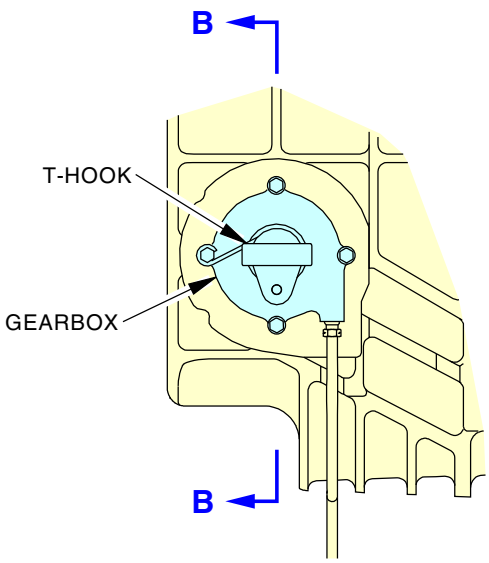
Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 7 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



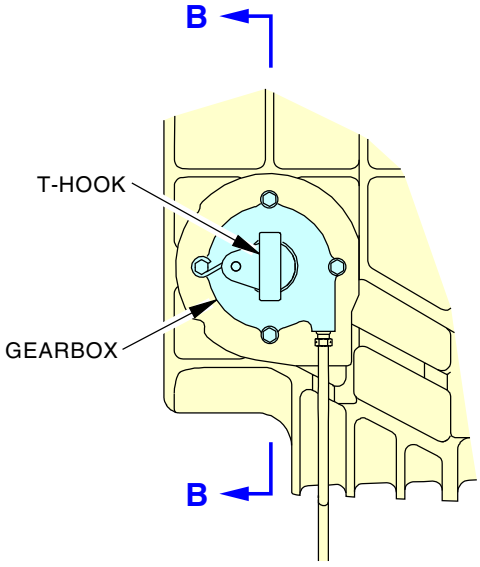
Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 8 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



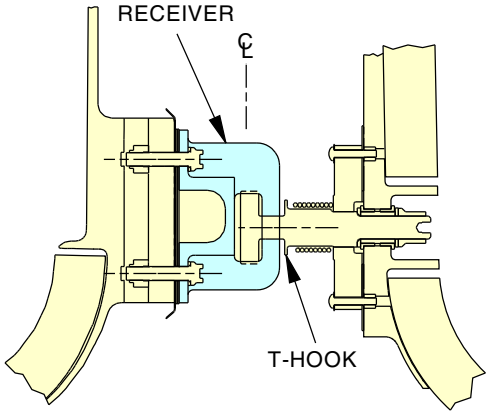
T-HOOK LATCH
(CLOSED POSITION)

I



T-HOOK LATCH
(OPEN POSITION)

I



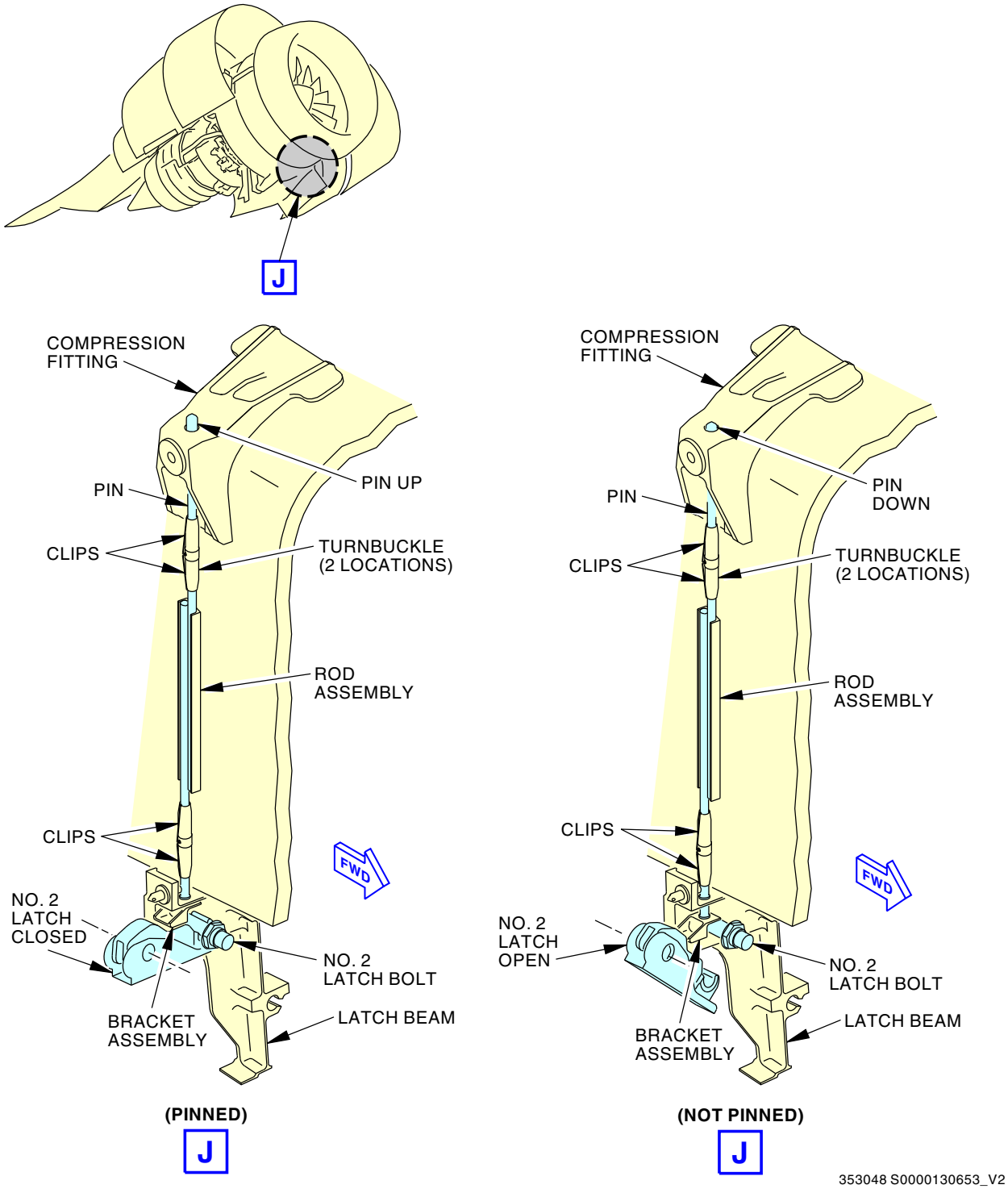
THRUST REVERSER CLOSED

B-B

D80010 S0000165142_V3

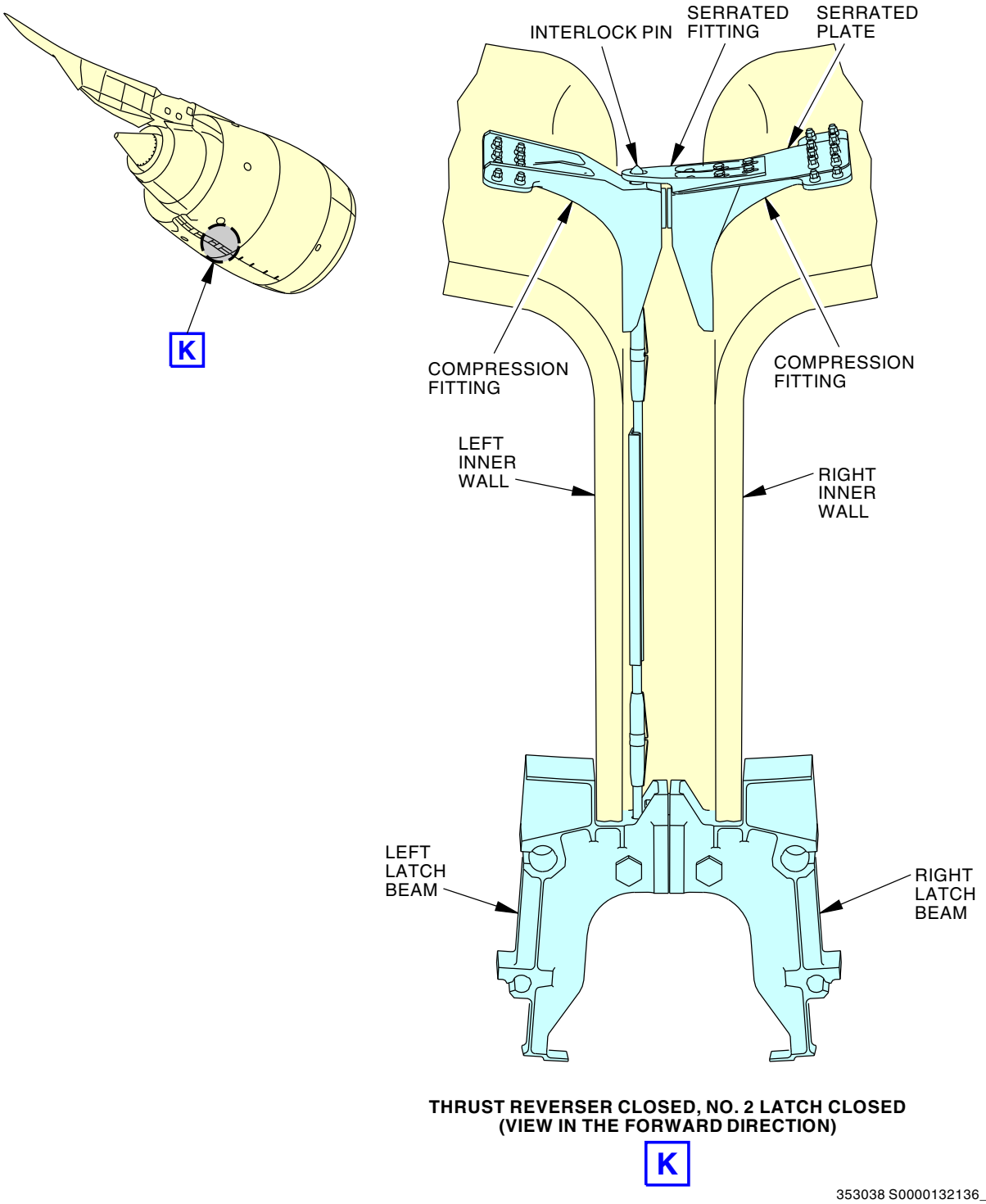
Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 9 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 10 of 11)

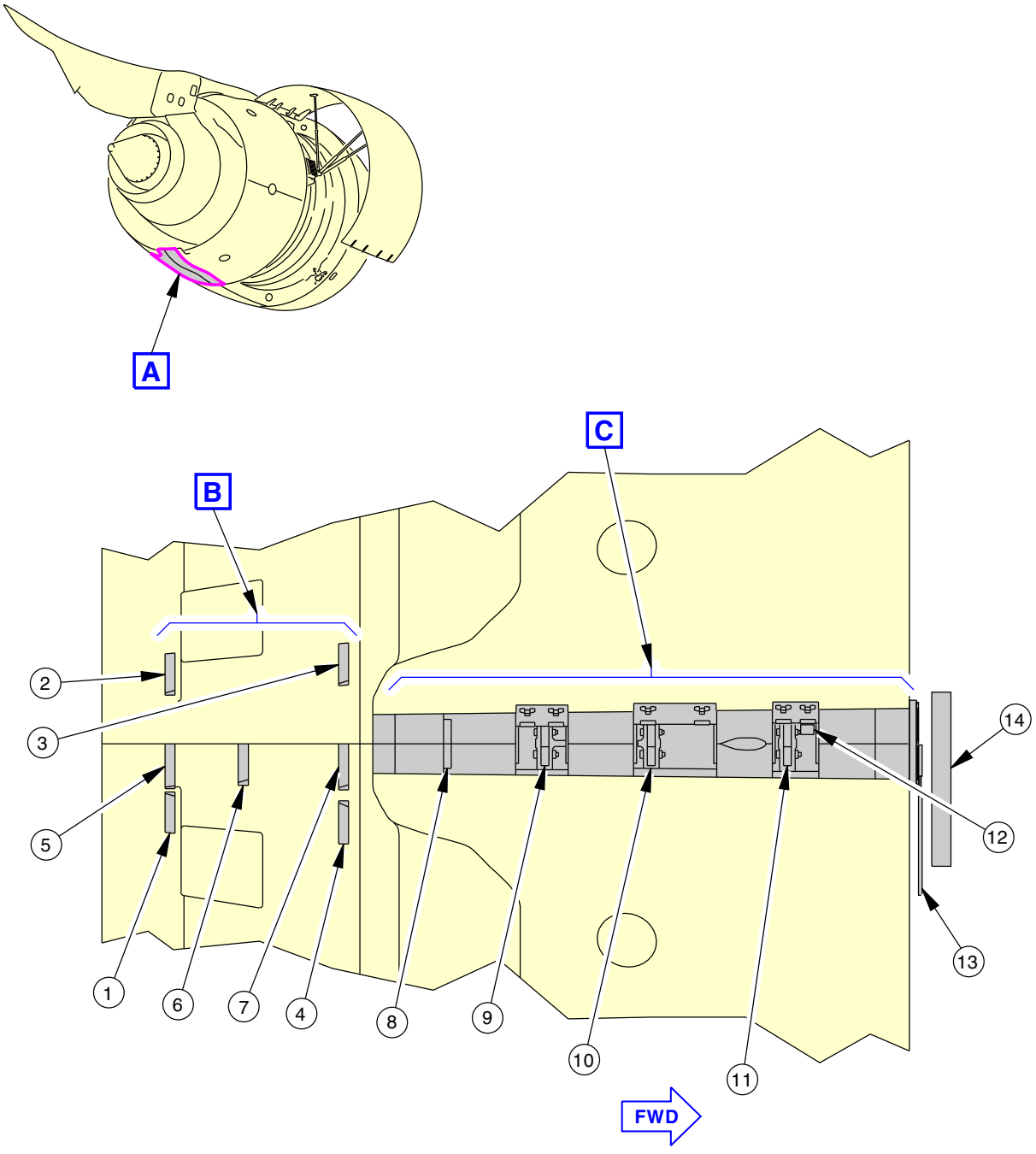
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER CLOSED, NO. 2 LATCH CLOSED
(VIEW IN THE FORWARD DIRECTION)

Thrust Reverser Latches
Figure 215/78-31-00-990-820-H01 (Sheet 11 of 11)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



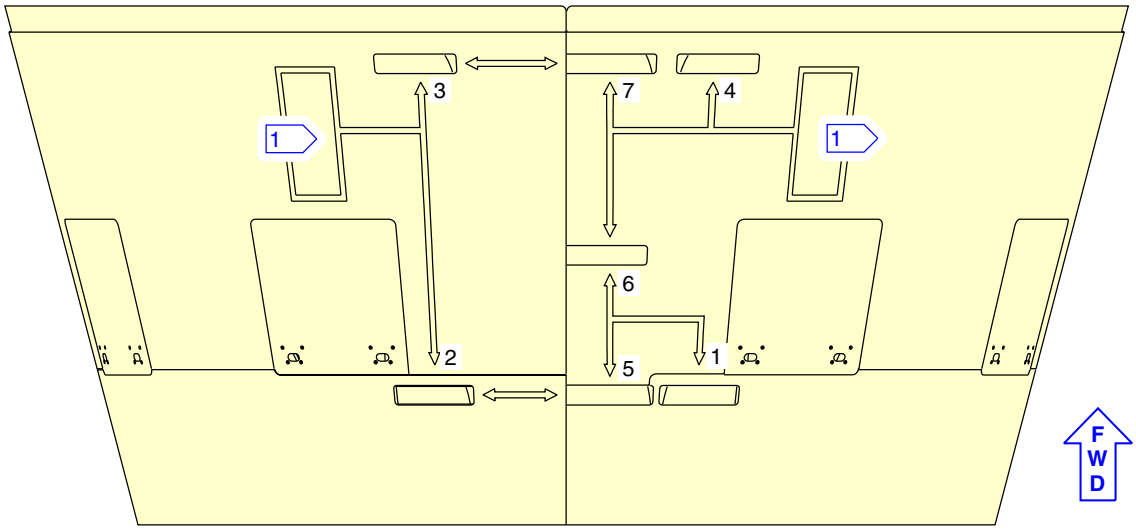
LEGEND:
◯ = LATCH LOCATION NUMBERS

A

D63535 S0000162243_V4

Thrust Reverser Latch Location Numbers
Figure 216/78-31-00-990-835-H00 (Sheet 1 of 2)

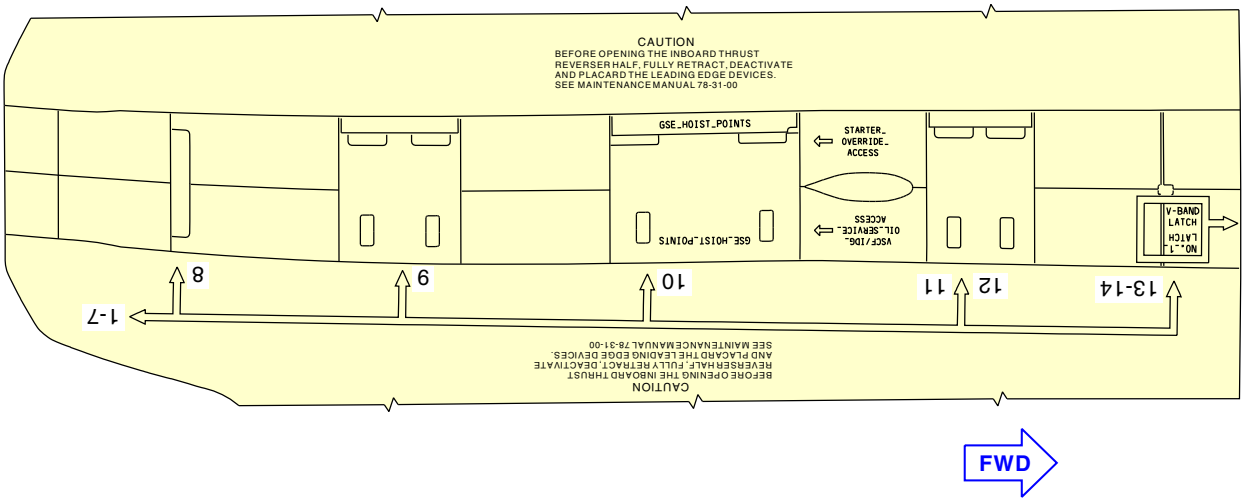
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 OPEN ALL 14 LATCHES ON BOTH T/R HALVES PRIOR TO OPENING EITHER T/R HALF

(VIEW IN THE UP DIRECTION)

B



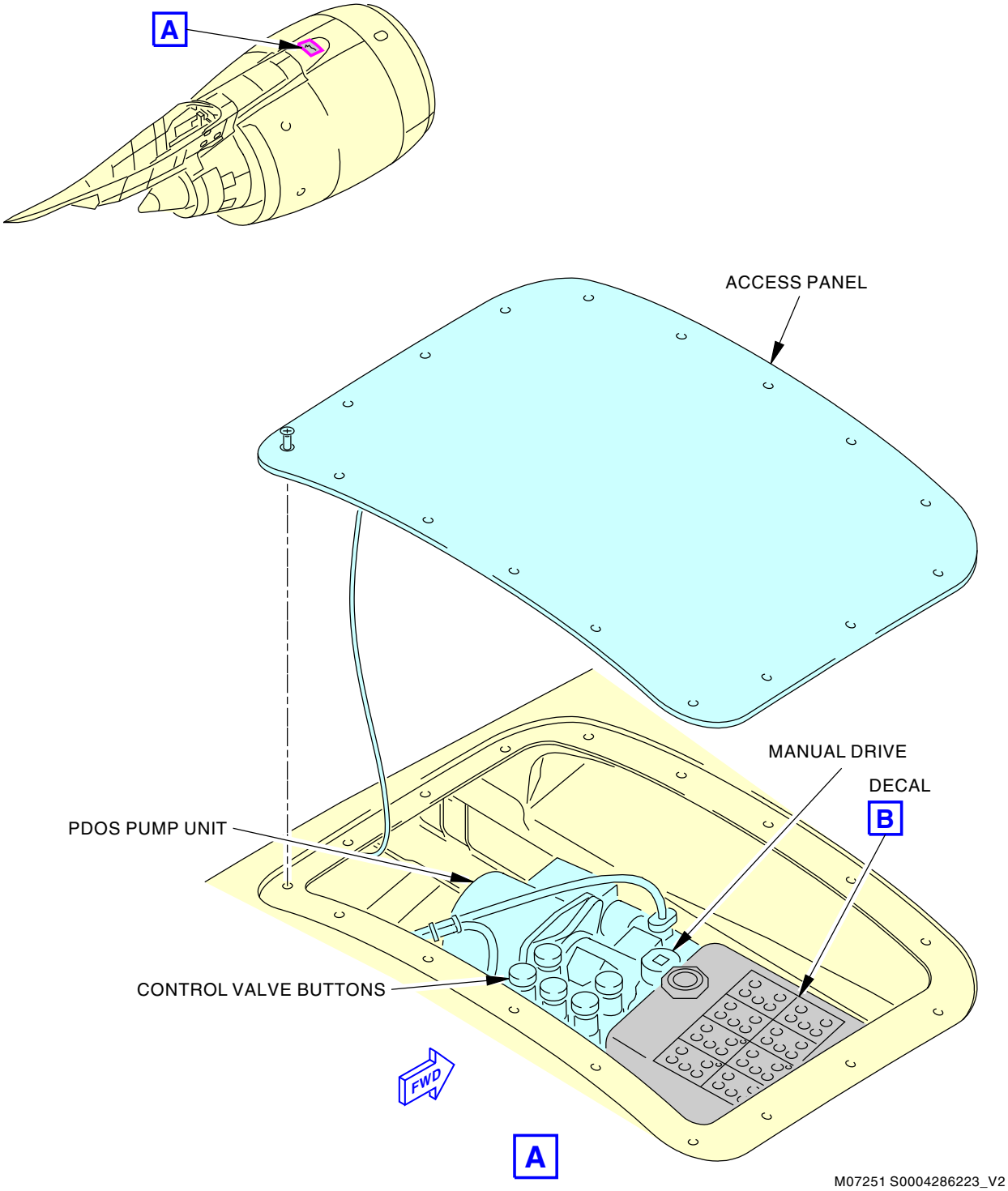
(VIEW IN THE UP DIRECTION)

C

J66085 S0000174744_V2

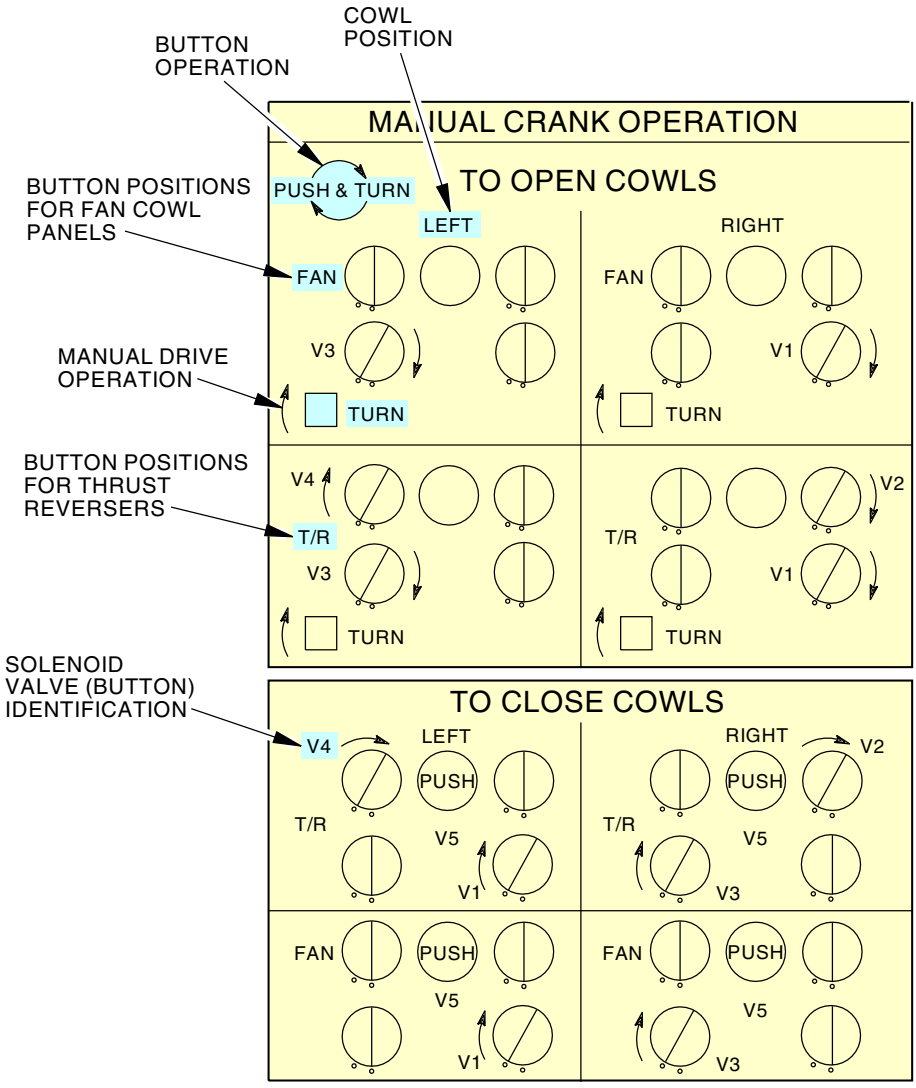
Thrust Reverser Latch Location Numbers
Figure 216/78-31-00-990-835-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser PDOS - Manual Method
Figure 217/78-31-00-990-837-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



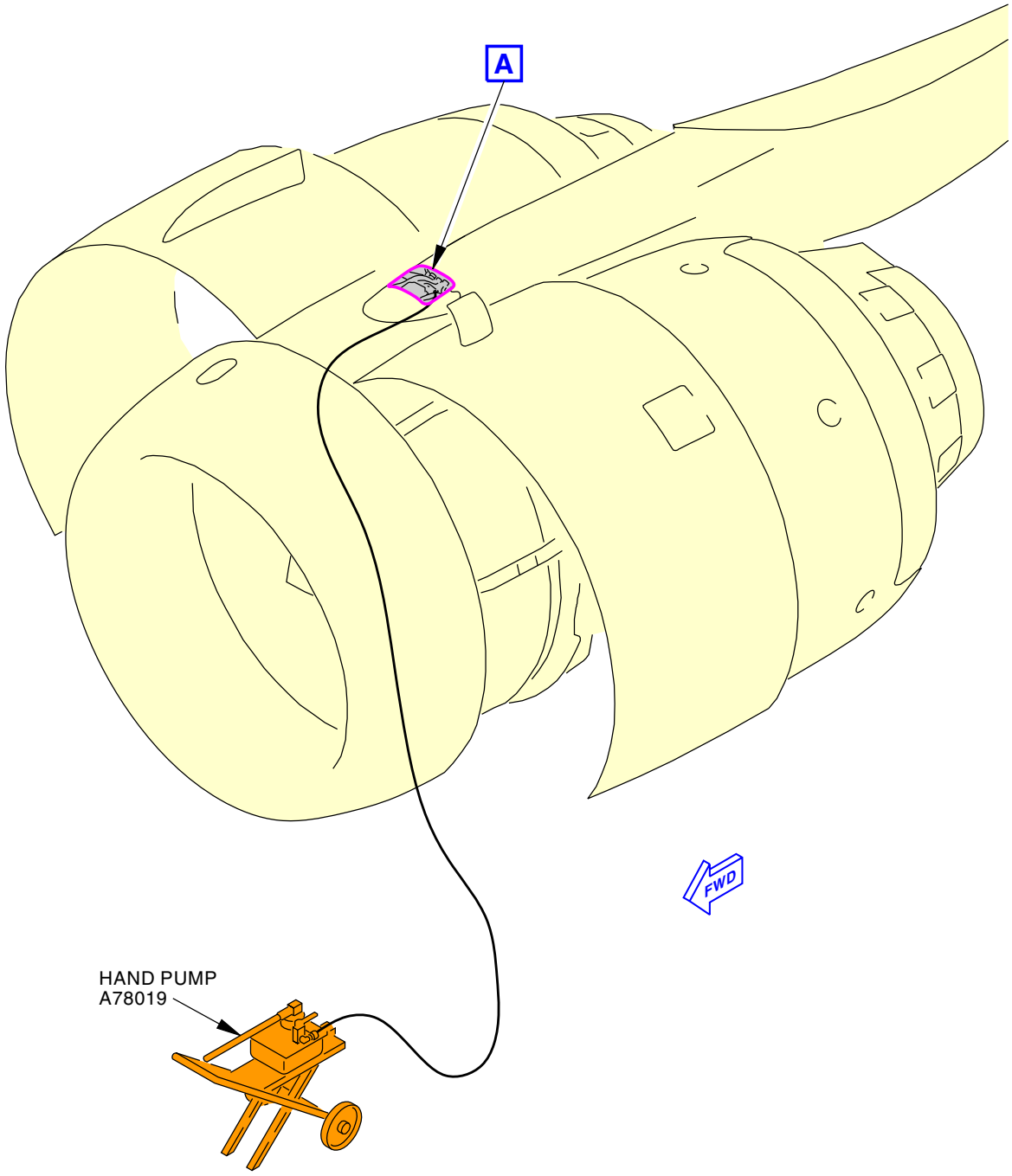
DECAL - PDOS

B

M07252 S0004286224_V2

Thrust Reverser PDOS - Manual Method
Figure 217/78-31-00-990-837-H00 (Sheet 2 of 2)

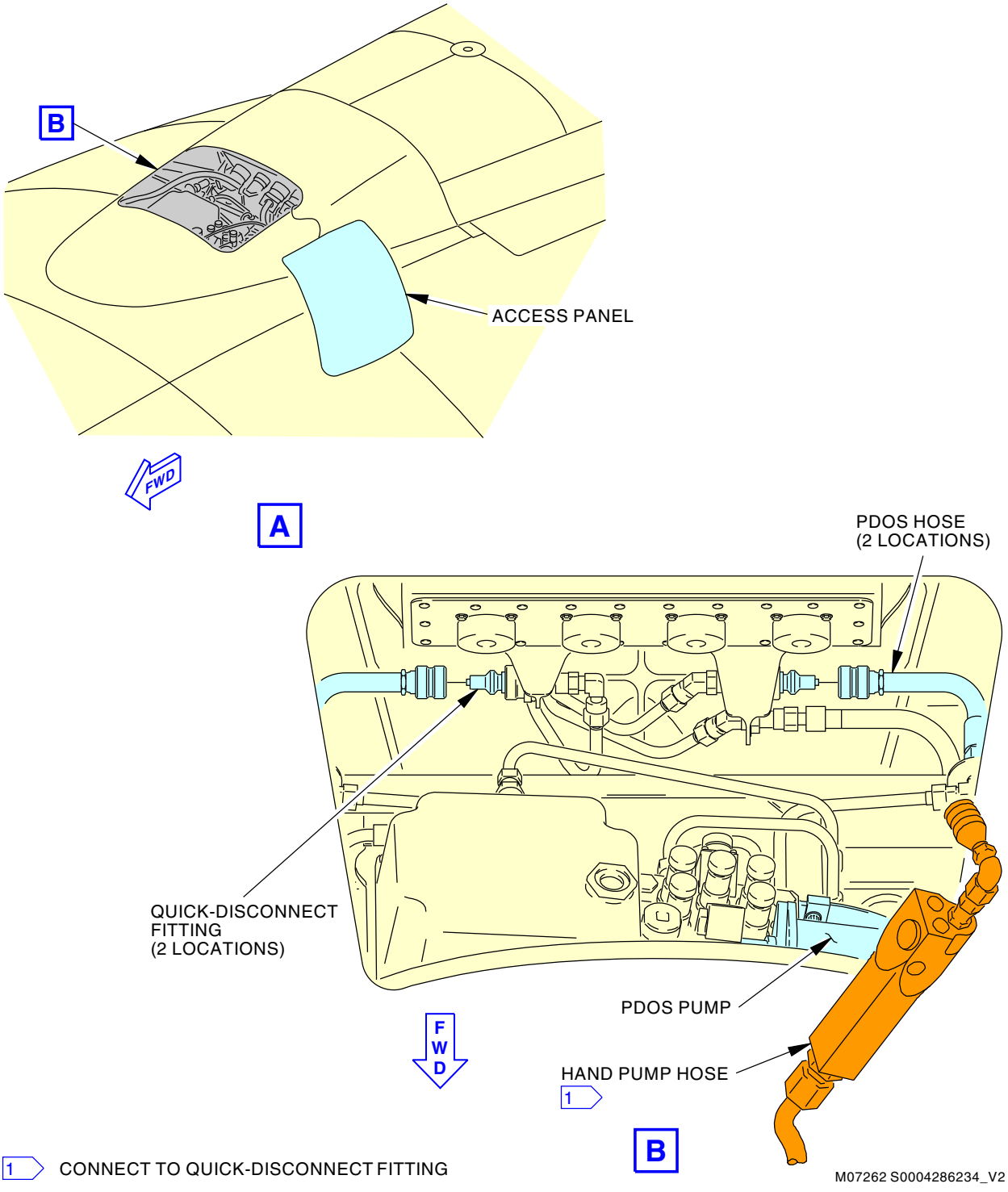
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07259 S0004286233_V2

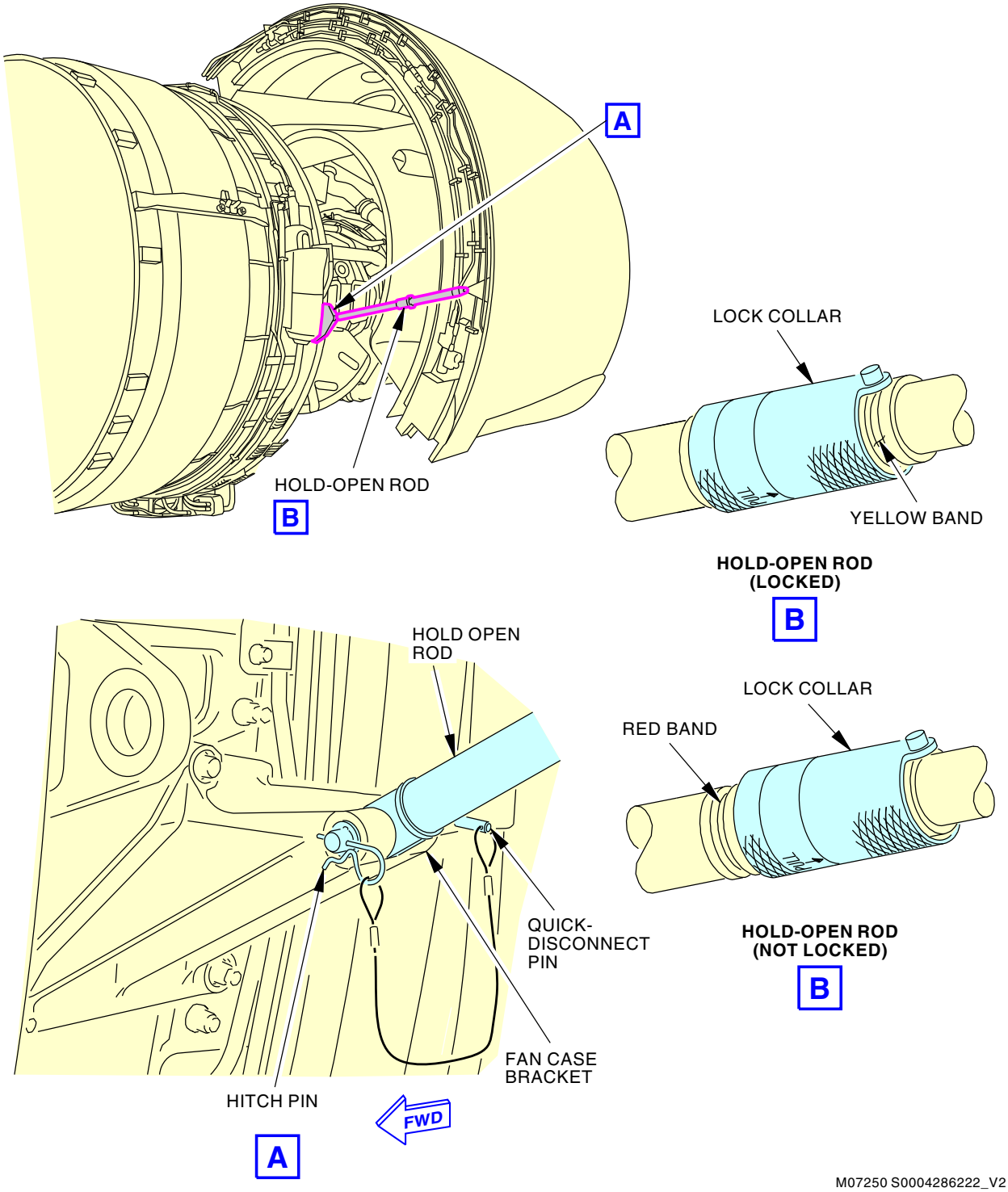
Open/Close Thrust Reverser Hand Pump Method
Figure 218/78-31-00-990-824-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Open/Close Thrust Reverser Hand Pump Method
Figure 218/78-31-00-990-824-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Hold-Open Rod
Figure 219/78-31-00-990-825-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-410-806-H01

11. Close the Thrust Reverser (Hand Pump Method)

(Figure 215, Figure 216, Figure 217, Figure 218, and Figure 219)

A. General

(1) This alternate procedure is used to close the thrust reverser when there is a problem with the power door opening system (PDOS) unit's electric pump or valves, the control circuit, or the inlet-mounted PDOS control switches are inoperative.

(2) This alternate procedure can be used after oil leakage from the PDOS tubing or hoses, or the PDOS actuators under the thrust reverser was repaired.

(3) In this procedure, you use a valve on the external hand pump to allow the oil from the PDOS actuators to return to the reservoir on the external hand pump. The weight of the thrust reverser causes the thrust reverser to close and forces the oil in the PDOS actuators to return to the reservoir on the hand pump. The strut mounted quick disconnect fittings are aft of the PDOS pump.

(4) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(5) To close the thrust reverser with the hand pump and the strut-mounted quick disconnect fittings, you must have removed the thumbnail fairing on the fan cowl support beam before you opened the fan cowl panels. With the fan cowl panels in the open position, the fan cowl panels interfere with the removal of the thumbnail fairing.

(6) A Tool Change Bulletin was sent to all operators that use the cowl opening hand pump, SPL-2417. The condition of the actuator oil in the pump becomes highly acidic over time. This highly acidic oil causes seal damage in the thrust reverser power door opening actuators, leakage and unscheduled maintenance. The bulletin recommends the actuator oil in the pump is changed on a periodic basis to reduce the high acid oil and increase the service life of the thrust reverser opening actuators.

(7) You must not extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(8) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(9) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(10) The thrust reverser for the GE90-100 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine.

(a) There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No.2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator.

(b) There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a fitting on the lower bifurcation on the right side thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Before you unlatch or latch the upper T-hook latch or the lower interlock pin, push the down button on PDOS unit to remove any pressure in the PDOS actuators that can put a force on the T-hook and the receiver or the interlock pin and the serrated fitting. Do not put excessive force in the T-handle when you push the T-handle to the latched position.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-19-000-801-H01	Thrust Reverser Latch Access Doors Removal (P/B 401)
78-31-19-400-801-H01	Thrust Reverser Latch Access Doors Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2417	Pump - Hand, Cowl opening Part #: A78019-29 Supplier: 81205 Opt Part #: A78019-27 Supplier: 81205

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
431	Forward Strut Fairing - Left Nacelle Strut
434	Aft Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine
431AB	PDOS Access Door, Left Strut

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
441AB	PDOS Access Door, Right Strut

F. Procedure

SUBTASK 78-31-00-490-009-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(1) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-00-010-021-H01

(2) Connect the cowl opening hand pump, SPL-2417 to the strut-mounted quick disconnect fittings (Figure 218).

(a) Disconnect the PDOS hose from the quick disconnect fitting on the strut for the applicable thrust reverser half.

(b) Connect the hand pump socket/filter and hose the quick disconnect fitting.

NOTE: The filter housing on the end of the hose can turn around the socket and interfere with the strut and fan cowl panels.

SUBTASK 78-31-00-410-014-H01

(3) Close the thrust reverser with the cowl opening hand pump, SPL-2417:

(a) Operate the hand pump to open the thrust reverser to remove the weight from the hold-open rod.

(b) Pull the collar on the hold-open rod to the unlocked position (Figure 219).

NOTE: The collar will stay in the unlocked position.

(c) Open the return valve on the hand pump slowly to close the thrust reverser.

WARNING KEEP HANDS CLEAR OF MATING SURFACES WHEN YOU CLOSE THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS CAN OCCUR.

CAUTION MAKE SURE THAT THE T-HANDLE IS IN THE FULL OPEN POSITION BEFORE YOU CLOSE THE THRUST REVERSER. DAMAGE CAN OCCUR AT THE T-HOOK LATCH.

1) Watch the clearances as you close the thrust reverser to make sure the outer v-groove blade aligns with and fully engages the outer v-groove on the engine fan case.

NOTE: It can be necessary to apply hand pressure forward or aft on the thrust reverser cowl to align the outer v-grooves.

(d) Close the return valve on the hand pump.

SUBTASK 78-31-00-410-015-H01

(4) Disconnect the cowl opening hand pump, SPL-2417.

(a) Disconnect the hand pump socket/filter and hose from the quick disconnect fitting.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Connect the PDOS hose to the quick disconnect fitting on the strut.

SUBTASK 78-31-00-410-044-H00

(5) Engage and close the latches on the thrust reverser in the sequence that follows (Figure 215):

NOTE: Close the V-band latch first. Close the aft cowl centerline latches from forward to aft. Close the aft cowl deflection limiter latches from forward to aft. Close the No.5, No. 4, No.3 centerline tension latches from aft to forward. Close the No.1 tension latch. Close the No.2 centerline tension latch to engage the lower interlock pin. Engage the upper T-hook latch last.

NOTE: The No.1 tension latch and the No.5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the thrust reverser sleeve.

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

(b) Close the v-band latch, first.

NOTE: This is the HARTWELL HA277-3 (BOEING S315W113-6) v-band latch.

1) Open the v-band latch handle from the stowed position.

CAUTION MAKE SURE THAT THE HOOK IN THE V-BAND LATCH ASSEMBLY IS CORRECTLY ENGAGED IN THE T-BOLT RECEIVER BEFORE YOU CLOSE THE V-BAND LATCH. DAMAGE TO THE HOOK OR THE T-BOLT RECEIVER ON THE V-GROOVE LATCH BAND CAN OCCUR.

2) Push the latch hook upward to engage the hook in the T-bolt receiver.

WARNING DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

3) With the handle horizontal to the right side of the latch, pull the handle down to the vertical position until trigger B latch engages.

NOTE: This is the take-up stroke.

4) Pull down on the trigger A to release the lock pin in the handle.

5) Move the handle up from the vertical to the horizontal position until the lock pin engages.

NOTE: The force to lock and stow the v-band latch is 50- 55 pounds (222-245 newtons).

(c) Close the three aft cowl centerline latches from forward to aft.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the latch keeper eyebolt.
3) Push the latch handle to the closed position.

(d) Close the four deflection limiter latches on the aft cowl from forward to aft.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the tension strap keeper.
3) Push the latch handle to the closed position.

(e) Close the No.5 tension latch, the No.4 tension latch and then the No.3 tension latch.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the latch bolt.
3) Push the latch handle to the closed position.

(f) Close the No.1 tension latch.

1) Engage the No.1 latch T-bolt into the latch keeper hook.
2) Move the latch handle upward to the closed position.

(g) Close the No.2 tension latch to engage the lower interlock pin.

NOTE: When you close the No. 2 tension latch, the body of the latch hook pushes the bracket assembly which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) If it is necessary, push the lower interlock pin upward to engage the serrated fitting on the lower bifurcation.
2) Open the latch handle away from the body of the latch hook.
3) Engage the latch hook on the latch bolt.
4) Push the latch handle to the closed position.

(h) Close the upper bifurcation T-hook latch on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

1) Push the T-handle in toward the latch access door hinges and push the T-hook latch handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Push the T-handle button and push the handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

NOTE: The force to push the T-handle to the closed position is not more than 35 pounds (157 newtons).

SUBTASK 78-31-00-410-037-H01

(6) Push and hold the DOWN button on each PDOS switch for the left and right thrust reversers for a minimum of 60 seconds.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-410-033-H01

CAUTION

DO A CHECK OF THE FIT AND FLUSHNESS OF THE CLOSED LATCH ACCESS DOORS TO THE FAIRINGS AROUND THE DOOR OPENINGS. IF THE FIT AND FLUSHNESS ARE NOT CORRECT, DAMAGE TO THE DOORS CAN OCCUR.

(1) Close the latch beam access doors.

Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

(a) Make sure that the latch access door closes smoothly and without excess force to engage the door latches.

1) If the latch access door will not close, make sure that the tension latches are closed and latched.

NOTE: The latch access doors have fittings which will prevent the closure of the access door if the tension latches are not closed and latched.

2) If the closed latch access door is not tight and flush to the structure, adjust the screw on the latch tongue; adjust both access door latches.

3) Look for bent or damaged latch door hinges.

4) If damage is found, replace the hinges or replace the latch access door.

NOTE: Damage to the door hinge can cause the latch access door to open and depart in flight.

a) Do this task: Thrust Reverser Latch Access Doors Removal, TASK 78-31-19-000-801-H01.

b) Do this task: Thrust Reverser Latch Access Doors Installation, TASK 78-31-19-400-801-H01.

SUBTASK 78-31-00-410-017-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-410-018-H01

(3) Install the PDOS access panel in the thumbnail fairing on the applicable fan cowl support beam (Figure 208):

(a) Close the applicable access panels:

Number	Name/Location
431AB	PDOS Access Door, Left Strut
441AB	PDOS Access Door, Right Strut

(b) Position the access panel in the access hole with the beveled edge forward; make sure the lanyard is not caught between the access panel and the fairing.

(c) Install 17 countersunk bolts to install the access panel.

SUBTASK 78-31-00-090-006-H01

(4) Remove the fall arrest equipment; do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-00-440-008-H01

(5) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-00-440-009-H01

(6) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 78-31-00-860-819-H00

12. Thrust Reverser Operation - Extend (Selection)

A. Procedure

SUBTASK 78-31-00-860-005-H01

(1) Do one of these tasks to extend the thrust reverser:

(a) Thrust Reverser Operation - Extend (Power Method), TASK 78-31-00-981-801-H01

(b) Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01

——— END OF TASK ———

TASK 78-31-00-860-818-H00

13. Thrust Reverser Operation - Retract (Selection)

A. Procedure

SUBTASK 78-31-00-860-006-H01

(1) Do one of these tasks to retract the thrust reverser:

(a) Thrust Reverser Operation - Retract (Power Method), TASK 78-31-00-981-802-H01

(b) Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-981-801-H01

14. Thrust Reverser Operation - Extend (Power Method)

(Figure 220/Figure 221)

A. General

(1) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(2) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

B. References

Reference	Title
27-61-00-040-801	Spoiler Deactivation (P/B 201)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
411	Engine, Left
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
421	Engine, Right
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Access Panels

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-31-00-040-011-H01

WARNING DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS. THE SPOILERS CAN EXTEND QUICKLY AND CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Do this task: Spoiler Deactivation, TASK 27-61-00-040-801.

SUBTASK 78-31-00-860-072-H00

(2) Put the ADIRU switch on panel P5 to the ON position.

SUBTASK 78-31-00-860-007-H01

(3) Make sure the Fuel Control switch is in the CUTOFF position.

SUBTASK 78-31-00-860-008-H01

(4) Put the applicable EEC MAINT L(R) ENG POWER switch on the overhead maintenance panel, P61, in the TEST position.

SUBTASK 78-31-00-860-009-H01

(5) Make sure the forward thrust levers are in the idle position.

SUBTASK 78-31-00-860-010-H01

(6) Make sure the reverse thrust levers are in the fully forward and down position.

SUBTASK 78-31-00-863-001-H01

(7) Do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-31-00-860-012-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(8) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-012-H01

(9) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-010-019-H01

(10) For the right fan cowl panel on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-981-001-H01

WARNING MAKE SURE ALL PERSONS AND EQUIPMENT ARE CLEAR OF THE AREA AFT OF THE APPLICABLE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER EXTENDS.

CAUTION DO NOT EXTEND THE THRUST REVERSER SLEEVE IF THE THRUST REVERSER IS OPEN. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE THRUST REVERSER AND ADJACENT STRUCTURES CAN OCCUR.

(11) You must use two people to do the steps that follow in the correct sequence to extend the thrust reverser:

NOTE: The first person must push and hold the test enable switch before the second person moves the reverse thrust lever to the up and aft position. While the first person holds the test enable switch the second person then moves the reverse thrust lever to the up and aft position.

Release of the test enable switch will cause the EEC to immediately close the isolation valve and stop the movement of the thrust reverser. No movement of the thrust reverser can occur unless the test enable switch is pushed and held.

If the thrust reverser sleeves stop before they fully extend, you will have to unlock the sync locks to continue to extend the thrust reverser sleeves.

(a) First person;

Push and hold the thrust reverser test enable switch to extend the thrust reverser sleeves (Figure 220).

NOTE: The test enable switch is adjacent to the PDOS switch for the right thrust reverser at the 4 o'clock position on the aft inlet bulkhead of the inlet cowl.

(b) Second person;

Move the reverse thrust lever up and aft until it engages the interlock stop and attach a DO-NOT-OPERATE tag.

NOTE: The thrust reverser will extend in not more than 6 seconds.

(c) Make sure the thrust reverser sleeves operate smoothly.

NOTE: The two thrust reverser sleeves do move together but there can be some sleeve mismatch during the deploy movement. If both sleeves deploy within the required time, then the sleeve mismatch during the deploy movement is acceptable.

(d) Release the test enable switch.

NOTE: If you hold the test enable switch for more than 20 seconds, it will cause annunciation of the ENG REVERSER status and advisory messages.

SUBTASK 78-31-00-865-001-H01

(12) Open these circuit breakers and install safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-010-020-H01

(13) Open the access panel to the applicable isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-040-013-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(14) Before you work around the thrust reverser while the thrust reverser sleeve is extended, do these steps to deactivate the thrust reverser (Figure 221):

(a) Install the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the shutoff valve spool on the isolation valve:

1) Push the shutoff valve spool in.

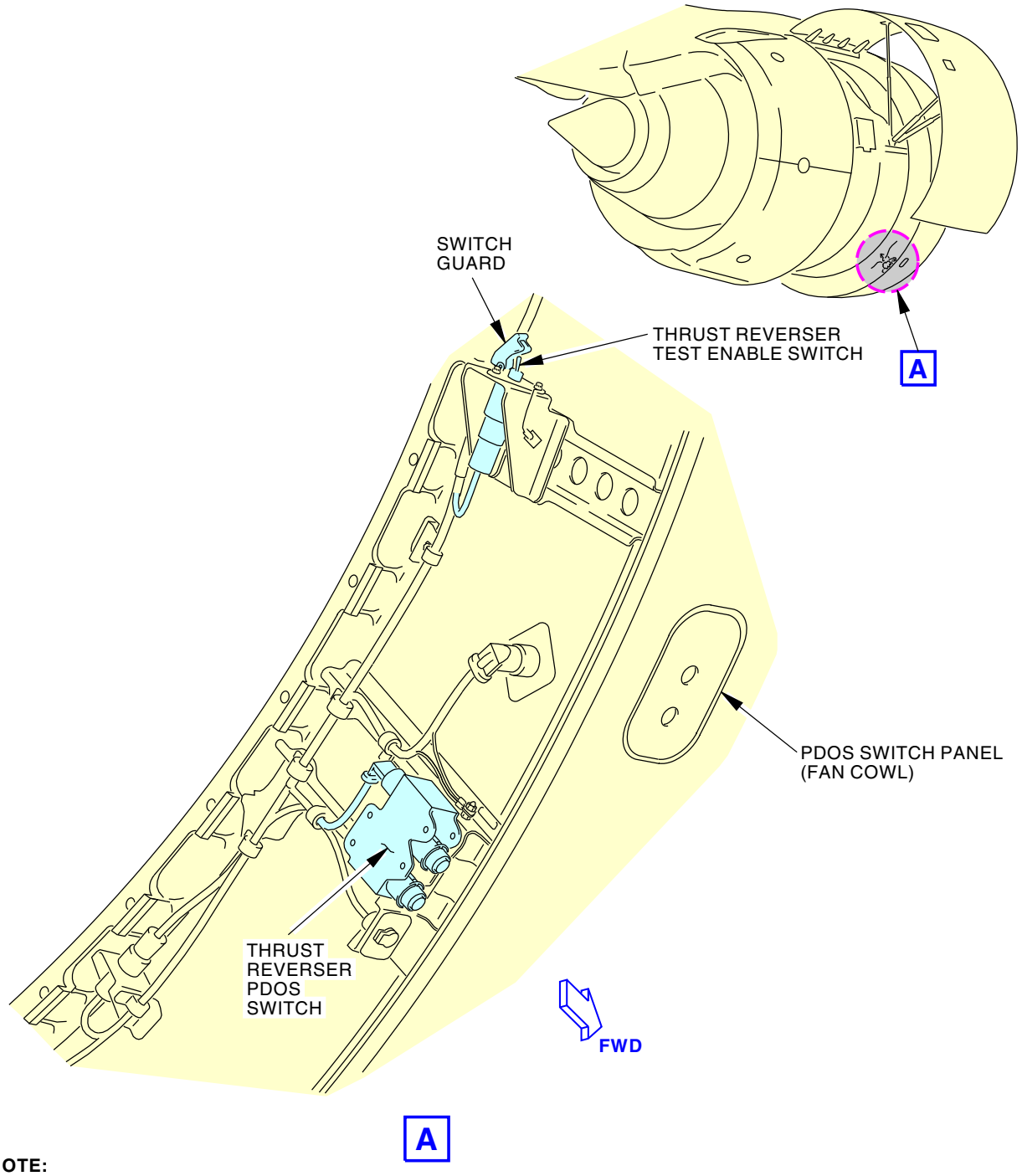
2) Install the lock pin through the hole in the shutoff valve body to hold the shutoff valve spool in the valve.

3) Install the hitch pin through the end of the lock pin.

(b) Make sure the red streamer is seen out of the access door.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



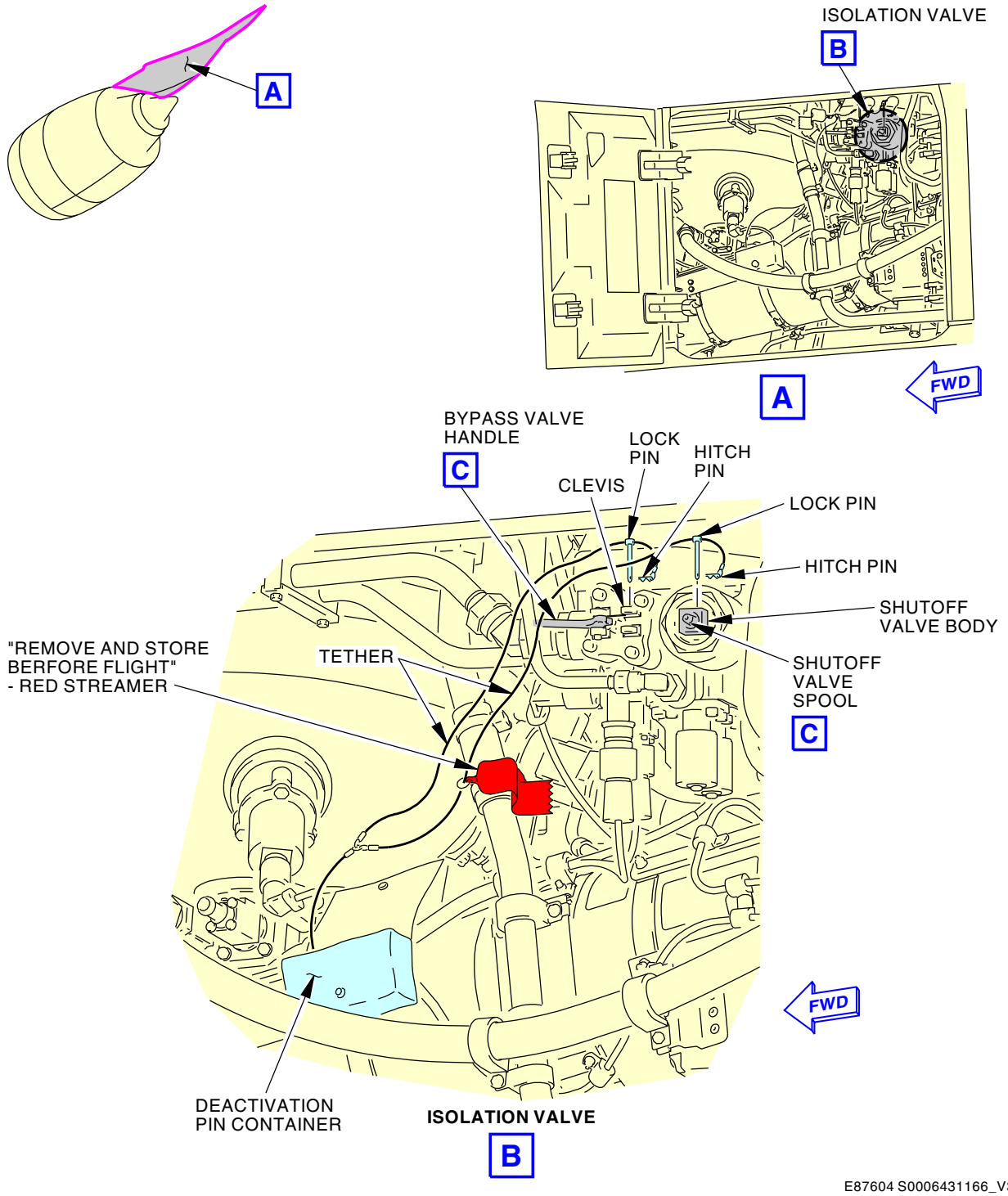
NOTE:

THE RIGHT SIDE IS SHOWN, THE LEFT SIDE IS EQUIVALENT FOR THE PDOS SWITCHES. THE TEST ENABLE SWITCH IS ON THE RIGHT SIDE ONLY.

M07267 S0004286240_V2

Thrust Reverser Test Enable Switch
Figure 220/78-31-00-990-827-H01

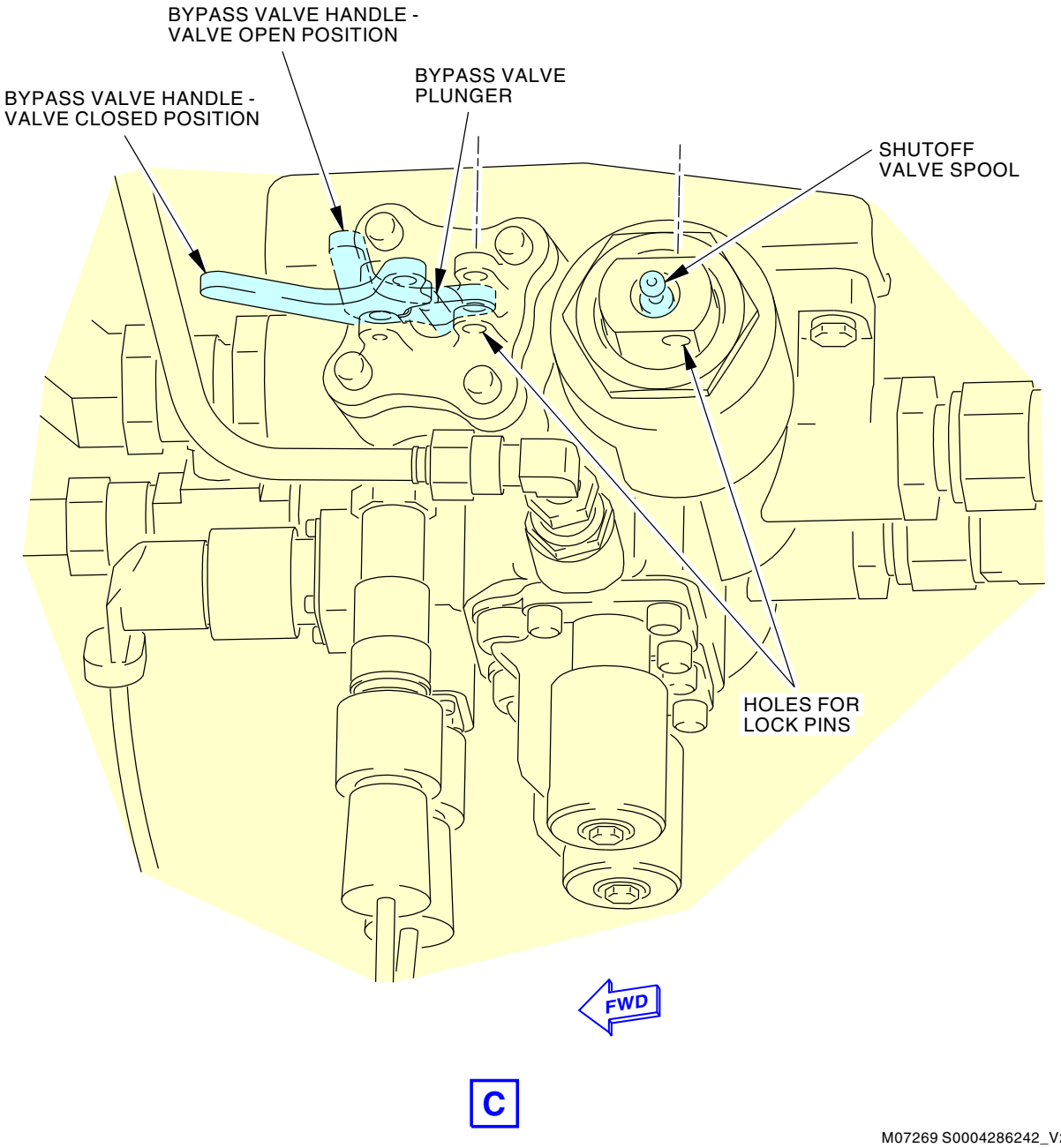
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



E87604 S0006431166_V3

Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 221/78-31-00-990-828-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07269 S0004286242_V2

Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 221/78-31-00-990-828-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-981-802-H01

15. Thrust Reverser Operation - Retract (Power Method)

(Figure 220/Figure 221)

A. General

(1) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(2) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

B. References

Reference	Title
27-61-00-440-801	Spoiler Activation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
411	Engine, Left
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
421	Engine, Right
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Access Panels

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-31-00-863-002-H01

(1) Do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-31-00-440-010-H01

(2) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591 from the shutoff valve spool on the isolation valve (Figure 221):

(a) Remove the hitch pin from the lock pin.

(b) Remove the lock pin from the shutoff valve body.

(c) Make sure the shutoff valve spool moves out to the usual position.

(d) Store the two lock pins and the red streamer in the pin container.

SUBTASK 78-31-00-410-019-H01

(3) Close the access panel to the applicable isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-865-002-H01

(4) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-410-020-H01

(5) You must use two people to do the steps that follow in the correct sequence to retract the thrust reverser:

NOTE: The first person must push and hold the test enable switch before the second person moves the reverse thrust lever to the fully forward and down position. While the first person holds the test enable switch, the second person then moves the reverse thrust lever to the fully forward and down position. After the thrust reverser is fully retracted, the first person must release the test enable switch in 15 to 19 seconds to prevent EICAS and CMC messages. If the thrust reverser sleeves stop before they fully retract, you will have to unlock the sync locks to continue to retract the thrust reverser sleeves.

(a) First person; Push and continue to hold the test enable switch until 15 to 19 seconds after the thrust reverser is fully retracted (Figure 220).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Second person; Remove the DO-NOT-OPERATE tag from the reverse thrust lever and move it to the fully forward and down position.

NOTE: The thrust reverser retraction time is 5 seconds.

(c) Make sure the thrust reverser sleeves operate smoothly.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-864-002-H01

(1) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-31-00-410-021-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-440-011-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-00-440-012-H01

(4) Do this task: Spoiler Activation, TASK 27-61-00-440-801.

SUBTASK 78-31-00-860-013-H01

(5) Make sure the DO-NOT-OPERATE tags arefrom the thrust levers.

SUBTASK 78-31-00-860-014-H01

(6) Make sure the reverse thrust levers are in the fully forward and down position.

SUBTASK 78-31-00-860-015-H01

(7) Make sure the forward thrust levers are in the idle position.

SUBTASK 78-31-00-860-016-H01

(8) Put the applicable EEC MAINT L(R) ENG POWER switch on the P61 panel to the NORM position.

SUBTASK 78-31-00-860-073-H00

(9) Put the ADIRU switch on panel P5 to the OFF position.

SUBTASK 78-31-00-860-099-H00

(10) Push forward on the speedbrake lever on the P10 control panel, to make sure it is in the DOWN position.

——— END OF TASK ———

TASK 78-31-00-980-801-H01

16. Thrust Reverser Operation - Extend (Manual Method)

(Figure 222)

A. General

(1) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(2) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-31-00-860-017-H01

(1) Make sure the Fuel Control switch is in the CUTOFF position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-860-018-H01

(2) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-00-860-019-H01

(3) Make sure the reverse thrust levers are in the fully forward and down position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-00-865-003-H01

(4) Open these circuit breakers and install safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-010-022-H01

(5) Open the access panel for the applicable isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-040-014-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(6) Before you work around the thrust reverser while the thrust reverser sleeve is extended, do these steps to deactivate the thrust reverser:

(a) Install the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the shutoff valve spool on the isolation valve.

1) Push the shutoff valve spool in.

2) Install the lock pin through the hole in the shutoff valve body to hold the shutoff valve spool in the valve.

3) Install the hitch pin through the end of the lock pin.

(b) Make sure the red streamer is seen out of the access door.

(c) Install the lock pin without the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the bypass valve handle and the clevis on the isolation valve.

1) Turn the bypass valve handle to align the hole with the clevis.

2) Install the lock pin through the clevis and bypass valve handle.

3) Install the hitch pin through the end of the lock pin.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-860-020-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(7) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-015-H01

(8) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-010-023-H01

(9) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-980-001-H01

(10) Do these steps to release the locks on the thrust reverser (Figure 222):

(a) Move the lock release lever on the center actuator to the unlock position and push-in the lock button to hold the lever in this position.

(b) Move the lock release lever on the lower actuator to the unlock position and push-in the lock button to hold the lever in this position.

CAUTION IF THE LOCK-RELEASE LEVER DOES NOT MOVE EASILY, DO NOT PUSH THE LEVER WITH TOO MUCH FORCE. TO MAKE THE LEVER MOVE FREELY, INSTALL A 3/8-INCH DRIVE INTO THE MANUAL DRIVE UNIT ON THE SYNC LOCK. TURN IT COUNTERCLOCKWISE (IN THE STOW DIRECTION) UNTIL YOU CAN MOVE THE LOCK-RELEASE LEVER FREELY. IF YOU APPLY TOO MUCH FORCE TO THE LEVER, DAMAGE TO THE LEVER SHAFT OR SPLINE WILL OCCUR.

(c) Move the lock release lever on the sync lock to the unlock position and push-in the pin to hold the lever in this position.

SUBTASK 78-31-00-980-002-H01

CAUTION DO NOT EXTEND THE THRUST REVERSER SLEEVE IF THE THRUST REVERSER IS OPEN. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE THRUST REVERSER AND ADJACENT STRUCTURES CAN OCCUR.

(11) Manually extend the thrust reverser sleeve:

(a) Install a 3/8-inch square drive into the manual drive unit.

NOTE: It is OK to use a 3/8 inch pneumatic wrench (nut runner).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Push-in and continue to push-in the 3/8-inch square drive while you turn the drive to extend the thrust reverser sleeve.

NOTE: You must push-in the 3/8-inch square drive to engage the pinion gear with the bevel gear in the sync lock while you turn the drive.

NOTE: The pinion gear in the manual drive unit is spring loaded to disengage from an internal sync lock bevel gear.

NOTE: The clutch in the manual drive unit has a torque limit of 125-130 inch-pounds (14.1-14.7 Newton-meters) to prevent damage to the sync shaft system.

(c) Make sure the thrust reverser sleeve operates smoothly.

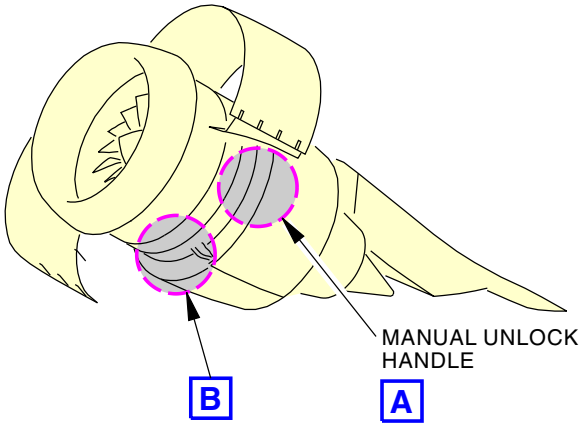
SUBTASK 78-31-00-860-021-H01

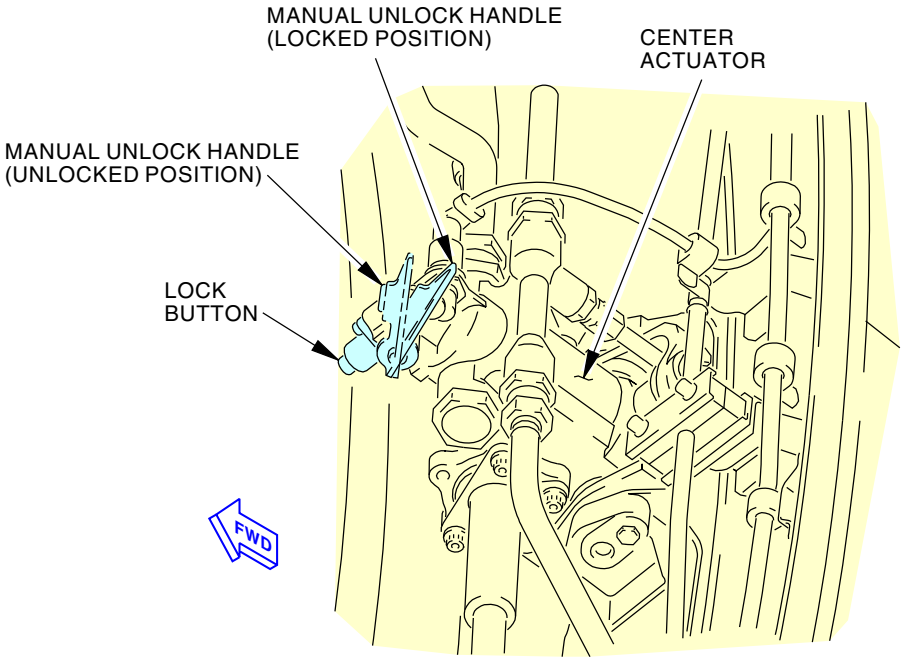
(12) If you do maintenance on the thrust reverser actuation system (TRAS), you must remove the thrust reverser isolation valve lock, SPL-2591 from the bypass valve on the isolation valve.

NOTE: The bypass valve must be open before you manually extend or retract the thrust reverser sleeve. This will prevent a hydraulic lock, which can prevent the movement of the thrust reverser sleeve. But, you must close the bypass valve if you remove thrust reverser hydraulic components or hydraulic tubing. If you do not close the bypass valve, hydraulic fluid from the hydraulic system reservoir will drain through the return line when you remove the components or tubing.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





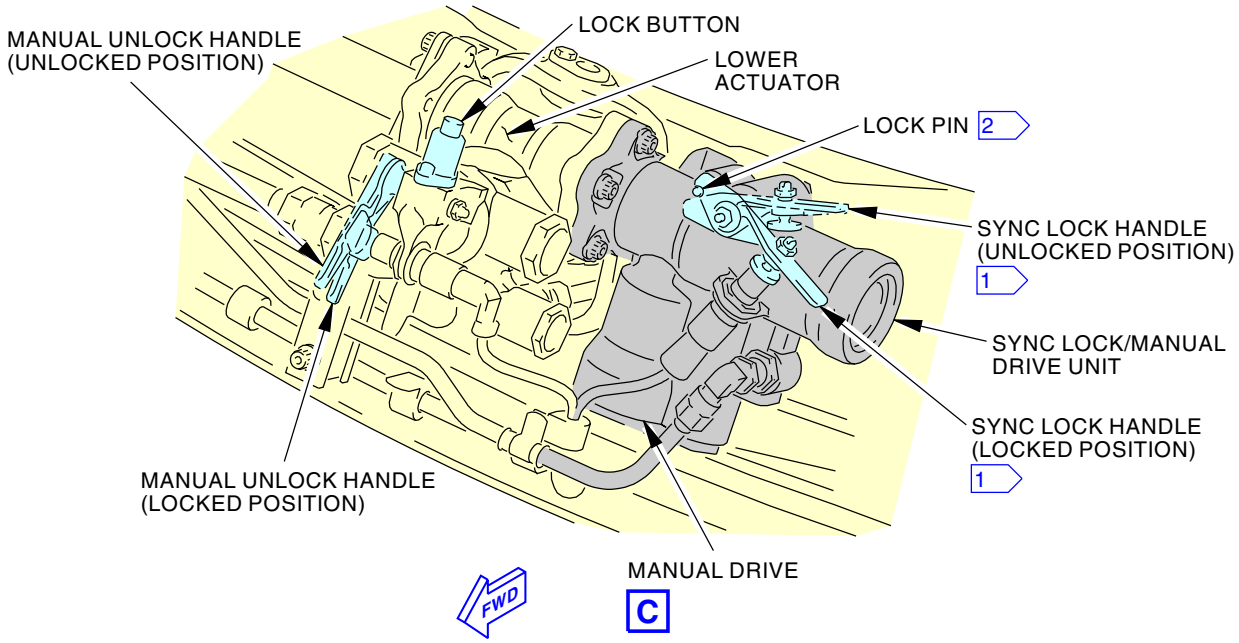
MANUAL UNLOCK HANDLE
(LEFT THRUST REVERSER IS SHOWN,
RIGHT THRUST REVERSER IS OPPOSITE)

A

M07255 S0004286235_V2

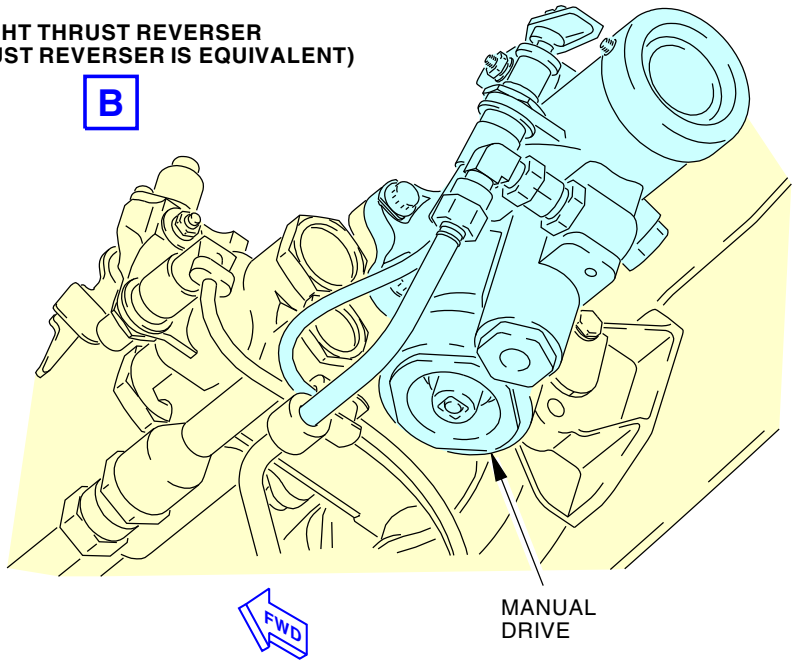
Thrust Reverser Locks and Manual Drive
Figure 222/78-31-00-990-814-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



RIGHT THRUST REVERSER
(LEFT THRUST REVERSER IS EQUIVALENT)

B



C

1 THE MANUAL UNLOCK HANDLE ON THE LEFT THRUST REVERSER IS BETWEEN THE SYNC LOCK AND THE THRUST REVERSER TORQUE BOX.

2 PUSH-IN OPPOSITE END OF LOCK PIN TO HOLD MANUAL UNLOCK HANDLE IN UNLOCK POSITION.

M07256 S0004286236_V2

Thrust Reverser Locks and Manual Drive
Figure 222/78-31-00-990-814-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-980-802-H01

17. Thrust Reverser Operation - Retract (Manual Method)

(Figure 222)

A. General

(1) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(2) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-31-00-860-022-H01

(1) Make sure the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, is in the shutoff valve spool on the isolation valve.

SUBTASK 78-31-00-860-023-H01

(2) Make sure the lock pin from the thrust reverser isolation valve lock, SPL-2591 is in the bypass valve handle and clevis on the isolation valve.

SUBTASK 78-31-00-980-021-H00

(3) Release the manual unlock handles on the center actuator and lower actuator:

(a) Move the manual unlock handles to the fully unlocked position to release the lock buttons.

(b) Make sure the lock buttons move out to their usual position.

SUBTASK 78-31-00-980-003-H01

CAUTION DO NOT RETRACT THE THRUST REVERSER SLEEVE IF THE THRUST REVERSER IS OPEN. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE THRUST REVERSER AND ADJACENT STRUCTURES CAN OCCUR.

(4) Manually retract the thrust reverser sleeve (Figure 222):

(a) Install a 3/8-inch square drive into the manual drive unit.

NOTE: It is OK to use a 3/8 inch pneumatic wrench (nut runner).

(b) Push-in and continue to push-in the 3/8-inch square drive in while you turn the manual drive to retract the thrust reverser sleeve.

NOTE: You must push-in the 3/8-inch square drive to engage the pinion gear with the bevel gear in the sync lock while you turn the drive.

NOTE: The pinion gear in the manual drive unit is spring loaded to disengage from an internal sync lock bevel gear.

NOTE: The clutch in the manual drive unit has a torque limit of 125-130 inch-pounds (14.1-14.7 Newton-meters) to prevent damage to the sync shaft system.

(c) Make sure the thrust reverser sleeve operates smoothly.

(d) Make sure the manual unlock handles on the center and lower actuators move back to their normal locked position.

NOTE: If the center actuator does not lock with the manual or pneumatic wrench method, it is acceptable to use hydraulic power to lock the center actuator.

SUBTASK 78-31-00-980-004-H01

(5) Engage the sync lock:

(a) Move the manual unlock handle to the fully unlocked position to release the lock pin.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Make sure the lock pin moves out to the usual position.

(c) Make sure the manual unlock handle moves back to the usual locked position.

SUBTASK 78-31-00-440-013-H01

(6) Do the activation of the isolation valve:

(a) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591 from the shutoff valve spool on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the shutoff valve body.

3) Make sure the shutoff valve spool moves out to the normal position.

(b) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591 from the bypass valve handle and clevis on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the bypass valve handle and clevis.

3) Make sure the bypass valve handle moves out to the normal position.

(c) Store the two lock pins and the red streamer in the pin container.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-410-022-H01

(1) Do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels to the isolation valves:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-410-023-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-865-004-H01

(3) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-440-014-H01

(4) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-860-024-H01

(5) Remove the DO-NOT-OPERATE tags from the thrust levers.

SUBTASK 78-31-00-860-098-H00

(6) Make sure the reverse thrust levers are forward and down and the forward thrust levers are in the idle position.

SUBTASK 78-31-00-860-025-H01

(7) Erase all thrust reverser EICAS messages and make sure they do not show again.

SUBTASK 78-31-00-860-027-H01

(8) Make sure no active thrust reverser maintenance messages are shown on the Existing Faults Display on the MAT.

(a) Clear all inactive thrust reverser maintenance messages.

SUBTASK 78-31-00-860-100-H00

(9) Push forward on the speedbrake lever on the P10 control panel, to make sure it is in the DOWN position.

——— END OF TASK ———

TASK 78-31-00-040-806-H00

18. Thrust Reverser Deactivation For Ground Maintenance

(Figure 223)

A. General

(1) Use this task for ground maintenance only. Accidental thrust reverser movement can occur if you use this task for thrust reverser deactivation for flight dispatch. If you do not obey these instructions, injury to persons and damage to equipment can occur.

(2) You must do the thrust reverser deactivation when you do maintenance work on the mechanical, hydraulic, or electrical systems of the thrust reverser. Also, you must do the thrust reverser deactivation when you do maintenance work on other airplane systems adjacent to the engine or the thrust reverser.

B. References

Reference	Title
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205
STD-858	Tag - DO NOT OPERATE

D. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
411	Engine, Left
421	Engine, Right
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-31-00-860-028-H01

(1) Make sure the Fuel Control switch is in the CUTOFF position.

SUBTASK 78-31-00-860-029-H01

(2) Make sure the forward thrust levers are in the idle position and attach DO NOT OPERATE tags, STD-858.

SUBTASK 78-31-00-860-030-H01

(3) Make sure the reverse thrust levers are in the fully forward and down position and attach DO NOT OPERATE tags, STD-858.

SUBTASK 78-31-00-865-005-H01

(4) Open these circuit breakers and install safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-010-024-H01

(5) Open the access panel for the applicable isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-040-016-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO DEACTIVATE THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Do these tasks in this sequence to safely deactivate the thrust reverser (Figure 223):

(a) Install the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the shutoff valve spool on the isolation valve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Push the shutoff valve spool in.
2) Install the lock pin through the hole in the shutoff valve body to hold the shutoff valve spool in the valve.
3) Install the hitch pin through the end of the lock pin.

(b) If it is necessary to manually operate the thrust reverser, install the lock pin from the thrust reverser isolation valve lock, SPL-2591, into the bypass valve handle and the clevis on the isolation valve.
1) Turn the bypass valve handle to align the hole with the clevis.
2) Install the lock pin through the clevis and bypass valve handle.
3) Install the hitch pin through the end of the lock pin.

(c) Make sure the red streamer is seen out of the access door.

(d) After you manually operate the thrust reverser and TRAS hydraulic components must be removed, remove the pin from the bypass valve handle and clevis to close the bypass valve to prevent drainage from the hydraulic system return lines.

G. Thrust Reverser - Tryout

NOTE: This tryout is to make sure that the thrust reverser system is in a zero energy state.

SUBTASK 78-31-00-860-108-H00

(1) Remove the DO NOT OPERATE tags, STD-858 from the reverse thrust levers to test the thrust reverser

SUBTASK 78-31-00-860-109-H00

WARNING

MAKE SURE THAT PERSONNEL AND EQUIPMENT ARE CLEAR OF ALL CONTROL SURFACES BEFORE YOU SUPPLY HYDRAULIC POWER. AILERONS, RUDDERS, ELEVATORS, FLAPS, SPOILERS, LANDING GEAR, AND THRUST REVERSERS CAN MOVE QUICKLY WHEN YOU SUPPLY HYDRAULIC POWER. THIS CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT

(2) Put the revers thrust levers to the idle detent position.
(a) Make sure that the thrust reverser sleeve does not move.

SUBTASK 78-31-00-860-110-H00

(3) Put the revers thrust levers in the fully forward and down position.
(a) Put DO NOT OPERATE tags, STD-858 on the thrust reverser levers.

——— END OF TASK ———

TASK 78-31-00-440-805-H00

19. Thrust Reverser Activation After Ground Maintenance

(Figure 223)

A. General

(1) Only use this task after ground maintenance. Do not use this task after thrust reverser deactivation for flight dispatch. If you do not obey these instructions, injury to persons and damage to equipment can occur.

B. References

Reference	Title
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
411	Engine, Left
421	Engine, Right
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-31-00-010-025-H01

(1) Open the access panel for the applicable isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-440-015-H01

(2) Do the activation of the isolation valve (Figure 223).

(a) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591, from the shutoff valve spool on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the shutoff valve body.

3) Make sure the shutoff valve spool moves out to the normal position.

(b) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591, from the bypass valve handle and clevis on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the bypass valve handle and clevis.

3) Make sure the bypass valve handle moves out to the normal position.

(c) Store the two lock pins and the red streamer in the pin container.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-410-024-H01

(3) Close the access panel for the isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-865-006-H01

(4) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-860-031-H01

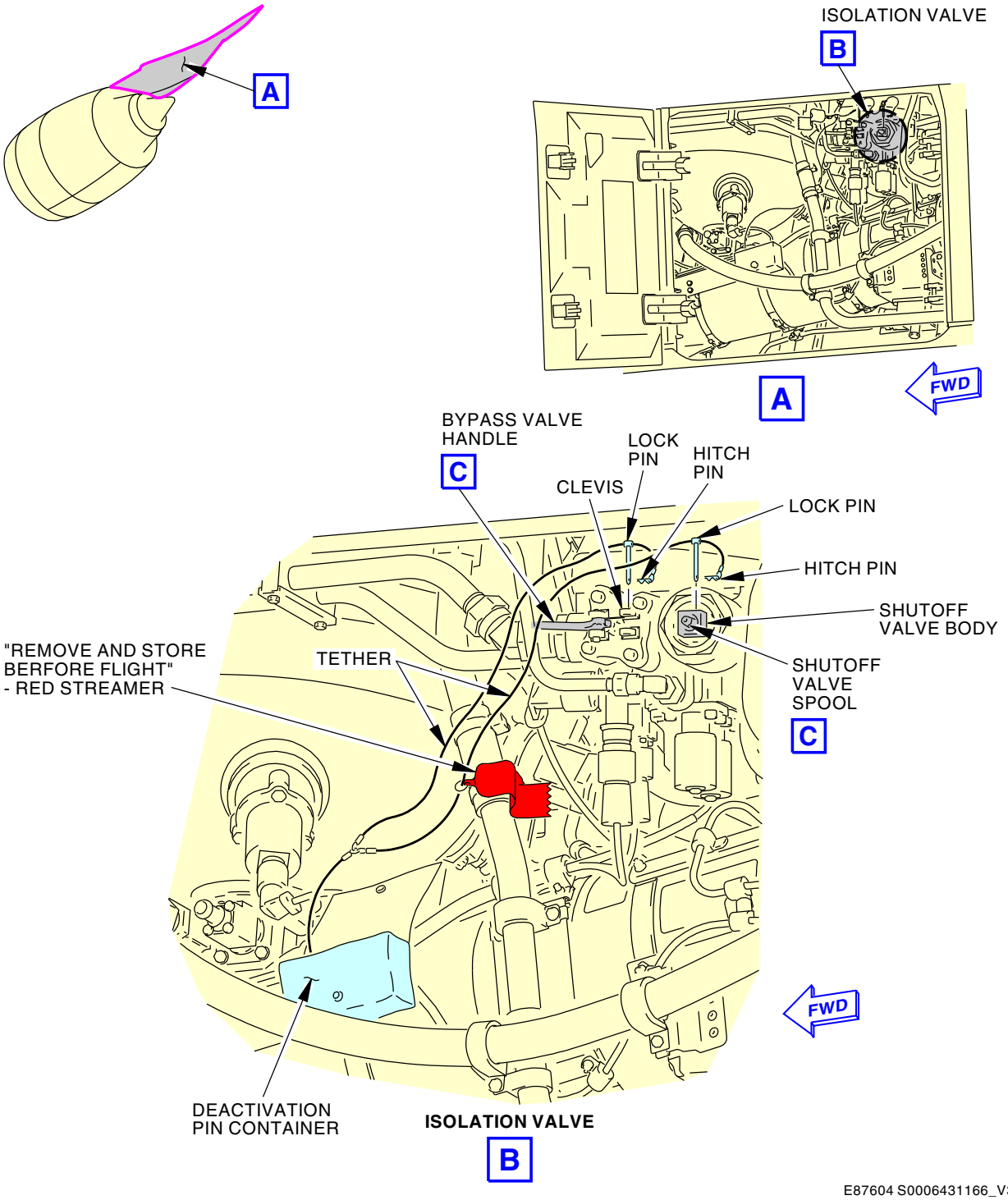
(5) Make sure the forward thrust levers are in the idle position and remove the DO-NOT-OPERATE tags from the forward thrust levers.

SUBTASK 78-31-00-860-032-H01

(6) Make sure the reverse thrust levers are in the fully forward and down position and remove the DO-NOT-OPERATE tags from the reverse thrust levers.

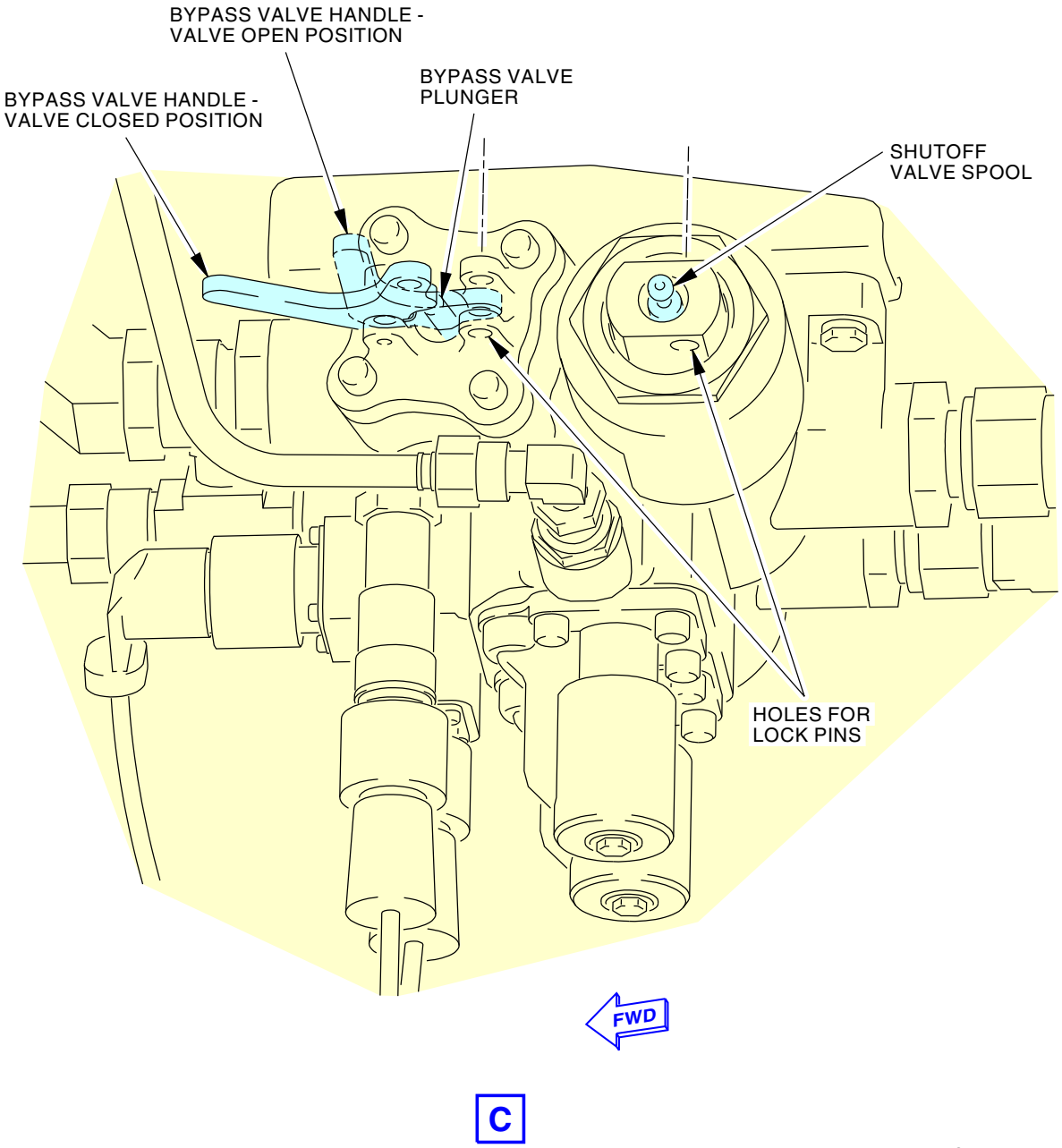
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 223/78-31-00-990-815-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 223/78-31-00-990-815-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-800-801-H01

20. Thrust Reverser Blocker Door Access Platform

(Figure 224)

A. General

(1) The blocker door access platform is a stack of modular structural foam blocks that are sized to fit the fan duct of the thrust reverser. This access platform permits access to the blocker doors and drag links near the upper bifurcation.

(2) There are five kinds of blocks; the lower bifurcation block, the main block, the spacer block, the wedge block and the 1/2 step block. The spacer block, main blocks and wedge blocks are interchangeable between the left and right installations. There is a left and right bifurcation wall blocks and left and right 1/2 step blocks. In addition, there is a tubular keel beam bumper pad with a 90 degree bend that fits on the lower bifurcation keel beam fairing. Also, there is a long, straight, tubular bumper pad that fits over the thrust reverser main track slider.

(3) The skin of the blocks is resistant to hydraulic fluid and fuel. The blocks are connected together with Velcro straps. The structural foam blocks have steps molded on blocks and are reinforced internally. In addition, the step blocks have a non-slip fabric surface and stencils on all blocks give the orientation of the block in the fan duct.

(4) This tool is a Boeing proprietary tool and can be purchased through Boeing Spares.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Install the Blocker Door Access Platform

SUBTASK 78-31-00-860-001-H01

WARNING DO NOT OPEN THE THRUST REVERSER TO REMOVE THE BLOCKER DOORS. YOUR WEIGHT CAN BREAK THE HOLD-OPEN RODS WHICH WILL CAUSE THE THRUST REVERSER TO CLOSE QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Make sure the thrust reverser is closed and latched.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-010-002-H01

WARNING

KEEP ALL PERSONNEL AND EQUIPMENT AWAY FROM THE AREA THAT IS AFT OF THE APPLICABLE THRUST REVERSER. IF YOU IGNORE THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER EXTENDS.

(2) Do this task: Thrust Reverser Operation - Extend (Selection), TASK 78-31-00-860-819-H00.

(a) Extend the thrust reverser to pull the blocker doors to the open position.

SUBTASK 78-31-00-040-001-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-00-490-001-H01

CAUTION

PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(4) Wear boot socks over your work boots and install a protective mat, STD-585 in the translating sleeve when you go into the aft end of the thrust reverser to get access to the blocker doors.

SUBTASK 78-31-00-490-002-H01

CAUTION

MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(5) Install the thrust reverser blocker doors access platform (GE90), SPL-2617 to get access to the blocker doors (Figure 224).

NOTE: To get access to the highest blocker door and drag link, install one bifurcation wall block, one spacer block, three main blocks, three wedge blocks and one 1/2 step block. The spacer block, main blocks and wedge blocks are interchangeable between the left and right installations. There are left and right bifurcation wall blocks and left and right 1/2 step blocks.

(a) Use a fall arrest harness and strap with a work platform positioned behind the extended translating sleeve.

(b) Select the applicable left or right bifurcation wall block.

(c) Use the stencil to orient the bifurcation wall block.

(d) Slide the bifurcation wall block forward along the lower bifurcation until it is wedged in position near the blocker door cavity.

(e) Use the stencil to orient the main block.

(f) Push the main block forward until it is stacked above the bifurcation wall block and the lower lip drops into the blocker door cavity.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(g) Use the Velcro straps to connect the main block and the bifurcation wall block together.

NOTE: There are Velcro straps on the forward face and aft face of the blocks.

(h) Use the stencil to orient the wedge block.

(i) Slide the wedge block between the main block and the fan duct inner wall; install the wedge block as tight as possible.

NOTE: The wedge block will prevent movement of the main blocks.

1) Push the wedge block from the front side of the block and from the thicker side of the wedge to install the wedge block as tight as possible.

(j) Use the stencil to orient the spacer block.

(k) Push the spacer block forward until it is stacked above the main block.

(l) Use the Velcro straps to connect the spacer block and the main block together.

NOTE: There are Velcro straps on the forward face and aft face of the blocks.

(m) Continue to install and connect the main blocks with the Velcro straps and install the wedge blocks to reach the required height.

(n) Use the stencil to orient the applicable left or right 1/2 step block.

(o) Stack the applicable left or right 1/2 step block on the main block.

(p) Use the Velcro straps to connect the 1/2 step block and the main block together.

NOTE: There are Velcro straps on the forward face and aft face of the blocks.

(q) Slide the wedge block between the 1/2 step block and the fan duct inner wall; install the wedge block as tight as possible.

NOTE: The wedge block will prevent movement of the 1/2 step block.

1) Push the wedge block from the front side of the block and from the thicker side of the wedge to install the wedge block as tight as possible.

(r) Install the tubular foam bumper pads on the opposite lower main track slider and lower bifurcation keel beam fairing.

NOTE: The keel beam bumper pad is used to protect the mechanic from the sharp edge of the keel beam fairing. The long tubular bumper pad protects the mechanic from injury and the main track slider from damage.

E. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-090-001-H01

(1) Remove the thrust reverser blocker doors access platform (GE90), SPL-2617.

(a) Disconnect the Velcro straps and remove the blocks in reverse order.

(b) Remove the tubular foam bumper pads from the lower main track slider and lower bifurcation keel beam fairing.

SUBTASK 78-31-00-090-002-H01

(2) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-00-440-001-H01

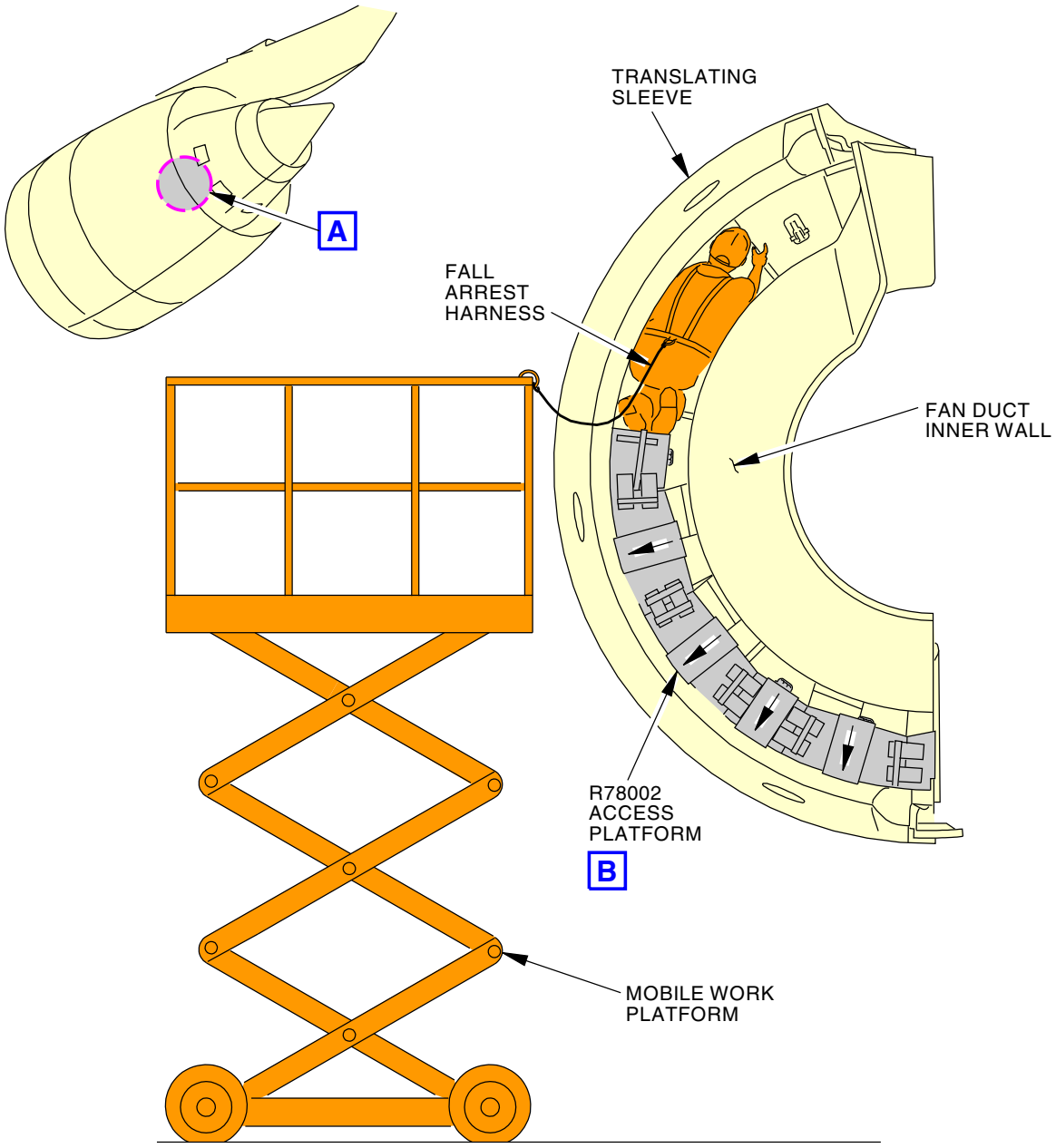
(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-00-410-002-H01

(4) Do this task: Thrust Reverser Operation - Retract (Selection), TASK 78-31-00-860-818-H00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



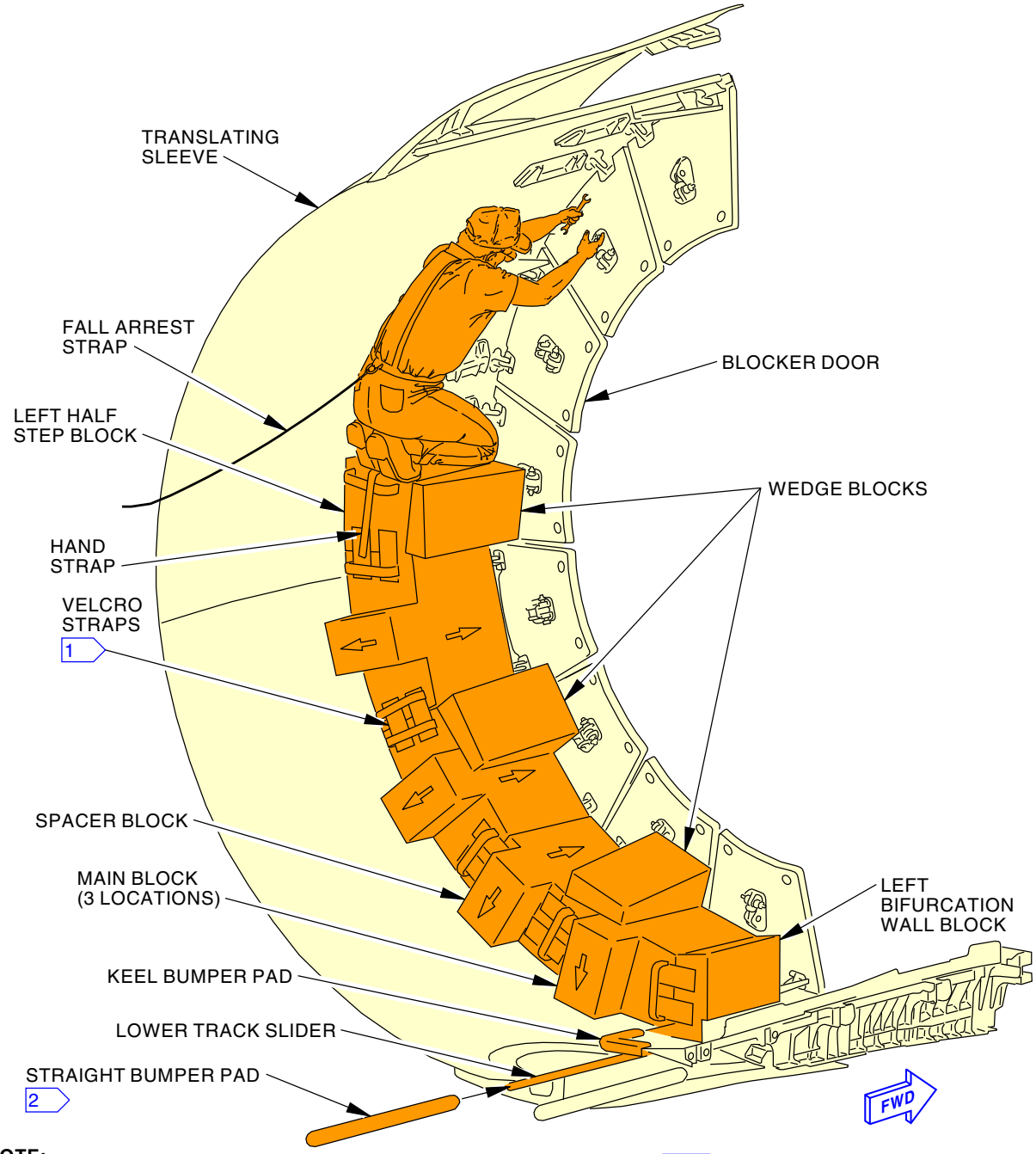
(VIEW IN THE FORWARD DIRECTION)
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

A

N46676 S0000101429_V2

Thrust Reverser Blocker Door Access Platform
Figure 224/78-31-00-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

FAN DUCT INNER WALL NOT SHOWN FOR CLARITY.

1 VELCRO STRAPS ON FRONT AND BACK OF BLOCKS

2 SLIDE PAD ON LOWER TRACK SLIDER

N46666 S0000101430_V2

Thrust Reverser Blocker Door Access Platform
Figure 224/78-31-00-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-980-803-H01

21. Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Open the Thrust Reverser

(Figure 225)

A. General

(1) This task gives the procedure to operate a damaged T-hook latch, gearbox or cable when you try to open the thrust reverser. The nut to operate the T-hook is in the fan duct at the upper bifurcation inner wall in the right side thrust reverser.

(2) You can use the wrench, SPL-14049 (which is eight feet long) to reach the T-hook latch.

(3) If the wrench, SPL-14049 is not available, you will need a 0.25 in. (6.35 mm) T-handled allen wrench or a long allen wrench to open the T-hook latch. You will need to climb into the fan duct to access the T-hook latch.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-14049	Wrench - Extended, Thrust Reverser T-Hook Latch Part #: J78028-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-1048	Stepladder - 6 foot (1.83m)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

E. Operate the Damaged T-Hook Latch - With the 8 foot Long T-Hook Tool

SUBTASK 78-31-00-040-027-H00

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-860-101-H00

(2) Put the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-00-010-056-H00

(3) Open the latch beam access doors on the applicable engine:

Open these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-00-010-057-H00

CAUTION

OPEN ALL LATCHES ON THE THRUST REVERSER HALVES BEFORE YOU OPEN A THRUST REVERSER HALF. IF A LATCH HOOK STAYS ENGAGED, DAMAGE TO THE THRUST REVERSER, THE STRUT LIMITER RODS, AND BRACKETS CAN OCCUR.

(4) Disengage the latches on the thrust reverser in the sequence that follows (Figure 201):

NOTE: The latch location numbers are shown in brackets.

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

(b) Open the upper bifurcation T-hook latch on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

1) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down to the fully extended position to keep the T-hook in the vertical (open) position.

2) Push the T-handle button in and pull down the handle to the fully extended position to keep the T-hook in the vertical (open) position.

SUBTASK 78-31-00-940-001-H00

(5) Place a 6 foot (1.83m) stepladder, STD-1048 behind the engine, and stand on the ladder so that you can reach up inside the thrust reverser with the wrench, SPL-14049.

SUBTASK 78-31-00-020-002-H00

(6) Put the wrench, SPL-14049 into the end of the T-hook and turn the wrench counter-clockwise to turn the T-hook latch to the vertical position so that it can disengage the receiver on the left side thrust reverser.

NOTE: The center of the T-hook shaft has a hex wrench feature for the allen wrench.

SUBTASK 78-31-00-010-058-H00

(7) Open the remaining latches on the thrust reverser in the sequence that follows:

(a) Open the No.2 centerline latch beam tension latch [11].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Push on the secondary lock to open the spring loaded latch handle.
2) Pull the handle to the full open position to release the hook from the latch bolt.
3) Make sure the bracket assembly for the interlock pin has moved down to the open position to disengage the interlock pin.

NOTE: The spring loaded interlock pin should move downward and move the bracket assembly downward to show that the interlock pin has disengaged from the serrated fitting on the right side thrust reverser. When you close the No. 2 tension latch, the latch body pushes the bracket assembly upward which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(b) Open the four deflection limiter latches [1], [2], [3] and [4] on the aft cowls.

NOTE: There are two deflection limiter latches for each aft cowl. All four deflection limiter latch hooks must be disengaged if the left or right thrust reverser is opened.

1) Open the two aft latches first, before you open the two forward latches.
2) Push on the secondary lock to open the spring loaded latch handle.
3) Pull the handle to the full open position to release the hook from the tension strap keeper.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(c) Open the three aft cowl centerline latches [5], [6] and [7] from the aft latch to the forward latch.

1) Push on the secondary lock to open the spring loaded latch handle.
2) Pull the handle to the full open position to release the hook from the latch keeper eyebolt.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(d) Open the No. 5 tension latch [8], the No. 4 tension latch [9] and the No. 3 tension latch [10] on the centerline latch beam from the aft latch to the forward latch.

NOTE: At the No. 5 tension latch, use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle. At the No.4 and No.3 tension latches, because of the small access space to the latches, a small wire hook (local manufacture) can be used to help open the latch handle.

1) Push on the secondary lock to open the spring loaded latch handle.
2) Pull the handle to the full open position to release the hook from the latch bolt.

(e) Open the No.1 tension latch [13].

1) Move the small, unlock lever down.
2) Move the latch handle downward to the open position.
3) Disengage the No.1 latch T-bolt from the latch keeper hook.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(f) Open the V-band latch [14].

1) Hold the latch handle firmly against the force you will feel when you release the trigger A latch and move the latch handle.

NOTE: The force on the handle will be 50-55 pounds (222-245 newtons).

2) Push upward on the end of the latch handle to release trigger A lock pin.

3) Slide trigger A toward the end of the handle.

4) Move the handle downward and to the left until the handle locks in the vertical position.

NOTE: This is the unlock stroke.

5) Hold the latch handle firmly against the force you will feel when you release the trigger B latch and move the latch handle.

6) Move the handle to the left to relieve the preload on trigger B.

7) Slide trigger B away from the handle pivot points.

8) Move the handle from the vertical to the horizontal position.

NOTE: This is the release stroke.

9) Make sure the latch hook is disengaged from the T-bolt receiver.

10) Put the v-band latch in the stowed position.

SUBTASK 78-31-00-010-059-H00

(8) Only open the left side thrust reverser at this time.

(a) Refer to this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

NOTE: You can use the power method, manual method, hand pump method or the sling method to open the left side thrust reverser.

SUBTASK 78-31-00-940-006-H00

(9) Remove the wrench, SPL-14049 from the end of the T-hook.

SUBTASK 78-31-00-940-002-H00

(10) Remove the ladder.

SUBTASK 78-31-00-010-060-H00

(11) Open the right thrust reverser with the power method, manual method, hand pump method or the sling method.

(a) Refer to this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

F. Operate the Damaged T-Hook Latch - Without the 8 foot Long T-Hook Tool

SUBTASK 78-31-00-040-023-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-860-069-H01

(2) Put the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-00-010-040-H01

(3) Open the latch beam access doors on the applicable engine:

Open these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-00-010-031-H01

CAUTION

OPEN ALL LATCHES ON THE THRUST REVERSER HALVES BEFORE YOU OPEN A THRUST REVERSER HALF. IF A LATCH HOOK STAYS ENGAGED, DAMAGE TO THE THRUST REVERSER, THE STRUT LIMITER RODS, AND BRACKETS CAN OCCUR.

(4) Disengage the latches on the thrust reverser in the sequence that follows (Figure 201):

NOTE: The latch location numbers are shown in brackets.

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

(b) Open the upper bifurcation T-hook latch on the right side thrust reverser.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

1) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down to the fully extended position to keep the T-hook in the vertical (open) position.

2) Push the T-handle button in and pull down the handle to the fully extended position to keep the T-hook in the vertical (open) position.

SUBTASK 78-31-00-490-010-H01

CAUTION

PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(5) Install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser to get access to the T-hook.

(a) Wear boot socks over your work boots.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-490-011-H01

CAUTION

MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(6) Install access platform or equivalent equipment to get access to the blocker doors.

NOTE: Access platform R78001 which is used to access blocker doors and blocker door drag links for maintenance can not be used. The R78001 platform blocks require you to extend the thrust reverser and fit into the spaces where the blocker doors are closed. The access hole for the T-hook is forward of the open blocker doors.

(a) If an access platform is not available, you can make an access platform from a stack of large, solid, styrofoam blocks which are a local procurement.

1) Make sure the size of the styrofoam blocks are of sufficient width and thickness so that you can wedge the blocks into the fan duct.

2) Make sure the size of the styrofoam blocks are of sufficient length so that the blocks are stable when you stack the blocks in the fan duct and stand on the blocks.

3) Cut or trim the blocks as it is necessary to make the blocks fit in the fan duct.

4) Make sure the surface of the blocks are clean to prevent damage to the composite inner walls.

(b) If you do not have an access platform, try these steps to use your body to get to the top of the fan duct.

1) Push your back against the inner wall of the translating sleeve and push on the opposite side of the inner duct wall with your legs.

2) Use your hands and arms to help you move or slide your back upward a small amount while you maintain the position of your feet.

3) One at a time, move your legs upward a small amount as you maintain the pressure on your back.

4) Continue to repeat these steps until you get to the top of the fan duct.

5) Continue to maintain the pressure on your back with your legs as you work on the T-hook nut.

SUBTASK 78-31-00-010-033-H01

CAUTION

DO NOT PULL OR PUT YOUR WEIGHT ON THE DRAG LINKS. YOU WILL CAUSE DAMAGE TO THE DRAG LINKS.

(7) Climb into the fan duct of the right side thrust reverser and climb towards the forward part of the upper bifurcation.

SUBTASK 78-31-00-010-034-H01

(8) Put the 0.25 in. (6.35 mm) T-handled allen wrench or 0.25 in. (6.35 mm) standard allen wrench into the end of the T-hook and turn the wrench counter-clockwise to turn the T-hook latch to the vertical position so that it can disengage the receiver on the left side thrust reverser.

NOTE: The center of the T-hook shaft has a hex wrench feature for the allen wrench.

SUBTASK 78-31-00-010-055-H00

(9) Open the remaining latches on the thrust reverser in the sequence that follows:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Open the No.2 centerline latch beam tension latch [11].

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

3) Make sure the bracket assembly for the interlock pin has moved down to the open position to disengage the interlock pin.

NOTE: The spring loaded interlock pin should move downward and move the bracket assembly downward to show that the interlock pin has disengaged from the serrated fitting on the right side thrust reverser. When you close the No. 2 tension latch, the latch body pushes the bracket assembly upward which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(b) Open the four deflection limiter latches [1], [2], [3] and [4] on the aft cowls.

NOTE: There are two deflection limiter latches for each aft cowl. All four deflection limiter latch hooks must be disengaged if the left or right thrust reverser is opened.

1) Open the two aft latches first, before you open the two forward latches.

2) Push on the secondary lock to open the spring loaded latch handle.

3) Pull the handle to the full open position to release the hook from the tension strap keeper.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(c) Open the three aft cowl centerline latches [5], [6] and [7] from the aft latch to the forward latch.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch keeper eyebolt.

NOTE: Use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle.

(d) Open the No. 5 tension latch [8], the No. 4 tension latch [9] and the No. 3 tension latch [10] on the centerline latch beam from the aft latch to the forward latch.

NOTE: At the No. 5 tension latch, use the flat blade of a screwdriver between the handle and the hook to help open the latch handle or use the slot in the handle. At the No.4 and No.3 tension latches, because of the small access space to the latches, a small wire hook (local manufacture) can be used to help open the latch handle.

1) Push on the secondary lock to open the spring loaded latch handle.

2) Pull the handle to the full open position to release the hook from the latch bolt.

(e) Open the No.1 tension latch [13].

1) Move the small, unlock lever down.

2) Move the latch handle downward to the open position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Disengage the No.1 latch T-bolt from the latch keeper hook.

WARNING MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(f) Open the V-band latch [14].

1) Hold the latch handle firmly against the force you will feel when you release the trigger A latch and move the latch handle.

NOTE: The force on the handle will be 50-55 pounds (222-245 newtons).

2) Push upward on the end of the latch handle to release trigger A lock pin.

3) Slide trigger A toward the end of the handle.

4) Move the handle downward and to the left until the handle locks in the vertical position.

NOTE: This is the unlock stroke.

5) Hold the latch handle firmly against the force you will feel when you release the trigger B latch and move the latch handle.

6) Move the handle to the left to relieve the preload on trigger B.

7) Slide trigger B away from the handle pivot points.

8) Move the handle from the vertical to the horizontal position.

NOTE: This is the release stroke.

9) Make sure the latch hook is disengaged from the T-bolt receiver.

10) Put the v-band latch in the stowed position.

SUBTASK 78-31-00-010-041-H01

(10) Only open the left side thrust reverser at this time.

NOTE: Do not open the right thrust reverser with a person in the fan duct. The PDOS system can not open the thrust reverser with the weight of a person or the platform blocks in the fan duct.

(a) Refer to this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

NOTE: You can use the power method, manual method, hand pump method or the sling method to open the left side thrust reverser.

SUBTASK 78-31-00-090-007-H01

(11) Climb out of the fan duct of the right side thrust reverser and remove the access platform or equivalent equipment.

NOTE: The PDOS is not designed to open the thrust reverser with additional weight.

SUBTASK 78-31-00-090-008-H01

(12) Remove the protective mat, STD-585 in the translating sleeve.

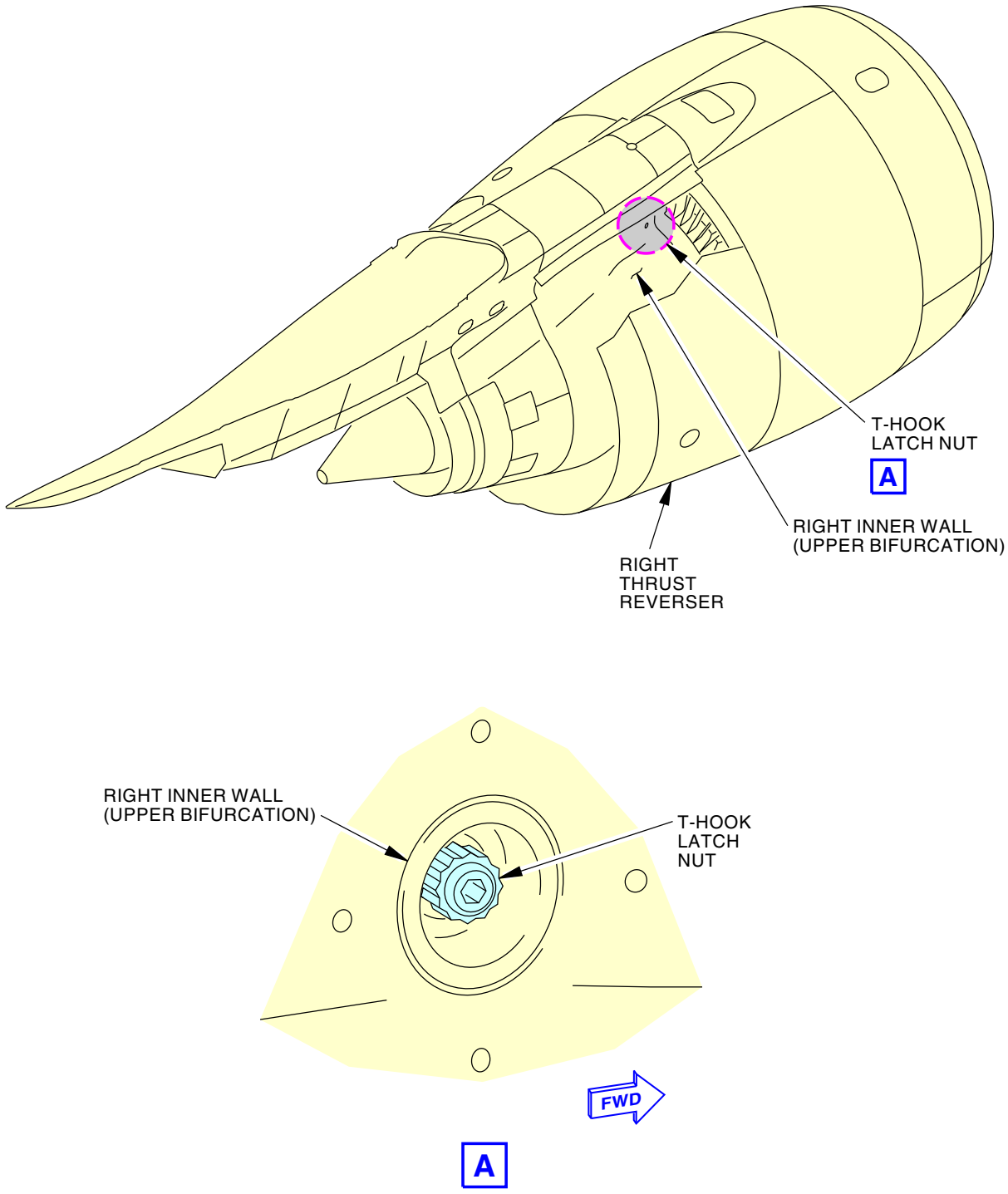
SUBTASK 78-31-00-010-035-H01

(13) Open the right thrust reverser with the power method, manual method, hand pump method or the sling method.

(a) Refer to this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Manual Operation of a Damaged T-Hook Latch
Figure 225/78-31-00-990-831-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-980-804-H00

22. Operation of a Damaged T-Hook Latch, Gearbox, Cable or Handle to Close the Thrust Reverser

(Figure 225)

A. General

(1) This task gives the procedure to operate a damaged T-hook latch, gearbox or cable when you try to close the thrust reverser. The nut to operate the T-hook is in the fan duct at the upper bifurcation inner wall in the right side thrust reverser.

(2) You can use the wrench, SPL-14049 (which is eight feet long) to reach the T-hook latch.

(3) If the wrench, SPL-14049 is not available, you will need a 0.25 in. (6.35 mm) T-handled allen wrench or a long allen wrench to open the T-hook latch. You will need to climb into the fan duct to access the T-hook latch.

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-14049	Wrench - Extended, Thrust Reverser T-Hook Latch Part #: J78028-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-1048	Stepladder - 6 foot (1.83m)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

E. Operate the Damaged T-Hook Latch to Close The Thrust Reverser - With the 8 foot Long T-Hook Tool

SUBTASK 78-31-00-410-055-H00

(1) Only close the right side thrust reverser at this time.

(a) Refer to this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

NOTE: You can use the power method, manual method, hand pump method or the sling method to close the right side thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-940-003-H00

(2) Place a 6 foot (1.83m) stepladder, STD-1048 behind the engine, and stand on the ladder so that you can reach up inside the thrust reverser with the wrench, SPL-14049.

SUBTASK 78-31-00-410-056-H00

(3) Put the wrench, SPL-14049 into the end of the T-hook.

NOTE: The center of the T-hook shaft has a hex wrench feature for the allen wrench.

SUBTASK 78-31-00-410-057-H00

(4) Turn the wrench clockwise to turn the T-hook to the vertical position so that it can engage the receiver on the left side thrust reverser, maintain the T-hook in the vertical position.

SUBTASK 78-31-00-410-058-H00

(5) Close the left thrust reverser with the power method, manual method, hand pump method or the sling method.

(a) Refer to this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

SUBTASK 78-31-00-410-059-H00

(6) Engage and close the latches on the thrust reverser in the sequence that follows (Figure 201).

NOTE: The latch location numbers are shown in brackets.

NOTE: Close the V-band latch [14] first. Close the No.1 tension latch [13]. Close the No.3 [10], No. 4 [9] and No.5 [8] centerline tension latches from forward to aft. Close the aft cowl centerline tension latches [7], [6] and [5] from forward to aft. Close the aft cowl deflection limiter latches from forward to aft [3], [4] then [2] and [1]. Close the No.2 centerline tension latch [11] to engage the lower interlock pin. Engage the upper T-hook latch [12] last.

NOTE: The No.1 tension latch and the No.5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the thrust reverser sleeve.

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

(b) Close the v-band latch [14].

1) Open the v-band latch handle from the stowed position.

CAUTION

MAKE SURE THAT THE HOOK IN THE V-BAND LATCH ASSEMBLY IS CORRECTLY ENGAGED IN THE T-BOLT RECEIVER BEFORE YOU CLOSE THE V-BAND LATCH. DAMAGE TO THE HOOK OR THE T-BOLT RECEIVER ON THE V-GROOVE LATCH BAND CAN OCCUR.

2) Push the latch hook upward to engage the hook in the T-hook receiver.

WARNING

DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(WARNING PRECEDES)

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

3) With the handle horizontal to the right side of the latch, pull the handle down to the vertical position until trigger B latch engages.

NOTE: This is the take-up stroke.

4) Pull down on the trigger A to release the lock pin in the handle.

5) Move the handle up from the vertical to the horizontal position until the lock pin engages.

NOTE: The force to lock and stow the v-band latch is 50- 55 pounds (222-245 newtons).

(c) Close the No.1 tension latch [13].

1) Engage the No.1 latch T-bolt into the latch keeper hook.

2) Move the latch handle upward to the closed position.

(d) Close the No.3 tension latch [10], the No.4 tension latch [9] and then the No.5 tension latch [8].

NOTE: Close the latches from forward to aft. Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.

2) Engage the latch hook on the latch bolt.

3) Push the latch handle to the closed position.

(e) Close the three aft cowl centerline latches [7], [6] and [5] from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.

2) Engage the latch hook on the latch keeper eyebolt.

3) Push the latch handle to the closed position.

(f) Close the four deflection limiter latches [3], [4] then [2] and [1] on the aft cowl from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.

2) Engage the latch hook on the tension strap keeper.

3) Push the latch handle to the closed position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(g) Close the No.2 tension latch [11] to engage the lower interlock pin.

NOTE: When you close the No. 2 tension latch, the body of the latch hook pushes the bracket assembly which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) If it is necessary, push the lower interlock pin upward to engage the serrated fitting on the lower bifurcation.
2) Open the latch handle away from the body of the latch hook.
3) Engage the latch hook on the latch bolt.
4) Push the latch handle to the closed position.

(h) Close the upper bifurcation T-hook latch [12] on the right side thrust reverser.

1) Turn the wrench counter-clockwise to turn the T-hook to the horizontal position to engage the receiver on the left side thrust reverser.
2) Push the T-handle in toward the latch access door hinges and push the T-hook latch handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

NOTE: Push the T-handle in toward the latch access door hinges while you push the handle up to get past the release mechanism. The force to push the T-handle to the closed position is not more than 35 pounds (157 newtons). Do not turn or twist the T-handle. You can damage the T-handle or the push-pull cable.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

SUBTASK 78-31-00-940-004-H00

(7) Remove the wrench, SPL-14049 from the end of the T-hook.

SUBTASK 78-31-00-940-005-H00

(8) Remove the ladder.

SUBTASK 78-31-00-410-060-H00

(9) Close the latch beam access doors on the applicable engine:

Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-00-860-102-H00

(10) Remove the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-00-410-061-H00

(11) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Operate the Damaged T-Hook Latch to Close The Thrust Reverser - Without the 8 foot Long T-Hook Tool

SUBTASK 78-31-00-410-045-H00

(1) Only close the right side thrust reverser at this time.

NOTE: Do not close the left thrust reverser with a person in the fan duct. The PDOS system can not close the thrust reverser with the weight of a person or the platform blocks in the fan duct.

(a) Refer to this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

NOTE: You can use the power method, manual method, hand pump method or the sling method to close the right side thrust reverser.

SUBTASK 78-31-00-490-013-H00

CAUTION

PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(2) Install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser to get access to the T-hook.

(a) Wear boot socks over your work boots.

SUBTASK 78-31-00-490-014-H00

CAUTION

MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(3) Install access platform or equivalent equipment to get access to the upper bifurcation of the inner wall.

NOTE: Access platform R78001 which is used to access blocker doors and blocker door drag links for maintenance can not be used. The R78001 platform blocks require you to extend the thrust reverser and fit into the spaces where the blocker doors are closed. The access hole for the T-hook is forward of the open blocker doors.

(a) If an access platform is not available, you can make an access platform from a stack of large, solid, styrofoam blocks which are a local procurement.

1) Make sure the size of the styrofoam blocks are of sufficient width and thickness so that you can wedge the blocks into the fan duct.

2) Make sure the size of the styrofoam blocks are of sufficient length so that the blocks are stable when you stack the blocks and stand on the blocks.

3) Cut or trim the blocks as it is necessary to make the blocks fit in the fan duct.

4) Make sure the surface of the blocks are clean to prevent damage to the composite inner walls.

(b) If you do not have an access platform, try these steps to use your body to get to the top of the fan duct.

1) Push your back against the inner wall of the translating sleeve and push on the opposite side of the inner duct wall with your legs.

2) Use your hands and arms to help you move or slide your back upward a small amount while you maintain the position of your feet.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) One at a time, move your legs upward a small amount as you maintain the pressure on your back.

4) Continue to repeat these steps until you get to the top of the fan duct.

5) Continue to maintain the pressure on your back with your legs as you work on the T-hook nut.

SUBTASK 78-31-00-410-046-H00

CAUTION

DO NOT PULL OR PUT YOUR WEIGHT ON THE DRAG LINKS. YOU WILL CAUSE DAMAGE TO THE DRAG LINKS.

(4) Climb into the fan duct of the right side thrust reverser and climb towards the forward part of the upper bifurcation.

SUBTASK 78-31-00-410-047-H00

(5) Put the 0.25 in. (6.35 mm) T-handled allen wrench or 0.25 in. (6.35 mm) standard allen wrench into the end of the T-hook.

NOTE: The center of the T-hook shaft has a hex wrench feature for the allen wrench.

SUBTASK 78-31-00-410-048-H00

(6) Turn the wrench clockwise to turn the T-hook to the vertical position so that it can engage the receiver on the left side thrust reverser, maintain the T-hook in the vertical position.

SUBTASK 78-31-00-410-049-H00

(7) Close the left thrust reverser with the power method, manual method, hand pump method or the sling method.

(a) Refer to this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

SUBTASK 78-31-00-410-050-H00

(8) Engage and close the latches on the thrust reverser in the sequence that follows (Figure 201).

NOTE: The latch location numbers are shown in brackets.

NOTE: Close the V-band latch [14] first. Close the No.1 tension latch [13]. Close the No.3 [10], No. 4 [9] and No.5 [8] centerline tension latches from forward to aft. Close the aft cowl centerline tension latches [7], [6] and [5] from forward to aft. Close the aft cowl deflection limiter latches from forward to aft [3], [4] then [2] and [1]. Close the No.2 centerline tension latch [11] to engage the lower interlock pin. Engage the upper T-hook latch [12] last.

NOTE: The No.1 tension latch and the No.5 tension latch are installed on the left side thrust reverser. The No.2, No.3 and No.4 tension latches are installed on the right side thrust reverser. The No.5 tension latch has a latch handle that has the same contour shape as the thrust reverser sleeve.

(a) Make sure that you press the left and right PDOS DOWN button for 10-30 seconds to relieve any pressure in each PDOS actuator that can pre-load the upper T-hook latch, the lower interlock pin and the tension latches.

(b) Close the v-band latch [14].

1) Open the v-band latch handle from the stowed position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION MAKE SURE THAT THE HOOK IN THE V-BAND LATCH ASSEMBLY IS CORRECTLY ENGAGED IN THE T-BOLT RECEIVER BEFORE YOU CLOSE THE V-BAND LATCH. DAMAGE TO THE HOOK OR THE T-BOLT RECEIVER ON THE V-GROOVE LATCH BAND CAN OCCUR.

2) Push the latch hook upward to engage the hook in the T-bolt receiver.

WARNING DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

3) With the handle horizontal to the right side of the latch, pull the handle down to the vertical position until trigger B latch engages.

NOTE: This is the take-up stroke.

4) Pull down on the trigger A to release the lock pin in the handle.

5) Move the handle up from the vertical to the horizontal position until the lock pin engages.

NOTE: The force to lock and stow the v-band latch is 50- 55 pounds (222-245 newtons).

(c) Close the No.1 tension latch [13].

1) Engage the No.1 latch T-bolt into the latch keeper hook.

2) Move the latch handle upward to the closed position.

(d) Close the No.3 tension latch [10], the No.4 tension latch [9] and then the No.5 tension latch [8].

NOTE: Close the latches from forward to aft. Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.

2) Engage the latch hook on the latch bolt.

3) Push the latch handle to the closed position.

(e) Close the three aft cowl centerline latches [7], [6] and [5] from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.

2) Engage the latch hook on the latch keeper eyebolt.

3) Push the latch handle to the closed position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Close the four deflection limiter latches [3], [4] then [2] and [1] on the aft cowl from forward to aft.

NOTE: Close the latches from forward to aft. Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) Open the latch handle away from the body of the latch hook.
2) Engage the latch hook on the tension strap keeper.
3) Push the latch handle to the closed position.

(g) Close the No.2 tension latch [11] to engage the lower interlock pin.

NOTE: When you close the No. 2 tension latch, the body of the latch hook pushes the bracket assembly which moves the interlock pin upward against the spring load to engage the pin in the lower bifurcation serrated fitting.

NOTE: Movement of the latch handle to the closed position will apply the latch hook load. The secondary lock will lock the latch handle to the hook. The force to close the tension latch is 45-55 pounds (200-245 newtons).

1) If it is necessary, push the lower interlock pin upward to engage the serrated fitting on the lower bifurcation.
2) Open the latch handle away from the body of the latch hook.
3) Engage the latch hook on the latch bolt.
4) Push the latch handle to the closed position.

(h) Close the upper bifurcation T-hook latch [12] on the right side thrust reverser.

1) Turn the wrench counter-clockwise to turn the T-hook to the horizontal position to engage the receiver on the left side thrust reverser.
2) Push the T-handle in toward the latch access door hinges and push the T-hook latch handle up to retract the T-handle into the handle body to turn the T-hook to the horizontal (closed) position.

NOTE: Push the T-handle in toward the latch access door hinges while you push the handle up to get past the release mechanism. The force to push the T-handle to the closed position is not more than 35 pounds (157 newtons). Do not turn or twist the T-handle. You can damage the T-handle or the push-pull cable.

NOTE: The T-hook latch handle is adjacent to the No. 2 tension latch.

SUBTASK 78-31-00-410-052-H00

(9) Remove the 0.25 in. (6.35 mm) T-handled allen wrench or 0.25 in. (6.35 mm) standard allen wrench from the end of the T-hook.

SUBTASK 78-31-00-090-010-H00

(10) Climb out of the fan duct of the right side thrust reverser and remove the access platform or equivalent equipment.

SUBTASK 78-31-00-090-011-H00

(11) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-00-410-053-H00

(12) Close the latch beam access doors on the applicable engine:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-00-440-022-H00

(13) Remove the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-00-440-023-H00

(14) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYSTEM - ADJUSTMENT/TEST

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has these tasks:

(1) Thrust Reverser - Operational Test (Selection)

(2) Thrust Reverser - Operational Test (Engine Not In Operation)

(3) Thrust Reverser - Operational Test (Engine In Operation)

(4) Thrust Reverser Actuator Locks - Operational Test

(5) Thrust Reverser Sync Lock - Operational Test

(6) Thrust Reverser Proximity Sensors - Operational Test

(7) Thrust Reverser Hydraulic Actuator Rod End - Adjustment

TASK 78-31-00-710-820-H00

2. Thrust Reverser - Operational Test (Selection)

A. Procedure

SUBTASK 78-31-00-710-014-H00

(1) Do these tasks to test the thrust reverser:

(a) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(b) Do this task: Thrust Reverser Actuator Locks - Operational Test, TASK 78-31-00-710-803-H01.

(c) Do this task: Thrust Reverser Sync Lock - Operational Test, TASK 78-31-00-710-804-H01.

(d) Do this task: Thrust Reverser Proximity Sensors - Operational Test, TASK 78-31-00-710-805-H01.

——— END OF TASK ———

TASK 78-31-00-710-821-H00

3. Thrust Reverser - Operational Test (Engine Not In Operation)

(Figure 501)

A. General

(1) The operational test is used to verify thrust reverser maintenance or for fault isolation that the thrust reverser operates correctly.

(2) Each thrust reverser's hydraulic control system, the isolation valve and the directional control valve, are common to both sleeves. The sleeves should move together when deploy or retract hydraulic pressure is commanded.

(3) Each sleeve actuation system, the hydraulic actuators, the sync shafts and sync locks, is independent of the other sleeve. Both sleeves should operate smoothly when deploy or retract hydraulic pressure is supplied.

(4) If a hydraulic system line or a component for the thrust reverser actuation system (TRAS) was disconnected, you must do the Thrust Reverser - Operational Test (Engine Not In Operation).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

B. References

Reference	Title
24-22-00-860-805	Supply Electrical Power (P/B 201)
24-22-00-860-806	Remove Electrical Power (P/B 201)
27-61-00-040-801	Spoiler Deactivation (P/B 201)
27-61-00-440-801	Spoiler Activation (P/B 201)
27-61-00-740-802	Speedbrake Lever Position Transducer Test (P/B 501)
27-62-00-710-801	Auto Speedbrake Control System - Operational Test (P/B 501)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
31-61-00-800-804	Showing a Maintenance Page (P/B 201)
31-61-00-800-813	Showing Status Messages (P/B 201)
45-10-00-740-818	How to Find Active or Latched Maintenance Messages in One ATA System (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-36-03-400-801-H01	Thrust Reverser Position Transducer (RVDT) Installation (P/B 401)

C. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Procedure

SUBTASK 78-31-00-040-025-H00

WARNING DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS, OR MOVE ALL PERSONNEL AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Spoiler Deactivation, TASK 27-61-00-040-801.

SUBTASK 78-31-00-861-002-H00

(2) Do this task:Supply Electrical Power, TASK 24-22-00-860-805.

SUBTASK 78-31-00-860-082-H00

(3) Set the L(R) EEC MODE switch on the P5 Overhead Panel to the NORM position.

SUBTASK 78-31-00-860-083-H00

(4) Make sure the L (R) FUEL CONTROL switch on the panel P10 is in the CUTOFF position.

SUBTASK 78-31-00-860-075-H00

(5) Put the ADIRU switch on panel P5 to the ON position.

SUBTASK 78-31-00-860-084-H00

(6) Put the applicable EEC MAINT L(R) ENG POWER switch on the overhead maintenance panel, P61, in the TEST position.

SUBTASK 78-31-00-860-079-H00

(7) Make sure that the L(R) START/IGNITION switch on the P5 Overhead Panel is in the NORM position.

SUBTASK 78-31-00-860-080-H00

(8) Make sure that the L(R) A/T ARM switch on the P55 Glareshield Panel is in the OFF position.

SUBTASK 78-31-00-860-081-H00

(9) Make sure the AUTOSTART switch on the P5 Overhead Panel is in the OFF position.

SUBTASK 78-31-00-860-085-H00

(10) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-00-860-086-H00

(11) Make sure the reverse thrust levers are in the fully forward and down position.

SUBTASK 78-31-00-860-087-H00

(12) Make sure no thrust reverser EICAS advisory or status messages are shown.

(a) Do this task: Showing Status Messages, TASK 31-61-00-800-813.

(b) Erase the thrust reverser related EICAS status messages and make sure that they are not shown again.

1) Do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

SUBTASK 78-31-00-860-088-H00

(13) Make sure no active thrust reverser maintenance messages are shown on the Existing Faults Display on the MAT.

(a) Do this task: How to Find Active or Latched Maintenance Messages in One ATA System, TASK 45-10-00-740-818.

(b) Clear all inactive thrust reverser maintenance messages.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-710-015-H00

(14) Make sure there is no REV indication on the EICAS display.

SUBTASK 78-31-00-710-016-H00

(15) Select EPCS Page 1 from the EICAS maintenance pages.

(a) Do this task: Showing a Maintenance Page, TASK 31-61-00-800-804.

(b) Make sure the Left Engine (Right Engine) values T/R L and T/R R are between -7.0 through +7.0 percent.

(c) If the indications are not in the limits, adjust the RVDT.

1) Reference this task: Thrust Reverser Position Transducer (RVDT) Installation, TASK 78-36-03-400-801-H01

SUBTASK 78-31-00-010-050-H00

(16) For the right fan cowl panel on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-860-078-H00

CAUTION

DO NOT EXTEND THE THRUST REVERSER SLEEVE IF THE THRUST REVERSER IS OPEN. DAMAGE TO THE THRUST REVERSER AND ADJACENT STRUCTURES CAN OCCUR.

(17) Make sure the thrust reverser is closed and latched.

SUBTASK 78-31-00-860-097-H00

(18) Make sure that the left (right) thrust reverser is in the fully stowed position.

SUBTASK 78-31-00-863-004-H00

(19) Pressurize the applicable (left or right) hydraulic system and reservoir.

(a) Do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-31-00-860-077-H00

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(20) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-026-H00

(21) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-981-005-H00

(22) You must use two people to do the steps that follow in the correct sequence to extend the thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING KEEP ALL PERSONNEL AND EQUIPMENT AWAY FROM THE AREA THAT IS AFT OF THE APPLICABLE THRUST REVERSER. IF YOU IGNORE THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER EXTENDS.

(a) For the first person at the engine, push and hold the thrust reverser test enable switch to extend the thrust reverser sleeves (Figure 501).

NOTE: Release of the test enable switch will cause the EEC to immediately close the isolation valve and stop the movement of the thrust reverser. No movement of the thrust reverser can occur unless the test enable switch is pushed and held.

NOTE: If the thrust reverser sleeves stop before they fully extend, you will have to unlock the sync locks to continue to extend the thrust reverser sleeves.

(b) For the second person in the flight compartment, move the applicable reverse thrust lever up and aft until it is stopped by the interlock actuator.

NOTE: The two thrust reverser sleeves do move together but there can be some sleeve mismatch during the deploy movement. If both sleeves deploy within the required time, then the sleeve mismatch during the deploy movement is acceptable.

(c) Make sure the thrust reverser sleeves move together and operate smoothly.

(d) Release the thrust reverser test enable switch after the thrust reverser sleeves are fully extended.

(e) Make sure the EICAS message REV amber comes on while the thrust reverser sleeves are in transit and changes to REV green when the thrust reverser sleeves are fully extended.

(f) Make sure the time for the thrust reverser sleeves to extend is not more than 6 seconds.

(g) Install a DO-NOT-OPERATE tag on the reverse thrust lever.

SUBTASK 78-31-00-710-018-H00

(23) On the EPCS Page 1, make sure the Left Engine (Right Engine) T/R L and T/R R are between 92.0 through 108.0 percent.

(a) If the indications are not in the limits, adjust the RVDT.

1) Reference this task: Thrust Reverser Position Transducer (RVDT) Installation, TASK 78-36-03-400-801-H01

SUBTASK 78-31-00-860-091-H00

(24) Remove the DO-NOT-OPERATE tag from the reverse thrust lever.

SUBTASK 78-31-00-860-092-H00

(25) Move the reverse thrust lever to the full reverse thrust position to make sure the interlock actuator is released.

SUBTASK 78-31-00-860-093-H00

(26) Install the DO-NOT-OPERATE tag on the reverse thrust lever again.

SUBTASK 78-31-00-710-021-H00

(27) Make sure that there are no EICAS advisory or status messages.

NOTE: ENG REVERSER L(R) EICAS advisory message.

SUBTASK 78-31-00-710-020-H00

(28) Make sure no active thrust reverser maintenance messages are shown on the Existing Faults Display on the MAT.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Wait for 60 seconds after the thrust reverser has deployed to make sure that these maintenance messages are not active.

1) Left thrust reverser: 78-00011 and 78-00071, or 78-00061.

2) Right thrust reverser: 78-00012 and 78-00072, or 78-00062.

3) If the maintenance messages for the left thrust reverser 78-00011 and 78-00071 (right thrust reverser 78-00012 and 78-00072) are active and the ENG REVERSER L(R) EICAS Advisory message is also shown, then make sure that the Sync Lock Switch and Leaf Spring installation operation is correct.

4) If the maintenance messages for the left thrust reverser 78-00011 and 78-00071 (right thrust reverser 78-00012 and 78-00072) are active and the ENG REVERSER L(R) EICAS Advisory message is not shown, you can ignore them if they are not active when the reverser is stowed.

5) If the maintenance messages for the left thrust reverser 78-00081 or 78-00091 (right thrust reverser 78-00082 or 78-00092) are active and the applicable sync lock unlock handle is in the locked position, you can be ignore them.

NOTE: These maintenance messages can occur when using the ACMP for hydraulic pressure.

(b) Clear all inactive thrust reverser maintenance messages.

SUBTASK 78-31-00-981-006-H00

(29) You must use two people to do the steps that follow in the correct sequence to retract the thrust reverser.

NOTE: The first person must push and hold the test enable switch before the second person moves the reverse thrust lever to the fully forward and down position. While the first person holds the test enable switch, the second person then moves the reverse thrust lever to the fully forward and down position. The first person must not release the test enable switch until 15 to 19 seconds after the thrust reverser is fully retracted to make sure the sync locks engage correctly. If the thrust reverser sleeves stop before they fully retract, you will have to unlock the sync locks to continue to retract the thrust reverser sleeves.

WARNING KEEP ALL PERSONNEL AWAY FROM THE THRUST REVERSER SLEEVE. THE THRUST REVERSER SLEEVE WILL RETRACT WHEN YOU MOVE THE TEST ENABLE SWITCH. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) First person at the engine, push and hold the test enable switch until 15 to 19 seconds after the thrust reverser is fully retracted.

NOTE: Do not release the test enable switch until 15 to 19 seconds after the thrust reverser is fully retracted to make sure the sync locks engage correctly. If you hold the test enable switch for more than 20 seconds, it will cause annunciation of the ENG REVERSER status and advisory messages.

1) Make sure the thrust reverser sleeves move together and operate smoothly.

2) Release the thrust reverser test enable switch 15 to 19 seconds after the thrust reverser sleeves are fully retracted.

(b) Second person in the flight compartment, remove the DO-NOT-OPERATE tag from the reverse thrust lever and move it to the fully forward and down position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Make sure the EICAS message changes from REV green to REV amber while the thrust reverser sleeves are in transit and goes off when the thrust reverser sleeves are fully retracted.

2) Make sure the time for the thrust reverser sleeves to retract is not more than 8 seconds.

3) Install the DO-NOT-OPERATE tag on the reverse thrust lever again.

SUBTASK 78-31-00-860-095-H00

(30) On the EPCS Page 1, make sure the Left Engine (Right Engine) T/R L and T/R R are between -7.0 through +7.0 percent.

(a) If the indications are not in the limits, adjust the RVDT.

1) Reference this task: Thrust Reverser Position Transducer (RVDT) Installation, TASK 78-36-03-400-801-H01

SUBTASK 78-31-00-710-019-H00

(31) Make sure no thrust reverser EICAS status messages are shown.

SUBTASK 78-31-00-860-096-H00

(32) Make sure no active thrust reverser maintenance messages are shown on the Existing Faults display on the MAT.

(a) Do this task: How to Find Active or Latched Maintenance Messages in One ATA System, TASK 45-10-00-740-818.

(b) Clear all inactive thrust reverser maintenance messages.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-410-054-H00

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-440-024-H00

(2) Do this task: Spoiler Activation, TASK 27-61-00-440-801.

SUBTASK 78-31-00-440-025-H00

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-00-860-076-H00

(4) If you see the AUTO SPEEDBRAKE EICAS message, do one of these tasks to clear the EICAS message.

(a) Do this task: Speedbrake Lever Position Transducer Test, TASK 27-61-00-740-802, or

(b) Do this task: Auto Speedbrake Control System - Operational Test, TASK 27-62-00-710-801.

SUBTASK 78-31-00-860-090-H00

(5) Remove the DO-NOT-OPERATE tags from the thrust levers.

SUBTASK 78-31-00-860-089-H00

(6) Put the applicable EEC MAINT L(R) ENG POWER switch on the P61 panel in the NORM position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-860-074-H00

(7) Put the ADIRU switch on panel P5 to the OFF position.

SUBTASK 78-31-00-864-007-H00

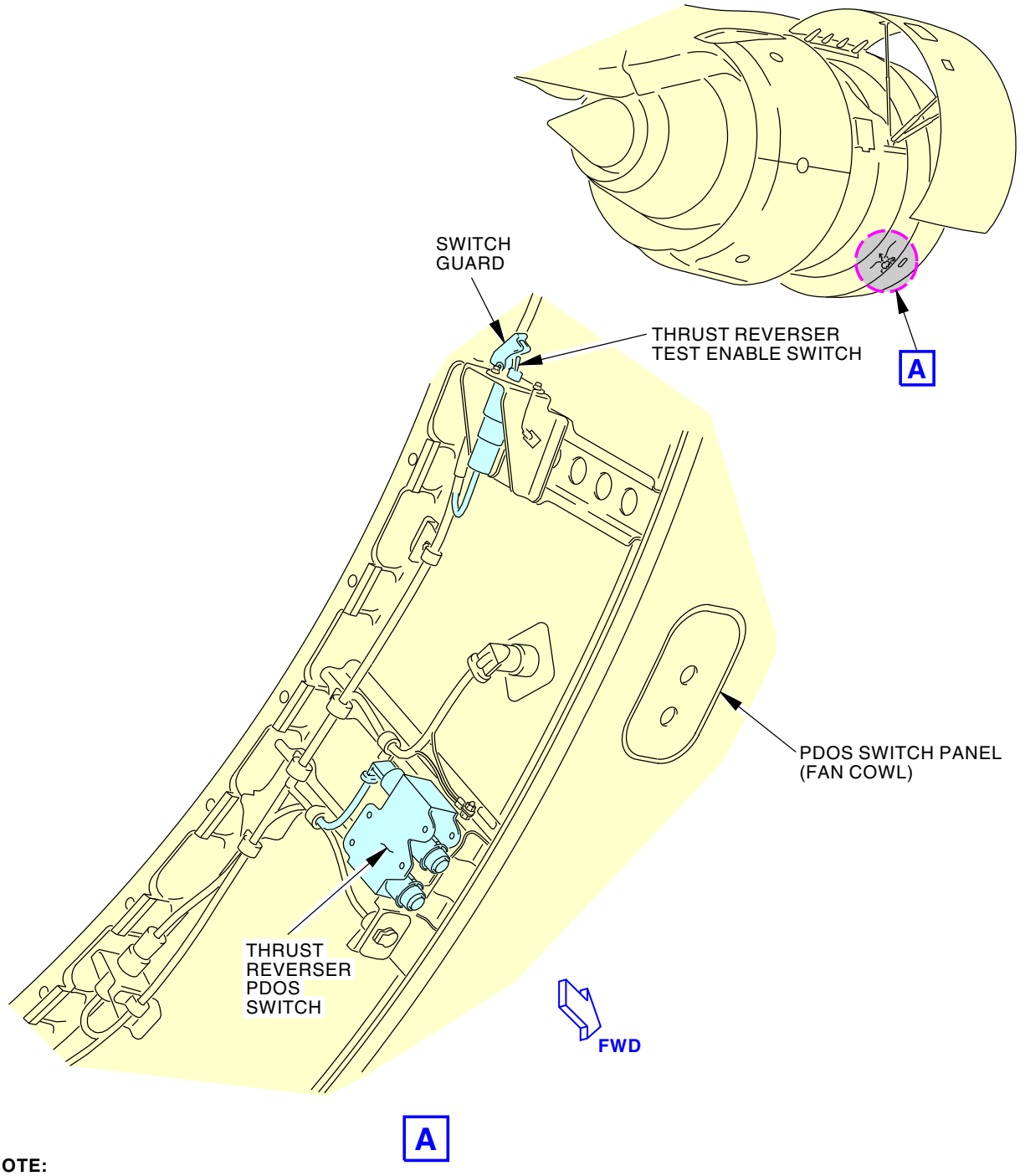
(8) If hydraulic power is not necessary, do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-31-00-862-002-H00

(9) If electrical power is no longer necessary, do this task: Remove Electrical Power, TASK 24-22-00-860-806.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

THE RIGHT SIDE IS SHOWN, THE LEFT SIDE IS EQUIVALENT FOR THE PDOS SWITCHES. THE TEST ENABLE SWITCH IS ON THE RIGHT SIDE ONLY.

M07267 S0004286240_V2

Thrust Reverser Test Enable Switch
Figure 501/78-31-00-990-803-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-710-823-H00

4. Thrust Reverser - Operational Test (Engine In Operation)

A. General

(1) This procedure does the Thrust Reverser - Operational Test (Engine In Operation).

B. References

Reference	Title
71-00-00-800-802-H01	Engine Operation Limits (P/B 201)
71-00-00-800-835-H00	Engine Start (Selection) (P/B 201)
71-00-00-800-837-H00	Usual Engine Stop (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)

C. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
411	Engine, Left
421	Engine, Right

D. Procedure

SUBTASK 78-31-00-860-103-H00

(1) Make sure all the cascade segments are installed correctly in each thrust reverser sleeve.

SUBTASK 78-31-00-860-104-H00

(2) Make sure the thrust reversers are closed and latched (TASK 78-31-00-410-816-H00).

SUBTASK 78-31-00-860-105-H00

(3) Make sure the fan cowl panels are closed and latched (TASK 71-11-04-410-814-H00).

SUBTASK 78-31-00-860-106-H00

(4) Do this task: Engine Start (Selection), TASK 71-00-00-800-835-H00.

SUBTASK 78-31-00-710-026-H00

(5) Operate the engine at minimum idle.

(a) Make sure the hydraulic system is pressurized to 3000 ±300 psi (20684 ±2068 kPa).

(b) Make a record of the N1 RPM.

SUBTASK 78-31-00-710-027-H00

(6) Quickly move the reverse thrust lever up and aft until it is stopped by the interlock actuator (idle detent position).

NOTE: If the thrust reverser sleeves stop before they fully extend, you will have to unlock the sync locks to continue to extend the thrust reverser sleeves.

(a) Hold the reverse thrust lever at this position.

(b) Use the EICAS indication REV to measure the time for the thrust reverser to fully extend.

(c) Make sure that the time for the EICAS indication REV to change from amber to green is not more than 3 seconds.

(d) Make sure the N1 RPM is the same value as the N1 RPM at the minimum idle.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Move the reverse thrust lever aft past the idle detent to make sure that the interlock actuator released.

NOTE: If you can move the reverse thrust lever aft, the interlock actuator released.

1) Do not go more than the maximum operation limits for reverse thrust in the static condition (TASK 71-00-00-800-802-H01).

(f) Move the reverse thrust lever to the idle detent.

SUBTASK 78-31-00-710-028-H00

(7) Move the reverse thrust lever to the fully forward and down position.

NOTE: If the thrust reverser sleeves stop before they fully retract, you will have to unlock the sync locks to continue to retract the thrust reverser sleeves.

(a) Use the EICAS indication REV to measure the time for the thrust reverser to fully retract.

(b) Make sure that the time for the EICAS indication REV to go off is not more than 5 seconds.

SUBTASK 78-31-00-860-107-H00

(8) Do this task: Usual Engine Stop, TASK 71-00-00-800-837-H00.

——— END OF TASK ———

TASK 78-31-00-710-803-H01

5. Thrust Reverser Actuator Locks - Operational Test

(Figure 502/Figure 503)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is to make sure that the actuator locks on the thrust reverser are serviceable:

(a) The lock on the center actuator.

(b) The lock on the lower actuator.

(2) To make sure a lock is serviceable, try to manually extend the thrust reverser sleeve with one actuator lock released and the sync lock released.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
45-10-00-740-808	How to Use the Central Maintenance Computing System (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205
STD-997	Wrench - Speed, 3/8 Inch Square Drive

D. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
411	Engine, Left
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
421	Engine, Right
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Prepare for the Procedure

SUBTASK 78-31-00-860-052-H01

(1) Make sure the FUEL CONTROL switch is in the CUTOFF position.

SUBTASK 78-31-00-860-053-H01

(2) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-00-860-054-H01

(3) Make sure the reverse thrust levers are in the fully forward and down position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-00-865-007-H01

(4) For the applicable engine, open the applicable circuit breakers and install safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-010-027-H01

(5) Open the strut hydraulic bay access door for the applicable isolation valve.

(a) Do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(b) Open these access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-040-019-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO PREVENT THRUST REVERSER MOVEMENT. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Do these tasks in this sequence to prevent the hydraulic operation of the thrust reverser (Figure 502):

(a) Install the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the shutoff valve spool on the isolation valve:

1) Push the shutoff valve spool in.

2) Install the lock pin through the hole in the shutoff valve body to hold the shutoff valve spool in the valve.

3) Install the hitch pin through the end of the lock pin.

(b) Install the lock pin without the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the bypass valve handle and the clevis on the isolation valve:

1) Turn the bypass valve handle to align the hole with the clevis.

2) Install the lock pin through the clevis and bypass valve handle.

3) Install the hitch pin through the end of the lock pin.

(c) Make sure the red streamer shows out of the access door.

SUBTASK 78-31-00-860-055-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(7) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-020-H01

(8) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-010-028-H01

(9) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Procedure

SUBTASK 78-31-00-980-005-H01

(1) Put the center actuator to the unlocked position (Figure 503):

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push the lock button in while you release the manual unlock handle.

(c) Make sure the manual unlock handle stays in the unlocked position.

SUBTASK 78-31-00-980-006-H01

(2) Put the lower actuator to the unlocked position:

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push the lock button in while you release the manual unlock handle.

(c) Make sure the manual unlock handle stays in the unlocked position.

SUBTASK 78-31-00-980-007-H01

(3) Put the sync lock to the unlocked position:

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push the lock pin while you release the manual unlock handle.

(c) Make sure the manual unlock handle stays in the unlocked position.

SUBTASK 78-31-00-980-008-H01

(4) Manually extend (deploy) the thrust reverser sleeve:

(a) Install a 3/8 inch square drive speed wrench, STD-997 into the manual drive unit on the sync lock.

NOTE: It is OK to use a 3/8 inch pneumatic wrench (nut runner).

(b) Push-in and continue to push-in the 3/8-inch square drive while you turn the drive to extend the thrust reverser sleeve.

NOTE: You must push-in the 3/8-inch square drive to engage the pinion gear with the bevel gear in the sync lock while you turn the drive.

NOTE: The pinion gear in the manual drive unit is spring loaded to disengage from an internal sync lock bevel gear.

NOTE: The clutch in the manual drive unit has a torque limit of 125-130 inch-pounds (14.1-14.7 Newton-meters) to prevent damage to the sync shaft system.

1) Turn the 3/8 inch square drive clockwise to extend (deploy) the left thrust reverser sleeve.

2) Turn the 3/8 inch square drive counter-clockwise to extend (deploy) the right thrust reverser sleeve.

(c) Make sure the thrust reverser sleeve operates smoothly.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-980-009-H01

CAUTION

DO NOT TRY TO MOVE THE MANUAL UNLOCK HANDLES TO THE LOCKED POSITION UNTIL YOU RETRACT THE THRUST REVERSER SLEEVE. DAMAGE TO EQUIPMENT CAN OCCUR IF YOU DO NOT RETRACT THE THRUST REVERSER SLEEVE FIRST.

(5) Release the manual unlock handles on the center actuator to the unlocked position:

(a) Move the manual unlock handle to the fully unlocked position to release the lock button.

(b) Make sure the lock button moves out to their usual position.

SUBTASK 78-31-00-980-020-H00

(6) Release the manual unlock handles on the lower actuator to the unlocked position:

(a) Move the manual unlock handle to the fully unlocked position to release the lock button.

(b) Make sure the lock button moves out to their usual position.

SUBTASK 78-31-00-980-010-H01

(7) Manually retract (stow) the thrust reverser sleeve until the manual unlock handles on the center actuator and lower actuator move to the locked position:

(a) Install a 3/8 inch square drive speed wrench, STD-997 into the manual drive unit in the sync lock.

NOTE: It is OK to use a 3/8 inch pneumatic wrench (nut runner).

(b) Push the 3/8-inch square drive in while you turn the manual drive to retract (stow) the thrust reverser sleeve.

NOTE: You must push-in the 3/8-inch square drive to engage the pinion gear with the bevel gear in the sync lock while you turn the drive.

NOTE: The pinion gear in the manual drive unit is spring loaded to disengage from an internal sync lock bevel gear.

NOTE: The clutch in the manual drive unit has a torque limit of 125-130 inch-pounds (14.1-14.7 Newton-meters) to prevent damage to the sync shaft system.

1) Turn the 3/8 inch square drive counter-clockwise to retract (stow) the left thrust reverser sleeve.

2) Turn the 3/8 inch square drive clockwise to retract (stow) the right thrust reverser sleeve.

(c) Make sure the thrust reverser sleeve operates smoothly.

(d) Make sure the manual unlock handles on the center actuator and lower actuator move to the locked position.

SUBTASK 78-31-00-710-002-H01

(8) Do a check of the lock on the center actuator:

(a) Put the lower actuator to the unlocked position:

1) Move and hold the manual unlock handle to the unlocked position.

2) Push the lock button in while you release the manual unlock handle.

3) Make sure the manual unlock handle stays in the unlocked position.

(b) Make sure the manual unlock handle on the center actuator is in the locked position.

1) Make sure the lock button is out in the usual position.

(c) Try to manually extend (deploy) the thrust reverser sleeve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Make sure the thrust reverser sleeve does not extend (deploy).

SUBTASK 78-31-00-710-003-H01

(9) Do a check of the lock on the lower actuator:

(a) Engage the lock on the lower actuator:

1) Move the manual unlock handle to the fully unlocked position to release the lock button.

2) Make sure the lock button moves out to the usual position.

3) Make sure the manual unlock handle moves back to the usual locked position.

a) If it is necessary, turn the manual drive in the retract (stow) direction until the manual unlock handle on the lower actuator moves to the locked position.

(b) Put the center actuator to the unlocked position:

1) Move and hold the manual unlock handle to the unlocked position.

2) Push the lock button in while you release the manual unlock handle.

3) Make sure the manual unlock handle stays in the unlocked position.

(c) Try to manually extend (deploy) the thrust reverser sleeve.

1) Make sure the thrust reverser sleeve does not extend (deploy).

SUBTASK 78-31-00-980-011-H01

(10) Do the steps that follow to engage all three locks (Figure 503):

(a) Make sure the manual unlock handle on the lower actuator is in the locked position.

1) Make sure the lock button is out to the usual position.

(b) Move the manual unlock handle on the center actuator to the fully unlocked position to release the lock button.

1) Make sure the lock button moves out to the usual position.

2) Make sure the manual unlock handle moves to the locked position.

(c) If the center actuator does not return the locked position, do these steps:

1) Unlock the lower actuator.

2) Insert a 3/8 inch square drive into the manual drive unit and turn the manual drive unit in the retract (stow) direction until the center actuator locks.

3) Lock the lower actuator.

(d) Remove the 3/8 inch square drive speed wrench, STD-997 from the manual drive unit in the sync lock.

(e) Engage the sync lock:

1) Move the manual unlock handle to the fully unlocked position to release the lock pin.

2) Make sure the lock pin moves out to the usual position.

3) Make sure the manual unlock handle moves to the locked position.

4) If the sync lock does not return the locked position, it may be necessary to insert a 3/8 inch square drive into the manual drive unit and turn the manual drive unit until the sync lock locks.

SUBTASK 78-31-00-710-004-H01

(11) Do the procedure again for the opposite thrust reverser sleeve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-440-018-H01

(1) Do the steps that follow to activate the isolation valve (Figure 502):

(a) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591, from the shutoff valve spool on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the shutoff valve body.

3) Make sure the shutoff valve spool moves out to the usual position.

(b) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591, from the bypass valve handle and clevis on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the bypass valve handle and clevis.

3) Make sure the bypass valve handle moves out to the usual position.

(c) Store the two lock pins and the red streamer in the pin container.

SUBTASK 78-31-00-410-026-H01

(2) Close the strut hydraulic bay access door on the applicable engine.

(a) Do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(b) Close these access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-410-027-H01

(3) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-440-019-H01

(4) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-00-865-008-H01

(5) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-860-056-H01

(6) Remove the DO-NOT-OPERATE tags from the thrust levers.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-860-057-H01

(7) Erase all thrust reverser EICAS messages and make sure they do not show again.

SUBTASK 78-31-00-860-058-H01

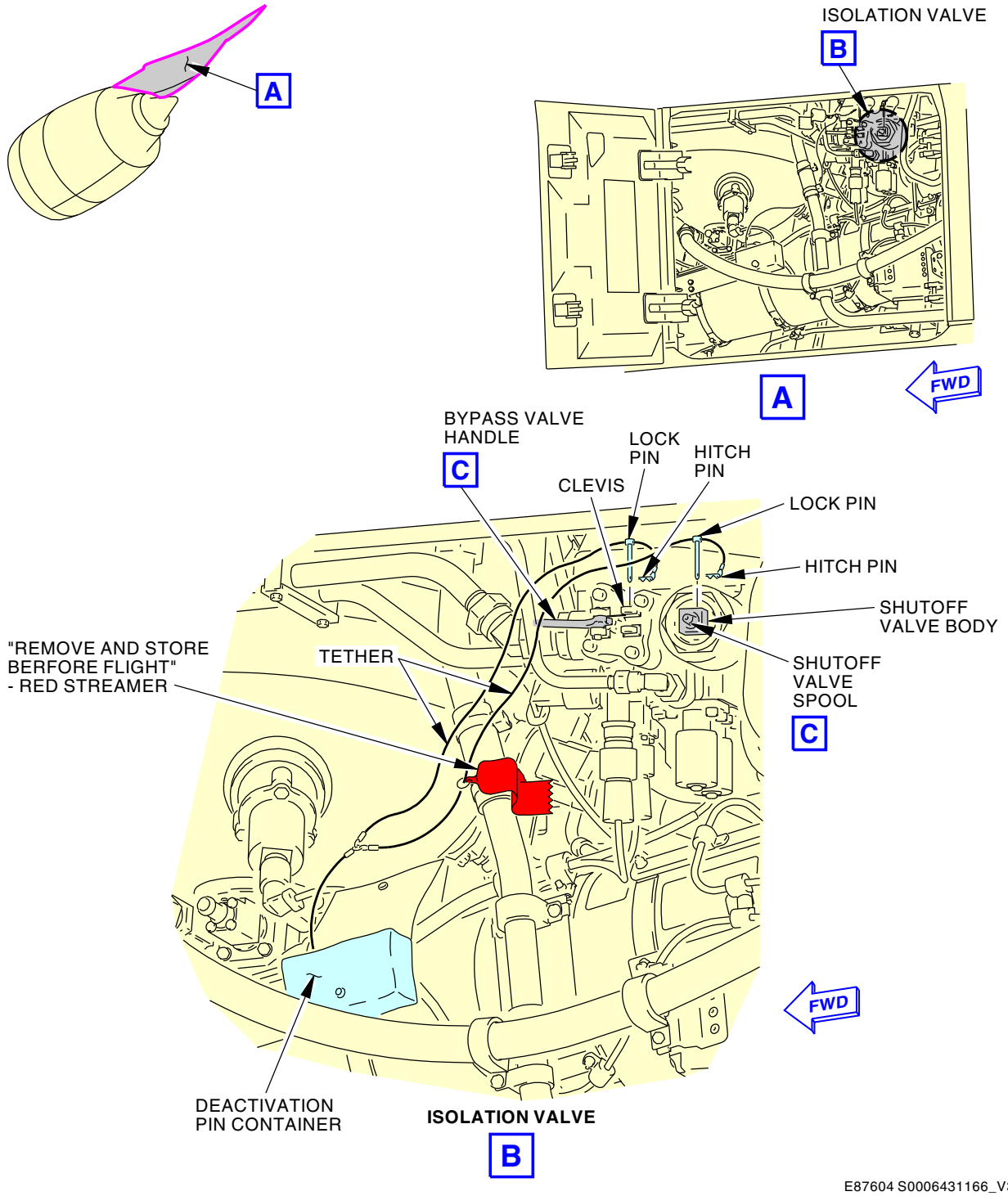
(8) Make sure no active thrust reverser maintenance messages are shown on the Existing Faults Display on the MAT.

(a) Do this task: How to Use the Central Maintenance Computing System, TASK 45-10-00-740-808.

(b) Clear all inactive thrust reverser maintenance messages.

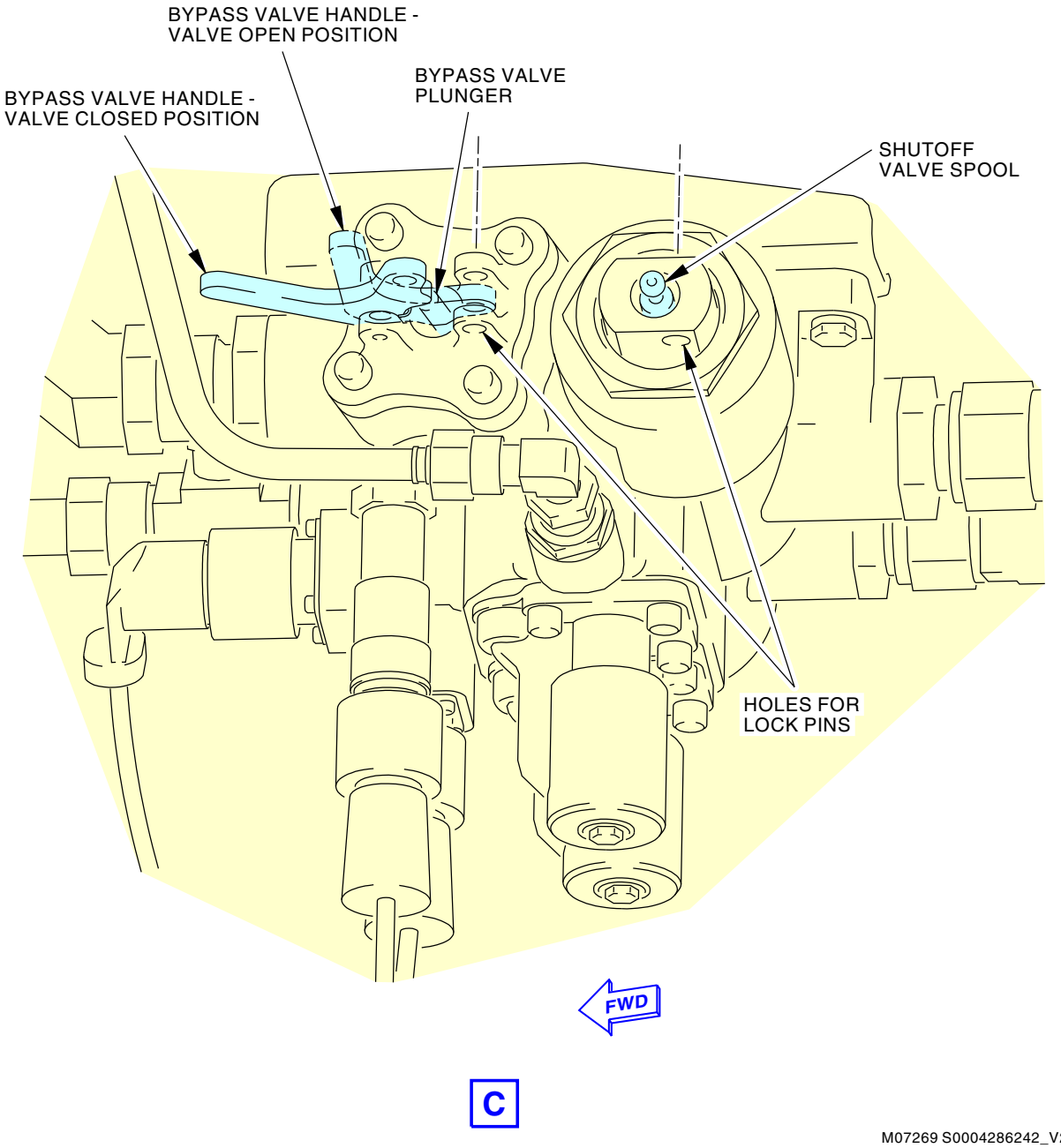
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



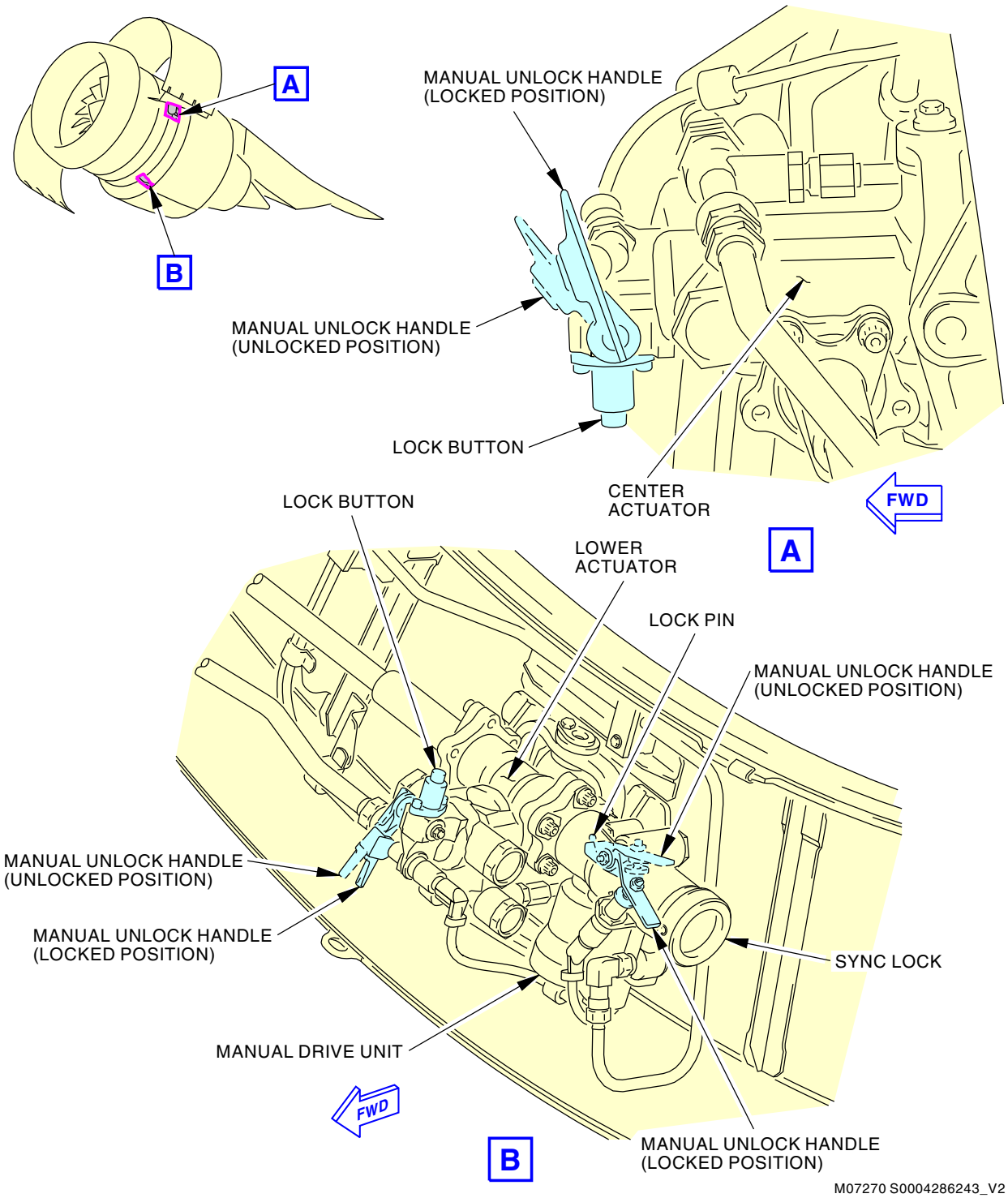
Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 502/78-31-00-990-806-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 502/78-31-00-990-806-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Locks
Figure 503/78-31-00-990-829-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

78-CMR-01

TASK 78-31-00-710-804-H01

6. Thrust Reverser Sync Lock - Operational Test

(Figure 502/Figure 503)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is to make sure that the sync lock on the thrust reverser is serviceable.

(2) To make sure the sync lock is serviceable, try to manually extend the thrust reverser sleeve with the two actuator locks released.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
45-10-00-740-808	How to Use the Central Maintenance Computing System (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205

D. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Procedure

SUBTASK 78-31-00-860-059-H01

(1) Make sure the FUEL CONTROL switch is in the CUTOFF position.

SUBTASK 78-31-00-860-060-H01

(2) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-00-860-061-H01

(3) Make sure the reverse thrust levers are in the fully forward and down position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-00-865-009-H01

(4) For the applicable engine, open the applicable circuit breakers and attach safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-010-029-H01

(5) Open the access door for the applicable isolation valve, do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-040-021-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO PREVENT THRUST REVERSER MOVEMENT. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Do these tasks in this sequence to prevent the hydraulic operation of the thrust reverser (Figure 504):

(a) Install the lock pin with the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the shutoff valve spool on the isolation valve:

1) Push the shutoff valve spool in.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Install the lock pin through the hole in the shutoff valve body to hold the shutoff valve spool in the valve.

3) Install the hitch pin through the end of the lock pin.

(b) Install the lock pin without the red streamer, from the thrust reverser isolation valve lock, SPL-2591, into the bypass valve handle and the clevis on the isolation valve:

1) Turn the bypass valve handle to align the hole with the clevis.

2) Install the lock pin through the clevis and bypass valve handle.

3) Install the hitch pin through the end of the lock pin.

(c) Make sure the red streamer shows out of the access door.

SUBTASK 78-31-00-860-062-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(7) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-00-040-022-H01

(8) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-00-010-030-H01

(9) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-980-012-H01

(10) Put the center actuator to the unlocked position (Figure 505):

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push the lock button in while you release the manual unlock handle.

(c) Make sure the manual unlock handle stays in the unlocked position.

SUBTASK 78-31-00-980-013-H01

(11) Put the lower actuator to the unlocked position:

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push the lock button in while you release the manual unlock handle.

(c) Make sure the manual unlock handle stays in the unlocked position.

SUBTASK 78-31-00-980-014-H01

(12) Put the sync lock to the unlocked position:

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push the lock pin while you release the manual unlock handle.

(c) Make sure the manual unlock handle stays in the unlocked position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-00-980-015-H01

(13) Manually extend (deploy) the thrust reverser sleeve approximately 3 inches:

(a) Install a 3/8-inch square drive into the manual drive unit.

NOTE: It is OK to use a 3/8 inch pneumatic wrench (nut runner).

(b) Push-in and continue to push-in the 3/8-inch square drive while you turn the drive to extend the thrust reverser sleeve.

NOTE: You must push-in the 3/8-inch square drive to engage the pinion gear with the bevel gear in the sync lock while you turn the drive.

NOTE: The pinion gear in the manual drive unit is spring loaded to disengage from an internal sync lock bevel gear.

NOTE: The clutch in the manual drive unit has a torque limit of 125 in-lb (14.1 N·m)-130 in-lb (14.7 N·m) to prevent damage to the sync shaft system.

1) Turn the 3/8 inch square drive clockwise to extend (deploy) the left thrust reverser sleeve.

2) Turn the 3/8 inch square drive counter-clockwise to extend (deploy) the right thrust reverser sleeve.

(c) Make sure the thrust reverser sleeve operates smoothly.

SUBTASK 78-31-00-980-016-H01

CAUTION

DO NOT TRY TO MOVE THE MANUAL UNLOCK HANDLES TO THE LOCKED POSITION UNTIL YOU RETRACT THE THRUST REVERSER SLEEVE. DAMAGE TO EQUIPMENT CAN OCCUR IF YOU DO NOT RETRACT THE THRUST REVERSER SLEEVE FIRST.

(14) Release the manual unlock handles on the center actuator and lower actuator to the unlocked position:

(a) Move the manual unlock handles to the fully unlocked position to release the lock buttons.

(b) Make sure that the lock buttons move out to their usual position.

SUBTASK 78-31-00-980-017-H01

(15) Manually retract (stow) the thrust reverser sleeve until the manual unlock handles on the center actuator and lower actuator move to the locked position:

(a) Install a 3/8-inch square drive into the manual drive unit.

NOTE: It is OK to use a 3/8 inch pneumatic wrench (nut runner).

(b) Push-in and continue to push-in the 3/8-inch square drive while you turn the drive to retract (stow) the thrust reverser sleeve.

NOTE: You must push-in the 3/8-inch square drive to engage the pinion gear with the bevel gear in the sync lock while you turn the drive.

NOTE: The pinion gear in the manual drive unit is spring loaded to disengage from an internal sync lock bevel gear.

NOTE: The clutch in the manual drive unit has a torque limit of 125 in-lb (14.1 N·m)-130 in-lb (14.7 N·m) to prevent damage to the sync shaft system.

1) Turn the 3/8 inch square drive counter-clockwise to retract (stow) the left thrust reverser sleeve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Turn the 3/8 inch square drive clockwise to retract (stow) the right thrust reverser sleeve.

(c) Make sure the thrust reverser sleeve operates smoothly.

(d) Make sure the manual unlock handles on the center actuator and lower actuator move to the usual locked position.

NOTE: If the center actuator does not lock with the manual or pneumatic wrench method, it is acceptable to use hydraulic power to lock the center actuator.

SUBTASK 78-31-00-980-018-H01

(16) Do a check of the sync lock:

(a) Engage the sync lock.

1) Move the manual unlock handle to the fully unlocked position to release the lock pin.

2) Make sure the lock pin moves out to the usual position.

3) Make sure the manual unlock handle moves back to the usual locked position.

(b) Put the lower actuator to the unlocked position.

1) Move and hold the manual unlock handle to the unlocked position.

2) Push the lock button in while you release the manual unlock handle.

3) Make sure the manual unlock handle stays in the unlocked position.

(c) Put the center actuator to the unlocked position.

1) Move and hold the manual unlock handle to the unlocked position.

2) Push the lock button in while you release the manual unlock handle.

3) Make sure the manual unlock handle stays in the unlocked position.

(d) Try to manually extend (deploy) the thrust reverser sleeve.

1) Make sure the thrust reverser sleeve does not extend (deploy).

SUBTASK 78-31-00-980-019-H01

(17) Do the steps that follow to engage all three locks (Figure 505):

(a) Put the sync lock to the unlocked position.

NOTE: You must release the sync lock while you turn the manual drive to engage the locks on the center and lower actuators.

1) Move and hold the manual unlock handle to the unlocked position.

2) Push the lock pin while you release the manual unlock handle.

3) Make sure the manual unlock handle stays in the unlocked position.

(b) Move the manual unlock handle on the center actuator and lower actuator to the fully unlocked position to release the lock buttons.

(c) Make sure the lock buttons move out to their usual position.

(d) Turn the manual drive in the retract (stow) direction until the manual unlock handles on the center actuator and lower actuator move to the locked position.

NOTE: If the center actuator does not lock with the manual or pneumatic wrench method, it is acceptable to use hydraulic power to lock the center actuator.

(e) Engage the sync lock:

1) Move the manual unlock handle to the fully unlocked position to release the lock pin.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Make sure the lock pin moves out to the usual position.

3) Make sure the manual unlock handle moves to the locked position.

SUBTASK 78-31-00-710-005-H01

(18) Do the procedure again for the opposite thrust reverser sleeve.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-440-020-H01

(1) Do the steps that follow to activate the isolation valve (Figure 504):

(a) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591, from the shutoff valve spool on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the shutoff valve body.

3) Make sure the shutoff valve spool moves out to the usual position.

(b) Remove the lock pin from the thrust reverser isolation valve lock, SPL-2591, from the bypass valve handle and clevis on the isolation valve.

1) Remove the hitch pin from the lock pin.

2) Remove the lock pin from the bypass valve handle and clevis.

3) Make sure the bypass valve handle moves out to the usual position.

(c) Store the two lock pins and the red streamer in the pin container.

SUBTASK 78-31-00-410-028-H01

(2) Close the access door for the isolation valve; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-31-00-410-029-H01

(3) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-440-021-H01

(4) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-00-865-010-H01

(5) For the applicable engine, close the applicable circuit breakers and remove the safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-31-00-860-063-H01

(6) Remove the DO-NOT-OPERATE tags from the thrust levers.

SUBTASK 78-31-00-860-064-H01

(7) Erase all thrust reverser EICAS messages and make sure they do not show again.

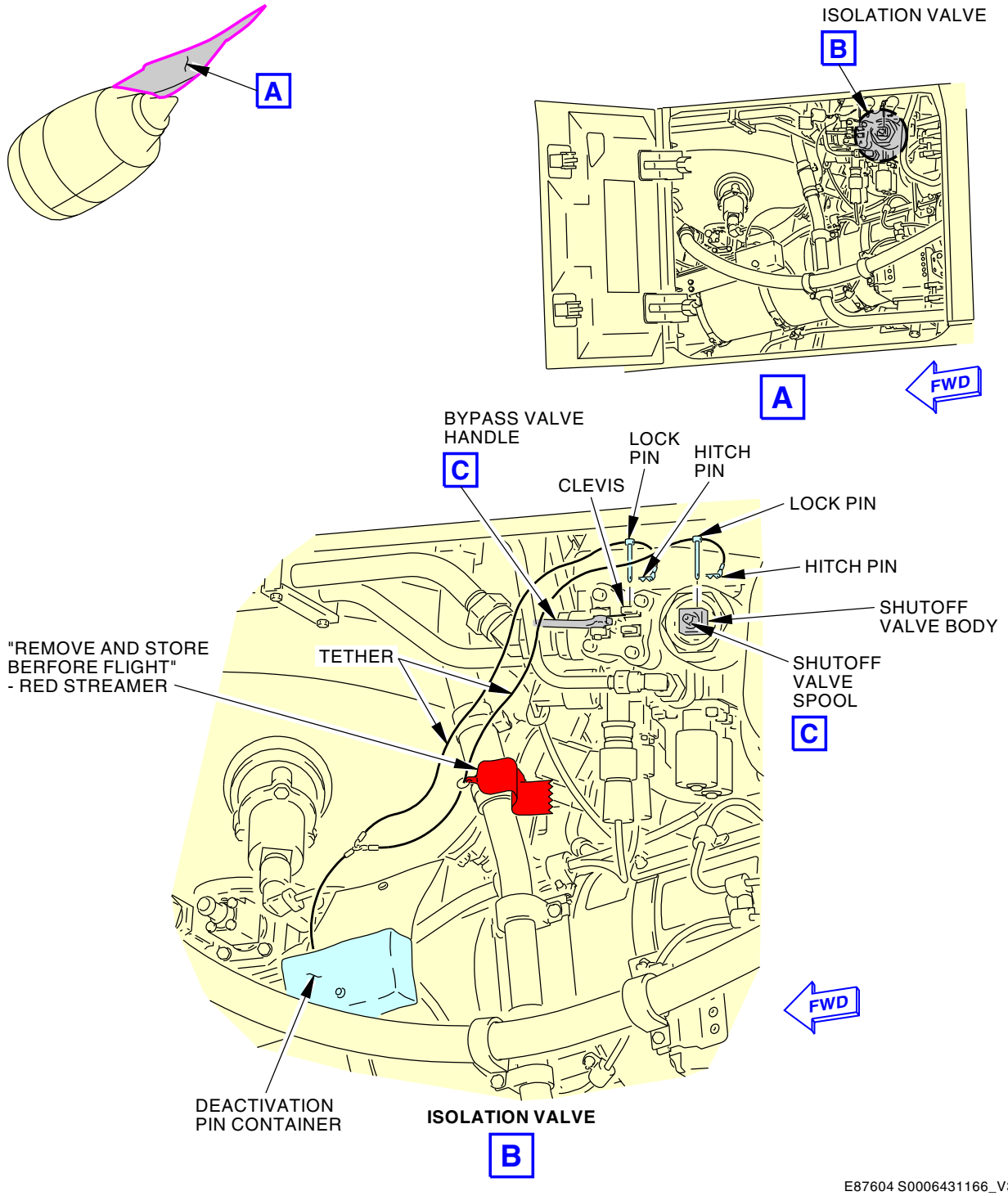
SUBTASK 78-31-00-860-065-H01

(8) Make sure no active thrust reverser maintenance messages are shown on the Existing Faults Display on the MAT; do this task: How to Use the Central Maintenance Computing System, TASK 45-10-00-740-808.

(a) Clear all inactive thrust reverser maintenance messages.

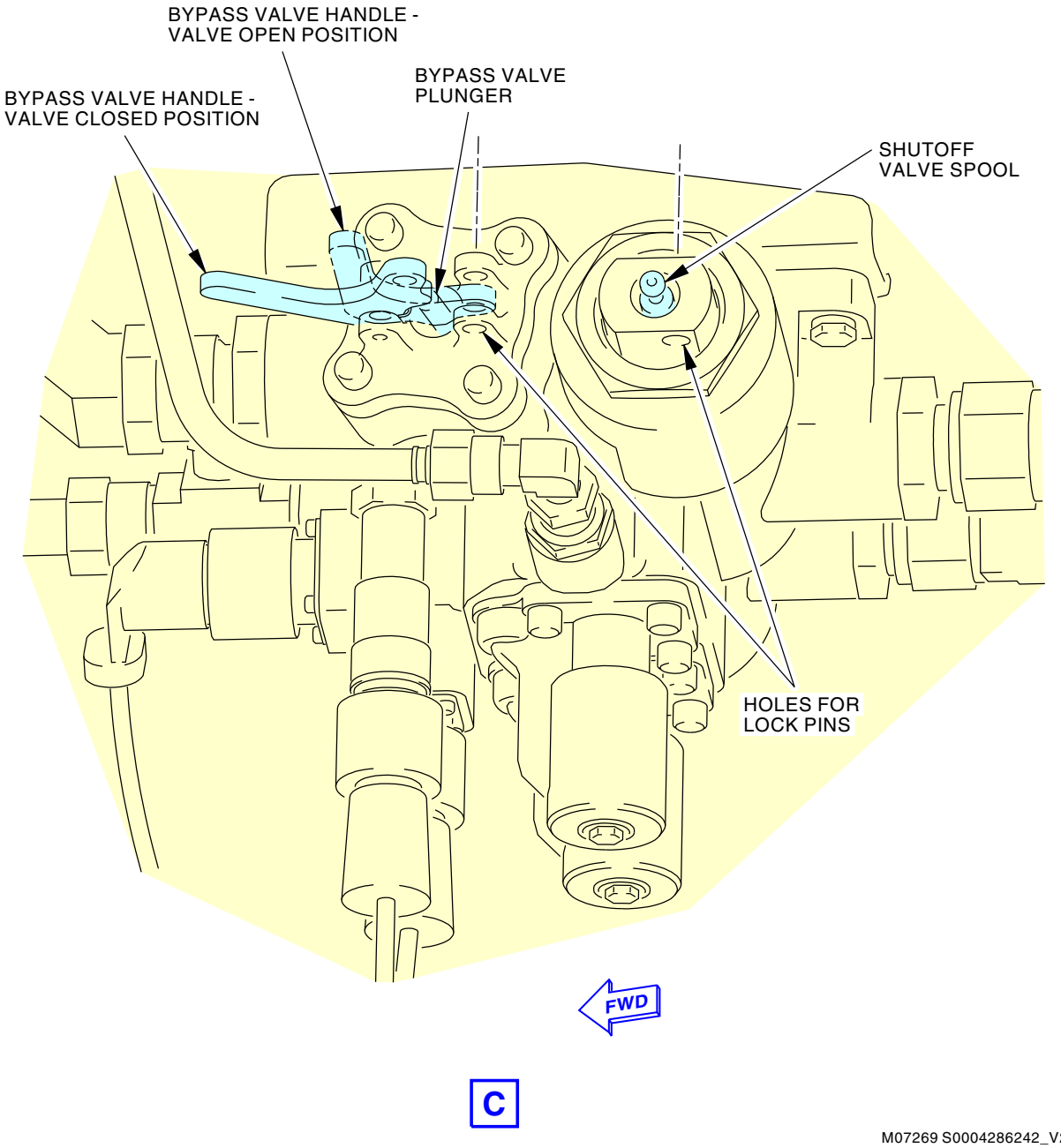
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



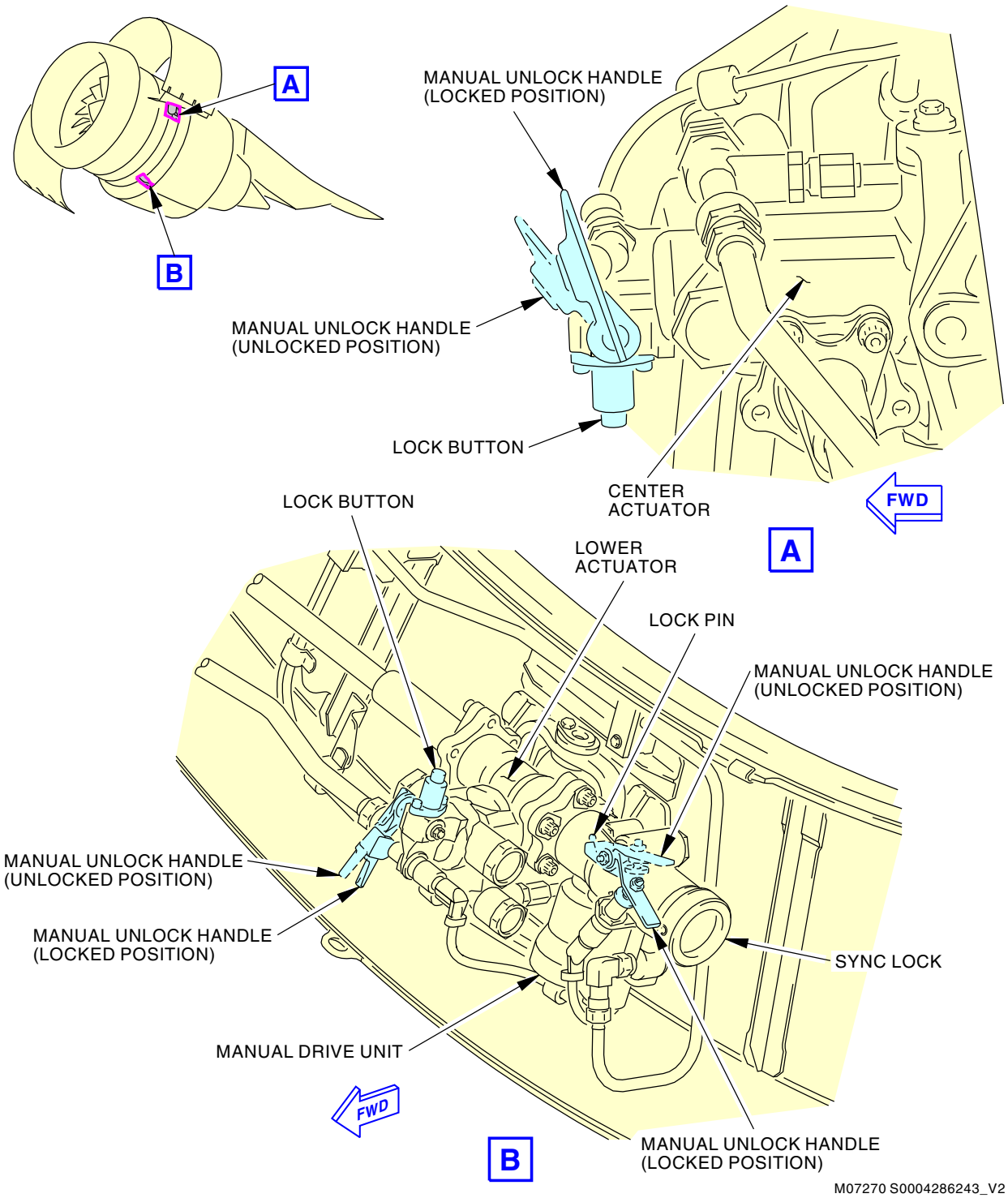
Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 504/78-31-00-990-804-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Isolation Valve Deactivation for Ground Maintenance
Figure 504/78-31-00-990-804-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Locks
Figure 505/78-31-00-990-830-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-710-805-H01

7. Thrust Reverser Proximity Sensors - Operational Test

(Figure 506)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This procedure uses the Input Line Monitoring function on the Maintenance Access Terminal (MAT) to do a check of all of the thrust reverser proximity sensors for each engine.

(a) Left sleeve, center actuator proximity sensor.

(b) Left sleeve, lower actuator proximity sensor.

(c) Left sleeve, sync lock proximity sensor.

(d) Directional Control Valve (DCV) proximity sensor.

(e) Right sleeve, center actuator proximity sensor.

(f) Right sleeve, lower actuator proximity sensor.

(g) Right sleeve, sync lock proximity sensor.

(2) You must extend and retract the thrust reversers (one engine at a time) while you monitor the MAT.

(3) Make sure the bit values for the thrust reverser proximity sensors are correct for the applicable thrust reverser position.

B. References

Reference	Title
45-10-00-740-808	How to Use the Central Maintenance Computing System (P/B 201)
78-31-00-981-801-H01	Thrust Reverser Operation - Extend (Power Method) (P/B 201)
78-31-00-981-802-H01	Thrust Reverser Operation - Retract (Power Method) (P/B 201)

C. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Procedure

SUBTASK 78-31-00-860-066-H01

(1) To select the Input Monitoring feature on the Central Maintenance Computer System (CMCS), do these steps: How to Use the Central Maintenance Computing System, TASK 45-10-00-740-808.

(a) Use the maintenance access terminal (MAT) or the portable maintenance access terminal (PMAT) to access the CMCS.

(b) Select ONBOARD MAINTENANCE from the initial MAT menu.

(c) Select OTHER FUNCTIONS from the CMCS main menu.

(d) Select INPUT MONITORING from the other functions menu.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Select GENERAL INPUT from the input monitoring main menu.

(f) Select CONTINUE.

(g) On the INPUT MONITORING - GENERAL INPUT display, put the cursor in the direct entry field.

(h) Use the keyboard to type the signal specification into the direct entry field.

NOTE: It is not necessary to type initial zeros.

1) For the left engine, type this signal specification; L/629/SYS L/DD0/1/4-4.

NOTE: The last digit of DD0 is a numerical zero.

2) For the right engine, type this signal specification; R/629/SYS R/DD0/2/4-4.

NOTE: The last digit of DD0 is a numerical zero.

(i) Select RUN to start the input monitoring data update.

NOTE: SAMPLING shows above the input monitoring data. RUN will cause the data to update at a rate of 1 Hertz (1 cycle per second). There will be three rows (or sampling fields) shown with 16-bits each. The top row is the newest data and the bottom row is the oldest data.

NOTE: Each row shows the bits in groups of four bits. The header, WORD NO. above the rows, identifies the word. The header, BIT NO. above the rows, identifies the left bit in each group of four bits.

(j) Select FREEZE to stop the data update.

(k) Select REPORT to print a report of the MAT display.

NOTE: The illustration is an example of the MAT display. Changes to the CMCS software can change the format of the display.

SUBTASK 78-31-00-981-004-H01

(2) Do these tasks to extend and retract the thrust reverser sleeves:

(a) Do this task: Thrust Reverser Operation - Extend (Power Method), TASK 78-31-00-981-801-H01.

(b) Do this task: Thrust Reverser Operation - Retract (Power Method), TASK 78-31-00-981-802-H01.

SUBTASK 78-31-00-860-067-H01

(3) Compare the MAT display or report with the table to make sure that the bit values shown are correct with the thrust reverser in the extended and retracted positions (Figure 506).

NOTE: Before the bit values are read, make sure that the thrust reverser test enable switch is in the released position.

(a) Refer to the example of the MAT display data output for thrust reverser retracted (Table 501).

(b) Refer to the example of the MAT display data output for thrust reverser extended (Table 502).

(c) Refer to the example of the thrust reverser proximity sensor bit values (Table 503).

(d) If you do not get the correct bit values, look at the Existing Faults Display on the MAT for thrust reverser proximity sensor messages; do this task: How to Use the Central Maintenance Computing System, TASK 45-10-00-740-808.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Table 501/78-31-00-993-801-H01 Example of MAT Display Data Output for Thrust Reverser Retracted

Example: Thrust Reverser Retracted - MAT Display Data Output																			
Bit No.	15	14	13	12		11	10	9	8		7	6	5	4		3	2	1	0
Data	0	1	1	0		1	0	1	0		1	0	1	0		1	0	1	0

Table 502/78-31-00-993-802-H01 Example of MAT Display Data Output for Thrust Reverser Extended

Example: Thrust Reverser Extended - MAT Display Data Output																			
Bit No.	15	14	13	12		11	10	9	8		7	6	5	4		3	2	1	0
Data	1	0	0	1		0	1	0	1		0	1	0	1		0	1	0	1

Table 503/78-31-00-993-803-H01 Example of Thrust Reverser Proximity Sensor Bit Values

Proximity Sensor Location	Bit No.		T/R Extended Bit Values	T/R Retracted Bit Values
ENGINE REVERSER L/R Advisory Message	15	14	Ignore -------	Ignore -------
Lower Actuator Right Sleeve	13	12	0 1 (Target Far)	1 0 (Target Near)
Center Actuator Right Sleeve	11	10	0 1 (Target Far)	1 0 (Target Near)
Sync Lock Right Sleeve	09	08	0 1 (Target Far)	1 0 (Target Near)
Directional Control Valve (DCV)	07	06	0 1 (Target Far)	1 0 (Target Near)
Lower Actuator Left Sleeve	05	04	0 1 (Target Far)	1 0 (Target Near)
Center Actuator Left Sleeve	03	02	0 1 (Target Far)	1 0 (Target Near)
Sync Lock Left Sleeve	01	00	0 1 (Target Far)	1 0 (Target Near)

SUBTASK 78-31-00-860-068-H01

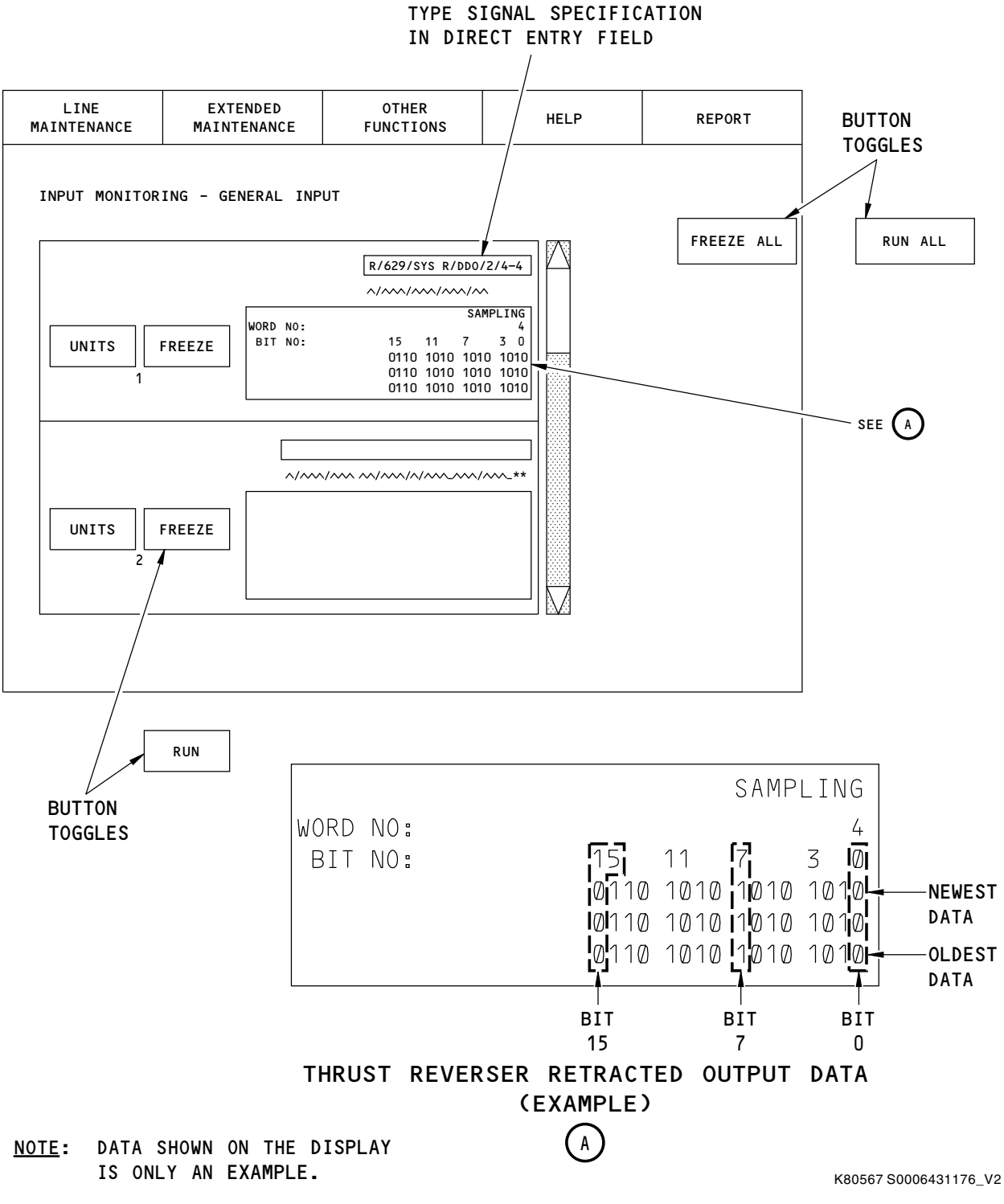
(4) To go back to the initial MAT menu, do these steps:

(a) Select LINE MAINTENANCE or OTHER FUNCTIONS from the CMCS main menu.

(b) Select EXIT MAINTENANCE from the line maintenance menu or the other functions menu.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER RETRACTED OUTPUT DATA
(EXAMPLE)

A

NOTE: DATA SHOWN ON THE DISPLAY IS ONLY AN EXAMPLE.

K80567 S0006431176_V2

Thrust Reverser Proximity Sensor Input Monitoring Data Output
Figure 506/78-31-00-990-808-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-00-820-801-H00

8. Thrust Reverser Hydraulic Actuator Rod End - Adjustment

A. General

(1) Do this adjustment if the thrust reverser hydraulic actuator rod ends were turned while the actuator was connected to the actuation system.

(a) If the actuator was not connected to the actuation system, this adjustment is not necessary.

(2) If one or more of the thrust reverser hydraulic actuator rod ends are turned, it is possible that the actuators will not be synchronized with each other, and the RVDT and Sync Lock could be out of rig.

(3) Each installation task includes an operational test which must be completed.

(4) This adjustment will make sure that the actuator rod ends are put back into correct rigging.

B. References

Reference	Title
78-34-10-000-801-H01	Thrust Reverser Sync Lock/Manual Drive Unit Removal (P/B 401)
78-34-10-400-801-H01	Thrust Reverser Sync Lock/Manual Drive Unit Installation (P/B 401)
78-34-13-000-801-H01	Thrust Reverser Sync Shaft and Tubing Removal (P/B 401)
78-34-13-400-801-H01	Thrust Reverser Sync Shaft and Tubing Installation (P/B 401)
78-36-03-000-801-H01	Thrust Reverser Position Transducer (RVDT) Removal (P/B 401)
78-36-03-400-801-H01	Thrust Reverser Position Transducer (RVDT) Installation (P/B 401)

C. Procedure

SUBTASK 78-31-00-900-001-H00

(1) Do these tasks to adjust the thrust reverser hydraulic actuator rod ends:

(a) Remove the Sync Shafts (TASK 78-34-13-000-801-H01).

(b) Install the Sync Shafts (TASK 78-34-13-400-801-H01).

NOTE: This installation task includes an operational test (TASK 78-31-00-710-821-H00). In steps E(15), E(23), and E(30) T/R L and T/R R are checked on the EPCS Page. If T/R L and T/R R are not correct, this means the RVDT is not rigged properly. This message can be ignored at this point because the RVDT will be correctly rigged in step (f) and T/R L and T/R R will be checked again after the RVDT has been rigged correctly. If T/R L and T/R R are correct, RVDT R/I steps do not need to be performed.

(c) Remove the Sync Lock (TASK 78-34-10-000-801-H01).

(d) Install the Sync Lock (TASK 78-34-10-400-801-H01).

NOTE: This installation task includes an operational test (TASK 78-31-00-710-821-H00). In steps E(15), E(23), and E(30) T/R L and T/R R are checked on the EPCS Page. If T/R L and T/R R are not correct, this means the RVDT is not rigged properly. This message can be ignored at this point because the RVDT will be correctly rigged in step (f) and T/R L and T/R R will be checked again after the RVDT has been rigged correctly. If T/R L and T/R R are correct, RVDT R/I steps do not need to be performed.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Remove the RVDT (TASK 78-36-03-000-801-H01).

(f) Install the RVDT (TASK 78-36-03-400-801-H01).

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYSTEM - INSPECTION/CHECK

1. General

A. This procedure has this task:

(1) Examination of the thrust reverser to EEC electrical connectors for lightening protection.

TASK 78-31-00-200-801-H00

2. Thrust Reverser to EEC Electrical Connector Examination For Lightening Protection

A. References

Reference	Title
24-22-00-860-805	Supply Electrical Power (P/B 201)
24-22-00-860-806	Remove Electrical Power (P/B 201)
57-41-10-000-801	Wing Leading Edge Panel Removal (P/B 401)
57-41-10-400-801	Wing Leading Edge Panel Installation (P/B 401)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)

B. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

C. Prepare for the Procedure

SUBTASK 78-31-00-862-001-H00

(1) Remove Electrical Power, TASK 24-22-00-860-806.

SUBTASK 78-31-00-010-042-H00

(2) Do this task: Wing Leading Edge Panel Removal, TASK 57-41-10-000-801.

(a) Remove the inboard fixed leading edge panels 511NB and 511PB from the left wing.

(b) Remove the inboard fixed leading edge panels 611NB and 611PB from the right wing.

SUBTASK 78-31-00-010-043-H00

(3) Refer to 777 AMM 54-52-01/401.

(a) Remove panel 431BT from the left engine strut.

(b) Remove panel 441BT from the right engine strut.

SUBTASK 78-31-00-010-044-H00

(4) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Procedure

SUBTASK 78-31-00-211-001-H00

(1) Do a detailed examination that includes touch and feel, of the left thrust reverser (T/R) sleeve rotary voltage differential transducer (RVDT) electrical connector DM78002.

(a) Examine the connector for loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation.

(b) Hand-tighten loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation if necessary.

SUBTASK 78-31-00-211-002-H00

(2) Do a detailed examination that includes touch and feel, of the right thrust reverser (T/R) sleeve rotary voltage differential transducer (RVDT) electrical connector DM78003.

(a) Examine the connector for loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation.

(b) Hand-tighten loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation if necessary.

SUBTASK 78-31-00-211-003-H00

(3) Do a detailed examination that includes touch and feel, of the electrical connectors on the strut disconnect panels.

(a) Refer to these tables.

1) GE90 Strut Electrical Disconnect Panel AN0183/Table 601.

2) GE90 Strut Electrical Disconnect Panel AN0184/Table 602.

(b) Examine the electrical connectors on the left side AN0183 and right side AN0184 disconnect panels on the left strut.

1) Examine the connector for loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation.

2) Hand-tighten loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation if necessary.

Table 601/78-31-00-993-804-H00 GE90 Strut Electrical Disconnect Panel AN0183

Engine	Connector Position	Eng Connector*[1]	Eng Wire bundle *[1]	Strut Connector	Strut Wire bundle
L Eng	1	D71322P	W0798	D71122J	W8541
L Eng	2	D71309P	W0790	D71109J	W8143
L Eng	3	D71312P	W0798	D71112J	W8145
R Eng	1	D71322P	W0798	D71222J	W8641
R Eng	2	D71309P	W0790	D71209P	W8243
R Eng	3	D71312P	W0798	D71212J	W8245

*[1] The engine connector and wirebundle is the same for installation as the left or right engine.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Table 602/78-31-00-993-805-H00 GE90 Strut Electrical Disconnect Panel AN0184

Engine	Eng Connector Position	Eng Connector *[1]	Eng Wire bundle *[1]	Strut Connector	Strut Wire bundle
L Eng	1	D71326P	W0799	D71126J	W8145
L Eng	2	D71314P	W0791	D71114J	W8143
L Eng	3	D71313P	W0799	D71113J	W8541
R Eng	1	D71326P	W0799	D71226J	W8245
R Eng	2	D71314P	W0791	D71214J	W8243
R Eng	3	D71313P	W0799	D71213J	W8641

*[1] The engine connector and wirebundle is the same for installation as the left or right engine.

(c) Examine the electrical connectors on the left side AN0183 and right side AN0184 disconnect panels on the right strut.

1) Examine the connector for loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation.

2) Hand-tighten loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation if necessary.

SUBTASK 78-31-00-211-004-H00

(4) Do a detailed examination that includes touch and feel, of the electrical connectors on the wing/strut disconnect panel.

(a) Refer to these tables.

1) Left Wing Disconnect Panel AW0405/Table 603.

2) Right Wing Disconnect Panel AW0406/Table 604.

(b) Examine the electrical connectors on the AW0405 disconnect panel for the left wing/engine.

1) Examine the connector for loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation.

2) Hand-tighten loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation if necessary.

Table 603/78-31-00-993-806-H00 Left Wing Disconnect Panel AW0405

Position	Connector	Wire bundle	Connector	Wire bundle
5	D7178J	W8104	D7178P	W8143
8	D7180J	W8104	D7180P	W8144
11	D7171J	W8502	D7171P	W8541

Table 604/78-31-00-993-807-H00 Right Wing Disconnect Panel AW0406

Position	Connector	Wire bundle	Connector	Wire Bundle
5	D7278J	W8204	D7278P	W8243
8	D7280J	W8204	D7280P	W8244
11	D7271J	W8602	D7271P	W8641

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Examine the electrical connectors on the AW0406 disconnect panel for the right wing/engine.

1) Examine the connector for loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation.

2) Hand-tighten loose pigtails, backshells, strain relief clamps, and the plug-to-connector installation if necessary.

E. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-00-410-038-H00

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-00-410-039-H00

(2) Refer to 777 AMM 54-52-01/401.

(a) Install panels 431BT to the left engine strut.

(b) Install panels 441BT to the right engine strut.

SUBTASK 78-31-00-410-040-H00

(3) Wing Leading Edge Panel Installation, TASK 57-41-10-400-801.

(a) Install the inboard fixed leading edge panels 511NB and 511PB to the left wing.

(b) Install the inboard fixed leading edge panels 611NB and 611PB to the right wing.

SUBTASK 78-31-00-861-001-H00

(4) Supply Electrical Power, TASK 24-22-00-860-805.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser.

(2) An installation of the thrust reverser.

B. The left and right thrust reverser are interchangeable to the left or right engine location if the cascade segments are in the specified location.

TASK 78-31-01-000-801-H01

2. Thrust Reverser Removal

(Figure 401,Figure 402,Figure 403,Figure 404andFigure 405)

A. General

(1) This task is the removal procedure for the left or right thrust reverser half.

(2) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(3) Do not move the thrust reverser in the horizontal position with the thrust reverser sling. The center of gravity of the thrust reverser in the horizontal position can cause the thrust reverser to turn over. Move the thrust reverser in the vertical position with the thrust reverser sling.

(4) Install protection covers on electrical connectors and receptacles, hydraulic lines and fittings, and pneumatic ducts to keep them clean, prevent damage, and prevent unwanted materials in the ducts or lines.

(5) The transportation stand is used to transport the thrust reverser half from the airplane to the maintenance shop. The transportation stand is also the work stand in the maintenance shop that allows access to the engine side and the airflow side of the thrust reverser half for component maintenance and repair.

(6) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(7) The No.2 and No.3 hinge fittings carry the weight of the thrust reverser. The No.1 hinge cross-tie rod and No.4 hinge cross-tie rod positions the thrust reverser hinge line and are not a static load path.

B. References

Reference	Title
20-10-10-000-801	Flexible Hose Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-000-801-001	Forward Fairings Removal (P/B 401)
71-11-04-000-805-H01	Fan Cowl Panels Removal (P/B 401)
78-31-00-010-802-H01	Open the Thrust Reverser (Power Method) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
78-31-00-410-802-H01	Close the Thrust Reverser (Power Method) (P/B 201)
78-31-19-000-801-H01	Thrust Reverser Latch Access Doors Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2594	Equipment - Sling, GE90 Fan Thrust Reverser Part #: J78004-123 Supplier: 81205 Opt Part #: J78004-89 Supplier: 81205
SPL-4256	Stand - Transportation, Fan Thrust Reverser (GE90/GE90-115B engine) Part #: J78031-85 Supplier: 81205
SPL-4259	Protector - Thread, Thrust Reverser Hinge Bolt (GE90-115B engine) Part #: J78005-10 Supplier: 81205
SPL-4278	Fittings - Hinge, GE90 Fan T/R Sling (GE90-70/80/90 series & -100 series) Part #: J78004-90 Supplier: 81205
STD-299	Load Measuring Device - 10,000 lbs minimum capacity
STD-470	Hoist - Overhead, Capacity 10,000 Pounds
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-589	Mat - Protective Cover
STD-2493	Hoist - Overhead, Capacity 10,000 lb (4,536kg)
STD-3842	Punch - Drift

D. Consumable Materials

Reference	Description	Specification
A50464	Tape - Vinyl, Adhesive Coated	BMS5-179
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00624	Bag - Plastic, General Purpose	
G02129	Tape - 223S (use until stock depleted)	

E. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
431	Forward Strut Fairing - Left Nacelle Strut
432	Forward Torque Box - Left Nacelle Strut
434	Aft Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut
442	Forward Torque Box - Right Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
415FL	Center Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
416FR	Center Thrust Reverser Hinge Cover, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

G. Prepare for the Removal

SUBTASK 78-31-01-860-001-H01

CAUTION

DO NOT LIFT OR MOVE THE THRUST REVERSER HALF UNLESS THREE CASCADE SEGMENTS ARE INSTALLED. BETWEEN THE INSTALLED SEGMENTS, NO MORE THAN TWO CASCADE SEGMENTS CAN BE MISSING. DAMAGE TO THE THRUST REVERSER STRUCTURE CAN OCCUR.

(1) Do not lift or move the thrust reverser with less then three cascade segments installed.

(a) Make sure a minimum of three cascade segments are installed equally spaced around the thrust reverser half.

NOTE: The cascades are part of the thrust reverser structure.

(b) Make sure no more than two cascade segments are missing between the installed segments.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-010-010-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(2) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-01-040-001-H01

(3) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-01-040-002-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) For the applicable engine, do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-01-864-001-H01

(5) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-31-01-490-001-H01

WARNING

USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(6) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-01-490-002-H01

(7) For the inboard thrust reverser, install a protective mat, STD-585 or protective cover mat, STD-589 on the leading edge of the wing.

NOTE: The chain hoist, strap and the upper sling assembly will be near the wing leading edge when the thrust reverser is removed or installed. These parts of the sling assembly can interfere or collide with the leading edge. The protective cover mat should be a continuous piece, cover a minimum length of 7 ft (2134 mm) of the leading edge and should wrap around the leading edge a minimum of 2 ft (610 mm). A carpet or heavy canvas fabric or rubber mat could be used.

(a) Install the protective cover mat, STD-589 with adhesive Nitto 223S Tape, G02129, tape, A50464 or equivalent local product.

SUBTASK 78-31-01-010-011-H01

(8) For the applicable engine, do this task:

Fan Cowl Panels Removal, TASK 71-11-04-000-805-H01.

(a) Remove the applicable access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-01-010-019-H01

(9) Remove the strut side fairing; do this task: Forward Fairings Removal, TASK 54-52-01-000-801-001.

(a) Remove the applicable access panels:

Number	Name/Location
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

SUBTASK 78-31-01-030-002-H01

(10) Remove the forward fairing [2] from the applicable thrust reverser (Figure 401).

(a) Remove 25 bolts [15] to remove this fairing and store the bolts in a small plastic bag, G00624.

1) Remove the applicable access panels:

Number	Name/Location
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine

SUBTASK 78-31-01-030-001-H01

(11) Remove the track fairing [1] from the applicable thrust reverser (Figure 401).

(a) Remove 34 bolts [15] to remove this fairing and store the bolts in a small plastic bag, G00624.

1) Remove the applicable access panels:

Number	Name/Location
415FL	Center Thrust Reverser Hinge Cover, Left Engine
416FR	Center Thrust Reverser Hinge Cover, Left Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine

SUBTASK 78-31-01-030-003-H01

(12) If the right thrust reverser half is to be removed, remove the middle latch access door.

NOTE: The middle latch access door must be removed to attach the ground support equipment sling at the lower attachment point.

(a) Do this task: Thrust Reverser Latch Access Doors Removal, TASK 78-31-19-000-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Thrust Reverser Removal

SUBTASK 78-31-01-030-004-H01

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS.

(1) Disconnect the electrical connectors at the strut disconnect panel (Figure 401):

(a) Disconnect the electrical connector [5] (RVDT channel A/proximity sensors).

(b) Disconnect the electrical connector [4] (RVDT channel B).

(c) Install the protection covers on all the electrical connections.

SUBTASK 78-31-01-030-005-H01

CAUTION INSTALL PROTECTION COVERS ON ALL OPENINGS IMMEDIATELY. DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(2) Disconnect the hydraulic lines at the strut disconnect panel, do this task: Flexible Hose Removal, TASK 20-10-10-000-801 (Figure 401).

(a) To decrease the hydraulic fluid spray, put your wrench on the nut and wind some cotton wiper, G00034, around the wrench and the hydraulic line.

(b) Disconnect the retract flexhose [6].

(c) Disconnect the sync lock flexhose [7].

(d) Disconnect the extend flexhose [8].

(e) Install the protection covers on all the hydraulic connections.

SUBTASK 78-31-01-030-006-H01

(3) Disconnect the bonding strap [21] (Figure 401).

(a) Remove the nut [23] and washer [22].

SUBTASK 78-31-01-030-007-H01

(4) Disconnect the NO.1 hinge cross tie rod [31] (Figure 403).

(a) Remove the nut [36], washer [32], bushing [33], washer [34] and bolt [35].

SUBTASK 78-31-01-030-008-H01

(5) Disconnect the NO.4 hinge cross tie rod [42] (Figure 403).

(a) Remove the nut [44], washer [45], bushing [46], washer [47] and bolt [43].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-010-012-H01

CAUTION

OPEN ALL LATCHES ON THE THRUST REVERSER HALVES BEFORE YOU OPEN A THRUST REVERSER HALF. IF A LATCH HOOK STAYS ENGAGED, DAMAGE TO THE THRUST REVERSER, THE STRUT LIMITER RODS, AND BRACKETS CAN OCCUR.

(6) Do this task: Open the Thrust Reverser (Power Method), TASK 78-31-00-010-802-H01.

(a) Unlatch all 13 latches for the thrust reverser; the v-band latch, the five latch beam centerline latches, the three aft cowl centerline latches and the four aft cowl deflection limiter latches.

(b) Make sure the hold-open rod is fully extended and locked.

SUBTASK 78-31-01-030-009-H01

(7) Disconnect the aft tension strap [49] from the aft deflection limiter rod [52] (Figure 403).

(a) Remove the nut [51], bushing [50], bushing [53] and bolt [48].

SUBTASK 78-31-01-030-010-H01

(8) Disconnect the forward tension strap [55] from the forward deflection limiter rod [58] (Figure 403).

(a) Remove the nut [56], bushing [57], bushing [59] and bolt [54].

SUBTASK 78-31-01-410-008-H01

(9) Do this task: Close the Thrust Reverser (Power Method), TASK 78-31-00-410-802-H01.

NOTE: Do not latch the thrust reverser latches.

SUBTASK 78-31-01-030-011-H01

(10) Disconnect the V-groove latch band [14] from the fan case bracket [17] (Figure 401).

(a) Remove the nut [20], washer [16] and bolt [18].

SUBTASK 78-31-01-490-003-H01

CAUTION

DO NOT ATTACH THE HOIST ASSEMBLY TO THE THRUST REVERSER SLEEVE. STRUCTURAL DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(11) Attach the GE90 fan thrust reverser sling equipment, SPL-2594 and hinge fitting, SPL-4278 to the thrust reverser [3] (Figure 404).

(a) Install the forward and aft hinge attach fittings to the upper hinge beam.

NOTE: The fittings are marked to show which end is attached to the thrust reverser.

1) At the forward upper attachment point, attach the forward hinge attach fitting [102] with the hinge attach pin [100] and the lynch pin [99].

2) At the aft upper attachment point, attach the aft hinge attach fitting [97] with the hinge attach pin [98] and the lynch pin [99].

(b) Install the lower attach fitting to the lower latch beam.

NOTE: The lower attach fitting is marked with the part number of the bolts and the attach fitting is also the storage location for the bolts and washers.

1) At the lower attachment point, attach the latch beam attach fitting [105] with the bolt [103] and washer [104].

(c) Attach the cables [90] to the upper sling assembly [96] and the lift plate [93].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Attach the chain hoist [94] to the lift plate [93].

(e) Attach the load cell [91] between the lift plate [93] and the master link [92].

NOTE: The minimum capacity 10,000 lbs, load measuring device, STD-299 is a customer furnished item.

(f) Connect a overhead crane/10,000 lb capacity overhead hoist, STD-470 to the master link [92].

NOTE: The overhead crane/10,000 lb capacity overhead hoist, STD-470 is a customer furnished item.

(g) Lift the sling equipment with the overhead crane/10,000 lb capacity overhead hoist, STD-470 to the thrust reverser.

(h) Attach the upper sling assembly [96] to the upper attachment points with the hinge attach pin [98] and the lynch pin [99].

(i) Attach the chain hoist [94] to the lower sling assembly [95].

SUBTASK 78-31-01-030-012-H01

(12) Disconnect the thrust reverser PDOS actuator [24] from the thrust reverser [3] (Figure 402):

NOTE: The thrust reverser must be removed in the closed position. If the PDOS actuator is disconnected with the thrust reverser in the open position, the PDOS actuator will be extended. It will be difficult to retract the PDOS actuator without the weight of the thrust reverser.

(a) To remove the thrust reverser half on one side of the engine, follow these steps:

1) For the opposite thrust reverser half, do this task: Open the Thrust Reverser (Power Method), TASK 78-31-00-010-802-H01.

2) Get access to the PDOS actuator bolt from the opposite side of the engine.

3) Remove the bolt [29], washer [28], bushing [27], washer [25] and nut [26].

NOTE: You must disconnect the bolt for the PDOS actuator in the retracted position. If the bolt will not come out, move the thrust reverser up and down slightly with the hoist.

4) For the opposite thrust reverser half, do this task: Close the Thrust Reverser (Power Method), TASK 78-31-00-410-802-H01.

5) Continue this procedure to remove the first thrust reverser half from the strut.

(b) If it is necessary to remove the remaining thrust reverser half, follow these steps:

1) Make sure the remaining thrust reverser half is in the closed position.

2) Get access to the PDOS actuator bolt from the side of the engine that you removed the first thrust reverser half.

3) Remove the bolt [29], washer [28], bushing [27], washer [25] and nut [26].

NOTE: You must disconnect the bolt for the PDOS actuator in the retracted position. If the bolt will not come out, move the thrust reverser up and down slightly with the hoist.

4) Continue this procedure to remove the remaining thrust reverser half from the strut.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-865-001-H01

(13) Open these circuit breakers and install safety tags:

Ground Service/Handling Power Panel, P320

Row	Col	Number	Name
D	12	C78613	L ENG COWL DR MOT CTRL
D	13	C78614	R ENG COWL DOOR MOTOR CONTROL
F	6	C78301	L ENG COWL DR MOT
F	9	C78302	R ENG COWL DR MOT

SUBTASK 78-31-01-020-004-H01

CAUTION BE VERY CAREFUL WHEN YOU MOVE THE THRUST REVERSER NEAR THE STRUT. MAKE SURE THAT YOU MONITOR THE V-BLADES AND ATTACHING HARDWARE. DAMAGE TO THE THRUST REVERSER AND ENGINE CAN OCCUR.

CAUTION MONITOR THE WEIGHT WHILE YOU PUT A LOAD ON THE SLING. THE SLING LOAD MUST NOT BE MORE THAN THE WEIGHT OF THE THRUST REVERSER AND SLING. IF THE LOAD IS TOO HIGH, DAMAGE TO THE THRUST REVERSER AND THE EQUIPMENT CAN OCCUR.

(14) Lift the weight of the thrust reverser [3] with the overhead crane/hoist approximately 1.0 inch (25.4 mm) (Figure 404).

NOTE: The weight for the left thrust reverser half is 1703 lb (772 kg). The weight for the right thrust reverser half is 1620 lb (735 kg). The weight of the thrust reverser for the GE90-100 series engine is less than the weight for the thrust reverser for the GE90-70/-80/-90 series engine.

SUBTASK 78-31-01-020-005-H01

(15) With the full weight of the thrust reverser [3] on the overhead crane/hoist, disengage the hold-open rod as follows:

(a) Use the chain hoist [94] on the sling equipment to open the thrust reverser approximately 0.5 inch (12.7mm).

(b) Pull the collar on the hold-open rod to unlock the hold-open rod.

(c) Remove the quick disconnect pin from the bracket on the engine for the hold-open rod.

(d) Install the hold-open rod to the bracket on the thrust reverser with the quick disconnect pin.

SUBTASK 78-31-01-020-006-H01

(16) Use the chain hoist [94] on the sling equipment to move the thrust reverser to approximately 13-15 degrees from the closed position.

NOTE: This angle gives sufficient engine clearance and prevents the engagement of the reverser v-blades with engine v-grooves.

(a) Make sure the inner and outer v-blades at the top of the thrust reverser do not touch the v-grooves in the engine fan case and the engine inner cowl support.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-980-002-H00

(17) Look at the sling dynamometer and adjust the overhead crane to keep the load value close to the weight of the thrust reverser.

NOTE: As the sling puts a greater load on the bolts in the hinge beam, the load value on the dynamometer increases. A greater load on the bolts increases the friction on the hinge bolts. This makes the removal of the hinge bolts more difficult.

SUBTASK 78-31-01-020-003-H01

CAUTION DO NOT LET THE THRUST REVERSER MOVE AWAY FROM THE STRUT WHEN YOU REMOVE THE HINGE BOLT. IF IT MOVES AWAY FROM THE STRUT WITH ONE HINGE BOLT INSTALLED, DAMAGE TO THE THRUST REVERSER OR STRUT CAN OCCUR.

(18) Remove the bolt [61] from the NO.3 hinge fitting [30] (Figure 403):

(a) Remove the nut [62], washer [63] and shim [60].

(b) Install a thrust reverser hinge bolt thread protector (GE90-115B), SPL-4259 on the No. 2 hinge bolt [61] before you remove it.

(c) Remove the No. 2 hinge bolt [61].

1) Use a wood drift punch, STD-3842and a hammer to push the thread protector to remove the hinge bolt.

SUBTASK 78-31-01-020-007-H01

(19) Remove the bolt [38] from the NO.2 hinge fitting [19] (Figure 403):

(a) Remove the nut [39], washer [40], and shim [37].

(b) Install a thrust reverser hinge bolt thread protector (GE90-115B), SPL-4259 on the No. 3 hinge bolt [38] before you remove it.

(c) Remove the No. 3 hinge bolt [38].

1) Use a wood drift punch, STD-3842and a hammer to push the thread protector to remove the hinge bolt.

SUBTASK 78-31-01-020-008-H01

WARNING MOVE THE THRUST REVERSER SLOWLY AND CAREFULLY. IT IS NOT EASY TO STOP THE MOVEMENT OF THE THRUST REVERSER AND SLING QUICKLY. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

WARNING KEEP THE THRUST REVERSER IN THE VERTICAL POSITION WHEN YOU MOVE IT WITH THE SLING. IF YOU MOVE THE THRUST REVERSER WHILE IT IS HORIZONTAL, IT CAN TURN UPSIDE DOWN SUDDENLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(WARNING PRECEDES)

CAUTION BE VERY CAREFUL WHEN YOU MOVE THE THRUST REVERSER NEAR THE STRUT. MAKE SURE THAT YOU MONITOR THE V-BLADES AND ATTACHING HARDWARE. DAMAGE TO THE THRUST REVERSER AND ENGINE CAN OCCUR.

(20) Lift the thrust reverser [3] away from the strut.

NOTE: When the thrust reverser is moved with the sling, the thrust reverser must be in the near vertical position. If the thrust reverser is moved in the horizontal position, the center of mass can cause the thrust reverser to turn upside down suddenly. This can cause damage to the thrust reverser, the sling and crane and injury to personnel.

NOTE: The left thrust reverser half weighs 1703 lb (772 kg). The right thrust reverser half weighs 1620 lb (735 kg). The weight for the thrust reverser for the GE90-100 series engine is less than the weight for the thrust reverser for the GE90-70/-80/-90 series engine.

SUBTASK 78-31-01-020-009-H01

(21) For the inboard thrust reverser, turn the thrust reverser away from the wing as you move it away from the engine.

SUBTASK 78-31-01-020-010-H01

(22) Put the thrust reverser [3] on an approved repair fixture or an approved transportation stand.

NOTE: An approved repair fixture or an approved transportation stand is necessary to transport the thrust reverser, hold the thrust reverser during repair, and prevent damage to the thrust reverser and the thermal insulation blankets on the upper and lower bifurcation.

(a) If the transportation stand, thrust reverser stand, SPL-4256 is available, install the thrust reverser half on the transportation stand (Figure 405).

NOTE: The transportation stand can be used for the left or right thrust reverser half by movement of the v-groove support to the correct position on the stand.

1) Install the forward hinge attachment assembly [120] at the NO.2 hinge fitting [19] on the thrust reverser hinge beam with a pin [132] and lynch pin [131].

2) Install the aft hinge attachment assembly [129] at the NO.3 hinge fitting [30] on the thrust reverser hinge beam with a pin [132] and lynch pin [131].

3) Move the V-groove support assembly [127] to the side of the transportation work stand [123] to contact the inner v-blade fitting on the front side of the thrust reverser.

NOTE: The v-groove support assembly is installed on the work stand with seven washers and hex head cap screws.

CAUTION MONITOR THE LATCH BEAM ACCESS DOORS AS THE LEFT THRUST REVERSER HALF IS INSTALLED ON THE TRANSPORTATION STAND. DAMAGE TO THE DOORS COULD OCCUR.

4) Put the thrust reverser half on the transportation work stand [123].

a) Use the chain hoist [94] on the sling to control the angle of the thrust reverser to approximately 40 degrees from the horizontal.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) Engage the pins on the forward hinge attachment assembly [120] and the aft hinge attachment assembly [129] with the notched flanges on the top of the transportation work stand [123].

NOTE: There are four notched flanges on the top beam of the transportation stand. These flanges are spaced for the hinge points on the left or right thrust reverser half. There are stencils that identify the thrust reverser hinge points on the transportation stand.

c) Lower the thrust reverser with the sling until contact is made with the pads [128] and pads [135] for the latch beam and aft cowl.

d) Attach the forward hinge attachment assembly [120] and the aft hinge attachment assembly [129] to the transportation work stand [123] with the pin [130] and lynch pin [131].

e) Adjust the three adjustable support blocks [136] to engage the v-blade on the thrust reverser.

NOTE: Loosen the cap screw to adjust each support block.

f) Adjust the upper levels [133] on the transportation work stand to contact the compression cups on the upper bifurcation.

g) Adjust the lower levels [134] on the transportation work stand to contact the compression pads on the lower bifurcation.

h) Use the long strap [122] and short strap [121] hold the thrust reverser to the transportation work stand [123] before the transportation stand is moved.

<1> Hook the loop in the end of the straps in the end links on the top beam of the work stand.

<2> Use the hold down rings [124] on the bottom of the transportation work stand [123] if the thrust reverser and stand are transported.

NOTE: Do not lift the work stand with the hold down rings. The hold down rings are used to tie down the transportation work stand.

<3> If the casters [125] are installed, use the towbar [126] to tow the work stand.

NOTE: If the work stand is towed, do not exceed 5 miles per hour (8 kilometers per hour).

SUBTASK 78-31-01-090-001-H01

(23) Remove the GE90 fan thrust reverser sling equipment, SPL-2594 and hinge fitting, SPL-4278 from the thrust reverser [3] (Figure 404).

(a) Disconnect the chain hoist from the lower sling assembly [95].

(b) Remove the hinge attach pin [98] and the lynch pin [99] to disconnect the upper sling assembly [96] from the upper attachment points.

(c) Remove the upper sling assembly [96], the lift plate [93], the master link [92], the chain hoist [94], the load cell [91] and the 10,000 pounds capacity overhead hoist, STD-2493.

(d) Remove the forward and aft hinge attach fittings.

1) At the forward upper attachment point, remove the lynch pin [99], the hinge attach pin [100] and the forward hinge attach fitting [102].

2) At the aft upper attachment point, remove the lynch pin [99], the hinge attach pin [98] and the aft hinge attach fitting [97].

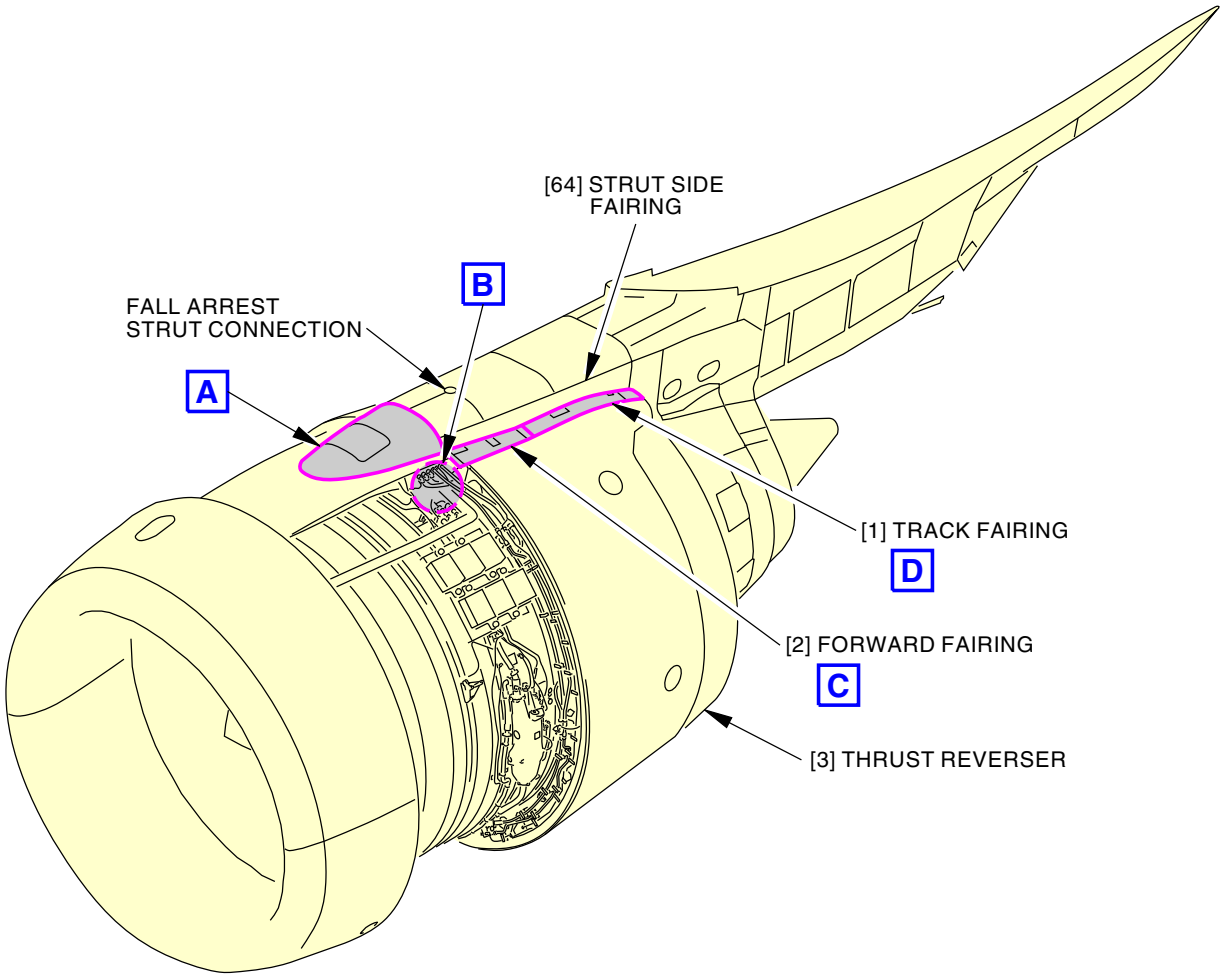
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) At the lower attachment point, remove the bolt [103], washer [104] and the latch beam attach fitting [105].

1) Store the bolts and washers on the latch beam attach fitting [105].

——— END OF TASK ———

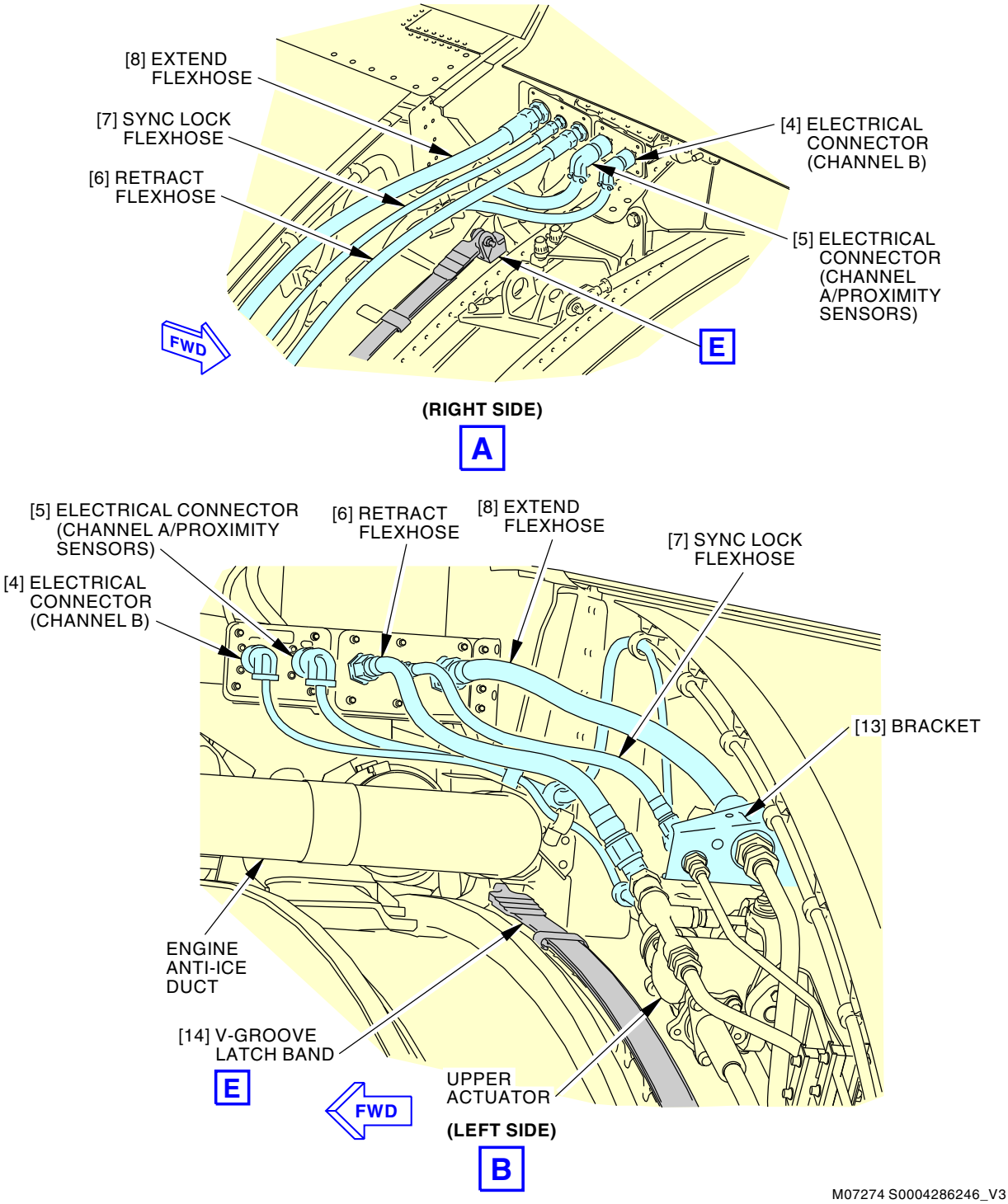
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07272 S0004286244_V2

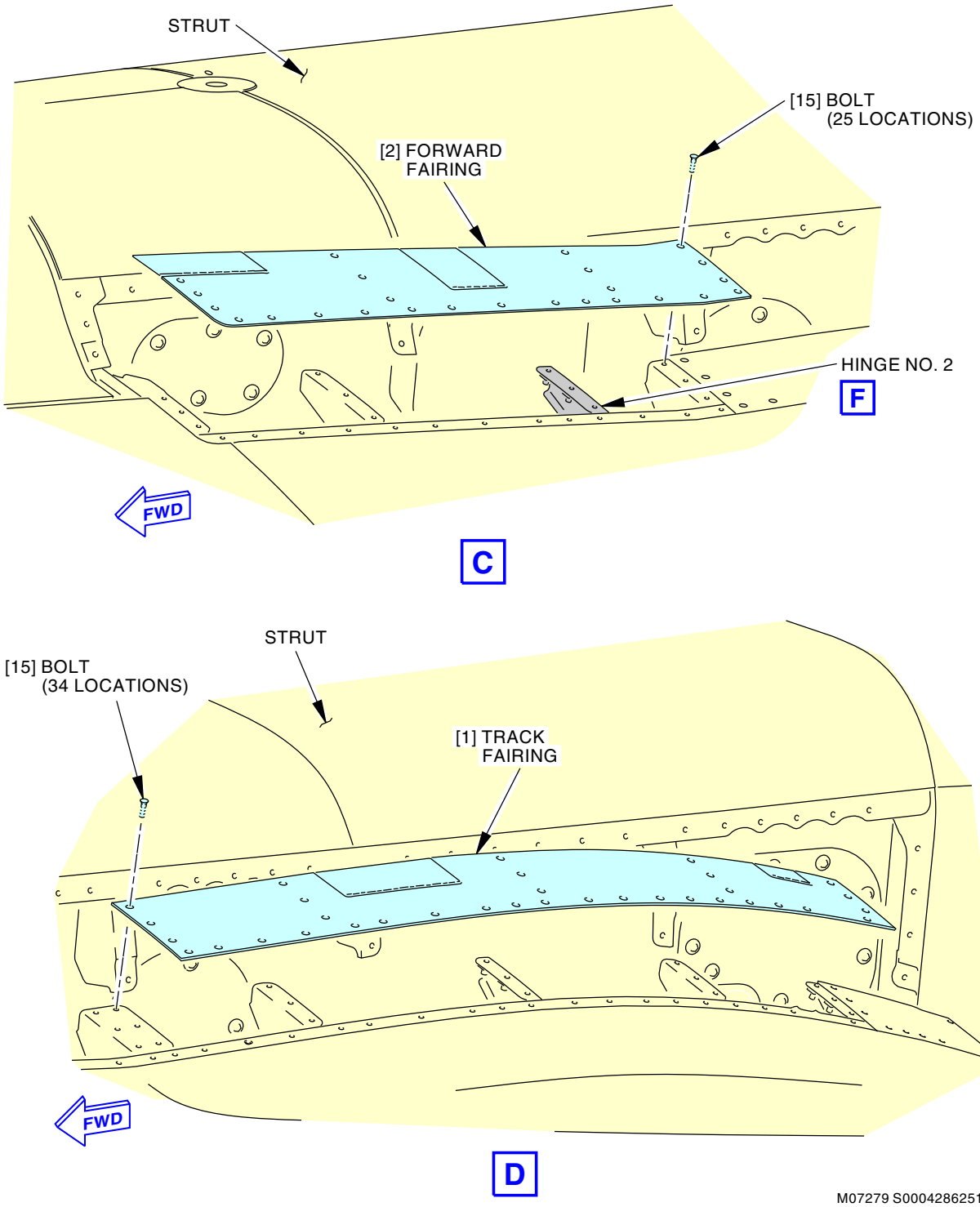
Thrust Reverser Disconnects
Figure 401/78-31-01-990-834-H00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



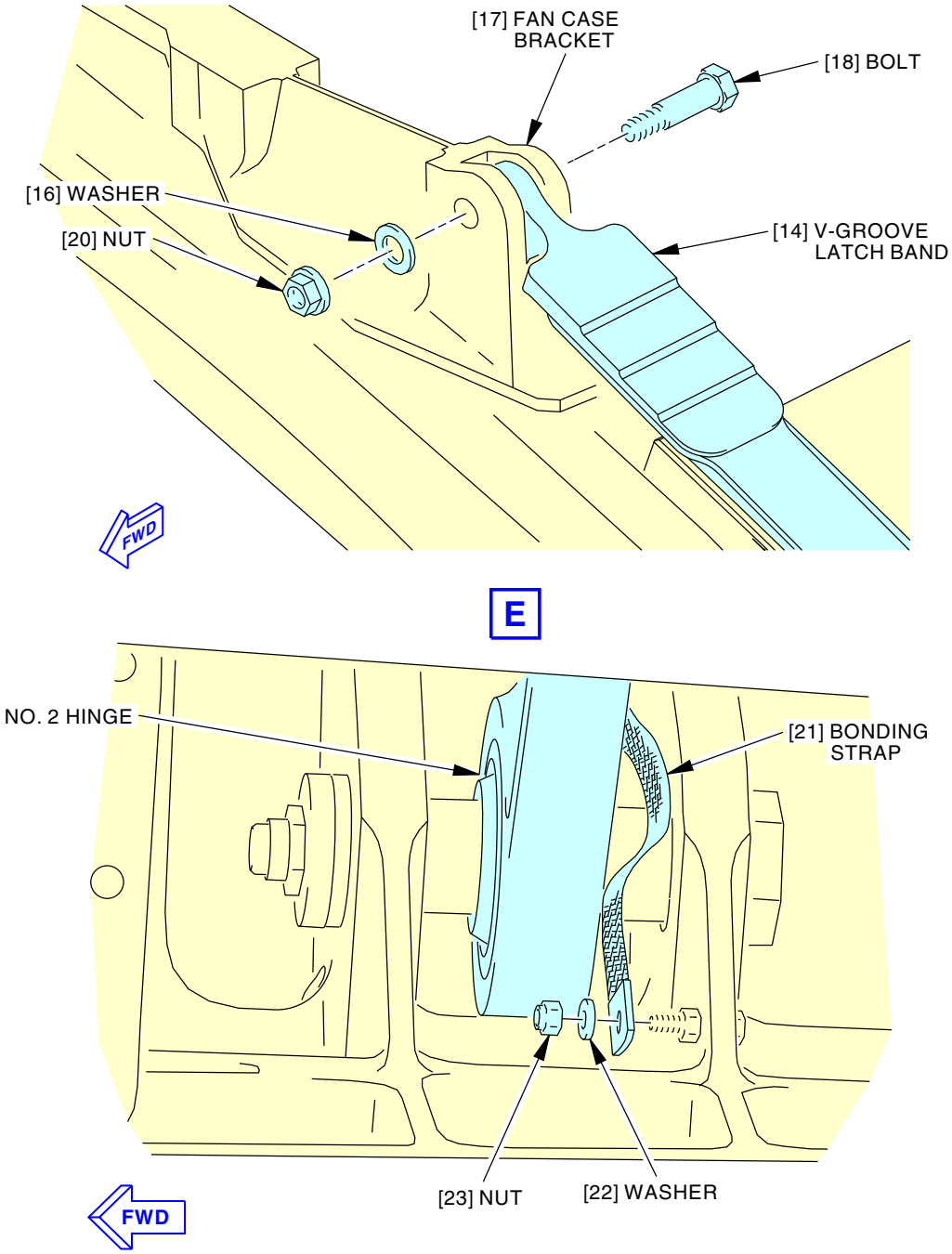
Thrust Reverser Disconnects
Figure 401/78-31-01-990-834-H00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Disconnects
Figure 401/78-31-01-990-834-H00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



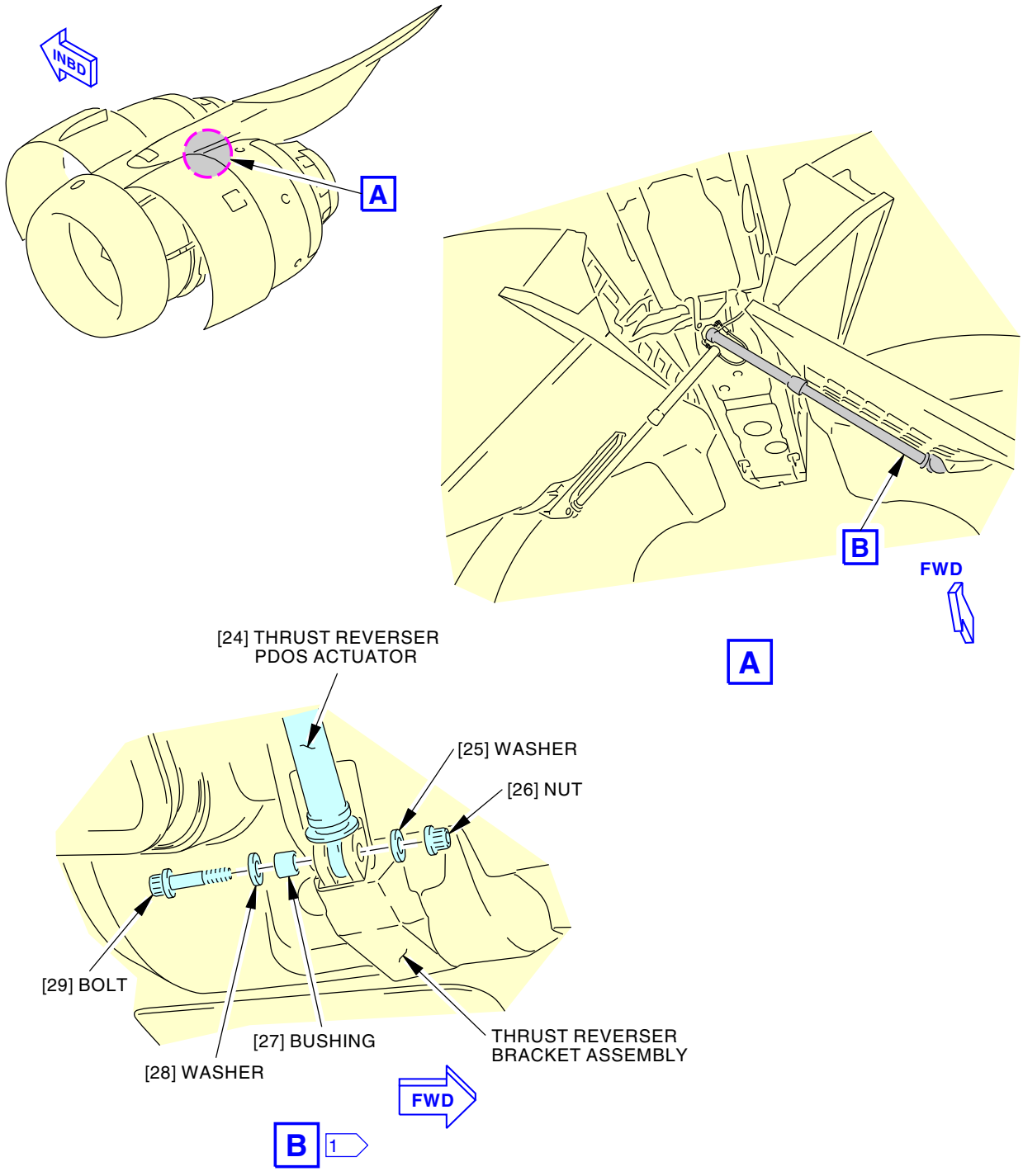
(LEFT SIDE IS SHOWN, RIGHT SIDE IS EQUIVALENT)

F

M07280 S0004286252_V2

Thrust Reverser Disconnects
Figure 401/78-31-01-990-834-H00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

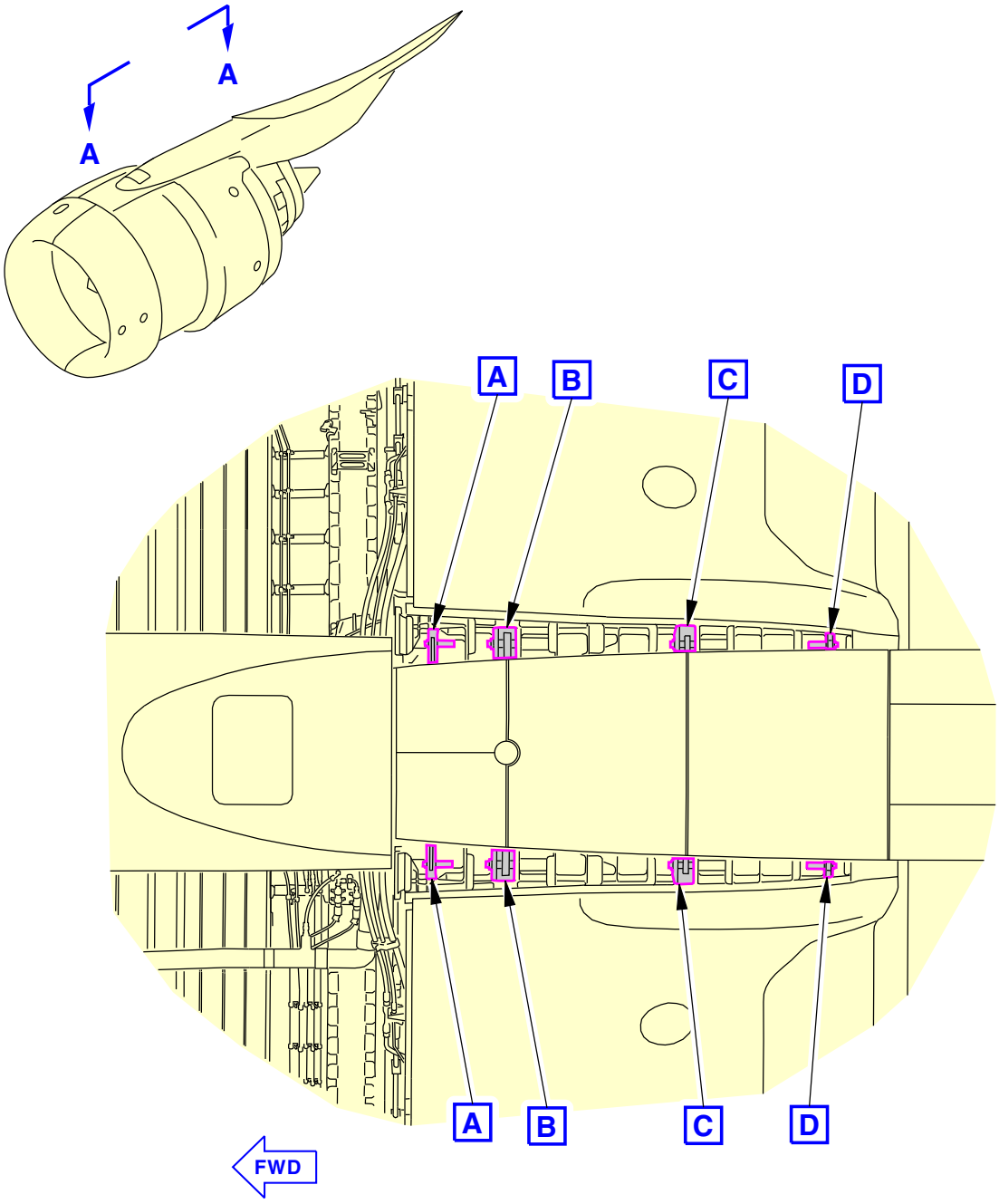


1 INSTALLATION OF THE LEFT AND RIGHT ACTUATOR IS THE SAME.

M07291 S0004286263_V2

Thrust Reverser PDOS Actuator Installation
Figure 402/78-31-01-990-835-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

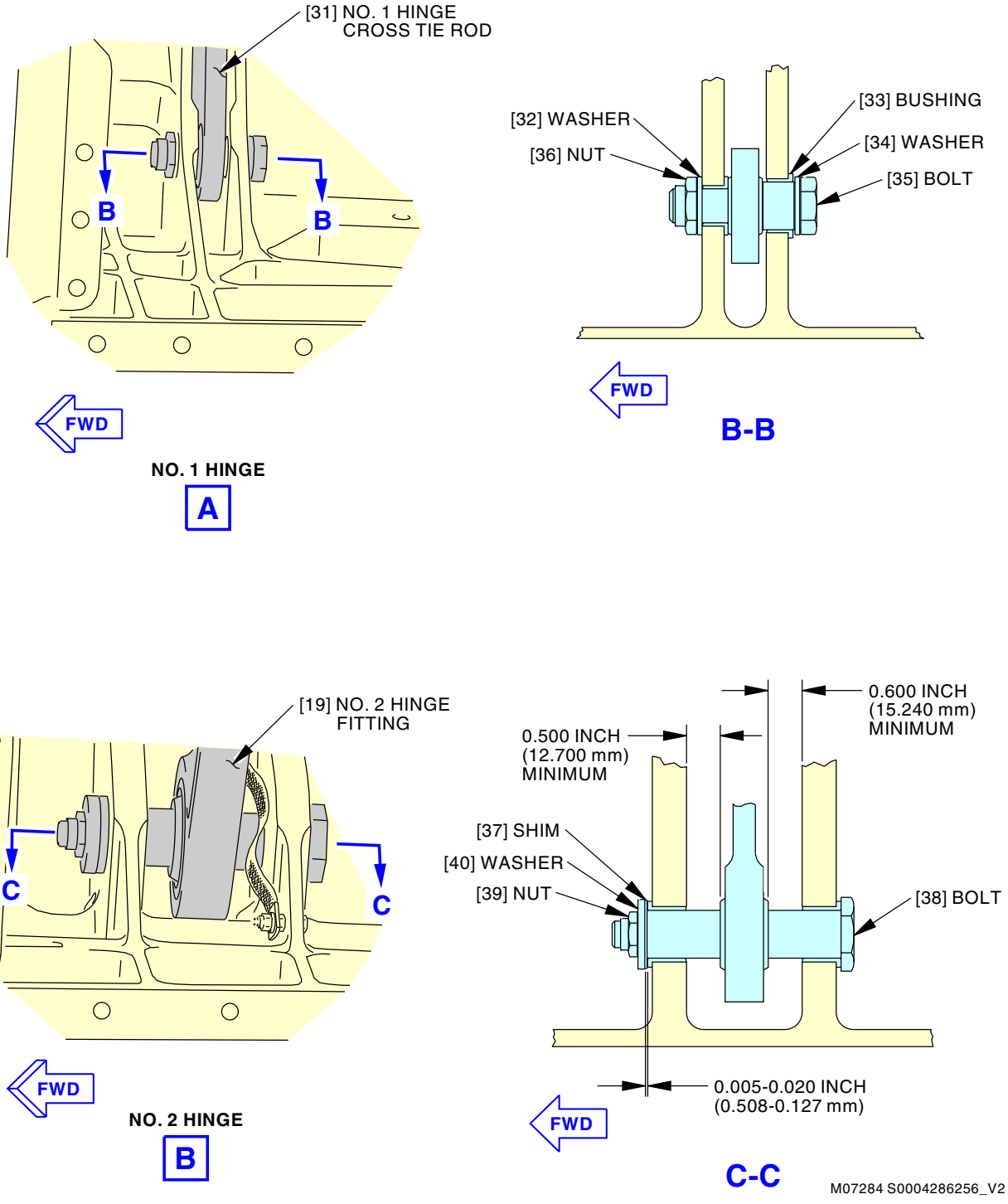


A-A

M07283 S0004286255_V2

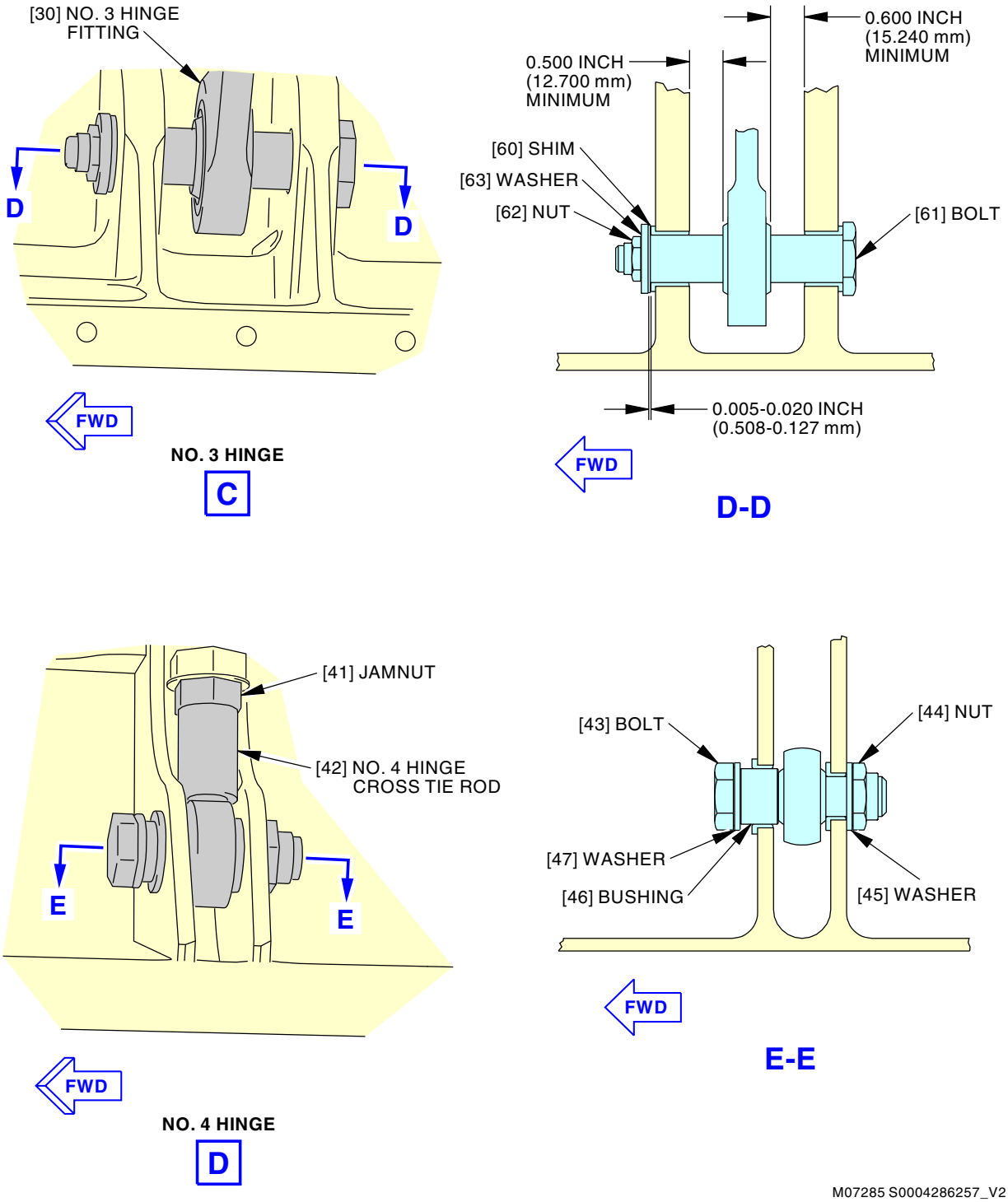
Thrust Reverser Hinge Installation
Figure 403/78-31-01-990-836-H00 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Hinge Installation
Figure 403/78-31-01-990-836-H00 (Sheet 2 of 5)

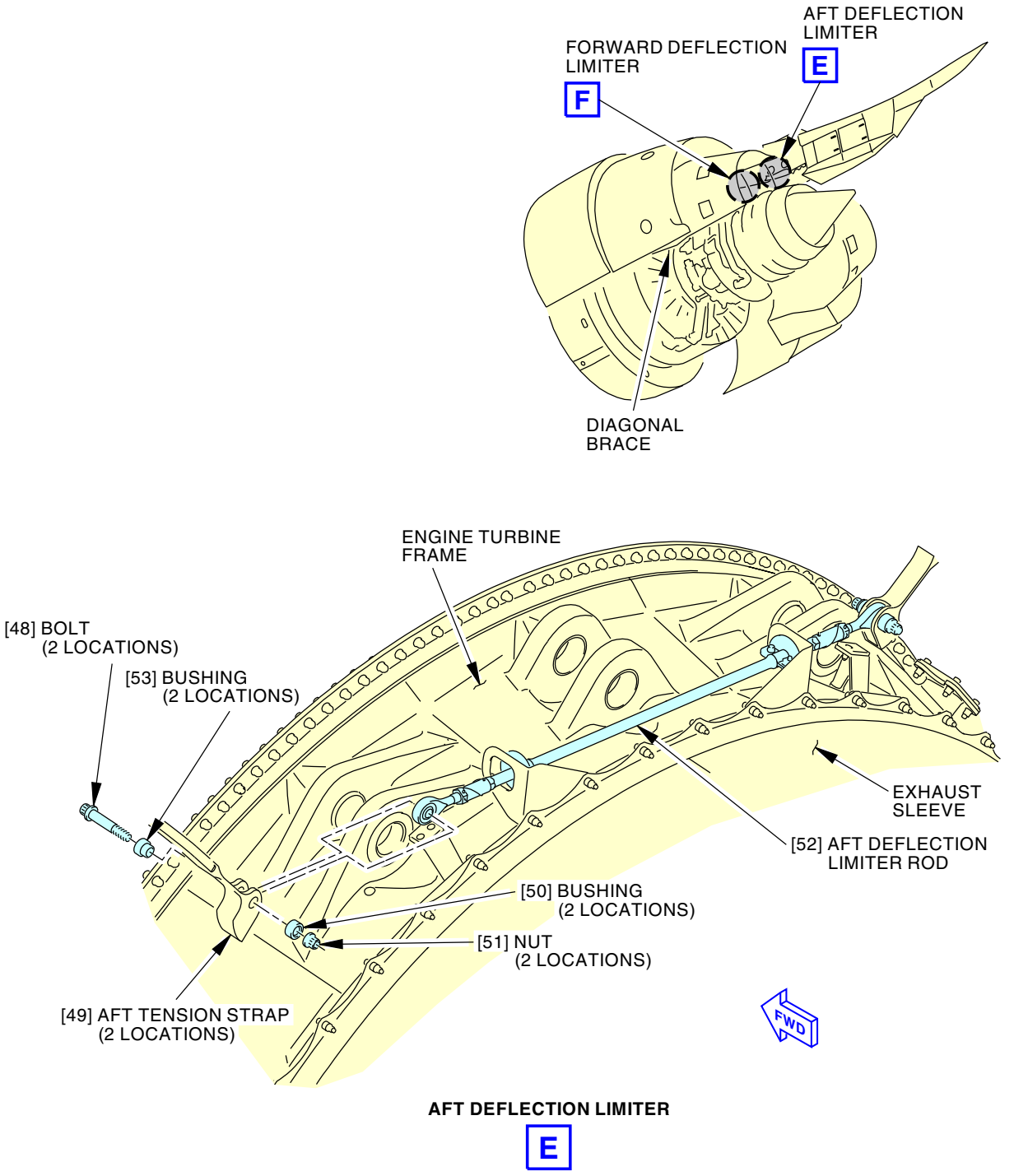
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07285 S0004286257_V2

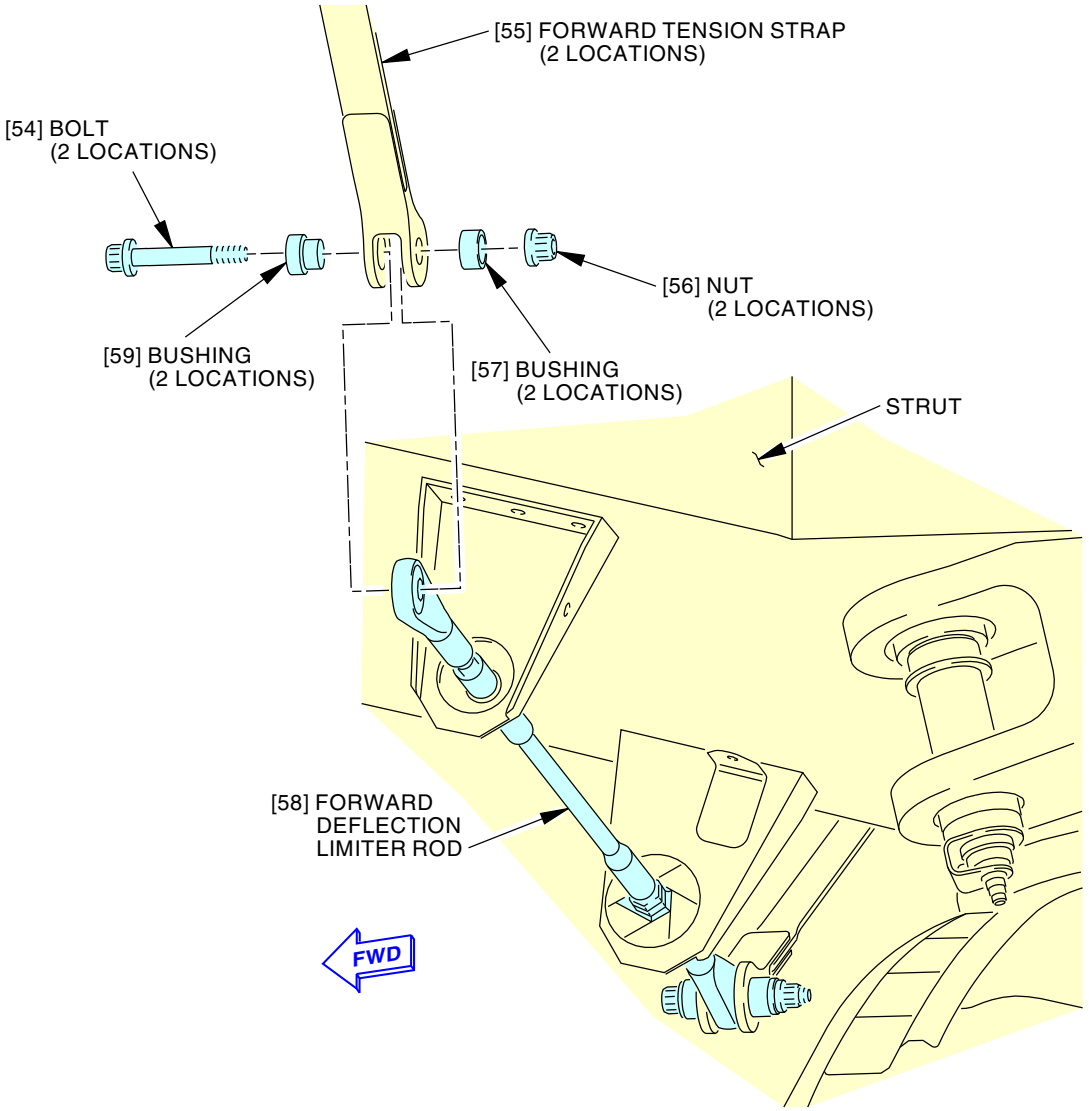
Thrust Reverser Hinge Installation
Figure 403/78-31-01-990-836-H00 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Hinge Installation
Figure 403/78-31-01-990-836-H00 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



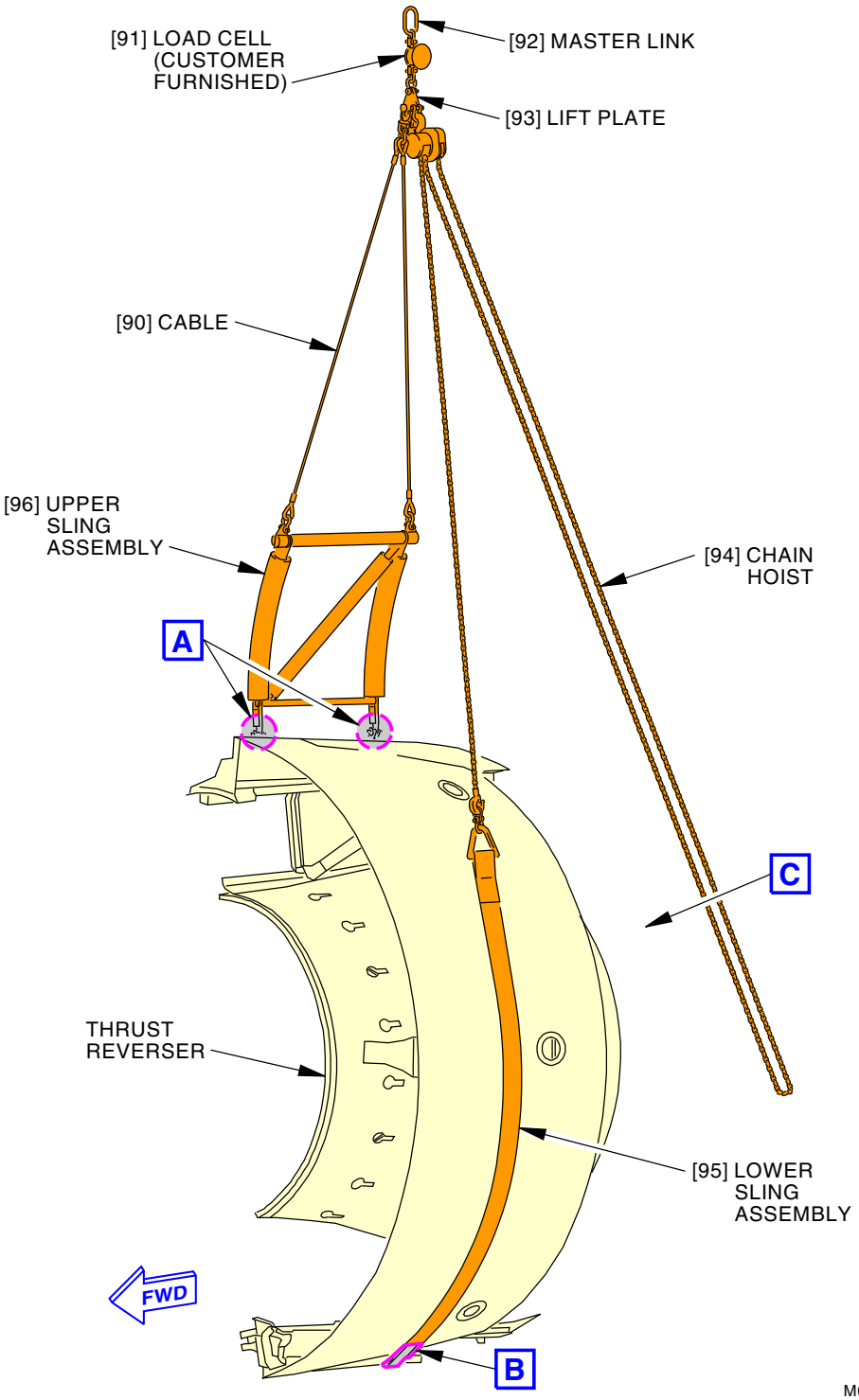
FORWARD DEFLECTION LIMITER
(DIAGONAL BRACE REMOVED FOR CLARITY)

F

M07287 S0004286259_V2

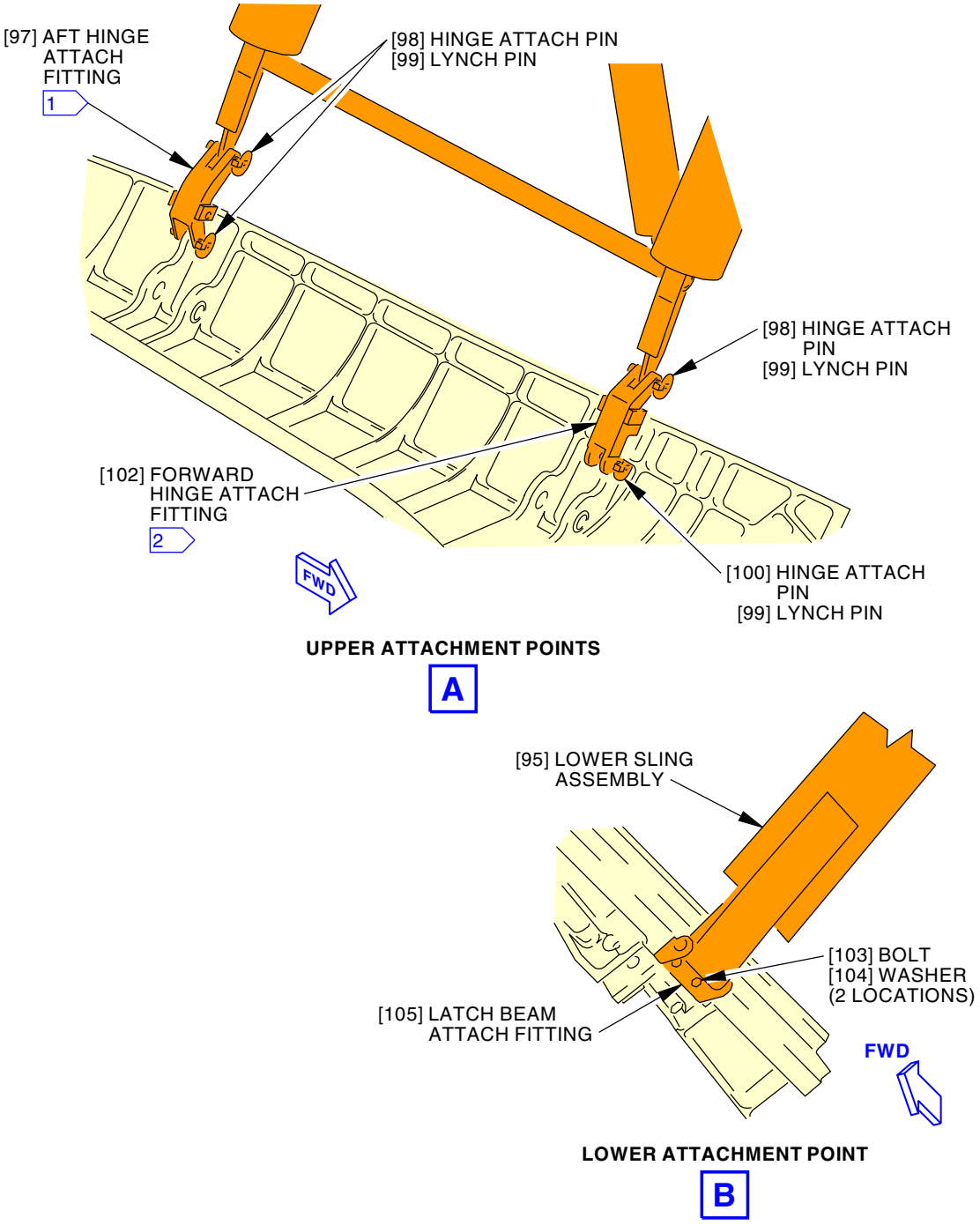
Thrust Reverser Hinge Installation
Figure 403/78-31-01-990-836-H00 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sling Assembly
Figure 404/78-31-01-990-837-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



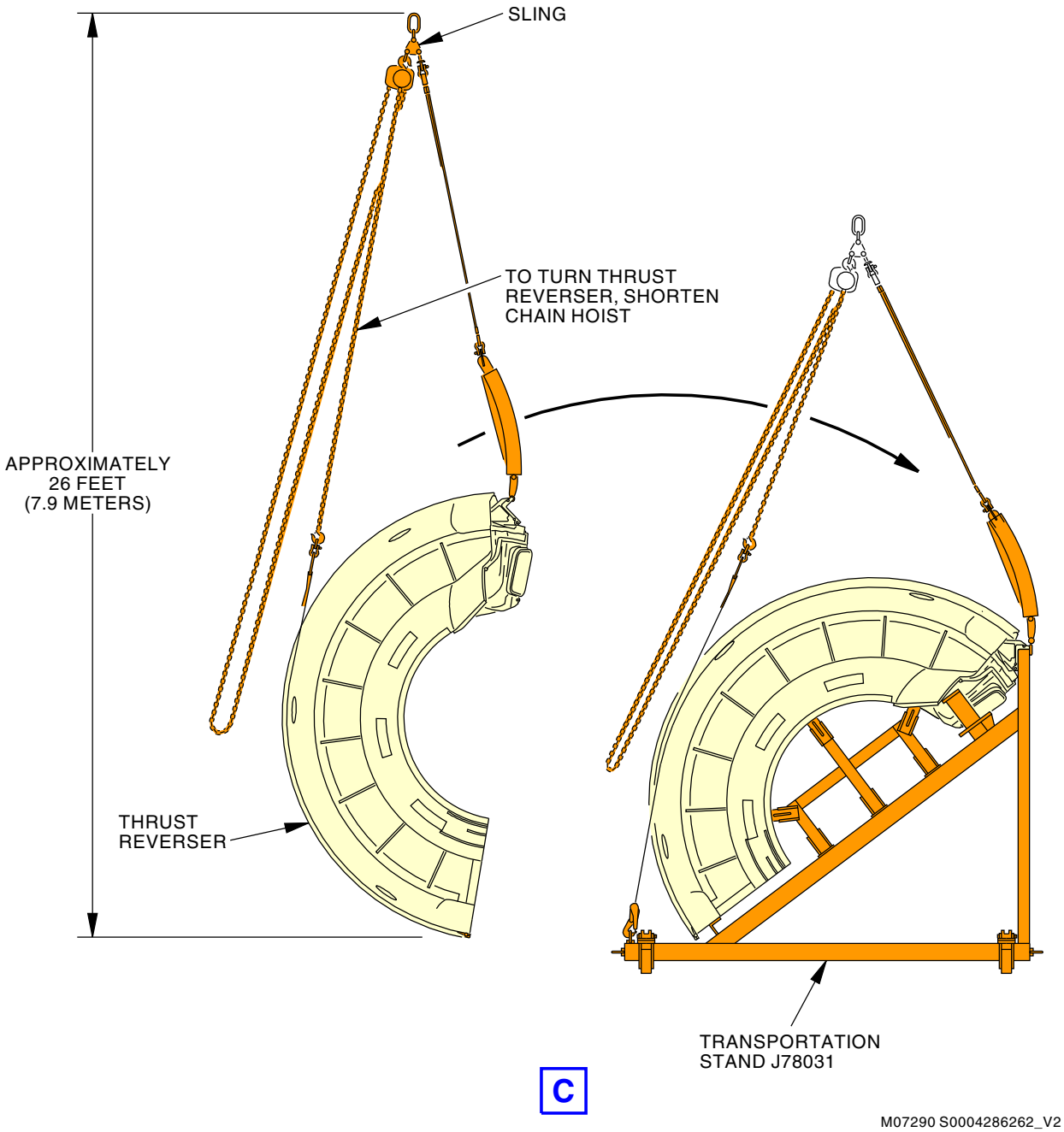
1 THE GSE ATTACH POINT IS ON THE 2ND HINGE FITTING FROM THE AFT END.

2 THE GSE ATTACH POINT IS ON THE 3RD HINGE FITTING FROM THE AFT END.

M07289 S0004286261_V2

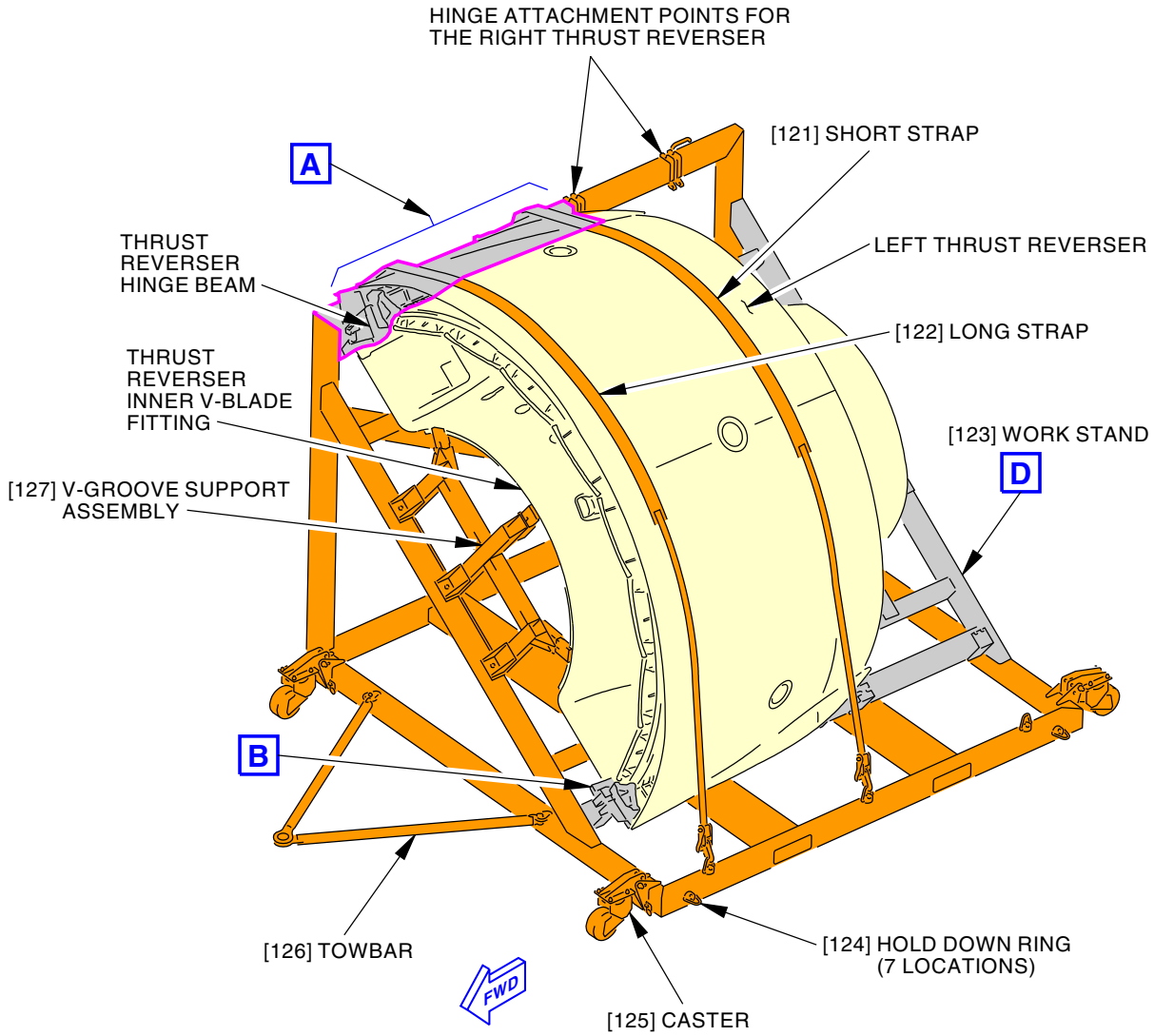
Thrust Reverser Sling Assembly
Figure 404/78-31-01-990-837-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sling Assembly
Figure 404/78-31-01-990-837-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



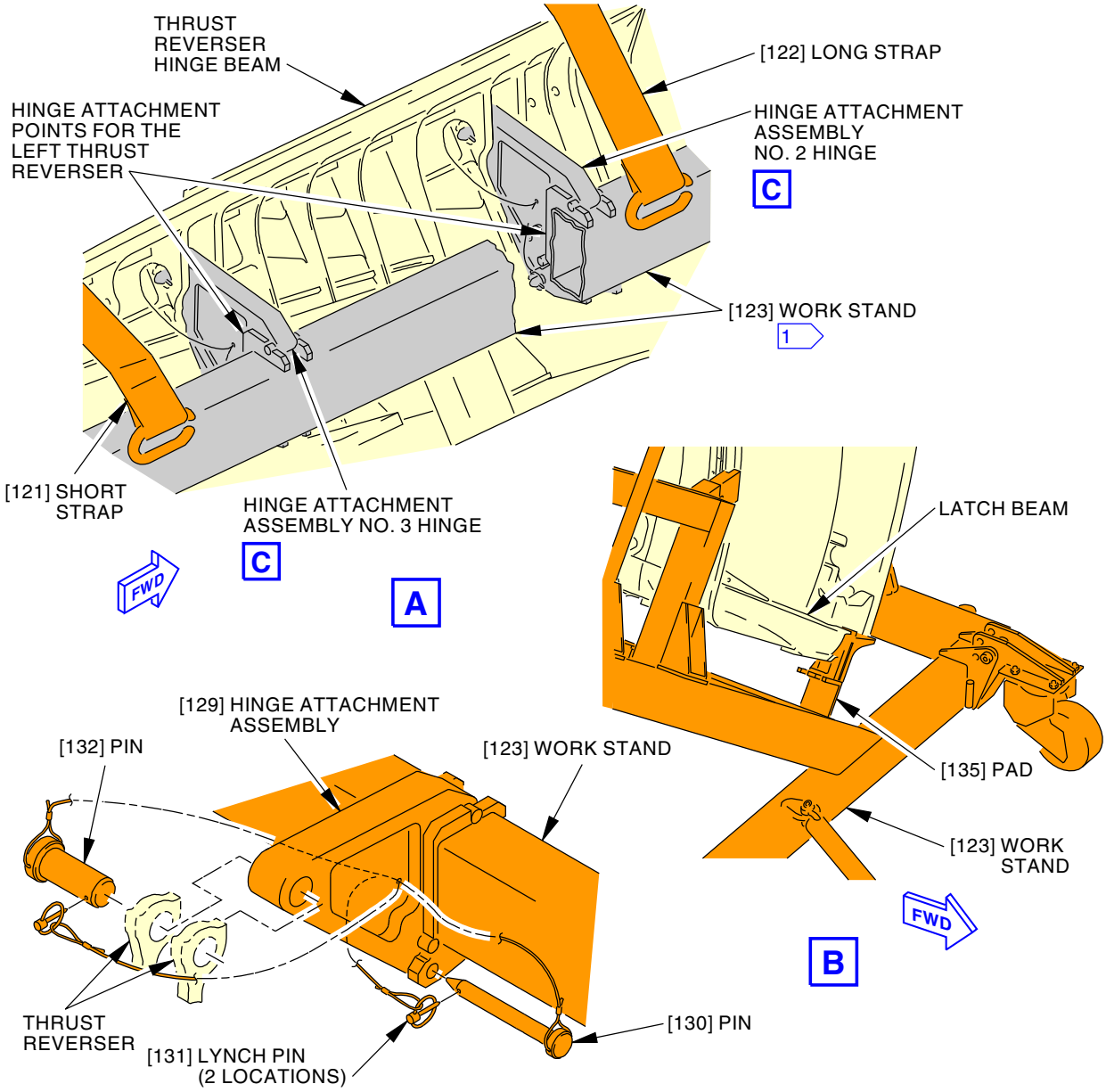
NOTE:

ADJUST LEVEL ASSEMBLIES TO
CONTACT THRUST REVERSER PADS.

M07292 S0004286264_V2

Thrust Reverser Transportation Work Stand
Figure 405/78-31-01-990-838-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



HINGE ATTACHMENT ASSEMBLY
NO. 2 HINGE SHOWN, NO. 3 HINGE IS EQUIVALENT

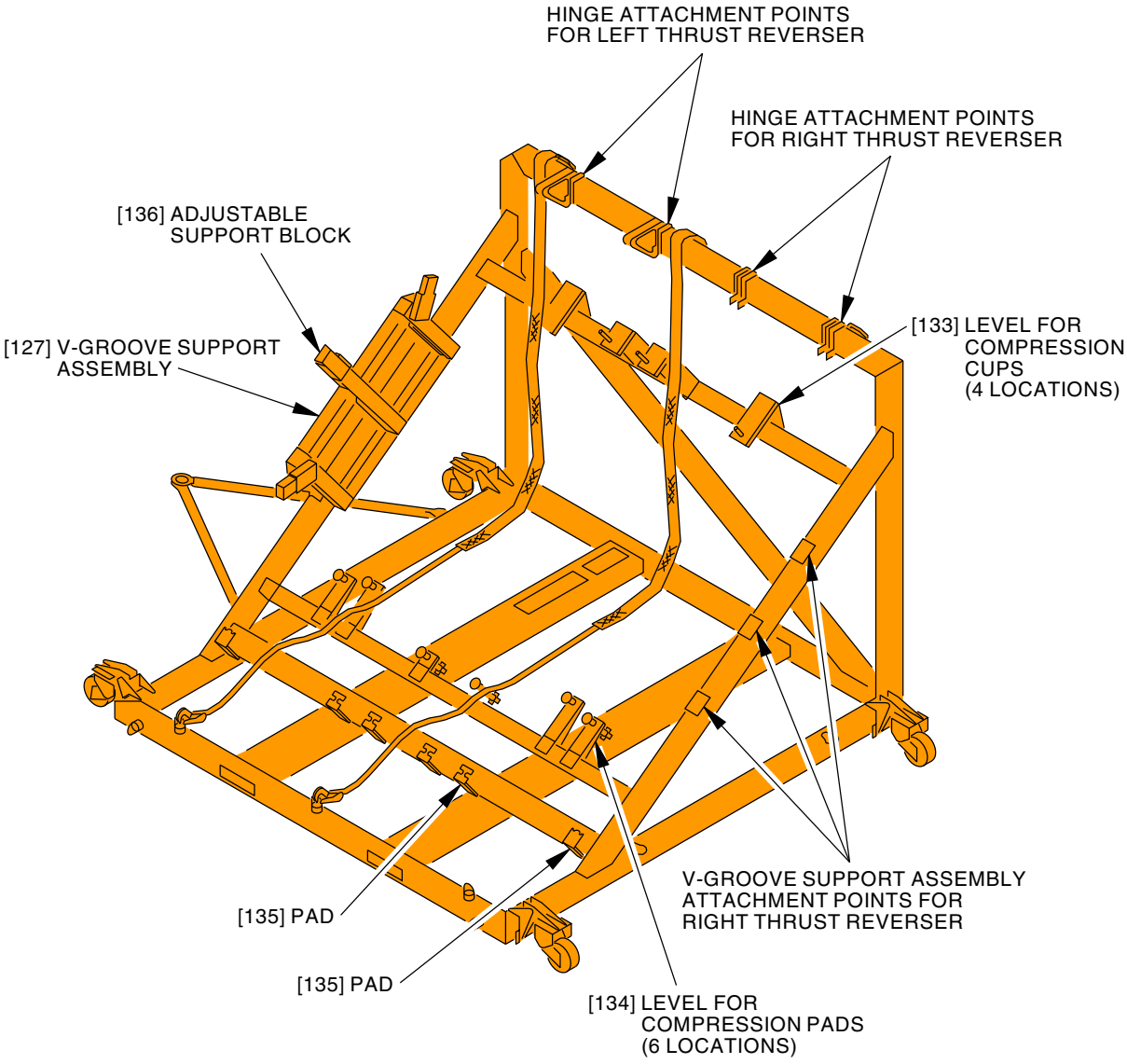
C

1 ATTACH THE HINGE ATTACHMENT ASSEMBLIES TO THE THRUST REVERSER BEFORE YOU LOAD THE THRUST REVERSER ON THE STAND

M07293 S0004286265_V2

Thrust Reverser Transportation Work Stand
Figure 405/78-31-01-990-838-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



D

N50625 S0000107597_V2

Thrust Reverser Transportation Work Stand
Figure 405/78-31-01-990-838-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-01-400-801-H01

3. Thrust Reverser Installation

(Figure 401, Figure 402, Figure 403, Figure 404 and Figure 405)

A. General

(1) This task is the installation procedure for the left or right thrust reverser half.

(2) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(3) You must do the thrust reverser adjustment after you install the thrust reverser.

(a) If you installed the same thrust reverser that was removed, it is not necessary to do the adjustment procedure.

(4) Move the thrust reverser in the vertical position with the thrust reverser sling. The center of gravity of the thrust reverser in the horizontal position can cause the thrust reverser to turn upside down suddenly.

(5) Remove the protection covers from the electrical connectors and receptacles, hydraulic lines and fittings which would prevent the correct operation of the engine and airplane systems.

(6) The transportation stand is used to transport the thrust reverser half from the maintenance shop to the airplane after component maintenance.

(7) The left and right thrust reverser is interchangeable to the left or right engine location if the cascade segments are in the specified location for that engine.

(8) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(9) The No.2 and No.3 hinge bolts and fittings carry the weight of the thrust reverser. The No.1 and No.4 hinge bolts keep the thrust reverser positioned on the hinges so that the inner and outer v-blades interface with the v-groove correctly.

B. References

Reference	Title
20-10-10-400-801	Flexible Hose Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-400-801-001	Forward Fairings Installation (P/B 401)
71-11-04-400-805-H01	Fan Cowl Panels Installation (P/B 401)
78-31-00-010-802-H01	Open the Thrust Reverser (Power Method) (P/B 201)
78-31-00-410-802-H01	Close the Thrust Reverser (Power Method) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-01-830-801-H01	Thrust Reverser Adjustment (P/B 501)
78-31-16-000-801-H01	Thrust Reverser Cascade Segments Removal (P/B 401)
78-31-16-400-801-H01	Thrust Reverser Cascade Segments Installation (P/B 401)
78-31-19-400-801-H01	Thrust Reverser Latch Access Doors Installation (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1550	Bonding Meters - Approved, Intrinsically Safe (Approved for use in Class I, Divisions I & II hazardous (classified) locations. Outside these hazardous locations, COM-614 can be used in lieu of COM-1550). Part #: 620LK Supplier: 1CRL2 Part #: M1 Supplier: 3AD17 Part #: T477W Supplier: 01014 Opt Part #: M1B Supplier: 3AD17
SPL-2594	Equipment - Sling, GE90 Fan Thrust Reverser Part #: J78004-123 Supplier: 81205 Opt Part #: J78004-89 Supplier: 81205
SPL-4256	Stand - Transportation, Fan Thrust Reverser (GE90/GE90-115B engine) Part #: J78031-85 Supplier: 81205
SPL-4259	Protector - Thread, Thrust Reverser Hinge Bolt (GE90-115B engine) Part #: J78005-10 Supplier: 81205
SPL-4278	Fittings - Hinge, GE90 Fan T/R Sling (GE90-70/80/90 series & -100 series) Part #: J78004-90 Supplier: 81205
STD-299	Load Measuring Device - 10,000 lbs minimum capacity
STD-470	Hoist - Overhead, Capacity 10,000 Pounds
STD-589	Mat - Protective Cover
STD-2493	Hoist - Overhead, Capacity 10,000 lb (4,536kg)

D. Consumable Materials

Reference	Description	Specification
A50464	Tape - Vinyl, Adhesive Coated	BMS5-179
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
D00633	Grease - Aircraft General Purpose	BMS3-33
G00039	Cord - Fibrous, Nylon (100 Lb Strength)	MIL-C-5040 Type IA
G02129	Tape - 223S (use until stock depleted)	

E. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
413	Left Fan Cowl - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
431	Forward Strut Fairing - Left Nacelle Strut
432	Forward Torque Box - Left Nacelle Strut
434	Aft Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut
442	Forward Torque Box - Right Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
415FL	Center Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
416FR	Center Thrust Reverser Hinge Cover, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

G. Thrust Reverser Installation

SUBTASK 78-31-01-860-002-H01

CAUTION DO NOT LIFT OR MOVE THE THRUST REVERSER HALF UNLESS THREE CASCADE SEGMENTS ARE INSTALLED. BETWEEN THE INSTALLED SEGMENTS, NO MORE THAN TWO CASCADE SEGMENTS CAN BE MISSING. DAMAGE TO THE THRUST REVERSER STRUCTURE CAN OCCUR.

(1) Do not lift or move the thrust reverser with less then three cascade segments installed.

(a) Make sure a minimum of three cascade segments are installed equally spaced around the thrust reverser half.

NOTE: The cascades are part of the thrust reverser structure.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Make sure no more than two cascade segments are missing between the installed segments.

SUBTASK 78-31-01-090-002-H01

(2) If the transportation stand, thrust reverser stand, SPL-4256 or equivalent equipment was used, prepare to remove the thrust reverser half from the transportation stand (Figure 405).

(a) Move the transportation stand to the airplane.

(b) Open the two straps that hold the thrust reverser half on the transportation stand.

(c) Remove the pins and lynch pins that hold the forward and aft hinge attach assemblies to the transportation stand.

SUBTASK 78-31-01-490-004-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(3) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-01-400-001-H00

(4) For the inboard thrust reverser, make sure that a protective cover mat, STD-589 is installed on the leading edge of the wing.

NOTE: The chain hoist, strap and the upper sling assembly will be near the wing leading edge when the thrust reverser is removed or installed. These parts of the sling assembly can interfere or collide with the leading edge. The protective cover mat should be a continuous piece, cover a minimum length of 7 ft (2134 mm) of the leading edge and should wrap around the leading edge a minimum of 2 ft (610 mm). A carpet or heavy canvas fabric or rubber mat could be used.

(a) Install the protective cover mat with adhesive Nitto 223S Tape, G02129, tape, A50464 or equivalent local product.

SUBTASK 78-31-01-490-005-H01

CAUTION DO NOT ATTACH THE HOIST ASSEMBLY TO THE THRUST REVERSER SLEEVE. STRUCTURAL DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(5) Attach the GE90 fan thrust reverser sling equipment, SPL-2594 and hinge fitting, SPL-4278 to the thrust reverser [3] (Figure 404).

(a) Install the forward and aft hinge attach fittings to the upper hinge beam.

NOTE: The fittings are marked to show which end is attached to the thrust reverser. These forward and aft hinge attach fittings are longer to give clearance with hinge beam.

1) At the forward upper attachment point, attach the forward hinge attach fitting [102] with the hinge attach pin [100] and the lynch pin [99].

2) At the aft upper attachment point, attach the aft hinge attach fitting [97] with the hinge attach pin [98] and the lynch pin [99].

(b) Install the lower attach fitting to the lower latch beam.

NOTE: The lower attach fitting is marked with the part number of the bolts and the attach fitting is also the storage location for the bolts and washers.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) At the lower attachment point, attach the latch beam attach fitting [105] with the bolt [103] and washer [104].

(c) Attach the cable [90] to the upper sling assembly [96] and the lift plate [93].

(d) Attach the chain hoist [94] to the lift plate [93].

(e) Attach the load cell [91] between the lift plate [93] and the master link [92].

NOTE: The minimum capacity 10,000 lbs, load measuring device, STD-299 is a customer furnished item.

(f) Connect a overhead crane/10,000 lb capacity overhead hoist, STD-470 to the master link [92].

NOTE: The overhead crane/hoist is a customer furnished item.

(g) Lift the sling equipment with the overhead crane/10,000 lb capacity overhead hoist, STD-470 to the thrust reverser.

(h) Attach the upper sling assembly [96] to the aft hinge attach fitting [97] and forward hinge attach fitting [102] with the hinge attach pin [98] and the lynch pin [99].

(i) Attach the chain hoist [94] to the lower sling assembly [95].

(j) Attach nylon cord, G00039 tag lines to the thrust reverser.

NOTE: These tag lines will be used to slow the movement of the thrust reverser as the thrust reverser is lifted into position.

SUBTASK 78-31-01-090-003-H01

(6) Remove the lynch pin [131] and pin [130] to disconnect the forward hinge attachment assembly [120]and the aft hinge attachment assembly [129] from the transportation work stand [123].

SUBTASK 78-31-01-420-003-H01

WARNING MOVE THE THRUST REVERSER SLOWLY AND CAREFULLY. IT IS NOT EASY TO STOP THE MOVEMENT OF THE THRUST REVERSER AND SLING QUICKLY. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

WARNING KEEP THE THRUST REVERSER IN THE VERTICAL POSITION WHEN YOU MOVE IT WITH THE SLING. IF YOU MOVE THE THRUST REVERSER WHILE IT IS HORIZONTAL, IT CAN TURN UPSIDE DOWN SUDDENLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

CAUTION BE VERY CAREFUL WHEN YOU MOVE THE THRUST REVERSER NEAR THE STRUT. MAKE SURE THAT YOU MONITOR THE V-BLADES AND ATTACHING HARDWARE. DAMAGE TO THE THRUST REVERSER AND ENGINE CAN OCCUR.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(CAUTION PRECEDES)

CAUTION

MONITOR THE WEIGHT WHILE YOU PUT A LOAD ON THE SLING. THE SLING LOAD MUST NOT BE MORE THAN THE WEIGHT OF THE THRUST REVERSER AND SLING. IF THE LOAD IS TOO HIGH, DAMAGE TO THE THRUST REVERSER AND THE EQUIPMENT CAN OCCUR.

(7) Move the thrust reverser [3] to the installation position:

NOTE: The weight for the left thrust reverser half is 1703 lb (772 kg). The weight for the right thrust reverser half is 1620 lb (735 kg). The weight for the thrust reverser for the GE90-100 series engine is less than the weight for the thrust reverser for the GE90-70/-80/-90 series engine.

NOTE: The weight of the thrust reverser is shown as a load value on the sling dynamometer.

(a) Carefully lift the thrust reverser from the transportation work stand [123].

(b) If the transportation stand, thrust reverser stand, SPL-4256 was used, remove the hinge attachment assemblies from the hinge beam before the thrust reverser half is aligned with the strut.

1) Remove the pin [132] and lynch pin [131] to remove the forward hinge attachment assembly [120] from the NO.2 hinge fitting [19].

2) Remove the pin [132] and lynch pin [131] to remove the aft hinge attachment assembly [129] from the NO.3 hinge fitting [30].

(c) Use the chain hoist [94] on the sling equipment to move the thrust reverser to approximately 13-15 degrees from the vertical position after the thrust reverser is removed from the work stand [123].

(d) Carefully lift the thrust reverser to the airplane strut.

1) Make your crane lift movements slow and small to keep control of the thrust reverser and sling.

NOTE: This instruction applies to factory or hanger, overhead crane/hoists with fine motor controls and to self-propelled, rubber tire, hydraulic extension beam cranes which may not have fine hydraulic controls. Because of the size and mass of this thrust reverser (inertia), it will be difficult to start the movement of the thrust reverser and sling and it will be difficult to stop the movement and the direction of the movement if the lift movements are too fast.

2) Make sure that you slow the movement of the thrust reverser and sling as you get near the strut; pull on the tag lines in the opposite direction if the movement of thrust reverser and sling looks like they will damage the side of the strut or the wing leading edge.

NOTE: It is possible to damage the aerodynamic fairings on the side of the strut with parts of the sling or the thrust reverser.

(e) Align the thrust reverser hinge beam flanges with the NO.2 hinge fitting [19] and NO.3 hinge fitting [30] on the strut.

NOTE: If the axial alignment of the bolt holes through the hinge beam flanges and the strut fittings is correct, the hinge bolts will not bind in the bushings in the flanges or the spherical bearing in the fitting when installed.

1) If the overhead crane/hoist has fine motor controls which allows precise adjustment, you can use the crane to align the bolt holes in the flanges and the fittings.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Use the sling chain hoist to roll the thrust reverser slightly upward or downward to make the holes align.

3) Personnel can stand to one side of the thrust reverser and manually push or pull the thrust reverser inward or outward in the necessary direction to make the holes align.

4) Personnel can stand to one side of the thrust reverser and manually push or pull the thrust reverser forward or aft in the necessary direction to position the hinge fittings between the hinge beam flanges.

(f) When you move the thrust reverser near the installation position, make sure the inner and outer v-blades are away and above the v-grooves.

SUBTASK 78-31-01-420-004-H01

(8) Make sure the NO.2 hinge fitting [19] and NO.3 hinge fitting [30] are correctly positioned between the flanges on the thrust reverser hinge beam (Figure 403).

(a) Measure the gap at the front side if the hinge fitting and the hinge beam flange; the gap should be 0.500 inch (12.700 millimeters) minimum.

(b) Measure the gap at the aft side if the hinge fitting and the hinge beam flange; the gap should be 0.600 inch (15.240 millimeters) minimum.

SUBTASK 78-31-01-420-005-H01

(9) Install the bolt [38] in the NO.2 hinge fitting [19].

(a) Make sure a thrust reverser hinge bolt thread protector (GE90-115B), SPL-4259 is installed on the No. 2 hinge bolt [38].

(b) Apply the grease, D00633 to the shank of the bolt [38].

NOTE: Do not put grease on the bolt threads.

(c) Install the No. 2 hinge bolt [38] from the aft side.

1) Make sure the alignment of the bolt holes through the hinge beam flanges and the strut fittings is correct.

(d) Remove the thrust reverser hinge bolt thread protector (GE90-115B), SPL-4259 from the No. 2 hinge bolt [38].

(e) Install the shim [37], washer [40] and nut [39].

NOTE: Do not tighten the nut at this time. The shim thickness is adjusted later in the procedure.

SUBTASK 78-31-01-420-006-H01

(10) Install the bolt [61] in the NO.3 hinge fitting [30].

(a) Make sure a thrust reverser hinge bolt thread protector (GE90-115B), SPL-4259 is installed on the No. 3 hinge bolt [61].

(b) Apply the grease, D00633 to the shank of the bolt [61].

NOTE: Do not put grease on the bolt threads.

(c) Install the No. 3 hinge bolt [61] from the aft side.

1) Make sure the alignment of the bolt holes through the hinge beam flanges and the strut fittings is correct.

(d) Remove the thrust reverser hinge bolt thread protector (GE90-115B), SPL-4259 from the No. 3 hinge bolt [61].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Install the shim [60], washer [63] and nut [62].

NOTE: Do not tighten the nut at this time. The shim thickness is adjusted later in the procedure.

SUBTASK 78-31-01-420-007-H01

(11) Make sure the gap between the flanges on the thrust reverser hinge beam and the NO.2 hinge fitting [19] and NO.3 hinge fitting [30] is same (Figure 403).

SUBTASK 78-31-01-420-008-H01

(12) Install the NO.1 hinge cross tie rod [31] to the thrust reverser (Figure 403).

(a) Apply the grease, D00633 to the shank of the bolt [35].

NOTE: Do not put grease on the bolt threads.

(b) Install the bolt [35], washer [34], bushing [33], washer [32] and nut [36].

NOTE: Do not tighten the nut at this time.

SUBTASK 78-31-01-420-009-H01

(13) Install the NO.4 hinge cross tie rod [42] to the thrust reverser (Figure 403).

(a) Apply the grease, D00633 to the shank of the bolt [43].

NOTE: Do not put grease on the bolt threads.

(b) Install the bolt [43], washer [47], bushing [46], washer [45] and nut [44].

NOTE: Do not tighten the nut at this time.

SUBTASK 78-31-01-420-010-H01

(14) Adjust the gaps between the shim and the flanged bushing in the hinge beam at the NO.2 hinge fitting [19] and NO.3 hinge fitting [30].

(a) Remove the nut [39] and nut [62].

(b) Add a shim or peel the laminations from the shim [37] and shim [60] to get the 0.005-0.020 inch (0.127-0.508 millimeter) gap between the shim and the flanged bushing in the hinge beam.

NOTE: The 0.050 inch (1.27 millimeter) thick shims are corrosion resistant steel (CRES) with 0.002 inch (0.051 millimeter) thick laminations. No finish is required on the shims after delamination. A maximum of two shims can be used for the No. 2 hinge and the No.3 hinge.

(c) Install the nut [39] and nut [62].

SUBTASK 78-31-01-420-011-H01

(15) Tighten the nut [36], nut [39], nut [44] and nut [62] at the four hinges to 660-980 pound-inches (74.6-110.7 newton-meters).

(a) Make sure the gaps between the shim and the flanged bushing remains the same.

SUBTASK 78-31-01-430-001-H01

(16) Attach the lower end of the hold-open rod to the receiver fitting on the engine fan case.

(a) Remove the quick disconnect pin from the hold-open rod on the thrust reverser.

(b) Install the lower end of the hold-open rod to the engine bracket with the quick disconnect pin.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-865-002-H01

(17) Remove the safety tags and close these circuit breakers:

Ground Service/Handling Power Panel, P320

Row	Col	Number	Name
D	12	C78613	L ENG COWL DR MOT CTRL
D	13	C78614	R ENG COWL DOOR MOTOR CONTROL
F	6	C78301	L ENG COWL DR MOT
F	9	C78302	R ENG COWL DR MOT

SUBTASK 78-31-01-430-002-H01

(18) Connect the thrust reverser PDOS actuator [24] to the thrust reverser [3] (Figure 402):

(a) To install the thrust reverser half on the inboard side of the engine, follow these steps:

NOTE: On the inboard thrust reverser, if the overhead crane and sling were used to open the thrust reverser half, the strap of the sling assembly will interfere and rub against the wing leading edge as you pull open the inboard thrust reverser. In addition, the thrust reverser will come very close to the underside of the wing. The protective cover mat on the wing leading edge would prevent some damage from the sling strap. However, use of the PDOS system to open the inboard thrust reverser is recommended.

1) Make sure the thrust reverser half is in the closed position.
2) Get access to the PDOS actuator bolt from the opposite side of the engine.
3) Extend the PDOS actuator rodend using the PDOS controls on the inlet cowl or pull the actuator piston out of the actuator body to align the rodend with the inner wall attachment fitting.
   a) To extend the PDOS actuator rod end using the PDOS controls, do this task: Open the Thrust Reverser (Power Method), TASK 78-31-00-010-802-H01.
4) Apply the grease, D00633 to the shank of the bolt [29].

   NOTE: Do not put grease on the bolt threads.
5) Install the bolt [29], washer [28], bushing [27], washer [25] and nut [26].

   NOTE: Install the countersunk side of the washer adjacent to the head of the bolt.
6) Tighten the nut to 480-790 pound-inches (54.2-89.3 newton-meters).
7) Open the inboard thrust reverser half with the PDOS system.
   a) To open the thrust reverser half, do this task: Open the Thrust Reverser (Power Method), TASK 78-31-00-010-802-H01.
   b) Slowly open the thrust reverser and stop when the hold open rod is fully extended and locked and you hear an audible click or snap.

      NOTE: A yellow safety band on the upper side of the lock collar is the indication for the locked position. A red safety band on the opposite side of the lock collar is the indication for the unlocked position. An audible click or snap is an indication you extended the hold-open rod to the locked position.

      NOTE: The thrust reverser should be supported in the open position by two devices, the hold open rod, the PDOS actuator in the extended position or the overhead crane/hoist.
8) Continue this procedure to complete installation of the thrust reverser half on the strut.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) To install the thrust reverser half on the outboard side of the engine, follow these steps:

NOTE: You can use the overhead crane/hoist and the sling to open the outboard thrust reverser half to connect the PDOS actuator rod end to the inner wall attachment fitting. You can also use the steps that were given above to connect the PDOS actuator rod end first from the opposite side of the engine before the thrust reverser half is opened with the PDOS system. Either method can be done on the outboard side.

1) Use the overhead crane/hoist and the sling to open the outboard thrust reverser half.

NOTE: On the outboard thrust reverser, if the overhead crane and sling were used, the strap of the sling assembly will not interfere and rub against the wing leading edge as you pull open the inboard thrust reverser. The crane/hoist and sling cannot touch the leading edge because of the back sweep of the wing's leading edge is away from the thrust reverser.

a) Slowly pull open the outboard thrust reverser half.

b) Stop when the hold open rod is fully extended and locked and you hear an audible click or snap.

NOTE: A yellow safety band on the upper side of the lock collar is the indication for the locked position. A red safety band on the opposite side of the lock collar is the indication for the unlocked position. An audible click or snap is an indication you extended the hold-open rod to the locked position.

NOTE: The thrust reverser should be supported in the open position by two devices, the hold open rod, the PDOS actuator in the extended position or the overhead crane/hoist.

2) Keep the tension of the sling with the overhead crane/hoist and get access to the PDOS actuator.

3) Extend the PDOS actuator rodend using the PDOS controls on the inlet cowl or pull the actuator piston out of the actuator body to align the rodend with the inner wall attachment fitting.

a) To extend the PDOS actuator rod end using the PDOS controls, do this task: Open the Thrust Reverser (Power Method), TASK 78-31-00-010-802-H01.

4) Apply the grease, D00633 to the shank of the bolt [29].

NOTE: Do not put grease on the bolt threads.

5) Install the bolt [29], washer [28], bushing [27], washer [25] and nut [26].

NOTE: Install the countersunk side of the washer adjacent to the head of the bolt.

6) Tighten the nut to 480-790 pound-inches (54.2-89.3 newton-meters).

7) Continue this procedure to complete the installation of the thrust reverser half on the strut.

SUBTASK 78-31-01-090-004-H01

(19) Remove the GE90 fan thrust reverser sling equipment, SPL-2594 and hinge fitting, SPL-4278 from the thrust reverser [3] (Figure 404).

(a) Disconnect the chain hoist from the lower sling assembly [95].

(b) Remove the hinge attach pin [98] and the lynch pin [99] to disconnect the upper sling assembly [96] from the upper attachment points.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Remove the upper sling assembly [96], the lift plate [93], the master link [92], the chain hoist [94], the load cell [91] and the 10,000 pounds capacity overhead hoist, STD-2493.

(d) Remove the forward and aft hinge attach fittings.

1) At the forward upper attachment point, remove the lynch pin [99], the hinge attach pin [100], and the forward hinge attach fitting [102].

2) At the aft upper attachment point, remove the lynch pin [99], the hinge attach pin [98] and the aft hinge attach fitting [97].

(e) At the lower attachment point, remove the bolt [103], washer [104], and the latch beam attach fitting [105].

1) Store the bolts and washers on the latch beam attach fitting [105].

SUBTASK 78-31-01-430-003-H01

(20) Connect the bonding strap [21] on the NO.2 hinge fitting [19] to the hinge beam flange (Figure 401).

(a) Install the washer [22] and the nut [23] and tighten to 28-35 inch-pounds (3.2-3.9 Newton-meters).

(b) Do a bonding resistance check with an intrinsically safe approved bonding meter, COM-1550; bonding resistance must not be more than 0.001 ohms.

SUBTASK 78-31-01-430-004-H01

(21) Install the forward tension strap [55] to the forward deflection limiter rod [58] (Figure 403).

(a) Apply the grease, D00633, to the shank of the bolt [54].

NOTE: Do not put grease on the bolt threads.

(b) Install the bolt [54], bushing [59], bushing [57] and nut [56].

(c) Tighten the nut [56] to 480-790 pound-inches (54.2-89.3 newton-meters).

SUBTASK 78-31-01-430-005-H01

(22) Install the aft tension strap [49] to the aft deflection limiter rod [52] (Figure 403).

(a) Apply the grease, D00633 to the shank of the bolt [48].

NOTE: Do not put grease on the bolt threads.

(b) Install the bolt [48], bushing [53], bushing [50] and nut [51].

(c) Tighten the nut [51] to 480-790 pound-inches (54.2-89.3 newton-meters).

SUBTASK 78-31-01-430-006-H01

(23) Install the middle latch access door.

(a) Do this task: Thrust Reverser Latch Access Doors Installation, TASK 78-31-19-400-801-H01.

SUBTASK 78-31-01-981-001-H01

(24) Do this task: Close the Thrust Reverser (Power Method), TASK 78-31-00-410-802-H01.

(a) Make sure the thrust reverser is closed and latch.

SUBTASK 78-31-01-430-007-H01

(25) Install the V-groove latch band [14] to the fan case bracket [17] (Figure 401).

(a) Apply the grease, D00633 to the shank of the bolt [18].

NOTE: Do not put grease on the bolt threads.

(b) Install the bolt [18], washer [16] and nut [20].

(c) Tighten the nut [20] to 250-350 pound-inches (28.2-39.5 newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-030-013-H01

(26) Remove the protection covers from the electrical connectors and receptacles and the hydraulic flexhoses and fittings.

SUBTASK 78-31-01-430-008-H01

CAUTION

DO NOT LET THE HOSE TWIST WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWIST IN THE HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE FAILURES, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(27) Connect the hydraulic flexhoses at the strut disconnect panel (Figure 401):

(a) The general practice for the connection of the flexible hoses is this task: Flexible Hose Installation, TASK 20-10-10-400-801.

(b) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

(c) Connect the retract flexhose [6].

1) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

(d) Connect the sync lock flexhose [7].

1) Tighten the hose nut to 257-283 pound-inches (29-32 newton-meters).

(e) Connect the extend flexhose [8].

1) Tighten the hose nut to 855-945 pound-inches (97-107 newton-meters).

SUBTASK 78-31-01-430-009-H01

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(28) Connect the electrical connectors at the strut disconnect panel (Figure 401):

(a) Connect the electrical connector [5] (RVDT channel A/proximity sensors).

(b) Connect the electrical connector [4] (RVDT channel B).

SUBTASK 78-31-01-410-009-H01

(29) Install the track fairing [1] on the thrust reverser [3] (Figure 401):

(a) Apply grease, D00633 to the bolts.

(b) Install these fairings with 34 bolts [15].

1) Install the applicable access panels:

Number	Name/Location
415FL	Center Thrust Reverser Hinge Cover, Left Engine
416FR	Center Thrust Reverser Hinge Cover, Left Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine

SUBTASK 78-31-01-410-010-H01

(30) Install the forward fairing [2] on the thrust reverser [3] (Figure 401):

(a) Apply grease, D00633 to the bolts.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Install these fairings with 25 bolts [15].

1) Close the applicable access panels:

Number	Name/Location
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine

SUBTASK 78-31-01-410-016-H01

(31) Install the strut side fairing; do this task: Forward Fairings Installation, TASK 54-52-01-400-801-001.

(a) Install the applicable access panels:

Number	Name/Location
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

SUBTASK 78-31-01-830-004-H01

(32) Do this task: Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

(a) If you installed the same thrust reverser that was removed and no changes were made to the lower bifurcation compression pads, the strut-mounted compression rods, the wear pads and spacers on the latch fittings, it is not necessary to do the adjustment procedure.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-01-860-004-H01

CAUTION

INSTALL THE CASCADE SEGMENTS IN THE CORRECT POSITION ON THE THRUST REVERSER. IF YOU INSTALL THE CASCADE SEGMENTS IN THE INCORRECT POSITION, DAMAGE TO EQUIPMENT CAN OCCUR.

(1) If a new replacement thrust reverser is installed or a thrust reverser from another engine is installed, look at the part number of the cascade segments to make sure they are installed in the correct position for the left or right engine.

NOTE: The left and right thrust reversers are interchangeable between the left and right engine, but the cascade segments must be installed in the correct position on the thrust reverser for the left or right engine.

(a) If it is necessary, change the cascade segments to the correct position for the left or right engine location.

1) Do this task: Thrust Reverser Cascade Segments Removal, TASK 78-31-16-000-801-H01.

2) Do this task: Thrust Reverser Cascade Segments Installation, TASK 78-31-16-400-801-H01.

(b) Make a record on the thrust reverser data plate to show the thrust reverser part number has changed and include the calendar date, mm/dd/yy.

NOTE: If the cascade segments were changed for the engine location, the thrust reverser has changed configuration. Use the illustrated parts catalog to find the applicable part number for the thrust reverser or contact Boeing.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-440-001-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-01-863-001-H01

(3) Do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-31-01-710-002-H01

(4) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser six times to remove the air from the thrust reverser actuation system.

SUBTASK 78-31-01-210-003-H01

CAUTION

REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(5) Examine the thrust reverser hydraulic strut connections for hydraulic leakage.

(a) If leakage occurs, depressurize the system, disassemble the fitting/hose connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/hose connection.

SUBTASK 78-31-01-220-003-H01

CAUTION

DO A CHECK OF THE CLEARANCE BETWEEN THE RETRACT FLEXHOSE AND THE ENGINE ANTI-ICE DUCT. THE THRUST REVERSER SHOULD BE CLOSED AND LATCHED WHEN YOU DO THIS CHECK. DAMAGE TO THE RETRACT FLEXHOSE CAN OCCUR.

(6) Make sure the retract flexhose [6] and the sync lock flexhose on the left side thrust reverser do not touch engine anti-ice (EAI) duct (Figure 401).

NOTE: The thrust reverser must be closed and latched to do a check of the clearance between the retract flexhose sync lock flexhose and the engine anti-ice (EAI) duct. The 45 degree elbows on the retract flexhose and the sync lock flexhose will cause the route of the flexhose to be away from the EAI duct.

SUBTASK 78-31-01-410-011-H01

(7) Do this task: Fan Cowl Panels Installation, TASK 71-11-04-400-805-H01.

(a) Close the applicable access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-01-090-005-H01

(8) Remove the fall arrest equipment from the strut.

(a) Do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-01-000-001-H00

(9) Remove the protective cover mat, STD-589 and Nitto 223S Tape, G02129 or tape, A50464 from the inboard leading edges.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-440-002-H01

(10) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER - ADJUSTMENT/TEST

1. General

A. This procedure has these tasks:

(1) Thrust reverser adjustment.

(2) Thrust reverser compression rod adjustment.

TASK 78-31-01-830-801-H01

2. Thrust Reverser Adjustment

(Figure 501, Figure 507, Figure 502, Figure 504, Figure 503, Figure 508, Figure 505, and Figure 506)

A. General

(1) A thrust reverser adjustment must be completed if either thrust reverser half has been replaced with a different thrust reverser half.

(2) Make sure that you adjust the thrust reverser in the sequence specified in this task. If you do not obey the instructions in this task, severe structural damage to the thrust reverser and other equipment can occur.

(3) This task has these procedures:

(a) Strut-mounted and Thrust Reverser-mounted hardware inspection and replacement

1) Compression rods

2) Compression cups

3) Aft and forward deflection limiter cross-tie rods

4) Strut/engine rod brackets

(b) Latch beam splitline gap and latch wearplate gap adjustment

1) Left thrust reverser No. 1, 2, 3, 4, and 5 latch wearplates

2) Left and right aft cowl No. 6, 7, and 8 latch wearplates

(c) Inner V-groove clearance adjustment

(d) Fire seal compression check

(e) Lower compression pads, and loadshare fittings adjustment

(f) Aft cowl deflection limiter cross-tie rods adjustment

(g) Upper compression rods adjustment

(h) T-hook latch and interlock pin adjustment

NOTE: The thrust reverser for the GE90-115 engine has two additional latches than the thrust reverser on the GE90-70/-80/-90 engine; the T-hook latch and the interlock pin. There is a handle and cable operated T-hook latch/gearbox on the upper bifurcation of the right side thrust reverser. The handle of the T-hook latch is forward of the No. 2 tension latch on the lower latch beam. The T-hook engages a receiver on the upper bifurcation on the left thrust reverser that is forward of the precooler kiss seal and PDOS actuator. There is a spring loaded interlock pin on the lower bifurcation of the left side thrust reverser. The interlock pin engages a serrated fitting on the lower bifurcation on the right side thrust reverser. This pin engages the fitting when the No.2 tension latch is closed. The T-hook latch, receiver, and the interlock pin and interlock pin serrated fitting are adjusted per the instructions in this procedure.

(i) V-band latch and (latch beam and aft cowl) centerline tension latches adjustment

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(j) Aft cowl deflection limiter latches adjustment

(k) Latch access door adjustment

(4) To close the V-band latch, you must stand forward of the V-band latch handle and pull the handle to close the latch. Do not push against the handle to close the V-band latch. If you push against the handle, you will be in the path of the latch handle. You can be injured if the latch springs open.

(5) ReproRubber is recommended to be used to find the gap between the compression cups on the upper bifurcation and the strut-mounted compression rods. The use of ReproRubber is allowed at the compression cups only because clay in the cup can become deformed when you measure the gap with a vernier caliper. However, ReproRubber will set quickly in 72 degree ambient temperature and it will not deform enough as it becomes too hard to get a good gap measurement at other locations such as the V-groove and V-blade, the aft cowl stop seats and the deflection limiter cross-tie rods, the lower bifurcation compression pads and loadshare wear pads. Different ratios of ReproRubber base compound to catalyst have been used, 1:1, 2:1 and 3:1, with results that vary from the expected gap requirements. Because ReproRubber becomes hard with a chemical reaction, it was found that the ambient temperature was a factor in the time the ReproRubber took to become hard. Warm temperatures would decrease the time for the ReproRubber to become hard. Cold temperatures would increase the time for the ReproRubber to become hard. If the temperature of the ReproRubber base compound and catalyst were controlled before use, it may become warm enough during the time it took for the components to be used that the gap results will not be correct. You must be careful if you use ReproRubber.

B. References

Reference	Title
20-10-23-400-801	Lockwire, Cotter Pins, and Lockrings - Installation (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
70-41-00-910-802-H01	Safety Cable Installation (P/B 201)
70-41-00-910-803-H00	Lockwire Installation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-11-01-000-801-H01	Primary Nozzle Removal (P/B 401)
78-11-01-400-801-H01	Primary Nozzle Installation (P/B 401)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-02-820-801-H01	Thrust Reverser V-Band Latch Adjustment (P/B 501)
78-31-04-820-801-H01	Thrust Reverser Tension Latches Adjustment (P/B 501)
78-31-05-000-801-H01	Thrust Reverser Fire Seal Removal (P/B 401)
78-31-05-400-801-H01	Thrust Reverser Fire Seal Installation (P/B 401)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-20-000-802-H01	T-Hook Latch Receiver Removal (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
78-31-21-000-802-H01	Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-146	Calipers - Vernier, 0 to 6 in (0 to 152 mm), Readable to 1/1000 in (.025 mm)
STD-405	Gauge - Feeler
STD-596	Micrometer - Depth, 0.0 to 1.07 in (0.0 to 25.0 mm)
STD-625	Pen
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)
STD-1081	Flashlight - Explosion Proof
STD-1096	Micrometer - Depth, 0-1 inch, Readable to 1/1000 inch
STD-1097	Caliper - Vernier, 0-6 inch, Readable to 1/1000 inch
STD-1107	Gauge - Feeler, 0.0 - 0.5 Inch, Readable to 1/1000th
STD-6566	Gage - Dial Push/Pull, DPP-25 (DPP-125N), 25 lb (11.3 kg) Capacity

D. Consumable Materials

Reference	Description	Specification
A00027	Adhesive - Silicone Rubber, 1 Part, RTV	BAC5010 Type 60
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
A00900	Sealant - Silicone, RTV - Dow Corning 93-006-1RF (Formerly 93-006-1. Use until Stock depleted)	
B00083	Solvent - VM&P Naphthas	TT-N-95 Type II, ASTM D-3735 Type III
D00006	Compound - Antiseize Pure Nickel Special - Never-Seez NSBT	BAC5008
D00504	Grease - Petrolatum	VV-P-236
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00440	Lockwire - MS20995C41, Corrosion Resistant Steel - 0.041 Inch (1.0414 mm) Diameter	NASM20995
G00624	Bag - Plastic, General Purpose	
G02020	Clay, Modeling	
G02061	Marker - Permanent, Felt Tip Pen	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description	Specification
G02380	Developer - Inspection - Met-L-Chek D-70	
G02473	Cable, Safety Kit	AS3510-03()K
G50092	Compound - Metrology Casting Material - ReproRubber Quick Setting Putty	
G50230	Glove - Vinyl	
G50314	Tape - Masking	BAC5034-4 Type VII Class 2

E. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
211	Flight Compartment, Left
212	Flight Compartment, Right
411	Engine, Left
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
419	Primary Exhaust Nozzle and Plug - Left Engine
421	Engine, Right
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
429	Primary Exhaust Nozzle and Plug - Right Engine
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Thrust Reverser Adjustment

SUBTASK 78-31-01-010-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-01-490-006-H01

(2) Use a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the top of the engine core V-groove, the strut-mounted compression rods, the upper bifurcation compression cups, and the deflection limiter stop seats on the aft cowl.

NOTE: The platforms or stepladders should be wheeled to allow easy movement when you move position at the upper bifurcation compression cups for gap measurements.

SUBTASK 78-31-01-010-020-H01

(3) Remove the thermal insulation blanket at the No. 1 lower compression fitting on the right side thrust reverser (TASK 78-31-06-000-801-H01).

SUBTASK 78-31-01-020-011-H01

(4) Mark the initial position of the serrated fitting for the interlock pin on the No.1 compression fitting with masking tape, G50314.

(a) Remove the serrated fitting from the No. 1 lower compression fitting (Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal, TASK 78-31-21-000-802-H01).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Strut-Mounted Hardware Inspection and Replacement

SUBTASK 78-31-01-210-001-H01

(1) Check the condition of the strut-mounted No. 1 compression rod [1], No. 2 compression rod [3], No. 3 compression rod [9], No. 4 compression rod [17], the forward deflection limiter cross-tie rod [19], the aft deflection limiter cross-tie rod [20], the rod brackets, and the supporting structure for damage or missing hardware (Figure 501).

NOTE: The compression rods are the primary load path to transfer the fan duct pressure load between the thrust reverser halves. Continued operation is not permitted with the compression rods damaged or missing. The compression rods are adjustable at the rod ends. The compression cups are not adjustable. Refer to SRM 54-33-02 (Allowable Damage 2) for allowable wear limits.

SUBTASK 78-31-01-960-002-H01

(2) If any compression rod or deflection limiter cross-tie rod is not serviceable, replace the rod(s).

(a) To replace the No. 1 compression rod [1] or No. 2 compression rod [3], pull the compression rod through the elastomer assembly [2].

1) If it is necessary to install the elastomer assembly [2] again, do these steps:

a) Apply adhesive, A00027 between the strut structure and the elastomer assembly.

b) Manually compress the snap ring and install the elastomer assembly into the hole in the strut fitting.

NOTE: The snap ring is molded into the elastomer assembly.

c) Install the elastomer assembly so that the large notch in the assembly faces aft.

d) Replace the No. 1 compression rod [1] or No. 2 compression rod [3].

2) Do not install lockwire on the ends of the compression rod at this time.

(b) To replace the No. 3 compression rod [9], do these steps:

1) Try to pull the rod out through the hole in the strut-mounted bracket, if not possible, do the applicable steps that follow:

a) Remove bracket [10] or bracket [13] to free one end of the compression rod.

<1> To remove bracket [10], remove two bolts [7] and washers [8] on top of the bracket and two bolts [11] and washers [8] on the bottom of the bracket.

<2> To remove bracket [13], remove two bolts [6], filler [4] and filler [5] on top of the bracket and two bolts [12] and washers [8] on the bottom of the bracket.

2) Replace the compression rod [9].

3) If necessary, install bracket [10] or bracket [13].

a) If a new bracket is installed, install new shims [35] with a rivet [36] on top of the bracket.

<1> Install one or two shims and peel the shim as required to fill the gap between the top of the bracket and the strut structure.

b) To install bracket [10], install two bolts [7] and washers [8] on top of the bracket and two bolts [11] and washers [8] on the bottom of the bracket.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

c) To install bracket [13], install two bolts [6], filler [4] and filler [5] on top of the bracket and two bolts [12] and washers [8] on the bottom of the bracket.

d) Tighten all bolts to 80 in-lb (9.0 N·m) to 90 in-lb (10.2 N·m).

4) Do not install lockwire on the ends of the compression rod at this time.

(c) To replace the No. 4 compression rod [17], do these steps:

1) Try to pull the rod out through the hole in the strut-mounted bracket, if not possible, do the applicable steps that follow:

a) Remove bracket [16] or bracket [18] to free one end stop on one end of the compression rod.

<1> Remove the three bolts [7], washers [8], washers [15], and nuts [14] to remove the bracket.

2) Replace the compression rod [17].

3) If necessary, install bracket [16] or bracket [18] to the fittings on the strut.

a) Install the three bolts [7], washers [8], washers [15], and nuts [14] to install the bracket.

b) Tighten the bolts to 25-35 inch-pounds (2.8-3.9 newton-meters).

4) Do not install lockwire on the ends of the compression rod at this time.

(d) If a compression rod or rod end is not serviceable, do a visual check of the 8 compression cups, fittings and the thrust reverser upper bifurcation and inner wall for damage.

NOTE: If one of the compression rods are not serviceable, the other compression rods will carry a greater load than usual.

1) If necessary, remove the thermal insulation blankets around the fittings on the thrust reverser upper bifurcation to do the visual check (TASK 78-31-06-000-801-H01).

2) Replace the compression cup [23] or compression cup [31] if it is necessary.

NOTE: The compression cup for the No. 1 compression rod is smaller than the compression cups for the No. 2, No. 3 or No. 4 compression rods. The upper bifurcation fittings have a threaded insert in the fitting for the compression cup. Use the Component Maintenance Manual to replace the insert and the fittings.

a) Tighten the compression cup(s) to 100.0 in-lb (11.3 N·m) - 150.0 in-lb (16.9 N·m).

3) If necessary, install the thermal insulation blankets around the fittings on the thrust reverser upper bifurcation (TASK 78-31-06-400-802-H01).

SUBTASK 78-31-01-960-001-H01

(3) If the forward deflection limiter cross-tie rod [19] must be replaced, disassemble the rod to remove and install the cross-tie rod from the strut-mounted brackets.

NOTE: The forward cross-tie rod has a turnbuckle feature, a center rod, two threaded side retainers and two threaded lug assemblies with end bearings.

(a) Disconnect the two deflection limiter straps from the lug assemblies.

1) Remove the bolt [24], plain bushing [25], flanged bushing [27], and nut [26].

(b) Make sure the bearing balls do not fall out of the bearing races on the lug assemblies.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Apply Never-Seez NSBT compound, D00006 to the threads of the lug assemblies before you assemble the rod.

NOTE: The threads must be completely covered with compound.

(d) Make sure the distance (dimension A) between the center of the bearing in the lug assembly and the flange on the side retainer are equal on the left and right sides of the assembled cross-tie rod (Figure 501 (Sheet 4)).

NOTE: If the dimension "A" is initially set to the same dimension on the two sides of the rod, subsequent adjustments can be made more quickly with the turnbuckle part of the rod. The cross-tie rods have a left hand thread/right hand thread turnbuckle.

(e) Make sure the length of the assembled rod between the center of the bearings is 29.00 ±0.03 in. (736.60 ±0.76 mm).

NOTE: 29.00 ±0.03 in. (736.60 ±0.76 mm) is the nominal length. The length may be adjusted to meet the gap requirements for the aft cowl stop seats later in this procedure.

(f) Do not connect the deflection limiter straps to the lug assemblies at this time.

(g) Do not install lockwire on the side retainers and the center rod at this time.

SUBTASK 78-31-01-960-003-H01

(4) If the aft deflection limiter cross-tie rod [20] must be replaced, do these steps:

(a) Disconnect the two deflection limiter straps from the lug assemblies.

1) Remove the bolt [24], plain bushing [25], flanged bushing [27], and nut [26].

(b) Make sure the bearing balls do not fall out of the bearing races on the lug assemblies.

(c) Remove the two bolts [29] and washers [30] to remove the top and bottom end stops [28] on one end of the cross-tie rod.

(d) Pull the cross-tie rod [20] through the hole in the engine-mounted bracket to replace the rod.

(e) Position the top and bottom end stops [28] on the cross-tie rod and install the two bolts [29] and washers [30] with the washer counter sink towards the bolt head.

1) The gap between the top and bottom end stop and the raised knuckle on the shaft of the rod must be 0.000-0.100 inch (0.000-2.540 millimeters).

2) Tighten the bolts to 25 in-lb (2.8 N·m) - 35 in-lb (4.0 N·m).

(f) Make sure the length of the assembled rod between the center of the bearings is 31.88 ±0.03 in. (809.75 ±0.76 mm) (Figure 501 (Sheet 4)).

NOTE: 31.88 ±0.03 in. (809.75 ±0.76 mm) is the nominal length. The length may be adjusted to meet the gap requirements for the aft cowl stop seats later in this procedure.

(g) Do not connect the deflection limiter straps to the lug assemblies at this time.

(h) Do not install lockwire or safety cable on the cross-tie rod at this time.

(i) If the engine-mounted brackets must be replaced, the brackets are removed and installed in the primary nozzle procedures (TASK 78-11-01-000-801-H01, TASK 78-11-01-400-801-H01).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-820-001-H01

CAUTION

MAKE SURE THAT YOU SET THE RODS AND PADS TO THE SPECIFIED LIMITS. STRUCTURAL DAMAGE TO THE COMPRESSION RODS, DEFLECTION LIMITER RODS, AND THE THRUST REVERSER CAN OCCUR IF THE ROD AND PAD ADJUSTMENTS ARE INCORRECT.

(5) Set the pre-adjustment length of the compression rods and deflection limiter cross-tie rods for the clay or ReproRubber check:

(a) Set the pre-adjustment length of the 4 strut-mounted compression rod [1], compression rod [3], compression rod [9], and compression rod [17] to the fully retracted position.

1) Remove the bullet-shaped rod ends on the 4 compression rods.

2) Remove the shims [21] and washers [22] from the left and right sides of the 4 compression rods.

3) Install the bullet-shaped rod ends on the 4 compression rods to get the pre-adjustment length.

(b) Set the pre-adjustment length of the forward deflection limiter cross-tie rod [19] and aft deflection limiter cross-tie rod [20] to the fully retracted position:

NOTE: If the dimension "A" is initially set to the same dimension on the two sides of the forward cross-tie rod, subsequent adjustments can be made more quickly with the turnbuckle part of the rod. The deflection limiter cross-tie rods have a left hand thread/right hand thread turnbuckle.

NOTE: It may be necessary to disconnect the forward and aft deflection limiter straps from the left and right sides of the cross-tie rods to set the pre-adjustment lengths.

1) On the forward deflection limiter cross-tie rod, use the turnbuckle to set the dimension between the center of the bearings of the lug assemblies to 29.00 ±0.03 in. (736.60 ±0.76 mm).

a) If necessary, remove the bolt [24], plain bushing [25], flanged bushing [27], and nut [26] from the deflection limiter straps.

b) Make sure that the dimension "A" between the center of the bearing of the lug assembly and the flange of the side retainer is equal on both sides of the cross-tie rod.

c) Apply antiseize Never-Seez NSBT compound, D00006 to the threads of the lug assemblies if it is necessary.

2) On the aft deflection limiter cross-tie rod, use the turnbuckle to set the dimension between the center of the bearings of the lug assemblies to 31.88 ±0.03 in. (809.75 ±0.76 mm).

a) If necessary, remove the bolt [24], plain bushing [25], flanged bushing [27], and nut [26] from the deflection limiter straps.

b) Apply antiseize Never-Seez NSBT compound, D00006 to the threads of the lug assemblies if it is necessary.

3) If disconnected, connect the deflection limiter straps to the lug assemblies on the left and right sides of the forward and aft cross-tie rods.

a) Install the bolt [24], plain bushing [25], flanged bushing [27], and nut [26] to each strap.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) Apply grease, D00633 only on the shank of the bolt [24]; remove all grease from the bolt threads.

c) Tighten the nut [26] to 480 in-lb (54.2 N·m) to 790 in-lb (89.3 N·m).

NOTE: Do not install lockwire on the rods at this time.

I. Latch Beam Splitline Gap, Latch Wearplate Gap, Aft Cowl Stop, Inner V-groove, and Deflection Limiter Tie Rods - Adjustment

SUBTASK 78-31-01-830-001-H01

(1) Remove the screw [43], wear plate [41], and spacer [42] from the aft 3 compression pads (No. 2, 3, 4) on the left thrust reverser, lower bifurcation.

(a) Reinstall the wear plate [41] and screw [43] without the spacers.

(b) Put the removed spacers in plastic bags, G00624, labeled with the location for each compression pad.

SUBTASK 78-31-01-030-014-H01

(2) Remove the screw [43], wear plate [41], and spacer [42] from the forward compression pad (No. 1) on the left side thrust reverser, lower bifurcation.

(a) Put the removed hardware in a plastic bag, G00624, labeled with the location for the compression pad.

SUBTASK 78-31-01-030-015-H01

(3) Remove the screw [43], wear plate [41], and spacer [42] from the forward compression pad (No. 1) on the right side thrust reverser, lower bifurcation.

(a) Put the removed hardware in a plastic bag, G00624, labeled with the location for the compression pad.

SUBTASK 78-31-01-820-003-H01

(4) Prepare to measure the gap between the inner engine V-groove and the V-blade (Figure 504).

NOTE: When you apply grease or clay on the inner engine V-groove, make sure that there is no wear on the base of the V-groove. Wear on the V-groove can affect the thickness values if not measured correctly.

(a) Apply grease, D00504 to the inner engine V-groove at seven equally spaced locations on each side of the engine core.

(b) Apply seven pieces of clay, G02020 that are cone shaped (approximately 0.20 in. (5.08 mm) by 0.32 in. (8.13 mm) thick) into the inner engine V-groove on each side of the engine core.

1) Place the clay with the base of the cone in the v-groove and the cone pointing outward.

2) Place the top and bottom pieces of clay 1.0 in. (2.5 cm) to 5.0 in. (12.7 cm) from the ends of the v-groove.

3) Place the remaining 5 pieces of clay evenly spaced between the top and bottom pieces.

NOTE: This is a total of 14 locations.

NOTE: Do not use too much clay. Too much clay can affect the thickness values and give you incorrect gap results. Use only the amount of clay given in the procedure. You must use a parting agent with clay. You must clean the parts with solvent and a cloth after the measurements.

(c) Apply grease, D00504 on the 14 pieces of clay in the engine V-groove.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Apply grease, D00504 as a parting agent to the inner V-blade at the 14 opposite locations on the thrust reverser halves.

SUBTASK 78-31-01-820-008-H01

(5) Prepare to measure the gap between the aft cowl stop seats and the forward and aft deflection limiter cross-tie rods:

NOTE: This procedure measures the total gap at the outboard side thrust reverser. It is not necessary to measure the gap on the inboard side thrust reverser. The cross-tie rods will move side-to-side in the brackets. When the gap is measured at the outboard side thrust reverser, the clay will push the cross-tie rod against the stop seat on the inboard side thrust reverser. The inboard side thrust reverser will have no gap when the gap is measured at the outboard side thrust reverser.

NOTE: You must use a parting agent with the clay. Clean the parts with solvent and a cloth after the measurements.

(a) Apply a piece of clay, G02020 approximately 0.40 inch (10.16 mm) thick at each of the two stop seats for both the forward and aft deflection limiters on the top of the outboard aft cowl.

(b) Apply grease, D00504 as a parting agent on the clay at all four locations.

(c) Apply grease, D00504 as a parting agent on the bushings for the cross-tie rod connection for the forward and aft deflection limiter straps at all four locations.

SUBTASK 78-31-01-410-032-H00

(6) Close the inboard thrust reverser half.

(a) Close the two inboard deflection limiter latches.

NOTE: There are two deflection limiter latches on the inboard aft cowl and two deflection limiter latches on the outboard aft cowl.

SUBTASK 78-31-01-410-033-H00

(7) Close the outboard thrust reverser half.

(a) Close the remaining thrust reverser latches in the order that follows: V-band latch, all 5 thrust reverser centerline latches, all 3 aft cowl centerline latches, and the two outboard deflection limiter latches.

NOTE: It may be difficult or not possible to close the outboard deflection limiter latches. Do not adjust the deflection limiter latches at this time if they do not close.

(b) Make sure that there is tension on all of the latches.

NOTE: It is not necessary to measure the tension on the latches at this time. If the latches are loose when latched, adjust the latch so there is enough tension to pull the thrust reverser halves closed. The latch tension is set later in this procedure.

(c) Do not close the latch access doors at this time.

SUBTASK 78-31-01-820-091-H00

(8) Try to push the T-hook handle up and push the handle in toward the hinges on the latch access door to move the T-hook to the locked position.

(a) If the T-hook handle can not be pushed up to the locked position, remove the T-hook latch receiver (T-Hook Latch Receiver Removal, TASK 78-31-20-000-802-H01).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-820-002-H01

(9) Check the gaps at the latch beam and aft cowl wear plates between the latch beam and aft cowl fairings (Figure 506).

NOTE: Each latch location has two sets of latch wear plates. At each latch location, at least one set of latch wear plates must be touching.

(a) Use a feeler gauge, STD-405 at the 10 thrust reverser latch wear plates and the 6 aft cowl latch wear plates to see if the latch plates touch.

NOTE: You can also use an explosion proof flashlight, STD-1081 to see if the latch plates touch.

1) Verify that there is contact between at least one set of wear plates at each of the centerline latch locations after the thrust reverser is closed.

a) Record contact or gaps in Table B (Figure 509 (Sheet 1)).

b) If a parallel gap exists, it must not be larger than 0.010 in. (0.254 mm).

c) If a tapered gap condition exists, the gap must not exceed 0.010 in. (0.254 mm) at the narrowest point and must not exceed 0.050 in. (1.270 mm) at the widest point.

2) If any gaps exceed these limits, add a spacer at that location and recheck all gaps at all 5 thrust reverser centerline latch locations.

SUBTASK 78-31-01-830-005-H01

(10) Measure the splitline gaps between the latch beam fairings and aft cowls (Figure 503).

NOTE: The latch beam fairings are on the left and right thrust reverser halves. The fairings are forward and aft of the latch access doors.

(a) Close the latch access doors.

(b) Use a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 to measure the splitline gaps between the latch beam fairings.

(c) Record the splitline gaps in Table A (Figure 509 (Sheet 1)).

(d) If the splitline gaps are not between the limits shown, make a note of the location of the gap to find the correct latch wear plates to adjust.

SUBTASK 78-31-01-010-002-H01

(11) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

CAUTION

OPEN THE DEFLECTION LIMITER LATCHES ON THE AFT COWL BEFORE YOU OPEN THE THRUST REVERSER. IF THE LATCHES ARE NOT OPEN, DAMAGE TO THE STRUT, CROSS-TIE RODS, AND THE THRUST REVERSER WILL OCCUR.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(a) Open the 3 aft cowl centerline latches, the 5 thrust reverser centerline latches, the 4 deflection limiter latches, and the V-band latch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-820-004-H01

(12) Measure and adjust the gap for the inner engine V-groove and V-blade:

(a) Use vernier calipers, STD-146 to measure the compressed thickness of the clay, G02020 at the 14 locations in the inner engine V-groove:

1) Make sure that you measure the clay thickness from the base of the inner engine V-groove (Figure 504).

2) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

3) Record the clay thickness from each location for the left and right thrust reverser in Table C (Figure 509 (Sheet 2)).

(b) Calculate the average thickness of the clay, G02020 for the inner engine V-groove for each thrust reverser half.

1) The maximum limit for the average thickness is 0.100 in. (2.540 mm) for each thrust reverser half.

(c) If the average gap exceeds the limits, adjust the shim or spacer stack-up thickness of the latch beam wear plates and aft cowl latch wear plates.

1) Remove shims or spacers as necessary.

NOTE: Adjust the shims to get a splitline gap which is closer to the lower end of the tolerance range.

2) Start again and repeat the steps to measure the gap at the inner engine V-groove and V-blade.

(d) If the average thickness does not exceed the limit, then continue.

SUBTASK 78-31-01-830-003-H01

(13) If the splitline gaps are not in the limits or the latch beam or aft cowl wear plate gaps are not in the limits, add or remove shims or spacers from the applicable wear plates on the thrust reverser and the aft cowl (Figure 502).

NOTE: The maximum permitted thickness of the shims and wear pad stack-up is 0.27 in. (6.86 mm). The spacers are 0.016 in. (0.406 mm) thick. The wear plate bolts thread into helicoil inserts in the latch beam; the bolt grip length is reduced one size as necessary as spacers are removed.

(a) Make sure the wear plates touch the opposite side at all latch locations.

1) Verify there is contact between one wear plate and its opposing compression pad for each of the centerline latch locations.

2) Any gap (tapered or parallel) on the other wear plate in the same latch location must not be greater than 0.010 in. (0.254 mm) at the narrowest point or 0.050 in. (1.270 mm) at the widest point.

a) If any gap is greater than these limits, add a spacer at that location and recheck all gaps.

(b) No. 1 Latch - Left Thrust Reverser

NOTE: The spacers are installed under the wear plates on the left thrust reverser latch beam. There are no wear plates on the right thrust reverser latch beam.

1) Remove wear plate [49] and spacers [48].

NOTE: A maximum of five spacers can be installed under each wear plate.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Remove the bolts [50], washers [47], and nuts [46].

NOTE: Remove two washers for each bolt.

2) Remove wear plate [53] and spacers [54].

NOTE: A maximum of five spacers can be installed under each wear plate.

a) Remove bolts [52] from the latch beam threaded insert.

3) Remove or install spacer [48] or spacer [54] as necessary to get the correct gap.

NOTE: The spacers are 0.0160 inch (0.4064 millimeter) thick.

4) Wipe or scrub the area where the spacers and wear plates are to be installed with a dry, clean cotton wiper, G00034 to remove all loose dirt, grease, oil or hydraulic fluid.

5) Prepare the sealant, A00160.

a) Mix the two-part sealant per the manufacturers instructions until it is homogeneous.

6) Install wear plate [53] and spacers [54].

a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.

b) Install bolts [52] through the wear plates and spacers into the latch beam threaded insert.

c) Tighten to 18 in-lb (2.0 N·m) to 25 in-lb (2.8 N·m).

7) Install wear plate [49] and spacers [48].

a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.

b) Install bolts [50] with washers [47] under the nuts [46].

NOTE: Install two washers for each bolt.

c) Tighten to 10 in-lb (1.1 N·m) to 18 in-lb (2.0 N·m).

(c) No. 2, 3, 4 and 5 Latches - Left Thrust Reverser

NOTE: The wear plates and spacers are installed only on the left thrust reverser latch beam. There are no wear plates on the right thrust reverser latch beam.

NOTE: The wear plate and spacer installations are the same for the No. 2, No. 3, No. 4 and No. 5 latch pads.

1) Remove wear plates [53] and spacers [54].

NOTE: A maximum of five spacers can be installed under each wear plate.

a) Remove bolts [52] from the latch beam threaded insert.

2) Remove or install spacers [54] as necessary to get the correct gap.

NOTE: The maximum permitted thickness of the shims and wear pad stack-up is 0.27 in. (6.86 mm). The spacers are 0.0160 in. (0.4064 mm) thick. The wear plate bolts thread into helicoil inserts in the latch beam; the bolt grip length is reduced one size as necessary as spacers are removed.

3) Wipe or scrub the area where the shims and wear plates are to be installed with a dry, clean cotton wiper, G00034 to remove all loose dirt, grease, oil or hydraulic fluid.

4) Prepare the sealant, A00160.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Mix the two-part sealant per the manufacturers instructions until it is homogeneous.

5) Install the wear plates [53] and spacers [54].

a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.

b) Install bolts [52] through the wear plates and spacers into the latch beam threaded insert.

c) Tighten to 18 in-lb (2.0 N·m) to 25 in-lb (2.8 N·m).

(d) If the total shim stackup thickness at any of the thrust reverser latch pads is more than 0.23 in. (5.84 mm), do these steps to change the shear pin:

1) Remove the shear pin at that location on the thrust reverser latch beam.

a) At the No. 1 latch pad, remove the shear pin [51], washer [45], and nut [44].

NOTE: This shear pin is 315W1406-2.

b) At the No. 2, No. 3, No. 4 or No. 5 latch pad, remove the shear pin [57], washer [56], and nut [55].

NOTE: This shear pin is 315W1406-1 or 315W1406-3.

2) Install a new shear pin that is longer.

a) At the No. 1 latch pad, replace shear pin [51] with shear pin [73].

NOTE: Use shear pin 315W1011-2 to replace shear pin 315W1406-2.

<1> Install the shear pin [73], washer [45], and nut [44].

<2> Tighten the nut to 180 in-lb (20.3 N·m) to 200 in-lb (22.6 N·m).

b) At the No. 2, No. 3, No. 4 or No. 5 latch pad, replace shear pin [57] with shear pin [74].

NOTE: Use shear pin 315W1011-1 to replace shear pin 315W1406-1 or 315W1406-3.

<1> Install the shear pin [74], washer [56], and nut [55].

<2> Tighten the nut to 200 in-lb (23 N·m) to 240 in-lb (27 N·m).

NOTE: The shear pin(s) must extend far enough into the bushing. If the wear plates are too thick, the pin will not extend far enough into the bushings. If the wear plates are too thin, the pin will extend more than is needed into the bushing

3) If it is necessary to install the original shear pins which are short.

a) At the No. 1 latch pad, install the shear pin [51], washer [45], and nut [44].

NOTE: This shear pin is 315W1406-2.

<1> Tighten the nut to 180 in-lb (20 N·m) to 200 in-lb (23 N·m).

b) At the No. 2, No. 3, No. 4 or No. 5 latch pad, install the shear pin [57], washer [56] and nut [55].

NOTE: This shear pin is 315W1406-1 or 315W1406-3.

<1> Tighten the nut to 200 in-lb (23 N·m) to 240 in-lb (27 N·m).

(e) No. 6, 7 and 8 Latches - Left Thrust Reverser, Aft Cowl

NOTE: The compression pads on the right aft cowl are installed without shims.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) For aft cowl No. 6 latch, remove the forward compression pad [60] and shims [59] or the aft compression pad [63] and shims [64].
   a) Remove bolts [61] and nuts [58].
2) For aft cowl No. 7 latch, remove the forward compression pad [60] and shims [59] or the aft compression pad [63] and shims [64].
   a) Remove bolts [70] and nuts [69].
3) For aft cowl No. 8 latch, remove forward compression pad [60] and shims [59] or the aft compression pad [72] and shims [71].
   a) Remove bolts [61] and nuts [58].
4) Remove or install the shim [59], shim [64], and shim [71] as necessary to get the correct gap.

   NOTE: The shims are 0.010 in. (0.254 mm) thick.
5) Wipe or scrub the area where the shims and compression pads are to be installed with a dry, clean cotton wiper, G00034 to remove all loose dirt, grease, oil or hydraulic fluid.
6) Prepare the sealant, A00160 or Dow Corning 93-006-1 RF sealant, A00900.
   a) Mix the sealant per the manufacturers instructions until it is homogeneous.
7) For aft cowl No. 6 latch, install the forward compression pad [60] and shim [59] or the aft compression pad [63] and shim [64].
   a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.
   b) Install bolts [61] and nuts [58].
   c) Tighten to 25 in-lb (2.8 N·m) to 35 in-lb (4.0 N·m).
8) For aft cowl No. 7 latch, install the forward compression pad [60] and shims [59] or the aft compression pad [63] and shims [64].
   a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.
   b) Install bolts [70] and nuts [69].
   c) Tighten to 25 in-lb (2.8 N·m) to 35 in-lb (4.0 N·m).
9) For aft cowl No. 8 latch, install the forward compression pad [60] and shims [59] or the aft compression pad [72] and shim [71].
   a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.
   b) Install bolts [61] and nuts [58].
   c) Tighten to 25 in-lb (2.8 N·m) to 35 in-lb (4.0 N·m).

(f) No. 6, 7 and 8 Latches - Right Thrust Reverser, Aft Cowl

NOTE: The compression pads on the right aft cowl are installed without shims. The compression pads on the right aft cowl are not adjusted; these instructions are given if the wear plates must be replaced.

1) For aft cowl No. 6 latch, remove forward compression pad [60] or aft compression pad [63].
   a) Remove bolts [61] and nuts [58].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) For aft cowl No. 7 latch, remove forward compression pad [60] or aft compression pad [63].
   a) Remove bolts [70] and nuts [69].
3) For aft cowl No. 8 latch, remove forward compression pad [60] or aft compression pad [72].
   a) Remove bolts [61] and nuts [58].
4) Wipe or scrub the area where the compression pads are to be installed with a dry, clean cotton wiper, G00034 to remove all loose dirt, grease, oil or hydraulic fluid.
5) Prepare the sealant, A00160 or Dow Corning 93-006-1 RF sealant, A00900.
   a) Mix the sealant per the manufacturers instructions until it is homogeneous.
6) For aft cowl No. 6 latch, install the forward compression pad [60] or the aft compression pad [63].
   a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.
   b) Install bolts [61] and nuts [58].
   c) Tighten to 25 in-lb (2.8 N·m) to 35 in-lb (4.0 N·m).
7) For aft cowl No. 7 latch, install the forward compression pad [60] or the aft compression pad [63].
   a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.
   b) Install bolts [70] and nuts [69].
   c) Tighten to 25 in-lb (2.8 N·m) to 35 in-lb (4.0 N·m).
8) For aft cowl No. 8 latch, install the forward compression pad [60] or the aft compression pad [72].
   a) Apply the sealant to the fastener shank and under the head of the fastener, except the threads.
   b) Install bolts [61] and nuts [58].
   c) Tighten to 25 in-lb (2.8 N·m) to 35 in-lb (4.0 N·m).

(g) Repeat the above steps until all the gaps are correct.

SUBTASK 78-31-01-820-086-H00

(14) If any adjustments were made to the latch pads, the v-groove gap must be measured and adjusted again.

SUBTASK 78-31-01-820-009-H01

(15) Measure the compressed thickness of the clay at the two stop seats on the top of the right aft cowl for the forward and aft deflection limiters.

NOTE: The clay thickness gives the necessary change in the length of each cross-tie rod.

(a) Use a 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay, G02020.
   1) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.
      a) Record the clay thickness values in Table D (Figure 509 (Sheet 2)).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) If the thickness values are not 0.0 inch (0.0 mm), adjust the length of the deflection limiter rods.

NOTE: The clay must be fully compressed out at the stop seats.

SUBTASK 78-31-01-820-042-H01

(16) If necessary, adjust the length of the cross-tie rods (Figure 501):

(a) Loosen the jamnuts on the two sides of the cross-tie rod.

NOTE: Do not disconnect the cross-tie rods from the deflection limiters; the rod ends must not turn during the adjustment of the cross-tie rods. The cross-tie rods have a turnbuckle feature.

(b) Increase the length of the cross-tie rod equal to the thinner of the two pieces of clay.

NOTE: One full turn of the shaft of the cross-tie rod will change the length of the cross-tie rod by 0.10 inch (2.54 millimeters).

NOTE: The gap between the cross tie-rod and at least one of the stop seats must be 0.0 inch (0.0 mm).

(c) Tighten the jamnuts.

(d) Install safety cable, G02473 or MS20995C41 lockwire, G00440, double twist method, on the cross-tie rods.

1) Refer to these tasks: Lockwire, Cotter Pins, and Lockrings - Installation, TASK 20-10-23-400-801, or Safety Cable Installation, TASK 70-41-00-910-802-H01, or Lockwire Installation, TASK 70-41-00-910-803-H00.

J. Prepare for Internal Clearance Adjustments

SUBTASK 78-31-01-160-006-H01

(1) Clean the fire seals on the left and right thrust reverser, the latch beam surface that touches the forward and center latch access doors and the fire seal depressors on the two sides of the strut and engine.

(a) Use a clean, dry cotton wiper, G00034 to remove all loose dirt and contamination.

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. MAKE SURE TO PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN USING THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAMES AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE IF NOT HANDLED PROPERLY.

(b) Use a clean cotton wiper, G00034 that is wet with solvent, B00083.

SUBTASK 78-31-01-820-022-H01

(2) Apply Met-L-Chek D-70 developer, G02380 to the strut seal depressors on the two sides of the strut (Figure 505).

NOTE: In this area, the fire seal on the thrust reverser upper bifurcation is compressed by the forward to aft, strut mounted depressors and the seal depressor on the aft cowl forward fairing.

(a) Apply the developer as a strip at least 1.5 in. (38 mm) wide.

(b) The coating should be even and uniform.

(c) Let the developer dry before you close the thrust reversers.

NOTE: The developer becomes a white powder with a dull finish when it is dry.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-820-023-H01

(3) Apply Met-L-Chek D-70 developer, G02380 on the two sides of the engine upper bifurcation firewall.

NOTE: In this area, the fire seal is compressed by the engine upper bifurcation firewall.

(a) Apply the developer as a strip at least 1.5 in. (38 mm) wide.

(b) The coating should be even and uniform.

(c) Let the developer dry before you close the thrust reversers.

NOTE: The developer becomes a white powder with a dull finish when it is dry.

SUBTASK 78-31-01-820-024-H01

(4) Apply Met-L-Chek D-70 developer, G02380 on the two sides of the engine inner cowl support.

NOTE: In this area, fire seal is compressed by the engine inner cowl support. The fire seal is aft of the inner wall V-blade on the thrust reverser. The thrust reverser inner wall V-blade fits into the V-groove forward of the engine inner cowl support.

(a) Apply the developer as a strip at least 1.5 in. (38 mm) wide.

(b) The coating should be even and uniform.

(c) Let the developer dry before you close the thrust reversers.

NOTE: The developer becomes a white powder with a dull finish when it is dry.

SUBTASK 78-31-01-820-025-H01

(5) Apply Met-L-Chek D-70 developer, G02380 on the two sides of the engine lower bifurcation firewall.

NOTE: In this area, the fire seal is compressed by the engine lower bifurcation firewall.

(a) Apply the developer as a strip at least 1.5 in. (38 mm) wide.

(b) The coating should be even and uniform.

(c) Let the developer dry before you close the thrust reversers.

NOTE: The developer becomes a white powder with a dull finish when it is dry.

SUBTASK 78-31-01-820-026-H01

(6) Apply Met-L-Chek D-70 developer, G02380 to the lower latch beam door faying surface along the seal line and to the bottom surface of both lower bifurcation fire seals.

(a) The coating should be even and uniform.

(b) Let the developer dry before you close the thrust reversers.

NOTE: The developer becomes a white powder with a dull finish when it is dry.

SUBTASK 78-31-01-820-014-H01

CAUTION

MAKE SURE THAT YOU SET THE RODS AND PADS TO THE SPECIFIED LIMITS. STRUCTURAL DAMAGE TO THE COMPRESSION RODS, DEFLECTION LIMITER RODS, AND THE THRUST REVERSER CAN OCCUR IF THE ROD AND PAD ADJUSTMENTS ARE INCORRECT.

(7) Make sure the spacers [42] from the lower bifurcation compression pads on the left thrust reverser half have been removed.

SUBTASK 78-31-01-820-060-H01

(8) Prepare to measure the gaps for the four compression pads and the 10 aft cowl loadshare wear pads on the left and right thrust reversers:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Apply grease, D00504 as a parting agent to the compression pads on the left thrust reverser.

NOTE: The wear plates and shims were removed from the four compression pads.

(b) Apply a cone shaped piece of clay, G02020 approximately 0.40 in. (10.2 mm) thick and 0.5 in. (12.7 mm) in diameter to each of the aft 3 compression pad locations (No. 2, 3, 4) on the left thrust reverser (Figure 502).

1) Place the clay near the outer edge of the compression pad.

NOTE: Placing the clay over the screw countersink in the center of the compression pad may cause an incorrect measurement.

2) Apply grease, D00504 as a parting agent on the clay.

3) Apply grease, D00504 as a parting agent to the compression pads on the right thrust reverser.

(c) Apply a cone shaped piece of clay, G02020 approximately 0.60 in. (15.2 mm) thick and 0.5 in. (12.7 mm) in diameter to the forward compression pad (No. 1) on the left thrust reverser (Figure 502):

1) Place the clay near the outer edge of the compression pad.

NOTE: Placing the clay over the screw countersink in the center of the compression pad may cause an incorrect measurement.

2) Apply grease, D00504 as a parting agent on the clay.

3) Apply grease, D00504 as a parting agent to the forward compression pad (No. 1) on the right thrust reverser.

(d) Apply a cone-shaped piece of clay, G02020 0.2 in. (5.1 mm) wide by 0.3 in. (7.6 mm) tall near the aft edge of each of the 10 engine-mounted turbine frame fittings.(Figure 507)

NOTE: There are five aft cowl loadshare wear pads on each thrust reverser for a total of 10 locations.

1) Apply grease, D00504 as a parting agent to the 10 aft cowl loadshare wear pads on the left and right thrust reversers .

2) Apply grease, D00504 as a parting agent on the clay.

SUBTASK 78-31-01-820-081-H00

(9) Prepare to measure the gap between the T-hook and the T-hook receiver.

(a) On the left side thrust reverser, apply a cone shaped piece of clay, G02020 which is approximately 0.40 in. (10.16 mm) thick and 0.5 in. (12.7 mm) in diameter in the center of the T-hook receiver between the two fasteners (Figure 506 (Sheet 6)).

(b) On the right side thrust reverser, apply grease, D00504 as a parting agent on the T-hook.

SUBTASK 78-31-01-410-030-H00

(10) Close the inboard thrust reverser half.

SUBTASK 78-31-01-820-013-H01

CAUTION

MAKE SURE THAT YOU SET THE RODS AND PADS TO THE SPECIFIED LIMITS. STRUCTURAL DAMAGE TO THE COMPRESSION RODS, DEFLECTION LIMITER RODS, AND THE THRUST REVERSER CAN OCCUR IF THE ROD AND PAD ADJUSTMENTS ARE INCORRECT.

(11) Make sure all shims [21] and washers [22] on the four strut-mounted compression rod [1], compression rod [3], compression rod [9], and compression rod [17] are removed to completely retract the compression rods.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-820-010-H01

(12) REPRORUBBER METHOD (Preferred):

Prepare to measure the gaps between the four strut-mounted compression rods and four compression cups on the left side thrust reverser:

NOTE: It is only necessary to put ReproRubber in the compression cups of one thrust reverser half. The compression rods slide side-to-side in the brackets. When the gap is measured, one side of the compression rod in the cup will have no gap. The gap measured is used for calculating the shims needed on both sides of the compression rod.

NOTE: It is not necessary to use a parting agent with ReproRubber or to clean the parts after the measurements.

(a) Make sure all compression rods are seated in the compression cups on the inboard thrust reverser half.

WARNING

DO NOT GET THESE MATERIALS IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THESE MATERIALS. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES WHEN YOU USE THESE MATERIALS. KEEP THESE MATERIALS AWAY FROM SPARKS, FLAME, AND HEAT. THESE MATERIALS ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(b) Use a pair of vinyl gloves, G50230 to mix the compound; do not use latex gloves or rubber gloves because these materials can prevent the set of the compound.

(c) Follow the manufacturers directions when you mix the 2 part ReproRubber Quick Setting Putty compound, G50092; mix a sufficient quantity of compound for the four compression cups and for a control sample.

NOTE: In general, you will knead two equal size balls of catalyst putty and base putty together for 30-45 seconds. Manipulation time to put the ReproRubber in the compression cups is approximately 3 to 4 minutes. ReproRubber will become hard in approximately 8 to 10 minutes. If the ReproRubber becomes hard before you close the thrust reverser, you will get incorrect gap measurement results.

NOTE: Mix enough of the 2-part compound to put a small amount in each location. Prepare equal amounts of the two compounds before you start to mix the compounds together. If possible, use a team in which one person mixes the compound and the other person puts the compound into position.

(d) Put a piece of ReproRubber that is approximately 0.4 in. (10 mm) thick as a control sample on a nearby metallic surface.

NOTE: The control sample is used to check the hardness of the ReproRubber after the thrust reverser is closed. ReproRubber is affected by the ambient temperature. Cold temperatures will increase the time for the ReproRubber to become hard. Warm temperatures will decrease the time for the ReproRubber to become hard.

NOTE: Do not handle the ReproRubber sample after it is placed to the side. Handling the sample may affect the cure time of the ReproRubber.

(e) Apply a piece of ReproRubber that is cone shaped 0.4 in. (10 mm) thick to the inside of each compression cup on the outboard thrust reverser (Figure 501).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Press the ReproRubber firmly into the compression cup without a pocket of air.

NOTE: A pocket of air can be trapped under the ReproRubber if not formed into a cone shape and pressed firmly into the cup. The pocket of air will give an incorrect gap measurement and an incorrect adjustment of the compression rod.

(f) Immediately go to the step to close the outboard thrust reverser half and close the latches; ReproRubber will become hard quickly.

SUBTASK 78-31-01-820-092-H00

(13) CLAY METHOD (Optional):

Prepare to measure the gaps between the four strut-mounted compression rods and four compression cups on the left side thrust reverser:

NOTE: It is only necessary to put clay in the compression cups of one thrust reverser half. The compression rods slide side-to-side in the brackets. When the gap is measured, one side of the compression rod in the cup will have no gap. The gap measured is used for calculating the shims needed on both sides of the compression rod.

(a) Make sure all compression rods are seated in the compression cups on the inboard thrust reverser half.

(b) Apply grease, D00504 as a parting agent to the rod ends on the outboard ends of the compression rods.

(c) Apply grease, D00504 as a parting agent in the compression cups on the outboard thrust reverser half.

(d) Apply a piece of clay that is cone shaped 0.4 in. (10 mm) thick to the inside of each compression cup on the outboard thrust reverser (Figure 501).

1) Press the clay firmly into the compression cup without a pocket of air.

NOTE: A pocket of air can be trapped under the clay if not formed into a cone shape and pressed firmly into the cup. The pocket of air will give an incorrect gap measurement and an incorrect adjustment of the compression rod.

SUBTASK 78-31-01-410-004-H01

(14) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

(a) Close the V-band latch, all 5 thrust reverser centerline latches, all 3 aft cowl centerline latches, and all 4 deflection limiter latches.

(b) Do not close the T-hook latch and the latch access doors at this time.

(c) Press both the left and right PDOS down buttons or pressure release buttons on the PDOS panel for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

SUBTASK 78-31-01-280-001-H00

(15) If using ReproRubber, check the control sample of ReproRubber to determine appropriate hardness before you open the thrust reverser.

NOTE: If the ReproRubber begins to harden before the thrust reverser is closed, all latches are closed and the PDOS is depressurized, the measurements of the ReproRubber may not be accurate. If this happens, the gaps between the 4 strut-mounted compression rods and cups must be checked again.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

K. Fire Seal Compression Check

SUBTASK 78-31-01-210-002-H01

(1) Open the forward latch access door and examine the inboard and outboard lower bifurcation fire seals that fit around the air tube and wire bundle structure.

(a) The fire seals must completely touch each other below the air tube and wire bundle structure except a triangular shaped area where the seals do not touch, 0.2 in. (5 mm) in length, directly under the structure.

(b) Record conformance in Table J (Figure 509 (Sheet 7)).

SUBTASK 78-31-01-010-009-H01

(2) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

SUBTASK 78-31-01-970-001-H01

(3) Measure the width of the developer that was removed from the faying surface for the forward and center latch access doors (Figure 506).

(a) Make sure the width of developer that was removed is equal to or more than 0.35 in. (9 mm) for the forward latch access door.

(b) Make sure the width of developer that was removed is equal to or more than 0.5 in. (13 mm) for the center latch access door.

(c) Record conformance in Table J (Figure 509 (Sheet 7)).

SUBTASK 78-31-01-970-002-H01

(4) Measure the width of the developer that was removed from the engine seal depressors at the lower bifurcation.

(a) Make sure the width of developer that was removed is equal to or more than 0.35 in. (8.9 mm) along the full length of the fire seals.

(b) If there are areas with a width of less than 0.35 in. (8.9 mm) on the lower bifurcation depressors, use these limits:

1) A minimum width of 0.20 in. (5.1 mm) is permitted for lengths of 1.5 in. (38.1 mm) in isolated areas where there are discontinuities in the strut surface or the fire seal.

2) The total length per thrust reverser half for discontinuities on the lower bifurcation with a minimum width of 0.20 in. (5.1 mm) is 4.5 in. (114.3 mm).

(c) The developer on the seal depressors must show that there are no wrinkles in the fire seal bulb.

(d) Record conformance in Table J (Figure 509 (Sheet 7)).

(e) If the fire seal is not in the limits, replace the fire seal:

1) Do this task: Thrust Reverser Fire Seal Removal, TASK 78-31-05-000-801-H01.

2) Do this task: Thrust Reverser Fire Seal Installation, TASK 78-31-05-400-801-H01.

(f) If a fire seal was replaced, do the steps to check the fire seal limit again.

SUBTASK 78-31-01-970-003-H01

(5) Measure the width of the developer that was removed from the strut mounted seal depressors on the upper bifurcation.

(a) Make sure the width of developer that was removed is equal to or more than 0.35 in. (8.9 mm) along the full length of the fire seals.

(b) If there are areas with a width of less than 0.35 in. (8.9 mm) on the upper bifurcation depressors, use these limits:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) A minimum width of 0.20 in. (5.1 mm) is permitted for lengths of 1.50 in. (38.1 mm) in isolated areas where there are discontinuities in the strut surface or the fire seal.

2) The total length per thrust reverser half for discontinuities with a minimum width of 0.20 in. (5.1 mm) is 17.5 in. (444.5 mm).

3) Areas where the fire seals do not touch the upper bifurcation depressors are allowed as follows:

a) A length of 0.40 in. (10.2 mm) per thrust reverser half for the forward and aft ends of the seal depressor on the aft cowl forward fairing (near the rear engine mount).

b) A length of 0.30 in. (7.6 mm) per thrust reverser half between the forward end of the strut seal depressor and the strut to engine bifurcation seal.

c) A length of 0.30 in. (7.6 mm) per thrust reverser half between the strut to engine bifurcation seal and the engine upper bifurcation land.

(c) The developer on the seal depressors must show that there are no wrinkles in the fire seal bulb.

(d) Record conformance in Table J (Figure 509 (Sheet 7)).

(e) If the fire seal is not in the limits, replace the fire seal:

1) Do this task: Thrust Reverser Fire Seal Removal, TASK 78-31-05-000-801-H01.

2) Do this task: Thrust Reverser Fire Seal Installation, TASK 78-31-05-400-801-H01.

(f) If a fire seal was replaced, do the steps to check the fire seal limit again.

SUBTASK 78-31-01-970-004-H01

(6) Measure the width of the developer that was removed from the seal depressors on the two sides of the engine inner cowl support.

NOTE: In this area, the seal depressor on the inner cowl support is aft of the inner engine V-groove. The thrust reverser fire seal is aft of the inner wall V-blade.

(a) Make sure the width of developer that was removed is equal to or more than 0.10 in. (2.5 mm) along the full length of the fire seal.

(b) The developer on the seal depressors must show that there are no wrinkles in the fire seal bulb.

(c) Record conformance in Table J (Figure 509 (Sheet 7)).

(d) If the fire seal is not in the limits, replace the fire seal:

1) Do this task: Thrust Reverser Fire Seal Removal, TASK 78-31-05-000-801-H01.

2) Do this task: Thrust Reverser Fire Seal Installation, TASK 78-31-05-400-801-H01.

(e) If a fire seal was replaced, do the steps to check the fire seal limit again.

SUBTASK 78-31-01-160-007-H01

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. MAKE SURE TO PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN USING THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAMES AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE IF NOT HANDLED PROPERLY.

(7) Clean all the residual Met-L-Chek D-70 developer, G02380 with solvent, B00083 and a clean cotton wiper, G00034.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

L. Upper Compression Rods Adjustment

SUBTASK 78-31-01-820-043-H01

(1) Measure the thickness of the ReproRubber or clay to find the gaps between the four compression rods and four compression cups on the left side thrust reverser (Figure 501):

NOTE: The ReproRubber thickness is the gap between the compression cup and the compression rod. The thickness represents the total gap plus the total number of spacers necessary for the installation of that compression rod.

(a) If ReproRubber is used, measure the thickness of the hard ReproRubber from the four compression cups on the outboard thrust reverser.

1) Remove the hard ReproRubber from the inside of the four compression cups.

a) If necessary, use a screwdriver blade to remove the ReproRubber from the compression cups.

NOTE: The ReproRubber will have a cone shape.

2) Make a note of the location for each piece of ReproRubber; write the location number on the ReproRubber with a pen, STD-625 or marker, G02061.

3) Cut the ReproRubber through the center of the rod end depression and the center of the compression cup.

NOTE: If the cut does not go through the centers of both the rod end and the compression cup, the gap measurement will be incorrect.

4) Use vernier calipers, STD-146 to measure the ReproRubber thickness between the tip of the cone to the bottom of the depression formed by the compression rod.

NOTE: Do not measure the smallest dimension between the tip of the compression rod and the side wall of the compression cup. This will give an incorrect value.

a) Draw a line from the bottom of the depression which is perpendicular to the centerline of the cone.

b) Measure across the cross-section from the line to the tip of the cone.

5) Record the thickness values for the four compression cups in Table E (Figure 509 (Sheet 2)).

(b) For measurements made with clay, do the steps that follow:

1) Carefully remove the clay from the compression cups.

NOTE: Be careful not to deform the clay when you remove it from the cups.

2) Measure the thickness of the clay inside of the four compression cups on the outboard thrust reverser.

a) Cut the clay through the center of the rod end depression and the center of the compression cup.

NOTE: Be careful not to deform the clay when you cut it.

NOTE: If the cut does not go through the centers of both the rod end and the compression cup, the gap measurement will be incorrect.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) Use vernier calipers, STD-146 to measure the clay thickness between the tip of the cone to the bottom of the depression formed by the compression rod Figure 501 (Sheet 7).

NOTE: Do not measure the smallest dimension between the tip of the compression rod and the side wall of the compression cup. This will give an incorrect value.

c) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

d) Record the thickness values for the four compression cups in Table E (Figure 509 (Sheet 2)).

3) Remove all the residual clay and parting agent from the 4 compression cups and rod ends with solvent, B00083 and a clean cotton wiper, G00034.

SUBTASK 78-31-01-820-015-H01

(2) Check the gap at the 4 compression cups on the outboard thrust reverser (Figure 501).

(a) Compare the recorded thickness values with the limits below:

1) The compressed thickness of the ReproRubber or clay at the No. 1 compression cup must be 0.020 in. (0.51 mm) to 0.050 in. (1.27 mm).

NOTE: The nominal thickness is 0.035 ±0.015 in. (0.889 ±0.381 mm) which converts to 0.020 in. (0.51 mm) to 0.050 in. (1.27 mm).

2) The compressed thickness of the ReproRubber or clay at the No. 2 compression cup must be 0.020 in. (0.51 mm) to 0.050 in. (1.27 mm).

NOTE: The nominal thickness is 0.035 ±0.015 in. (0.889 ±0.381 mm) which converts to 0.020 in. (0.51 mm) to 0.050 in. (1.27 mm).

3) The compressed thickness of the ReproRubber or clay at the No. 3 compression cup must be 0.090 in. (2.29 mm) to 0.120 in. (3.05 mm).

NOTE: The nominal thickness is 0.105 ±0.015 in. (2.667 ±0.381 mm) which converts to 0.090 in. (2.29 mm) to 0.120 in. (3.05 mm).

4) The compressed thickness of the ReproRubber or clay at the No. 4 compression cup must be 0.120 in. (3.05 mm) to 0.150 in. (3.81 mm).

NOTE: The nominal thickness is 0.135 ±0.015 in. (3.429 ±0.381 mm) which converts to 0.120 in. (3.05 mm) to 0.150 in. (3.81 mm).

5) Calculate the shim thickness for the left and right side of each strut-mounted compression rod [1], compression rod [3], compression rod [9], and compression rod [17] in Table E (Figure 509 (Sheet 2)).

NOTE: The shims (P/N 315W3020–4) are made from shim stock BAC1534-50C. All the layers of the shim stock are laminated corrosion resistant steel (CRES). The total shim thickness is 0.048-0.056 inch (1.219-1.422 millimeters) and the thickness of each lamination is 0.020 inch (0.508 millimeter).

(b) If you have locations where the compressed ReproRubber or clay thickness is not in the limits, adjust the length of each compression rod [1], compression rod [3], compression rod [9], and compression rod [17] with washers [22] and shims [21]:

1) Remove the two bullet shaped rod ends from the compression rod.

2) Install the washer [22].

3) Install half the number of shims [21] to the left side of the compression rod and half the number of shims [21] to the right side of the compression rod.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Peel the shims [21] to the required thickness.

NOTE: The shims are made from shim stock BAC1534-50C. All the layers of the shim stock are laminated corrosion resistant steel (CRES). The total shim thickness is 0.048-0.056 inch (1.219-1.422 millimeters) and the thickness of each lamination is 0.020 inch (0.508 millimeter).

b) Install and tighten the two bullet shaped rod ends.

M. Compression Pad Adjustment

SUBTASK 78-31-01-820-016-H01

(1) Measure the gap at the aft 3 compression pads (No. 2, 3, 4) on the lower bifurcation of the left thrust reverser (Figure 506).

(a) Record the gaps in Table F1 (Figure 509 (Sheet 6)).

(b) Compare the clay thickness values with this limit:

1) The compressed thickness of clay at the compression pads must be 0.060 in. (1.52 mm) to 0.100 in. (2.54 mm).

NOTE: The thickness value at each location is the wear plate spacer thickness plus the nominal gap between the wear plates that is required when the latches are closed.

NOTE: The nominal gap used in the calculation is 0.080 ±0.020 in. (2.032 ±0.508 mm) which converts to 0.060 in. (1.52 mm) to 0.100 in. (2.54 mm).

2) If the gap is not in the limits, calculate the number of the spacers for the required thickness (Figure 509 (Sheet 6)).

(c) Add or remove the necessary spacers under the wear plates on the right side compression pads (No. 2, 3, 4):

NOTE: The spacers for the compression pads on the left thrust reverser were removed in a previous step.

1) Get the spacers [42] for the correct thickness at the left and right side forward compression pads (No. 2, 3, 4).

NOTE: The thickness of the wear plate is 0.160 ±0.005 in. (4.064 ±0.127 mm).

NOTE: The thickness of the spacer is 0.020 in. (0.508 mm).

2) Install the wear plate [41], spacers [42] and screw [43] on the left and right side compression pads (No. 2, 3, 4).

NOTE: If more than 2 spacers are used under the wear plate, use a screw with the next longer grip length.

a) Tighten the screw to 72 in-lb (8.1 N·m) to 88 in-lb (9.9 N·m).

SUBTASK 78-31-01-820-047-H01

(2) Measure the gap at the forward compression pad (No. 1) on the lower bifurcation of the left thrust reverser (Figure 506).

(a) Record the gap in Table F2 (Figure 509 (Sheet 6)).

(b) Compare the clay thickness values with this limit:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) The compressed thickness of clay at the compression pad must be 0.060 in. (1.52 mm) to 0.100 in. (2.54 mm).

NOTE: The thickness value at each location is the wear plate spacer thickness plus the nominal gap between the wear plates that is required when the latches are closed.

NOTE: The nominal gap used in the calculation is 0.080 ±0.020 in. (2.032 ±0.508 mm) which converts to 0.060 in. (1.52 mm) to 0.100 in. (2.54 mm).

2) If the gap is not in the limits, calculate the number of the spacers for the required thickness (Figure 509 (Sheet 6)).

NOTE: The wear plate and spacers for the forward compression pad on the left and right side thrust reversers were removed in a previous step.

NOTE: The thickness of the spacer is 0.020 in. (0.508 mm). The thickness of the wear plate is 0.160 ±0.005 in. (4.064 ±0.127 mm).

(c) Add or remove the necessary spacers under the wear plates on the left and right side forward compression pads (No. 1):

1) Get the spacers [42] for the correct thickness at the left and right side forward compression pads (No. 1).

2) Install the wear plate [41], spacers [42], and screw [43] on the left and right side forward compression pads (No.1).

NOTE: If more than 2 spacers are used under the wear plate, use a screw with the next longer grip length.

a) Tighten the screw to 72 in-lb (8.1 N·m) to 88 in-lb (9.9 N·m).

SUBTASK 78-31-01-160-004-H01

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. MAKE SURE TO PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN USING THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAMES AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE IF NOT HANDLED PROPERLY.

(3) Remove all the residual clay and parting agent from the 8 compression pads with solvent, B00083 and a clean cotton wiper, G00034.

SUBTASK 78-31-01-820-017-H01

(4) Measure the gap between the 10 loadshare rub pads on the aft cowl and the engine-mounted turbine frame bumper brackets.

(a) Measure the thickness of the clay, G02020 from the 10 aft cowl loadshare wear pads.

1) Use a 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay.

NOTE: The clay thickness at each location is the gap between the loadshare rub pad and the engine-mounted turbine frame fittings.

2) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

3) Record the thickness values for the 10 aft cowl loadshare wear pads in Table G (Figure 509 (Sheet 6)).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Calculate the average thickness of the clay at the 10 loadshare rub pads (Figure 509 (Sheet 6)).

(c) The average gap limit between the loadshare rub pads and the engine-mounted bumper brackets must be 0.110 in. (2.79 mm) to 0.270 in. (6.86 mm).

(d) If the average gap is not in the limits, add or remove the fillers under the loadshare rub pads as necessary.

NOTE: The thickness of each filler is 0.010 in. (0.254 mm). The thickness of each rub pad is 0.090 in. (2.286 mm). There are two rub pads on the left and right aft cowl forward latch fitting and eight rub pads on the left and right aft cowl forward frame. A maximum of nine fillers can be installed under each rub pad.

1) On the left or right aft cowl latch fitting, remove the rub pad [90] and fillers [91].
   a) Remove the bolts [92], rub pad [90], and fillers [91].
   b) Add or remove the fillers [91] under the rub pad to get the correct gap.
   c) Install the bolts [92] to install the rub pad [90] and fillers [91].
2) On the left or right aft cowl frame, remove rub pad [93] and fillers [94].
   a) Remove the bolts [92], rub pad [93], and fillers [94].
   b) Add or remove the fillers [94] under the rub pad to get the correct gap.
   c) Install the bolts [92] to install the rub pad [93] and fillers [94].
3) Measure the gaps at the 10 aft cowl loadshare wear pads again.
4) Calculate the average aft cowl loadshare gap again.
5) Adjust the gap at the aft cowl loadshare wear pads until the average aft cowl loadshare gap is in the limits before you continue with the procedure.

SUBTASK 78-31-01-160-005-H01

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. MAKE SURE TO PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN USING THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAMES AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE IF NOT HANDLED PROPERLY.

(5) Remove all the residual clay and parting agent from the loadshare rub pads and the engine-mounted turbine frame fittings with solvent, B00083 and a clean cotton wiper, G00034.

SUBTASK 78-31-01-820-088-H00

(6) If any of the upper compression rod lengths or lower compression pad gaps have been adjusted, measure the gaps again.

(a) Adjust the gaps at the lower compression pads as necessary until all gaps are within limits.

(b) Adjust the length of the compression rods as necessary until all gaps are within limits.

1) If the gaps are correct, install safety cable, G02473 or MS20995C41 lockwire, G00440, double twist method, between the rod and the rod ends.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

N. Interlock Pin Fitting Adjustment and Installation

SUBTASK 78-31-01-820-049-H01

(1) Use the forward compression pad (No. 1) gap measurement recorded earlier to calculate the position of the serrated fitting.

NOTE: The wear plate and spacers for the forward compression pad on the left and right side thrust reversers were removed in a previous step. The 0.440 inch value is based on the wear plate thickness, any spacer thickness required, the 0.06-0.10 inch (1.52-2.54 millimeters) gap between the wear plates after the latches are closed and the position of the hole in the tongue of the serrated fitting in relation to the fitting.

NOTE: The thickness of the spacer is 0.020 inch (0.508 millimeter). The thickness of the wear plate is 0.160 ± 0.005 inch (4.064 ± 0.1270 millimeter)

(a) Use the Table H to calculate the minimum fitting overhang dimension (Figure 509 (Sheet 4)).

(b) Install the serrated fitting on the serrated surface of the forward (No. 1) compression fitting at the overhang dimension.

1) Use a depth micrometer (0-1 inch, readable to 1/1000 inch), STD-1096 or a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 to set the dimension.

NOTE: There is a short, flat, vertical surface below the radius of the tongue on the serrated fitting. Set the overhang as close as possible to the calculated dimension; the serrations on the fitting and the plate are 0.0357 inch (0.9068 millimeter) apart.

(c) Install the six bolts and six washers.

1) Tighten the bolts to 31 in-lb (3.5 N·m) to 39 in-lb (4.4 N·m).

(d) Remove and discard the tape used to locate the serrated fitting.

(e) Install safety cable at four locations between the bolts.

1) Use corrosion resistant steel (cres) safety cable, G02473 and ferrule.

NOTE: The safety cable comes as a kit which has cable that is 0.040-0.046 inch (1.016-1.168 millimeter) in diameter, 18 inches (457.2 millimeters) in length.

a) Refer to this task: Safety Cable Installation, TASK 70-41-00-910-802-H01.

2) If safety cable is not available, use corrosion resistant steel (cres) MS20995C41 lockwire, G00440, installed double twist method.

a) Refer to this task: Lockwire Installation, TASK 70-41-00-910-803-H00.

SUBTASK 78-31-01-820-048-H01

(2) Measure the thickness of the clay, G02020 between the T-hook and the T-hook receiver on the left and right thrust reverser halves:

(a) Use 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay.

(b) Be careful you do not deform the clay as you measure it to prevent a false value.

NOTE: The gap between the T-hook and the T-hook receiver must be 0.155 in. (3.937 mm) to 0.175 in. (4.445 mm).

(c) Record the gap in Table I (Figure 509 (Sheet 6)).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Find the combination of spacers to install under the T-hook receiver (Figure 506 (Sheet 6)).

NOTE: The combination of spacers to install under the receiver will give you the correct bolt grip length.

Table 501/78-31-01-993-810-H00 T-Hook Receiver Spacers

Spacer Part Number	Spacer Nominal Thickness
315W1728-2 (Large spacer with bent edges)	0.025 inch (0.635 mm)
315W1728-3	0.050 inch (1.270 mm)
315W1728-4	0.125 inch (3.175 mm)
315W1728-5	0.010 inch (0.254 mm)

(e) Compare the thickness value from the clay with the required thickness of 0.1550-0.1750 inch (3.9370-4.4450 millimeters).

(f) Calculate the total thickness for the combination of spacers from Table 501.

1) You must use the large spacer with the bent edges and a combination of small spacers when you calculate the total thickness.

O. V-Band Latch and (Latch Beam and Aft Cowl) Centerline Tension Latches - Adjustment

SUBTASK 78-31-01-410-029-H00

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

(a) Close the V-band latch, the 5 thrust reverser centerline latches, the 3 aft cowl centerline latches, the 4 deflection limiter latches, and the T-hook latch.

(b) Do not close the latch access doors at this time.

(c) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

SUBTASK 78-31-01-820-005-H01

(2) Do this task: Thrust Reverser V-Band Latch Adjustment, TASK 78-31-02-820-801-H01.

NOTE: Close and latch all other tension latches.

(a) Do not lockwire the jamnut on the V-band latch at this time.

(b) Completely open and close the V-band latch a minimum of 3 times.

(c) Close the V-band latch when the adjustment is completed.

SUBTASK 78-31-01-820-006-H01

(3) Adjust the 5 thrust reverser centerline latches and the 3 aft cowl centerline latches.

(a) Do this task: Thrust Reverser Tension Latches Adjustment, TASK 78-31-04-820-801-H01.

(b) Completely open and close each tension latch a minimum of 3 times.

(c) Keep the tension latches closed after the adjustment is completed.

(d) Record the latch closing tension in Table K (Figure 509 (Sheet 7)).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

P. Aft Cowl Deflection Limiter Latches - Adjustment

SUBTASK 78-31-01-820-007-H01

(1) Adjust the deflection limiter latches:

NOTE: There are two deflection limiter latches on the left aft cowl and two deflection limiter latches on the right aft cowl. Only close the two deflection limiter latches on one side at a time. If the two sides are latched at the same time, the adjustment of the deflection limiter latches will not be correct.

(a) Make sure the thrust reversers are closed and all the tension latches are closed except for the deflection limiter latches.

(b) Make sure that the right deflection limiter latches are open.

(c) Adjust the two left deflection limiter latches.

1) Do this task: Thrust Reverser Tension Latches Adjustment, TASK 78-31-04-820-801-H01.

2) Open the left deflection limiter latches when the adjustment is complete.

(d) Adjust the two right deflection limiter latches.

1) Do this task: Thrust Reverser Tension Latches Adjustment, TASK 78-31-04-820-801-H01.

2) Open the right deflection limiter latches when the adjustment is complete.

(e) Record the latch closing tension in Table K (Figure 509 (Sheet 7)).

Q. Latch Access Doors Adjustment

SUBTASK 78-31-01-820-021-H01

(1) Check the force necessary to close the latches on the thrust reverser latch access doors.

(a) Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

(b) Close each thrust reverser latch access door located on the latch beam fairing and make sure that the door is held firmly to the left hand thrust reverser latch beam and that the door latches can be closed with no more than 20 lbf (89 N) maximum force.

1) With both latches on the door closed, place your hand on the door near the latch and push the door toward the closed position to determine if the door is loose near the latch.

(c) If the door is loose near the latch, adjust the access door adjustment screw to make a tight fit.

1) While holding the door closed with your hand, measure the force needed to close each latch with a push pull dial gage, STD-6566 or equivalent.

(d) If more than 20 lbf (89 N) of force is required to close the latch, do the steps that follow to adjust the latch force.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Use a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 to measure the stack up of the latch beam assembly at the location where the latch interfaces with the beam (Figure 508, Dimension A, View A-A).
2) Adjust the access door adjustment screw to match Dimension A measurement plus .000-.005 inch (.000 - .127 millimeter) (Figure 508, Dimension B, View A-A).
   a) Measure the adjustment with a shop aid or 0.0 - 0.5 Inch feeler gauge, STD-1107.
3) While holding the door closed with your hand, measure the force needed to close the latch with a push pull dial gage, STD-6566 or equivalent.
4) Measure the force at least 3 times.
5) The force to close the latch must be no more than 20 lbf (89 N).
6) If the force to close the latch is more than 20 lbf (89 N), go back and adjust the access door adjustment screw again.

(e) Make sure that the latch gap does not exceed 0.039 in. (1.0 mm) (Figure 508, View B).

(f) Make sure that you examine every latch.

(g) When all 6 door latches have been adjusted and the force to close the latches is 20 lbf (89 N) or less, make sure that the doors do not rattle and do not move.

R. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-01-090-006-H01

(1) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-01-710-003-H01

(2) Close and open the thrust reverser a minimum of 3 times:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to release this pressure to get an accurate gap value.

(b) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

SUBTASK 78-31-01-410-007-H01



WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

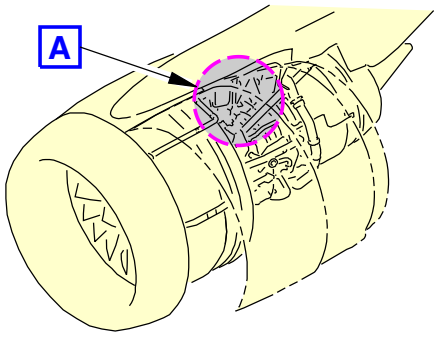
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

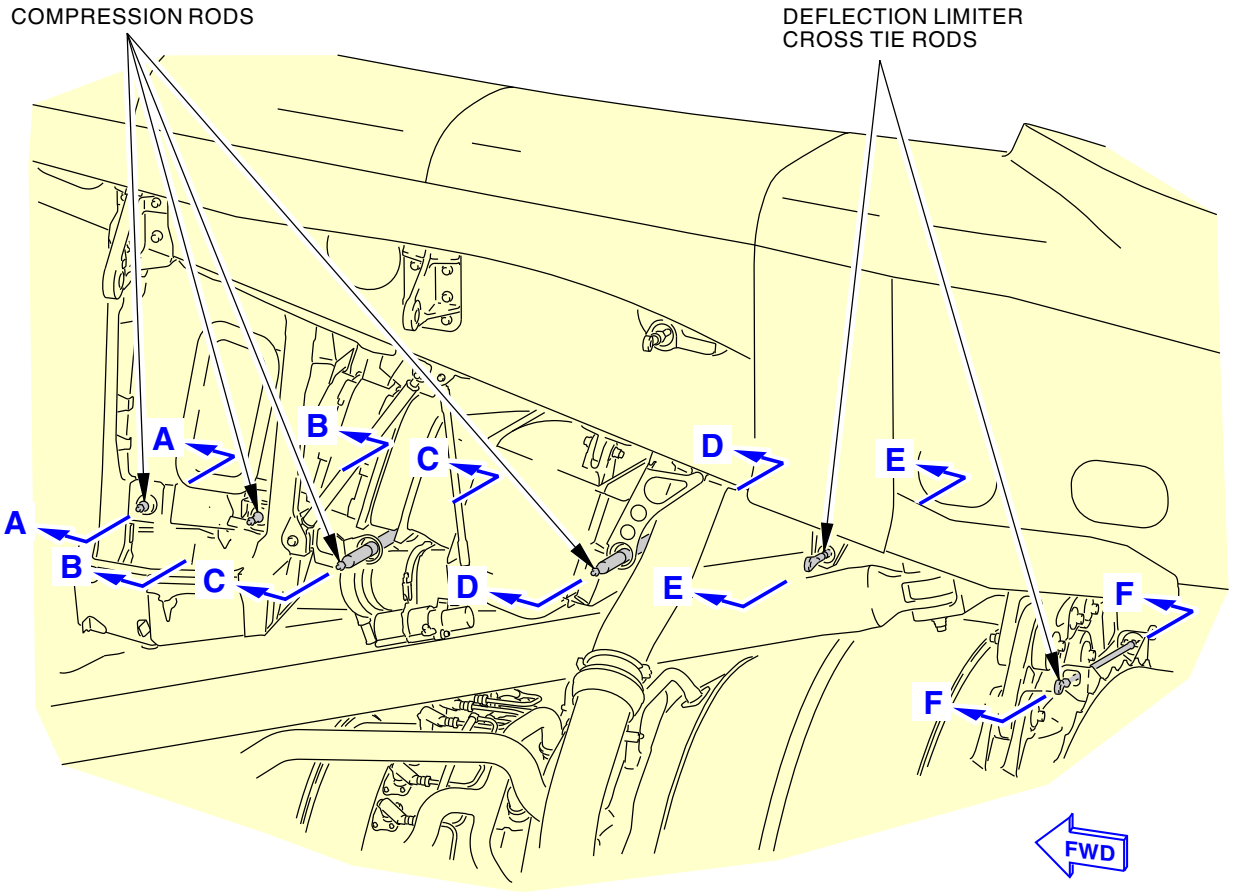
(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





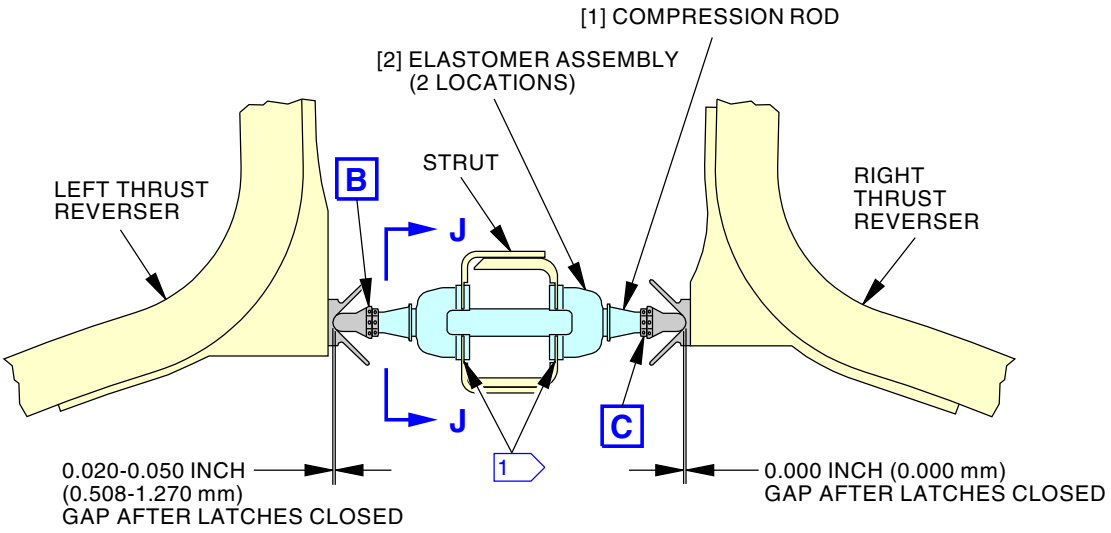
(THRUST REVERSER REMOVED FOR CLARITY)

A

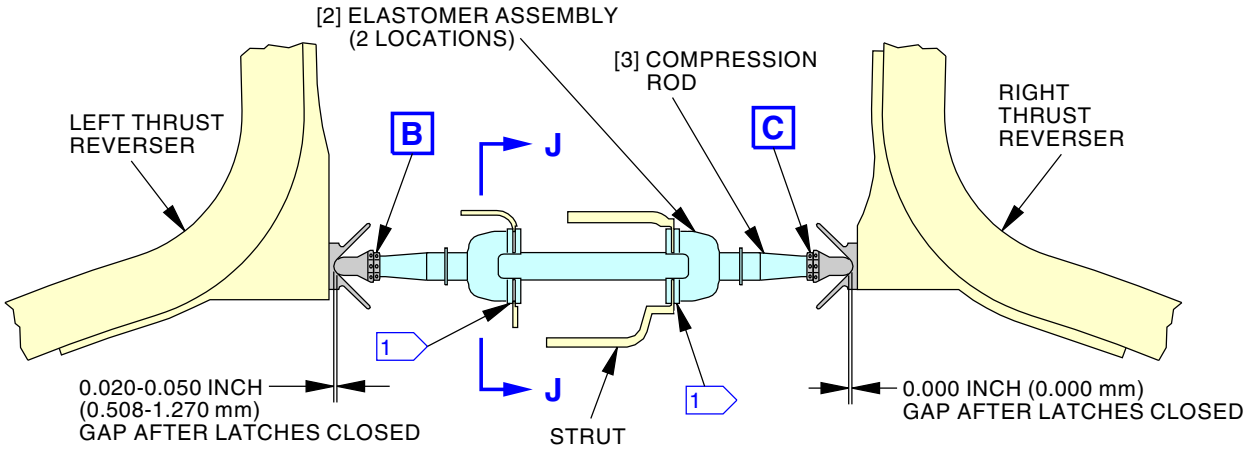
M07294 S0004286266_V2

Thrust Reverser Compression and Deflection Limiter Rod Adjustment
Figure 501/78-31-01-990-803-H01 (Sheet 1 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



A-A



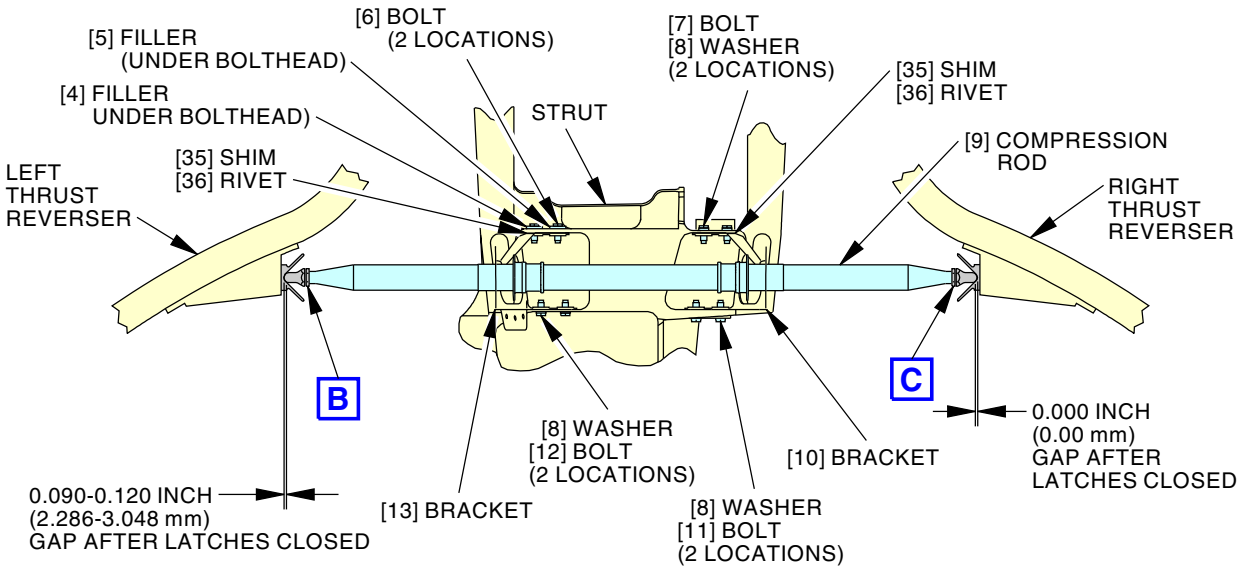
B-B

1 APPLY ADHESIVE BETWEEN THE STRUT AND ELASTOMER ASSEMBLY

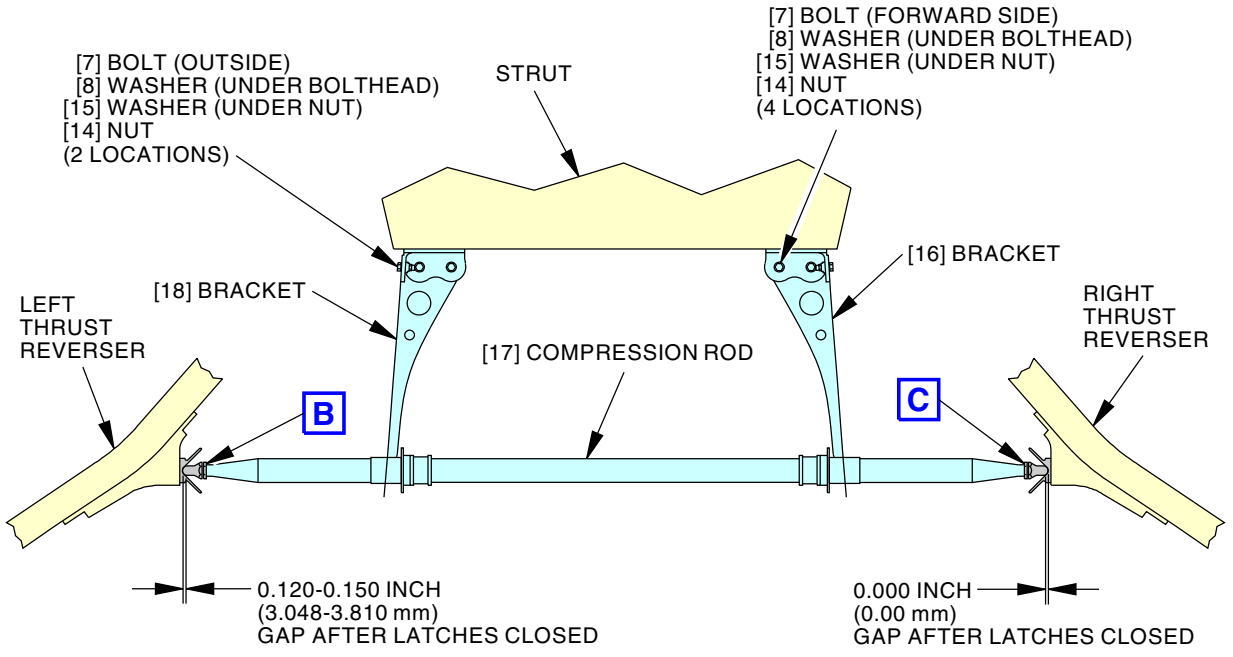
M07295 S0004286267_V2

Thrust Reverser Compression and Deflection Limiter Rod Adjustment
Figure 501/78-31-01-990-803-H01 (Sheet 2 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



C-C

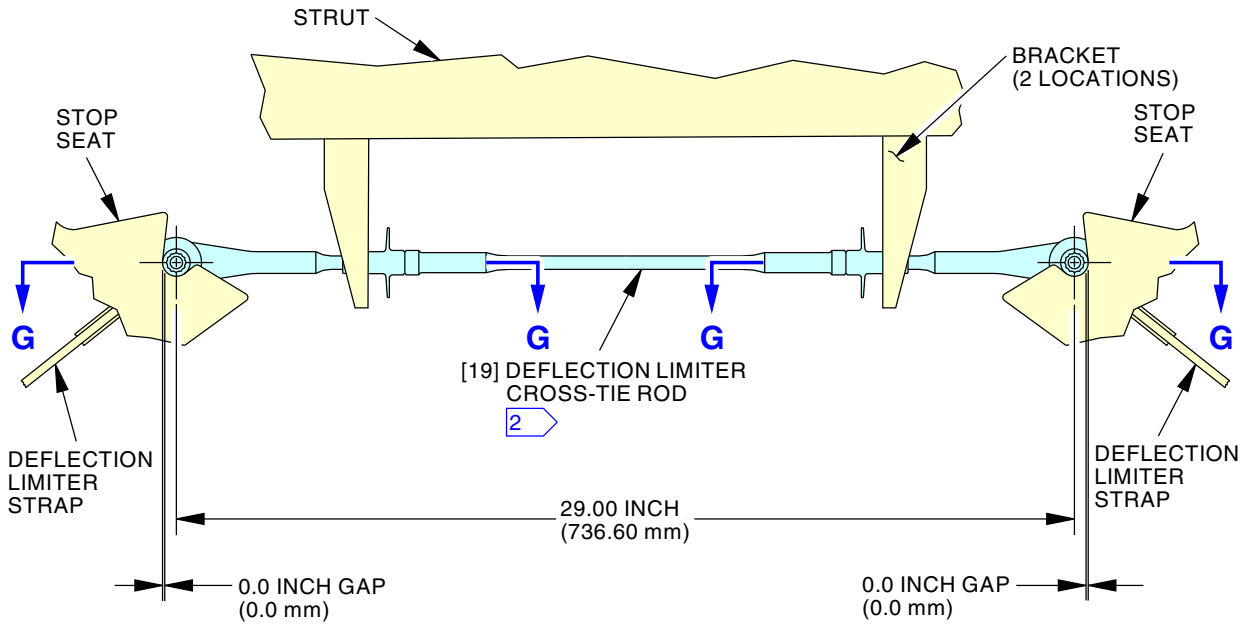


D-D

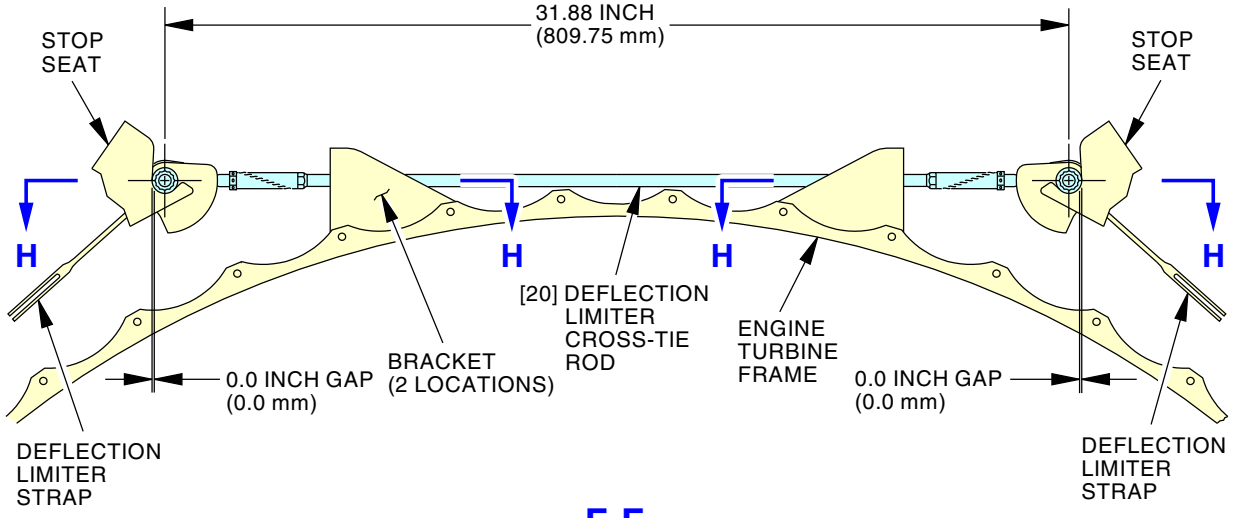
M07296 S0004286268_V3

Thrust Reverser Compression and Deflection Limiter Rod Adjustment
Figure 501/78-31-01-990-803-H01 (Sheet 3 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



E-E



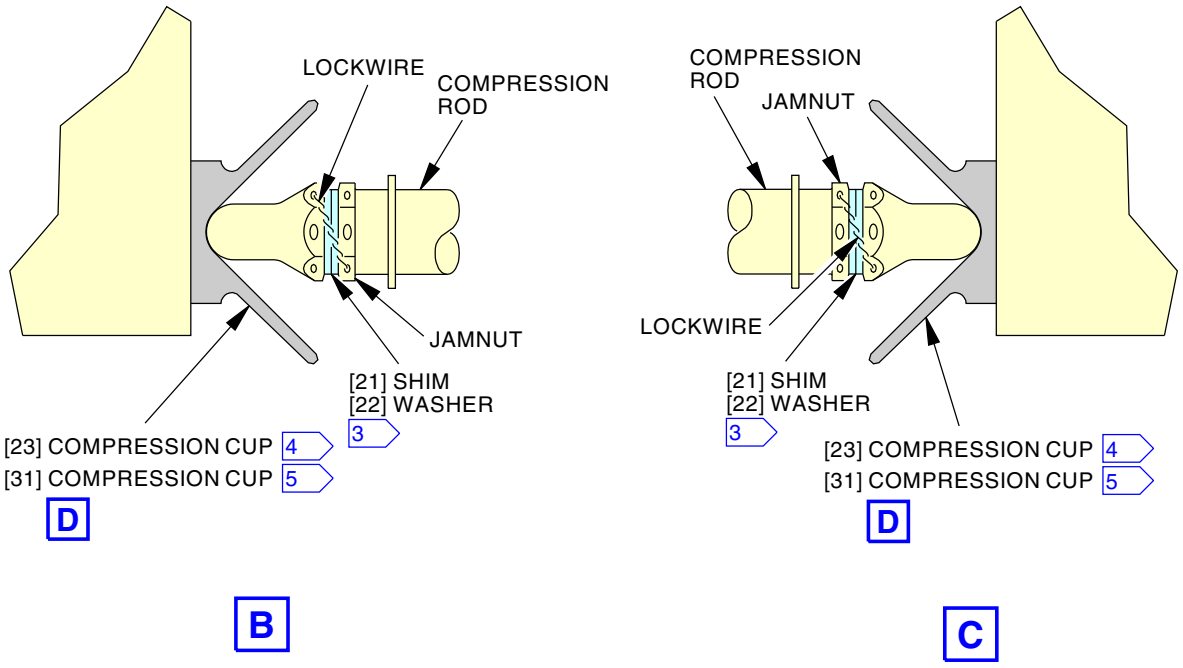
F-F

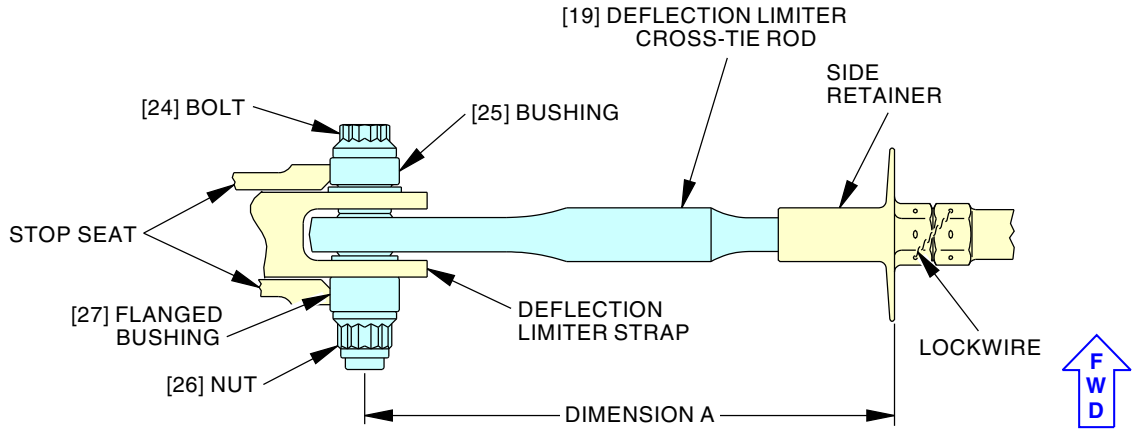
2 DISASSEMBLE ROD TO REMOVE FROM BRACKETS

M07297 S0004286269_V3

Thrust Reverser Compression and Deflection Limiter Rod Adjustment
Figure 501/78-31-01-990-803-H01 (Sheet 4 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





3 USE A COMBINATION OF SHIMS AND WASHERS TO GET GAP IN THE PERMITTED LIMITS.

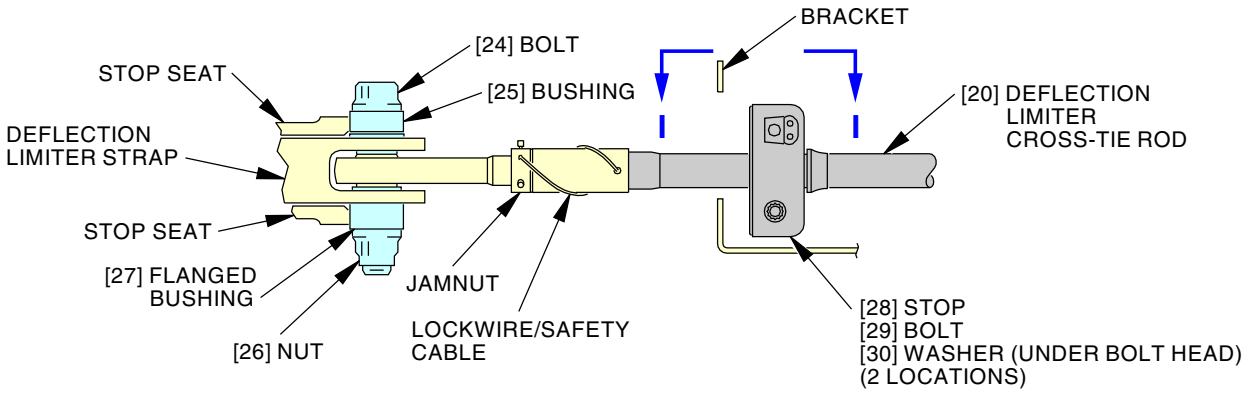
4 NO. 1 COMPRESSION CUP.

5 NO. 2, 3, 4 COMPRESSION CUP.

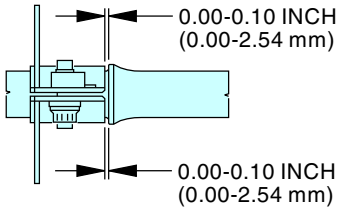
M07298 S0004286270_V4

Thrust Reverser Compression and Deflection Limiter Rod Adjustment
Figure 501/78-31-01-990-803-H01 (Sheet 5 of 7)

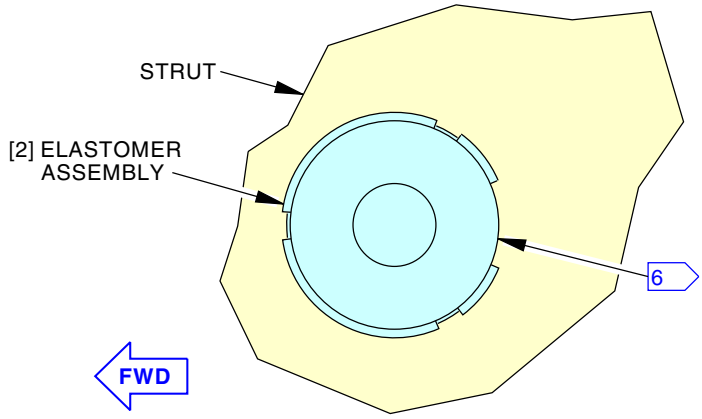
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



H-H



I-I



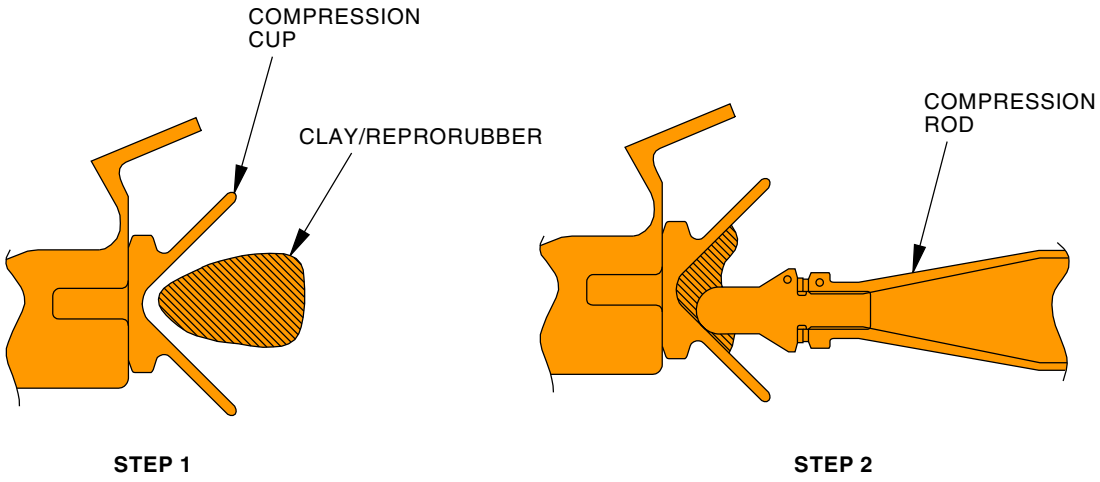
J-J

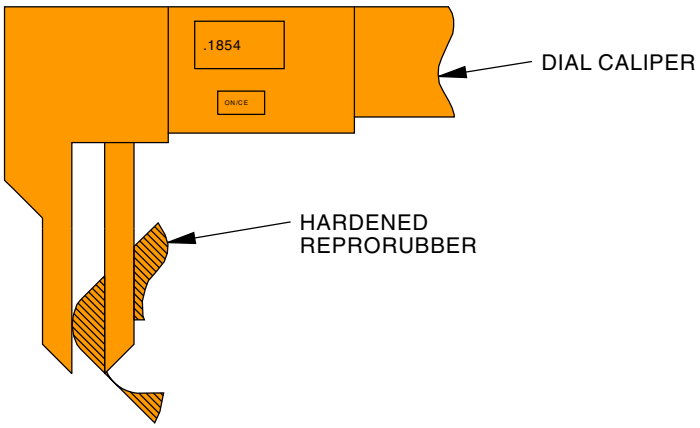
6 INSTALL ELASTOMER ASSEMBLY WITH NOTCH AFT

N01488 S0000103421_V2

Thrust Reverser Compression and Deflection Limiter Rod Adjustment
Figure 501/78-31-01-990-803-H01 (Sheet 6 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



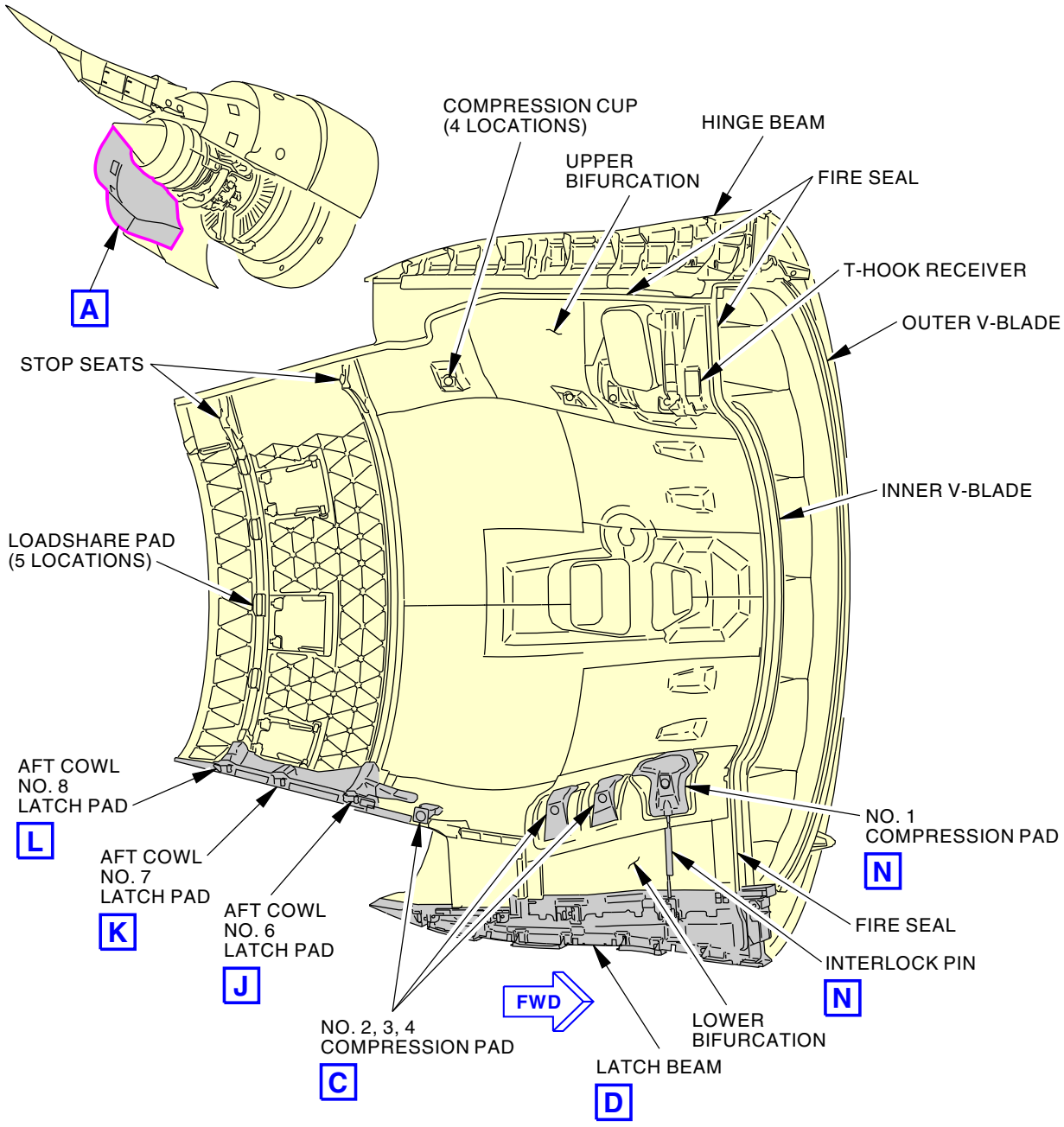


D

W32542 S0000121712_V4

Thrust Reverser Compression and Deflection Limiter Rod Adjustment
Figure 501/78-31-01-990-803-H01 (Sheet 7 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



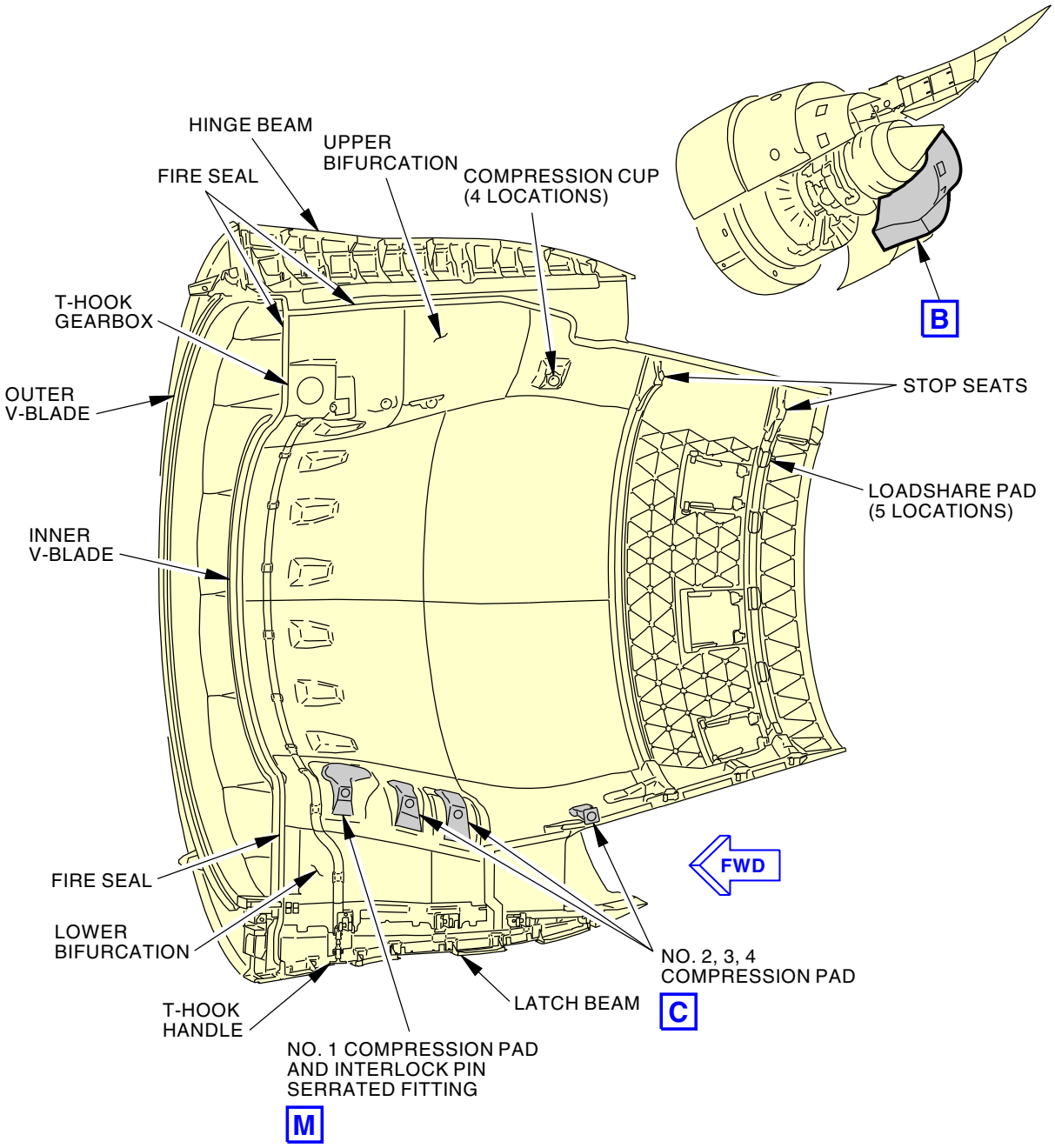
LEFT THRUST REVERSER HALF
(INTERNAL SIDE)

A

M07300 S0004286272_V4

Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 1 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



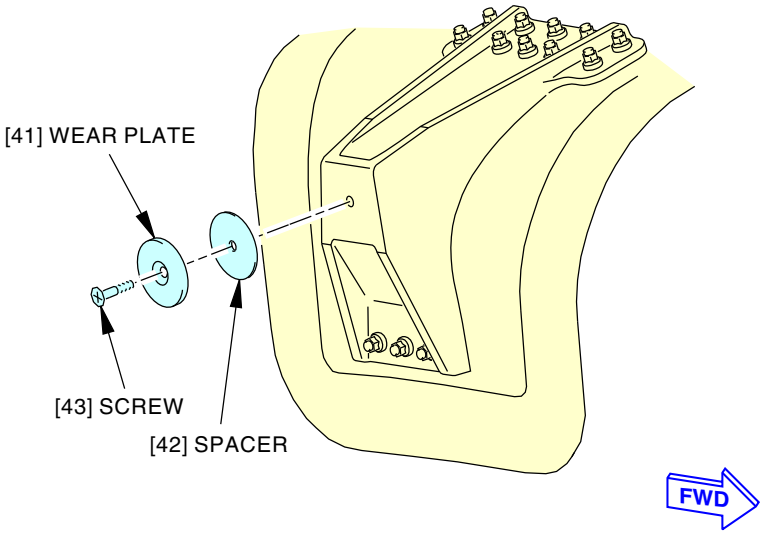
RIGHT THRUST REVERSER HALF (INTERNAL SIDE)

B

353013 S0000132636_V3

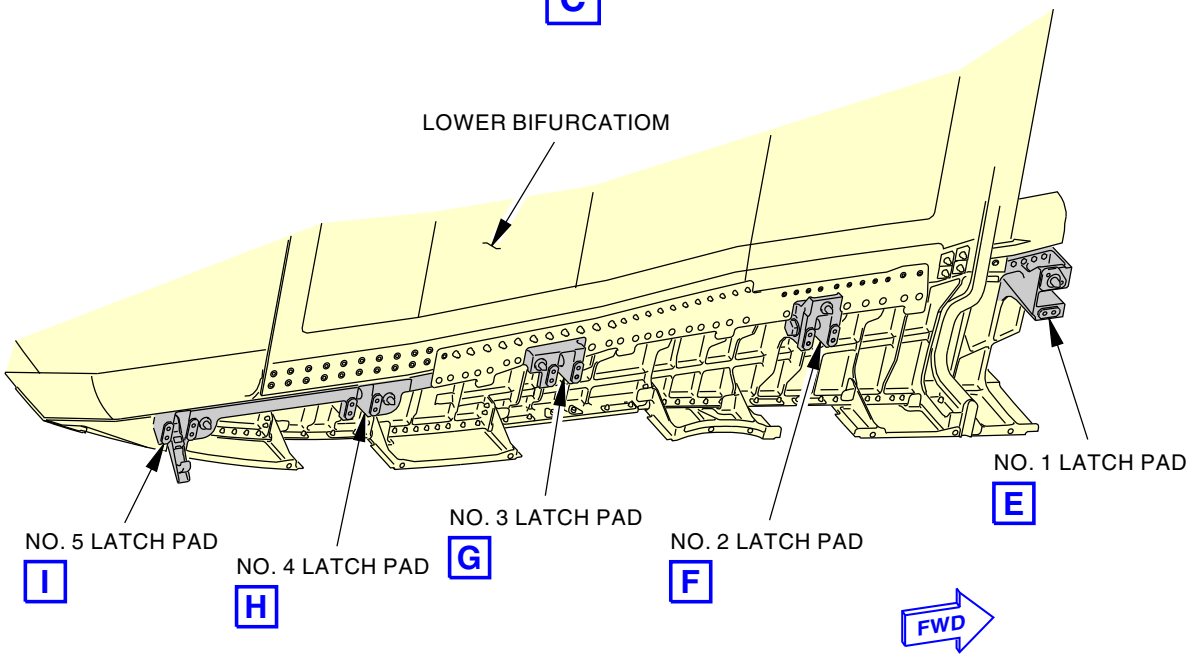
Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 2 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NO. 2, 3, 4 COMPRESSION PAD
(3 LOCATIONS, LEFT SIDE IS SHOWN,
RIGHT SIDE IS OPPOSITE)

C



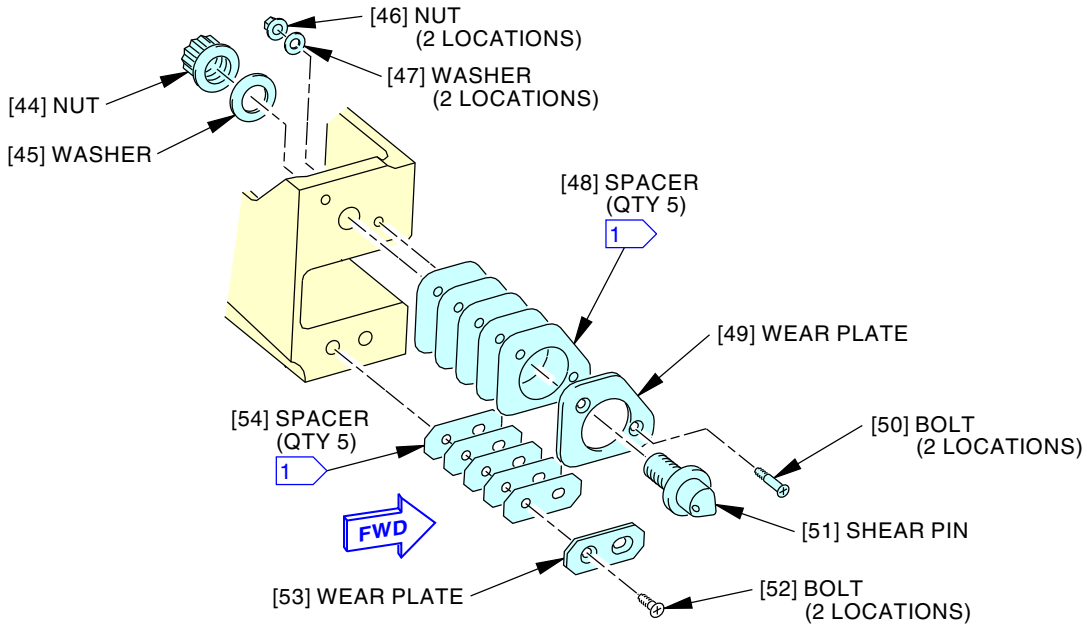
LATCH BEAM
(LOWER BIFURCATION)

D

M07301 S0004286273_V3

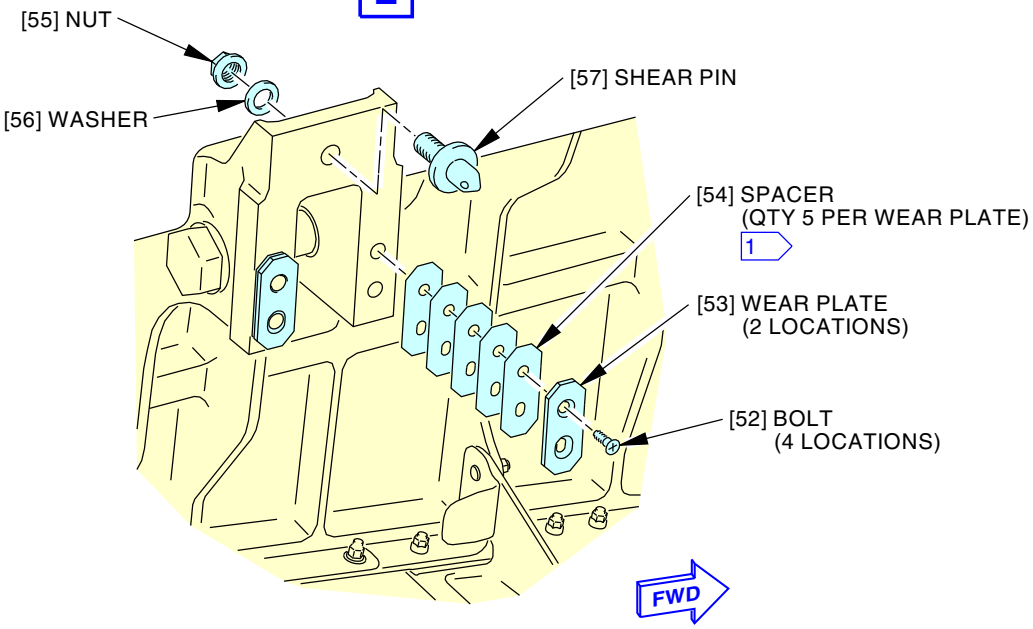
Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 3 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NO. 1 LATCH PAD

E



NO. 2 LATCH PAD

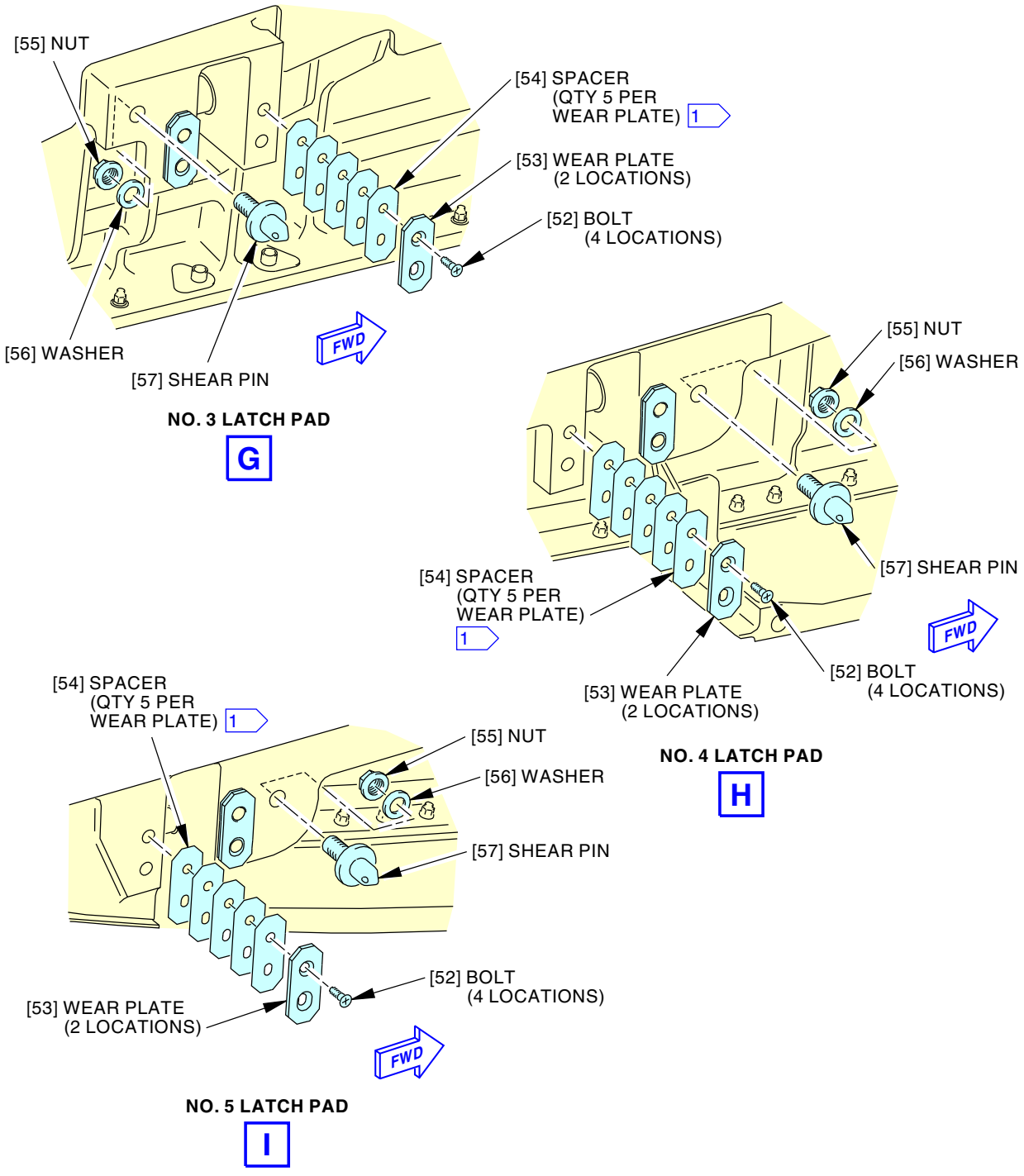
F

1 MAXIMUM SPACERS.

M07302 S0004286274_V4

Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 4 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

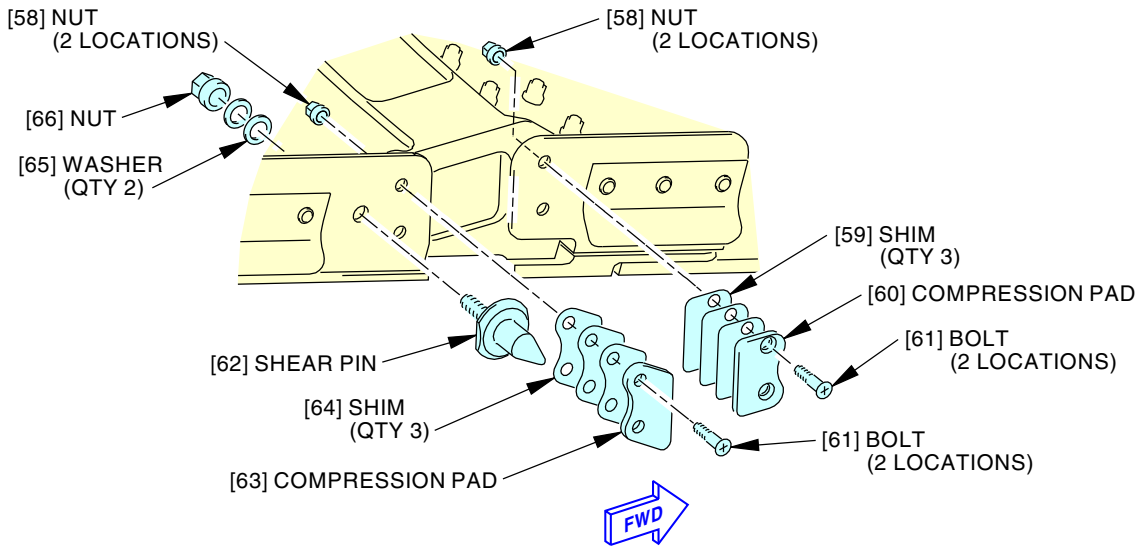


1 MAXIMUM SPACERS.

M07303 S0004286275_V4

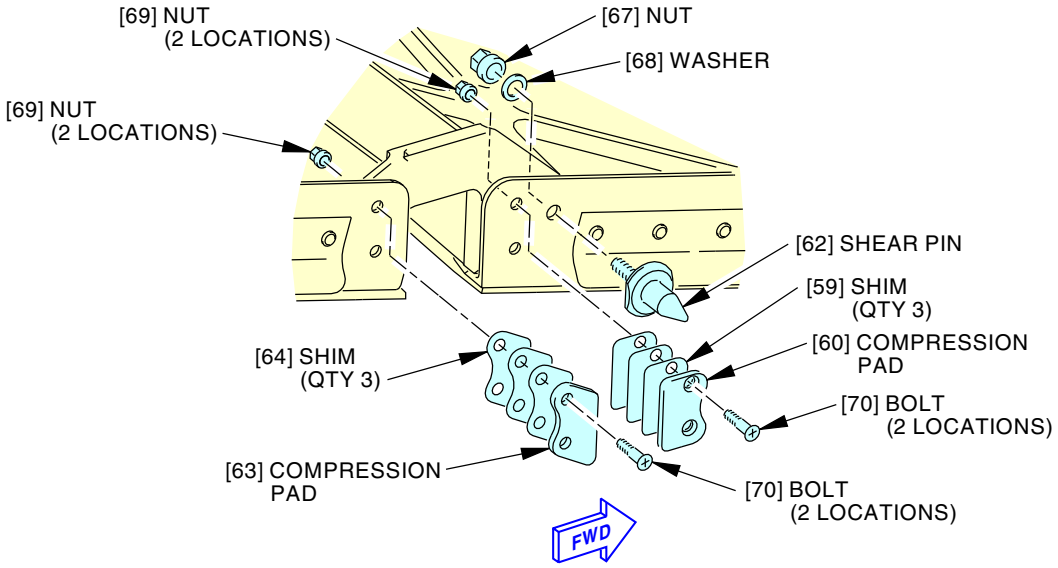
Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 5 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL NO. 6 LATCH PAD

J



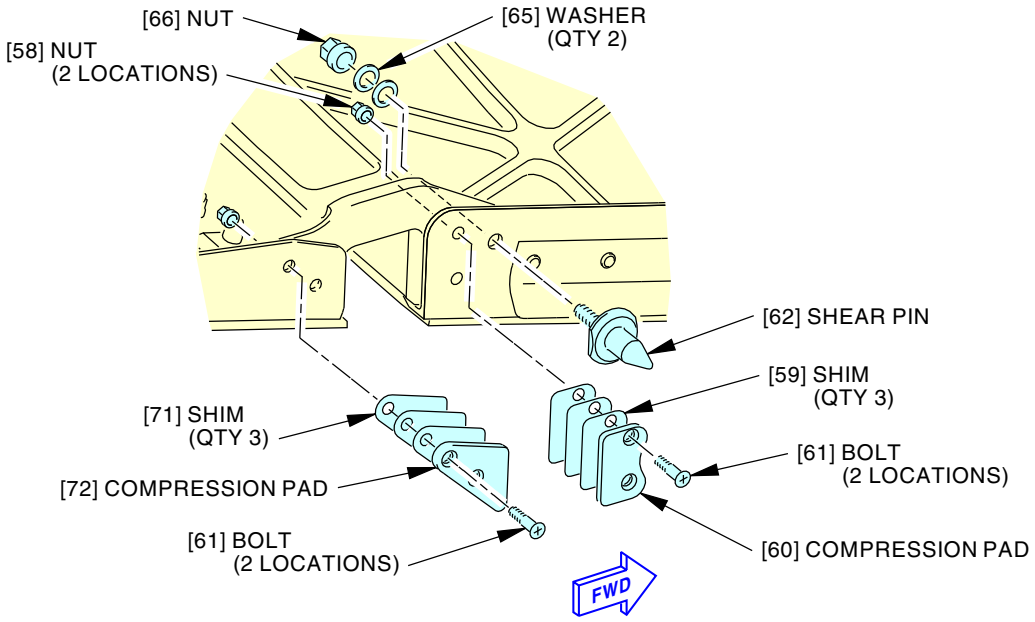
AFT COWL NO. 7 LATCH PAD

K

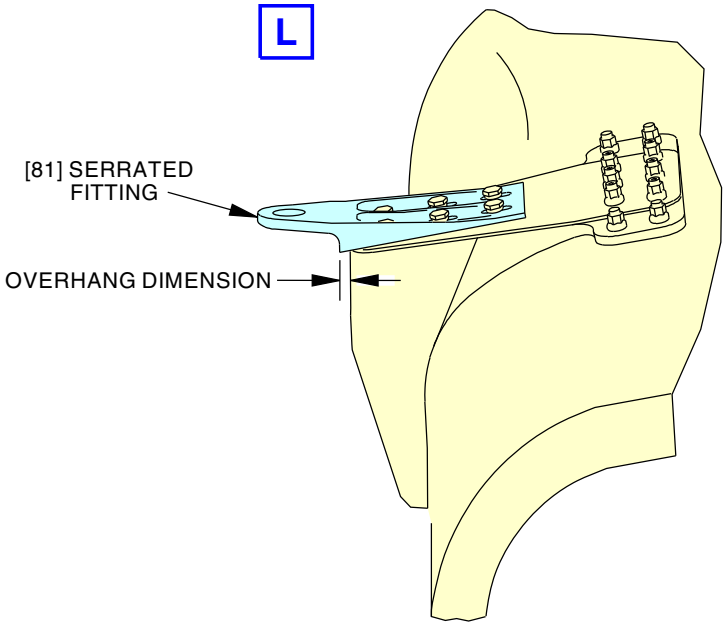
M07304 S0004286276_V4

Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 6 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL NO. 8 LATCH PAD



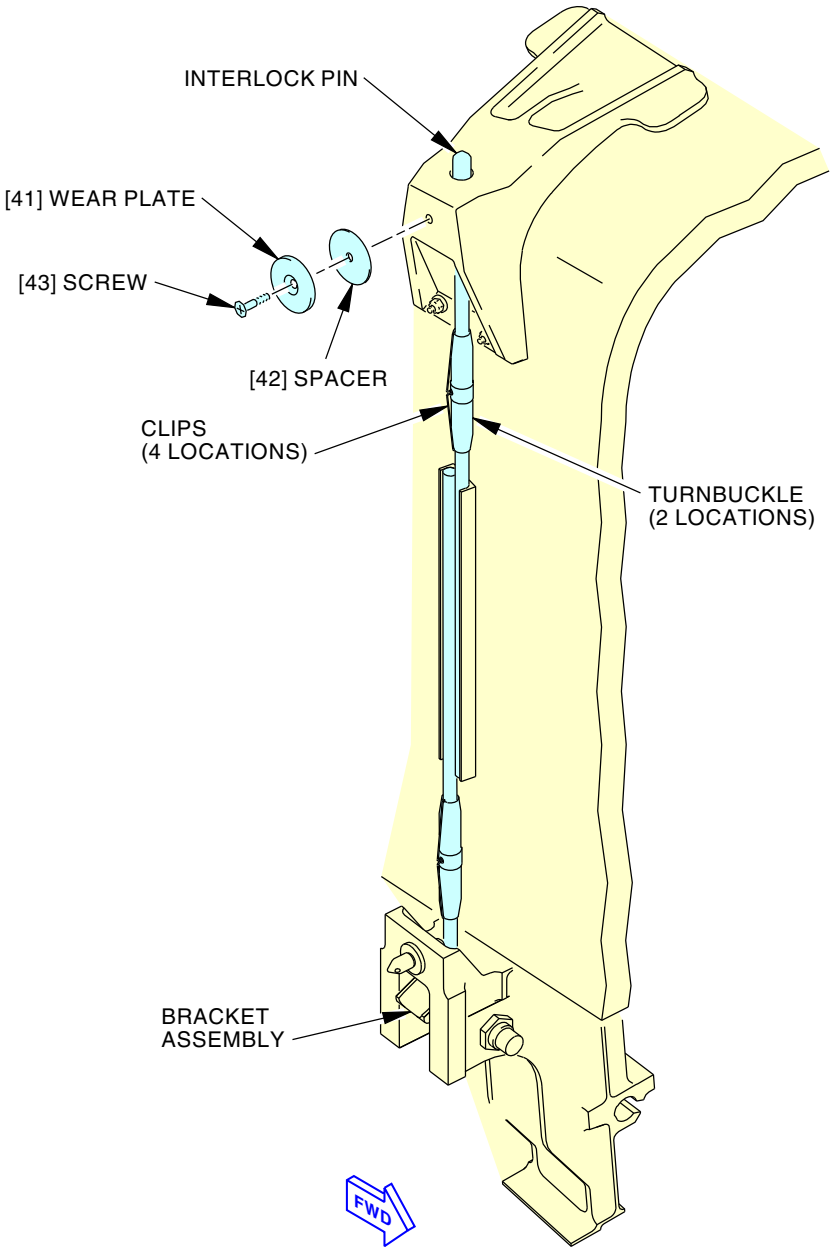
NO. 1 COMPRESSION PAD AND INTERLOCK PIN SERRATED FITTING (RIGHT SIDE)

M

N32735 S0000106872_V5

Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 7 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



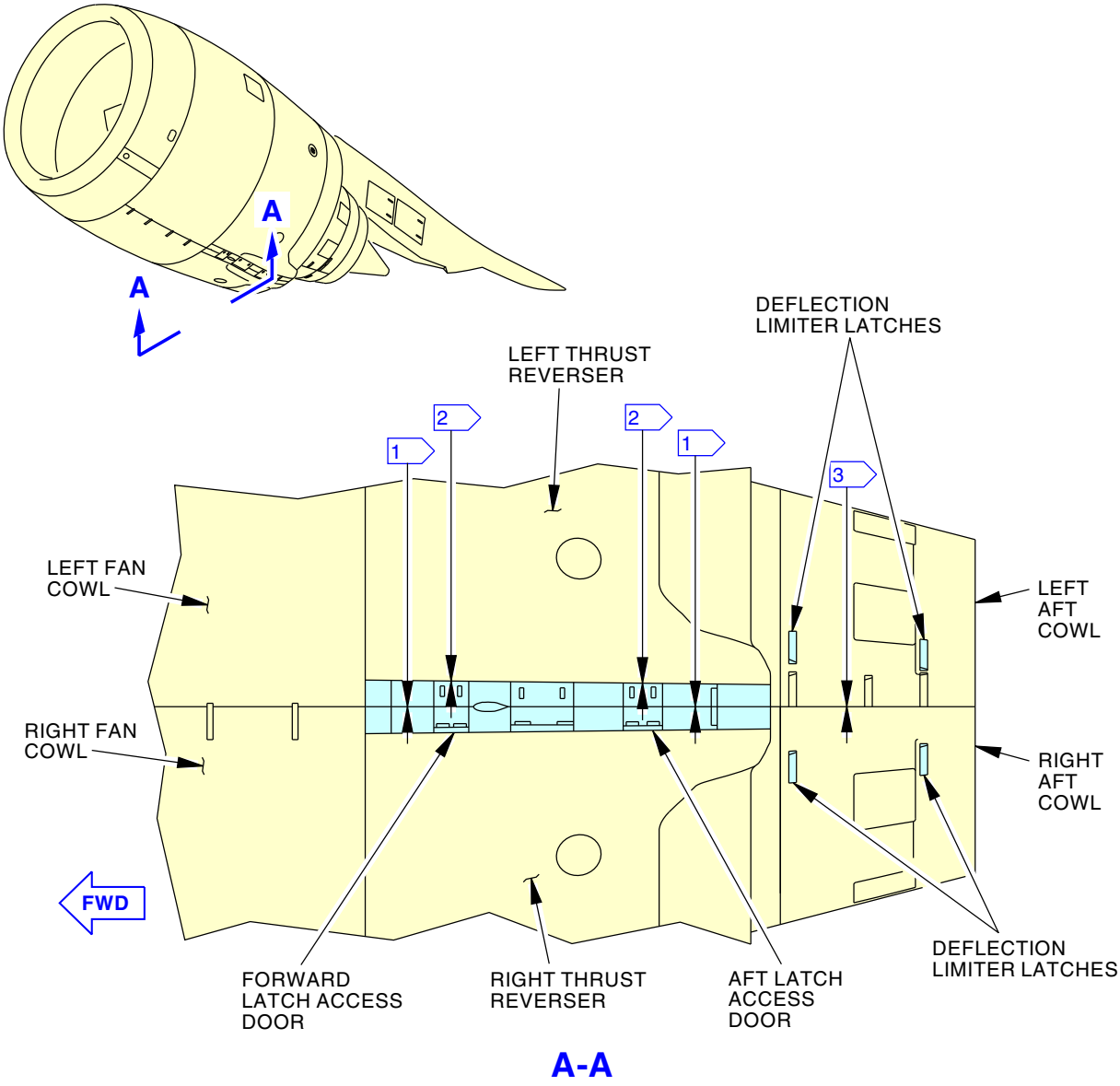
NO. 1 COMPRESSION PAD AND INTERLOCK PIN (LEFT SIDE)

N

353075 S0000132743_V2

Thrust Reverser Adjustment
Figure 502/78-31-01-990-821-H01 (Sheet 8 of 8)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

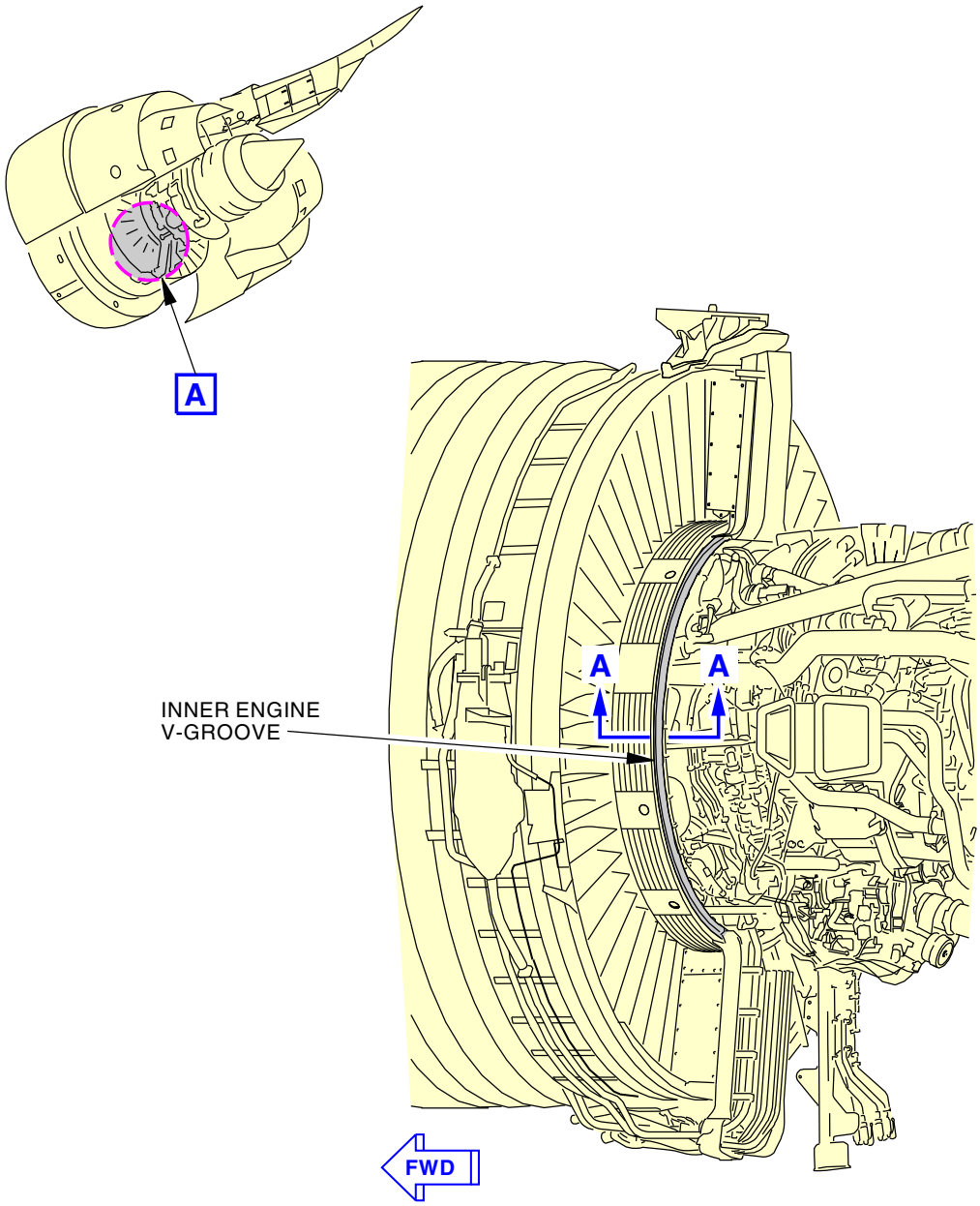
MEASURE THE GAP AT THE SMALLEST GAP AND THE LARGEST GAP ALONG THE SPLITLINE.

1. 0.0100-0.2000 INCH (0.2540-5.0800 mm)
2. 0.0600-0.2100 INCH (1.5240-5.3340 mm)
3. 0.0100-0.1600 INCH (0.2540-4.0640 mm)

M07305 S0004286277_V6

Latch Beam Fairing and Aft Cowl Splitline Gaps
Figure 503/78-31-01-990-822-H01

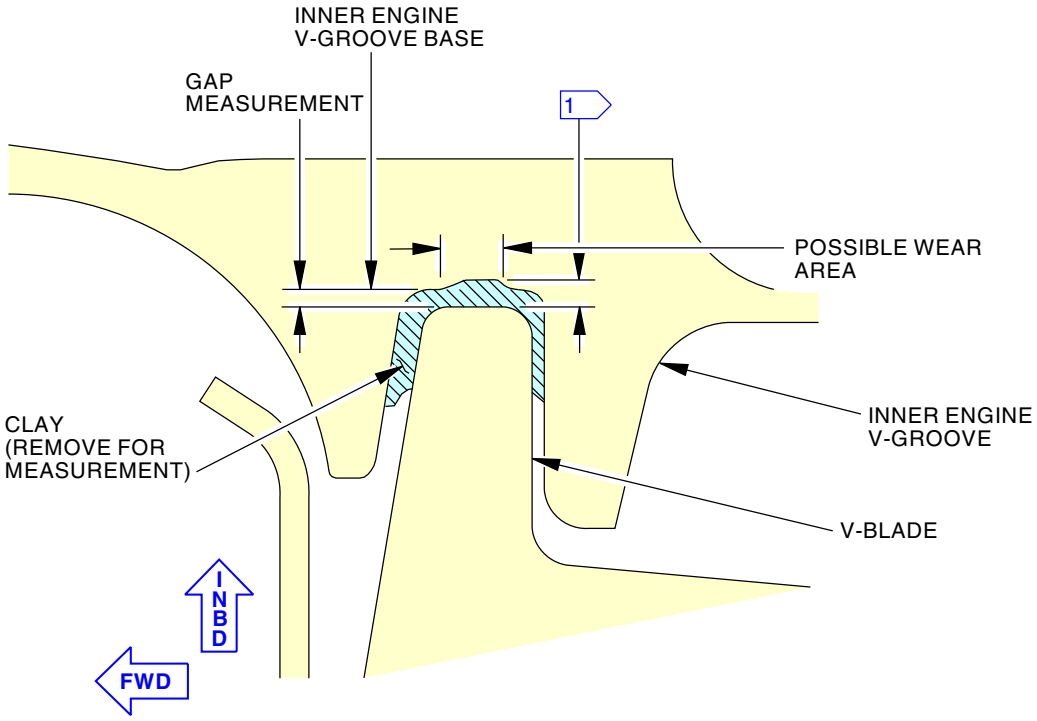
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2232474 S0000497868_V2

Inner V-Groove Gaps
Figure 504/78-31-01-990-840-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



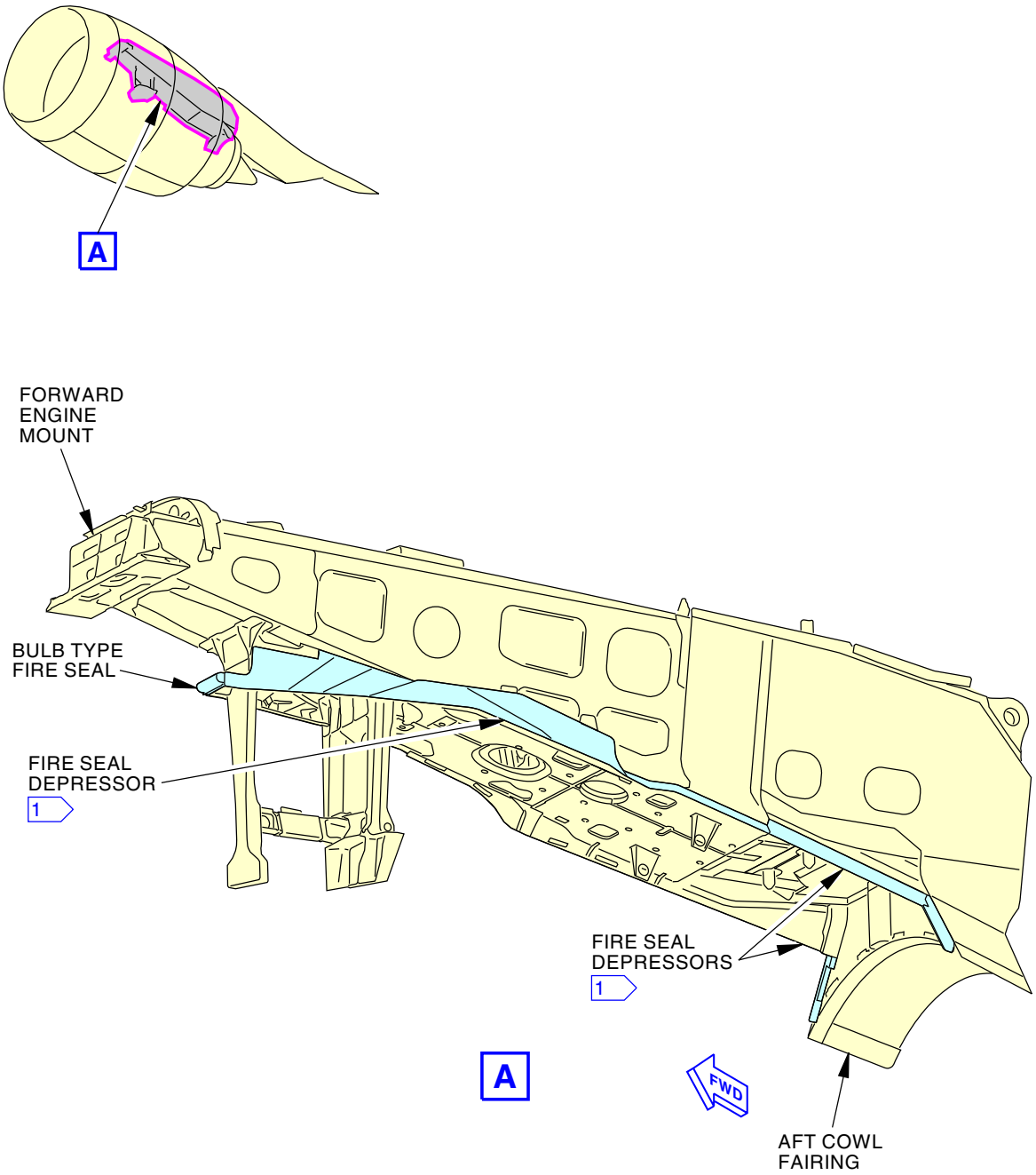
A-A

1 DO NOT MEASURE TO WEAR DEPTH.

2232477 S0000497869_V3

Inner V-Groove Gaps
Figure 504/78-31-01-990-840-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

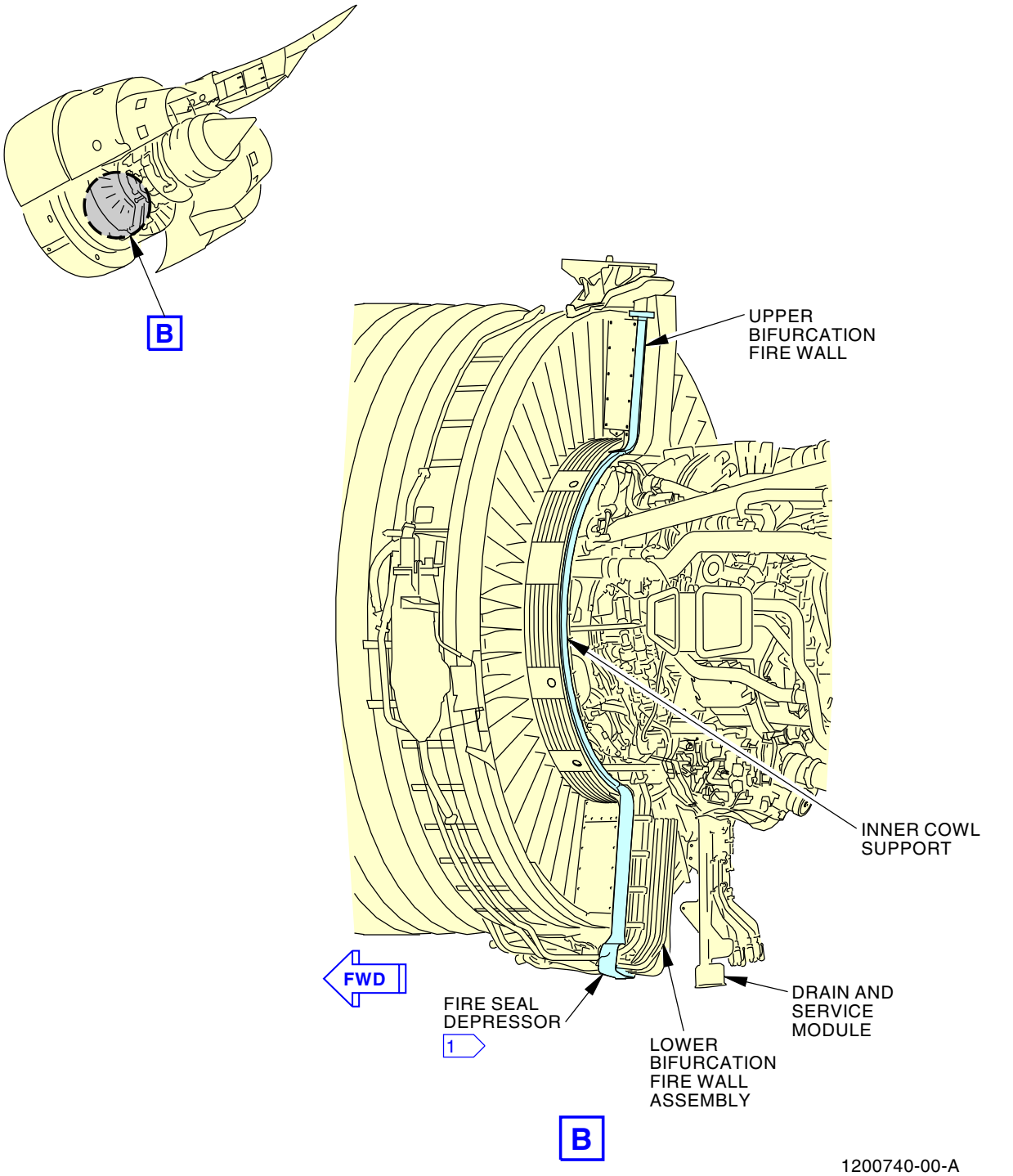


1 APPLY DEVELOPER TO THE DEPRESSOR FOR FIRE SEAL CHECK

N56091 S0000108513_V2

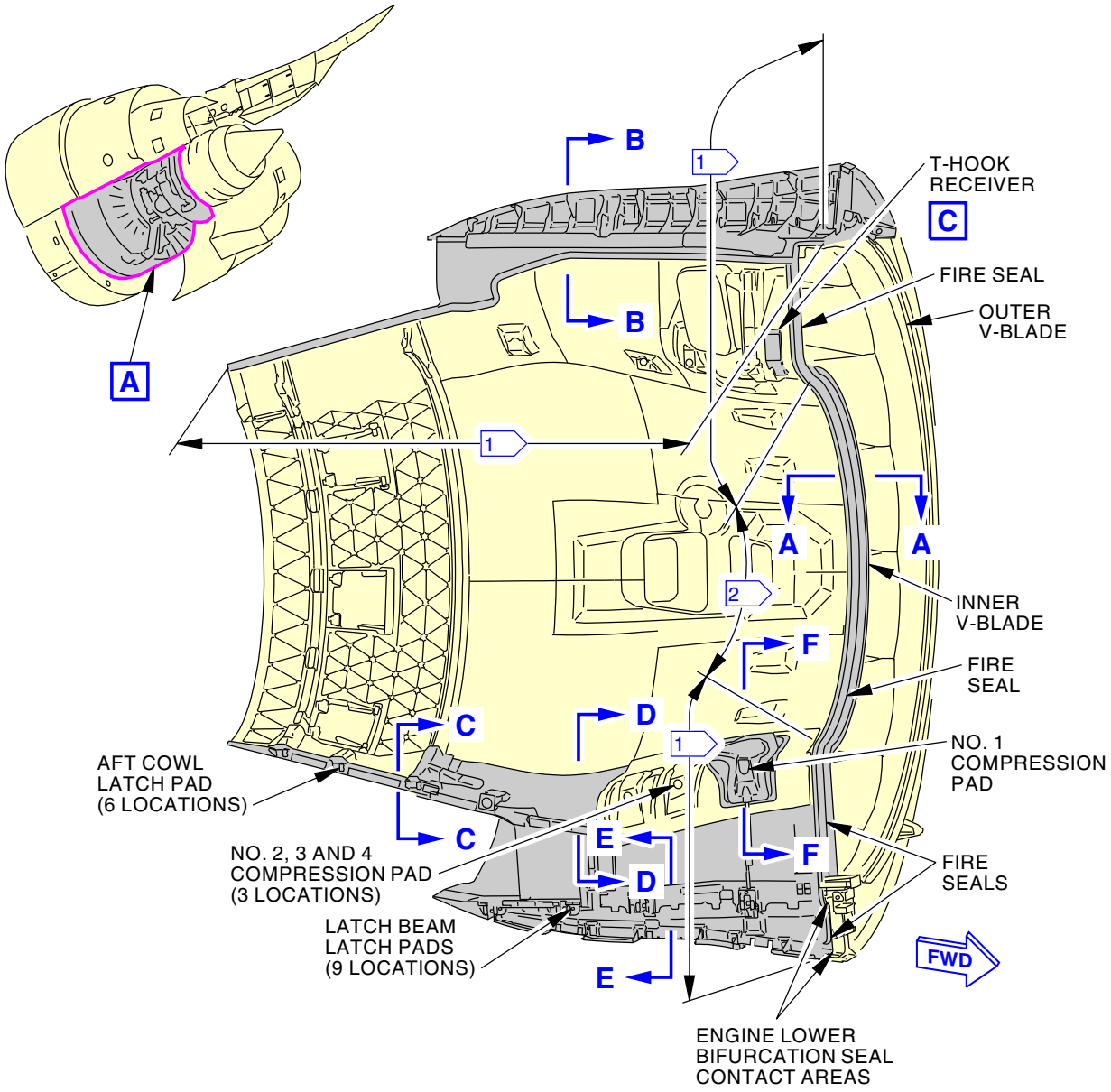
Engine and Strut Fire Seal Depressor
Figure 505/78-31-01-990-826-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Engine and Strut Fire Seal Depressor
Figure 505/78-31-01-990-826-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEFT THRUST REVERSER HALF
(INTERNAL SIDE)

A

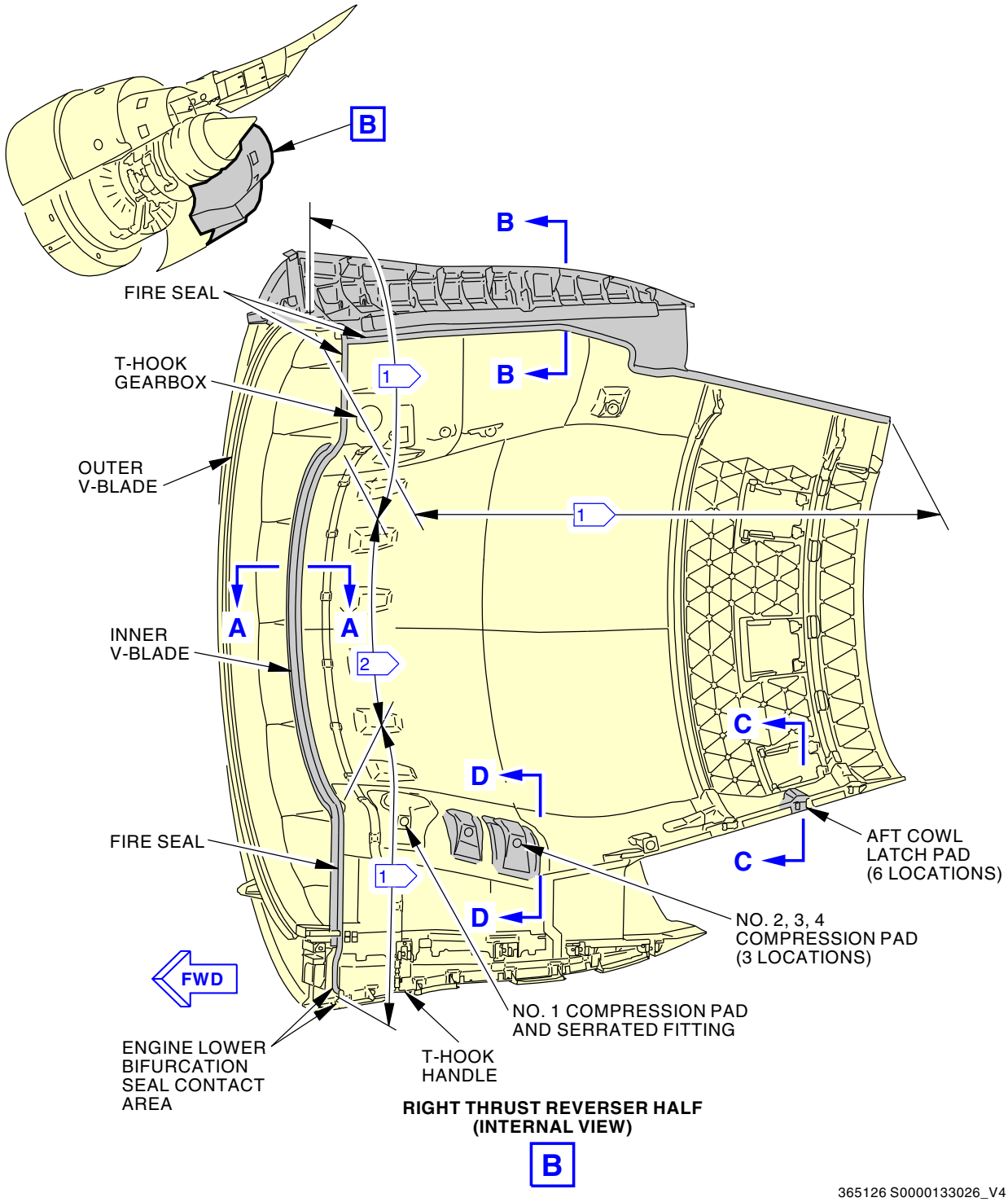
1 0.35 INCH (8.89 mm) MINIMUM SEAL CONTACT

2 0.10 INCH (2.54 mm) MINIMUM SEAL CONTACT ON ENGINE CORE INNER COWL SUPPORT

M07306 S0004286278_V4

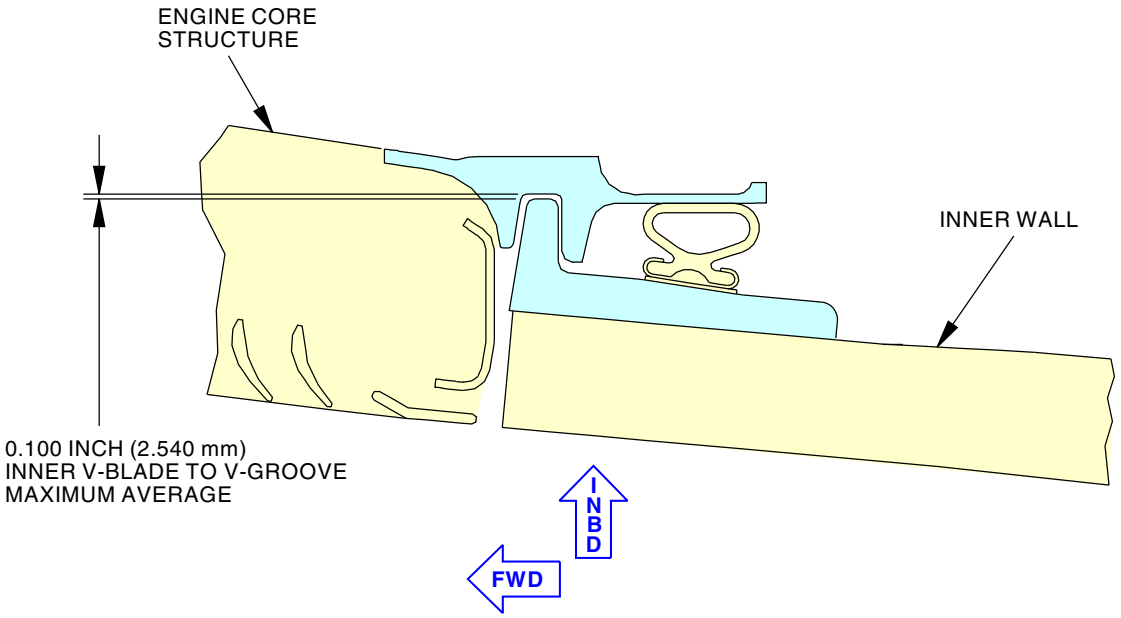
Thrust Reverser Wear Plate Gaps and Fire Seal Compression
Figure 506/78-31-01-990-823-H01 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



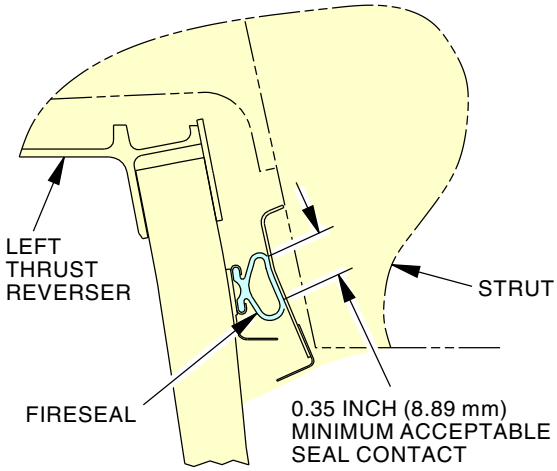
Thrust Reverser Wear Plate Gaps and Fire Seal Compression
Figure 506/78-31-01-990-823-H01 (Sheet 2 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



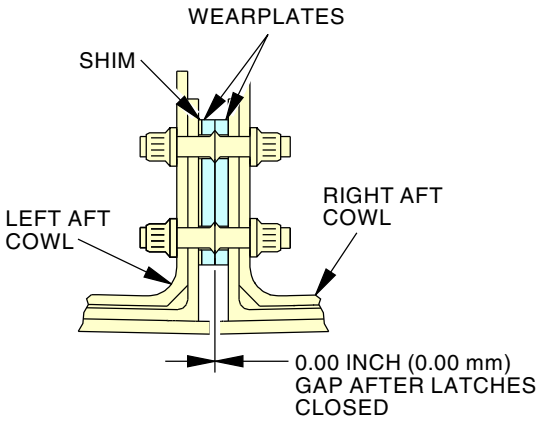
(VIEW IN THE DOWN DIRECTION)

A-A



(VIEW IN THE FORWARD DIRECTION)

B-B



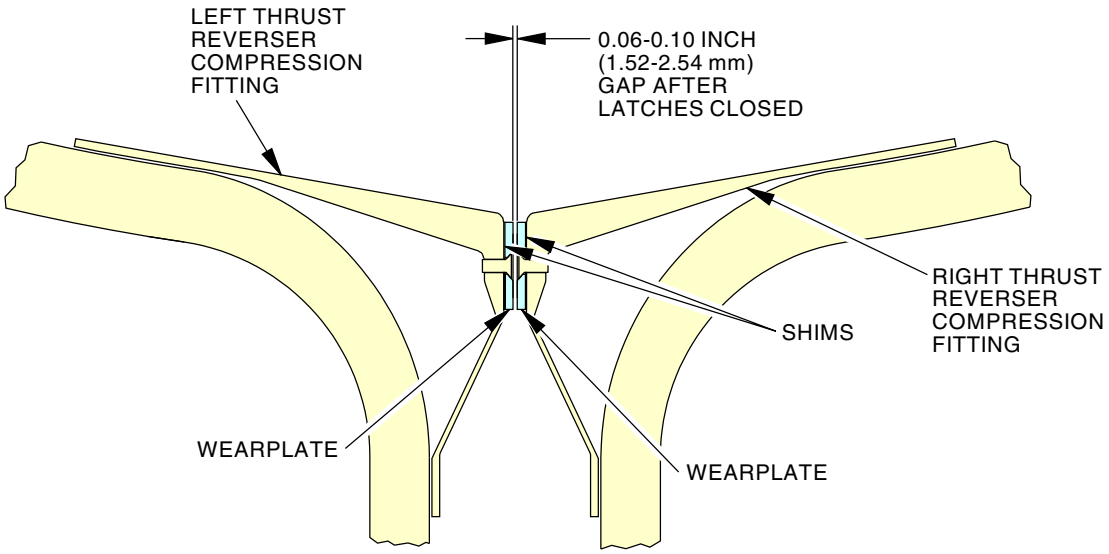
AFT COWL LATCH PAD
(6 LOCATIONS)

C-C

M07307 S0004286279_V6

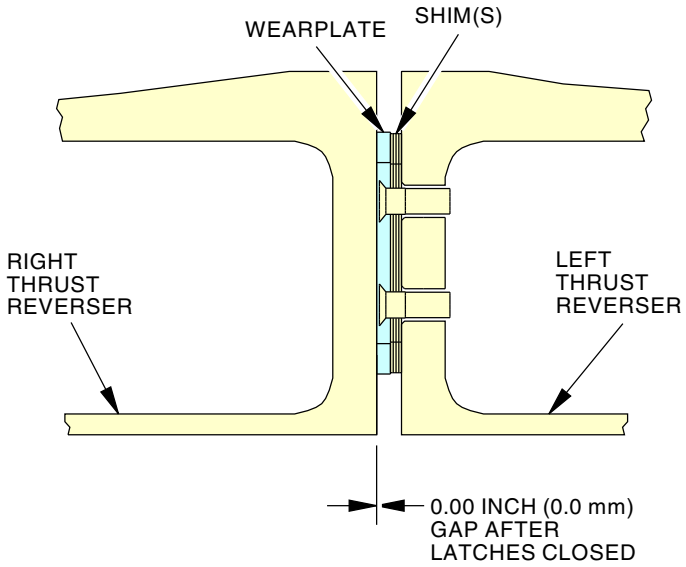
Thrust Reverser Wear Plate Gaps and Fire Seal Compression
Figure 506/78-31-01-990-823-H01 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LOWER BIFURCATION NO. 2, 3, AND 4 COMPRESSION PAD
(VIEW IN THE FORWARD DIRECTION)
(3 LOCATIONS)

D-D



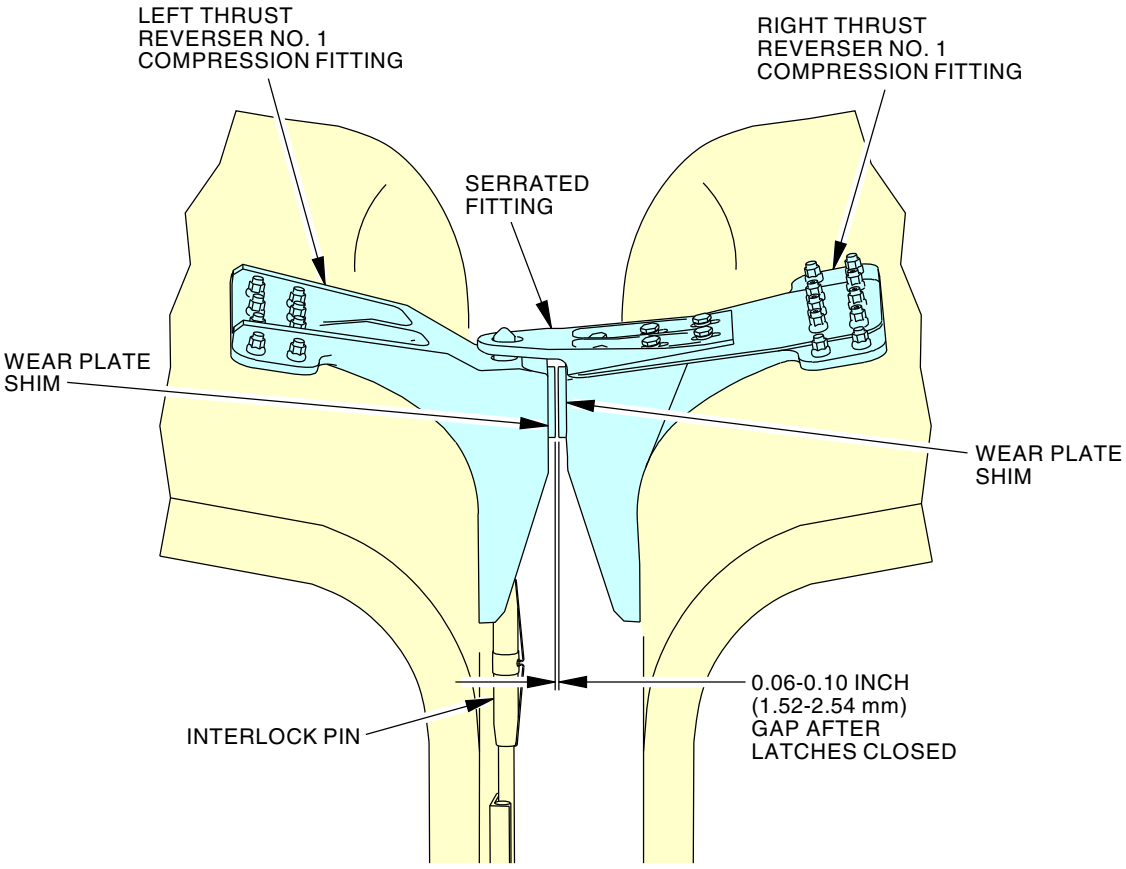
LATCH BEAM LATCH PAD
(9 LOCATIONS)

E-E

M07308 S0004286280_V5

Thrust Reverser Wear Plate Gaps and Fire Seal Compression
Figure 506/78-31-01-990-823-H01 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



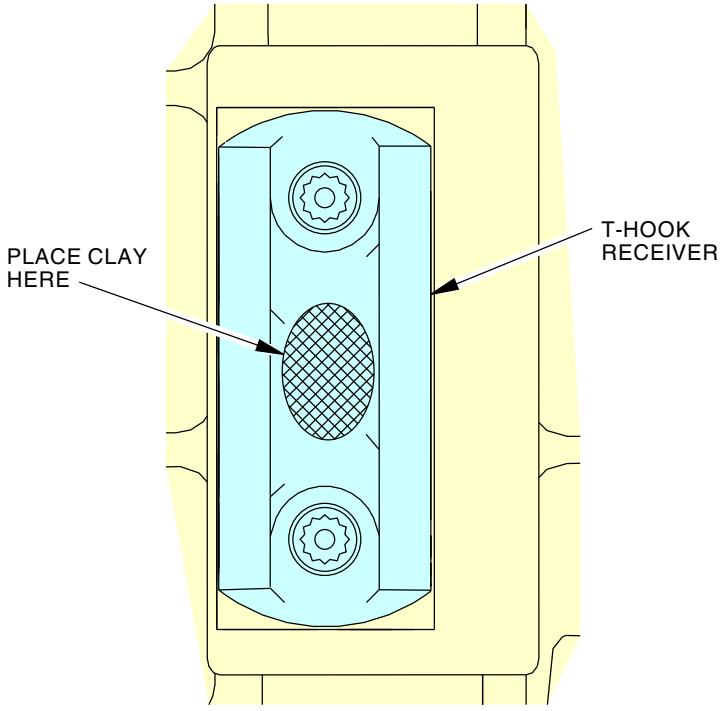
LOWER BIFURCATION NO. 1 COMPRESSION PAD

F-F

356766 S0000132632_V3

Thrust Reverser Wear Plate Gaps and Fire Seal Compression
Figure 506/78-31-01-990-823-H01 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



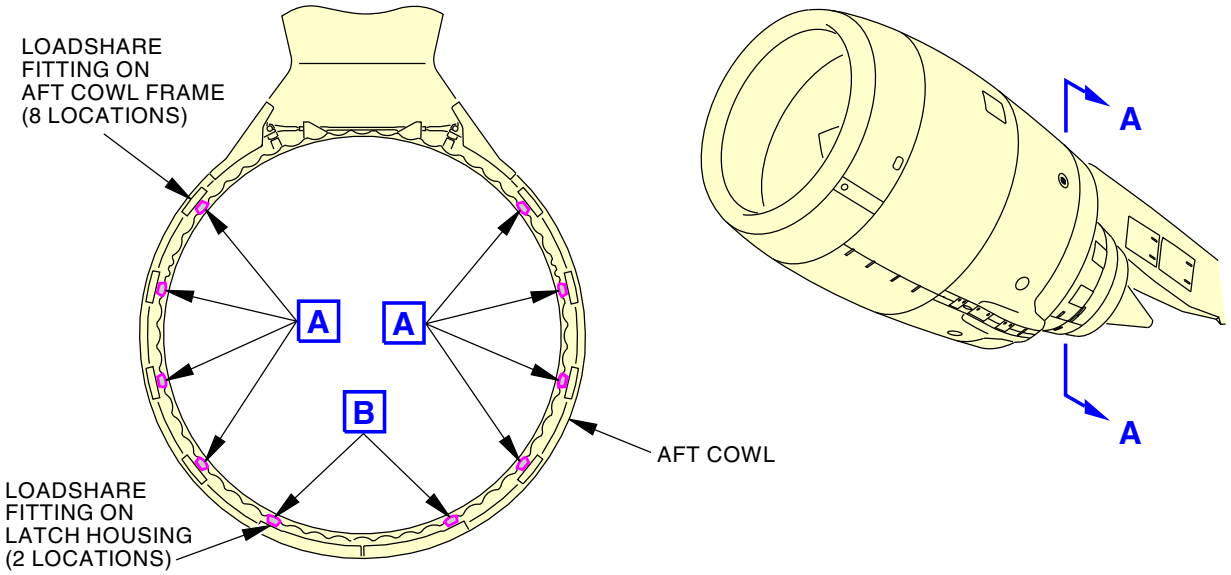
T-HOOK RECEIVER

C

2406510 S0000555410_V2

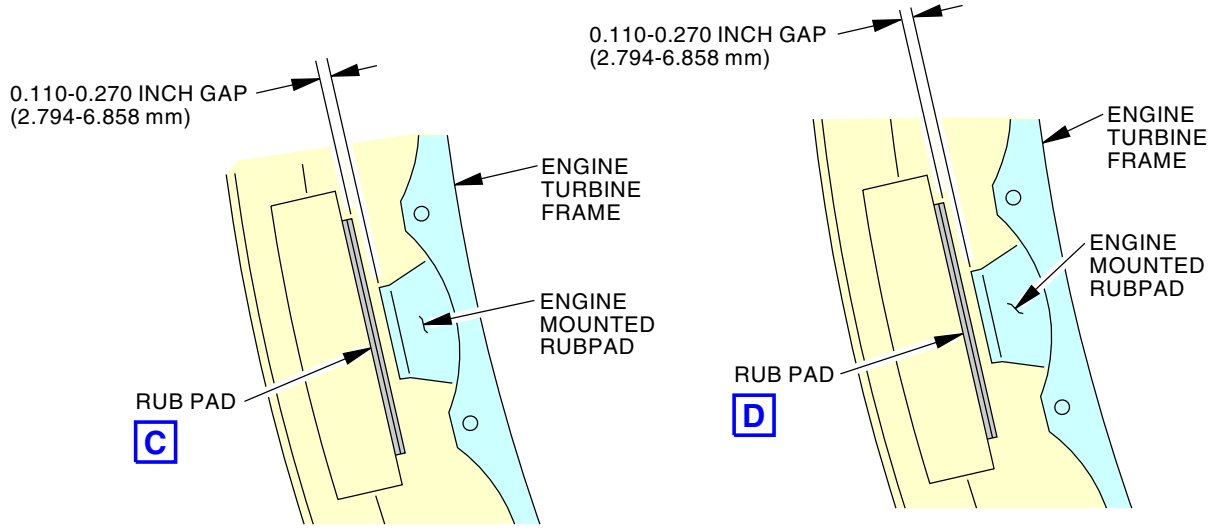
Thrust Reverser Wear Plate Gaps and Fire Seal Compression
Figure 506/78-31-01-990-823-H01 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(VIEW IN THE AFT DIRECTION)

A-A



AFT COWL LOADSHARE PAD (AFT COWL FRAME)

A

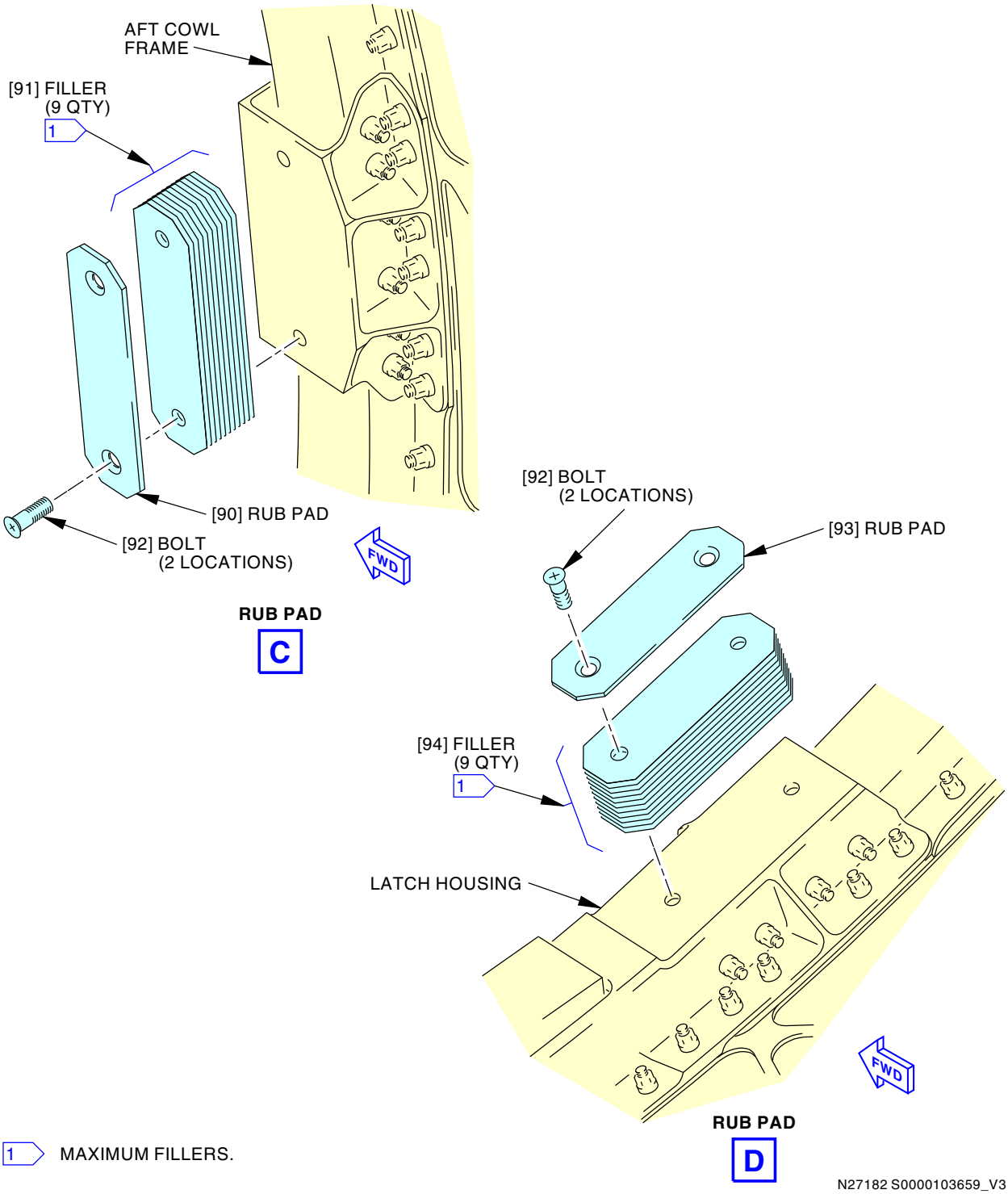
AFT COWL LOADSHARE PAD (LATCH HOUSING)

B

N00183 S0000103420_V3

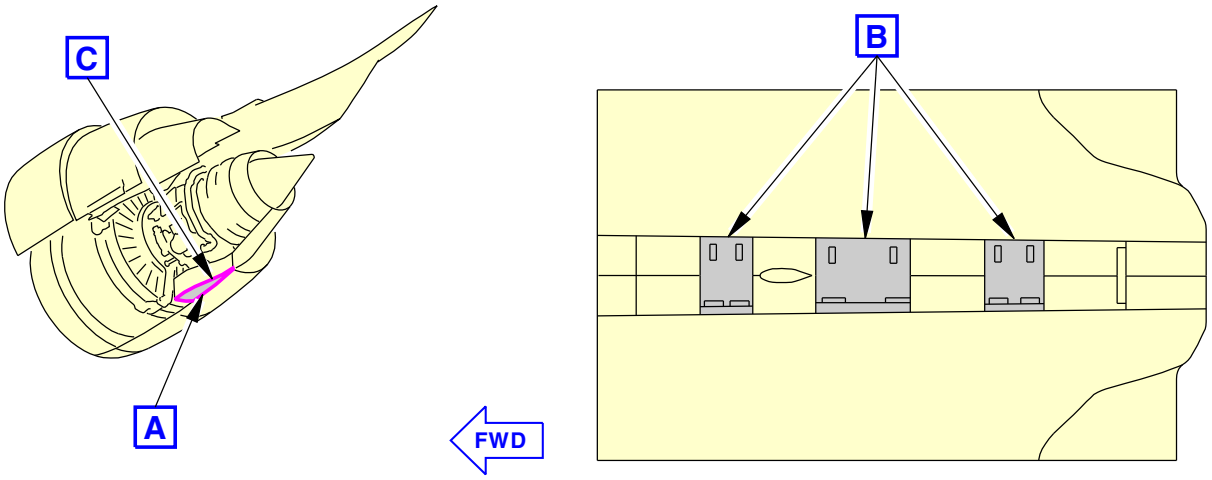
Aft Cowl Loadshare Pad Adjustment
Figure 507/78-31-01-990-820-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



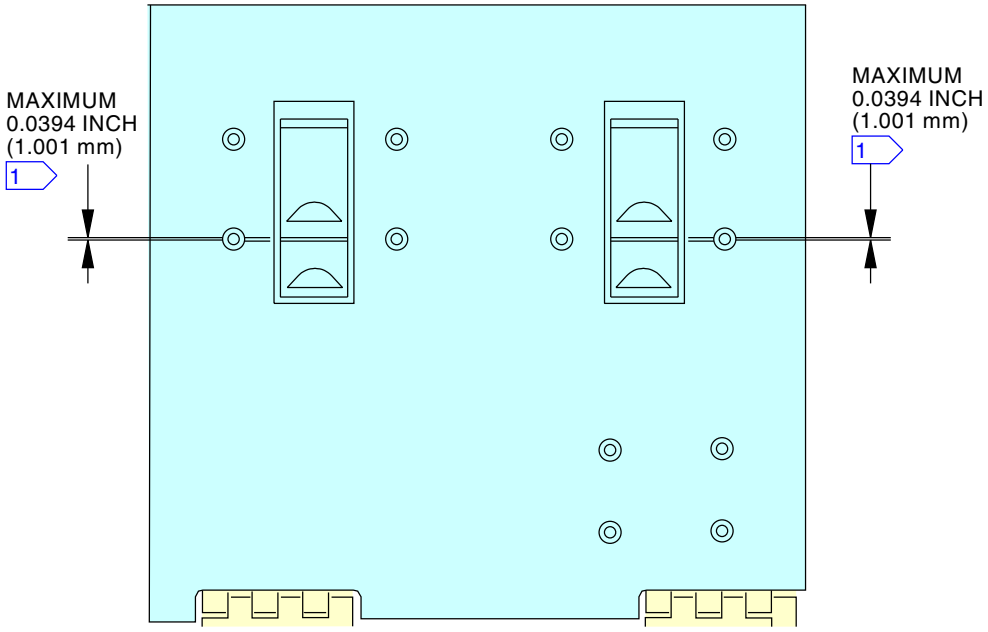
Aft Cowl Loadshare Pad Adjustment
Figure 507/78-31-01-990-820-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEFT AND RIGHT THRUST
REVERSERS SHOWN CLOSED

A



LATCH ACCESS DOOR
(EXAMPLE)

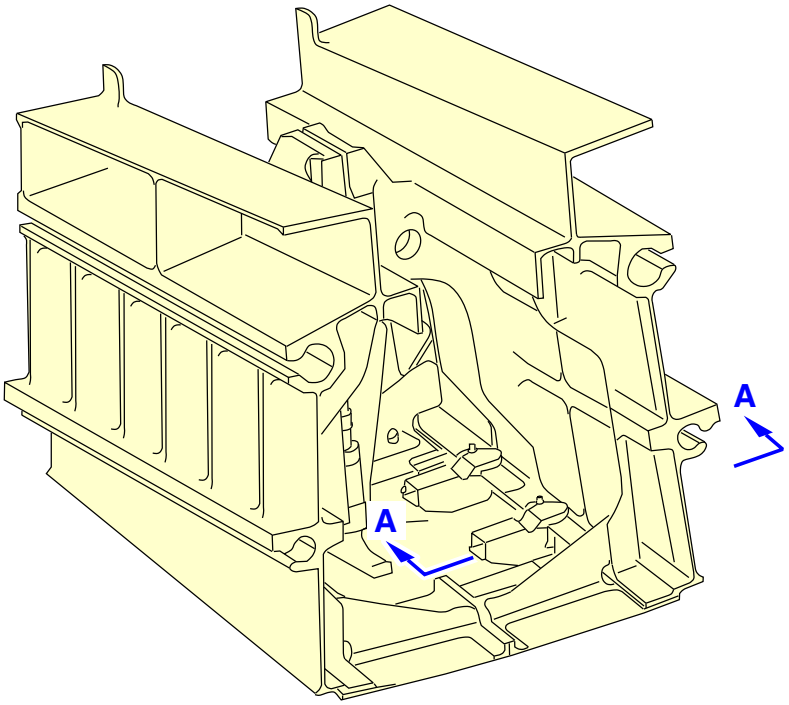
B

1 MEASUREMENT APPLIES ONLY TO DOORS WITH RECTANGULAR LATCHES.

1950049 S0000371508_V3

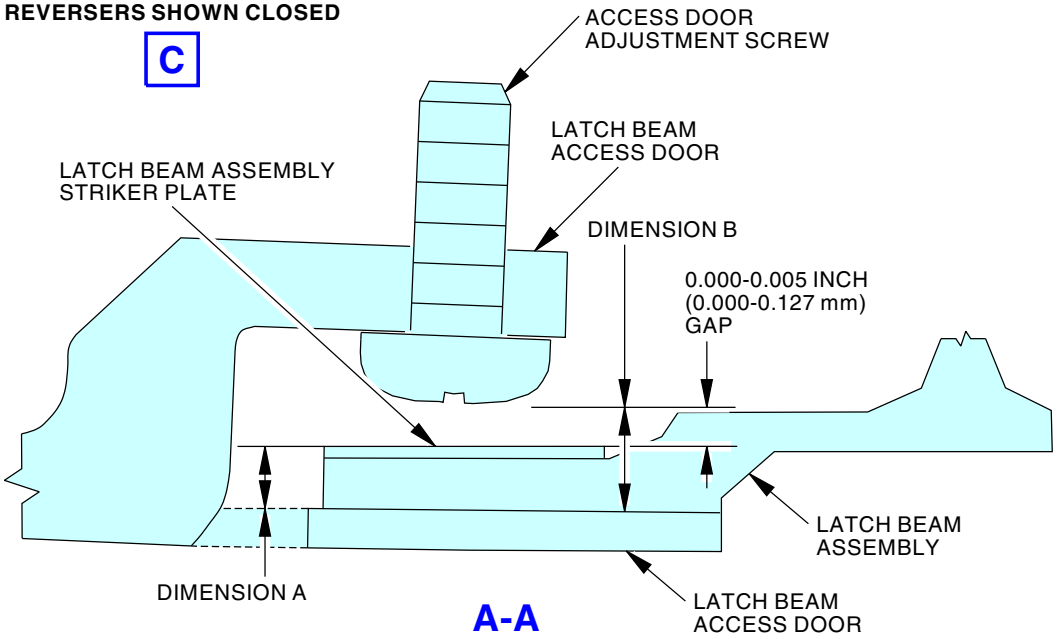
Thrust Reverser Latch Access Doors
Figure 508/78-31-01-990-839-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEFT AND RIGHT THRUST
REVERSERS SHOWN CLOSED

C



A-A

NOTE:

INTERNAL GAP MEASUREMENT APPLIES ONLY TO DOORS WITH RECTANGULAR LATCHES.

1950610 S0000371509_V4

Thrust Reverser Latch Access Doors
Figure 508/78-31-01-990-839-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE A

SPLIT LINE GAPS			
LOCATION	SPECIFICATION	VALUE (FWD)	VALUE (AFT)
CENTERLINE (FL 1)	0.010–0.200 INCH (0.254–5.080 mm)		
DOOR TO LATCH BEAM FAIRING (FL 2)	0.060–0.210 INCH (1.524–5.334 mm)		
AFT COWL (FL 3)	0.010–0.160 INCH (0.254–4.064 mm)		N/A

DATA TABLE B

LATCH PAD GAPS		
LOCATION		VALUE
CENTERLINE LATCH 1	TOP PAD	
	BOTTOM PAD	
CENTERLINE LATCH 2	FWD PAD	
	AFT PAD	
CENTERLINE LATCH 3	FWD PAD	
	AFT PAD	
CENTERLINE LATCH 4	FWD PAD	
	AFT PAD	
CENTERLINE LATCH 5	FWD PAD	
	AFT PAD	
AFT–COWL LATCH 1	FWD PAD	
	AFT PAD	
AFT–COWL LATCH 2	FWD PAD	
	AFT PAD	
AFT–COWL LATCH 3	FWD PAD	
	AFT PAD	

2427202 S0000561360_V2

Data Tables
Figure 509/78-31-01-990-852-H00 (Sheet 1 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE C

V-GROOVE TO V-BLADE GAP			
LEFT T/R	VALUE	RIGHT T/R	VALUE
LOCATION 1 (TOP)		LOCATION 1 (TOP)	
LOCATION 2		LOCATION 2	
LOCATION 3		LOCATION 3	
LOCATION 4		LOCATION 4	
LOCATION 5		LOCATION 5	
LOCATION 6		LOCATION 6	
LOCATION 7 (BOTTOM)		LOCATION 7 (BOTTOM)	
AVERAGE: ADD 1-7 THEN DIVIDE BY 7 (0.100 MAX)		AVERAGE: ADD 1-7 THEN DIVIDE BY 7 (0.100 MAX)	

DATA TABLE D

DEFLECTION LIMITER TIE ROD STOP SEAT GAPS		
LOCATION	SPECIFICATION	VALUE
FWD TIE ROD	0.00 INCH	
AFT TIE ROD	0.00 INCH	

2427218 S0000561361_V2

Data Tables
Figure 509/78-31-01-990-852-H00 (Sheet 2 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE E

COMPRESSION CUP - ROD END GAPS				
COMPRESSION PAD	#1 (FWD)	#2	#3	#4 (AFT)
MEASURED GAP (REPRORUBBER OR CLAY THICKNESS)				
SUBTRACT NOMINAL GAP	-0.035 INCH (-0.889 mm)	-0.035 INCH (-0.889 mm)	-0.105 INCH (-2.667 mm)	-0.135 INCH (-3.429 mm)
REQUIRED TOTAL SHIM AND WASHER THICKNESS				
DIVIDE BY 2	DIVIDE BY 2	DIVIDE BY 2	DIVIDE BY 2	DIVIDE BY 2
SHIM AND WASHER THICKNESS TO BE INSTALLED UNDER EACH ROD END				
FINAL GAP SPECIFICATION (WITH SHIMS AND WASHERS INSTALLED)	0.020-0.050 INCH (0.508-1.270 mm)	0.020-0.050 INCH (0.508-1.270 mm)	0.090-0.120 INCH (2.286-3.048 mm)	0.120-0.150 INCH (3.048-3.810 mm)

2435725 S0000565297_V3

Data Tables
Figure 509/78-31-01-990-852-H00 (Sheet 3 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE F1

LOWER COMPRESSION PAD GAPS			
COMPRESSION PAD	#2	#3	#4 (AFT)
MEASURED GAP (CLAY THICKNESS)			
SUBTRACT NOMINAL GAP	-0.080 INCH (-2.032 mm)	-0.080 INCH (-2.032 mm)	-0.080 INCH (-2.032 mm)
REQUIRED TOTAL SPACER THICKNESS			
FINAL GAP SPECIFICATION (WITH SPACERS INSTALLED)	0.060 - 0.100 INCH (1.524 - 2.540 mm)	0.060 - 0.100 INCH (1.524 - 2.540 mm)	0.060 - 0.100 INCH (1.524 - 2.540 mm)

2435726 S0000564994_V3

Data Tables
Figure 509/78-31-01-990-852-H00 (Sheet 4 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE F2

#1 LOWER COMPRESSION PAD GAP	
COMPRESSION PAD	#1 (FWD)
MEASURED GAP (CLAY THICKNESS) [1]	
SUBTRACT NOMINAL GAP	-0.080 INCH (-2.032 mm)
--	
SUBTRACT LEFT AND RIGHT WEAR PLATE THICKNESS (2x0.160)	-0.320 INCH (-8.128 mm)
REQUIRED TOTAL SPACER THICKNESS	
DIVIDE BY 2	DIVIDE BY 2
SPACER THICKNESS TO BE INSTALLED UNDER EACH WEAR PLATE	
FINAL GAP SPECIFICATION (WITH SPACERS INSTALLED)	0.060 - 0.100 INCH (1.524 - 2.540 mm)

[1] THIS MEASUREMENT WILL BE REQUIRED FOR THE INTERLOCK PIN SERRATED FITTING POSITION CALCULATION

2435727 S0000565299_V4

Data Tables
Figure 509/78-31-01-990-852-H00 (Sheet 5 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE G

AFT LOAD SHARE GAP	
LEFT T/R	VALUE
LOCATION 1 (TOP)	
LOCATION 2	
LOCATION 3	
LOCATION 4	
LOCATION 5 (BOTTOM)	
RIGHT T/R	VALUE
LOCATION 1 (TOP)	
LOCATION 2	
LOCATION 3	
LOCATION 4	
LOCATION 5 (BOTTOM)	
AVERAGE: ADD ALL 10 LOCATIONS THEN DIVIDE BY 10 (0.110 - 0.270 INCH)	

DATA TABLE H

SERRATED FITTING OVERHANG	
#1 COMPRESSION PAD GAP [1] (CLAY THICKNESS)	
SUBTRACT NOMINAL GAP	-0.440 INCH (11.180 mm)
MINIMUM FITTING OVERHANG DIMENSION	

DATA TABLE I

T-HOOK GAP	
T-HOOK GAP (CLAY THICKNESS)	
SUBTRACT NOMINAL GAP	-0.165 INCH (4.191 mm)
REQUIRED TOTAL SPACER THICKNESS	
FINAL GAP SPECIFICATION (WITH SPACERS INSTALLED)	0.155 - 0.175 INCH (3.937 - 4.445 mm)

2427447 S0000561362_V4

Data Tables
Figure 509/78-31-01-990-852-H00 (Sheet 6 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE J

FIRE SEAL	
LOCATION	CONFORMS (Y/N)
LOWER BIFURCATION SEALS AT FWD LATCH ACCESS DOOR (INBOARD AND OUTBOARD)	
FORWARD AND CENTER LATCH ACCESS DOOR FAYING SURFACE	
ENGINE SEAL DEPRESSOR AT LOWER BIFURCATION (INBOARD AND OUTBOARD)	
STRUT MOUNTED SEAL DEPRESSOR AT UPPER BIFURCATION	
ENGINE INNER COWL SUPPORT	

DATA TABLE K

LATCH TENSION		
LOCATION	SPECIFICATION	VALUE
V-BAND	50 - 55 LBS	
CENTERLINE LATCH #1	45 - 55 LBS	
CENTERLINE LATCH #2	45 - 55 LBS	
CENTERLINE LATCH #3	45 - 55 LBS	
CENTERLINE LATCH #4	45 - 55 LBS	
CENTERLINE LATCH #5	45 - 55 LBS	
AFT COWL LATCH #6	45 - 55 LBS	
AFT COWL LATCH #7	45 - 55 LBS	
AFT COWL LATCH #8	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (FWD LEFT)	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (FWD RIGHT)	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (AFT LEFT)	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (AFT RIGHT)	45 - 55 LBS	

2427452 S0000561363_V3

Data Tables
Figure 509/78-31-01-990-852-H00 (Sheet 7 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-01-820-802-H00

3. Thrust Reverser Compression Rod Adjustment

A. General

(1) This procedure has the steps to adjust the thrust reverser upper compression rods.

(2) Follow these instructions carefully. If you do not obey the instructions in this task, severe structural damage to the thrust reverser and other equipment can occur.

(3) This procedure can only be used under the following conditions:

(a) None of the strut mounted compression rods and compression cup gaps are net (0.00 inch).

(b) Splitline gap is in tolerance.

(c) All latch pads are net (0.00 inch).

(d) The only components being changed are strut mounted compression cups and / or compression rods.

(4) If any of the conditions noted above are not met, a full Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01must be completed.

(5) ReproRubber is used to measure gaps between the compression cups on the upper bifurcation and the strut-mounted compression rods. The use of ReproRubber is allowed at the compression cups because the clay in the cup can become deformed when measuring the gap. However, ReproRubber will set quickly in 72 degree ambient temperature and it will not deform enough as it becomes hard to get a good gap measurement. Different ratios of ReproRubber base compound to catalyst have been used; 1:1, 2:1, 3:1, with results that vary from the expected gap requirements. Because ReproRubber becomes hard with a chemical reaction, it was found that the ambient temperature was a factor in the time the ReproRubber took to become hard. Warm temperatures would decrease the time for the ReproRubber to become hard. Cold temperatures would increase the time of the ReproRubber to become hard. If the temperature of the ReproRubber base compound and catalyst were controlled before use, it may become warm enough during the time it took for the components to be used that the gap will not be correct. You must be careful if you use ReproRubber.

B. References

Reference	Title
20-10-23-400-801	Lockwire, Cotter Pins, and Lockrings - Installation (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
70-41-00-910-802-H01	Safety Cable Installation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)
STD-1097	Caliper - Vernier, 0-6 inch, Readable to 1/1000 inch

D. Consumable Materials

Reference	Description	Specification
D00504	Grease - Petrolatum	VV-P-236
G00440	Lockwire - MS20995C41, Corrosion Resistant Steel - 0.041 Inch (1.0414 mm) Diameter	NASM20995
G02020	Clay, Modeling	
G02061	Marker - Permanent, Felt Tip Pen	
G02473	Cable, Safety Kit	AS3510-03()K
G50092	Compound - Metrology Casting Material - ReproRubber Quick Setting Putty	
G50230	Glove - Vinyl	

E. Location Zones

Zone	Area
117	Main Equipment Center, Left
118	Main Equipment Center, Right
411	Engine, Left
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
421	Engine, Right
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the compression rod adjustment.

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

SUBTASK 78-31-01-860-006-H00

(1) Do these tasks in sequence to safely open the left and right thrust reverser on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00

(d) For the left and right fan cowl panels, do this task: Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

1) Open these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

1) Open these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-01-200-006-H00

(2) Use the work platform, COM-1525, or engine and strut access platform, STD-653, or 6 foot (1.83m) stepladder, STD-1048 to get access to the strut mounted compression rods and the upper bifurcation compression cups.

NOTE: The platform or stepladders should be wheeled to allow easy movement when you move into position to apply the ReproRubber or clay at the upper bifurcation compression cups for gap measurements.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Upper Compression Rod - Adjustment

CAUTION

MAKE SURE THAT YOU SET THE RODS AND PADS TO THE SPECIFIED LIMITS. STRUCTURAL DAMAGE TO THE COMPRESSION RODS, DEFLECTION LIMITER RODS, AND THE THRUST REVERSER CAN OCCUR IF THE ROD AND PAD ADJUSTMENTS ARE INCORRECT.

SUBTASK 78-31-01-820-069-H00

(1) Set the pre-adjustment length of the 4 compression rods for the ReproRubber or clay check:

(a) Set the pre-adjustment length of the 4 strut-mounted compression rods 1, 2, 3, and 4 to the fully retracted position.

1) Remove the bullet-shaped rod ends on the 4 compression rods.

2) Remove any shim and washer.

3) Install the bullet-shaped rod ends on the 4 compression rods.

NOTE: Do not lockwire rod to the rod ends at this time.

SUBTASK 78-31-01-400-002-H00

(2) Close the inboard thrust reverser half

NOTE: The remainder of the adjustment procedure should be completed with the inboard thrust reverser half closed. Only close one thrust reverser half at a time. Before closing the outboard thrust reverser half make sure that the compression rods # 1, 2, 3, & 4 are completely seated in the compressions cups on the inboard thrust reserve half.

SUBTASK 78-31-01-820-070-H00

(3) Measure the gaps between the four strut-mounted compression rods and four compression cups on the outboard side thrust reverser:

(a) Place a piece of foam pipe insulation with a wall thickness of 0.5 inch to 0.75 inch around the compression rod so that it rests inside the hole in the strut when the opposite rod end is centered in the compression cup with no gap (Figure 511).

NOTE: it is only necessary to put clay or ReproRubber in the compression cups of one thrust reverser half. The compression rods slide side-to-side in the brackets. When the gap is measured, one side of the compression rod in the cup will have no gap (zero) and the gap is measured with ReproRubber on the other side of the compression rod.

NOTE: Measurements may be made with ReproRubber or clay. ReproRubber is preferred as it takes a permanent set creating a more accurate measurement. In extremely hot or cold environments however, clay make be the prepared material.

NOTE: If you use clay, you must use a parting agent with clay. You must clean the parts with solvent and a cloth after the measurements.

NOTE: If the ReproRubber becomes hard before you close the thrust reverser to do a check of the gap, you will get the wrong results. It is not necessary to use a parting agent with ReproRubber. It is not necessary to clean the parts with solvent and a cloth after the measurements.

(b) Make the measurements with ReproRubber Quick Setting Putty compound, G50092 (preferred method).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING DO NOT GET THESE MATERIALS IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THESE MATERIALS. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES WHEN YOU USE THESE MATERIALS. KEEP THESE MATERIALS AWAY FROM SPARKS, FLAME, AND HEAT. THESE MATERIALS ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

1) Use a pair of vinyl glove, G50230 to mix the compound; do not use latex gloves or rubber gloves because these materials can prevent the set of the compound.

2) Follow the manufacturers directions when you mix the 2 part ReproRubber Quick Setting Putty compound, G50092; mix a sufficient quantity of compound to fill the four compression cups.

   NOTE: In general, you will knead two equal size balls of catalyst putty and base putty together for 30-45 seconds. Manipulation time to put the ReproRubber in the compression cups and on the compression pads and wear pads is 3 to 4 minutes; ReproRubber will become hard in 8 to 10 minutes.

   NOTE: Mix a small amount of the 2-part compound for each location. For each location, prepare the amounts of the two compounds before you start to mix the compounds together. If possible, use a team in which one person mixes the compound and the other person puts the compound into position.

   NOTE: ReproRubber is affected by the ambient temperature. Cold temperatures will increase the time for the ReproRubber to become hard. Warm temperatures will decrease the time for the ReproRubber to become hard.

3) Apply a piece of ReproRubber that is approximately 0.40 inch in diameter (10.16 mm) x 1.00 - 1.75 inch long (25.4 mm - 44.45 mm) to the inside of the four compression cups on the upper bifurcation of the outboard thrust reverser. Ensure that the end of the ReproRubber being placed into the cup is rounded to a diameter of less than .5 inch (12.7 mm).

   a) Form the ReproRubber into a point so that the rubber seats in the compression cup without air entrapment.

      NOTE: A pocket of air can be trapped under the ReproRubber if the rubber is not formed into a cone and pressed firmly into the cup. The pocket of air will give an incorrect gap measurement and an incorrect adjustment of the compression rod.

   b) Press the ReproRubber firmly into the compression cups.

4) Immediately go to the step to close and latch the thrust reverser cowls: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00

(c) Make the measurements with clay, G02020 (optional method):

1)) Apply a piece of clay, G02020 which is 0.40 inch (10.16 millimeters) thick to the inside of the four compression cups on the upper bifurcation of the left thrust reverser.

   a) Form the clay into a point so that the clay seats in the compression cup without air entrapment.

      NOTE: A pocket of air can be trapped under the clay if the clay is not formed into a cone and pressed firmly into the cup. The pocket of air will give an incorrect gap measurement and an incorrect adjustment of the compression rod.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) Press the clay firmly into the compression cups.

c) Apply petrolatum grease, D00504 as a parting agent on the clay in the compression cups.

d) Apply petrolatum grease, D00504 as a parting agent to the ends of the strut mounted compression rods.

SUBTASK 78-31-01-400-003-H00

(4) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00

CAUTION

CLOSE ONLY ONE THRUST REVERSER HALF AT A TIME. IF YOU CLOSE THE TWO HALVES AT THE SAME TIME, DAMAGE TO THE COMPRESSION RODS, AND CUPS CAN OCCUR.

(a) Close one thrust reverser at a time.

(b) Make sure all four compression rods are pushed into the four compression cups on the closed thrust reverser half.

(c) Close the v-band latch, the 5 thrust reverser centerline latches, the 3 aft cowl centerline latches, and the 4 deflection limiter latches.

(d) Do not close the T-hook latch and the latch access doors at this time.

(e) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

SUBTASK 78-31-01-200-010-H00

CAUTION

OPEN THE DEFLECTION LIMITER LATCHES ON THE AFT COWL BEFORE YOU OPEN THE THRUST REVERSER. IF THE LATCHES ARE NOT OPEN, DAMAGE TO THE STRUT, CROSS-TIE RODS, AND THE THRUST REVERSER WILL OCCUR.

CAUTION

DO NOT OPERATE THE PDOS SYSTEM UNTIL THE FOUR LATCH HOOKS MOVE AWAY FROM THE DEFLECTION LIMITER STRAPS. THE FOUR LATCH HOOKS ARE ON DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL. DAMAGE TO THE STRUT-MOUNTED AND ENGINE-MOUNTED BRACKETS THAT HOLD THE CROSS-TIE RODS CAN OCCUR.

(5) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

(a) Make sure that the left and right deflection limiter latches are open and the latch hooks are not engaged on the deflection limiter straps before you open the thrust reverser.

(b) Open the 4 deflection limiter latches, the 3 aft cowl centerline latches, the 5 thrust reverser centerline latches, and the v-band latch.

SUBTASK 78-31-01-820-071-H00

(6) Measure the thickness of ReproRubber or clay to find the gaps between the four strut mounted compression rods and four compression cups on the outboard side thrust reverser:

NOTE: The ReproRubber or clay thickness is the gap between the compression cup and the compression rod. The ReproRubber or clay thickness represents the total gap plus the total number of spacers necessary for the installation of that compression rod.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Measurements made with ReproRubber or clay ReproRubber Quick Setting Putty compound, G50092.

1) Measure the thickness of the hard ReproRubber or clay from the inside of the four compression cups on the upper bifurcation of the outboard thrust reverser.

a) Remove the hard ReproRubber or clay from the inside of the four compression cups.

NOTE: The hard ReproRubber or clay will have a cone shape.

b) Make a note of the location for each piece of hard ReproRubber or clay; write the location number on the ReproRubber or clay with a marker, G02061.

c) Use a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 to measure the compressed ReproRubber or clay or clay at the 4 compression cups on the upper part of the outboard thrust reverser.

d) Make a record of the thickness values for the four compression cups.

SUBTASK 78-31-01-820-072-H00

(7) Do a check of the gap at the 4 compression cups on the upper bifurcation of the outboard thrust reverser.

(a) Compare the record of thickness values with the limits below:

1) The compressed thickness of the clay or ReproRubber at the No. 1 compression cup must be 0.020-0.050 inch (0.51-1.27 millimeters).

NOTE: The nominal thickness is 0.035±0.015 inch (0.899±0.381 millimeters) which converts to 0.020-0.050 inch (0.51-1.27 millimeters).

2) The compressed thickness of the clay or ReproRubber at the No. 2 compression cup must be 0.020-0.050 inch (0.51-1.27 millimeters).

NOTE: The nominal thickness is 0.035±0.015 inch (0.899±0.381 millimeters) which converts to 0.020-0.050 inch (0.51-1.27 millimeters).

3) The compressed thickness of the clay or ReproRubber at the No. 3 compression cup must be 0.090-0.120 inch (2.29-3.05 millimeters).

NOTE: The nominal thickness is 0.105±0.015 inch (2.667±0.381 millimeters) which converts to 0.090-0.120 inch (2.29-3.05 millimeters).

4) The compressed thickness of the clay or ReproRubber at the No. 4 compression cup must be 0.120-0.150 inch (3.05-3.81 millimeters).

NOTE: The nominal thickness is 0.135±0.015 inch (3.429±0.381 millimeters) which converts to 0.120-0.150 inch (3.05-3.81 millimeters).

5) Calculate the shim thickness for the left and right side of each strut-mounted compression rod #1, 2, 3 & 4.

6) Refer to the table: Strut-Mounted Compression Rod Shim Thickness Calculation Example/Table 502.

NOTE: The shims are made from shim stock BAC1534-50C. All the layers of the shim stock are laminated corrosion resistant steel (CRES). The total shim thickness is 0.048-0.056 inch (1.219-1.422 millimeters) and the thickness of each lamination is 0.020 inch (0.508 millimeter).

Table 502/78-31-01-993-809-H00 Strut-Mounted Compression Rod Shim Thickness Calculation Example

Calculate the Total Shim and Washer Thickness for the Compression Rod

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Total Shim and Washer Thickness = Measured Clay Thickness - Nominal Gap	
Measured ReproRubber or Clay Thickness	0.280 inch (7.112 mm)
Minus the Nominal Gap	- 0.035 inch (1.270 mm)
Equals the Total Shim and Washer Thickness	= 0.245 inch (5.842 mm)
Calculate the Shim Thickness for the Left and Right Shims at the Compression Rod	
Total Shim and Washer Thickness	0.245 inch (5.842 mm)
Divided by 2	÷ 2
Equals the Thickness of Shims and Washers Installed Under Each Rod End	= 0.1225 inch (2.921 mm)
Install Nominal Shim Thickness and Washer Under Each Rod End	
Round Off Shim Thickness for Shim Laminations and Washers Thickness Thickness of shim: 0.020 inch (0.508 mm) Thickness of washer: 0.063 inch (1.60 mm)	0.125 inch (2.921 mm) rounds off to approximately 0.120 inch (3.048 mm)
Note: Total Tolerance Band of 0.105-0.135 inch (2.667-3.429 mm) for Added Shims and Washers	

(b) If you have locations where the compressed ReproRubber thickness is not in the limits, adjust the length of each strut-mounted compression rods #1, 2, 3, & 4 with washers and shims:

1) Remove the two bullet shaped rod ends from the compression rod.

2) Install the washers and shims calculated above.

3) Install half the number of washers and shims to the left side of the compression rod and half the number of washers and shims to the right side of the compression rod.

a) Select the appropriate number of washers that adds up to less than the required thickness.

NOTE: The washers are made from AMS2700 and have a nominal thickness of 0.057-0.069 inch (1.458-1.753 millimeter)

b) Using the example above, use one washer (nominal thickness 0.063 (1.600 millimeter))

NOTE: The shims are made from shim stock BAC1534-50C. All the layers of the shim stock are laminated corrosion resistant steel (CRES). The total shim thickness is 0.048-0.056 inch (1.219-1.422 millimeters) and the thickness of each lamination is 0.020 inch (0.508 millimeter).

c) Using the above example, add one laminated shim, 0.052 inch nominal (1.321 millimeter) and one 0.020 inch (0.508 millimeter) shim lamination to the washer from step 3) b) for each side. This will give a nominal washer and shim stack of 0.063 + 0.052 + 0.020 inch (1.600 + 1.321 + 0.508 millimeter) for a total of 0.135 inch (3.429 millimeter) for each side. It is permissible to vary the shim thickness on one side by a maximum of one shim (.052 inch: 1.321 millimeter).

d) Peel the shims to the required thickness and install with washers from 3) a).

e) Install and tighten the two bullet shaped rod ends.

4) Recheck compression rod to compression cup gap starting at I (2).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) When all 4 gaps are within specified gap install cable, G02473 or MS20995C41 lockwire, G00440, double twist method, between the rod and the rod ends.

<1> > Refer to this task: Lockwire, Cotter Pins, and Lockrings - Installation, TASK 20-10-23-400-801.

<2> Refer to this task: Safety Cable Installation, TASK 70-41-00-910-802-H01.

SUBTASK 78-31-01-000-009-H00

(8) Remove the foam pipe insulation from the compression rods that were used to keep the inboard compression rod end seated in the inboard compression cup.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-01-000-010-H00

(1) Remove the work platform, COM-1525, or engine and strut access platform, engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-01-000-011-H00

(2) Close and open the thrust reverser a minimum of 3 times:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00

1) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

(b) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

SUBTASK 78-31-01-000-012-H00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00

SUBTASK 78-31-01-400-004-H00

(4) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-01-400-005-H00

(5) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

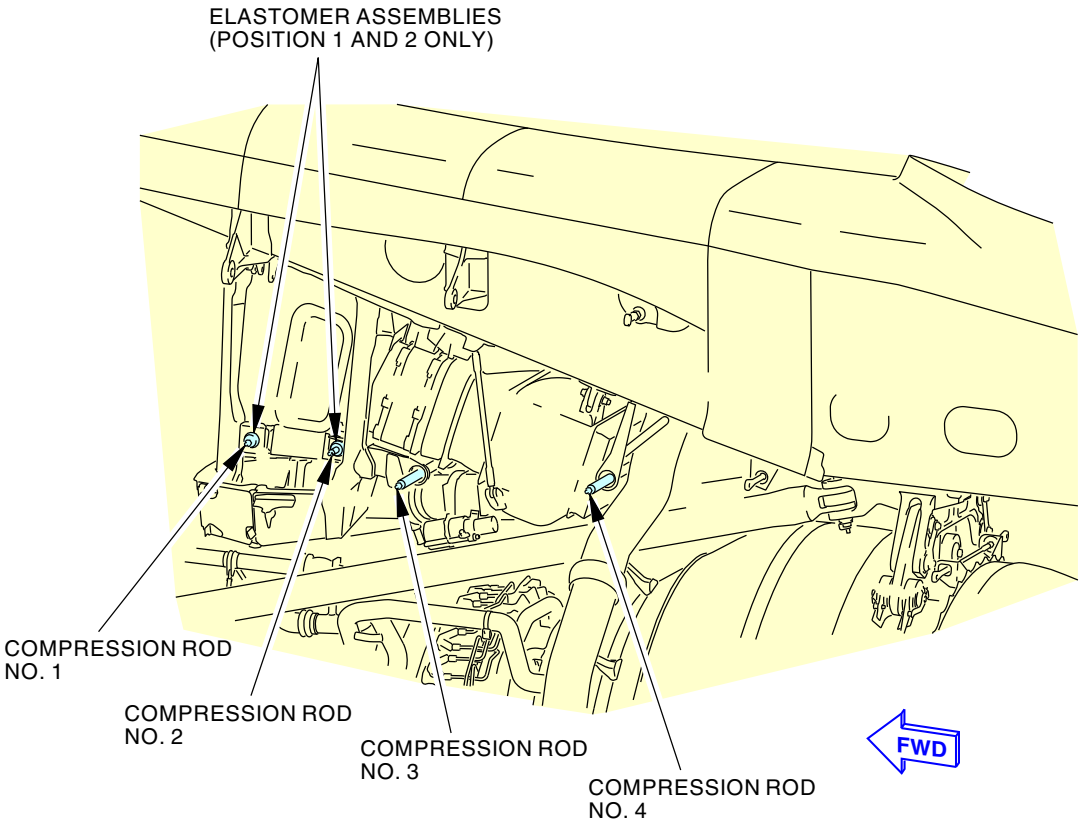
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00

2) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

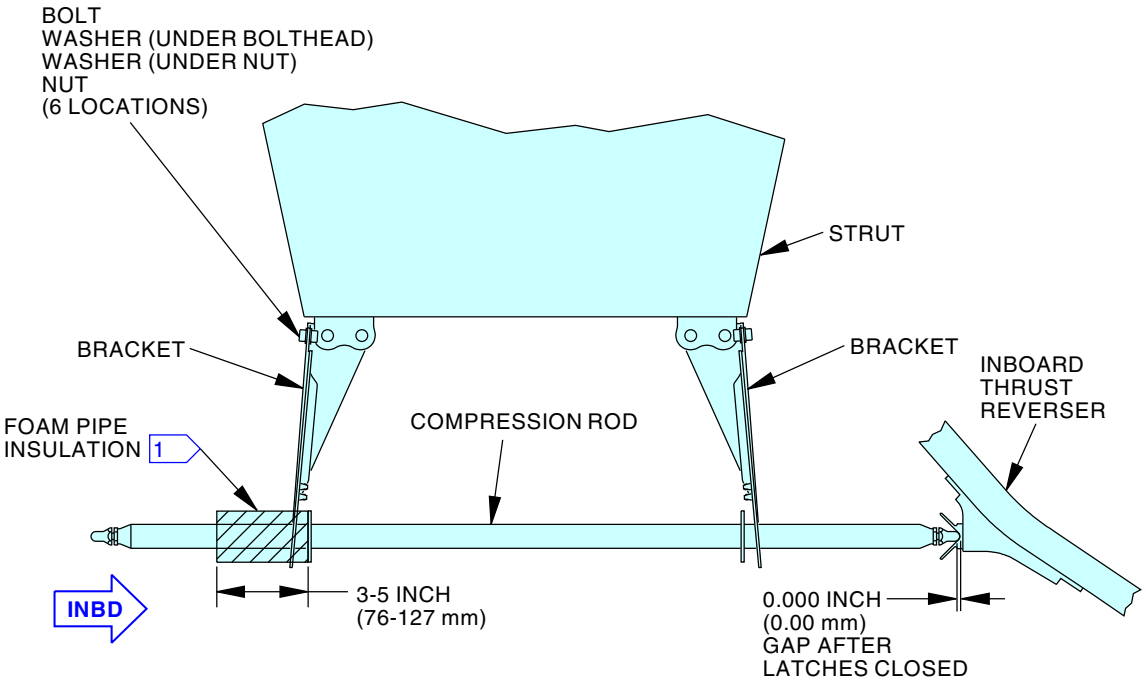


(THRUST REVERSER NOT SHOWN)

2259479 S0000506382_V2

Compression Rod Locations
Figure 510/78-31-01-990-844-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(OUTBOARD TRUST REVERSER IN OPEN POSITION)

1 FOR NO.3 AND NO.4 COMPRESSION RODS:

BEFORE PLACING THE CLAY/REPRORUBBER IN THE OUTBOARD TRUST REVERSER COMPRESSION CUP:

1) PLACE A 3-5 INCH (76-127 mm) LENGTH OF FOAM PIPE INSULATION WITH A WALL THICKNESS BETWEEN 0.5-0.75 INCH (12.7-19.0 mm) OVER THE COMPRESSION ROD.
2) PUSH COMPRESSION ROD TOWARDS INBOARD THRUST REVERSER CENTERING THE ROD END IN THE CUP.
3) MAKE SURE THAT THE FOAM PIPE INSULATION REST INSIDE THE ROD BRACKET. THE FOAM AND ITS POSITION KEEPS THE ROD END ON THE INBOARD SIDE CENTERED IN THE INBOARD CUP DURING THE CLAY/REPRORUBBER GAP MEASUREMENT.

2259487 S0000506383_V2

Positioning of Pipe Insulation for Positioning Rod Prior to Gap Measurement
Figure 511/78-31-01-990-845-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER - INSPECTION/CHECK

1. General

A. This procedure has this task:

(1) An inspection of the thrust reverser.

TASK 78-31-01-200-802-H01

2. Thrust Reverser Inspection

Figure 601

A. General

(1) This task gives the instructions to make sure that the interface between the thrust reverser and the engine is correct.

(a) This task has these procedures:

1) Latch Beam Splitline Gap Check
2) Latch Beam Wearplate Gap Check
3) T-Hook Latch Check
4) Lower Bifurcation Interlock Pin Check
5) Strut-Mounted Hardware Check and Replacement
   a) Compression Rods
   b) Compression Cups
   c) Forward and Aft Deflection Limiter Cross-Tie Rods
   d) Strut/Engine Rod Brackets/Supporting Structure
6) Internal Clearance Checks
   a) Inner V-Groove Check
   b) T-Hook Clearance Check
   c) Lower Compression Pads Check
   d) Upper Compression Rods and Cups Check
   e) Aft Cowl Loadshare Fittings Check
7) Fire Seal Check
8) Tension Latch Closing Force Check
9) Hinge Beam Access Panel Access Door and Bumper Check

(2) Do not continue the thrust reverser inspection if any of these conditions has occurred; a complete adjustment is necessary:

(a) The forward deflection limiter cross-tie rod length was changed or the cross-tie rod was replaced.

(b) The aft deflection limiter cross-tie rod was moved from the removed engine to the new installed engine and the cross-tie rod length was changed or the cross-tie rod was replaced.

(c) Any wear plate or wear pad was replaced or thickness of any stack of shims was changed for the latch beam wear plates.

(d) The thrust reverser was replaced.

(e) The strut was replaced.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) For a complete adjustment, do the thrust reverser adjustment (TASK 78-31-01-830-801-H01).

(g) If you only replaced the engine, continue with the thrust reverser inspection.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-01 P/B 401	THRUST REVERSER - REMOVAL/INSTALLATION
78-31-01-820-802-H00	Thrust Reverser Compression Rod Adjustment (P/B 501)
78-31-01-830-801-H01	Thrust Reverser Adjustment (P/B 501)
78-31-04-820-801-H01	Thrust Reverser Tension Latches Adjustment (P/B 501)
78-31-05-000-801-H01	Thrust Reverser Fire Seal Removal (P/B 401)
78-31-05-300-802-H00	Thrust Reverser Bulb Seal Repair (P/B 801)
78-31-05-400-801-H01	Thrust Reverser Fire Seal Installation (P/B 401)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-20-000-802-H01	T-Hook Latch Receiver Removal (P/B 401)
78-31-20-400-802-H01	T-Hook Latch Receiver Installation (P/B 401)
78-31-21-000-802-H01	Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal (P/B 401)
78-31-21-400-802-H01	Thrust Reverser Lower Bifurcation Interlock Pin Fitting Installation (P/B 401)
78-31-21-820-802-H01	Thrust Reverser Lower Bifurcation Interlock Pin Fitting Adjustment (P/B 501)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-146	Calipers - Vernier, 0 to 6 in (0 to 152 mm), Readable to 1/1000 in (.025 mm)
STD-405	Gauge - Feeler

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description
STD-596	Micrometer - Depth, 0.0 to 1.07 in (0.0 to 25.0 mm)
STD-625	Pen
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)
STD-1081	Flashlight - Explosion Proof
STD-1097	Caliper - Vernier, 0-6 inch, Readable to 1/1000 inch
STD-1107	Gauge - Feeler, 0.0 - 0.5 Inch, Readable to 1/1000th
STD-6566	Gage - Dial Push/Pull, DPP-25 (DPP-125N), 25 lb (11.3 kg) Capacity

D. Consumable Materials

Reference	Description	Specification
B00083	Solvent - VM&P Naphthas	TT-N-95 Type II, ASTM D-3735 Type III
D00504	Grease - Petrolatum	VV-P-236
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02020	Clay, Modeling	
G02061	Marker - Permanent, Felt Tip Pen	
G50092	Compound - Metrology Casting Material - ReproRubber Quick Setting Putty	
G50230	Glove - Vinyl	

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Inspection

SUBTASK 78-31-01-010-025-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO PREPARE THE THRUST REVERSERS FOR THE INSPECTION. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely prepare the left and right thrust reversers for the inspection.

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-01-490-008-H01

(2) Use the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the top of the engine core V-groove, the strut fire seal depressors, the strut-mounted compression rods, the upper bifurcation compression cups, and the deflection limiter stop seats on the aft cowl.

H. Latch Beam Wearplate and Splitline Gap Check

SUBTASK 78-31-01-211-004-H00

(1) Check the gaps at the latch beam and aft cowl wear plates between the latch beam and aft cowl fairings (Figure 602).

(a) Use a feeler gauge, STD-405 at the 10 thrust reverser latch wear plates and the 6 aft cowl latch wear plates to see if the latch plates touch.

NOTE: You can also use an explosion proof flashlight, STD-1081 to see if the latch plates touch.

1) Verify that there is contact between at least one set of wear plates at each of the centerline latch locations after the thrust reverser is closed.

a) Record contact or gaps in Table B (Figure 608 (Sheet 1)).

b) If a parallel gap exists, it must not be larger than 0.010 in. (0.254 mm).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

c) If a tapered gap condition exists, the gap must not exceed 0.010 in. (0.254 mm) at the narrowest point and must not exceed 0.050 in. (1.270 mm) at the widest point.

2) If any gaps exceed these limits, stop this inspection task and do this task: Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

SUBTASK 78-31-01-220-030-H00

(2) Measure the splitline gaps between the latch beam fairings and aft cowls (Figure 602).

NOTE: The latch beam fairings are on the left and right thrust reverser halves. The fairings are forward and aft of the latch access doors.

(a) Close the latch access doors.

(b) Use a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 to measure the splitline gaps between the latch beam fairings.

(c) Record the gaps in Table A (Figure 608 (Sheet 1).

(d) If the splitline gaps are not between the limits shown, stop this inspection task and do this task: Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

I. T-Hook Latch Check and Lower Bifurcation Interlock Pin Check

SUBTASK 78-31-01-820-052-H01

(1) Check the operation of the upper bifurcation T-hook latch.

(a) Pull the T-hook latch handle down and push the handle in toward the latch beam to disengage the T-hook in the T-hook receiver.

NOTE: Push the T-hook latch handle in toward the latch beam for the release mechanism.

(b) Push the T-hook handle up and push the handle in toward to the latch beam to engage the T-hook in the T-hook receiver.

(c) Open and close the T-hook latch 3 times to make sure the gearbox operates easily and correctly.

SUBTASK 78-31-01-020-013-H00

(2) If the T-hook latch does not operate correctly, do this task: T-Hook Latch Receiver Removal, TASK 78-31-20-000-802-H01

SUBTASK 78-31-01-710-004-H00

(3) Check the operation of the lower bifurcation interlock pin.

(a) Open and close the No. 2 tension latch 3 times and do a check that the bracket assembly of the interlock pin moves down each time.

NOTE: When the No.2 tension latch on the thrust reverser is opened, the bracket assembly must move down. This shows the spring loaded interlock pin has disengaged from the serrated fitting.

SUBTASK 78-31-01-020-014-H00

(4) If the interlock pin does not move smoothly, do this task: Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal, TASK 78-31-21-000-802-H01.

J. Strut-Mounted Hardware Check and Replacement

SUBTASK 78-31-01-010-028-H00

(1) For the applicable left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-01-210-007-H00

(2) Check the condition of the four strut-mounted compression rods, the forward deflection limiter cross-tie rod, the aft deflection limiter cross-tie rod, the rod brackets, and the supporting structure for damage or missing hardware (Figure 604 (Sheet 1)) .

NOTE: The compression rods are the primary load path to transfer the fan duct pressure load between the thrust reverser halves. Continued operation is not permitted with the compression rods damaged or missing. The compression rods are adjustable at the rod ends. The compression cups are not adjustable. Refer to SRM 54-33-02 for allowable wear limits.

(a) If a compression rod is not serviceable, do a visual check of the compression cups, fittings, and the thrust reverser upper bifurcation.

NOTE: If one of the compression rods are not serviceable, the other compression rods will carry a greater load than usual.

1) If necessary, remove the thermal insulation blankets around the fittings on the thrust reverser upper bifurcation to do the visual check.

a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

b) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

2) If a compression rod or cup is not serviceable, make a note of which cups and rod ends need to be replaced.

(b) If the forward or aft deflection limiter cross-tie rod is not serviceable, stop this inspection procedure, replace the deflection limiter cross-tie rod, and do this task: Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

NOTE: If a cross-tie rod is replaced, the complete thrust reverser adjustment procedure must be done.

K. Internal Clearance Checks

SUBTASK 78-31-01-820-062-H01

(1) Prepare to check the gaps between the inner engine V-groove and the V-blade and the 10 loadshare fittings on the left and right thrust reverser halves(Figure 605, Figure 606).

NOTE: When you apply grease or clay on the inner engine V-groove, make sure that there is no wear on the base of the V-groove. Wear on the V-groove can affect the thickness values if not measured correctly.

(a) Apply grease, D00504 to the inner engine V-groove at seven equally spaced locations on each side of the engine core Figure 605 (Sheet 1).

(b) Apply seven pieces of clay, G02020 that are cone shaped (approximately 0.20 in. (5.08 mm) by 0.32 in. (8.13 mm) thick) into the inner engine V-groove on each side of the engine core.

1) Place the clay with the base of the cone in the v-groove and the cone pointing outward.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Place the top and bottom pieces of clay 1.0 in. (2.5 cm) to 5.0 in. (12.7 cm) from the ends of the v-groove.

3) Place the remaining 5 pieces of clay evenly spaced between the top and bottom pieces.

NOTE: This is a total of 14 locations.

NOTE: Do not use too much clay. Too much clay can affect the thickness values and give you incorrect gap results. Use only the amount of clay given in the procedure. You must use a parting agent with clay. You must clean the parts with solvent and a cloth after the measurements.

(c) Apply grease, D00504 on the 14 pieces of clay in the engine V-groove.

(d) Apply grease, D00504 as a parting agent to the inner V-blade at the 14 opposite locations on the thrust reverser halves.

(e) Apply a piece of clay, G02020 that is cone shaped (approximately 0.20 in. (5.08 mm) by 0.32 in. (8.13 mm) thick) near the aft edge of each of the 10 loadshare fittings on the left and right sides of the engine turbine frame(Figure 606).

NOTE: There are five aft cowl loadshare wear pads on each side of the engine.

1) Apply grease, D00504 as a parting agent on the clay.

2) Apply grease, D00504 as a parting agent to the 10 loadshare fittings on the left and right thrust reverser halves.

SUBTASK 78-31-01-410-026-H00

(2) Do these steps to find the gap between the T-hook and T-hook receiver:

(a) If the T-hook latch receiver was removed, position the receiver on the mount fitting without the spacers.

1) Install two bolts and washers and tighten the bolts finger tight at this time.

a) If the original bolts are too long, use a short bolt at this time.

NOTE: Use a short bolt, BACB30LE6K17.

(b) On the left side thrust reverser, apply a piece of clay which is approximately 0.4 in. (10.2 mm) thick and 0.5 in. (12.7 mm) in diameter in the center of the T-hook receiver between the two fasteners.

(c) On the right side thrust reverser, apply petrolatum grease, D00504 as a parting agent on the T-hook.

SUBTASK 78-31-01-410-024-H00

(3) Close the inboard thrust reverser half.

SUBTASK 78-31-01-980-003-H00

(4) Close the inboard aft cowl deflection limiter latches.

SUBTASK 78-31-01-820-076-H00

(5) Prepare to check the gaps at the lower compression pads and the stop seats for the forward and aft deflection limiter rods on the top of the outboard aft cowl.

(a) Apply a cone-shaped piece of clay, G02020 approximately 0.40 in. (10.16 mm) thick and 0.5 in. (12.7 mm) in diameter at each of the 4 compression pads on the inboard thrust reverser half.

1) Place the clay near the outer edge of the compression pad.

NOTE: Placing the clay over the screw countersink in the center of the compression pad may cause an incorrect measurement.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Apply grease, D00504 as a parting agent on the clay.

3) Apply grease, D00504 as a parting agent on the compression pads on the outboard thrust reverser half.

(b) Apply a piece of clay, G02020 approximately 0.40 in. (10.16 mm) thick at the two stop seats for the forward and aft deflection limiter rods on the top of the outboard aft cowl Figure 604 (Sheet 2)Figure 604 (Sheet 3).

1) Apply grease, D00504 as a parting agent on the clay.

2) Apply grease, D00504 as a parting agent on the bushings for the cross-tie rod connection for the aft deflection limiter.

SUBTASK 78-31-01-820-089-H00

(6) REPRORUBBER METHOD (Preferred):

Prepare to measure the gaps between the four strut-mounted compression rods and four compression cups on the left side thrust reverser:

NOTE: It is only necessary to put ReproRubber in the compression cups of one thrust reverser half. The compression rods slide side-to-side in the brackets. When the gap is measured, one side of the compression rod in the cup will have no gap. The gap measured is used for calculating the shims needed on both sides of the compression rod.

NOTE: It is not necessary to use a parting agent with ReproRubber or to clean the parts after the measurements.

(a) Make sure all compression rods are seated in the compression cups on the inboard thrust reverser half.

WARNING DO NOT GET THESE MATERIALS IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THESE MATERIALS. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES WHEN YOU USE THESE MATERIALS. KEEP THESE MATERIALS AWAY FROM SPARKS, FLAME, AND HEAT. THESE MATERIALS ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(b) Use a pair of vinyl gloves, G50230 to mix the compound; do not use latex gloves or rubber gloves because these materials can prevent the set of the compound.

(c) Follow the manufacturers directions when you mix the 2 part ReproRubber Quick Setting Putty compound, G50092; mix a sufficient quantity of compound for the four compression cups and for a control sample.

NOTE: In general, you will knead two equal size balls of catalyst putty and base putty together for 30-45 seconds. Manipulation time to put the ReproRubber in the compression cups is approximately 3 to 4 minutes. ReproRubber will become hard in approximately 8 to 10 minutes. If the ReproRubber becomes hard before you close the thrust reverser, you will get incorrect gap measurement results.

NOTE: Mix enough of the 2-part compound to put a small amount in each location. Prepare equal amounts of the two compounds before you start to mix the compounds together. If possible, use a team in which one person mixes the compound and the other person puts the compound into position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Put a piece of ReproRubber that is approximately 0.4 in. (10 mm) thick as a control sample on a nearby metallic surface.

NOTE: The control sample is used to check the hardness of the ReproRubber after the thrust reverser is closed. ReproRubber is affected by the ambient temperature. Cold temperatures will increase the time for the ReproRubber to become hard. Warm temperatures will decrease the time for the ReproRubber to become hard.

NOTE: Do not handle the ReproRubber sample after it is placed to the side. Handling the sample may affect the cure time of the ReproRubber.

(e) Apply a piece of ReproRubber that is cone shaped 0.4 in. (10 mm) thick to the inside of each compression cup on the outboard thrust reverser (Figure 604 (Sheet 4)).

1) Press the ReproRubber firmly into the compression cup without a pocket of air.

NOTE: A pocket of air can be trapped under the ReproRubber if not formed into a cone shape and pressed firmly into the cup. The pocket of air will give an incorrect gap measurement and an incorrect adjustment of the compression rod.

(f) Immediately go to the step to close the outboard thrust reverser half and close the latches; ReproRubber will become hard quickly.

SUBTASK 78-31-01-820-090-H00

(7) CLAY METHOD (Optional):

Prepare to measure the gaps between the four strut-mounted compression rods and four compression cups on the left side thrust reverser:

NOTE: It is only necessary to put clay in the compression cups of one thrust reverser half. The compression rods slide side-to-side in the brackets. When the gap is measured, one side of the compression rod in the cup will have no gap. The gap measured is used for calculating the shims needed on both sides of the compression rod.

(a) Make sure all compression rods are seated in the compression cups on the inboard thrust reverser half.

(b) Apply grease, D00504 as a parting agent to the rod ends on the outboard ends of the compression rods.

(c) Apply grease, D00504 as a parting agent in the compression cups on the outboard thrust reverser half.

(d) Apply a piece of clay that is cone shaped 0.4 in. (10 mm) thick to the inside of each compression cup on the outboard thrust reverser (Figure 604 (Sheet 4)).

1) Press the clay firmly into the compression cup without a pocket of air.

NOTE: A pocket of air can be trapped under the clay if not formed into a cone shape and pressed firmly into the cup. The pocket of air will give an incorrect gap measurement and an incorrect adjustment of the compression rod.

SUBTASK 78-31-01-410-025-H00

(8) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

(a) Close the V-band latch, the 5 thrust reverser centerline latches, the T-hook latch, the 3 aft cowl centerline latches, and the 4 deflection limiter latches.

(b) Do not close the latch access doors at this time.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

SUBTASK 78-31-01-820-078-H00

(9) If ReproRubber is used, check the control sample of ReproRubber to determine appropriate hardness before you open the thrust reverser.

NOTE: If the ReproRubber begins to harden before the thrust reverser is closed, all latches are closed and the PDOS is depressurized, the measurements of the ReproRubber may not be accurate. If this happens, the gaps between the 4 strut-mounted compression rods and cups must be checked again.

SUBTASK 78-31-01-010-029-H00

CAUTION OPEN THE DEFLECTION LIMITER LATCHES ON THE AFT COWL BEFORE YOU OPEN THE THRUST REVERSER. IF THE LATCHES ARE NOT OPEN, DAMAGE TO THE STRUT, CROSS-TIE RODS, AND THE THRUST REVERSER WILL OCCUR.

CAUTION MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(10) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

(a) Open the 4 deflection limiter latches, the 3 aft cowl centerline latches, the 5 thrust reverser centerline latches, and the V-band latch.

(b) Make sure that the left and right deflection limiter latches are open and the latch hooks are not engaged on the deflection limiter straps before you open the thrust reverser.

SUBTASK 78-31-01-220-031-H00

(11) Measure the thickness of the ReproRubber or clay to find the gaps between the four compression rods and four compression cups on the outboard thrust reverser (Figure 604 (Sheet 4)):

NOTE: The ReproRubber or clay thickness is the gap between the compression cup and the compression rod. The thickness represents the total gap plus the total number of spacers necessary for the installation of that compression rod.

(a) If ReproRubber is used, measure the thickness of the hard ReproRubber from the four compression cups on the outboard thrust reverser.

1) Remove the hard ReproRubber from the inside of the four compression cups.

a) If necessary, use the blade of a screwdriver to remove the hard ReproRubber from the inside of the four compression cups.

NOTE: The ReproRubber will have a cone shape.

2) Make a note of the location for each piece of ReproRubber; write the location number on the ReproRubber with a pen, STD-625 or marker, G02061.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Cut the ReproRubber through the center of the rod end depression and the center of the compression cup.

NOTE: If the cut does not go through the centers of both the rod end and the compression cup, the gap measurement will be incorrect.

4) Use vernier calipers, STD-146 to measure the ReproRubber thickness between the tip of the cone to the bottom of the depression formed by the compression rod Figure 604 (Sheet 4).

NOTE: Do not measure the smallest dimension between the tip of the compression rod and the side wall of the compression cup. This will give an incorrect value.

a) Draw a line from the bottom of the depression which is perpendicular to the centerline of the cone.

b) Measure across the cross-section from the line to the tip of the cone.

5) If any thickness values are 0.00 inch, stop this inspection procedure, and do this task: Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

6) If none of the thickness values are 0.00 inch, record the thickness values for the four compression cups in Table E (Figure 608 (Sheet 2)).

(b) For measurements made with clay, do the steps that follow:

1) Carefully remove the clay from the compression cups.

NOTE: Be careful not to deform the clay when you remove it from the cups.

2) Measure the thickness of the clay inside of the four compression cups on the left thrust reverser.

a) Cut the clay through the center of the rod end depression and the center of the compression cup.

NOTE: Be careful not to deform the clay when you cut it.

NOTE: If the cut does not go through the centers of both the rod end and the compression cup, the gap measurement will be incorrect.

b) Use vernier calipers, STD-146 to measure the clay thickness between the tip of the cone to the bottom of the depression formed by the compression rod Figure 604 (Sheet 4).

NOTE: Do not measure the smallest dimension between the tip of the compression rod and the side wall of the compression cup. This will give an incorrect value.

c) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

3) If any thickness values are 0.00 inch, stop this inspection procedure, and do this task: Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

4) If none of the thickness values are 0.00 inch, record the thickness values for the four compression cups in Table E (Figure 608 (Sheet 2)).

SUBTASK 78-31-01-220-029-H01

(12) Measure the thickness of the clay to find the gap at the inner engine V-groove and V-blade:

(a) Use vernier calipers, STD-146 to measure the compressed thickness of the clay at the six locations in the inner engine V-groove:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Make sure that you measure the clay thickness from the base of the inner engine V-groove (Figure 605 (Sheet 2)).

2) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

3) Record the clay thickness from each location for the left and right thrust reverser in Table C (Figure 608 (Sheet 2)).

(b) Calculate the average thickness of the clay for the inner engine V-groove for each thrust reverser half.

1) The maximum limit for the average thickness is 0.100 in. (2.540 mm) for each thrust reverser half.

(c) If the average gap is not in the limits, stop this inspection task and do this task Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01

(d) If the average thickness is in the limit, then continue.

SUBTASK 78-31-01-160-017-H01

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE IN THE FUMES FROM THE SOLVENT. MAKE SURE TO PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN USING THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAMES AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY OR DAMAGE IF NOT HANDLED PROPERLY.

(13) Clean the inner engine V-groove and the V-blade of all the residual clay and parting agent with solvent, B00083 and a clean cotton wiper, G00034.

SUBTASK 78-31-01-220-027-H01

(14) Measure the compressed thickness of the clay at the stop seats on the top of the outboard aft cowl for the aft deflection limiters.

NOTE: The clay thickness gives the necessary change in the length of each cross-tie rod.

(a) Use a 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay, G02020.

1) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

a) Record the clay thickness values in Table D (Figure 608 (Sheet 2)).

2) If the thickness values are not 0.0 in. (0.0 mm), do this task: Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

NOTE: The clay must be fully compressed out at the stop seats.

SUBTASK 78-31-01-900-001-H00

(15) If any of the compression rods or cups are not serviceable, as determined earlier, stop this inspection task, replace the compression rod ends and compression cups, and, do this task: Thrust Reverser Compression Rod Adjustment, TASK 78-31-01-820-802-H00

L. Upper Compression Rod Measurements

SUBTASK 78-31-01-820-079-H00

(1) Compare the recorded thicknesses of the ReproRubber or clay from the compression cups to these limits:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Upper Compression Rod Gaps

Rod No.	Lower Gap Limit	Upper Gap Limit
1 (FWD)	0.020 in. (0.51 mm)	0.050 in. (1.27 mm)
2	0.020 in. (0.51 mm)	0.050 in. (1.27 mm)
3	0.090 in. (2.29 mm)	0.120 in. (3.05 mm)
4 (AFT)	0.120 in. (3.05 mm)	0.150 in. (3.81 mm)

(a) If any compression rod has a gap that is not in the limits, do this task: Thrust Reverser Compression Rod Adjustment, TASK 78-31-01-820-802-H00

M. Aft Cowl Load Share Pad Gap Measurement

SUBTASK 78-31-01-220-019-H01

(1) Check the gaps at the 10 aft cowl loadshare pads:

(a) Use a 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay at the 10 locations on the loadshare fittings.

NOTE: The clay thickness at each location is the gap between the loadshare rub pad and the engine-mounted turbine frame fittings.

NOTE: If no deformation is noted in the clay on the loadshare pads, re-position the clay to the aft edge of the engine-mounted loadshare pads and close the thrust reverser halves again.

(b) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

(c) Make a record of the clay thickness values for the 10 aft cowl loadshare wear pads in Table G (Figure 608 (Sheet 4)).

(d) Calculate the average thickness of the clay for the loadshare fittings.

(e) The average thickness of the clay must be 0.110 in. (2.794 mm) - 0.270 in. (6.858 mm).

(f) If the gap is not in the limits, add or remove the fillers under the loadshare rub pads as necessary.

NOTE: The thickness of each filler is 0.010 in. (0.254 mm). The thickness of each rub pad is 0.090 in. (2.286 mm). There are two rub pads on the left and right aft cowl forward latch fitting and eight rub pads on the left and right aft cowl forward frame. A maximum of nine fillers can be installed under each rub pad.

1) Adjust the gap at the aft cowl loadshare wear pads until the average aft cowl loadshare gap is in the limits before you continue with the procedure.

(g) If the average thickness is in the limits, then continue.

N. T-hook Latch Adjustment

SUBTASK 78-31-01-220-032-H00

(1) Measure the thickness of the clay, G02020 between the T-hook and the T-hook receiver on the left and right thrust reverser halves:

(a) Use 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay.

(b) Be careful you do not deform the clay as you measure it to prevent a false value.

(c) Make a record of the thickness value in Table I (Figure 608 (Sheet 4)).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-820-084-H00

(2) Find the combination of spacers to install under the T-hook receiver.

NOTE: The combination of spacers to install under the receiver will give you the correct bolt grip length.

Table 601/78-31-01-993-812-H00 T-Hook Receiver Spacers

Spacer Part Number	Spacer Nominal Thickness
315W1728-2 (Large spacer with bent edges)	0.025 inch (0.635 mm)
315W1728-3	0.050 inch (1.270 mm)
315W1728-4	0.125 inch (3.175 mm)
315W1728-5	0.010 inch (0.254 mm)

(a) Compare the thickness value from the clay with the required thickness of 0.1550-0.1750 inch (3.9370-4.4450 millimeters).

(b) Calculate the total thickness for the combination of spacers from the table.

1) You must use the large spacer with the bent edges and a combination of small spacers when you calculate the total thickness.

SUBTASK 78-31-01-160-018-H00

WARNING

DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(3) Remove all the residual clay and parting agent from the T-hook and the T-hook receiver with solvent, B00083 and a clean cotton wiper, G00034.

SUBTASK 78-31-01-020-015-H00

(4) Remove the temporary bolts and washers and the T-hook receiver.

SUBTASK 78-31-01-420-017-H00

(5) Install the T-hook receiver with the combination of spacers and correct bolt grip length.

(a) Do this task: T-Hook Latch Receiver Installation, TASK 78-31-20-400-802-H01.

O. Lower Compression Pad Gap Check and Adjustment

SUBTASK 78-31-01-220-033-H00

(1) Measure the thickness of the clay from the aft 3 compression pads (No .2, 3, 4) and the forward compression pad (No. 1) on the left thrust reverser.

(a) Use a 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay.

(b) Be careful not to deform the clay while you measure it to prevent an incorrect thickness value.

(c) Record the clay thickness values for each compression pad location in Table F (Figure 608 (Sheet 4)).

(d) If any of the clay thickness measurements is 0 in. (0 mm), stop this inspection task and do this task Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-820-085-H00

(2) The compressed thickness of clay at the compression pads must be 0.060 in. (1.52 mm) to 0.100 in. (2.54 mm).

NOTE: The thickness value at each location is the wear plate spacer thickness plus the nominal gap between the wear plates that is required when the latches are closed.

NOTE: The nominal gap used in the calculation is 0.080 ±0.020 in. (2.032 ±0.508 mm) which converts to 0.060 in. (1.52 mm) to 0.100 in. (2.54 mm).

(a) If the gap is not in the limits, add or remove spacers to get the required gap.

(b) Tighten the compression pad screw to 72 in-lb (8.1 N·m) to 88 in-lb (9.9 N·m).

P. Lower Bifurcation Interlock Pin Fitting Re-installation and Adjustment

SUBTASK 78-31-01-410-027-H00

(1) If the lower bifurcation interlock pin fitting was removed, do these tasks:

(a) Thrust Reverser Lower Bifurcation Interlock Pin Fitting Installation, TASK 78-31-21-400-802-H01

(b) Thrust Reverser Lower Bifurcation Interlock Pin Fitting Adjustment, TASK 78-31-21-820-802-H01

Q. Fire Seal Visual Check

SUBTASK 78-31-01-210-009-H00

(1) Visually examine the left and right thrust reverser fire seals for the conditions that follow (Figure 601):

(a) Do a check that the fire seal is correctly installed along the entire length by the seal foot and seal retainer.

(b) Do a check of the fire seal sections at each corner and joint for separations or frayed edges or ends.

(c) If sealant was used on the fire seal, do a check that the sealant is attached to the fire seal and intact.

(d) Do a check at the ends of the fire seals for tears, looseness or frayed ends.

(e) Do a check of the fire seal surfaces for these conditions:

1) Damage, wrinkles, or foreign material embedded in the seal.

2) Bubbles greater than 0.20 in. (5.08 mm).

3) Wear that is greater than 0.0625 in. (1.5875 mm) in depth.

4) Wear that goes through the outer layer of fabric.

5) Dark discoloration that is caused by heat.

(f) Examine the fire seal for cracks.

1) If you see circumferential cracks, reject it.

2) If you see radial cracks, you must obey the conditions that follow:

a) Permit a maximum of four cracks which are not more than half the height of the fire seal.

b) The distance between cracks must be a minimum of 6.0 in. (152.4 mm).

3) If you see damage, you must obey the conditions that follow:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) The seal strip is permitted to have a maximum of ten damaged areas, if each damaged area is not more than 1.0 in. (25.4 mm) long and a maximum of 30 percent of the width.

NOTE: The damaged areas in the front and the rear seal strip must not align.

(g) Make sure the fasteners for the fire seals on the latch beam are installed and tightened.

(h) Record any unserviceable condition in Table J (Figure 608 (Sheet 5)).

(i) If the damage found is more than the limits, replace the fire seal.

1) Do this task: Thrust Reverser Fire Seal Removal, TASK 78-31-05-000-801-H01.

2) Do this task: Thrust Reverser Fire Seal Installation, TASK 78-31-05-400-801-H01.

(j) If the damage to the bulb seal is in the area between the ends of the v-blade and adjacent to the v-blade on the inner wall barrel, repair the bulb seal.

1) Do this task: Thrust Reverser Bulb Seal Repair, TASK 78-31-05-300-802-H00.

R. Close the Thrust Reverser Halves

SUBTASK 78-31-01-410-028-H00

(1) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

(a) Close the V-band latch, the 5 thrust reverser centerline latches, the 3 aft cowl centerline latches, and the 4 deflection limiter latches.

(b) Do not close the T-hook latch and the latch access doors at this time.

(c) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

S. Tension Latches Check

SUBTASK 78-31-01-820-080-H00

(1) Do this task: Thrust Reverser Tension Latches Adjustment, TASK 78-31-04-820-801-H01

NOTE: This task includes checks of the latch closing forces of the V-band latch, all the centerline tension latches and the deflection limiter latches. If the latch closing forces are correct, no adjustment is necessary. If the latch closing forces are not correct, the task includes steps to adjust the latches.

(a) Record the latch closing forces in Table K (Figure 608 (Sheet 5)).

T. Hinge Beam Access Panel Access Door and Bumper Check

Figure 607

SUBTASK 78-31-01-210-005-H01

(1) Check the access doors in the hinge beam access panels.

NOTE: The access doors give clearance for the strut hinge fittings when the thrust reverser is opened and closes with its own weight when the thrust reverser is closed.

(a) Examine the access door hinge for loose or missing fasteners.

1) Replace the hinge beam access panel if it is necessary.

NOTE: The hinge beam access panel is removed and installed in the thrust reverser removal and installation procedure (PAGEBLOCK 78-31-01/401).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Examine the foam rubber bumpers under the access doors for damage.

NOTE: The foam rubber bumpers remove the play in the door hinge to reduce the hinge wear during flight.

1) Replace the foam rubber bumpers if they are missing or damaged.

SUBTASK 78-31-01-280-002-H00

(2) Check the force necessary to close the latches on the thrust reverser latch access doors.

(a) Close these access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

(b) Close each thrust reverser latch access door located on the latch beam fairing and make sure that the door is held firmly to the left hand thrust reverser latch beam and that the door latches can be closed with no more than 20 lbf (89 N) maximum force.

1) With both latches on the door closed, place your hand on the door near the latch and push the door toward the closed position to determine if the door is loose near the latch.

(c) If the door is loose near the latch, adjust the access door adjustment screw to make a tight fit.

1) While holding the door closed with your hand, measure the force needed to close each latch with a push pull dial gage, STD-6566 or equivalent.

(d) If more than 20 lbf (89 N) of force is required to close the latch, do the steps that follow to adjust the latch force.

1) Use a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 to measure the stack up of the latch beam assembly at the location where the latch interfaces with the beam (Figure 607 (Sheet 2), Dimension A, View A-A).

2) Adjust the access door adjustment screw to match Dimension A measurement plus .000-.005 inch (.000 - .127 millimeter) (Figure 607 (Sheet 2), Dimension B, View A-A).

a) Measure the adjustment with a shop aid or 0.0 - 0.5 Inch feeler gauge, STD-1107.

3) While holding the door closed with your hand, measure the force needed to close the latch with a push pull dial gage, STD-6566 or equivalent.

4) Measure the force at least 3 times.

5) The force to close the latch must be no more than 20 lbf (89 N).

6) If the force to close the latch is more than 20 lbf (89 N), go back and adjust the access door adjustment screw again.

(e) Make sure that the latch gap does not exceed 0.039 in. (1.0 mm)(Figure 607 (Sheet 1), View B).

(f) Make sure that you examine every latch.

(g) When all 6 door latches have been adjusted and the force to close the latches is 20 lbf (89 N) or less, make sure that the doors do not rattle and do not move.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

U. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-01-090-008-H01

(1) Remove the work platform, COM-1525 or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-01-410-015-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

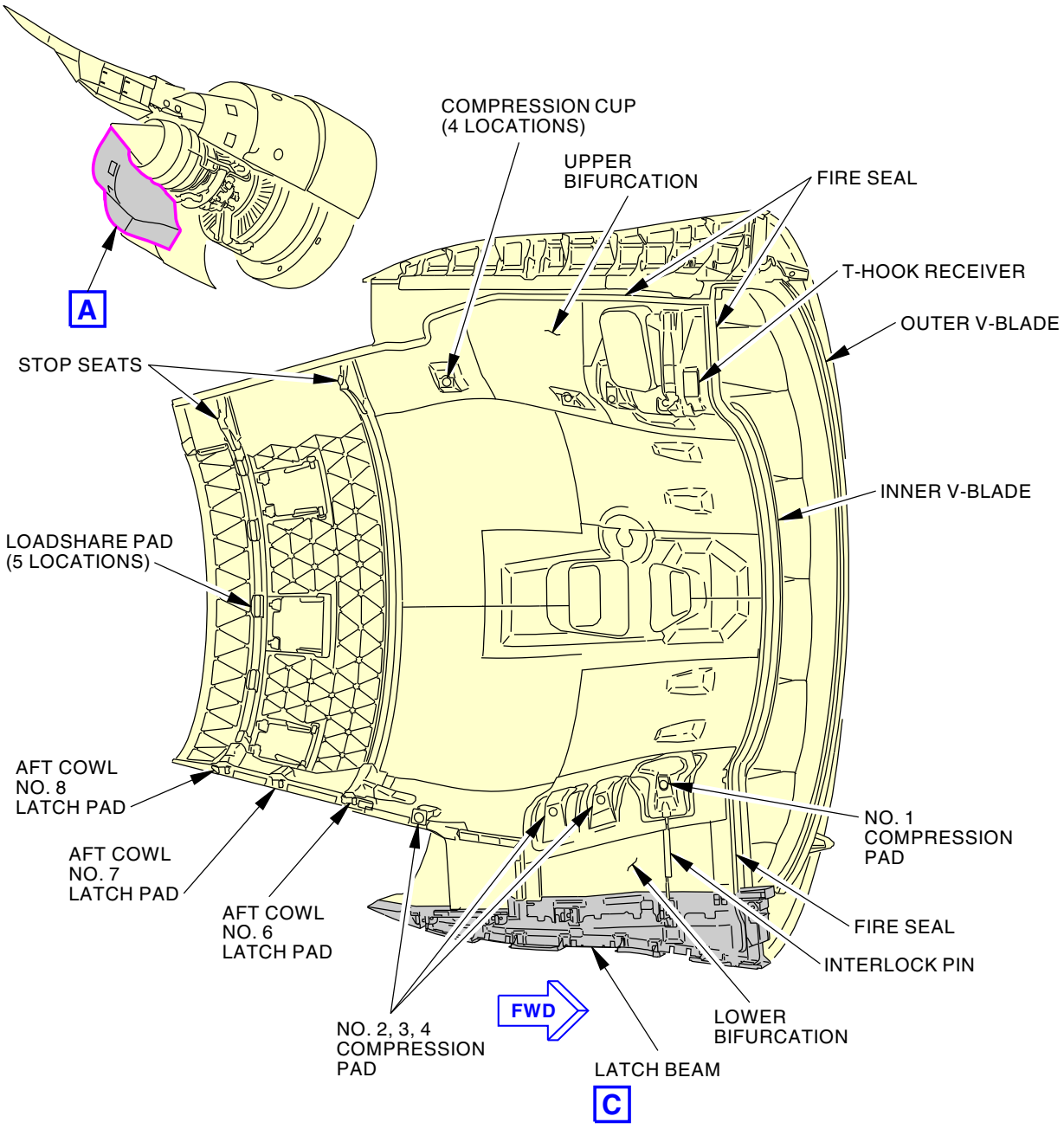
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



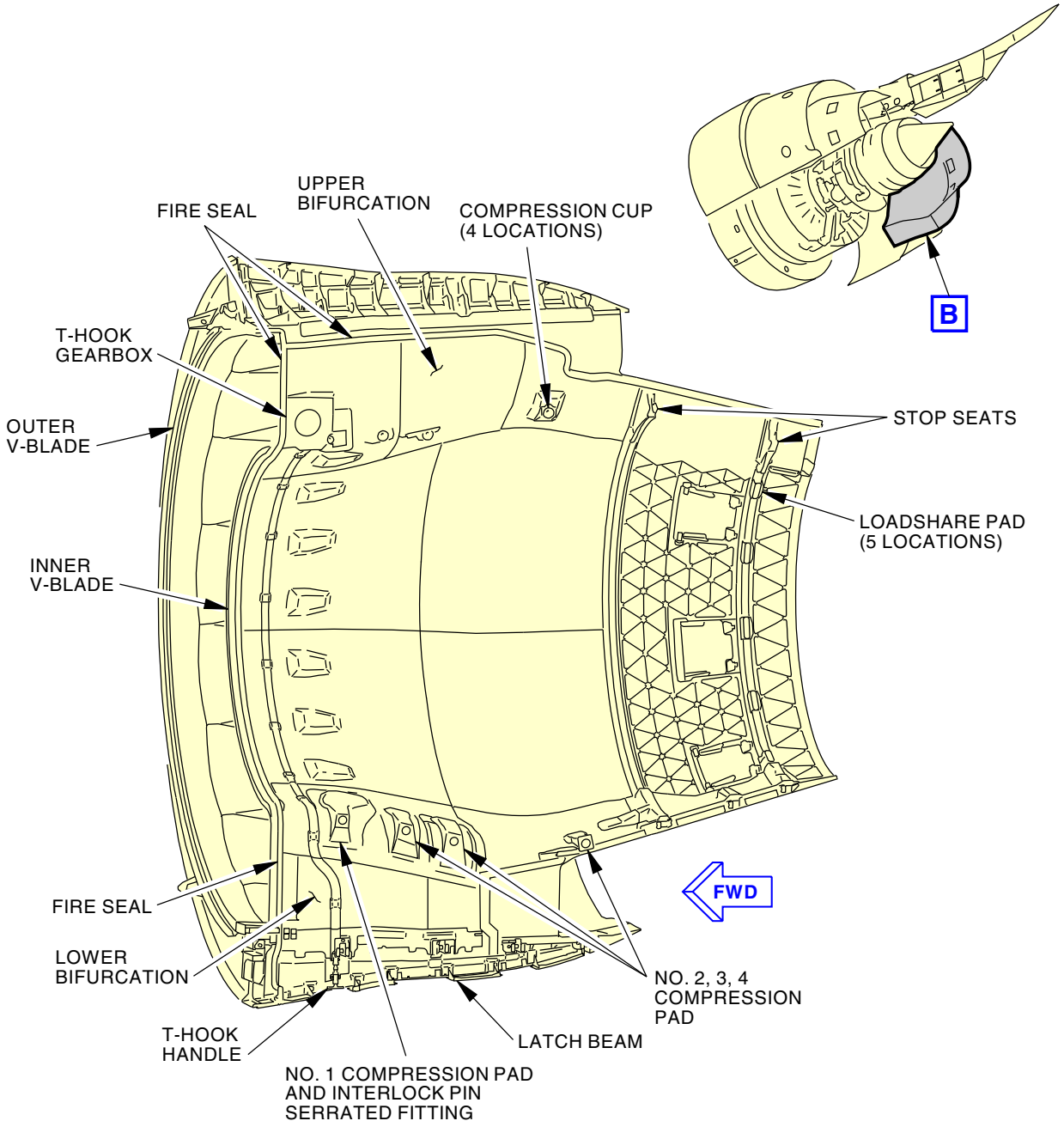
LEFT THRUST REVERSER HALF
(INTERNAL SIDE)

A

2325996 S0000527516_V3

Thrust Reverser Inspection
Figure 601/78-31-01-990-846-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



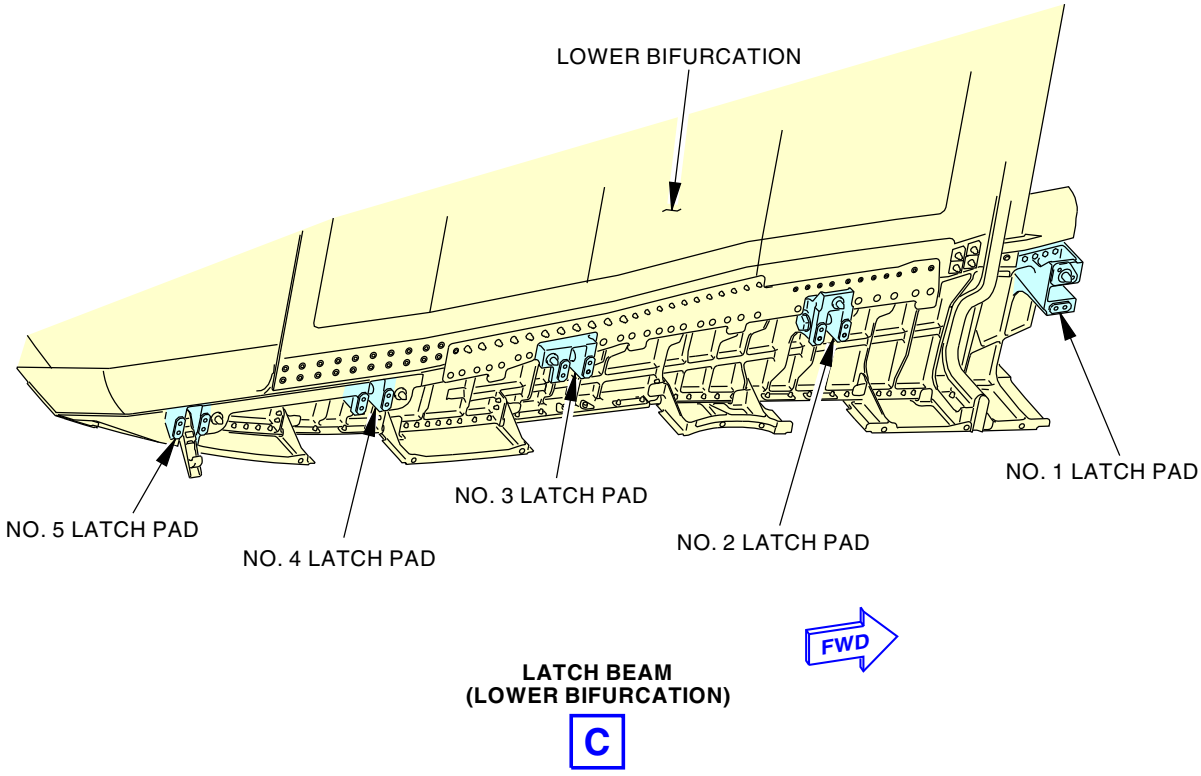
RIGHT THRUST REVERSER HALF (INTERNAL SIDE)

B

2326117 S0000527517_V3

Thrust Reverser Inspection
Figure 601/78-31-01-990-846-H00 (Sheet 2 of 3)

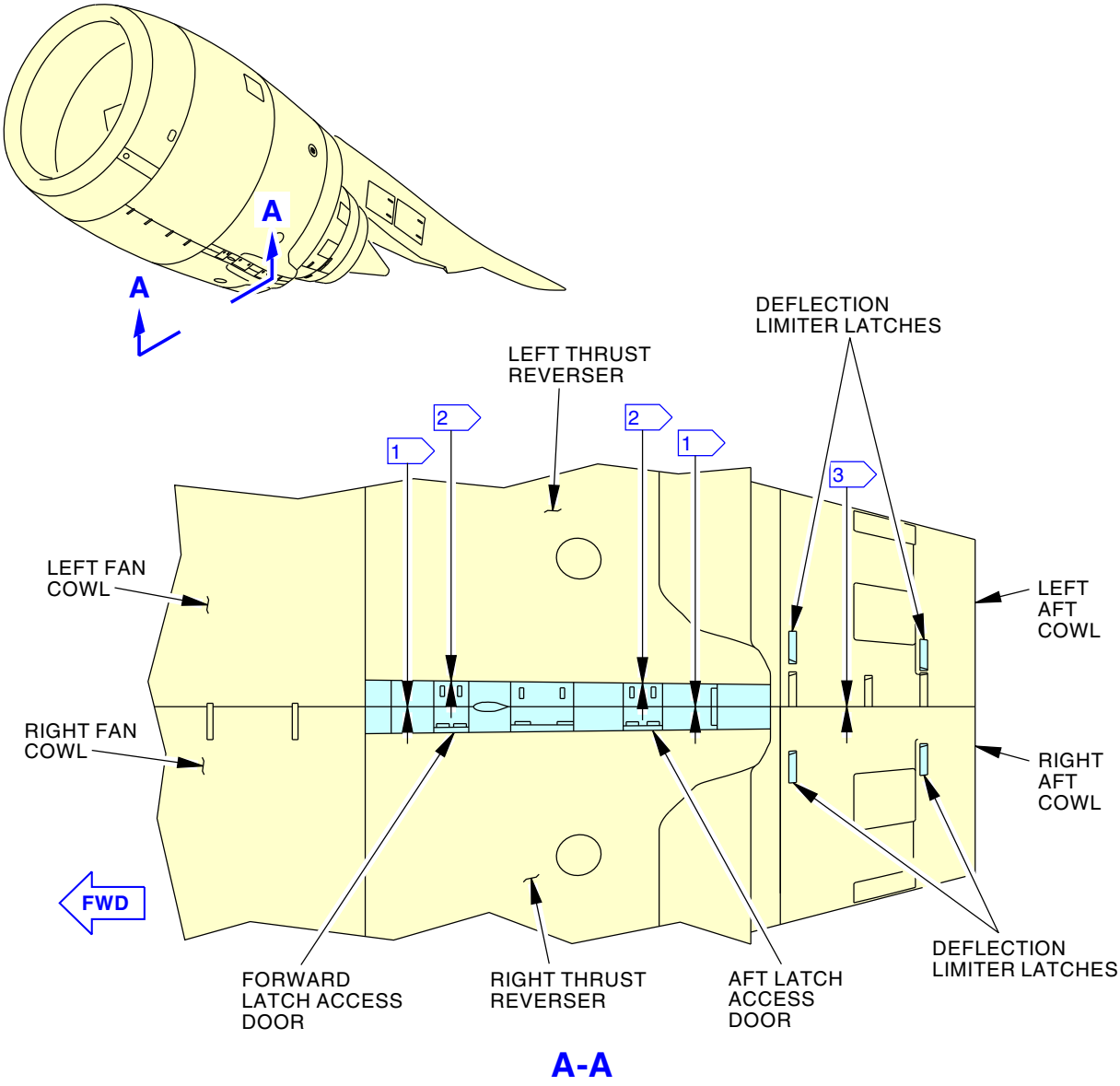
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2326093 S0000527518_V2

Thrust Reverser Inspection
Figure 601/78-31-01-990-846-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

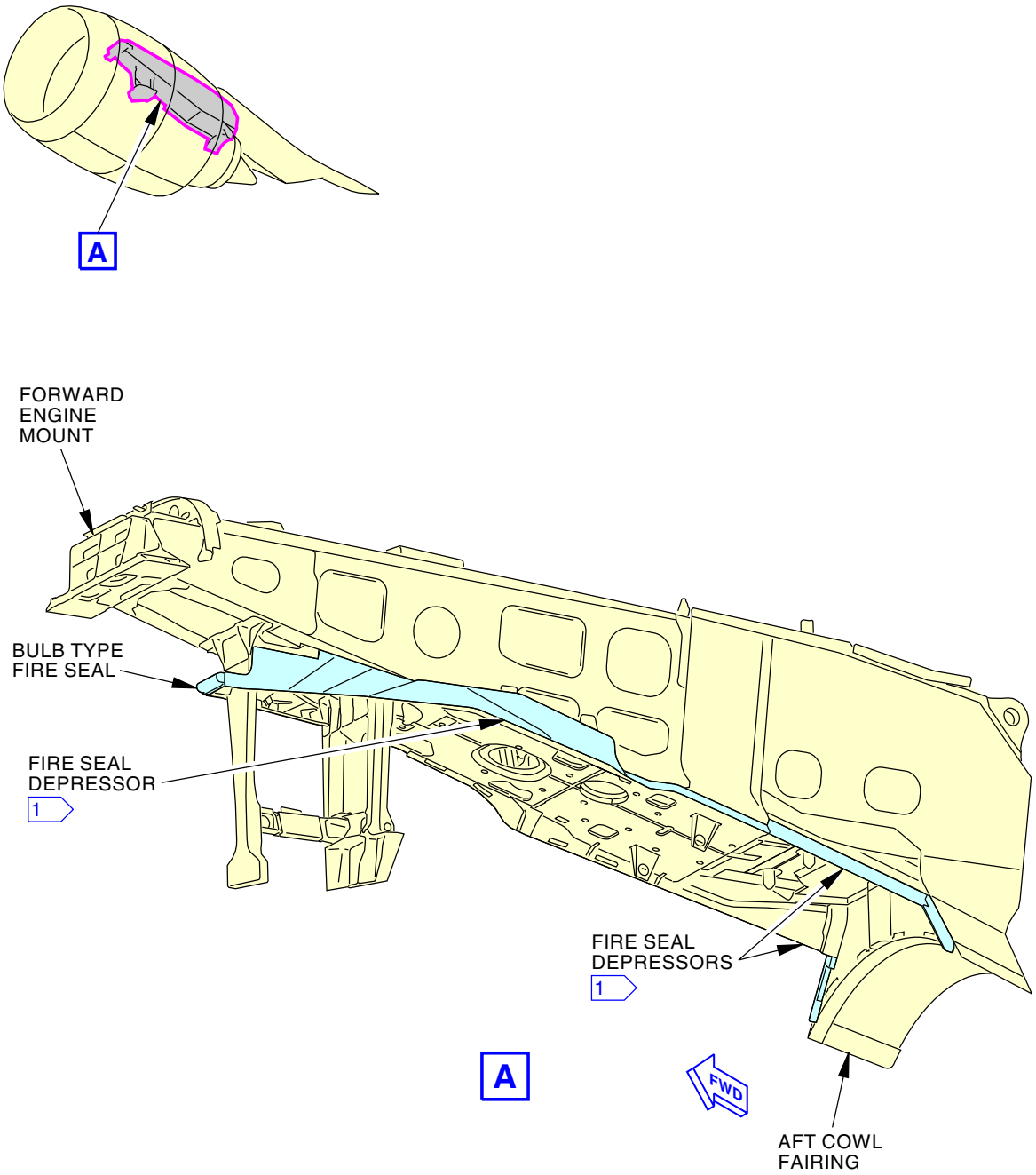
MEASURE THE GAP AT THE SMALLEST GAP AND THE LARGEST GAP ALONG THE SPLITLINE.

1. 0.0100-0.2000 INCH (0.2540-5.0800 mm)
2. 0.0600-0.2100 INCH (1.5240-5.3340 mm)
3. 0.0100-0.1600 INCH (0.2540-4.0640 mm)

M07305 S0004286277_V6

Latch Beam Fairing and Aft Cowl Splitline Gaps
Figure 602/78-31-01-990-847-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

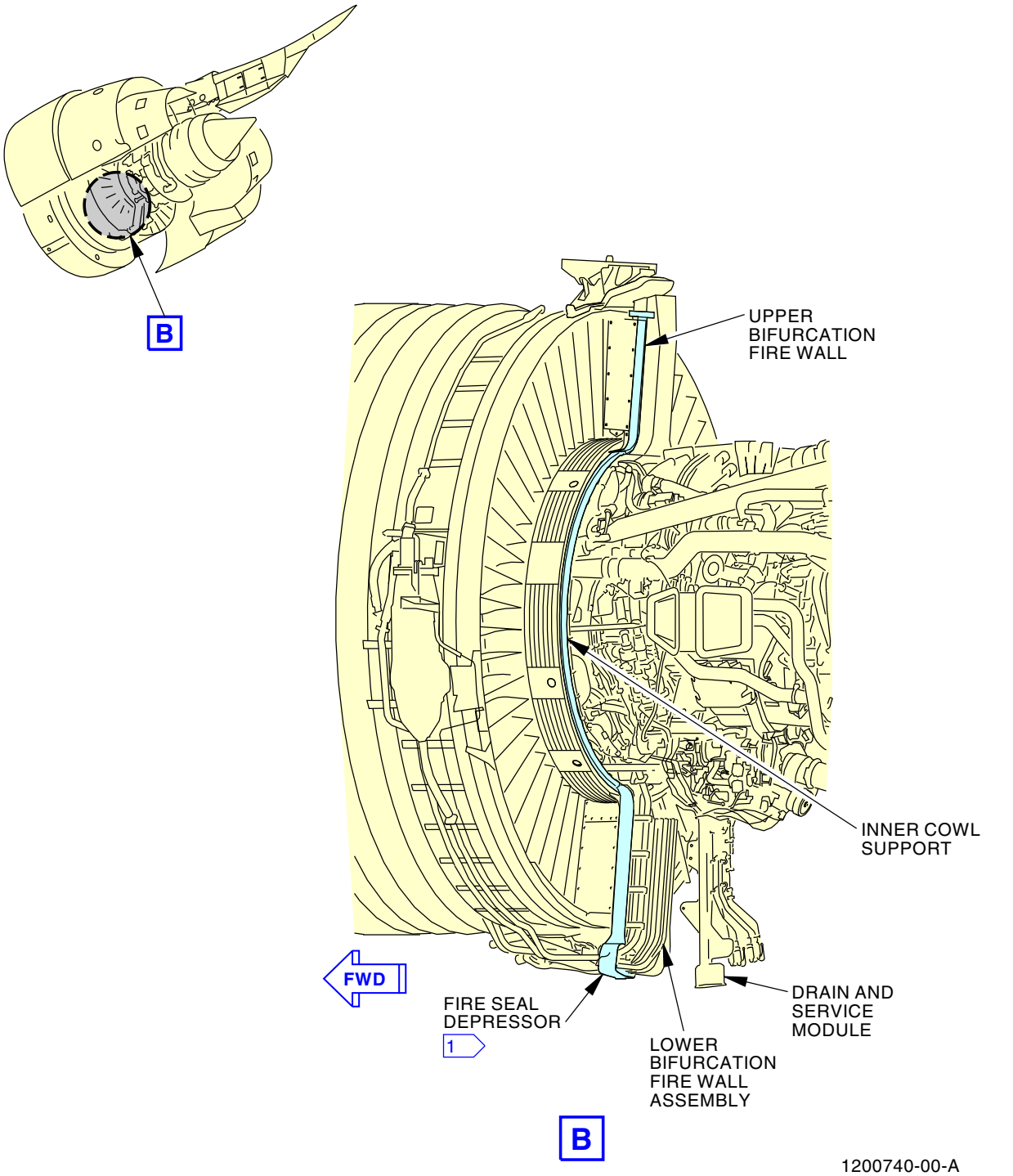


1 APPLY DEVELOPER TO THE DEPRESSOR FOR FIRE SEAL CHECK

N56091 S0000108513_V2

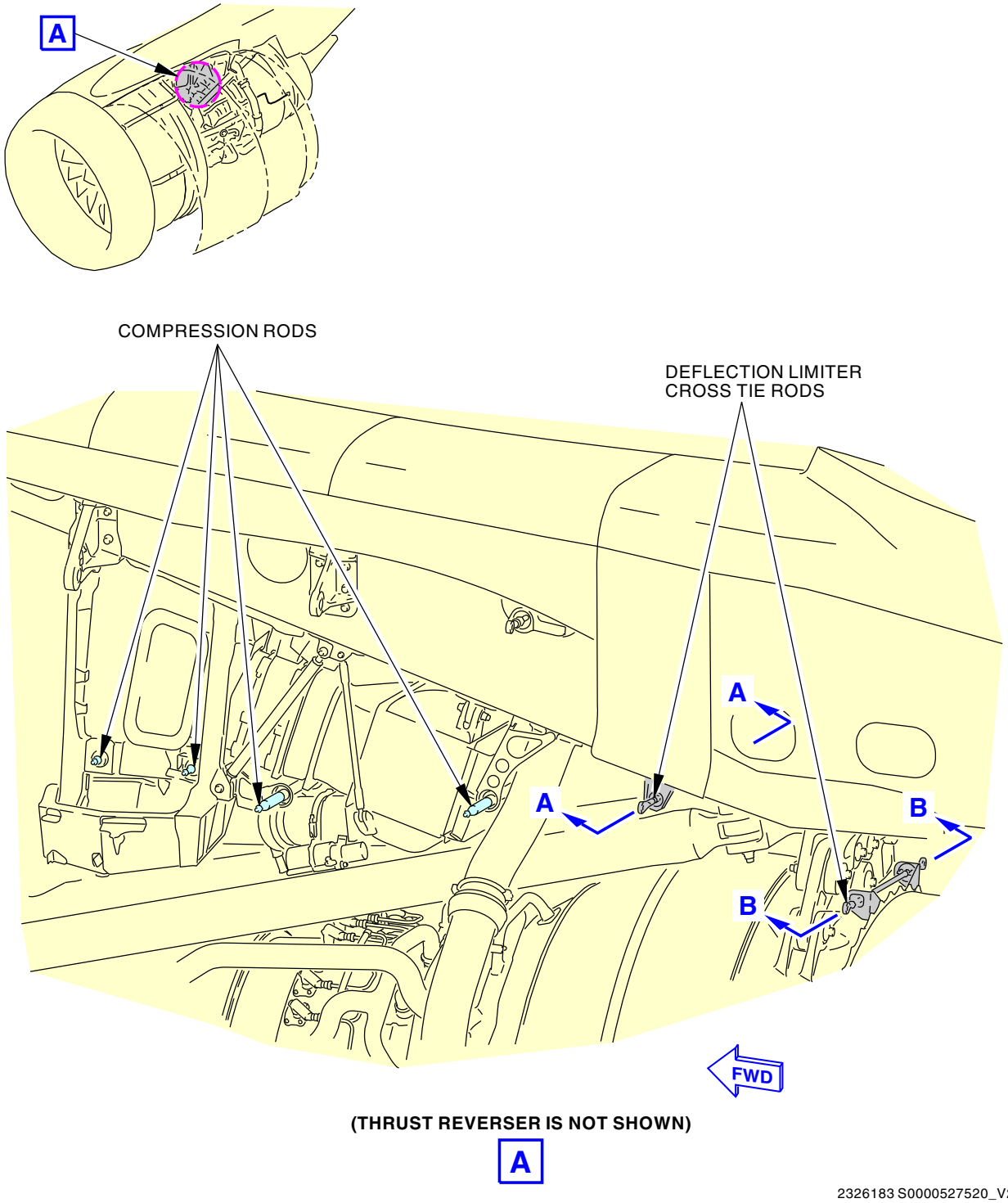
Engine and Strut Fire Seal Depressor
Figure 603/78-31-01-990-848-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



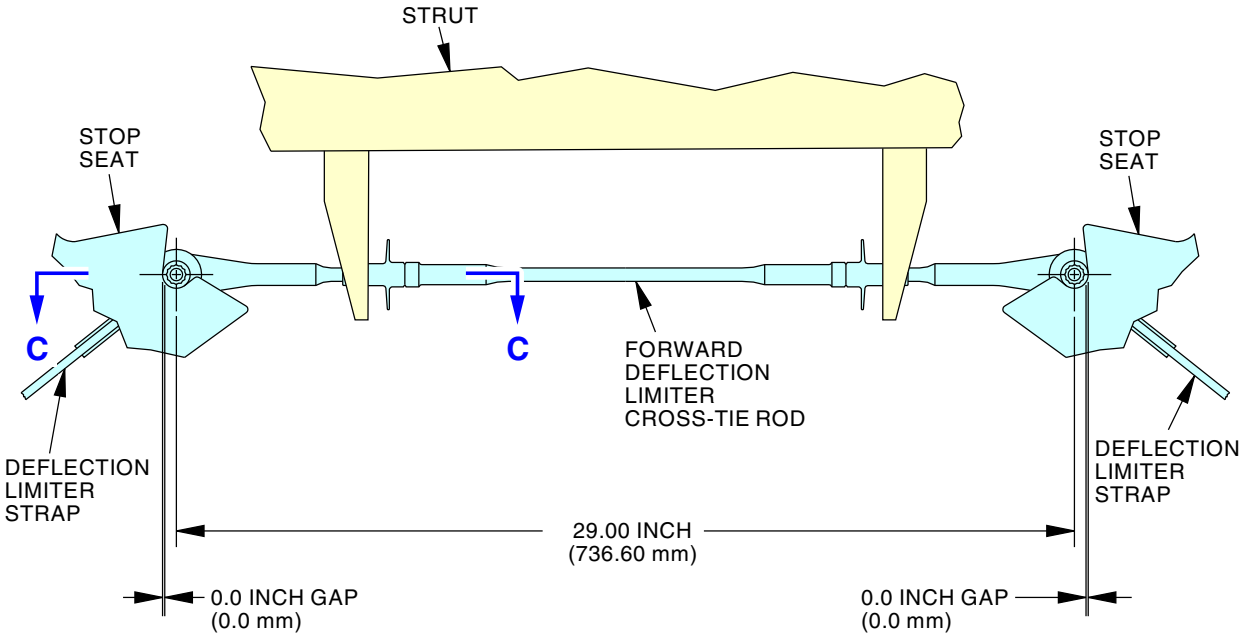
Engine and Strut Fire Seal Depressor
Figure 603/78-31-01-990-848-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

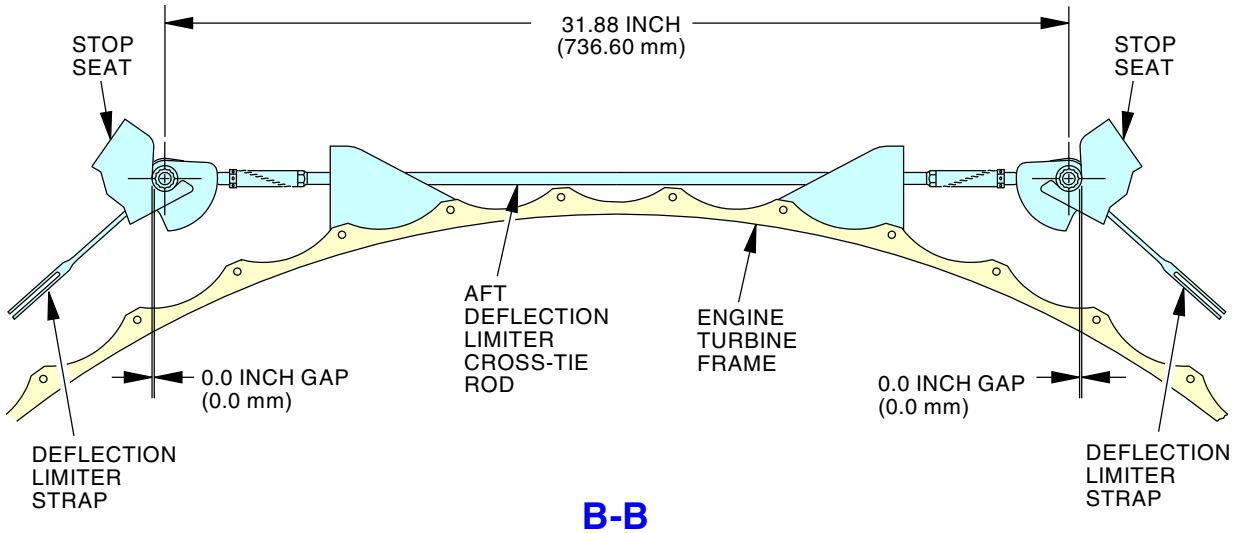


Thrust Reverser Compression and Deflection Limiter Rods
Figure 604/78-31-01-990-849-H00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



A-A

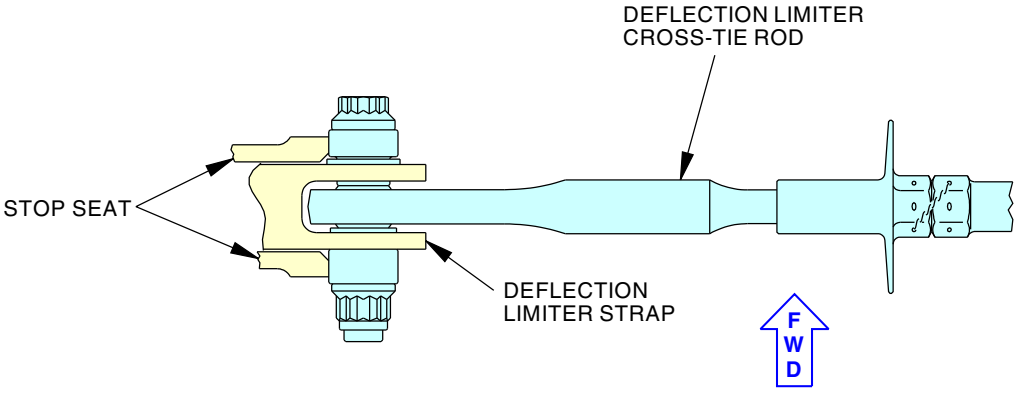


B-B

2326010 S0000527521_V3

Thrust Reverser Compression and Deflection Limiter Rods
Figure 604/78-31-01-990-849-H00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



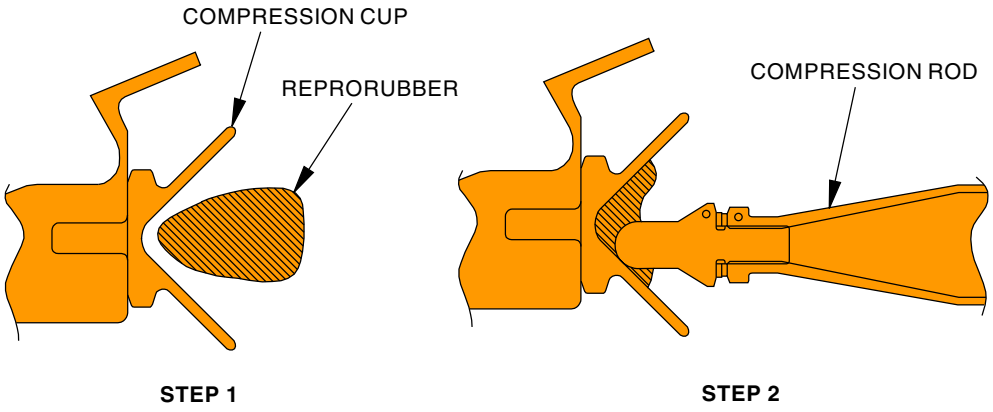
(TYPICAL)

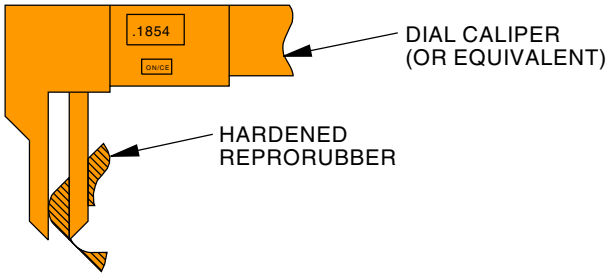
C-C

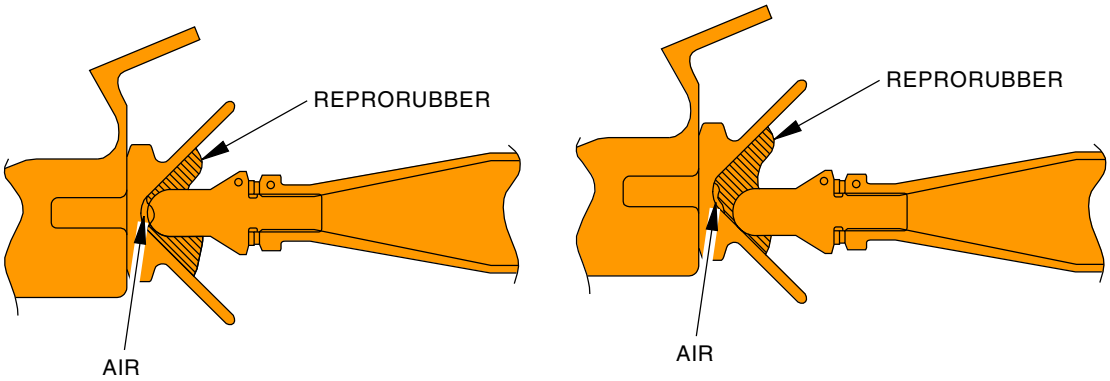
2326205 S0000527522_V2

Thrust Reverser Compression and Deflection Limiter Rods
Figure 604/78-31-01-990-849-H00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





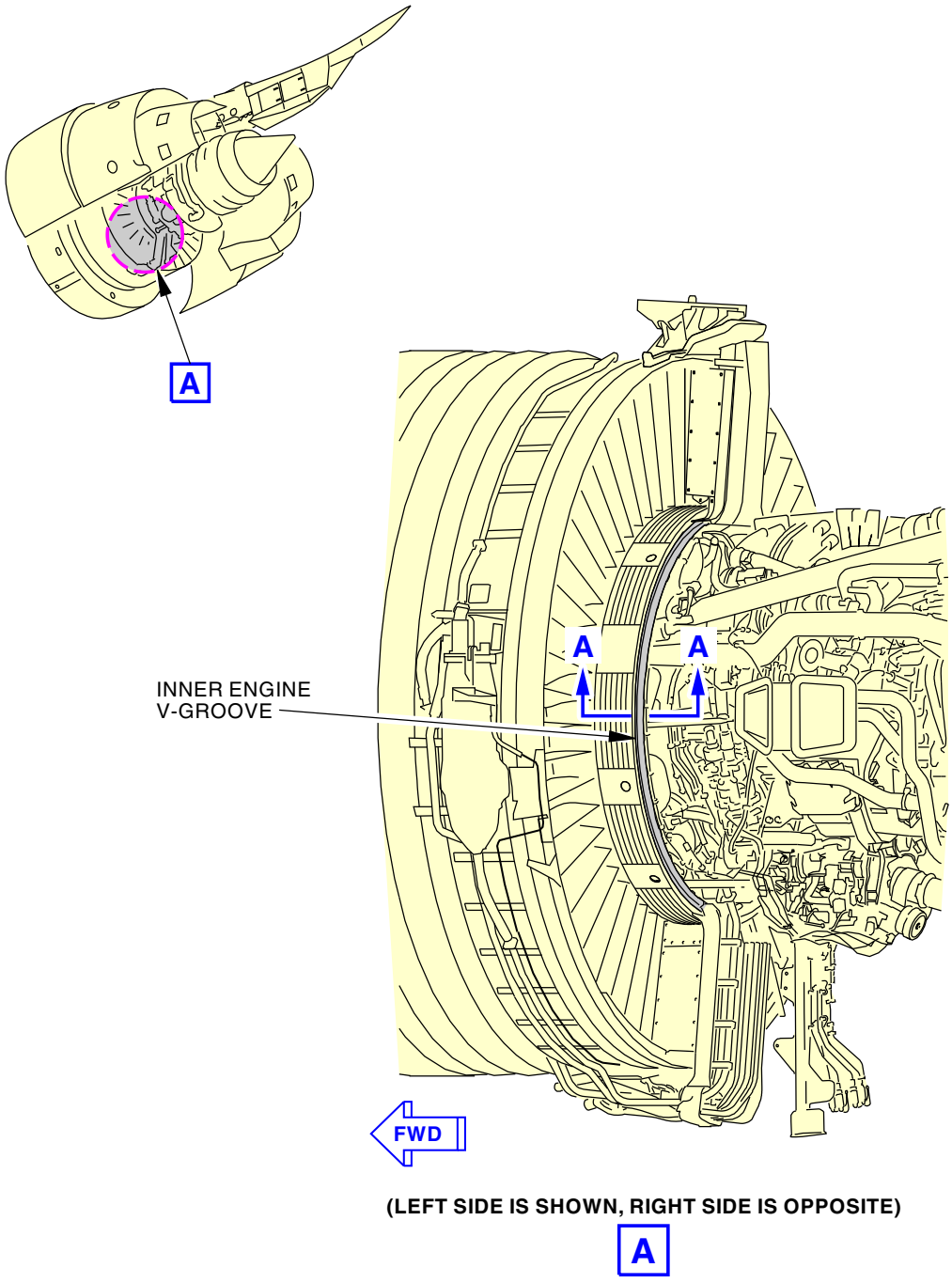


D

2326243 S0000527523_V2

Thrust Reverser Compression and Deflection Limiter Rods
Figure 604/78-31-01-990-849-H00 (Sheet 4 of 4)

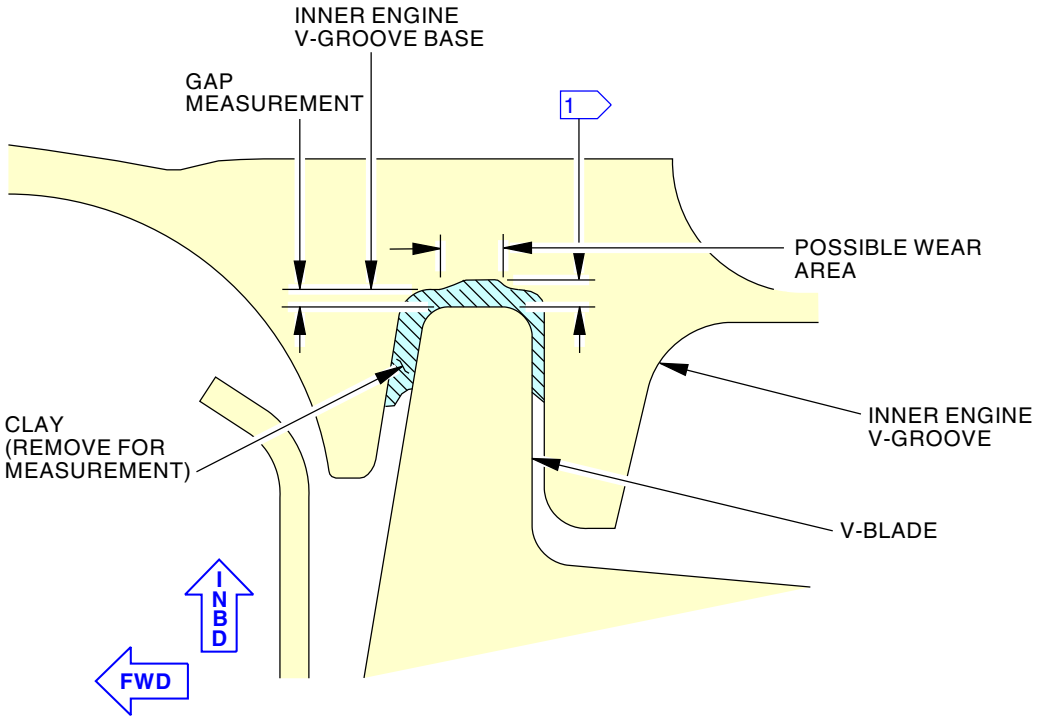
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2232474 S0000497868_V2

Inner V-Groove Gaps
Figure 605/78-31-01-990-841-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



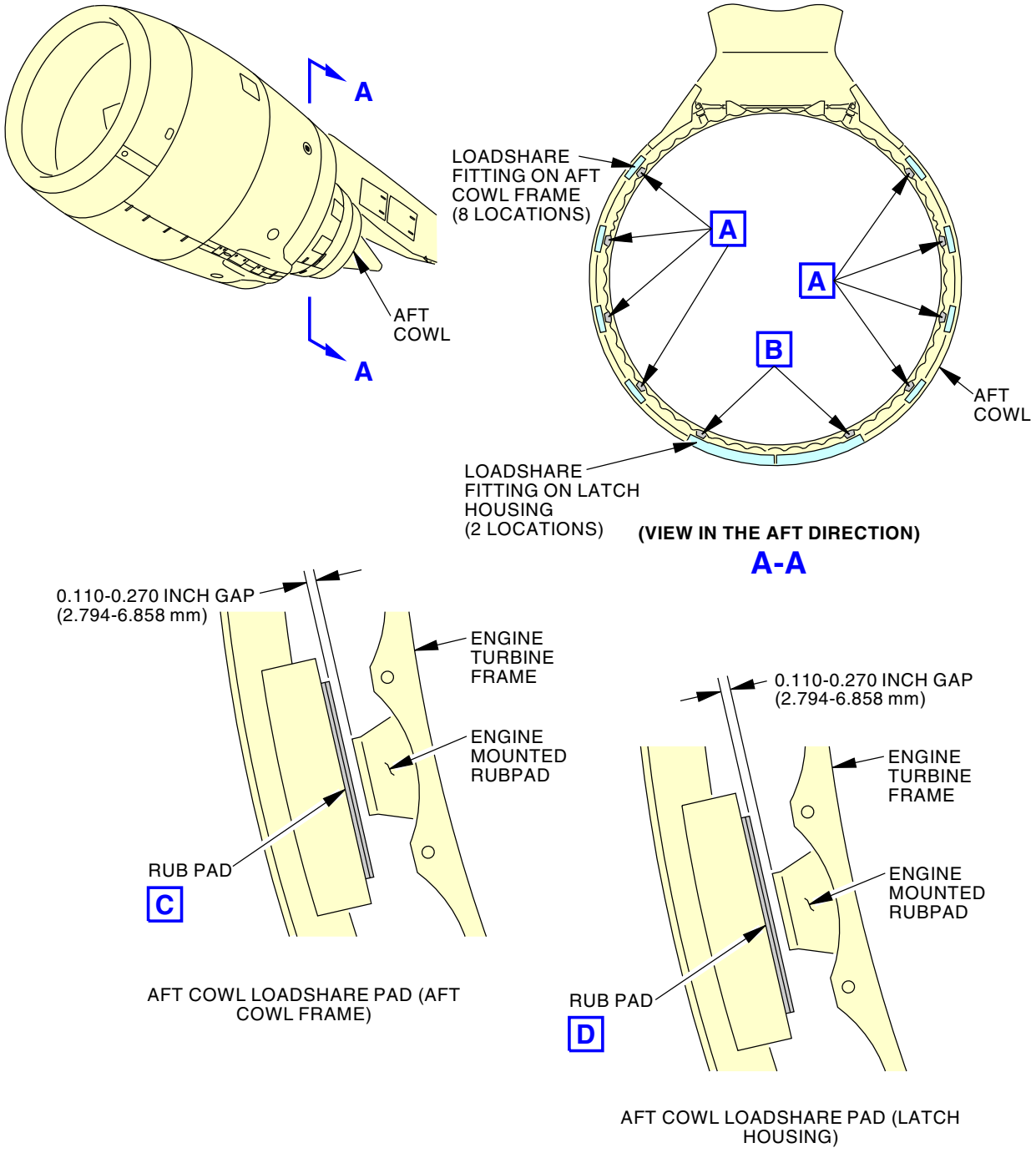
A-A

1 DO NOT MEASURE TO WEAR DEPTH.

2232477 S0000497869_V3

Inner V-Groove Gaps
Figure 605/78-31-01-990-841-H01 (Sheet 2 of 2)

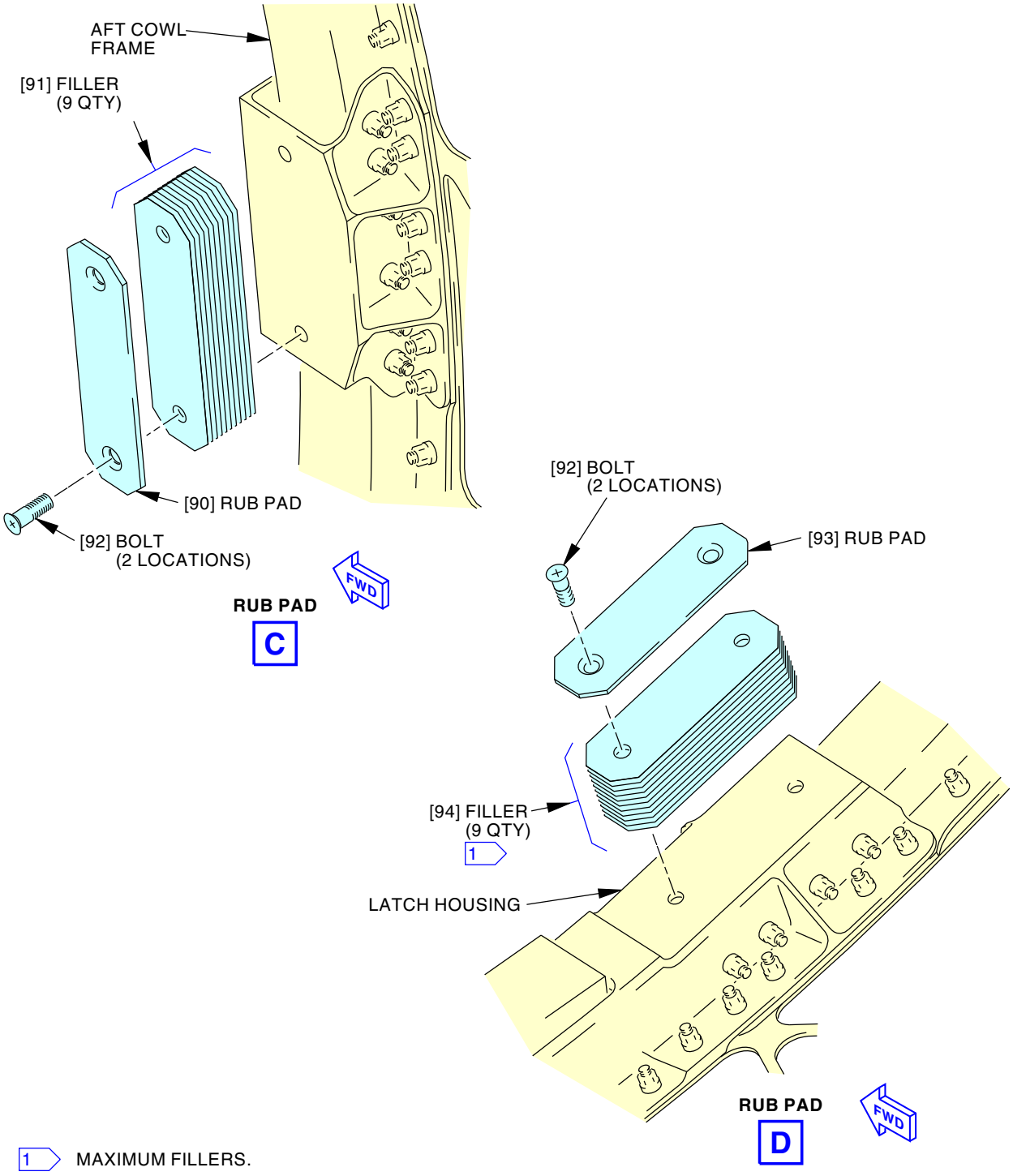
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2326270 S0000527524_V2

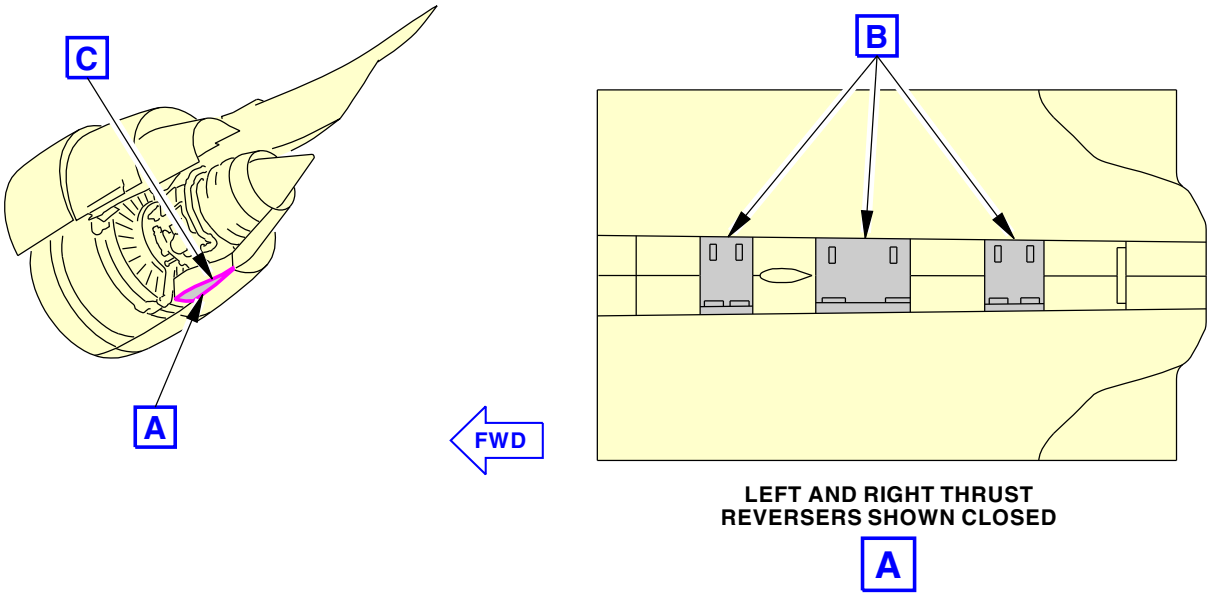
Aft Cowl Loadshare Pads
Figure 606/78-31-01-990-850-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



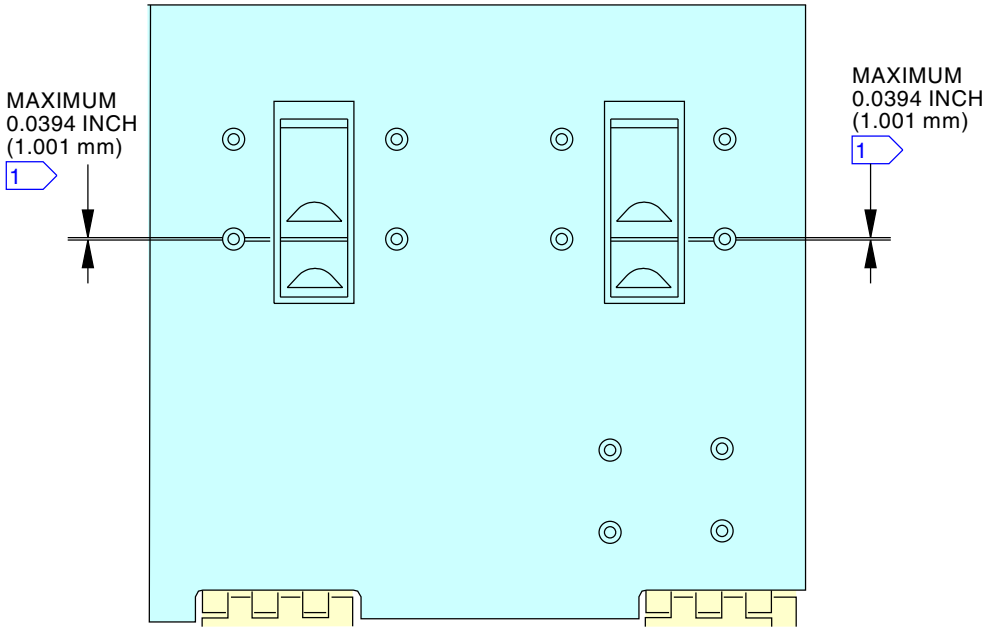
Aft Cowl Loadshare Pads
Figure 606/78-31-01-990-850-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEFT AND RIGHT THRUST
REVERSERS SHOWN CLOSED

A



LATCH ACCESS DOOR
(EXAMPLE)

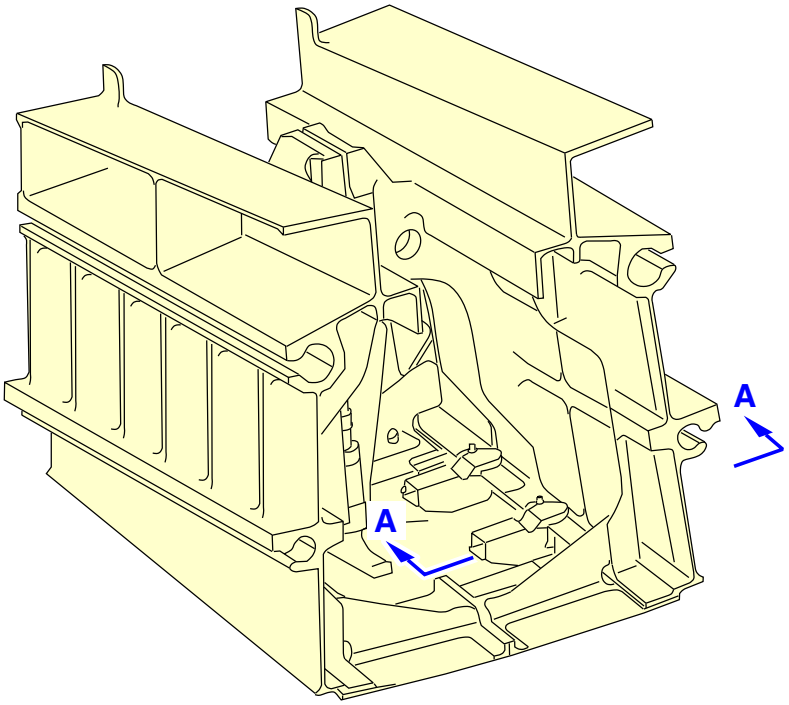
B

1 MEASUREMENT APPLIES ONLY TO DOORS WITH RECTANGULAR LATCHES.

1950049 S0000371508_V3

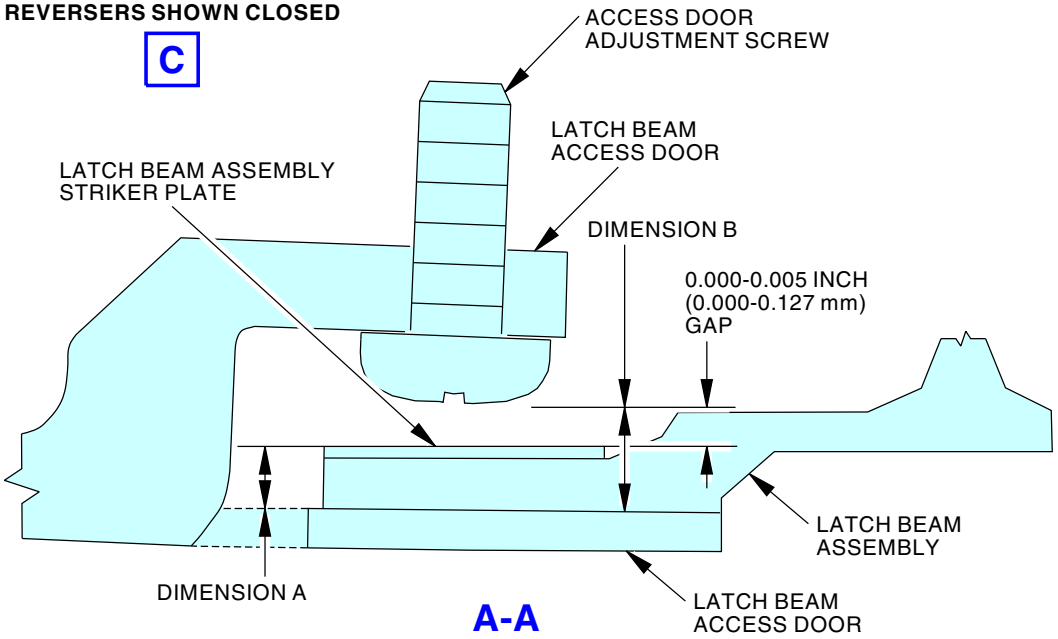
Thrust Reverser Latch Access Doors
Figure 607/78-31-01-990-851-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEFT AND RIGHT THRUST REVERSERS SHOWN CLOSED

C



A-A

NOTE:

INTERNAL GAP MEASUREMENT APPLIES ONLY TO DOORS WITH RECTANGULAR LATCHES.

1950610 S0000371509_V4

Thrust Reverser Latch Access Doors
Figure 607/78-31-01-990-851-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE A

SPLIT LINE GAPS			
LOCATION	SPECIFICATION	VALUE (FWD)	VALUE (AFT)
CENTERLINE (FL 1)	0.010–0.200 INCH (0.254–5.080 mm)		
DOOR TO LATCH BEAM FAIRING (FL 2)	0.060–0.210 INCH (1.524–5.334 mm)		
AFT COWL (FL 3)	0.010–0.160 INCH (0.254–4.064 mm)		N/A

DATA TABLE B

LATCH PAD GAPS		
LOCATION		VALUE
CENTERLINE LATCH 1	TOP PAD	
	BOTTOM PAD	
CENTERLINE LATCH 2	FWD PAD	
	AFT PAD	
CENTERLINE LATCH 3	FWD PAD	
	AFT PAD	
CENTERLINE LATCH 4	FWD PAD	
	AFT PAD	
CENTERLINE LATCH 5	FWD PAD	
	AFT PAD	
AFT–COWL LATCH 1	FWD PAD	
	AFT PAD	
AFT–COWL LATCH 2	FWD PAD	
	AFT PAD	
AFT–COWL LATCH 3	FWD PAD	
	AFT PAD	

2427202 S0000561360_V2

Data Tables
Figure 608/78-31-01-990-853-H00 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE C

V-GROOVE TO V-BLADE GAP			
LEFT T/R	VALUE	RIGHT T/R	VALUE
LOCATION 1 (TOP)		LOCATION 1 (TOP)	
LOCATION 2		LOCATION 2	
LOCATION 3		LOCATION 3	
LOCATION 4		LOCATION 4	
LOCATION 5		LOCATION 5	
LOCATION 6		LOCATION 6	
LOCATION 7 (BOTTOM)		LOCATION 7 (BOTTOM)	
AVERAGE: ADD 1-7 THEN DIVIDE BY 7 (0.100 MAX)		AVERAGE: ADD 1-7 THEN DIVIDE BY 7 (0.100 MAX)	

DATA TABLE D

DEFLECTION LIMITER TIE ROD STOP SEAT GAPS		
LOCATION	SPECIFICATION	VALUE
FWD TIE ROD	0.00 INCH	
AFT TIE ROD	0.00 INCH	

2427218 S0000561361_V2

Data Tables
Figure 608/78-31-01-990-853-H00 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE E

COMPRESSION CUP - ROD END GAPS				
COMPRESSION ROD	#1 (FWD)	#2	#3	#4 (AFT)
MEASURED GAP (REPRORUBBER OR CLAY THICKNESS)				
GAP LIMITS	0.020-0.050 INCH (0.508-1.270 mm)	0.020-0.050 INCH (0.508-1.270 mm)	0.090-0.120 INCH (2.286-3.048 mm)	0.120-0.150 INCH (3.048-3.810 mm)

DATA TABLE F

COMPRESSION PAD GAPS				
COMPRESSION PAD	#1 (FWD)	#2	#3	#4 (AFT)
MEASURED GAP (CLAY THICKNESS)				
GAP LIMITS	0.060-0.100 INCH (1.524-2.540 mm)	0.060-0.100 INCH (1.524-2.540 mm)	0.060-0.100 INCH (1.524-2.540 mm)	0.060-0.100 INCH (1.524-2.540 mm)

2460704 S0000573378_V2

Data Tables
Figure 608/78-31-01-990-853-H00 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE G

AFT LOAD SHARE GAP	
LEFT T/R	VALUE
LOCATION 1 (TOP)	
LOCATION 2	
LOCATION 3	
LOCATION 4	
LOCATION 5 (BOTTOM)	
RIGHT T/R	VALUE
LOCATION 1 (TOP)	
LOCATION 2	
LOCATION 3	
LOCATION 4	
LOCATION 5 (BOTTOM)	
AVERAGE: ADD ALL 10 LOCATIONS THEN DIVIDE BY 10 (0.110 - 0.270 INCH)	

DATA TABLE H

SERRATED FITTING OVERHANG	
#1 COMPRESSION PAD GAP [1] (CLAY THICKNESS)	
SUBTRACT NOMINAL GAP	-0.440 INCH (11.180 mm)
MINIMUM FITTING OVERHANG DIMENSION	

DATA TABLE I

T-HOOK GAP	
T-HOOK GAP (CLAY THICKNESS)	
SUBTRACT NOMINAL GAP	-0.165 INCH (4.191 mm)
REQUIRED TOTAL SPACER THICKNESS	
FINAL GAP SPECIFICATION (WITH SPACERS INSTALLED)	0.155 - 0.175 INCH (3.937 - 4.445 mm)

2427447 S0000561362_V4

Data Tables
Figure 608/78-31-01-990-853-H00 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

DATA TABLE J

FIRE SEAL	
LOCATION	CONFORMS (Y/N)
LOWER BIFURCATION SEALS AT FWD LATCH ACCESS DOOR (INBOARD AND OUTBOARD)	
FORWARD AND CENTER LATCH ACCESS DOOR FAYING SURFACE	
ENGINE SEAL DEPRESSOR AT LOWER BIFURCATION (INBOARD AND OUTBOARD)	
STRUT MOUNTED SEAL DEPRESSOR AT UPPER BIFURCATION	
ENGINE INNER COWL SUPPORT	

DATA TABLE K

LATCH TENSION		
LOCATION	SPECIFICATION	VALUE
V-BAND	50 - 55 LBS	
CENTERLINE LATCH #1	45 - 55 LBS	
CENTERLINE LATCH #2	45 - 55 LBS	
CENTERLINE LATCH #3	45 - 55 LBS	
CENTERLINE LATCH #4	45 - 55 LBS	
CENTERLINE LATCH #5	45 - 55 LBS	
AFT COWL LATCH #6	45 - 55 LBS	
AFT COWL LATCH #7	45 - 55 LBS	
AFT COWL LATCH #8	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (FWD LEFT)	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (FWD RIGHT)	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (AFT LEFT)	45 - 55 LBS	
AFT COWL DEFLECTION LIMITER LATCH (AFT RIGHT)	45 - 55 LBS	

2427452 S0000561363_V3

Data Tables
Figure 608/78-31-01-990-853-H00 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER - REPAIRS

1. General

A. This procedure includes these tasks:

(1) Temporary repair procedures for the metal faced thermal insulation blanket.

(2) A permanent repair procedure for the metal faced thermal insulation blanket.

(3) A click-bond stud replacement.

(4) Enamel paint touch-up procedure for cracks in the paint on the thrust reverser cowl.

TASK 78-31-01-300-823-H00

2. Temporary Repair of the Thrust Reverser Metal-Faced Thermal Insulation Blankets

A. General

(1) This task gives the instructions for a temporary repair of the metal faced (CRES) thermal insulation blanket.

(a) The thermal insulation blanket can remain installed while you do this temporary repair procedure with the thrust reverser in the opened position for the hot side of the blanket.

(2) These blankets are a thermal insulation and fire barrier layer which is necessary to keep the thrust reverser structurally serviceable and can decrease the damage and repair costs from a duct burst or a fire.

(3) The function of the CRES face sheets is to prevent fluid contamination of the blanket insulation and to provide a fire barrier.

(4) The function of the polyimide sheets on the cold side is to prevent fluid contamination of the blanket insulation.

(5) The thermal performance of the insulation blanket will be reduced by up to 35% if the insulation is exposed to fluid (water, engine oil, hydraulic fluid). The performance is reduced by 35% even after the insulation dries after exposure to fluid. It is therefore very important to examine the blanket for fluid penetration the damaged areas where the CRES foil has been compromised.

(6) Clean surfaces are required to get the high strength bonds to hold the adhesive and patch to the blanket. All unwanted materials such as oils, greases, waxes or dirt must be removed.

(7) The materials in the consumable materials list are used for factory production of the blanket assemblies. Small quantities of these materials from the material suppliers may not be available for a field repair. Substitution of other materials that are not on this consumable material list is not permitted because the substitution of materials could affect the performance of the insulation blanket.

(a) Refer to the supplier for the consumable materials, in the smaller quantities that are necessary, for a field or component repair.

1) Hi-Temp Insulation Inc, 4700 Calle Alto, Camarillo, California 93012, USA.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-418	Gloves
STD-809	Spatula
STD-810	Spatula - Fillet Smoothing, Hardwood or Plastic

D. Consumable Materials

Reference	Description	Specification
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
C00954	Primer - Adhesive Bonding - SS4004P RTV	BAC5010 PSD 6-168 Type 74
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01306	Gloves - Lint-free	
G50111	Insulation - Microporous Core Quilted Between High Temperature Cloth, 16 PCF - Flexible Min-K F182-16	
G50117	Sheet - 301 series, CRES, 0.018 - 0.025 inch Thick	AMS5517, AMS5518, AMS5902, AMS5519

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Damage Limits for the Temporary Repair

SUBTASK 78-31-01-800-001-H01

(1) If the damage to the insulation blanket is within these damage limits, you can do a temporary repair.

NOTE: Damage is defined as any penetration through the metal face sheet. Scratches and dents are not considered damage which require repair.

(a) Damage to the inner metal sheet or hot side is less than 2 square inches (1290 square mm).

(b) A tear in the inner metal sheet or hot side is shorter than 3 inches (76 mm).

(c) The damaged area is more than 0.5 inch (12.7 mm) from a grommet, sharp bend or edge in the blanket.

(d) Around each damaged area in all directions, there is at least 0.5 inch (12.7 mm) of undamaged blanket.

(e) A maximum of two damage locations on each thrust reverser blanket; the damaged areas must be separated by more than 6.0 inches (152 mm).

(2) A temporary repair must be replaced within 500 hours with a permanent repair.

H. Prepare for the Temporary Repair

SUBTASK 78-31-01-010-022-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

I. Temporary Repair of the Inner Metal Sheet on the Hot Side of the Thermal Insulation Blanket

SUBTASK 78-31-01-220-001-H01

(1) Make sure the damaged area of the blanket is within the given damage limits above.

SUBTASK 78-31-01-350-001-H01

(2) Repair the damaged area of the inner metal sheet on the hot side of the blanket.

WARNING MAKE SURE YOU USE PROTECTIVE CLOTHING ON THE HAND AND ARM. THIS WILL PREVENT INJURY TO PERSONS.

WARNING DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

(a) Remove the sharp edges from the metal sheet and the loose insulation material from the damaged area.

(b) Remove a minimum of four installation fasteners and washers on the nearest insulation blanket.

1) Keep the installation fasteners and washers for the installation.

(c) View the damaged area and find the size of repair patch required.

1) The repair patch must extend a minimum of 1.0 inch (25.4 mm) beyond the fasteners and in all directions around the damaged area by a minimum of 2.0 inch (50.8 mm).

2) Make a pattern for the repair patch with any clean paper.

NOTE: A paper pattern is used to find the size of the patch if the patch must cover a contoured surface.

3) Dry fit the paper pattern over the damaged area to make sure the repair patch is the correct size and will cover the damaged area.

(d) Use the paper pattern to cut a repair patch from a 0.018-0.025 inch (0.457-0.635 mm) thick CRES sheet, G50117 that will overlap the surface repair area.

1) Deburr the edges of the CRES sheet.

2) Radius the corners of the CRES sheet a minimum of 0.12 inch (3.05 mm).

(e) Dry fit the CRES patch at the repair location.

1) Make a mark of the locations of the fastener holes on the patch.

2) Shape the CRES sheet to match the inside contour of the blanket within 0.030 inch (0.762 mm).

(f) Drill 0.345-0.405 inch (8.8-10.3 mm) diameter holes (0.375 inch (9.525 mm) nominal) through the patch at the same locations as the fastener locations.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(g) Clean the CRES patch.

1) Clean the patch with a clean cotton wiper, G00034 moist with solvent, B00062.

2) Wipe the patch with a dry, clean cloth before the solvent evaporates.

(h) Make sure the cleaned repair patch is kept clean.

NOTE: Apply primer to the cleaned surface within four hours.

1) Use clean lint-free gloves, G01306 when you handle the cleaned repair patch.

(i) Use a clean cotton wiper, G00034 to apply a thin layer of SS4004P RTV primer, C00954 to the cleaned repair patch.

1) Let the primer become dry for a minimum of 30 minutes at 65-100 degrees F (18.3-37.8 degrees C).

NOTE: Do not exceed 72 hours to allow the primer to dry.

(j) Make sure the primed patch is kept clean.

1) Use clean, lint-free gloves, STD-418 when you handle the primed repair patch.

(k) Prepare the adhesive.

1) If you use the RTV 106 adhesive, A00081 for the repair, this is a one-part silicon adhesive/sealant which is supplied ready to use.

NOTE: The maximum thickness for one application of RTV106 is 0.125 inch (3.18 mm) and then the adhesive is allowed to completely cure before a second application. If RTV106 is applied to a thickness of 0.25 inch (6.35 millimeters) in one application, the outside surface of the RTV 106 forms a thick skin and the inside core of the RTV106 will not cure correctly.

NOTE: The RTV 106 sealant has a short work life. Exposure to the air for more than a few minutes will cause a skin to form which will prevent adhesion on the surfaces.

2) If you use the firewall sealant, A00160 for the repair, use the manufacturers instructions to mix the two-part sealant.

NOTE: After the firewall sealant is mixed, there is a limited application time. BMS5-63, B-1/2, Type II application time is 0.50 hours. Firewall sealant BMS5-63, B-4, Type II application time is 4 hours. Do not use the sealant if it has exceeded the application time.

WARNING DO NOT BREATHE THE DUST FROM THE INSULATION MATERIAL. PUT ON A DUST MASK. INJURIES TO PERSONS CAN OCCUR.

(l) Replace the damaged, contaminated or wet insulation material.

1) Carefully cut the damaged or wet insulation material from the damaged area.

2) Make sure you do not cut the polymide sheet on the outside surface of the blanket (cold side).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Cut a new replacement piece of insulation material, Flexible Min-K F182-16 insulation, G50111, that will fit the area where the damaged insulation material was removed.

NOTE: The replacement insulation material must have the same density and thickness as the insulation that was removed.

4) Install the replacement insulation material with RTV 106 adhesive, A00081 or firewall sealant, A00160.

a) Seal the edges and insulation material around the damaged area of the blanket with RTV 106 adhesive, A00081 or firewall sealant, A00160.

b) Seal the edges of the replacement insulation material with RTV 106 adhesive, A00081 or firewall sealant, A00160.

c) Apply RTV 106 adhesive, A00081 or firewall sealant, A00160 to seal the blanket insulation.

d) Make sure there are no gaps between the replacement insulation material and the insulation in the blanket.

e) Fill all gaps with adhesive.

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

CAUTION DO NOT LET THE SOLVENT AND OTHER FLUIDS TOUCH THE INSULATION MATERIAL. THE SOLVENT AND OTHER FLUIDS WILL DECREASE THE PERFORMANCE AND MATERIAL PROPERTIES OF THE INSULATION MATERIAL.

(m) Clean the damaged area plus a minimum of 0.5 inch (12.7 mm) in all directions around the damaged area.

1) Clean the damaged area with a clean cotton wiper, G00034 moist with solvent, B00062.

2) Continue to clean the surface again with a new, clean cotton wiper, G00034 moist with solvent, B00062 until no contamination is seen on the cloth.

3) Wipe the repair area with a dry, clean cloth before the solvent evaporates.

(n) Make sure the cleaned repair surface and the patch are kept clean.

NOTE: Apply primer to the cleaned surface within four hours.

1) Use clean lint-free gloves, G01306 when you handle the cleaned repair surface or the patch.

(o) Use a clean cotton wiper, G00034 to apply a thin layer of SS4004P RTV primer, C00954 to the cleaned repair surface and the patch.

1) Let the primer become dry for a minimum of 30 minutes at 65-100 degrees F (18.3-37.8 degrees C).

NOTE: Do not exceed 72 hours to allow the primer to dry.

(p) Make sure the primed repair surface and the patch are kept clean.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Use clean, lint-free gloves, STD-418 when you handle the primed repair surface or the patch.

(q) Apply RTV 106 adhesive, A00081 or firewall sealant, A00160 to the primed repair surface of the inner metal sheet.

1) Use a hardwood or plastic fillet smoothing spatula, STD-810 or spatula, STD-809 to apply a layer of adhesive or sealant.

2) Make sure the adhesive is a maximum of 0.125 inch (3.18 mm) thick and extends in all directions from the damaged area a minimum of 0.5 inch (13 mm).

3) Make sure the adhesive is smooth.

4) Make sure the CRES patch is installed immediately after the adhesive or sealant is applied.

NOTE: Immediately after the adhesive is applied, the adhesive will begin to cure and within a few minutes, form a skin on the surface of the adhesive. The patch will not adhere properly if a skin has formed on the adhesive.

CAUTION

DO NOT APPLY TOO MUCH PRESSURE WHEN YOU APPLY THE PATCH TO THE REPAIR AREA. THE ADHESIVE WILL COME OUT FROM BELOW THE PATCH.

(r) Position and apply the CRES patch over the repair area.

1) Install the fasteners and washers.

2) Apply light pressure to the patch as the adhesive dries.

3) Remove all extra adhesive from the edges with a clean cotton wiper, G00034 or cloth.

(s) Let the sealant or adhesive cure.

1) Adhesive RTV 106 will cure in a minimum of 24 hours at a minimum temperature of 65 degrees F (18.3 degrees C).

NOTE: The adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. The smell of acetic acid will be present until the adhesive has cured.

2) Firewall sealant BMS5-63 cure time depends on the type used.

NOTE: Firewall sealant BMS5-63, B-1/2, Type II cures in 4 hours. Firewall sealant BMS5-63, B-4, Type II cures in 48 hours. Lower temperatures or lower relative humidity will increase cure time. Higher temperatures or higher relative humidity will decrease cure time. As an example, at 50 percent relative humidity, cure time is decreased by 50 percent for every 20 degree F increase in temperature. At 75 degrees F, cure time is decreased by 50 percent for every 15 percent increase in relative humidity.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

J. Put the Airplane Back to the Usual Condition

SUBTASK 78-31-01-410-019-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 78-31-01-300-824-H00

3. Permanent Repair of the Thrust Reverser Metal-faced Thermal Insulation Blankets

A. General

(1) This task gives the instructions for the permanent repair for the inner metal sheets of the thermal insulation blankets:

(a) The thermal insulation blanket must be removed from the airplane to do this permanent repair.

(2) These are the repair topics.

(a) Permanent Weld Repair of the Outer Metal Sheet on the Thermal Insulation Blanket

1) Overlap Spot Weld CRES Repair

2) Seam Weld the CRES Repair

3) Weld the Patch

(b) Cold Side Edge Delamination Repair

(c) Cold Side Repair of Rips, Holes, and Tears

(d) Puncture Repair Through the Blanket

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Spacer Replacement

(f) Midsupport Replacement

(g) Weldscrew Replacement

(h) Edge Repair of the CRES Foil

(i) Insulation Repair for Superficial Cuts

(j) Make an Insulation.Repair Plug

(k) Application of Cold Side Film Adhesive

(l) Cure the Hot Side or Cold Side Adhesive

(3) These blankets are a thermal insulation and fire barrier layer which is necessary to keep the thrust reverser structurally serviceable and can decrease the damage and repair costs from a duct burst or a fire. The thermal insulation in the blanket protects the thrust reverser inner wall composite structure from the heat from the engine during normal operation and during a fire.

(4) The metal-faced thermal insulation blanket is made of these components; a textured, hot side, corrosion resistant steel (CRES) skin over a glass cloth that is stitched around the thermal insulation of different densities and thicknesses and a cold side polyimide film. The CRES metal face sheets on the hot side of the blankets is the fire barrier and also the moisture barrier for the blanket. The polyimide sheet on the cold side of the blanket is a moisture barrier. The moisture barrier prevents the contamination of the insulation from moisture or fluid which can make the insulation become less effective.

(5) An operator reported damage to several thermal insulation blankets from a missing borescope inspection plug on another engine model. The damaged blankets had missing material and could not be repaired. The hot compressor air caused heat damage to the thrust reverser inner wall composite structure. A visual and tap test structural inspection for delamination of the composite inner wall was necessary.

(6) Some of the blankets are very large and must be lifted and handled carefully. Support must be given at the edge of the blankets. The weight of the blanket can bend, twist or break the blanket.

(7) The blanket must be removed to do the repair. Some repairs may require the original forming or oven lay-up molds to do the repair. In this event the blanket should be returned to the blanket manufacturer for repair.

(8) Consumable Materials Storage

(a) These materials are time and temperature sensitive; follow the manufacturers recommendations for storage requirements from time of receipt to time of use.

1) The materials are: AF-15, FM-57, FM-57MB, FM-67, FM-67MB, RTV106, SS 4004.

(b) Let the film adhesives AF-15, FM-57, FM-57MB, FM-67, and FM-67MB come to room temperature before you use them. Do not remove the outer cover until condensation is no longer on the outer cover.

(c) Adhesives have a shelf life. Do not use the adhesives if the shelf life is exceeded.

(d) Film adhesives must be stored on a rack to prevent distortion when the adhesive is not in a freezer.

(9) Repair Facilities Control

(a) Repairs must be done in an area away from operations or processes that have or make a spray, dust, fumes or any particulate material.

(b) Protection of lubricated equipment in the repair area is necessary.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Do not use hand creams, parting agents, waxes or any other uncured silicones in the repair area.

(d) Equipment used for the control or measurement of temperature shall be calibrated.

(10) Special Tools and Equipment

(a) Vacuum systems capable of maintaining a minimum of 20 inches of Hg for the entire adhesive cure process

(b) Oven or heat blanket capable of 340-380 degrees F (177-204 degrees C) for the entire adhesive cure process

(c) Vacuum bag capable of 400 degrees F (204 degrees C)

(d) Perforated Parting Film - Fluorinated Ethylene Propylene (FEP) or Polytetrafluoroethylene (PTFE). 0.001 inch thick minimum, Open Source

(e) Solid Parting Film - FEP or PFTE, 0.001 inch thick minimum, Open Source

(f) Flash Control Tape - Permacel P421, Airtech Airkap 1, Airtech Flashbreaker No.1 or equivalent, Open Source

(g) Surface Breather - Airtech Airweave N10; Airtech Ultraweave 1332 or equivalent, Open Source

(h) Bagging Film - Airtech DP1000 or equivalent, 0.002 inch thick minimum, Open Source

(i) Bag Sealer Tape - Schnee-Morehead 5N-179-AN or equivalent, Open Source

(j) Bleeder fabric - Hawkeye No. 2222 fiberglass release fabric or equivalent, Open Source

(k) Grommet Set Dies with Arch Punch, 0.340 and 0.460 inch, full, half and quarter size, Open Source

(11) If the kit is not available, the materials in the consumable materials list are used for factory production of the blanket assemblies. Small quantities of these materials from the material suppliers may not be available for a field repair. Substitution of other materials that are not on this consumable material list is not permitted because the substitution of materials could affect the performance of the insulation blanket.

(a) Refer to the blanket supplier for new consumable materials in the smaller quantities for a field or component repair.

1) Hi-Temp Insulation Inc, 4700 Calle Alto, Camarillo, California 93012, USA..

B. References

Reference	Title
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Reference	Description
COM-4927	T/R Insulation Blanket Spot Welder Part #: 125DP Supplier: 05942 Part #: 250DP Supplier: 05942 Part #: PKGB12L Supplier: U1517 Part #: PKGPG2 Supplier: U1517 Part #: PW0186 Supplier: U1517
STD-94	Bag - Vacuum
STD-418	Gloves
STD-572	Light - White
STD-618	Oven
STD-821	Squeegee - Plastic
STD-926	Thermocouple - with up to 1000° F (538° C) Range, Compatible with HH-26J Thermometer
STD-1086	Gloves - Rubber
STD-1304	Blanket - Heat, Capable of Maintaining 350 to 400 Degrees F
STD-1306	Iron - Electric, Sealing, Capable of 250 to 350 Degrees F (121-177 Degrees C)
STD-3723	Gun - Hot Air
STD-3949	Scalpel - X-ACTO Knife
STD-6161	Magnifying Glass

D. Consumable Materials

Reference	Description	Specification
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74
A50023	Adhesive - Condensation Polyimide Film, .010 inch Thick - FM-57	
A50024	Adhesive - Nitrile-Phenolic Film, Unsupported, .003 inch Thick - Scotch-weld AF-15	
A50073	Film - Adhesive, Prebonded with polyimide film, FM-67MB	D800-10473-1
A50075	Film - Adhesive, FM-67, 0.003 inch thick (alternative to A50024)	
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00130	Alcohol - Isopropyl	TT-I-735
C00954	Primer - Adhesive Bonding - SS4004P RTV	BAC5010 PSD 6-168 Type 74
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00150	Tape - Nitto P-421 NAT (Formerly Permacel) PTFE Film Tape	
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054
G01306	Gloves - Lint-free	
G50102	Film - Polyimide, DuPont Kapton HN (2 mil Thick)	
G50103	Film, FEP or TFE Perforated Parting Film, .001 inch Thick Minimum	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description	Specification
G50104	Film, FEP or TFE Solid Parting Film, .001 inch Thick Minimum	
G50106	Tape - High Temperature, Polyester Pressure Sensitive - Flashbreaker 1	
G50107	Mat - High Temperature, Polyester, Non-Woven Breather - Airweave N-10	
G50108	Mat - High Temperature, High Pressure, Nylon, Non-Woven Breather - Ultraweave 1332	
G50109	Film, High Temperature Nylon Bagging, .002 inch Thick - DP1000	
G50111	Insulation - Microporous Core Quilted Between High Temperature Cloth, 16 PCF - Flexible Min-K F182-16	
G50112	Fabric, Glass, 57X54 YPI	
G50113	Tape - Skived Ceramic Filled PTFE, Ceramic Etched On 1 Side, .010 inch Thick - RM 827	
G50324	Thread - Saint Gobain Quartzel PTFE Coated Sewing Thread Q18	
G50325	Tape - Nitto P-212 WHT (Formerly Permacel) Glass Cloth	MIL-I-19166
G50332	Foil - Stainless Steel 321, 0.003 - 0.006 inches thick, Texturized, Diamond Patten	SAE AMS5510
G50340	Abrasive Paper - Aluminum Oxide, 400 Grit	
G50343	Fabric - Bleeder, Fiberglass Release, Hawkeye S2222	
G50381	Abrasive - Aluminum Oxide Paper, 180 Grit	

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Prepare for the Repair

SUBTASK 78-31-01-020-001-H01

> **WARNING** DO NOT SPOT-WELD REPAIRS TO THE THERMAL INSULATION BLANKET WHILE THE BLANKET IS INSTALLED ON THE AIRPLANE. THE SPARKS AND HOT METAL CAN CAUSE A FIRE. REMOVE THE THERMAL INSULATION BLANKET FROM THE AIRPLANE BEFORE YOU DO THE SPOT-WELD REPAIR. DAMAGE TO THE EQUIPMENT AND INJURIES TO PERSONS CAN OCCUR.

(1) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

G. Permanent Weld Repair of the Outer Metal Sheet on the Thermal Insulation Blanket

NOTE: Weld repair for rips, cracks, holes, and tears on the hot side CRES foil, more than 0.5 inch (12.7 millimeters) from an edge or spacer, midsupport, or weldscrew.

SUBTASK 78-31-01-310-001-H01

(1) Prepare the damaged metal sheet on the thermal insulation blanket.

> **WARNING** MAKE SURE YOU USE PROTECTIVE CLOTHING ON THE HAND AND ARM. THIS WILL PREVENT INJURY TO PERSONS.

> **WARNING** DO NOT LET THE SHARP METAL EDGES CUT YOU. PUT ON GLOVES. INJURIES TO PERSONS CAN OCCUR.

(a) Remove the sharp edges from the metal sheet and the loose insulation material from the damaged area.

> **WARNING** DO NOT BREATHE THE DUST FROM THE INSULATION MATERIAL. PUT ON A DUST MASK. INJURIES TO PERSONS CAN OCCUR.

(b) Remove the damaged, contaminated or wet insulation material.

1) Carefully cut the damaged or wet insulation material from the damaged area.

a) Make the cutout area the same size as the insulation plug, 2.0 X 2.0 inch (50.8 X 50.8 millimeters); the insulation plug must fit tightly in the cutout area.

b) For damage that is larger than one insulation plug, make the cutout area large enough for multiple plugs; the insulation plugs must fit tightly in the cutout area.

NOTE: The insulation plugs must fit tightly in the cutout area to reduce the amount of RTV 106 used to fill the gap between the plug and the blanket insulation. If the RTV 106 is too thick, the outside surface of the RTV 106 forms a thick skin and the inside core of the RTV 106 will not cure correctly.

2) Make sure you do not cut the polyimide sheet on the opposite surface of the blanket.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Seal the edges and insulation material around the damaged cutout area of the blanket with Nitto P-212 tape, G50325.

(c) Install a new replacement piece of insulation material, Flexible Min-K F182-16 insulation, G50111, that will fit the area where the damaged insulation material was removed.

NOTE: The replacement insulation material, Flexible Min-K F182-16 insulation, G50111, is a large sheet of insulation, covered with a glass cloth and stitched in a 1.0 inch (25.4 millimeters) square pattern. Contact the blanket supplier for the thickness.

NOTE: The replacement insulation material have a density that is equal to or greater than the density of the insulation that was removed. The thickness of the replacement insulation material must not be less the thickness of the insulation that was removed.

1) Refer to the steps to make an insulation repair plug.

2) Make sure there are no gaps between the replacement Flexible Min-K F182-16 insulation, G50111 and the insulation in the blanket.

3) Fill all gaps with RTV 106 adhesive, A00081.

NOTE: The maximum thickness for one application of RTV 106 is 0.125 inch (3.18 mm) and then the adhesive is allowed to completely cure before a second application. If RTV 106 is applied to a thickness of 0.25 inch (6.35 millimeters) in one application, the outside surface of the RTV 106 forms a thick skin and the inside core of the RTV 106 will not cure correctly.

NOTE: The RTV 106 sealant has a short work life. Exposure to the air for more than a few minutes will cause a skin to form which will prevent adhesion on the surfaces.

NOTE: The RTV 106 is a one-part silicon adhesive/sealant which is supplied ready to use.

(d) View the damaged area and find the size of repair patch required.

1) The patch must overlap a minimum of 0.50 inch (12.70 millimeters) in all directions around the damaged area.

NOTE: If it is necessary, make a paper pattern for the repair patch with any clean paper. A paper pattern is used to find the size of the patch if the patch must cover a contoured surface. Dry fit the paper pattern over the damaged area to make sure the repair patch is the correct size and will cover the damaged area, then cut the CRES patch from the paper pattern.

2) Position the texture on the CRES foil patch to match as closely as possible the texture on the foil on the blanket.

NOTE: The weld repair is easier to do when the foil texture is matched because the foil patch will conform to the texture on the blanket which allows better contact pressure.

(e) Cut a repair patch from the CRES foil sheet that will overlap the surface repair area.

1) Use the 0.003-0.006 inch (0.076-0.152 millimeters) thick stainless steel foil, G50332 for the hot side of the blanket.

NOTE: This CRES foil has a textured surface pattern. The textured surface will fit closer to the textured foil on the blanket. A flat CRES foil will not fit close to the textured foil on the blanket and is more difficult to weld.

2) Trim the corners to make a rounded edge that has a minimum radius of 0.25 inch (6.35 millimeters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Dry fit the CRES patch at the repair location to make sure the repair patch is the correct size and will cover the damaged area.

WARNING DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(g) Wear rubber glove, STD-1086 when you clean the damaged area around the blanket and the CRES foil patch with solvent.

CAUTION DO NOT LET THE SOLVENT AND OTHER FLUIDS TOUCH THE INSULATION MATERIAL. THE SOLVENT AND OTHER FLUIDS WILL DECREASE THE PERFORMANCE AND MATERIAL PROPERTIES OF THE INSULATION MATERIAL.

(h) Clean the area around the damaged area plus a minimum of 0.50 inch (12.70 millimeters) in all directions around the damaged area to remove the surface oxidation and unwanted material.

1) Clean the area around the damaged area with a abrasive mat, G00251 pad to remove surface oxidation and dirt.
2) Clean the area around the damaged area with a clean cotton wiper, G00034 moist with solvent, B00062.
3) Clean the surface again with a new, clean cotton wiper, G00034 moist with solvent, B00062.
4) Wipe the area with a dry, clean cotton wiper, G00034, or lint-free cloth before the solvent evaporates.

(i) Clean the CRES foil patch.

1) Clean the repair patch with a clean cotton wiper, G00034 moist with solvent, B00062.
2) Clean the surface again with a new, clean cotton wiper, G00034 moist with solvent, B00062.
3) Wipe the patch with a dry, clean cotton wiper, G00034 or lint-free cloth before the solvent evaporates.

(j) Remove the surface oxidation and unwanted material from the two cleaned CRES patches with one of the materials that follow:

1) Start with a abrasive mat, G00251, fine grade, aluminum oxide mat and progress through finer grades to an ultrafine grade, aluminum oxide abrasive mat, or
2) Start with a aluminum oxide, 180 grit abrasive paper, G50381 and progress through finer grades to an aluminum oxide, 400 grit abrasive paper, G50340.
3) Use these abrasive materials dry.

(k) Make sure the cleaned repair surface and the repair patch are kept clean.

1) Use clean lint-free gloves, G01306 when you handle the cleaned repair surface or the foil patch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-01-310-004-H00

(2) Overlap Spot Weld the CRES Repair Patch on the Thermal Insulation Blanket.

NOTE: Welds are either continuous overlapping spot welds or seam welds. Seam welds are preferred as this gives a better moisture resistant seal.

NOTE: Hot side adhesive, FM-57, is required between the CRES repair patch and the hot side face sheet for overlapped spot weld repairs.

(a) Refer to the figure: Weld Repair - CRES Thermal Insulation Blanket/Figure 803.

(b) Place two layers of FM-57 adhesive, A50023 between the damaged CRES foil and insulation.

1) If accessible from the cold side, do this operation after you weld the patch instead of before you weld the patch.

2) Heat tack the FM-57 adhesive in place around the edge of the cavity before you install the insulation plug.

a) Use a 250 to 350 degrees F (121-177 degrees C) electric sealing iron, STD-1306, heat tack must not exceed 300 F (149 degrees C).

(c) Place two layers of FM-57 adhesive, A50023 between the CRES repair patch and the hot side face sheet before you weld to patch.

1) Position the FM-57 adhesive so it does not interfere with the weld operation; the FM-57 adhesive must overlap the damaged area by 0.25 inch (6.35 millimeters) minimum.

(d) Do the steps that follow to do the weld operation.

SUBTASK 78-31-01-310-002-H00

(3) Seam Weld the CRES Repair Patch on the Thermal Insulation Blanket.

NOTE: Welds are either continuous overlapping spot welds or seam welds. Seam welds are preferred as this gives a better moisture resistant seal.

(a) Refer to the figure: Weld Repair - CRES Thermal Insulation Blanket/Figure 803.

(b) Optional Step: Place two layers of FM-57 adhesive, A50023 between the CRES repair patch and the hot side face sheet before you weld the patch.

NOTE: Hot side adhesive, FM-57, is not required between the CRES repair patch and the hot side face sheet for seam weld repairs. Hot side adhesive, FM-57, is optional for seam weld repairs.

1) Position the FM-57 adhesive so it does not interfere with the weld operation; the FM-57 adhesive must overlap the damaged area by 0.25 inch (6.35 millimeters) minimum.

(c) Do the steps that follow to do the weld operation.

SUBTASK 78-31-01-310-005-H00

(4) Do these steps to weld the patch.

NOTE: A 6 X 6 inch (152 X 152 millimeters) patch can take 2 to 3 hours or more to spot weld because of the fit of the patch to the blanket from the wrinkles or the lack of wrinkles. Weld operator fatigue can be a problem if the repair is in the middle of the blanket. Arm rests and a light source like a dentist uses would be very helpful.

NOTE: The illustration shown is a similar set up of a spot welder at the blanket supplier, which uses a small pencil-tip electrode on the weld gun and a small pencil tip on the ground electrode.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Refer to the figure: Weld Repair - CRES Thermal Insulation Blanket/Figure 803.

(b) Get a position adjustable magnifying glass, STD-6161 that is mounted in a stand or that you can wear.

(c) Make sure there is sufficiently bright light from a source of white light, STD-572 above the area were you will do the weld repair.

(d) Hold the foil patch in the required position with heat protective, insulated gloves, STD-418.

(e) Use a portable spot welder with small tip electrode on the weld gun and small tip ground electrode to seam weld around the edge of the CRES patch.

1) If you use the spot welder, COM-4927 which is the poke welder B12L (spot welder) and weld gun PG2, a part of the usage instructions follow.

NOTE: These instructions from the Poke Welder B12L (spot welder) and weld gun PG2. For operators that use the B12L, request the complete instructions to operate this spot welder from the manufacturer, Portable Welders Ltd., Bicester, Oxon, United Kingdom.

a) Initial set up; adjust these controls as necessary during the practice of the weld repair.

<1> Set Weld Time to 5 cycles.

<2> Set Cool Time to 3 cycles.

<3> Set the Single/Repeat toggle switch to Single.

<4> Switch Heat Switch to 4.

<5> Set Heat Control to 95%.

2) Keep the weld time as short as possible as you make a satisfactory weld to keep the heat in the weld gun and the cables to a minimum.

3) Short weld times and high heat settings will get the best weld results.

(f) If you use a local source for a spot welder, get a spot welder with this general capacity.

1) Input voltage for the electrical service for your country or region.

2) Output of 160 watt seconds.

3) High repetition rate which is the number of welds in one minute.

4) Use the manufacturers instructions for the local source spot welder.

(g) Move the ground clamp or ground electrode away from the weld to get better weld results.

(h) Use the minimum electrode tip diameter, such as a 0.125 inch (3.175 millimeters) diameter cone shaped pencil tip.

1) Do not weld on the point of the electrode.

2) Use the side of the electrode tip to put the most force on the electrode.

NOTE: Use the side of the electrode tip to increase the pressure that you can apply to the weld to improved the weld quality.

(i) The maximum thickness that can be welded is the thickness of the patch to itself or the thickness of the patch to anything thicker.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(j) Before you begin to do the spot weld repair, you must practice continuous, closely placed spot welds on scrap pieces of foil and scrap pieces of a metal blanket.

NOTE: The ability to make good, consistent, overlapped or closely spaced spot welds is a combination of the operator experience, the weld technique of the operator and the setting of the welder controls. The CRES foil patch and the blanket CRES foil is 0.003 inch (0.076 millimeter) thick and is easily damaged.

NOTE: Where the patch is on the blanket, the wrinkled areas are the more difficult areas to create a good weld.

1) Adjust the welder controls to settings which allow you to make a good spot weld.

NOTE: Too high a setting on the welder controls will create burn through areas and pinhole damage to the CRES foil patch and the CRES foil surface of the blanket.

2) Determine the best weld technique for the equipment and settings.

a) Determine the distance between the two electrodes to create good spot welds.

NOTE: If the distance between the electrodes is too close, this causes the weld to splatter metal in the direction of the ground electrode that weakens the weld.

b) Determine if your weld tip placement and movement creates good welds.

NOTE: Pin holes can be caused if you do not move the tip and you make a double weld in the same spot.

3) Make sure you have sufficient magnification for a visual inspection of your welds.

4) During the weld practice, make continuous, closely placed or overlapped spot welds to create a continuous weld bead that is a fluid and moisture tight seal.

a) You must put force on the electrode to maintain contact pressure between the CRES foil patch and the blanket foil.

NOTE: The generation of flying sparks is an indication of contamination on the blanket or foil patch or improper contact pressure between the CRES foil patch and the blanket foil.

b) If you use a ground clamp, put the clamp at the edge of the blanket.

c) If you use a pencil tip ground electrode, you must determine the distance between the weld gun electrode and the pencil tip ground electrode.

(k) Initially, hold the CRES foil patch in position on the blanket with spot welds on all edges to prevent slippage during the final weld operation.

(l) Make continuous, closely placed or overlapped spot welds to create a continuous seam that is a fluid and moisture tight seal.

SUBTASK 78-31-01-310-003-H00

(5) Visually inspect the welds for pinholes.

(a) No pinholes are allowed.

H. Cold Side Edge Delamination of CRES Foil Repair

SUBTASK 78-31-01-350-003-H00

(1) Do these steps for cold side edge delamination of CRES foil repair.

(a) Refer to the figure: Cold Side Repair - CRES Thermal Insulation Blanket/Figure 801.

(b) Solvent clean the area using alcohol, B00130 or solvent, B00062.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Take two plies of FM-57 adhesive, A50023, a nominal 0.5 inch (12.7 millimeters) wide by length of the delamination.

(d) Insert the plies of FM-57 adhesive, A50023 between the CRES flap and DuPont Kapton HN film, G50102 facesheet.

(e) Heat tack with 250 to 350 degrees F (121-177 degrees C) electric sealing iron, STD-1306 to temporary hold the CRES flap down, heat tack must not exceed 300 degrees F (149 degrees C).

(f) Overlay a 1.0 inch (25.4 millimeters) minimum width strip of film adhesive, A50075 over the CRES and Kapton face sheet.

(g) Extend film adhesive, A50075 at least 0.5 inch (12.7 millimeters) in all directions from the edge of the delamination.

1) If film adhesive, A50075 is not available, use a layer of FM-57 adhesive, A50023 with a layer of DuPont Kapton HN film, G50102.

(h) Vacuum bag either the entire blanket or a local area.

(i) Cure the adhesive.

I. Cold Side Repair of Rips, Holes, and Tears

SUBTASK 78-31-01-350-004-H00

(1) Do these steps for cold side repair of rips, holes, and tears on the cold side polyimide film, more than 0.5 inch (12.7 millimeters) from an edge or spacer, midsupport, or weldscrew.

(a) Refer to the figure: Cold Side Repair - CRES Thermal Insulation Blanket/Figure 801.

(b) Trim away the damaged face sheet.

(c) Examine the insulation for damage.

1) If any insulation is damaged or missing, do an insulation plug repair.

2) Do an insulation repair for any superficial cuts that do not compromise the integrity of the insulation.

(d) Apply a cold side adhesive.

(e) Cure the adhesive.

J. Puncture Repair Through the Blanket

SUBTASK 78-31-01-350-005-H00

(1) Do these steps for repair of puncture through the blanket more than 1.0 inch (25.4 millimeters) from the nearest edge.

(a) Trim away damaged foil, insulation and cold side surface.

(b) Bind all exposed raw edges of insulation with Nitto P-212 tape, G50325.

(c) Weld a patch in place to repair the hot side first.

(d) Prepare and insert a new piece of Flexible Min-K F182-16 insulation, G50111.

(e) Apply a cold side adhesive.

(f) Cure the adhesive.

K. Spacer Replacement

SUBTASK 78-31-01-350-006-H00

(1) Do these steps for spacers that are replaced or the location is changed.

(a) Refer to the figure: Spacer, Midsupport and Weldscrew Details - CRES Thermal Insulation Blanket/Figure 805.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Carefully grind the swaged portion of the spacer located on the cold side and remove the washer.

(c) From the cold side, remove a minimum 2.0 inch by 2.0 inch (50.4 millimeters by 50.4 millimeters) of insulation and face sheet from around spacer and discard.

(d) Bind all exposed raw edges of insulation with Nitto P-212 tape, G50325.

(e) Cut the metal foil around spacer and discard.

(f) Make a CRES repair patch.

(g) Find the location for the spacer and cut a hole in the repair patch.

(h) Pin spacer in place and weld the spacer to the patch.

(i) Clean area with alcohol, B00130 or solvent, B00062 again.

(j) Weld the patch to the blanket.

(k) Apply SS4004P RTV primer, C00954 to the shank of the spacer and let dry.

(l) Apply a bead of RTV 106 adhesive, A00081 around the shank of the spacer and on the inside of the hot side facesheet.

(m) Cure RTV 106 adhesive, A00081 to cure for 24 hours minimum at room temperature.

(n) Prepare and insert a new piece of Flexible Min-K F182-16 insulation, G50111.

(o) Cut a hole in the insulation plug for the spacer before insertion into the blanket.

(p) Bind all exposed raw edges of insulation with Nitto P-212 tape, G50325.

(q) Apply a layer of cold side face sheet, DuPont Kapton HN film, G50102 around the spacer.

1) Clean the area to be repaired with alcohol, B00130 or solvent, B00062.

a) Do not allow alcohol, B00130 or solvent, B00062 to penetrate into the insulation.

2) Trim off any loose, ragged Kapton.

3) Clean with alcohol, B00130 or solvent, B00062 as required, and wipe dry.

4) Cut a patch of cold side film adhesive prebonded with polyimide film, A50073 that will extend a minimum 0.5 inch (12.7 millimeters) past the damage in each direction.

5) Optional material for film adhesive prebonded with polyimide film, A50073 is to use a layer of cold side film adhesive, A50075 bonded to DuPont Kapton HN film, G50102.

a) Do not trap air.

b) Heat tack with 250 to 350 degrees F (121-177 degrees C) electric sealing iron, STD-1306 to hold patch in position as required, heat tack must not exceed 300 degrees F (149 degrees C).

6) Place the patch of cold side film adhesive prebonded with polyimide film, A50073 over the repair area.

a) Heat tack with 250 to 350 degrees F (121-177 degrees C) electric sealing iron, STD-1306 to hold patch in position as required, heat tack must not exceed 300 degrees F (149 degrees C).

b) If folds are required, place a layer of film adhesive, A50075 within the fold to bond the Kapton surfaces together.

c) If darts are required, place a patch of film adhesive prebonded with polyimide film, A50073 over the initiation of the dart to cover any pinholes.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(r) Place one layer of FM-57 adhesive, A50023 and PTFE doubler, RM 827 tape, G50113, over the cold side spacer.

(s) Cure the adhesive.

(t) Apply a bead of RTV 106 adhesive, A00081 around the shank of the spacer, install washer and swage.

(u) Swage operation shall not cause visible damage to the spacer or to the cold side facesheet.

1) Washers must not turn.

(v) Rubstrip PTFE doubler, RM 827 tape, G50113, and FM-57 adhesive, A50023 may be trimmed as required when spacer is located near a blanket edge.

(w) Wipe away any adhesive with a clean dry cotton wiper, G00034 or cloth.

L. Midsupport Replacement

SUBTASK 78-31-01-350-007-H00

(1) Do these steps for midsupport replacement.

(a) Refer to the figure: Spacer, Midsupport and Weldscrew Details - CRES Thermal Insulation Blanket/Figure 805.

(b) From the hot side, carefully cut around the midsupport and cut through the CRES face sheet within 0.25 inch (6.35 millimeters) outside of the weld marks common to the midsupport.

(c) From the cold side, remove a minimum 2.0 inch by 2.0 inch (50.4 millimeters by 50.4 millimeters) of insulation and face sheet from around midsupport and discard.

(d) Bind all exposed raw edges of insulation with Nitto P-212 tape, G50325.

(e) Prepare an insulation plug for the interior of the midsupport.

(f) Place the insulation plug within the midsupport and weld the midsupport to the hot side patch.

(g) Weld the patch to the blanket.

(h) Prepare an insulation plug for the blanket.

(i) Cut a hole in the insulation plug for the midsupport before insertion into the blanket.

(j) Bind all exposed raw edges of insulation with Nitto P-212 tape, G50325.

(k) Apply the cold side film adhesive, Scotch-weld AF-15 adhesive, A50024 or film adhesive, A50075, onto the midsupport on the cold side.

(l) Place an additional layer of FM-57 adhesive, A50023 and PTFE doubler, RM 827 tape, G50113 on the coldside over the midsupport before cure.

(m) Cure the adhesive.

M. Weldscrew Replacement

SUBTASK 78-31-01-350-008-H00

(1) Do these steps for the weldscrew replacement.

(a) Refer to the figure: Spacer, Midsupport and Weldscrew Details - CRES Thermal Insulation Blanket/Figure 805.

(b) Remove sealant around weldscrew on hot side of blanket.

(c) Trim around the baseplate to carefully remove the weldscrew from the cold side.

(d) Discard baseplate.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Examine damaged area.

(f) If hot side facesheet is damaged or if weldscrew is moved to a new location, do a hot side repair.

(g) Cut hole in patch for weldscrew before the weld operation.

(h) If insulation is damaged or if weldscrew is moved to a new location, prepare and insert a new insulation plug.

(i) Fill baseplate of new weldscrew with RTV 106 adhesive, A00081.

1) Allow RTV 106 adhesive, A00081 to cure for 24 hours minimum at room temperature.

(j) Wrap the baseplate with a layer of cold side film adhesive, Scotch-weld AF-15 adhesive, A50024 or film adhesive, A50075, and insert the weldscrew into the blanket.

(k) Use Nitto P-212 tape, G50325 to cover the base plate.

(l) Apply a cold side patch over the weldscrew; do a cold side delamination repair.

(m) After cure, apply RTV 106 adhesive, A00081 around the stud on the hot side to seal any path for fluid ingress and allow RTV 106 adhesive, A00081 to dry.

N. Edge Repair of the CRES Foil

SUBTASK 78-31-01-350-009-H00

(1) Do these steps for edge repair for cracks or holes in the CRES foil within 0.5 inch (12.7 millimeters) of an edge or along the edge of a blanket without any loss of insulation.

(a) Refer to the figure: Edge Repair - CRES Thermal Insulation Blanket/Figure 802.

(b) Trim away damaged foil as required to for the repair.

(c) Examine insulation for damage.

(d) If any insulation is damaged or missing, replace the damaged insulation blanket with a new insulation blanket.

(e) Repair any superficial cuts that do not compromise the integrity of the insulation.

(f) Prepare a CRES patch from stainless steel foil, G50332.

1) The patch size must overlap the repair area on the hot side by a minimum 0.5 inch (12.7 millimeters) on all sides.

2) The patch must also be large enough to wrap around on to the cold side.

(g) Add FM-57 adhesive, A50023 dependent on the size of the damaged area.

1) For damaged areas less than 0.5 inch (12.7 millimeters), place three layers of FM-57 adhesive, A50023 between the CRES foil and the CRES foil cap.

2) For damaged areas greater than 0.5 inch (12.7 millimeters), place two layers of FM-57 adhesive, A50023 between the CRES foil and insulation, and two layers of FM-57 adhesive, A50023 between the CRES foil and the CRES foil cap.

(h) Weld a repair cap over the damaged area.

1) The CRES patch must be folded over onto the end and welded on both the hot side and along the edge.

(i) Cure the adhesive.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

O. Insulation Repair for Superficial Cuts

SUBTASK 78-31-01-350-010-H00

(1) Do these steps for insulation repair for superficial surface cuts and there has been no loss of insulation.

(a) Refer to the figure: Insulation Plug Repair - CRES Thermal Insulation Blanket/Figure 804.

(b) Place a layer of Nitto P-212 tape, G50325 or glass fabric, G50112 over the cut.

(c) Stitch the material in place with quartzel sewing thread Q18, G50324.

(d) Place a layer of FM-57 adhesive, A50023 over the cut, followed by a layer of Nitto P-212 tape, G50325 or glass fabric, G50112.

(e) Cure the adhesive.

P. Make an Insulation Repair Plug

SUBTASK 78-31-01-350-011-H00

(1) Do these steps to make an insulation repair plug.

(a) Refer to the figure: Insulation Plug Repair - CRES Thermal Insulation Blanket/Figure 804.

(b) Trim the damaged insulation with a X-ACTO knife scalpel, STD-3949.

(c) Remove and discard damaged insulation.

(d) Bind all exposed edges of insulation in the blanket with Nitto P-212 tape, G50325.

1) It is optional to use quartzel sewing thread Q18, G50324 to sew the binding in place.

(e) Make a new insulation plug.

1) Get a piece of replacement insulation, Flexible Min-K F182-16 insulation, G50111, that is the same thickness as the damaged insulation.

NOTE: Replacement insulation can the same density and thickness as the damaged insulation. You can use insulation of a greater density and the same thickness. The Flexible Min-K F182-16 insulation, G50111, is 16 pounds per cubic foot (PCF) density.

2) Insulation plug should retain as many stitch lines as possible.

3) The plug should be 0.05–0.15 inch (1.27-3.81 millimeters) more on each side than the hole in the blanket.

(f) Use Nitto P-212 tape, G50325 to bind all raw edges of the insulation in the plug.

1) Tape should overlap by 0.5 inch (12.7 millimeters) minimum.

2) It is optional to use quartzel sewing thread Q18, G50324 to sew the Nitto P-212 tape, G50325 in position.

(g) On the interior side of the hot side of the blanket, insert one layer of FM-57 adhesive, A50023.

NOTE: This FM-57 adhesive, A50023 requirement is in addition to any layers of FM-57 used in the weld repair operation.

1) Heat tack with 250 to 350 degrees F (121-177 degrees C) electric sealing iron, STD-1306 to hold adhesive in position around the edge of the hole, heat tack must not exceed 300 degrees F (149 degrees C).

a) The FM-57 adhesive should overlap the edge by 0.5 inch (12.7 millimeters) minimum.

2) Insert the insulation plug into the hole.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) The plug should fit snugly into the blanket.

a) No voids or gaps are allowed.

(h) On the cold side of the blanket, attach the plug to the blanket insulation with FM-57 adhesive, A50023 and Nitto P-212 tape, G50325.

Q. Application of Cold Side Film Adhesive

SUBTASK 78-31-01-350-012-H00

(1) Do these steps to apply cold side film adhesive.

(a) Clean the area to be repaired with alcohol, B00130 or solvent, B00062.

1) Do not let the alcohol, B00130 or solvent, B00062 go into the insulation.

(b) Trim off any loose, ragged Kapton.

(c) Clean the area again with alcohol, B00130 or solvent, B00062 as required, and wipe dry.

(d) Cut a patch of film adhesive prebonded with polyimide film, A50073 that will extend a minimum 0.5 inch (12.7 millimeters) past the damage in each direction.

(e) Optional material for film adhesive prebonded with polyimide film, A50073 is to use a layer of cold side film adhesive, Scotch-weld AF-15 adhesive, A50024 or film adhesive, A50075, bonded to DuPont Kapton HN film, G50102.

1) Do not trap air under the adhesive or film.

(f) Place the patch over the repair area.

1) Heat tack with 250 to 350 degrees F (121-177 degrees C) electric sealing iron, STD-1306 to hold patch in position, heat tack must not exceed 300 F (149 degrees C).

2) If folds are required, place a layer of adhesive within the fold to bond the Kapton surfaces together.

3) If darts are required, place a patch of film adhesive prebonded with polyimide film, A50073 over the initiation of the dart to cover any pinholes.

(g) Warm patch with hot air gun, STD-3723 and gently use a plastic squeegee, STD-821 to squeeze the patch to the film surface to remove any trapped air.

(h) Cure the adhesive.

R. Cure the Adhesive

SUBTASK 78-31-01-350-013-H00

(1) Do these steps to cure the film adhesive.

(a) Place perforated FEP or TFE film, perforated parting film, G50103, over the patch to extend a minimum of 1.0 inch (25.4 millimeters) past the patch in each direction.

1) You can use Nitto P-212 tape, G50325 to hold the film in place.

(b) Place bleeder fabric, G50343 over the perforated film to extend a minimum of 0.5 inch (12.7 millimeters) past the perforated film.

1) Tape in place as required.

(c) Place solid FEP or TFE film, solid parting film, G50104, over the bleeder fabric and with approximately 0.5 inch (12.7 millimeters) of the bleeder fabric exposed around all edges.

1) Tape in place as required.

(d) Place thermocouples, STD-926 in areas that you think will be the hottest and coolest areas of the repair during heat-up.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Place a heat blanket, STD-1304 over the repair area.

1) If an oven, STD-618 is to be used to cure the repair, do not apply the heat blanket.

(f) Place a surface breather mat, Airweave N-10 mat, G50107 or Ultraweave 1332 mat, G50108, over the repair area.

1) Make sure that the surface breather mat contacts the bleeder fabric around all edges and is large enough to allow placement of the vacuum port so that it does not sit over the repair patch.

(g) Place a vacuum bag, STD-94 over the repair area with bagging film, DP1000 film, G50109 and sealer tape, Flashbreaker 1 tape, G50106 or Nitto P-421 tape, G00150.

1) Place the vacuum port so that it does not sit over the repair patch.

2) Apply a vacuum.

a) Refer to the table: Vacuum Requirements/Table 801.

3) If leakage cannot be eliminated, a minimum of 10 inches of mercury vacuum is acceptable.

Table 801/78-31-01-993-806-H00 Vacuum Requirements

Blanket Thickness	Density	Vacuum requirements
> 0.30 inch	8 PCF	10 + 3 inches of Hg.
< 0.30 inch	8 PCF	15 + 3 inches of Hg.
all thicknesses	10 PCF	15 + 3 inches of Hg.
all thicknesses	16 PCF	20 + 3 inches of Hg.

(h) Heat to 350 degrees F (204 degrees C) at 3-5 degrees F per minute.

(i) Cure the repair at 350-400 degrees F (177-204 degrees C) for three hours minimum.

(j) Allow to cool to below 150 degrees F (65.6 degrees C) before you release vacuum.

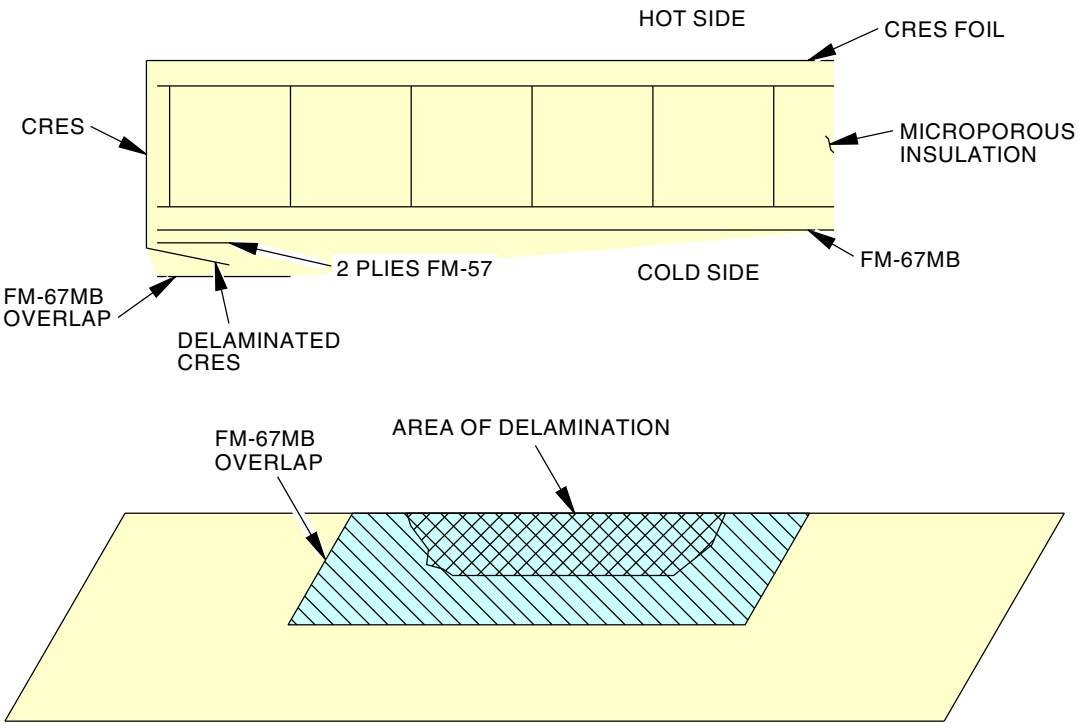
S. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-01-420-001-H01

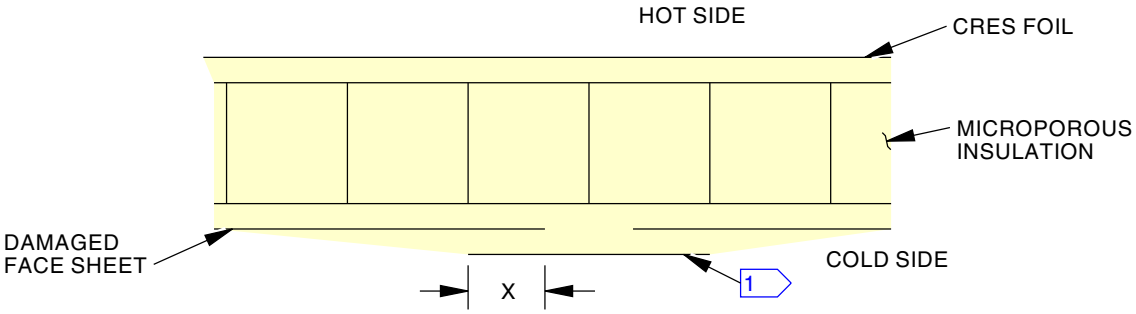
(1) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



COLD SIDE CRES DELAMINATION REPAIR



X = 0.5 INCH (12.7 mm) MINIMUM, 1.0 INCH (25.4 mm) PREFERRED

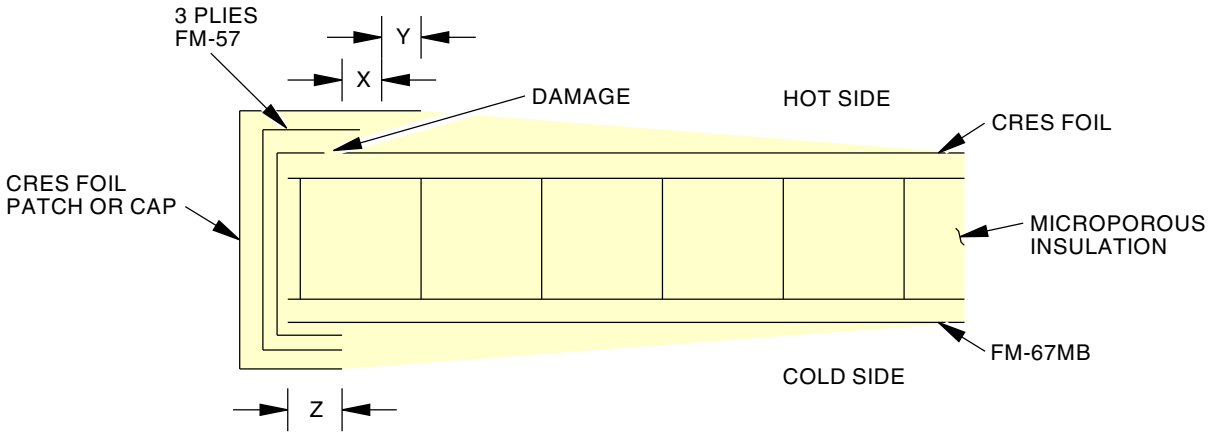
1 FM-67MB; OR COLD SIDE ADHESIVE AND KAPTON (COLD SIDE ADHESIVE NEXT TO INSULATION)

COLD SIDE REPAIR

J76644 S0000176433_V2

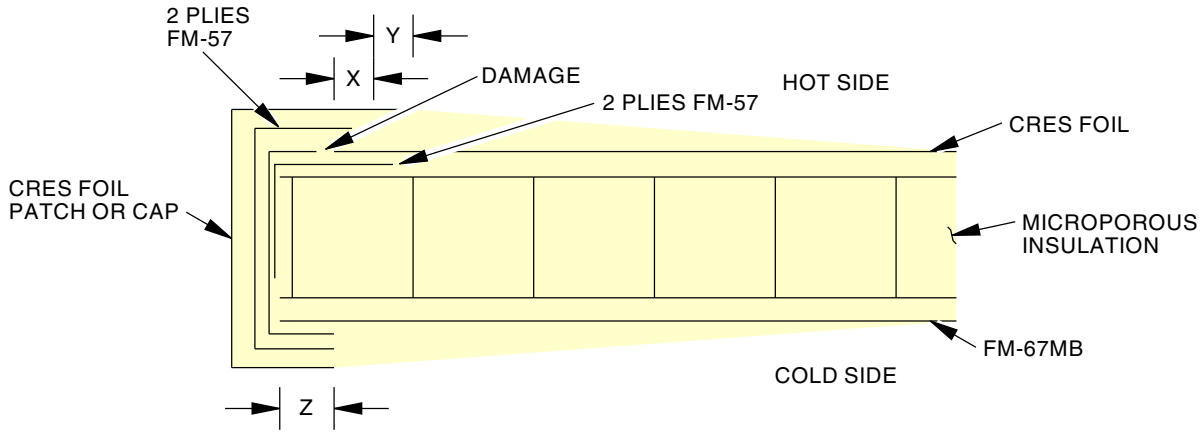
Cold Side Repair - CRES Thermal Insulation Blanket
Figure 801/78-31-01-990-829-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



X = 0.25 INCH (6.35 mm) MINIMUM
Y = 0.25 INCH (6.35 mm) NOMINAL
Z = 0.50 INCH (12.7 mm) NOMINAL
(COINCIDENT TO EXISTING CRES CLOSE-OUT)

EDGE REPAIR FOR DAMAGE LESS THAN 0.5 INCH (12.7 mm)



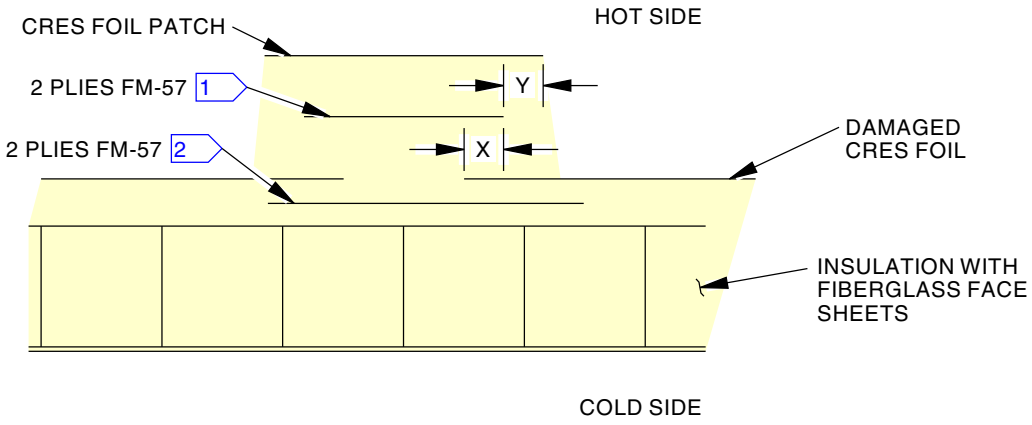
X = 0.25 INCH (6.35 mm) MINIMUM
Y = 0.25 INCH (6.35 mm) NOMINAL
Z = 0.50 INCH (12.7 mm) NOMINAL
(COINCIDENT TO EXISTING CRES CLOSE-OUT)

EDGE REPAIR FOR DAMAGE GREATER THAN 0.5 INCH (12.7 mm)

J76698 S0000176435_V2

Edge Repair - CRES Thermal Insulation Blanket
Figure 802/78-31-01-990-830-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



X (OVERLAP OF FM-57 OVER DAMAGE) = 0.25 INCH (6.35 mm) MINIMUM
Y (OVERLAP OF CRES ON FM-57) = 0.25 INCH (6.35 mm) NOMINAL

1 OPTIONAL WHEN PERFORMING A SEAM WELD

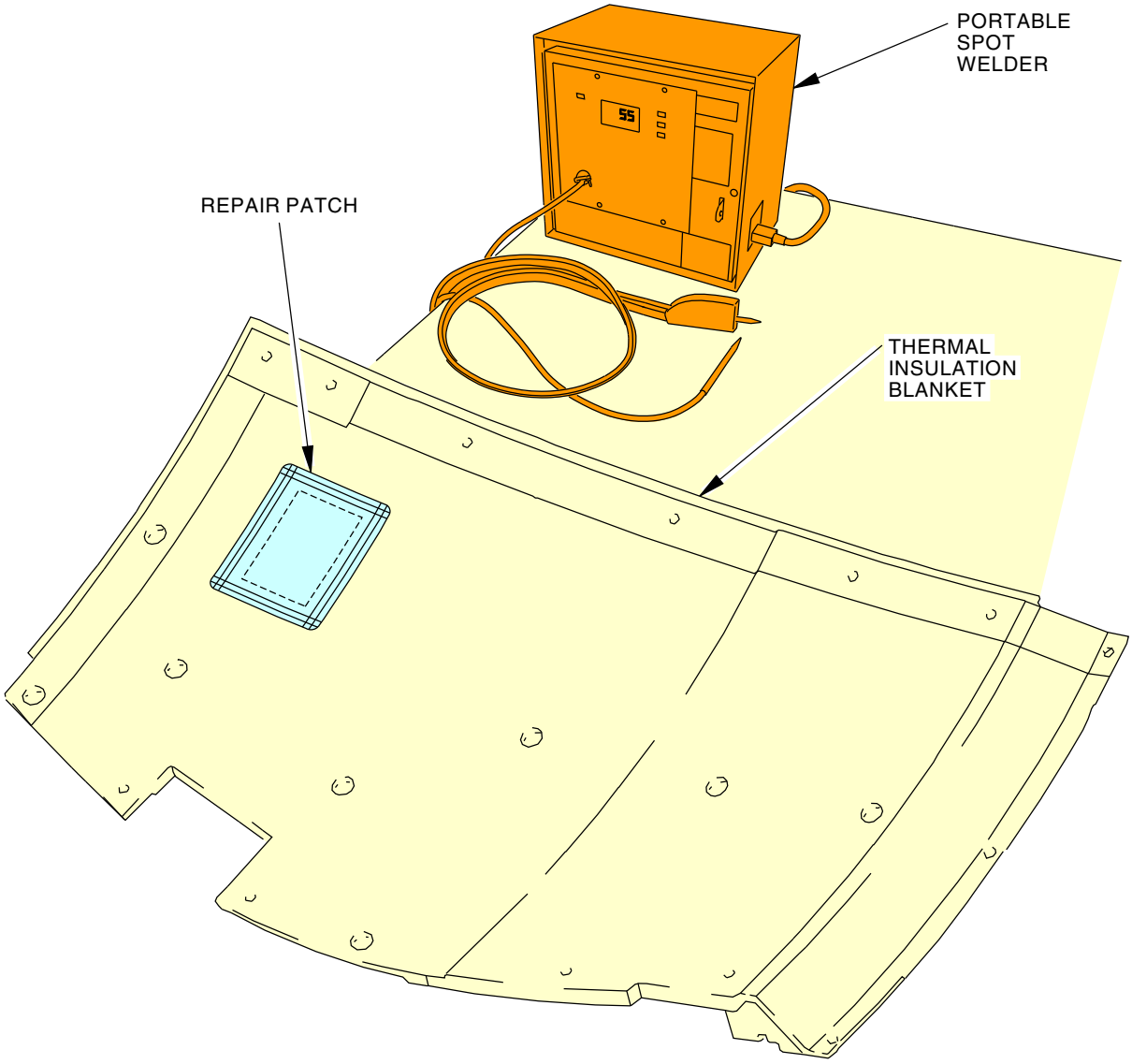
2 THE INNERMOST TWO PLIES OF FM-57 MUST BE LARGER THAN THE CRES PATCH AND EXTEND BEYOND THE CRES PATCH IN ALL AREAS.

WELD REPAIR

J76708 S0000176436_V2

Weld Repair - CRES Thermal Insulation Blanket
Figure 803/78-31-01-990-831-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

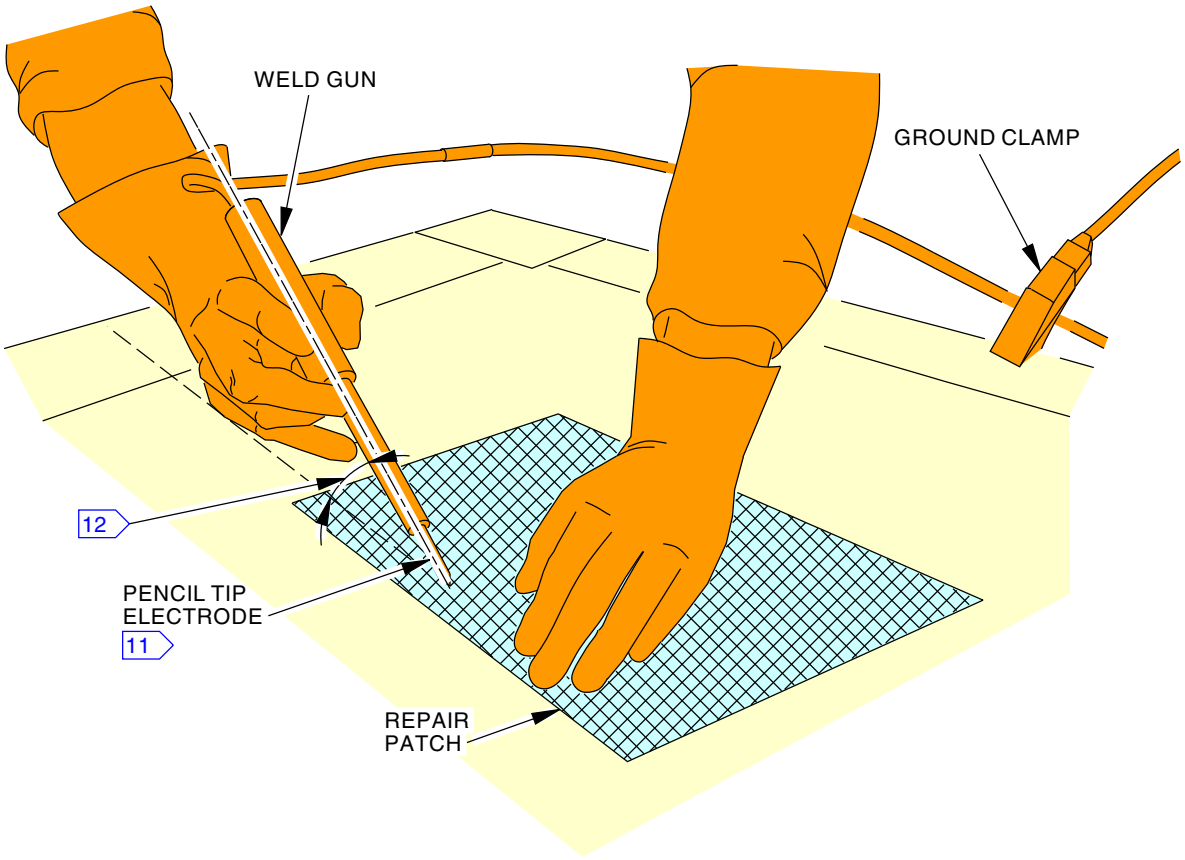


INSULATION BLANKET REPAIR EQUIPMENT

W25324 S0000120650_V2

Weld Repair - CRES Thermal Insulation Blanket
Figure 803/78-31-01-990-831-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



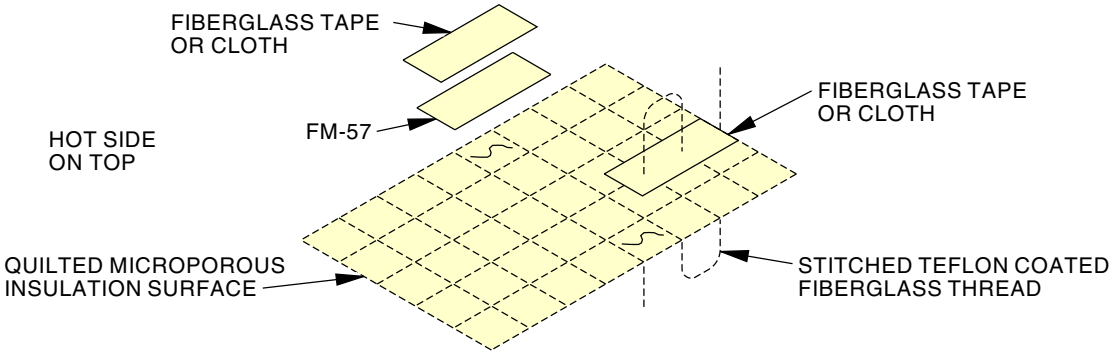
11 USE THE SIDE OF THE ELECTRODE TIP TO PUT THE MOST FORCE ON THE WELD AREA.

12 ANGLE OF WELD GUN ALLOWS USE OF THE SIDE OF ELECTRODE PENCIL TIP

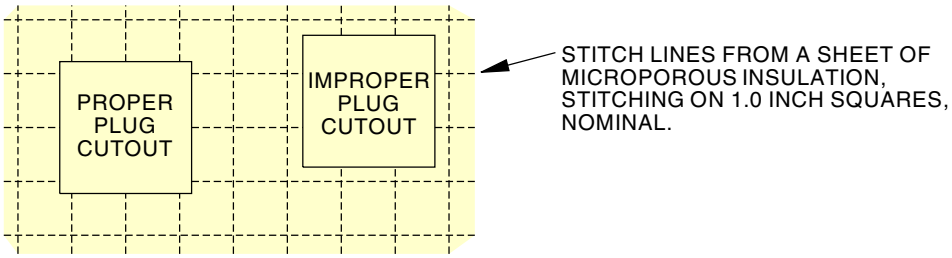
U66791 S0000212979_V2

Weld Repair - CRES Thermal Insulation Blanket
Figure 803/78-31-01-990-831-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

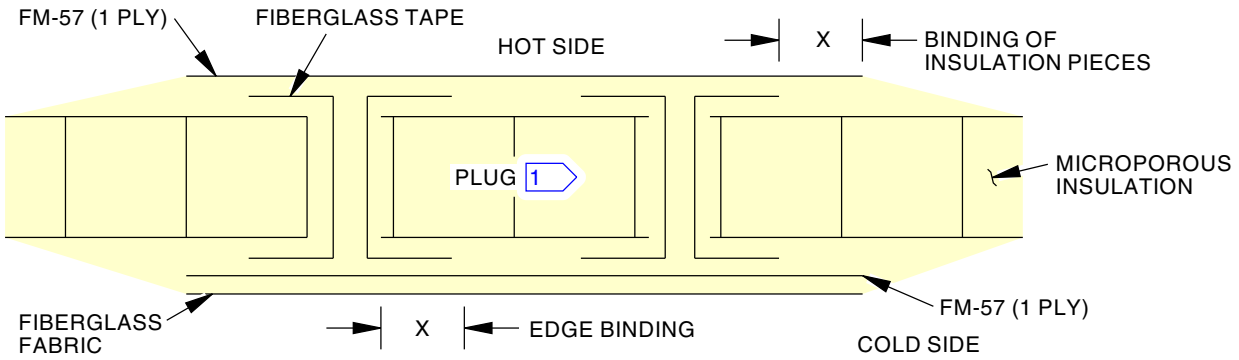


SUPERFICIAL INSULATION REPAIR



EXAMPLE OF HOW TO CUT OUT A SLIGHTLY OVERSIZED 2 INCH (50.4 mm) BY 2 INCH (50.4 mm) INSULATION PLUG (NOMINAL 2.25 INCH [57.15 mm] BY 2.25 INCH [57.15 mm]).

INSULATION PLUG CUTOUT



X = 0.5 INCH (12.7 mm) MINIMUM, 1.0 INCH (25.4 mm) PREFERRED

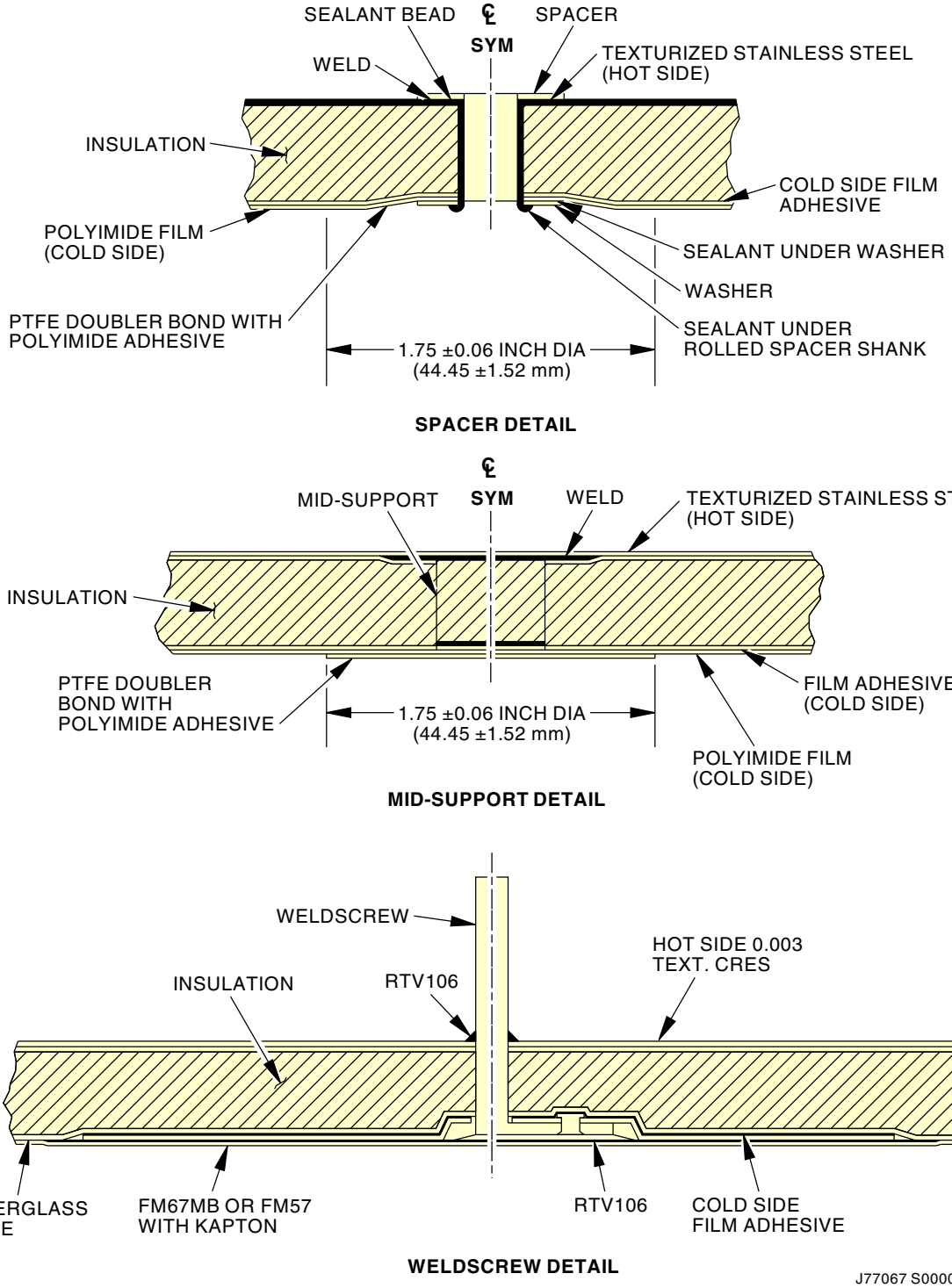
1 PLUG NOT SHOWN OVERSIZED IN ORDER TO SHOW DETAIL.
HOT SIDE CRES SHEET AND COLD SIDE KAPTON NOT SHOWN FOR CLARITY.

INSULATION PLUG BINDING

J76720 S0000176437_V2

Insulation Plug Repair - CRES Thermal Insulation Blanket
Figure 804/78-31-01-990-832-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Spacer, Midsupport and Weldscrew Details - CRES Thermal Insulation Blanket
Figure 805/78-31-01-990-833-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-01-300-804-H01

4. Click-Bond Stud Replacement

(Figure 806)

A. General

(1) This procedure gives the task to remove and replace the click-bond studs on the inner wall of the thrust reverser fan duct cowl.

(a) The click-bond studs are part of the fasteners that hold the thermal insulation blankets to the inner wall of the thrust reverser.

(b) The blankets are a thermal insulation and fire barrier layer which is necessary to keep the thrust reverser structurally serviceable and can decrease the damage and repair costs from a duct burst or a fire.

(c) Each click-bond stud has a pressure application fixture (PAF) to aid the location and installation of the stud.

(2) The inner wall of the thrust reverser fan duct cowl is a secondary structure composed of a carbon fiber reinforced plastic (CFRP) honeycomb sandwich and glass fiber reinforced plastic (GFRP) isolation plies.

(3) Composite structures are different than metallic structures as follows:

(a) The stiffness of a composite structure is greater than metallic structures which makes pull up on the drill more difficult.

(b) Carbon and glass fiber materials are abrasive and cause higher drill wear. Carbide drills are recommended. Use only clean, sharp tools and correctly ground drills. Dull or incorrectly ground drills will cause inaccurate cut, unsatisfactory holes and damage or burn the structure.

(c) Composite structures can be easily delaminated if they are not drilled correctly.

(d) Surface fibers of the composite material can be pulled out when it is cut. This makes the procedure more difficult when you deburr the holes.

(4) You must follow the tool and equipment requirements, the repair practices and procedures, and allowable damage limits found in the Structural Repair Manual (SRM) to do this replacement.

B. References

Reference	Title
NDT Part 4, 78-30-03	SKIN-TO-CORE INSPECTION OF THE INNER WALL OF THRUST REVERSER FROM THE INNER SIDE SKIN -RB211 ENGINE
SRM 51-20-08	Structural Repair Manual
SRM 51-30-05	General - Equipment and Tools for Repairs
SRM 51-70-08	Structural Repair Manual
SRM 54-20-08	Structural Repair Manual
SRM 54-31-01	Structural Repair Manual

C. Tools/Equipment

Reference	Description
STD-202	Container - Non-absorbent Glass, Metal or Polyethylene Coated Paper
STD-813	Spatula - Stainless Steel

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description
STD-1053	Knife - Putty, Broad Blade
STD-1219	Wheel - Rex-Cut

D. Consumable Materials

Reference	Description	Specification
A01085	Adhesive - Epoxy, High Temperature Resistant, 2 Part	BAC5010 Type 111 (BMS5-141)
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00102	Abrasive - Aluminum Oxide Coated Cloth	
B00130	Alcohol - Isopropyl	TT-I-735
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054
G00270	Tape - Scotch Flatback Masking 250	ASTM D6123 (Supersedes A-A-883)
G02145	Tape - Aluminum Foil	BMS8-289
G02367 [P05-044]	Pen - Marks-A-Lot	
G50400	Resin - Fiberglass Layup, Short Worklife, Non-Brominated	BMS8-201 Type IV (Supersedes BMS8-201 Type II)

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Procedure

SUBTASK 78-31-01-020-017-H00

(1) Remove the damaged click-bond stud from the inner wall (Preferred Method).

(a) Mask an area approximately 2 in. (5 cm) around the click-bond with tape, G02145 to protect the surface.

(b) Use a wheel, STD-1219 to cut off the stud flush with the base.

1) Cut the stud carefully so heat does not build up and cause damage to the composite inner wall.

(c) Use a sanding disc or sandpaper to remove the remaining stud to prevent damage to the blankets from sharp edges.

NOTE: In locations where click-bond stud will not be replaced, it is not necessary to continue with the following steps.

(d) Use a sanding disc or sandpaper to remove the remaining base, and click-bond plies.

1) Sand the remaining material in incremental steps so heat does not build up and cause damage to the composite inner wall.

NOTE: Do not damage or remove any underlying structural plies.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Sand the adhesive to allow removal of the click-bond center pin.

NOTE: It is not necessary to remove all of the click-bond adhesive. The center pin can be removed by pushing the pin through the panel or by carefully drilling it out. Do not damage the area around the pin.

1) If the remaining pin hole will not be covered by replacing the click-bond, fill the hole with adhesive, A01085.

(f) Inspect the inner wall structure for delaminations or disbonds caused by the removal procedure (NDT Part 4, 78-30-03).

SUBTASK 78-31-01-020-016-H00

CAUTION

BE CAREFUL TO NOT DAMAGE THE COMPOSITE INNER WALL WHEN YOU REMOVE THE STUD. TOO MUCH FORCE MAY CAUSE DELAMINATIONS OR DISBONDS BETWEEN THE SKIN AND CORE MATERIAL.

(2) Remove the damaged click-bond stud from the inner wall (Alternate Method).

(a) Use a flat tool or broad blade putty knife, STD-1053 to remove the stud.

(b) Carefully use the tool to work around the stud base to pry and peel the base from the wall.

(c) Pull the stud and pin from the wall.

NOTE: The stud has a location pin in the base that fits a hole in the composite plies.

(d) Inspect the inner wall structure for delaminations or disbonds caused by the removal procedure (NDT Part 4, 78-30-03).

SUBTASK 78-31-01-330-001-H01

(3) Locate the position of the new click-bond stud with the insulation blanket grommet hole as necessary.

(a) Put a mark with a Marks-A-Lot pen, G02367 [P05-044] on the hole location before you drill the hole.

(b) If you put a score to mark the hole location, make sure the score is inside the hole diameter.

SUBTASK 78-31-01-330-002-H01

WARNING

WEAR AN APPROVED DUST MASK AND SAFETY GLASSES WHEN YOU DRILL OR REAM IN COMPOSITE STRUCTURE. USE A VACUUM TO PICK UP DUST AND PARTICLES THAT OCCUR WHEN YOU DRILL COMPOSITES. IF YOU DO NOT FOLLOW THESE INSTRUCTIONS, INJURY TO PERSONNEL CAN OCCUR.

WARNING

ELECTRICALLY GROUND THE CARBON-FIBER REINFORCED-PLASTIC (CFRP) PARTS TO PREVENT ELECTRICAL DISCHARGE. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT CAN OCCUR.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(WARNING PRECEDES)

CAUTION

DO NOT ALLOW THE CARBON DUST TO COME IN CONTACT WITH ELECTRIC MOTORS, SWITCHES, RELAYS, CONTACTS OR ELECTRONIC CIRCUITS. USE DUST-PROOF VACUUM EQUIPMENT ON POWER TOOLS. CARBON DUST IS AN ELECTRICAL CONDUCTOR AND CAN CAUSE A SHORT CIRCUIT IN ELECTRICAL EQUIPMENT. IF YOU DO NOT OBEY THESE INSTRUCTIONS, PERMANENT DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Do the SRM procedures to drill holes in the GFRP, CFRP and CFRP-to-GFRP composite structure assemblies.

NOTE: Refer to SRM 51-20-08 procedure; General Procedures to Drill Holes in Composite Structures.

NOTE: Supplier information for tools and equipment that are used to drill and cut composite materials is given in SRM 51-30-05 procedure; General - Tools and Equipment for Repairs.

CAUTION

DO NOT DRILL THROUGH THE INNER WALL STRUCTURE. CONTROL THE DRILL DEPTH TO PREVENT DAMAGE TO THE INNER CORE AND THE OUTER SKIN OF THE INNER WALL.

(a) Drill the hole in the inner wall to the diameter and depth shown.

1) Select the drill rod type, drill motor and the correct drill speed and feed rate for this procedure.

2) Use dust-proof vacuum system to remove the carbon dust.

3) Use a drill guide to make sure the hole is perpendicular to the surface.

4) Use a drill stop to control the drill depth to prevent damage to the inner core and the outer skin of the inner wall.

SUBTASK 78-31-01-330-003-H01

(5) Do a check of the inner wall composite structure for defects caused by removal of damaged stud or the procedure to drill the hole.

(a) Do the SRM procedure to identify the underlayer structure of the thrust reverser inner wall skin.

NOTE: Refer to SRM 54-31-01, Identification 3 - Thrust reverser inner wall skin - GE90 engine, to identify the underlayer structure.

(b) If it is necessary, do the SRM procedure to deburr the hole with 180 grit or finer abrasive cloth, B00102 paper.

NOTE: Refer to SRM 54-20-08, Procedure to deburred holes in composite structure.

1) Limit the surface sanded by application of masking Scotch Flatback Masking Tape 250, G00270 around the hole.

(c) Do the SRM procedure to do a quality check of the deburred holes in the inner wall composite structure for defects.

NOTE: Refer to SRM 54-20-08, Procedure to do a quality check of the deburred holes in composite structure.

1) Look for defects like delamination, fiber breakout, microcracks and fiber or resin pullout.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Follow the allowable damage and rework limits in the SRM.

NOTE: Refer to SRM 51-20-08, Properties of a Good Quality Hole; Hole properties in composite structures.

2) Look for defects like nicks, scratches and gouges on the surface around the hole.

a) If it is necessary, do the SRM Resin Sweep-Fair repair procedure to apply a sealing resin, G50400 on the surface around the hole.

NOTE: Refer to SRM 51-70-08, General Resin Sweep-Fair Procedures to apply a sealing resin.

SUBTASK 78-31-01-160-008-H01

(6) Clean the surface of the inner wall.

(a) Wipe or scrub the surface of the inner wall to remove any loose soil, oil, grease, or hydraulic fluid with a clean cotton wiper, G00034.



CAUTION

DO NOT DAMAGE ANY UNDERLYING STRUCTURAL PLIES.

(b) Sand mating surfaces with 180 grit or finer aluminum oxide silicone free sandpaper until all surface gloss is removed.

(c) Wet a clean cotton wiper, G00034 with alcohol, B00130 or solvent, B00062 or solvent, B00148 and wipe the surface of the inner wall.

1) Remove all excess solvent or alcohol with a cloth.

2) Continue to wipe the surface with a new cloth and solvent until the cloth remains clean.

SUBTASK 78-31-01-420-002-H01

(7) Install the replacement click-bond stud (Figure 806).

(a) Prepare the adhesive, A01085 to make a smooth mixture of uniform consistency and color that is free of lumps and entrapped air.

NOTE: BMS5-141 is a two component, 60-80 degree F (16-27 degree C) cure, epoxy adhesive.

1) Use a clean and dry, teflon, non-absorbent container, STD-202 to mix the adhesive.

a) Use a metal or stainless steel spatula, STD-813 to mix the adhesive by hand.

b) If a metal container or spatula is used, no rust is allowed in the metal container or on the spatula.

2) Thoroughly blend the two components to this ratio by weight; 97-103 part A to 16.5-17.5 part B.

a) Work life of the adhesive is approximately 60 minutes at temperatures under 75 degrees F (24 degrees C).

(b) Apply a continuous and uniform layer of adhesive to the base of the stud.

NOTE: The base of the stud will be inside the pressure application fixture (PAF) and above the bottom of the PAF.

(c) Apply and work a sufficient amount of adhesive into the composite surface until the opposite composite surface is completely wetted.

(d) Remove the release liner ring from the pressure-sensitive adhesive on the bottom of the PAF.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Put the replacement stud/PAF in position and centered over the hole.

(f) Push down around the outer edge of the PAF to seat the PAF on the inner wall surface.

(g) Push down on the center of the PAF until you hear or feel a click.

NOTE: The PAF causes the stud base to contact the inner wall surface and the pin under the stud base into the hole.

1) Make sure the adhesive squeeze-out is continuous all around the stud base.

(h) Wipe off the excess adhesive before it has cured with a clean cotton wiper, G00034 moist with solvent, B00062.

1) Do not allow the solvent to flow into the bondline.

(i) Let the adhesive, A01085 cure.

1) Adhesive BMS 5-141 cures in 27-35 hours at temperatures of 70-80 degrees F (21-27 degrees C).

2) Apply heat to accelerate the cure with a non-explosive heat source.

NOTE: Cure time versus temperature is a non-linear function.

a) Adhesive BMS 5-141 cures in 12 hours at temperature of 100 degrees F (38 degrees C).

b) Adhesive BMS 5-141 cures in 5 hours at temperature of 120 degrees F (49 degrees C).

c) Adhesive BMS 5-141 cures in 3 hours at temperature of 150 degrees F (66 degrees C).

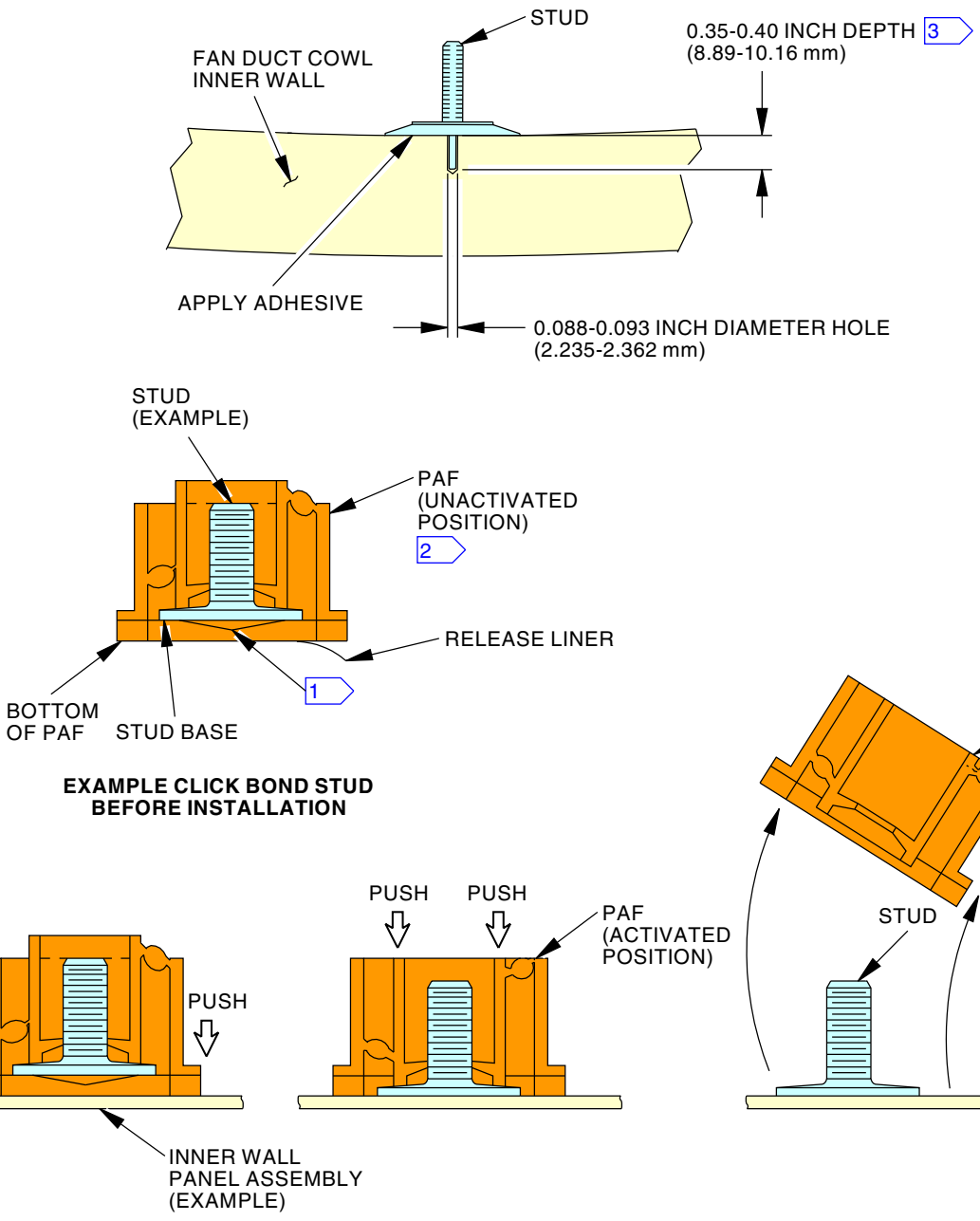
d) Adhesive BMS 5-141 cures in 1 hour at temperature of 180 degrees F (82 degrees C).

(j) After the adhesive has cured, peel off the PAF and discard it.

(k) Remove any cured adhesive on the surface of the stud with a non-woven, non-metallic abrasive mat, G00251 mat (Scotch-Brite pad).

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 APPLY ADHESIVE TO THIS SURFACE.

2 PAF = PRESSURE APPLICATION FIXTURE

3 DRILL DEPTH MUST BE CONTROLLED TO PREVENT DAMAGE TO INNER CORE AND OUTER SKIN.

M07322 S0004286294_V2

Click Bond Stud Replacement
Figure 806/78-31-01-990-802-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-01-300-805-H01

5. Enamel Paint Touch-up for Cracks in the Paint on the Thrust Reverser Cowl

A. General

(1) This task gives the procedure to touch-up the enamel paint on the thrust reverser cowl.

B. Tools/Equipment

Reference	Description
STD-128	Brush - Paint
STD-193	Container

C. Consumable Materials

Reference	Description	Specification
A00436	Sealant - Fuel Tank	BMS5-45 (Supersedes BMS5-26)
B00130	Alcohol - Isopropyl	TT-I-735
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
C00033	Coating - Protective Enamel, Flexibility Use	BMS10-60 Type II
C00175	Primer - Urethane Compatible, Corrosion Resistant (Less Than 1% Aromatic Amines)	BMS10-79 Type III
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00270	Tape - Scotch Flatback Masking 250	ASTM D6123 (Supersedes A-A-883)
G01659	Swab - Cotton Or Rayon, (Disposable)	
G50077	Abrasive - Aluminum Oxide Paper, 240 grit or finer	

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Procedure

SUBTASK 78-31-01-370-001-H01

(1) Apply a gloss enamel coating, C00033 to the cracks in the paint surface.

(a) Wipe or scrub the surface with a clean cotton wiper, G00034 to remove all dirt, oil, grease, hydraulic fluid or unwanted residues.

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. SOLVENT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) Clean the surface with solvent, B00148 or alcohol, B00130 on a clean cotton wiper, G00034 to remove unwanted residues.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Use Scotch Flatback Masking Tape 250, G00270 to mask or cover all areas not to be coated.

CAUTION

DO NOT ABRADE THE SURFACE INTO THE GRAPHITE FIBERS. DAMAGE TO THE EQUIPMENT CAN OCCUR.

(d) Lightly sand and smooth the enamel surface with 240 grit or finer abrasive paper, G50077.

1) Do not sand through the primer layer or into the composite layers.

(e) Clean the surface with solvent, B00148 or alcohol, B00130 on a clean cotton wiper, G00034 to remove the dust.

1) Immediately wipe the surface dry with a dry clean cloth.

2) Continue to change the soiled cloth for a new cloth and wipe the surface again until you see no residue on the cloth.

(f) If it is necessary, apply aerodynamic sealant, A00436 between the outer cowl panel and the inner acoustic panel.

(g) If it is necessary, apply primer, C00175, Grade D with a paint brush, STD-128 or disposable swab, G01659.

1) Thoroughly mix the primer to the required proportions per the manufacturers instructions.

2) Allow the primer to dry for 60 minutes minimum at 60-100 degrees F (15.5-37.8 degrees C).

(h) Thoroughly mix the enamel catalyst, base and thinner to the required proportions per the manufacturers instructions.

1) Use a clean container, STD-193 to mix the enamel components.

NOTE: Metal containers are recommended. Do not use uncoated paper cups or paper cups with soluble organic coatings, alkyds or wax which can contaminate the paint and cause finish problems.

(i) Apply the enamel in one direction to form an even continuous coat with a paint brush, STD-128 or disposable swab, G01659.

1) Apply the coating when the temperature is 50-95 degrees F (10-35 degrees C) and the relative humidity is 85 percent maximum.

(j) Remove the tape.

——— END OF TASK ———

TASK 78-31-01-350-801-H01

6. Bond the Seal Pad to the Thermal Insulation Blanket

(Figure 807)

A. General

(1) This task gives the procedure to bond a seal pad on the end of the thermal insulation blanket.

(2) The seal pad has been accidentally removed by some operators.

(3) A seal pad closes the end of the blanket that covers the No. 4 compression fittings on the lower bifurcation. The seal pad is on the blankets for the left and right side thrust reversers. The seal pad, P/N 315W1814-9, is part of the blanket assembly.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(4) There is a hole in the center of the pad to allow the adjustment of the spacers under the circular compression pad. The seal pad is a closed cell, silicone sponge rubber pad, 0.1900 inch thick and can be a white or black color. The seal pad is bonded to the CRES foil on the end of the blanket.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-202	Container - Non-absorbent Glass, Metal or Polyethylene Coated Paper
STD-809	Spatula

D. Consumable Materials

Reference	Description	Specification
A00335	Adhesive - Silicone Rubber, 2 Part, RTV	BAC5010 Type 68
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
B00634	Solvent - Stabilized Limonene Cleaner	BMS11-10 Type 1, 2, or 3
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Procedure

SUBTASK 78-31-01-010-021-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

H. Procedure

SUBTASK 78-31-01-350-002-H01

(1) Bond the seal pad to the blanket that covers the No.4 compression fitting to seal the end of the blanket.

(a) If there is damaged or torn CRES foil, do permanent repair of the foil around the end of the blanket before you bond the seal pad to the blanket.

1) Do this task: Permanent Repair of the Thrust Reverser Metal-faced Thermal Insulation Blankets, TASK 78-31-01-300-824-H00.

(b) Wipe the surface of the foil with solvent, B00148 or Limonene solvent, B00634 on a clean cotton wiper, G00034.

1) Wipe the surface dry with a clean cotton wiper, G00034 before the solvent evaporates.

2) Continue to clean the surface with a new clean cloth and solvent until no contamination is shown on the cloth.

(c) Prepare the adhesive, A00335 to make a smooth mixture of uniform consistency and color that is free of lumps and entrapped air.

1) Select the correct catalyst for the applicable pot life.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Use a clean and dry, non-absorbent container, STD-202 to mix the adhesive.

3) Thoroughly blend the two components to this ratio; 10 parts by weight of catalyst to 100 parts by weight of base compound.

a) Remove the surface crust from the catalyst which forms if exposed to moisture.

b) Manually mix the components for 2-5 minutes.

(d) Bond the seal pad to the thermal insulation blanket.

1) Apply a continuous and uniform layer of adhesive to the surface and the seal pad with a spatula, STD-809 or similar tool.

2) Put the seal pad in position on the end of the blanket.

3) Install the seal pad to the surface with sufficient pressure to force out the air.

4) Let the adhesive cure in-service.

NOTE: Adhesive DC93-076 and GE RTV 430 will cure in 24 hours at temperatures of 60-80°F (16-27°C). Adhesive DC3-6999-1/2 will cure in 8 hours at temperatures of 60-80°F (16-27°C).

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-01-410-018-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

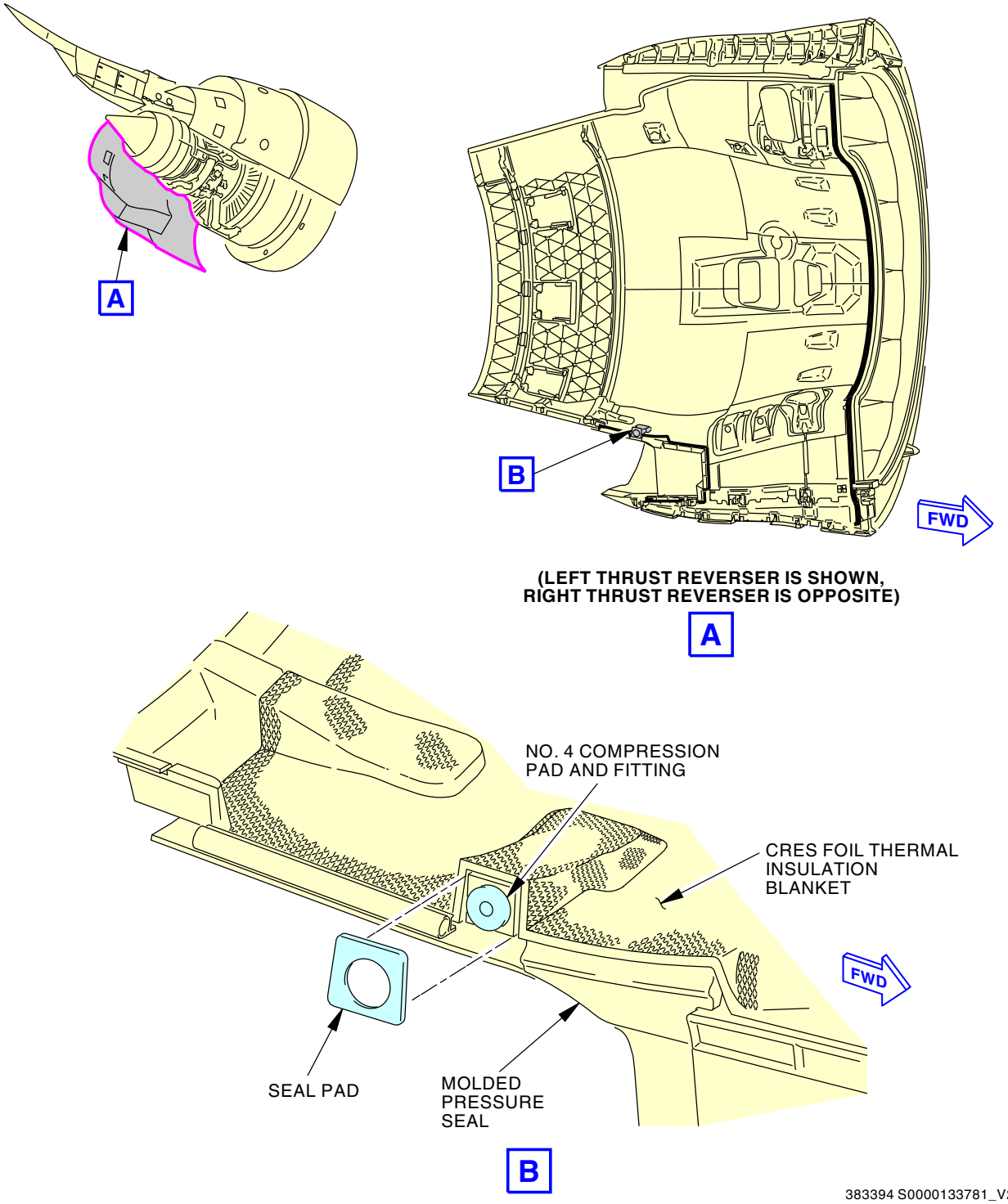
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Bond the Seal Pad
Figure 807/78-31-01-990-828-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER V-GROOVE LATCH BANDS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the V-groove latch bands

(2) An installation of the V-groove latch bands.

TASK 78-31-02-000-801-H01

2. Thrust Reverser V-Groove Latch Bands Removal

(Figure 401)

A. General

(1) This task is the removal procedure for the thrust reverser v-groove latch bands.

(2) The v-groove latch bands are located under the fan cowl panels on the torque box v-blade of the thrust reverser.

(3) The right v-groove latch band has a v-band link that has a t-bolt receiver. The left v-groove latch band has a v-band latch with an adjustable hook.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Prepare for the Removal

SUBTASK 78-31-02-860-001-H01

> **CAUTION** RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-02-040-001-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-02-040-002-H01

> **WARNING** DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-02-010-003-H01

(4) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Thrust Reverser V-Groove Latch Bands Removal

SUBTASK 78-31-02-020-001-H01

(1) Remove the left v-groove latch band assembly [5] or right v-groove latch band assembly [10] (Figure 401).

NOTE: The left v-groove latch band has the v-band latch. The right v-groove latch band has the v-band link which engages the hook on the v-band latch.

> **WARNING** MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(a) Release the v-band latch [1] and disengage the latch hook from the v-band link.

(b) Remove the bolt [7], washer [8], and nut [9] that attach the v-groove latch band to the fan case bracket [6].

(c) Remove the latch band retainers [4]:

NOTE: The latch band retainers are installed at 6 locations on the left thrust reverser and 6 locations on the right thrust reverser.

1) Remove the bolts [2] and washers [3].

2) Remove the latch band retainer [4].

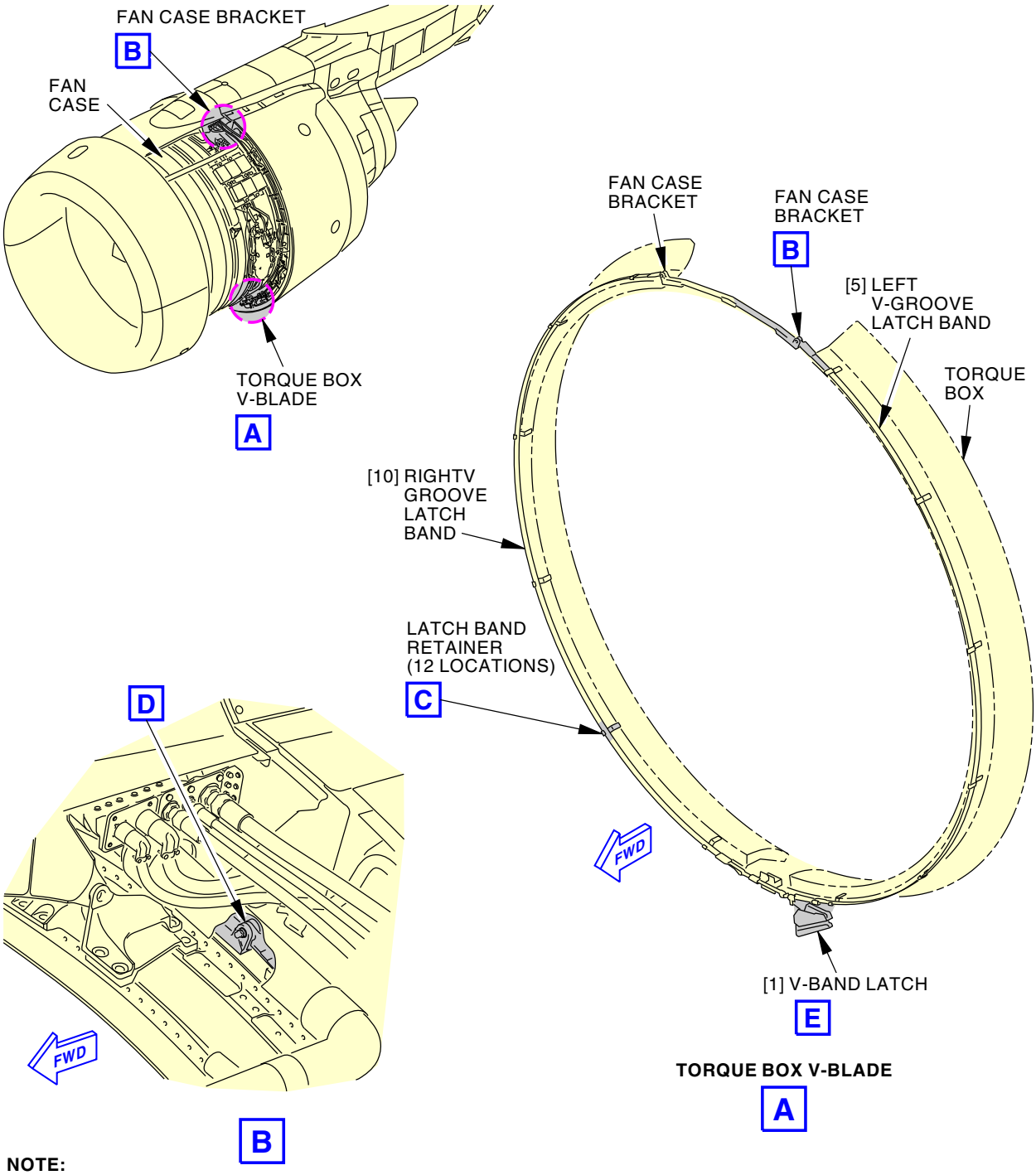
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Move the v-band link out of the retainer on the No.1 tension latch receiver to remove the right v-groove latch band assembly [10].

(e) Disengage the clip on the v-band latch from the v-blade structure to remove the left v-groove latch band assembly [5].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



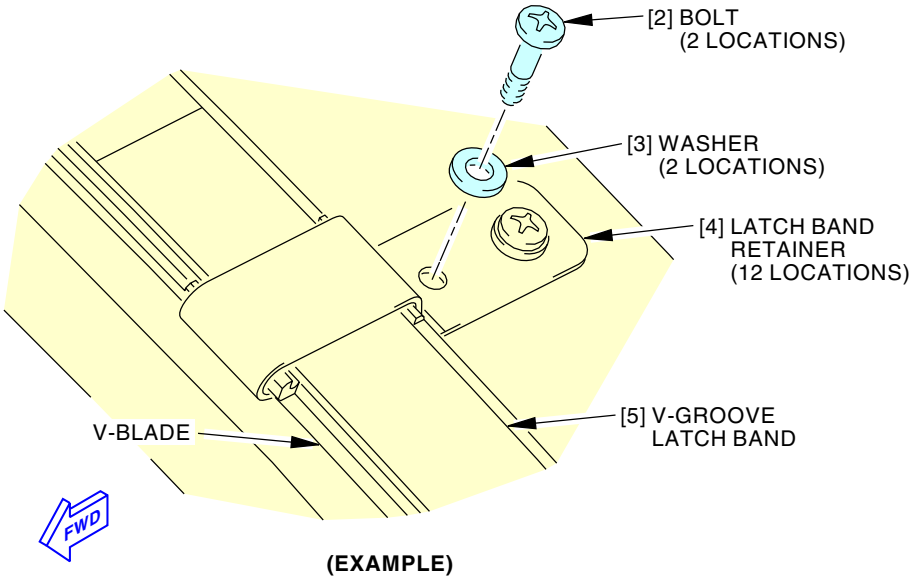
NOTE:

LEFT SIDE IS SHOWN, RIGHT SIDE IS EQUIVALENT.

M07323 S0004286295_V3

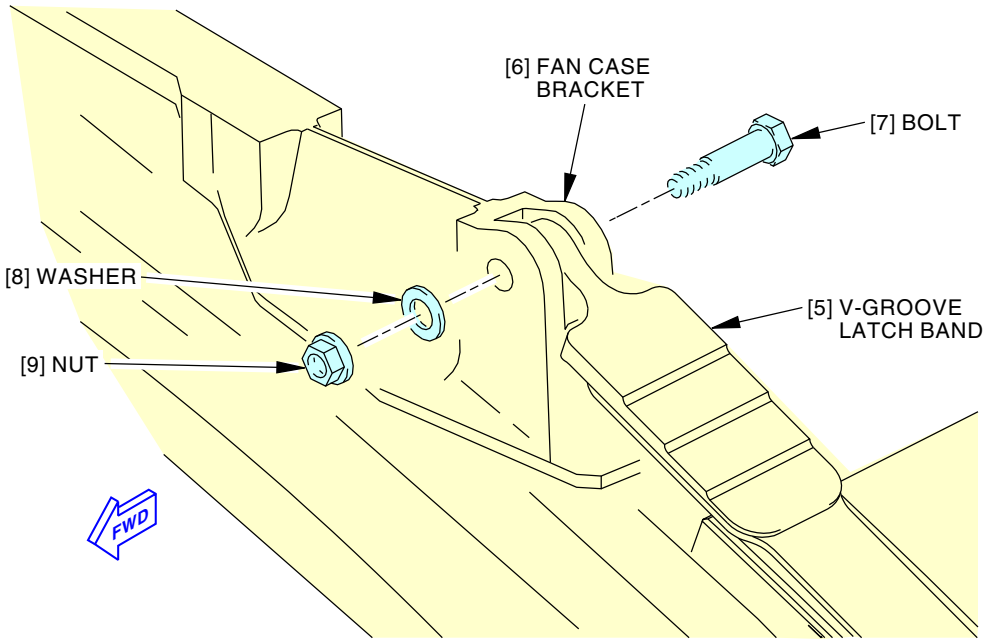
Thrust Reverser V-Groove Latch Band Installation
Figure 401/78-31-02-990-801-H01 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(EXAMPLE)

C



D

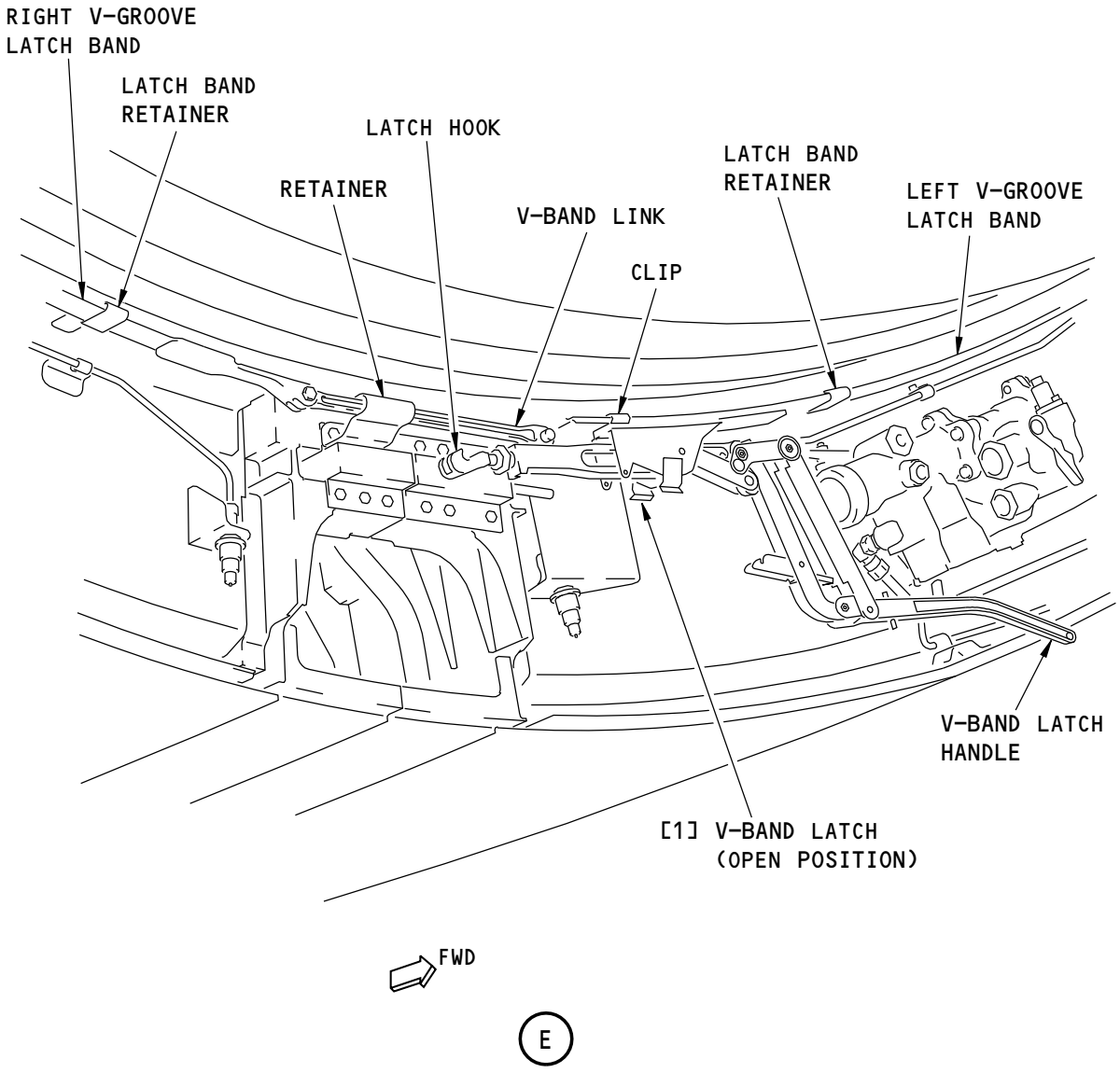
NOTE:

LEFT SIDE IS SHOWN, RIGHT SIDE IS EQUIVALENT.

M07324 S0004286296_V2

Thrust Reverser V-Groove Latch Band Installation
Figure 401/78-31-02-990-801-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M62313 S000098722_V1

Thrust Reverser V-Groove Latch Band Installation
Figure 401/78-31-02-990-801-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-02-400-801-H01

3. Thrust Reverser V-Groove Latch Bands Installation

(Figure 401)

A. General

(1) This task is the installation procedure for the thrust reverser v-groove latch bands.

(2) After the installation of the v-groove latch bands, you must adjust the tension of the v-band latch.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-02-820-801-H01	Thrust Reverser V-Band Latch Adjustment (P/B 501)

C. Consumable Materials

Reference	Description	Specification
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
B00184	Solvent - Presealing, Cleaning Solvent	BMS11-7
B00634	Solvent - Stabilized Limonene Cleaner	BMS11-10 Type 1, 2, or 3
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Thrust Reverser V-Groove Latch Bands Installation

SUBTASK 78-31-02-110-001-H01

(1) Clean the surface of the retainers with a clean cotton wiper, G00034 that is wet with solvent, B00184 or Limonene solvent, B00634 or solvent, B00148.

(a) Wipe the surface with a clean cloth before the solvent dries.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-02-420-001-H01

(2) Install the left v-groove latch band assembly [5] or right v-groove latch band assembly [10] (Figure 401):

NOTE: The left v-groove latch band has the v-band latch. The right v-groove latch band has the v-band link which engages the hook on the v-band latch.

(a) Position the v-groove latch band on the thrust reverser v-blade structure.

1) Position the v-band link on the right v-groove latch band assembly [10] in the retainer on the No.1 tension latch receiver.

2) Engage the clip on the v-band latch to the v-blade structure for the left v-groove latch band assembly [5].

(b) Install the v-groove latch band to the fan case bracket [6]:

1) Apply the grease, D00633 to the shank of the bolt [7]; do not apply grease to the threads of the bolt.

2) Install the bolt [7], washer [8] and nut [9].

NOTE: Install the bolt from the aft side.

3) Tighten the nut to 250-350 pound-inches (28.2-39.5 newton-meters).

(c) Install the latch band retainers [4] over the v-groove latch band and v-blade structure:

1) Apply the sealant, A00160 to the bolts [2] and install the bolts with wet sealant.

a) Mix the two part sealant to the manufacturers instructions.

b) Apply a coat of the sealant to the entire bolt shank and all the threads.

2) Install two bolts [2] and washers [3] to install the latch band retainers [4].

NOTE: The retainers are installed at 6 locations on the left thrust reverser and 6 locations on the right thrust reverser.

SUBTASK 78-31-02-820-001-H01

(3) Do this task : Thrust Reverser V-Band Latch Adjustment, TASK 78-31-02-820-801-H01.

SUBTASK 78-31-02-410-001-H01

WARNING DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(4) Close the V-band latch [1] on the bottom of the engine to lock the V-groove latch band [5].

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-02-410-004-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-02-440-001-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-02-440-002-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER V-GROOVE LATCH BANDS - ADJUSTMENT/TEST

1. General

A. This procedure has one task:

(1) An adjustment of the thrust reverser V-groove latch bands (Hartwell HA277-3 (Boeing S315W113-6)).

TASK 78-31-02-820-801-H01

2. Thrust Reverser V-Band Latch Adjustment

(Figure 501)

A. General

(1) This task is the adjustment procedure for the v-band latch.

(2) The v-band latch is found below the fan cowl panels at the forward end of the thrust reverser.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-755	Scale - Spring, Push/Pull Type, 0 to 150lbs (0 to 68kg) Capacity

D. Consumable Materials

Reference	Description	Specification
G00440	Lockwire - MS20995C41, Corrosion Resistant Steel - 0.041 Inch (1.0414 mm) Diameter	NASM20995
G02473	Cable, Safety Kit	AS3510-03()K

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Adjustment

SUBTASK 78-31-02-860-002-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-02-040-003-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-02-040-004-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-02-010-004-H01

(4) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

H. Thrust Reverser V-Band Latch Adjustment

SUBTASK 78-31-02-820-002-H01

(1) Do these steps to adjust the v-band latch (Figure 501).

(a) Make sure all the tension latches on the latch beam are latched.

WARNING MAKE SURE THAT YOU ARE FORWARD OF THE V-BAND LATCH WHEN YOU OPERATE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

(b) Open the v-band latch.

1) Hold the latch handle firmly against the force you will feel when you release trigger A.

2) Push upward on the end of the latch handle to release trigger A lock pin.

3) Slide trigger A toward the end of the handle.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

4) Move the handle downward and to the left until the handle locks in the vertical position.

NOTE: This is the unlock stroke.

5) Hold the latch handle firmly against the force you will feel when you release the trigger B latch and move the latch handle.

NOTE: The force on the handle will be 50-55 pounds (222-245 newtons).

6) Move the handle to the left to relieve the preload on trigger B.

7) Slide trigger B away from the handle pivot points.

8) Move the handle from the vertical to the horizontal position.

NOTE: This is the release stroke.

9) Make sure the latch hook is disengaged from the t-bolt receiver.

WARNING DO NOT PUSH THE V-BAND LATCH HANDLE TO CLOSE THE V-BAND LATCH. PULL ON THE LATCH HANDLE TO CLOSE THE V-BAND LATCH. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

WARNING MAKE SURE THE V-BAND LATCH IS FULLY ENGAGED BEFORE YOU RELEASE THE LATCH HANDLE. INJURIES TO PERSONNEL CAN OCCUR IF THE LATCH OPENS SUDDENLY AND THE LATCH HANDLE HITS YOU.

CAUTION MAKE SURE THAT THE V-BAND ENGAGED CORRECTLY IN THE RECEIVER OF THE V-GROOVE LATCH BAND BEFORE YOU CLOSE THE V-BAND LATCH HANDLE. DAMAGE TO THE V-BAND LATCH OR THE RECEIVER CAN OCCUR.

(c) Measure the force to close the v-band latch:

1) Push the latch hook upward to engage the t-bolt receiver.

2) With the handle horizontal to the right side of the latch, pull the handle down to the vertical position until trigger B latch engages.

NOTE: This is the take-up stroke.

3) Use the spring scale, STD-755 in the pull mode with a hook or lanyard inserted through the hole in the web at the end of the latch handle.

4) Pull down on the trigger A to release the lock pin in the handle.

5) Move the handle up from the vertical to the horizontal position with the scale until the lock pin engages.

NOTE: The force to lock and stow the v-band latch is 50-55 pounds (222-245 newtons).

(d) If the force is not 50-55 pounds (222-245 newtons), adjust the v-band latch:

1) Open the v-band latch.

2) Remove the lockwire and loosen the jamnut on the end of the v-band latch near the hook.

3) Turn the hook of the v-band latch to move it outward or inward to adjust the force.

4) Tighten the jamnut on the end of the v-band latch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

5) Measure the force to close the latch again.

a) Adjust the v-band latch until you use 50-55 pounds (222-245 newtons) of force to close the v-band latch.

(e) Open and close the v-band latch two more times after you get the force of 50-55 pounds (222-245 newtons).

1) Make sure the force remains in the limits for each time that you open and close the latch.

(f) Remove the scale.

(g) Install safety cable, G02473, 18 inches long or MS20995C41 lockwire, G00440, double twist method, on the v-band latch jamnut.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-02-410-005-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-02-440-003-H01

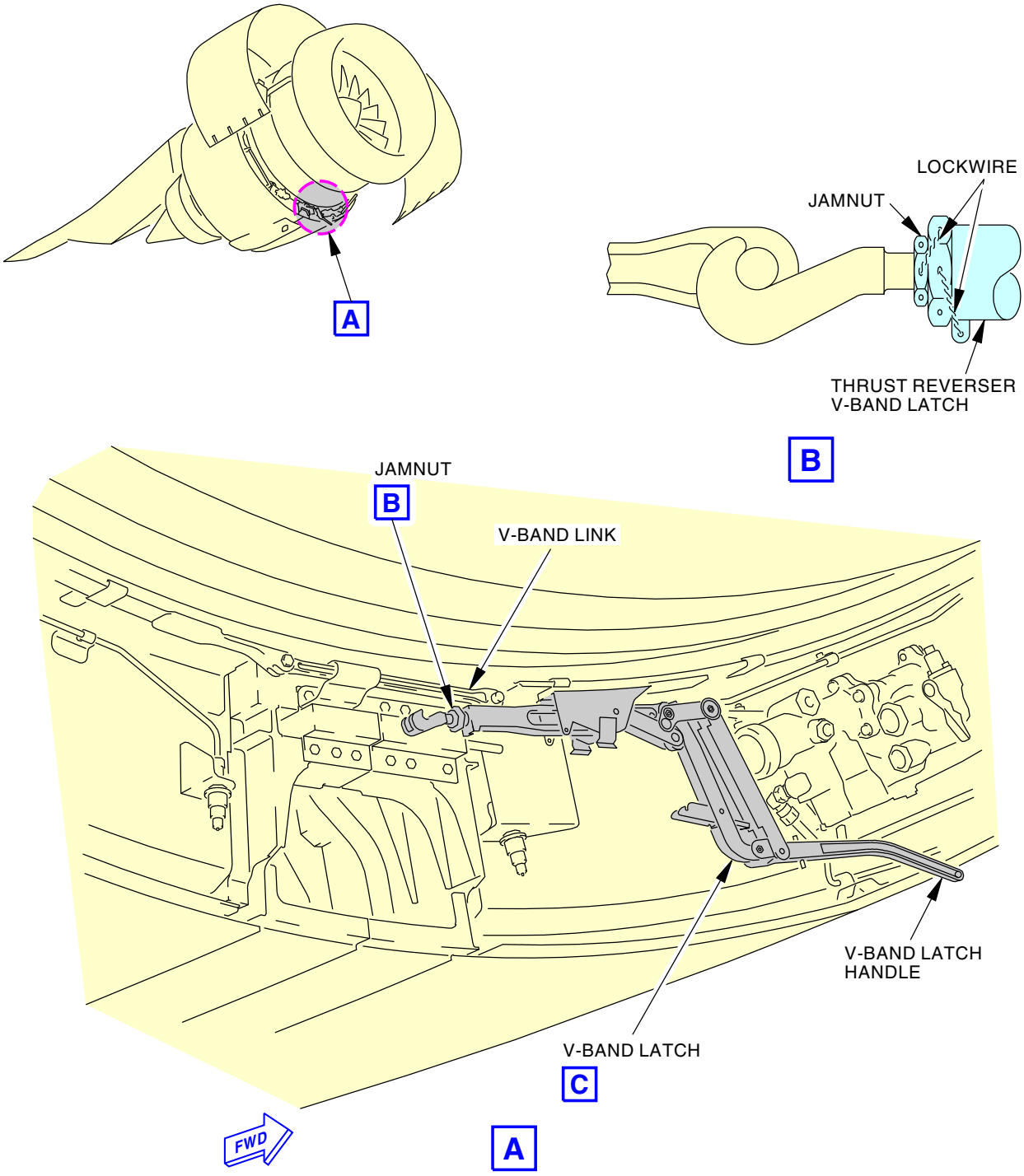
(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-02-440-004-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

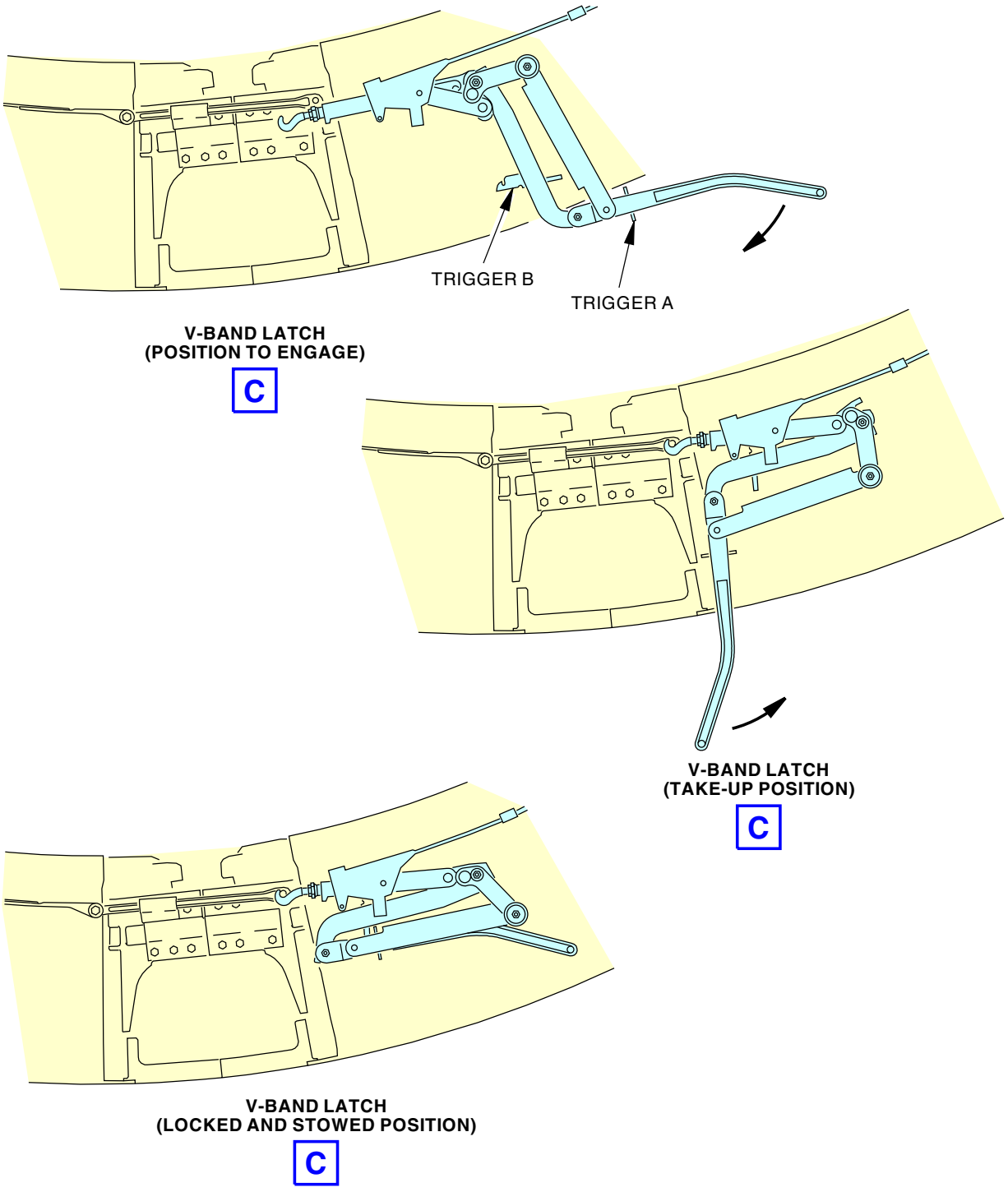
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07326 S0004286299_V2

Thrust Reverser V-Groove Latch Band Adjustment
Figure 501/78-31-02-990-802-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07328 S0004286300_V2

Thrust Reverser V-Groove Latch Band Adjustment
Figure 501/78-31-02-990-802-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER TENSION LATCHES - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser tension latches

(2) An installation of the thrust reverser tension latches.

TASK 78-31-04-000-801-H01

2. Thrust Reverser Tension Latches Removal

(Figure 401/Figure 402/Figure 403/Figure 404)

A. General

(1) This task is the removal procedure for the thrust reverser and aft cowl tension latches.

(2) This task also has the removal procedure for the thrust reverser latch beam keeper bolts and aft cowl latch keepers.

(3) There are four different groups of tension latches:

(a) The No.1 tension latch is on the forward face of the thrust reverser torque box at the 6 o'clock position aft of the V-band latch.

1) This latch is a non-adjustable, lever-actuated, t-bolt that engages an adjustable hooked keeper.

(b) The No. 2, 3, and 4 tension latches are mounted on the right thrust reverser.

1) These latches are adjustable hooks that engage latch bolts on the left thrust reverser.

(c) The No. 5 tension latch is mounted on the left thrust reverser.

1) This latch is an adjustable hook that engages a latch bolt on the right thrust reverser.

(d) The three aft cowl tension latches are mounted on the left aft cowl.

1) These latches are adjustable hooks that engage keeper eyebolts on the right aft cowl.

(e) The four deflection limiter tension latches are on the aft cowls approximately 6 inches from the centerline.

1) There are two deflection limiter tension latches on the left aft cowl and two deflection limiter tension latches on the right aft cowl.

2) These latches have adjustable hooks that engage tension strap keepers in the left and right aft cowls. These straps are connected to cross-tie rods mounted under the strut and on the engine turbine frame.

(4) To open the No.1 tension latch, operate the latch handle and lock lever to disengage the latch t-bolt on the opposite latch hook receiver.

(5) To open the other tension latches and deflection limiter latches, do these steps:

(a) Push on the secondary lock square with your finger to release the spring-loaded latch handle.

NOTE: The latch handle will pop-up when the secondary lock is released.

(b) Pull the latch handle to release the hook load.

(c) Pull the handle to the full open position to lift and clear the latch hook from the opposite latch bolt or latch keeper.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-02-000-801-H01	Thrust Reverser V-Groove Latch Bands Removal (P/B 401)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

E. Prepare for the Removal

SUBTASK 78-31-04-010-006-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-04-010-001-H01

(2) To get access to the No.1 tension latch, partially remove the V-band latch and V-groove latch band from the thrust reverser outer v-blade.

(a) Do this task: Thrust Reverser V-Groove Latch Bands Removal, TASK 78-31-02-000-801-H01.

1) Remove the bottom two retainers for the v-groove latch band.

2) Disconnect the v-band latch clip from the thrust reverser outer v-blade.

SUBTASK 78-31-04-010-002-H01

(3) To get access to the tension latches on the thrust reverser latch beam or the aft cowl, remove the thermal insulation blankets around the tension latches.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

F. Thrust Reverser Tension Latches Removal

SUBTASK 78-31-04-020-001-H01

(1) Remove the thrust reverser No.1 tension latch [9] (Figure 401).

(a) Remove the three countersunk bolts [7].

(b) Remove the two bolts [4], washers [5], and nuts [6] on the top flange of the latch.

(c) Remove the bolt [4] and washer [5] from the nutplate on the top flange.

(d) Remove three bolts [8], washers [5] and nuts [6] from the bottom flange of the latch.

SUBTASK 78-31-04-020-002-H01

(2) Remove the No.1 latch keeper [10].

(a) Remove the three bolts [11], washers [12], washers [13] and nuts [14].

(b) Remove the bolt [15], washer [12], washer [13] and nut [14].

(c) Remove the bolt [1], washer [2], washer [13] and nut [14].

(d) Remove bolt [1] and washer [2] from the nutplates to remove the retainer [3].

SUBTASK 78-31-04-020-003-H01

(3) Remove the thrust reverser No.2 tension latch [20] or No.3 tension latch [20] or No.4 tension latch [20] (Figure 402).

NOTE: The No. 2, No. 3 and No. 4 tension latches are on the right thrust reverser and are all the same part number.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Remove the nut [24], washer [23], washer [25], washer [26], washer [27], washer [22] and bolt [21].

SUBTASK 78-31-04-020-004-H01

(4) Remove the thrust reverser No.5 tension latch [31].

NOTE: The No. 5 tension latch is on the left thrust reverser.

(a) Remove the panel [61] on the bottom of the latch beam fairing to get access to the nut [30].

1) Remove the eight countersunk bolts [60].

(b) Remove the nut [30], washer [29], washer [23], washer [25], washer [26], washer [28], and bolt [69].

G. Aft Cowl Tension Latches Removal

SUBTASK 78-31-04-020-005-H01

(1) Remove the left aft cowl, No.3 tension latch [32] (Figure 403).

(a) Remove the nut [36], washers [35], washer [34], and bolt [33].

SUBTASK 78-31-04-020-006-H01

(2) Remove the left aft cowl, aft deflection limiter tension latch [37].

(a) Remove the nut [36], washer [35], washer [34], and bolt [33].

SUBTASK 78-31-04-020-007-H01

(3) Remove the left aft cowl, No.2 tension latch [38].

(a) Remove the nut [42], washer [41], washer [40] and bolt [39].

SUBTASK 78-31-04-020-008-H01

(4) Remove the left aft cowl, No.1 tension latch [43].

(a) Remove the nut [47], washer [46], washer [45], and bolt [44].

SUBTASK 78-31-04-020-009-H01

(5) Remove the left aft cowl, forward deflection limiter latch [48].

(a) Remove the nut [47], washer [46], washer [45], and bolt [44].

SUBTASK 78-31-04-020-010-H01

(6) Remove the right aft cowl, aft deflection limiter latch [49] (Figure 404).

(a) Remove the nut [36], washer [35], washer [34], and bolt [33].

SUBTASK 78-31-04-020-011-H01

(7) Remove the right aft cowl, forward deflection limiter latch [50].

(a) Remove the nut [47], washer [46], washer [45], and bolt [44].

H. Thrust Reverser Latch Beam Keeper Bolts Removal

SUBTASK 78-31-04-020-012-H01

(1) Remove the No.2 or No.3 or No.4 tension latch keeper bolt [51] on the left thrust reverser.

(a) Remove the bolt [51], washer [52], washer [55], washer [56], washer [57], washer [53] and nut [54].

SUBTASK 78-31-04-020-013-H01

(2) Remove the No.5 tension latch keeper bolt [58] on the right thrust reverser.

(a) Remove the panel [59] on the bottom of the latch beam fairing to get access to the nut [24].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Remove the eight countersunk bolts [60].

(b) Remove the bolt [58], washer [22], washer [25], washer [26], washer [27], washer [23] and nut [24].

I. Right Aft Cowl Latch Keeper (Eyebolt) Removal

SUBTASK 78-31-04-020-014-H01

(1) To remove the aft cowl No.1 tension latch keeper [62], remove the washer [63] and nut [64].

SUBTASK 78-31-04-020-015-H01

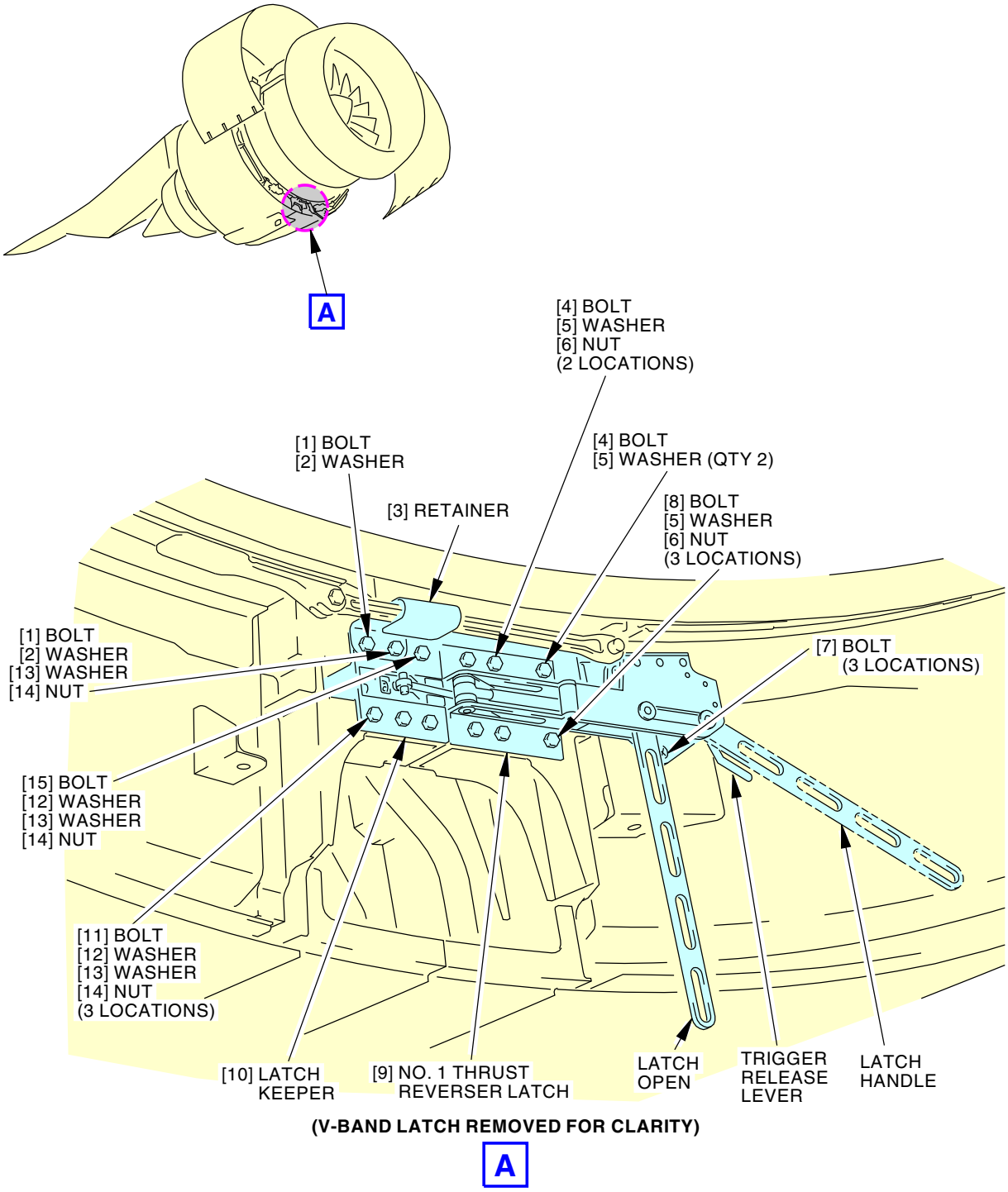
(2) To remove the aft cowl No.2 tension latch keeper [65], remove the washer [66] and nut [67].

SUBTASK 78-31-04-020-016-H01

(3) To remove the aft cowl No.3 tension latch keeper [68], remove the washer [63] and nut [64].

——— END OF TASK ———

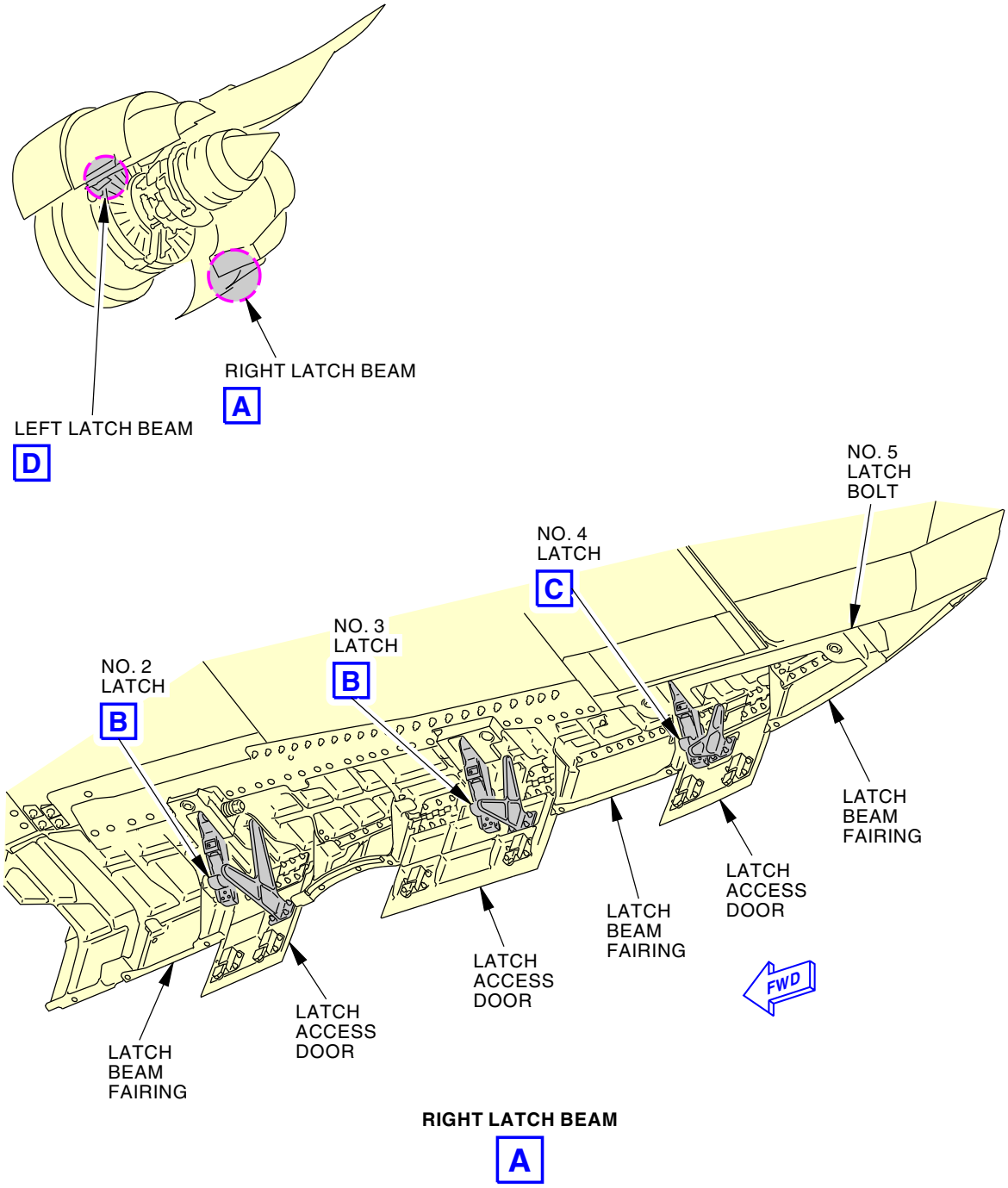
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07331 S0004286303_V2

Thrust Reverser No. 1 Tension Latch Installation
Figure 401/78-31-04-990-801-H01

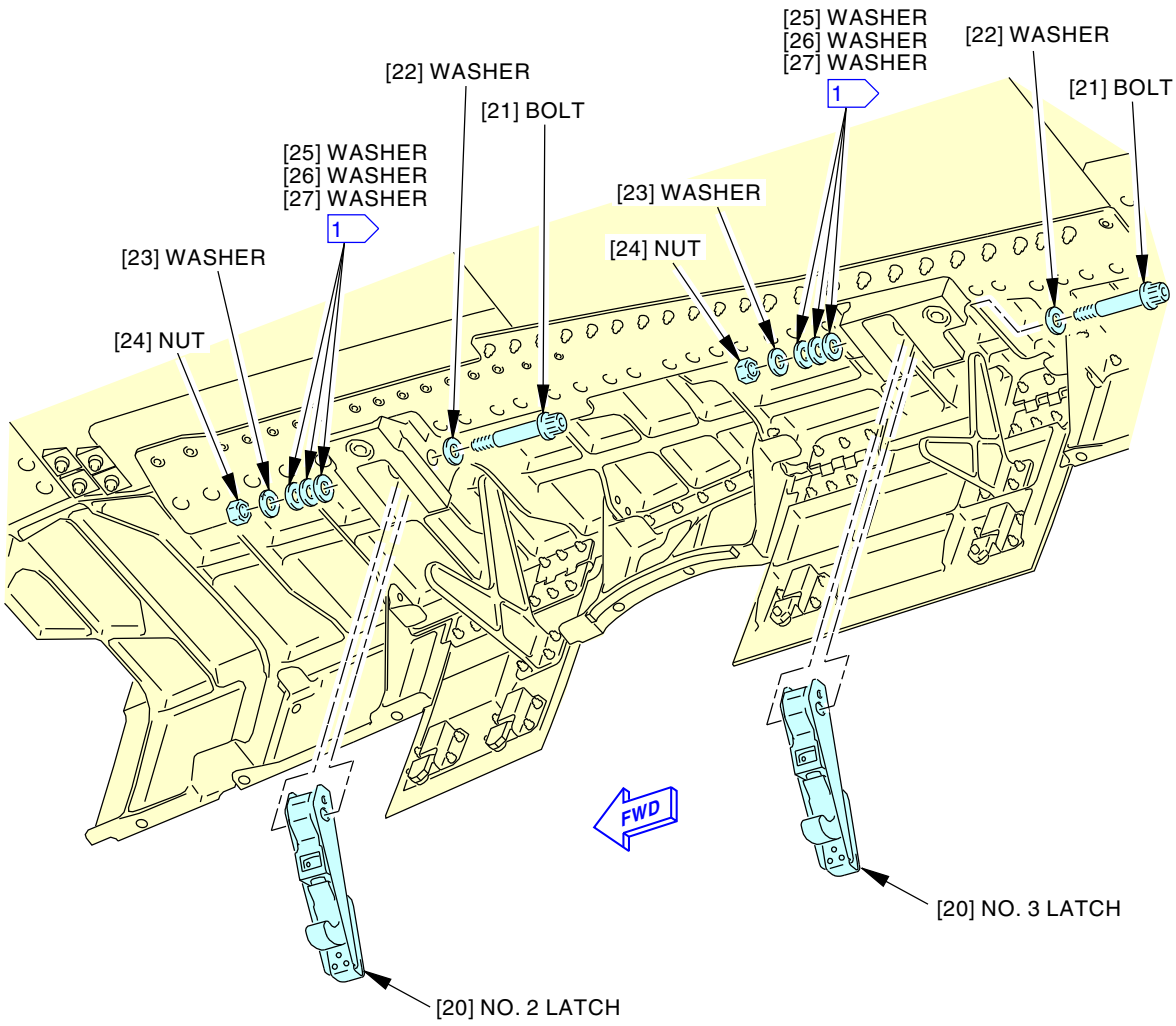
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07337 S0004286304_V2

Thrust Reverser No. 2 - 5 Tension Latch Installation
Figure 402/78-31-04-990-807-H01 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NO. 2 AND 3 THRUST REVERSER LATCHES

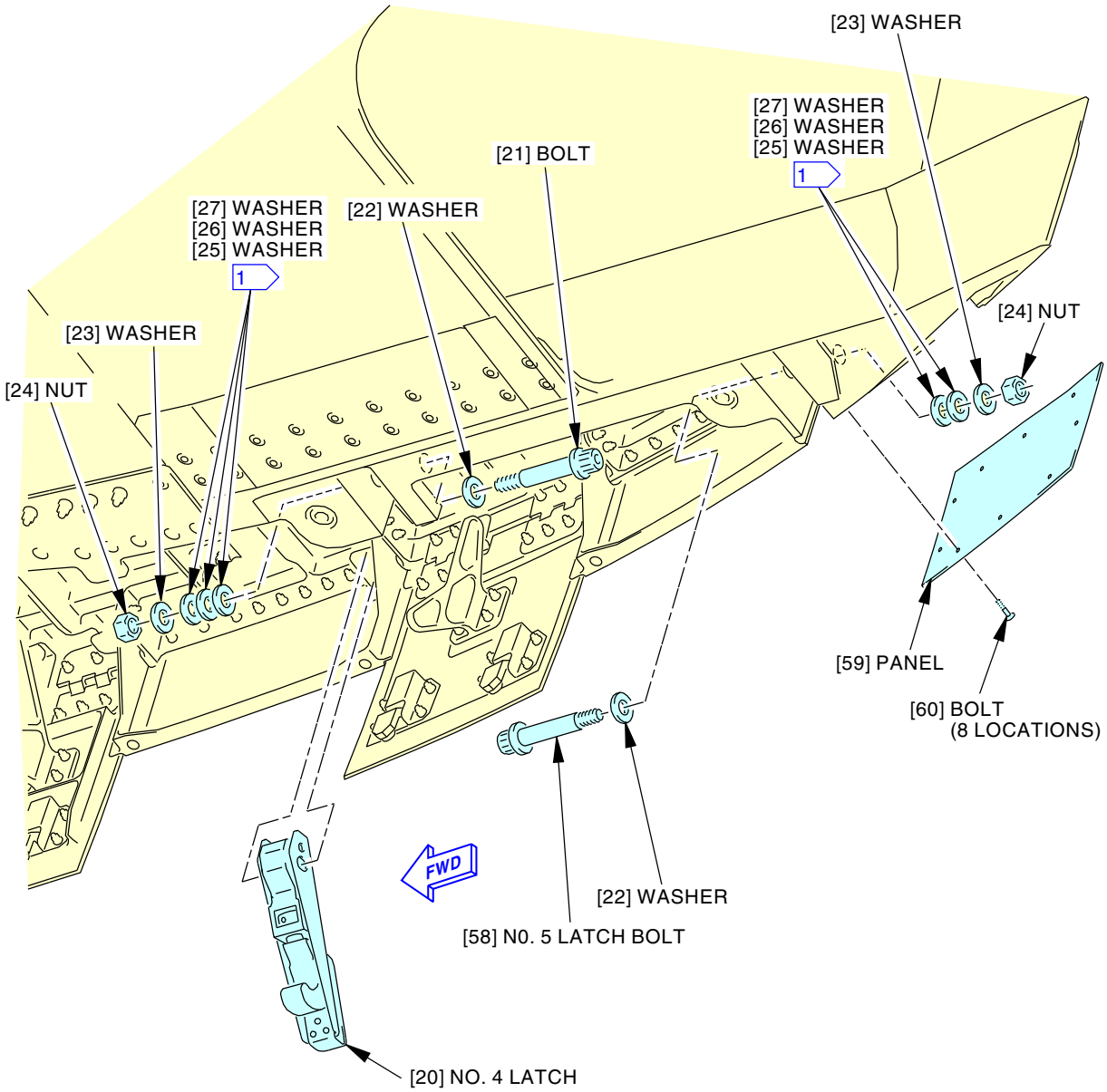
B

1 ADD WASHERS AS NECESSARY TO HAVE 0.005-0.021 INCH (0.13-0.53 mm) GAP BETWEEN SHOULDER AND TOP WASHER.

M07338 S0004286305_V2

Thrust Reverser No. 2 - 5 Tension Latch Installation
Figure 402/78-31-04-990-807-H01 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



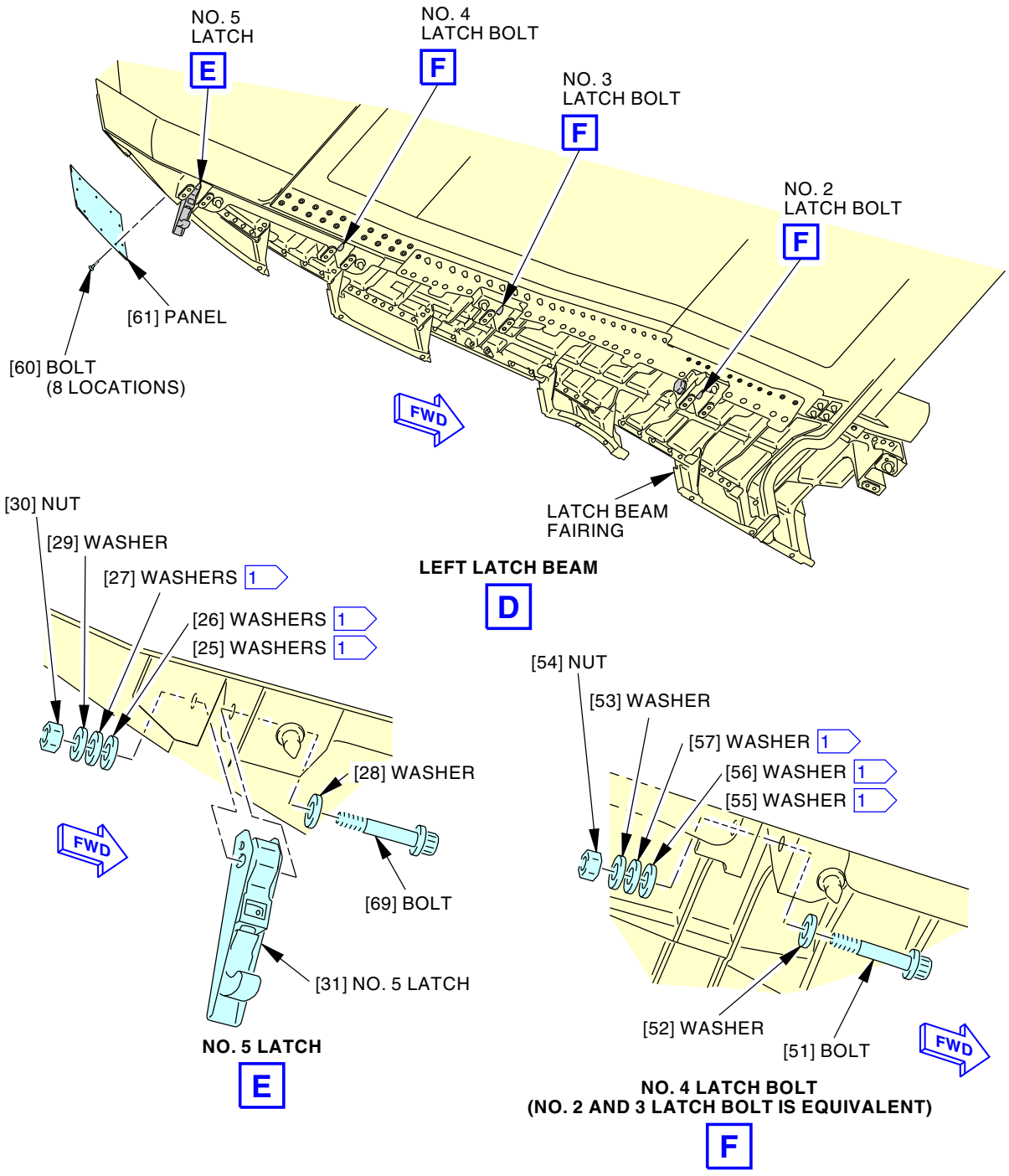
NO. 4 THRUST REVERSER LATCH AND N0.5 LATCH BOLT AND ACCESS PANEL

C

M07339 S0004286306_V2

Thrust Reverser No. 2 - 5 Tension Latch Installation
Figure 402/78-31-04-990-807-H01 (Sheet 3 of 4)

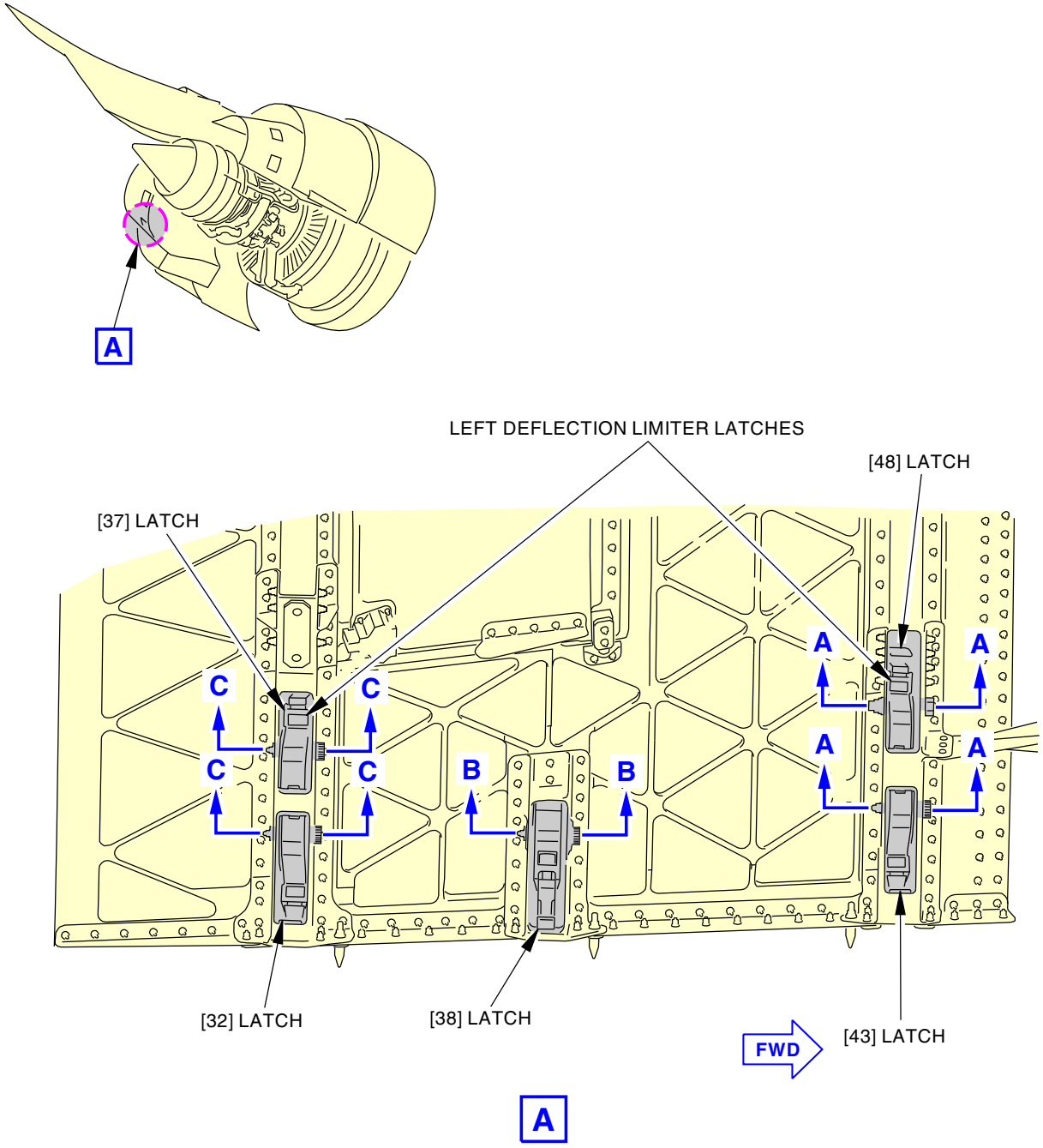
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07340 S0004286307_V2

Thrust Reverser No. 2 - 5 Tension Latch Installation
Figure 402/78-31-04-990-807-H01 (Sheet 4 of 4)

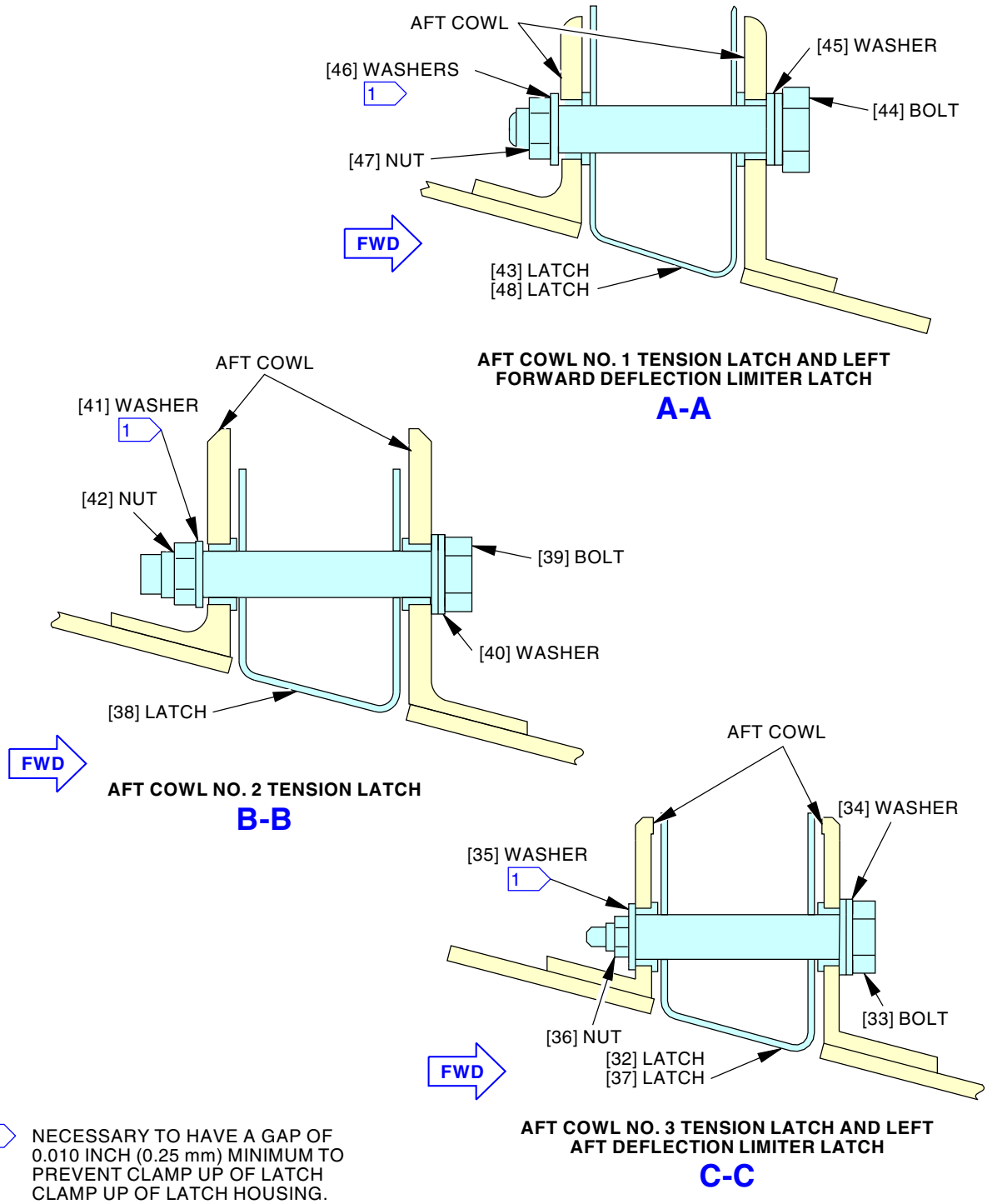
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07341 S0004286308_V2

Left Aft Cowl Tension Latch Installation
Figure 403/78-31-04-990-808-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

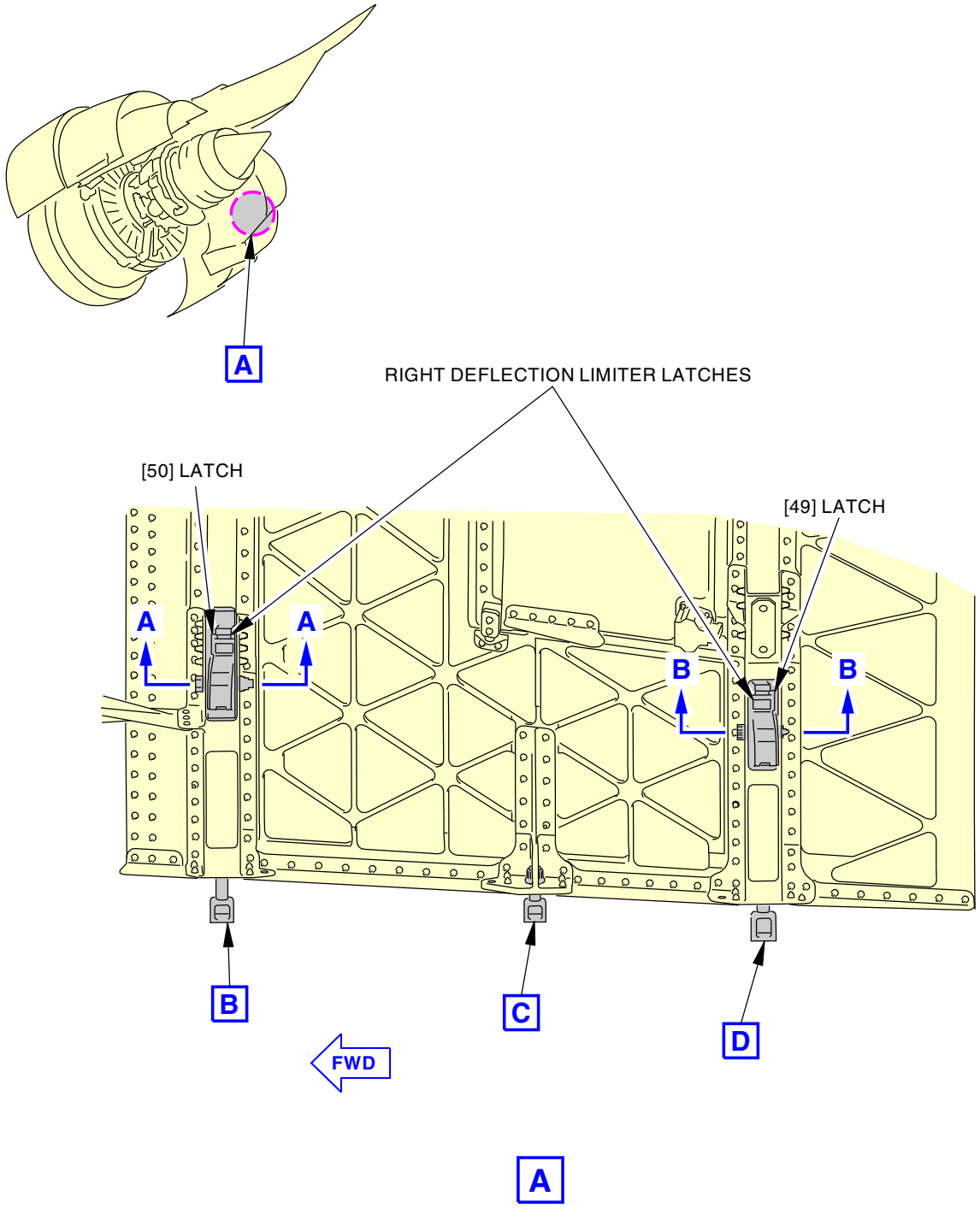


1 NECESSARY TO HAVE A GAP OF 0.010 INCH (0.25 mm) MINIMUM TO PREVENT CLAMP UP OF LATCH CLAMP UP OF LATCH HOUSING.

M07342 S0004286309_V2

Left Aft Cowl Tension Latch Installation
Figure 403/78-31-04-990-808-H01 (Sheet 2 of 2)

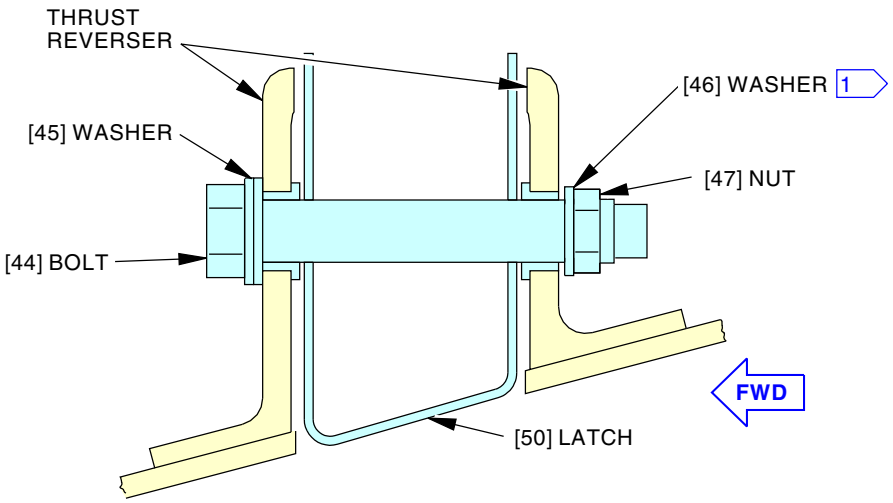
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07343 S0004286310_V2

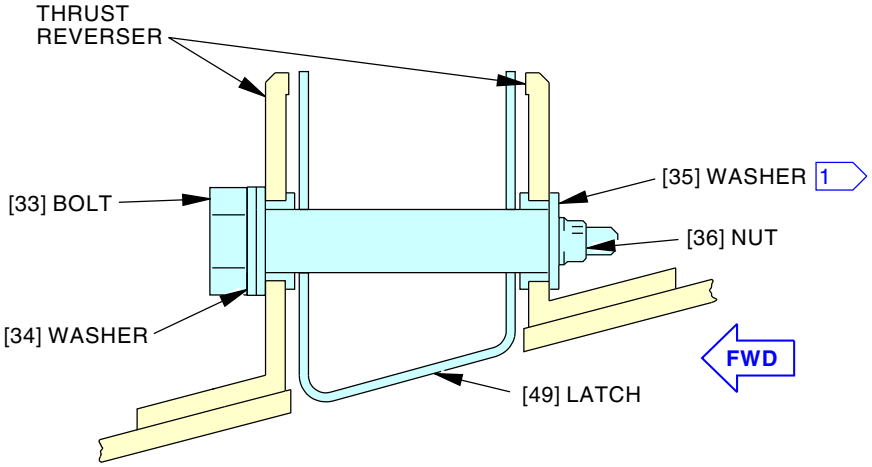
Right Aft Cowl Tension Latch Installation
Figure 404/78-31-04-990-809-H01 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



RIGHT FORWARD DEFLECTION LIMITER LATCH

A-A



RIGHT AFT DEFLECTION LIMITER LATCH

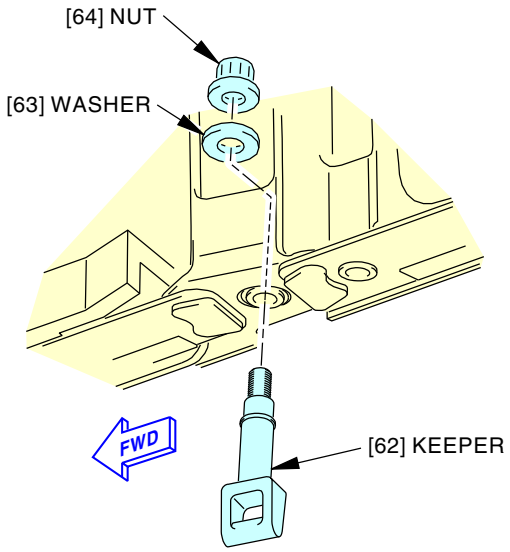
B-B

1 NECESSARY TO HAVE A GAP 0.010 INCH (0.25 mm) MINIMUM TO PREVENT CLAMP UP OF LATCH HOUSING.

M07344 S0004286311_V2

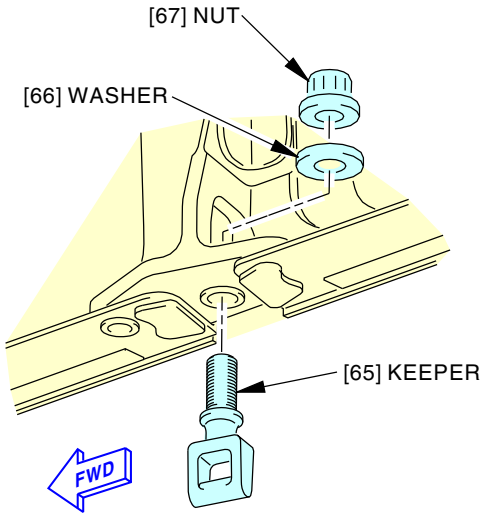
Right Aft Cowl Tension Latch Installation
Figure 404/78-31-04-990-809-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



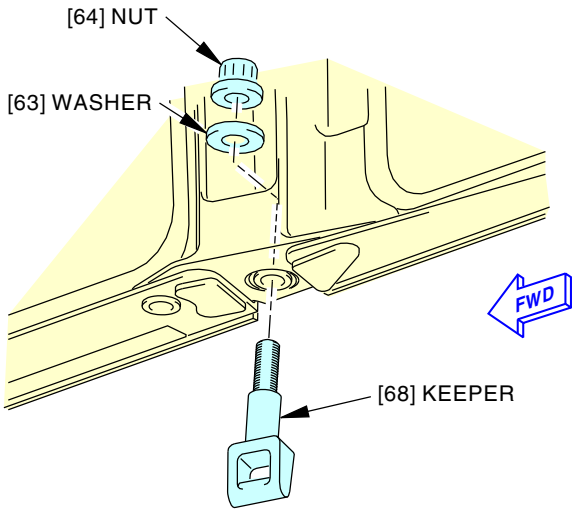
NO. 1 TENSION LATCH KEEPER

B



NO. 2 TENSION LATCH KEEPER

C



NO. 3 TENSION LATCH KEEPER

D

M07345 S0004286312_V2

Right Aft Cowl Tension Latch Installation
Figure 404/78-31-04-990-809-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-04-400-801-H01

3. Thrust Reverser Tension Latches Installation

(Figure 401/Figure 402/Figure 403/Figure 404)

A. General

(1) This task is the installation procedure for the thrust reverser and aft cowl tension latches.

(2) This task also has the installation procedure for the thrust reverser latch beam keeper bolts and aft cowl latch keepers.

(3) After you install a tension latch, you must do the tension latch adjustment procedure.

(4) To close the No.1 tension latch, operate the latch handle and lock lever to engage the latch t-bolt on the opposite latch hook receiver.

(5) To close the other tension latches and deflection limiter latches, do these steps:

(a) Engage the latch hook on the opposite latch bolt or latch keepers.

(b) Push the latch handle to the closed position.

NOTE: Movement of the latch handle to the closed position will over-center lock the latch and apply the latch hook load. The secondary lock will lock the latch handle to the hook.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-02-400-801-H01	Thrust Reverser V-Groove Latch Bands Installation (P/B 401)
78-31-04-820-801-H01	Thrust Reverser Tension Latches Adjustment (P/B 501)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Thrust Reverser Tension Latches Installation

SUBTASK 78-31-04-420-001-H01

(1) Install the thrust reverser No.1 tension latch [9] (Figure 401):

(a) Install the two bolts [4], washers [5] and nuts [6] on the top flange of the latch.

1) Apply primer, C00259 to all areas of the hole, countersink, counterbore and immediately install the bolt.

2) Tighten to 50-80 pound-inches (5.6-9.0 newton-meters).

(b) Install the one bolt [4] and washer [5] into the nutplate on the top flange of the latch.

1) Apply primer, C00259 to all areas of the hole, countersink, counterbore and immediately install the bolt.

2) Tighten to 72-88 pound-inches (8.1-9.9 newton-meters).

(c) Install the three bolts [8], washer [5] and nuts [6] on the bottom flange of the latch.

1) Apply primer, C00259 to all areas of the hole, countersink, counterbore and immediately install the bolt.

2) Tighten to 50-80 pound-inches (5.6-9.0 newton-meters).

(d) Install the three countersunk bolts [7] behind the latch handle.

1) Apply primer, C00259 to all areas of the hole, countersink, counterbore and immediately install the bolt.

2) Tighten to 30-40 pound-inches (3.4-4.5 newton-meters).

SUBTASK 78-31-04-420-002-H01

(2) Install the thrust reverser No.1 tension latch keeper [10]:

(a) Install the three bolts [11] with washers [12] under the bolt head and washers [13] under the nuts [14] on the lower flange of the keeper.

1) Apply sealant, A00160 to the bolt shanks and threads and install the bolt immediately.

2) Tighten to 50-80 pound-inches (5.6-9.0 newton-meters).

(b) Install the one bolt [15] with washer [12] under the bolt head and washer [13] under the nut [14].

1) Apply sealant, A00160 to the bolt shanks and threads and install the bolt immediately.

2) Tighten to 50-80 pound-inches (5.6-9.0 newton-meters).

(c) Install the retainer [3] on the keeper [10].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Install one bolt [1] with washer [2] under the bolt head and washer [13] under the nut [14].
   a) Apply sealant, A00160 to the bolt shanks and threads and install the bolt immediately.
   b) Tighten to 50-80 pound-inches (5.6-9.0 newton-meters).

(d) Install one bolt [1] and washer [2] into the nutplate.
1) Apply sealant, A00160 to the bolt shanks and threads and install the bolt immediately.
2) Tighten to 72-88 pound-inches (8.1-9.9 newton-meters).

SUBTASK 78-31-04-420-003-H01

(3) Install the thrust reverser No.2 tension latch [20] or No.3 tension latch [20] or No.4 tension latch [20] (Figure 402):
(a) Install the bolt [21] with washer [22] under the bolt head, and washer [23] under the nut [24].
(b) Install additional washer [25], washer [26], washer [27] as necessary to have a 0.005-0.021 inch (0.127-0.533 mm) gap between the bolt shoulder and the top washer.

NOTE: These additional washers have a thickness of 0.063 inch (1.600 millimeters), 0.016 inch (0.406 millimeter) and 0.032 inch (0.813 millimeter).

(c) Tighten the nut to 290-510 pound-inches (32.8-57.6 newton-meters).

SUBTASK 78-31-04-420-004-H01

(4) Install the thrust reverser No.5 tension latch [31]:
(a) Install the bolt [69] with washer [28] under the bolt head and washer [29] under the nut [30].
(b) Add additional washer [25], washer [26], washer [27] as necessary to have a 0.005-0.021 inch (0.127-0.533 mm) gap between the bolt shoulder and the top washer.

NOTE: These additional washers have a thickness of 0.063 inch (1.600 millimeters), 0.016 inch (0.406 millimeter) and 0.032 inch (0.813 millimeter).

(c) Tighten the nut to 250-350 pound-inches (28.2-39.5 newton-meters).
(d) Install the panel [61] on the bottom of the latch beam fairing.
1) Install the eight countersunk bolt [60].

G. Aft Cowl Tension Latches Installation

SUBTASK 78-31-04-420-005-H01

(1) Install the left aft cowl, No.3 tension latch [32] (Figure 403):
(a) Install the bolt [33] with washer [34] under the bolt head and washer [35] under the nut [36].
(b) Tighten the nut to 25-35 pound-inches (2.8-3.9 newton-meters).
(c) Make sure there is a 0.010 inch (0.254 mm) minimum end play in the bolt to prevent clamp-up of the latch housing.

SUBTASK 78-31-04-420-006-H01

(2) Install the left aft cowl, aft deflection limiter latch [37]:
(a) Install the bolt [33] with washer [34] under the bolt head and washer [35] under the nut [36].
(b) Tighten the nut to 25-35 pound-inches (2.8-3.9 newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Make sure there is a 0.010 inch (0.254 mm) minimum end play in the bolt to prevent clamp-up of the latch housing.

SUBTASK 78-31-04-420-007-H01

(3) Install the left aft cowl, No.2 tension latch [38]:

(a) Install the bolt [39] with washer [40] under the bolt head and washer [41] under the nut [42].

(b) Tighten the nut to 25-35 pound-inches (2.8-3.9 newton-meters).

(c) Make sure there is a 0.010 inch (0.254 mm) minimum end play in the bolt to prevent clamp-up of the latch housing.

SUBTASK 78-31-04-420-008-H01

(4) Install the left aft cowl, No.1 tension latch [43]:

(a) Install the bolt [44] with washer [45] under the bolt head and washer [46] under nut [47].

(b) Tighten the nut to 250-350 pound-inches (28.2-39.5 newton-meters).

(c) Make sure there is a 0.010 inch (0.254 mm) minimum end play in the bolt to prevent clamp-up of the latch housing.

SUBTASK 78-31-04-420-009-H01

(5) Install the left aft cowl, forward deflection limiter latch [48]:

(a) Install the bolt [44] with washer [45] under the bolt head and washer [46] under nut [47].

(b) Tighten the nut to 250-350 pound-inches (28.2-39.5 newton-meters).

(c) Make sure there is a 0.010 inch (0.254 mm) minimum end play in the bolt to prevent clamp-up of the latch housing.

SUBTASK 78-31-04-420-010-H01

(6) Install the right aft cowl, aft deflection limiter latch [49] (Figure 404):

(a) Install the bolt [33] with washer [34] under the bolt head and washer [35] under nut [36].

(b) Tighten the nut to 25-35 pound-inches (2.8-3.9 newton-meters).

(c) Make sure there is a 0.010 inch (0.254 mm) minimum end play in the bolt to prevent clamp-up of the latch housing.

SUBTASK 78-31-04-420-011-H01

(7) Install the right aft cowl, forward deflection limiter latch [50]:

(a) Install the bolt [44] with washer [45] under the bolt head and washer [46] under nut [47].

(b) Tighten the nut to 250-350 pound-inches (28.2-39.5 newton-meters).

(c) Make sure there is a 0.010 inch (0.254 mm) minimum end play in the bolt to prevent clamp-up of the latch housing.

H. Thrust Reverser Latch Beam Keeper Bolts Installation

SUBTASK 78-31-04-420-012-H01

(1) Install the No.2 or No.3 or No.4 tension latch keeper bolt [51] on the left thrust reverser.

(a) Install the bolt [51] with washer [52] under the bolt head and washer [53] under nut [54].

(b) Add washer [55], washer [56], washer [57] under the nut as necessary to have 0.005-0.021 inch (0.127-0.533 mm) end play in the bolt.

NOTE: These additional washers have a thickness of 0.063 inch (1.600 millimeters), 0.016 inch (0.406 millimeter) and 0.032 inch (0.813 millimeter).

(c) Tighten the nut to 660-980 pound-inches (74.6-110.7 newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-04-420-013-H01

(2) Install the No.5 tension latch keeper bolt [58] on the right thrust reverser.

(a) Install the bolt [58] with washer [22] under the bolthead and washer [23] under nut [24].

(b) Add washer [25], washer [26], washer [27] under the bolt head as necessary to have 0.005-0.021 inch (0.127-0.533 mm) end play in the bolt.

NOTE: These additional washers have a thickness of 0.063 inch (1.600 millimeters), 0.016 inch (0.406 millimeter) and 0.032 inch (0.813 millimeter).

(c) Tighten the nut to 290-510 pound-inches (32.8-57.6 newton-meters).

(d) For the No.5 latch keeper bolt, install the panel [61] on the bottom of the latch beam fairing.

1) Install the eight countersunk bolts [60].

I. Right Aft Cowl Latch Keeper (Eyebolt) Installation

SUBTASK 78-31-04-420-014-H01

(1) Install the keeper [62] for the aft cowl No.1 tension latch.

(a) Install the keeper [62] with the washer [63] under the nut [64].

(b) Tighten the nut to 370-690 pound-inches (41.8-77.9 newton-meters).

SUBTASK 78-31-04-420-015-H01

(2) Install the keeper [65] for the aft cowl No.2 tension latch.

(a) Install the keeper [65] with the washer [66] under the nut [67].

(b) Tighten the nut to 1000-1470 pound-inches (112.9-166.0 newton-meters).

SUBTASK 78-31-04-420-016-H01

(3) Install the keeper [68] for the aft cowl No.3 tension latch.

(a) Install the keeper [68] with the washer [63] under the nut [64].

(b) Tighten the nut to 370-690 pound-inches (41.8-77.9 newton-meters).

SUBTASK 78-31-04-820-001-H01

(4) Do this task: Thrust Reverser Tension Latches Adjustment, TASK 78-31-04-820-801-H01.

J. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-04-410-001-H01

(1) Install the thermal insulation blankets around the tension latches on the thrust reverser latch beam or aft cowl.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-04-410-002-H01

(2) Install the V-band latch and V-groove latch band on the thrust reverser outer v-blade.

(a) Do this task: Thrust Reverser V-Groove Latch Bands Installation, TASK 78-31-02-400-801-H01.

1) Install the bottom two retainers for the v-groove latch band.

2) Install the v-band latch clip on the thrust reverser outer v-blade.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-04-410-007-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER TENSION LATCHES - ADJUSTMENT/TEST

1. General

A. This procedure has one task:

(1) An adjustment of the thrust reverser tension latches.

TASK 78-31-04-820-801-H01

2. Thrust Reverser Tension Latches Adjustment

(Figure 501/Figure 502)

A. General

(1) This procedure provides the adjustment for these latches:

(a) The 5 latch beam tension latches along the thrust reverser splitline at the 6 o'clock position.

(b) The 3 aft cowl splitline tension latches at the 6 o'clock position.

(c) The 4 deflection limiter latches at the 7 and 5 o'clock positions.

(2) To open or close the No.1 tension latch, operate the latch handle and lock lever to disengage or engage the latch t-bolt on the opposite latch hook receiver.

(3) To open the tension latches and deflection limiter latches, do these steps:

(a) Push on the secondary lock square with your finger to release the spring-loaded latch handle.

NOTE: The latch handle will pop-up when the secondary lock is released.

(b) Pull the latch handle to release the hook load.

(c) Pull the handle to the full open position to lift and clear the latch hook from the opposite latch bolt or keeper eyebolt.

(4) To close the tension latches and deflection limiter latches, do these steps:

(a) Engage the latch hook on the opposite latch bolt or keeper eyebolt.

(b) Push the latch handle to the closed position.

NOTE: Movement of the latch handle to the closed position will over-center lock the latch and apply the latch hook load. The secondary lock will lock the latch handle to the hook.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-02-820-801-H01	Thrust Reverser V-Band Latch Adjustment (P/B 501)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

Reference	Description
STD-756	Scale - Spring, 0 to 100 lbs. (0 to 45.36 kg), Compression

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

F. Prepare for the Adjustment

SUBTASK 78-31-04-860-002-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-04-040-001-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-04-040-002-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-04-010-005-H01

(4) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-04-010-004-H01

(5) Open the 3 latch beam access doors on the bottom of the thrust reverser for the applicable engine:

(a) Open the applicable access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-04-820-002-H01

(6) Do this task: Thrust Reverser V-Band Latch Adjustment, TASK 78-31-02-820-801-H01.

(a) Close and latch the V-band latch after adjustment.

G. Tension Latch Adjustment

SUBTASK 78-31-04-820-003-H01

(1) Adjust the thrust reverser splitline latches and aft cowl splitline latches (Figure 501):

(a) Make sure the V-band latch is in the closed and latched position.

(b) Adjust one tension latch at a time.

1) Start with the most forward latch and continue aft for all eight tension latches on the thrust reverser and aft cowl.

2) Make sure all other tension latches are closed and latched.

(c) Measure the force to close the tension latch with the compression spring scale (0 to 100 lbs. (0 to 45.36 kg), STD-756 positioned 1.0 inch (25.4 mm) from the end of the latch handle.

(d) If the force is not 45-55 pounds (200.2-244.6 newtons), adjust the latch force:

1) Turn the adjustment wheel on the latch with a 0.125 inch (3 millimeter) diameter rod or allen wrench.

(e) Repeat the above steps until the force is correct.

(f) Do a check of the force to close the adjusted tension latch a minimum of three times.

(g) Leave all splitline latches closed when complete.

SUBTASK 78-31-04-820-004-H01

(2) Adjust the aft cowl deflection limiter latches:

(a) Make sure the v-band latch is in the closed and latched position.

(b) Make sure all other tension latches are closed and latched.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Adjust the two deflection limiter latches on the left aft cowl first, then adjust the two deflection limiter latches on the right aft cowl.

NOTE: Open the right aft cowl deflection limiter latches and disengage the hooks when you adjust the left aft cowl deflection limiter latches. Open the left aft cowl deflection limiter latches and disengage the hooks when you adjust the right aft cowl deflection limiter latches.

(d) Measure the force to close the deflection limiter latch with the spring compression spring scale (0 to 100 lbs. (0 to 45.36 kg), STD-756 positioned 1.0 inch (25.4 mm) from the end of the latch handle (Figure 502).

(e) If the force is not 45-55 pounds (200.2-244.6 newtons), adjust the latch force:

1) Turn the adjustment wheel on the latch with a 0.125 inch (3 millimeter) diameter rod or allen wrench.

(f) Repeat the above steps until the force is correct.

SUBTASK 78-31-04-820-005-H01

(3) Do this task again: Thrust Reverser V-Band Latch Adjustment, TASK 78-31-02-820-801-H01.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-04-410-004-H01

(1) Close the three latch beam access doors on the bottom of the thrust reverser for the applicable engine:

(a) Close the applicable access panels:

Number	Name/Location
415HB	Aft Thrust Reverser Latch Panel, Left Engine
415JB	Thrust Reverser Latch Panel, Left Engine
415KB	Forward Thrust Reverser Latch Panel, Left Engine
425HB	Aft Thrust Reverser Latch Panel, Right Engine
425JB	Thrust Reverser Latch Panel, Right Engine
425KB	Forward Thrust Reverser Latch Panel, Right Engine

SUBTASK 78-31-04-410-006-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-04-440-001-H01

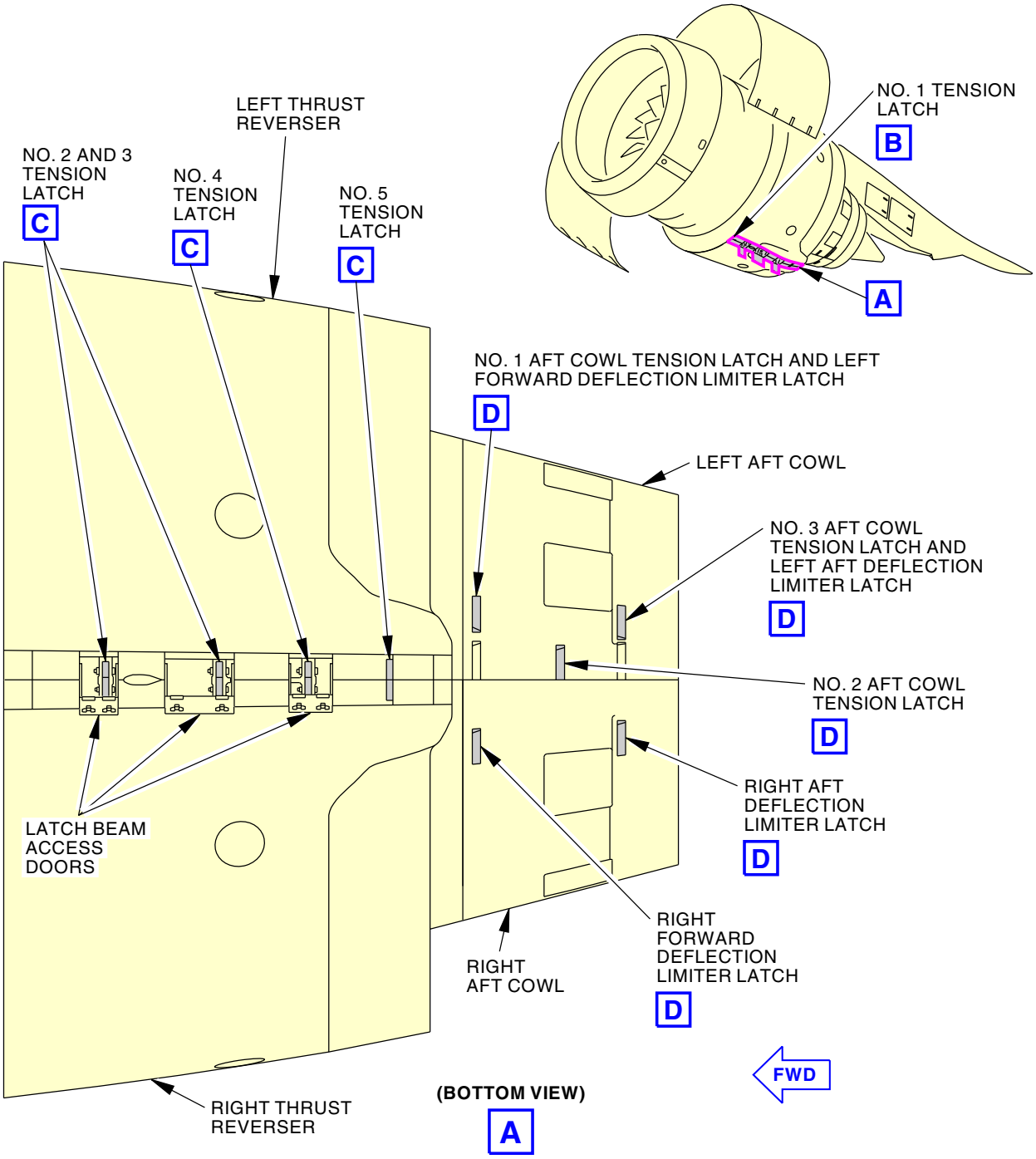
(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-04-440-002-H01

(4) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

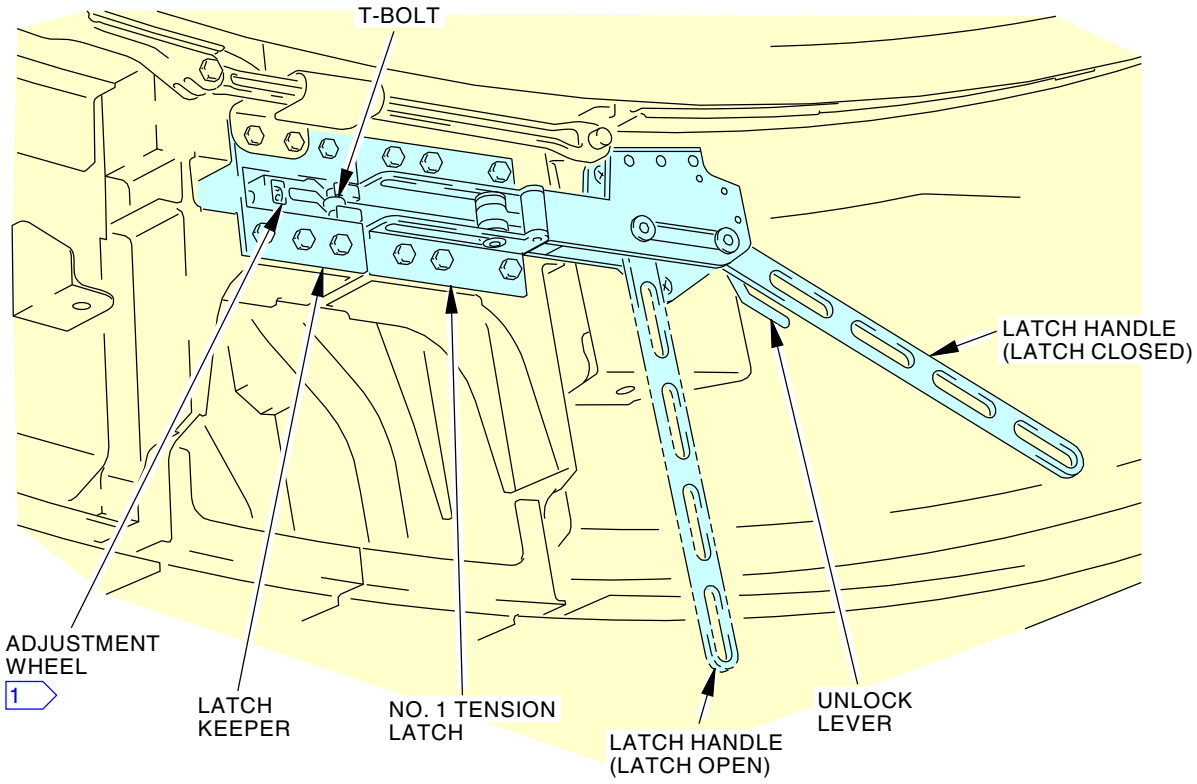
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07346 S0004286313_V2

Thrust Reverser Tension Latch Adjustment
Figure 501/78-31-04-990-805-H01 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER NO. 1 TENSION LATCH
(V-BAND LATCH REMOVED FOR CLARITY)

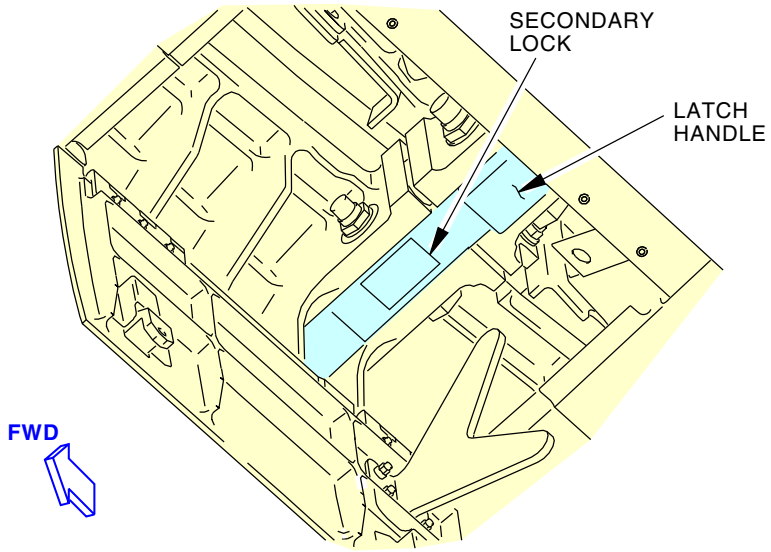
B

1 INSTALL THE ALLEN WRENCH AND TURN THE ADJUSTMENT WHEEL

M07347 S0004286314_V2

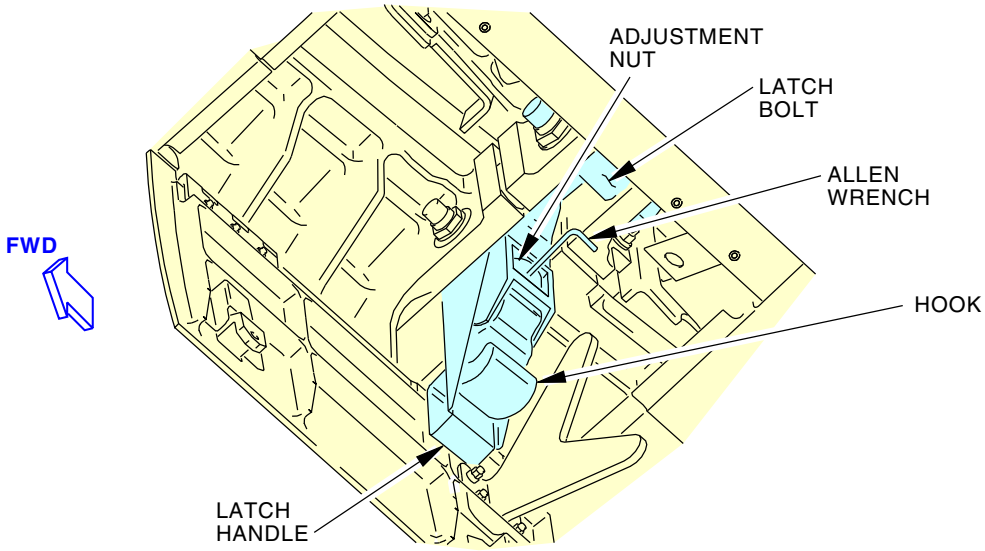
Thrust Reverser Tension Latch Adjustment
Figure 501/78-31-04-990-805-H01 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER NO. 2-5 TENSION LATCH
(CLOSED POSITION)
(EXAMPLE, 4 LOCATIONS)

C



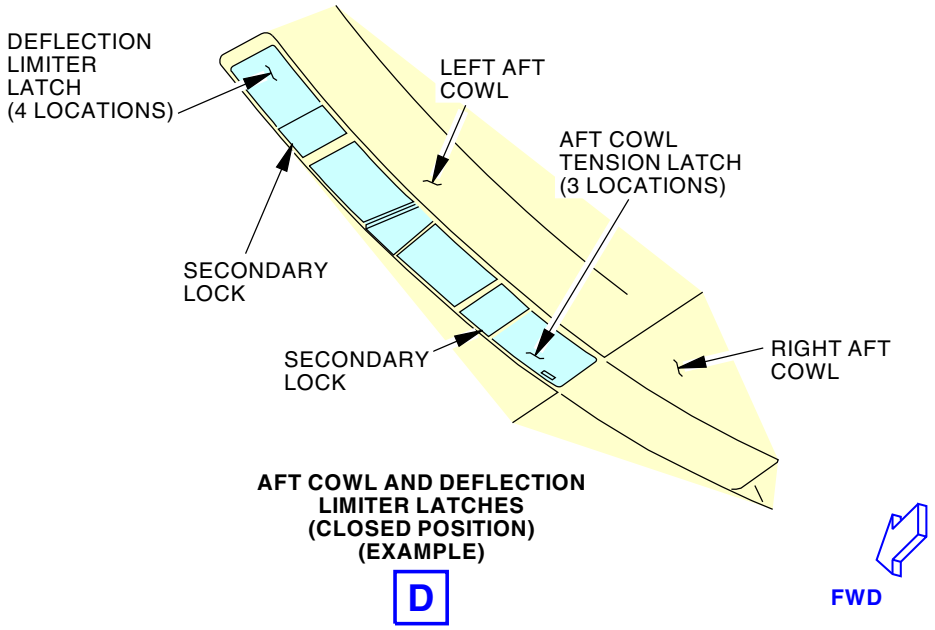
THRUST REVERSER NO. 2-5 TENSION LATCH
(OPEN POSITION WITH ALLEN WRENCH INSERTED)
(EXAMPLE, 4 LOCATIONS)

C

M07348 S0004286315_V3

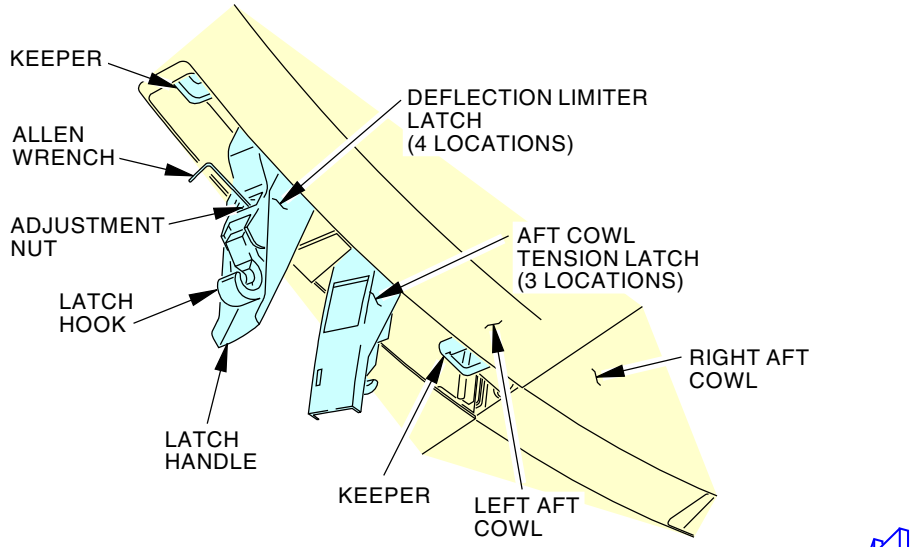
Thrust Reverser Tension Latch Adjustment
Figure 501/78-31-04-990-805-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL AND DEFLECTION LIMITER LATCHES (CLOSED POSITION) (EXAMPLE)

D



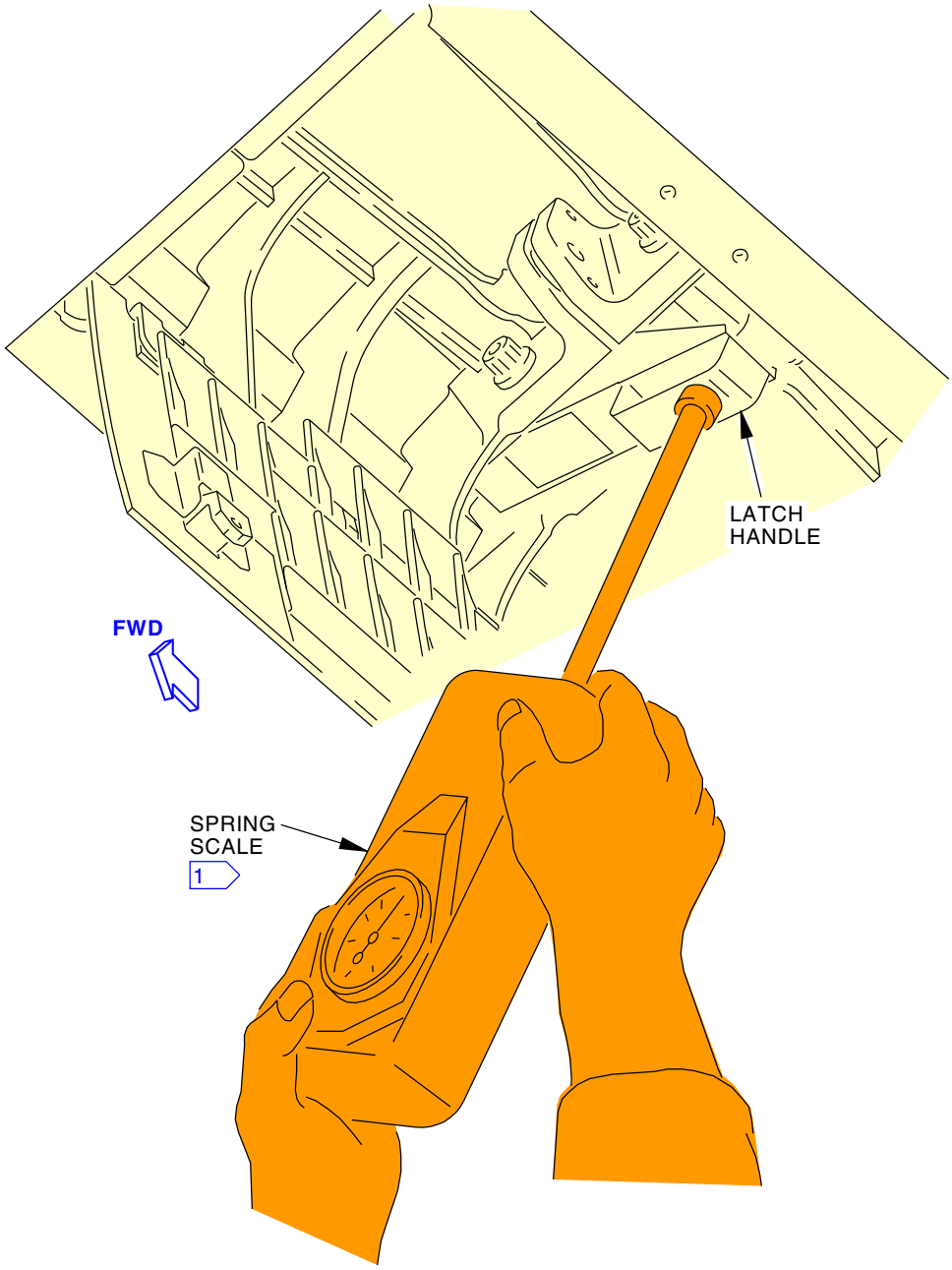
AFT COWL AND DEFLECTION LIMITER LATCHES (OPEN POSITION) (EXAMPLE)

D

M07349 S0004286316_V2

Thrust Reverser Tension Latch Adjustment
Figure 501/78-31-04-990-805-H01 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 EXAMPLE OF THE SPRING SCALE USED TO MEASURE THE FORCE TO A LATCH.
PLACE THE SCALE APPROXIMATELY 1.0 INCH (25.4 mm) FROM THE END OF THE HANDLE.

M07350 S0004286317_V2

Spring Scale
Figure 502/78-31-04-990-806-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER FIRE SEALS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser and aft cowl fire seals.

(2) An installation of the thrust reverser and aft cowl fire seals.

TASK 78-31-05-000-801-H01

2. Thrust Reverser Fire Seal Removal

(Figure 401)

A. General

(1) This task is the removal procedure for the thrust reverser fire seals.

(2) There are two bulb-type fire seals assemblies that make up the complete fire seal.

(a) One fire seal assembly covers the length of the upper bifurcation wall, the front of the thrust reverser hinge beam, and a part of the fan duct cowl vee blade seal.

(b) The second fire seal assembly covers the remaining portion of the fan duct cowl vee blade and the vertical segment down the lower bifurcation wall to the front of the latch beam.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-764	Scraper - Non-metallic
STD-765	Scraper - Plastic

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Prepare to Remove the Fire Seals

SUBTASK 78-31-05-010-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Remove the Thrust Reverser Fire Seals

SUBTASK 78-31-05-020-001-H01

(1) Remove the bulb-type fire seal [1] or fire seal [3] (Figure 401).

(a) Cut the sealant with non-metallic scraper, STD-764 or plastic scraper, STD-765 or wooden or plastic cutting tools.

(b) If the seals are to be separated, carefully cut the seals apart.

(c) Pull the fire seal from the seal retainer [2].

NOTE: As you pull the fire seal from the retainer, it may be necessary to scrape the sealant behind the fire seal.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-05-020-004-H01

(2) Remove the molded fire seal [4] on the lower latch beam.

NOTE: The left side and right side fire seals have different shapes that fit together.

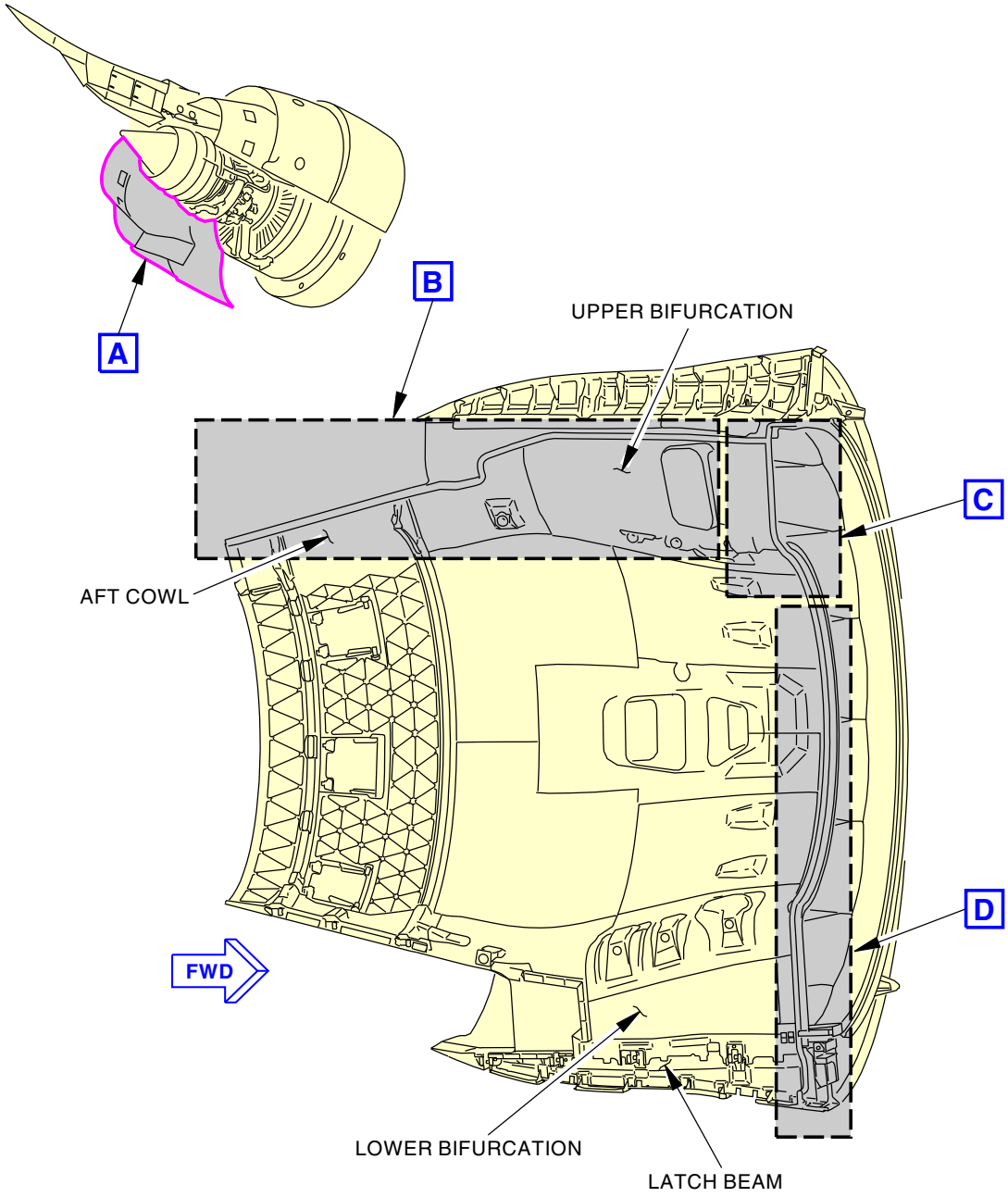
(a) Cut the sealant with non-metallic scraper, STD-764 or plastic scraper, STD-765 or wooden or plastic cutting tools.

(b) If the seals are to be separated, carefully cut the seals apart.

(c) Remove the bolts [6], bolts [7] and nuts [8] which attach the molded seal to the lower latch beam.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



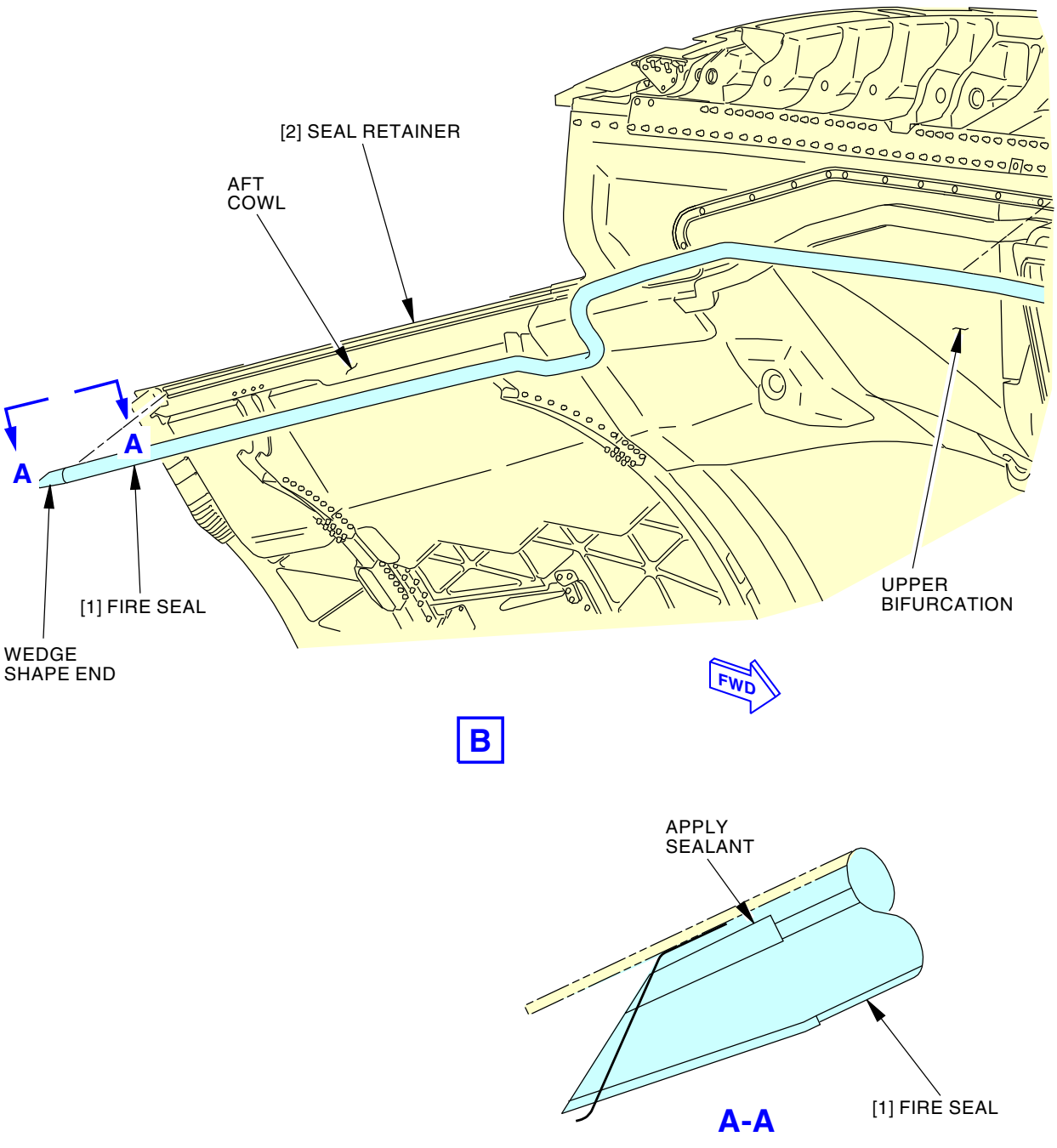
LEFT THRUST REVERSER
(INTERNAL SIDE, RIGHT THRUST REVERSER IS OPPOSITE)

A

M07351 S0004286318_V2

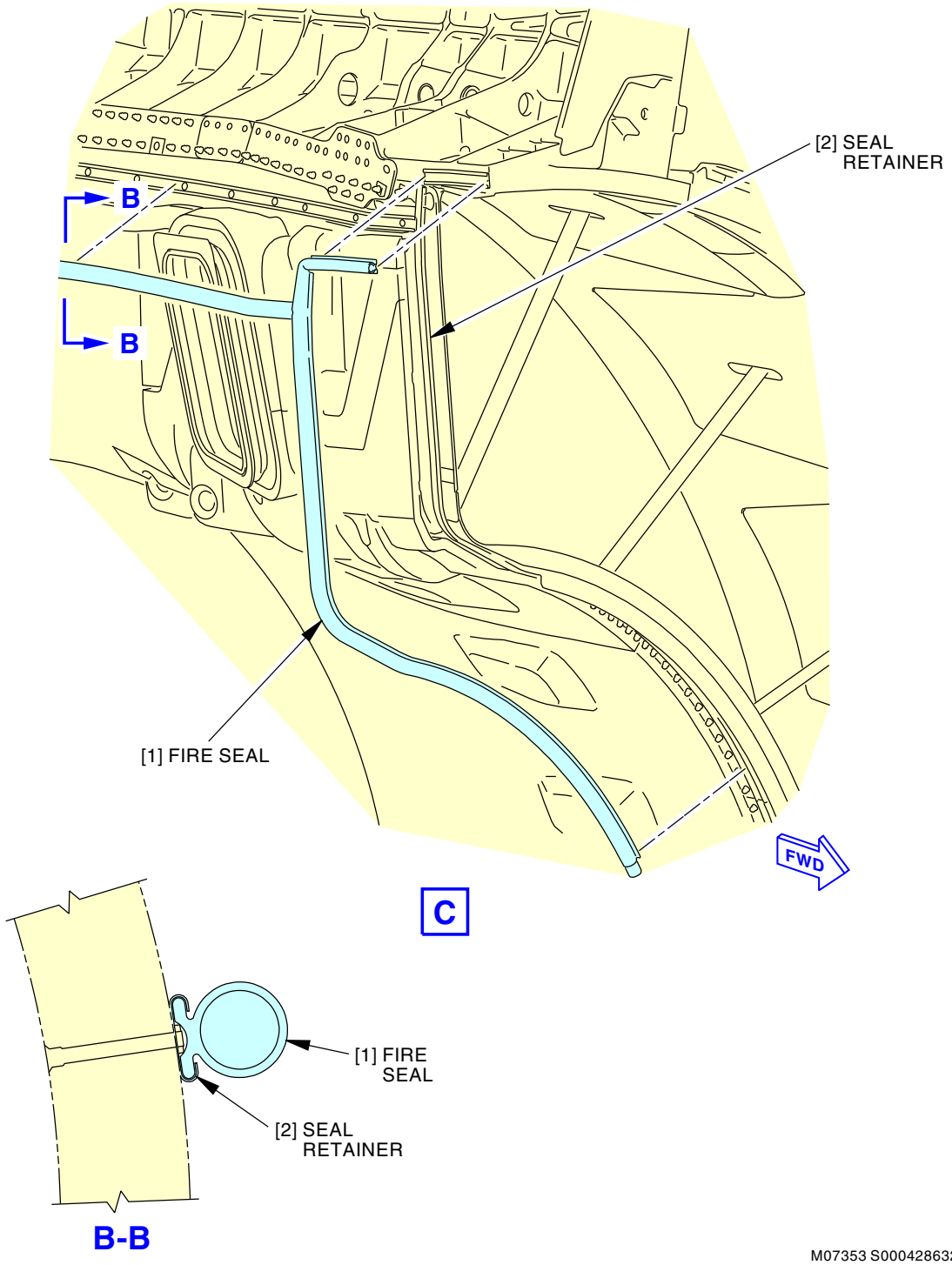
Thrust Reverser Fire Seal Installation
Figure 401/78-31-05-990-802-H01 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



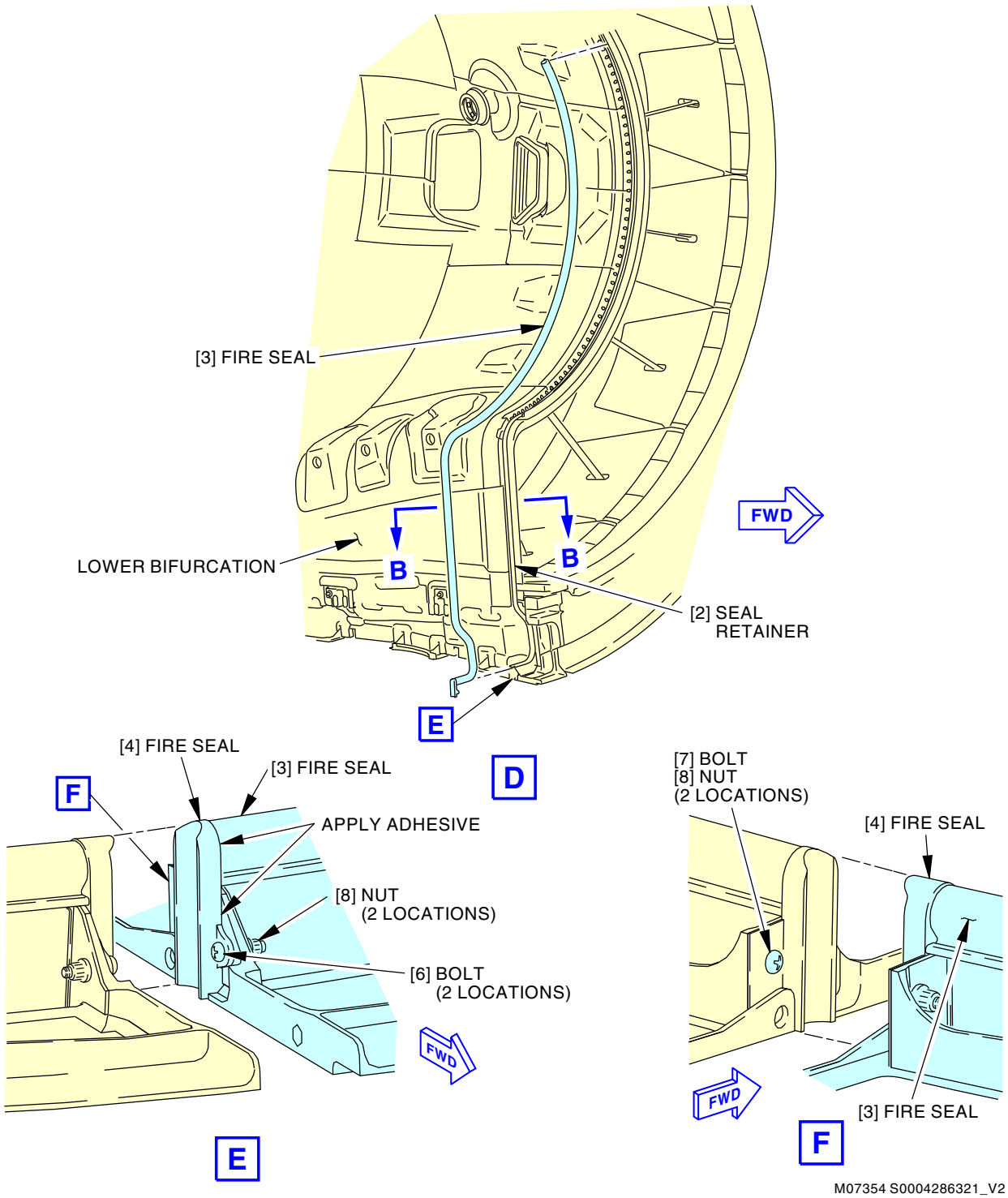
Thrust Reverser Fire Seal Installation
Figure 401/78-31-05-990-802-H01 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Fire Seal Installation
Figure 401/78-31-05-990-802-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Fire Seal Installation
Figure 401/78-31-05-990-802-H01 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-05-400-801-H01

3. Thrust Reverser Fire Seal Installation

(Figure 401)

A. General

(1) This task is the installation procedure for the thrust reverser bulb-type fire seals.

(2) There are two bulb-type fire seals assemblies that make up the complete fire seal.

(a) One fire seal assembly covers the length of the upper bifurcation wall, the front of the thrust reverser hinge beam, and a part of the fan duct cowl vee blade seal.

(b) The second fire seal assembly covers the remaining portion of the fan duct cowl vee blade and the vertical segment down the lower bifurcation wall to the front of the latch beam.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-122	Brush
STD-766	Gun - Sealant
STD-810	Spatula - Fillet Smoothing, Hardwood or Plastic

D. Consumable Materials

Reference	Description	Specification
A00027	Adhesive - Silicone Rubber, 1 Part, RTV	BAC5010 Type 60
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
A00335	Adhesive - Silicone Rubber, 2 Part, RTV	BAC5010 Type 68
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00130	Alcohol - Isopropyl	TT-I-735
C00511	Primer - Adhesion	BAC5010 Type 68
C00580	Primer - Adhesive Bonding, RTV - PR-1200 (Formerly DC 1200)	
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G50078	Abrasive - Aluminum Oxide Paper, 320 grit or finer	

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Install the Thrust Reverser Fire Seals

SUBTASK 78-31-05-420-001-H01

(1) Install the upper bulb-type fire seal [1] (Figure 401).

(a) Wipe or scrub the seal retainer with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid, or oil.

(b) Make sure that the fire seal [1] is not folded, creased or wrinkled as you install the seal.

(c) Put the fire seal foot into the seal retainer [2] to install the upper fire seal.

(d) Bond the fire seal [1] to the aft cowl, upper bifurcation.

1) Wipe or scrub the retainer and the fay surface on the aft cowl with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid, or oil.

2) Wipe or scrub the aft cowl with alcohol, B00130 or solvent, B00062 on a clean cotton wiper, G00034 to remove oils and grease.

3) Lightly abrade the bottom of the wedge shape end of the fire seal [1] with 320 grit or finer abrasive paper, G50078.

NOTE: This removes the mold release material from the surface of the fire seal which can prevent adhesion.

a) Remove all unwanted material from the fire seal.

4) Wipe or scrub the bottom of the wedge shape end of the rubber fire seal [1] with alcohol, B00130 or solvent, B00062 on a clean cotton wiper, G00034 to remove oils and grease.

5) To install the fire seal [1] with two-part adhesive, A00335, do these steps:

a) Apply primer, C00511 with a clean brush, STD-122 or clean cotton wiper, G00034 to the fay surface of the fire seal if the adhesive chosen requires primer.

<1> Wait for a minimum of 10 minutes to allow the primer to dry on the rubber parts.

b) Apply primer, C00511 to the fay surface on the thrust reverser if the adhesive chosen requires primer.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

<1> Wait for a minimum of 60 minutes to allow the primer to dry on the metal parts.

c) Completely blend the adhesive, A00335 10 parts by weight of catalyst to 100 parts by weight of base compound.

<1> Mix the adhesive by hand for two to five minutes.

d) Apply the adhesive to the fire seal with a sealant gun, STD-766 or a hardwood or plastic fillet smoothing spatula, STD-810.

e) Apply firm pressure to make sure the fire seal is seated in the adhesive.

f) You must allow the adhesive, A00335 to cure before you put the fire seal into service.

<1> The standard cure time is 24 hours at 60-80 degrees F (15.6-26.7 degrees C).

<2> The accelerated cure time is 4 hours at 180 degrees F (82.2 degrees C) or 2 hours at 200 degrees F (93.3 degrees C).

NOTE: Use an explosion proof heat source.

6) To install the fire seal [1] with one-part adhesive, A00027, do these steps:

a) Apply PR-1200 primer, C00580 with a clean brush, STD-122 or clean cotton wiper, G00034 to the fay surface on the aft cowl.

NOTE: No primer is required for the rubber seal.

<1> Do not thin the primer and do not use a primer that is cloudy or milky color.

<2> Wait for 30 minutes minimum to 4 hours maximum at 65-100 degrees F (18.3-37.7 degrees C) to allow the primer to dry on the metal parts.

b) Apply a continuous layer of adhesive to the fire seals with a hardwood or plastic fillet smoothing spatula, STD-810.

<1> Make sure the adhesive is smooth and has no lumps.

c) Immediately mate the fire seal with the aft cowl after the adhesive is applied.

NOTE: Immediately after the adhesive is applied, the adhesive will begin to cure and within a few minutes, form a skin on the surface of the adhesive. The fire seals will not adhere together properly if a skin has formed on the adhesive.

d) Apply firm pressure to make sure the fire seal is seated; do not squeeze out an excessive amount of adhesive.

e) You must allow the adhesive to cure before you put the fire seal into service.

<1> The cure time is 24 hours at 65-100 degrees F (18.3-37.7 degrees C).

NOTE: The adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. There will be the smell of acetic acid until the adhesive has cured.

(e) Bond the upper fire seal [1] to the lower fire seal [3].

1) Do the steps that follow to bond the upper fire seal to the lower fire seal after the lower fire seal is installed.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-05-420-002-H01

(2) Install the lower bulb-type fire seal [3] (Figure 401).

(a) Wipe or scrub the seal retainer [2] with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid, or oil.

(b) Make sure that the fire seal [3] is not folded, creased or wrinkled as you install the seal.

(c) Put the fire seal foot into the seal retainer [2] to install the lower fire seal [3].

(d) Bond the upper fire seal [1] to the lower fire seal [3].

1) Do the steps that follow to bond the upper fire seal to the lower fire seal.

(e) Bond the lower fire seal [3] to the fire seal [4] on the lower latch beam.

1) Do the steps that follow to bond the lower fire seal to the latch beam fire seal.

SUBTASK 78-31-05-915-001-H01

(3) Bond the upper bulb-type fire seal [1] to the lower bulb-type fire seal [3].

(a) Wipe or scrub the seal retainer [2] with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid, or oil.

(b) Lightly abrade the plug on the upper fire seal [1] with 320 grit or finer abrasive paper, G50078.

NOTE: This removes the mold release material from the surface of the fire seal which can prevent adhesion.

1) Remove all unwanted material from the surface of the fire seal.

(c) Lightly abrade the inside surface and the end of the lower fire seal [3] with 320 grit or finer abrasive paper, G50078.

NOTE: This removes the mold release material from the surface of the fire seal which can prevent adhesion.

1) Remove all unwanted material from the plug and inside surface of the fire seal.

(d) Wipe or scrub the inside surface of the lower fire seal [3] and the plug surface of the upper fire seal [1] with alcohol, B00130 or solvent, B00062 on a clean cotton wiper, G00034 to remove oils or grease.

(e) To install the fire seal [3] with two-part adhesive, A00335, do these steps:

1) Apply primer, C00511 with a clean brush, STD-122 or clean cotton wiper, G00034 to the inside surface of the lower fire seal and the upper fire seal plug if the adhesive chosen requires primer.

a) Wait for a minimum of 10 minutes to allow the primer to dry on the rubber parts.

2) Completely blend the adhesive, A00335 10 parts by weight of catalyst to 100 parts by weight of base compound.

a) Mix the adhesive by hand for two to five minutes.

3) Apply the adhesive to the fire seal with a sealant gun, STD-766 or a hardwood or plastic fillet smoothing spatula, STD-810.

4) Mate the fire seals together.

5) You must allow the adhesive to cure before you put the fire seal into service.

a) The standard cure time is 24 hours at 60-80 degrees F (15.6-26.7 degrees C).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) The accelerated cure time is 4 hours at 180 degrees F (82.2 degrees C) or 2 hours at 200 degrees F (93.3 degrees C).

NOTE: Use an explosion proof heat source.

(f) To install the fire seal [3] with a one-part adhesive, A00027, do these steps:

NOTE: For the adhesive, A00027, primer is not required to be applied to the rubber seals.

1) Apply a continuous layer of adhesive to the fire seals with a hardwood or plastic fillet smoothing spatula, STD-810.

a) Make sure the adhesive is smooth and has no lumps.

2) Immediately mate the fire seals together after the adhesive is applied.

NOTE: Immediately after the adhesive is applied, the adhesive will begin to cure and within a few minutes, form a skin on the surface of the adhesive. The fire seals will not adhere together properly if a skin has formed on the adhesive.

3) Apply firm pressure to make sure the fire seals are seated; do not squeeze out an excessive amount of adhesive.

4) You must allow the adhesive to cure before you put the fire seal into service.

a) The cure time is 24 hours at 65-100 degrees F (18.3-37.7 degrees C).

NOTE: The adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. There will be the smell of acetic acid until the adhesive has cured.

SUBTASK 78-31-05-420-005-H01

(4) Install the molded fire seal [4] on the lower latch beam (Figure 401).

NOTE: The left side and right side fire seals have different shapes that fit together.

(a) Wipe or scrub the latch beam surface and the seal retainer [2] with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid, or oil.

(b) Lightly abrade the ends of the fire seals with 320 grit or finer abrasive paper, G50078.

NOTE: This removes the mold release material from the surface of the fire seal which can prevent adhesion.

1) Remove all unwanted material from the fire seal.

(c) Wipe or scrub the ends of the fire seals with alcohol, B00130 or solvent, B00062 on a clean cotton wiper, G00034 to remove oils and grease.

(d) To install the fire seal [4] with a two-part adhesive, A00335, do these steps:

1) Apply primer, C00511 with a clean brush, STD-122 or clean cotton wiper, G00034 to the seal retainer and the lower latch beam if the adhesive chosen requires primer.

a) Wait for a minimum of 60 minutes to allow the primer to dry on the metal parts.

2) Completely blend the adhesive, A00335 10 parts by weight of catalyst to 100 parts by weight of base compound.

a) Mix the adhesive by hand for two to five minutes.

3) Apply adhesive to the metal plate on the back of the fire seal.

a) Apply the adhesive with a sealant gun, STD-766 or a hardwood or plastic fillet smoothing spatula, STD-810.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

4) Apply adhesive to the surface between fire seal [3] and fire seal [4].
   a) Apply the adhesive to the fire seals with a sealant gun, STD-766 or a hardwood or plastic fillet smoothing spatula, STD-810.
5) Mate the fire seals together.

(e) To install the fire seal [4] with a one-part adhesive, A00027, do these steps:

NOTE: No primer is required for the rubber seal.

1) Apply PR-1200 primer, C00580 with a clean brush, STD-122 or clean cotton wiper, G00034 to the seal retainer and the lower latch beam.
   a) Do not thin the primer and do not use a primer that is cloudy or milky color.
   b) Wait for 30 minutes minimum to 4 hours maximum at 65-100 degrees F (18.3-37.7 degrees C) to allow the primer to dry before the adhesive is applied.
2) Apply adhesive to the metal plate on the back of the fire seal [4].
   a) Apply a continuous layer of adhesive to the metal plate with a hardwood or plastic fillet smoothing spatula, STD-810.
   b) Make sure the adhesive is smooth and has no lumps.
3) Apply adhesive to the surface between fire seal [4] and fire seal [3].
   a) Apply a continuous layer of adhesive to the fire seals with a hardwood or plastic fillet smoothing spatula, STD-810.
   b) Make sure the adhesive is smooth and has no lumps.
4) Immediately mate the fire seals together after the adhesive is applied.

   NOTE: Immediately after the adhesive is applied, the adhesive will begin to cure and within a few minutes, form a skin on the surface of the adhesive. The fire seals will not adhere together properly if a skin has formed on the adhesive.

(f) Install the long bolt [6] and nut [8] in the forward hole in the metal plate.

1) Mix the two-part sealant, A00160 per the manufacturers instructions.
2) Apply sealant, A00160 to the bolt shank and threads and install the bolt with wet sealant

   NOTE: Sealant, BMS5-63, Type II does not require the use of primer. If sealant, BMS5-63, B-1/2, Type II is used, parts must be mated and fasteners tightened with 30 minutes of application. If sealant, BMS5-63, B-4, Type II is used, work life is 15 minutes.

3) Tighten the bolt to 25-35 inch-pounds (2.8-3.9 newton-meters).

(g) Install the short bolt [7] and nut [8] on the aft hole in the metal plate.

1) Mix the two-part sealant, A00160 per the manufacturers instructions.
2) Apply sealant, A00160 to the bolt shank and threads and install the bolt with wet sealant
3) Tighten the bolt to 25-35 inch-pounds (2.8-3.9 newton-meters).

(h) Fill the gaps between the back of the fire seal [4] and the lower latch beam and seal retainer with sealant, A00160, Type II.

1) Smooth the fillet seal with a hardwood or plastic fillet smoothing spatula, STD-810.

(i) You must allow the adhesive or sealant to cure before you put the fire seal into service.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) For the two-part adhesive, A00335:
   a) The standard cure time is 24 hours at 60-80 degrees F (15.6-26.7 degrees C).
   b) The accelerated cure time is 4 hours at 180 degrees F (82.2 degrees C) or 2 hours at 200 degrees F (93.3 degrees C).

      NOTE: Use an explosion proof heat source.

2) For the one-part adhesive, A00027:
   a) The cure time is 24 hours at 65-100 degrees F (18.3-37.7 degrees C).

      NOTE: The adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. There will be the smell of acetic acid until the adhesive has cured.

3) For the two-part sealant, A00160:
   a) The cure time for sealant, A00160 B-4 Type II is 48 hours at 72-82 degrees F (22.2-27.8 degrees C) and 45-55 percent relative humidity.
   b) The cure time for sealant, A00160 B-1/2 Type II is 4 hours at 72-82 degrees F (22.2-27.8 degrees C) and 45-55 percent relative humidity.

      NOTE: Lower temperature or lower relative humidity will increase cure time. Higher temperature or higher relative humidity will decrease cure time.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-05-410-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 78-31-05-000-802-H01

4. Aft Cowl Fire Seal Removal

(Figure 402)

A. General

(1) This task is the removal procedure for the aft cowl fire seals on the thrust reverser.

(2) The metal fire seals are on the upper, aft edge of each aft cowl. These metal fire seals come in contact with seal depressors on the aft cowl fairing over the exhaust sleeve.

(a) The purpose of the metal fire seals is to contain a fire under the aft cowl.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

E. Prepare To Remove the Aft Cowl Fire Seals

SUBTASK 78-31-05-010-005-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Remove the Aft Cowl Metal Fire Seals

SUBTASK 78-31-05-020-002-H01

(1) Remove the metal fire seal assembly [27] on the aft cowl (Figure 402).

(a) Remove the four bolts [29] and nuts [25] to remove the fire seal assembly [27].

1) Discard the nuts.

SUBTASK 78-31-05-020-003-H01

(2) Remove the metal fire seal [28] and fire seal [30] on the aft cowl.

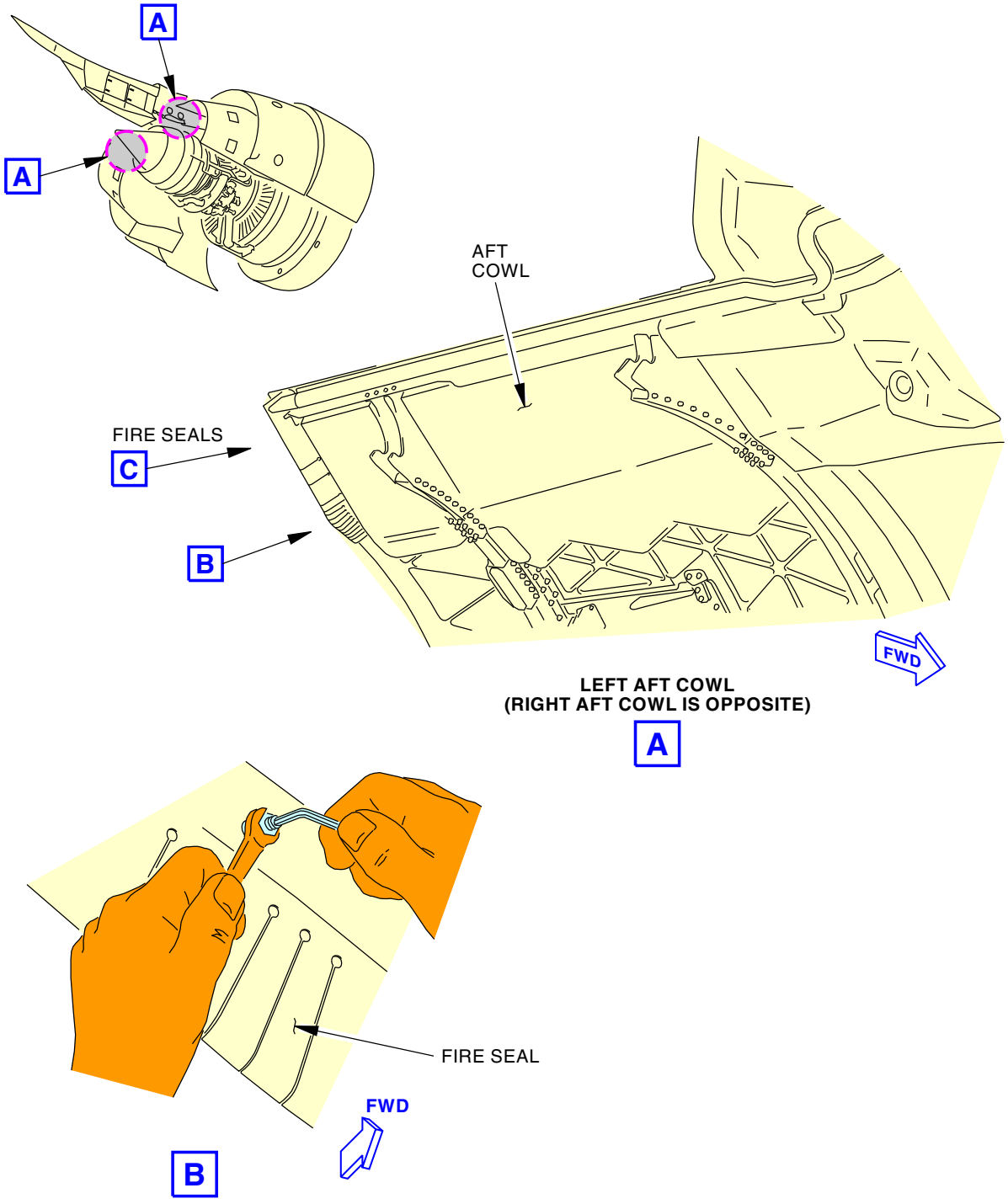
(a) If it is necessary, remove the aft, wedge shape portion of the upper bifurcation bulb-type fire seal to get access to the fire seal fasteners.

(b) Remove the eight bolts [23] and nuts [25] to remove the fire seal [28] and fire seal [30] with doubler [24] and doubler [26].

1) Discard the nuts.

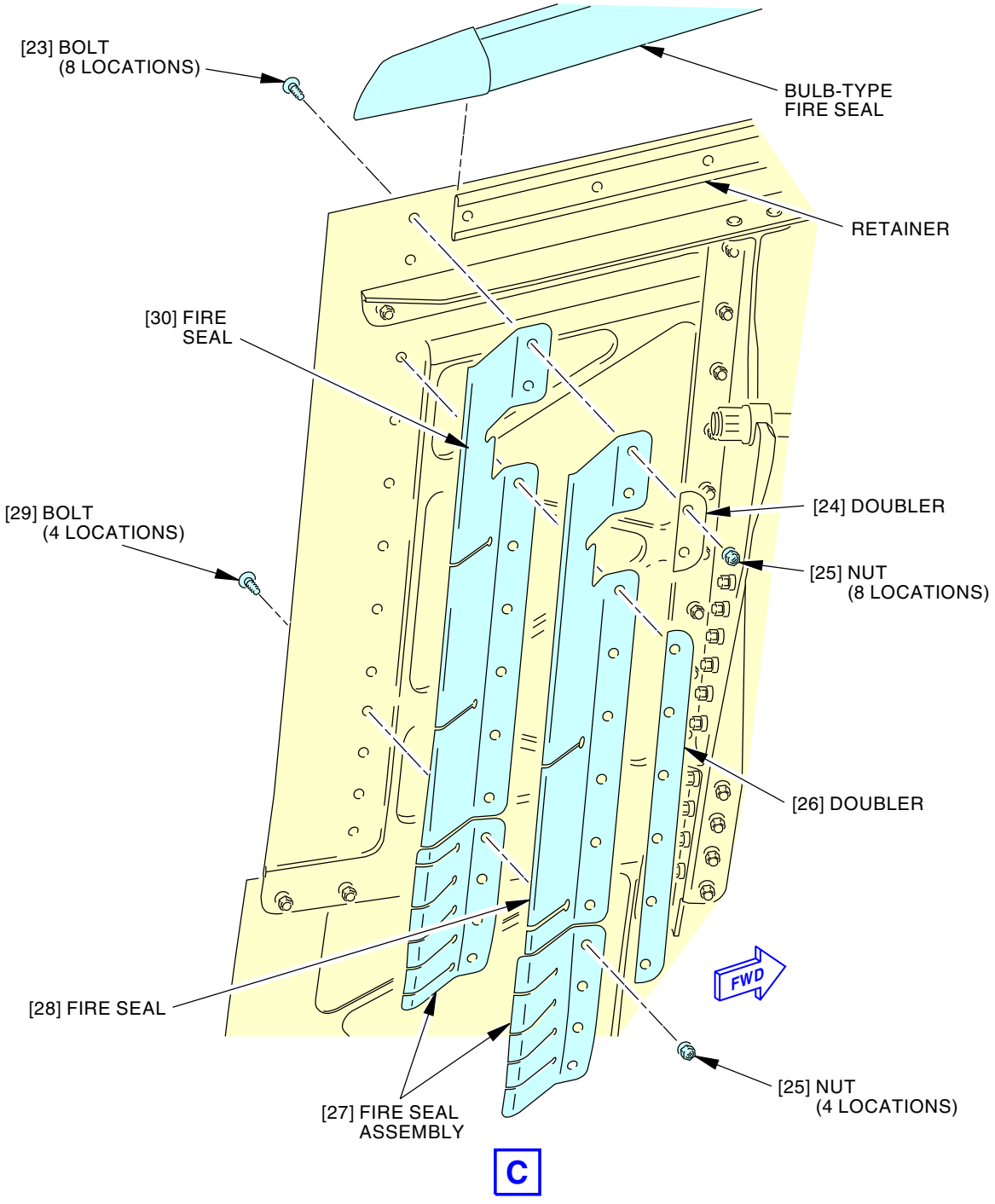
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Aft Cowl Metal Fire Seal Installation
Figure 402/78-31-05-990-803-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Aft Cowl Metal Fire Seal Installation
Figure 402/78-31-05-990-803-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-05-400-802-H01

5. Aft Cowl Fire Seal Installation

(Figure 402)

A. General

(1) This task is the installation procedure for the aft cowl metal fire seals on the thrust reverser.

(2) There are two metal fire seals on the upper, aft edge of each aft cowl. These metal fire seals come in contact with seal depressors on the aft cowl fairing over the exhaust sleeve.

(a) The purpose of the metal fire seals is to contain a fire under the aft cowl.

(b) The fire seal assembly is two segmented, overlapped fire seals which are the same size.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
A00900	Sealant - Silicone, RTV - Dow Corning 93-006-1RF (Formerly 93-006-1. Use until Stock depleted)	

D. Location Zones

Zone	Area
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Install the Aft Cowl Fire Seals

SUBTASK 78-31-05-420-003-H01

(1) Install the metal fire seal assembly [27] on the aft cowl (Figure 402).

(a) Apply sealant, A00160 or Dow Corning 93-006-1 RF sealant, A00900 to the seal assembly [27].

1) Mix the two part sealant to the manufacturers instructions.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Apply a coat of the sealant to the faying surface of the seal.

(b) Position the fire seal assembly [27] on the aft cowl.

(c) Apply sealant, A00160 or Dow Corning 93-006-1 RF sealant, A00900 to the bolts [29].

1) Apply a coat of the sealant to the entire bolt shank and all the threads.

(d) Install the four bolts [29] and nuts [25] with wet sealant.

(e) Tighten the nuts to 25-35 inch-pounds (2.8-3.9 newton-meters).

SUBTASK 78-31-05-420-004-H01

(2) Install the metal fire seal [28] and fire seal [30] on the aft cowl.

(a) Apply sealant, A00160 or Dow Corning 93-006-1 RF sealant, A00900 to the seal [28] and the seal [30].

1) Mix the two part sealant to the manufacturers instructions.

2) Apply a coat of the sealant to the faying surfaces of the seals.

(b) Position the fire seal [30] and fire seal [28] under doubler [26] and doubler [24] on the aft cowl.

(c) Apply sealant, A00160 or Dow Corning 93-006-1 RF sealant, A00900 to the bolts.

1) Apply a coat of the sealant to the entire bolt shank and all the threads.

(d) Install the eight bolts [23] and nuts [25] with wet sealant.

(e) Tighten the nuts to 25-35 inch-pounds (2.8-3.9 newton-meters).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-05-410-005-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER FIRE SEALS - INSPECTION/CHECK

1. General

A. This task gives the procedure to inspect the thrust reverser and aft cowl fire seals.

TASK 78-31-05-200-801-H01

2. Thrust Reverser Fire Seal Inspection

(Figure 601)

A. General

(1) There are two bulb-type fire seals assemblies that make the complete fire seal for the thrust reverser.

(a) One fire seal assembly covers the length of the upper bifurcation wall, the front of the thrust reverser hinge beam, and a part of the fan duct cowl vee blade seal.

(b) The second fire seal assembly covers the remaining portion of the fan duct cowl vee blade and the vertical segment down the lower bifurcation wall to the front of the latch beam.

(2) There are two metal fire seals on the upper, aft edge of each aft cowl. These metal fire seals come in contact with the seal depressors on the aft cowl fairing over the exhaust sleeve.

(a) The purpose of the metal fire seals is to contain a fire under the aft cowl.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-05-000-801-H01	Thrust Reverser Fire Seal Removal (P/B 401)
78-31-05-300-802-H00	Thrust Reverser Bulb Seal Repair (P/B 801)
78-31-05-400-801-H01	Thrust Reverser Fire Seal Installation (P/B 401)

C. Location Zones

Zone	Area
411	Engine, Left
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
421	Engine, Right
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

E. Prepare to Inspect the Fire Seals

SUBTASK 78-31-05-010-006-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Examine the Thrust Reverser Bulb-Type Fire Seals

SUBTASK 78-31-05-210-001-H01

(1) Visually examine the left and right thrust reverser fire seals for the conditions that follow (Figure 601):

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do a check that the fire seal is correctly installed along the entire length by the seal foot and seal retainer.

(b) Do a check of the fire seal sections at each corner and joint for separations or frayed edges or ends.

(c) If sealant was used on the fire seal, do a check that the sealant is attached to the fire seal and intact.

(d) Do a check at the ends of the fire seals for tears, looseness or frayed ends.

(e) Do a check of the fire seal surfaces for these conditions:

1) Damage, wrinkles, or foreign material embedded in the seal.

2) Bubbles greater than 0.20 inch (5.080 mm).

3) Wear that is greater than 0.0625 inch (1.5875 mm) in depth.

4) Wear that goes through the outer layer of fabric.

5) Dark discoloration that is caused by heat.

(f) Examine the fire seal for cracks.

1) If you see circumferential cracks, reject it.

2) If you see radial cracks, you must obey the conditions that follow:

a) Permit a maximum of four cracks which are not more than half the height of the fire seal.

b) The distance between cracks must be a minimum of 6.00 inches (152.40 mm).

3) If you see damage, you must obey the conditions that follow:

a) The seal strip is permitted to have a maximum of ten damaged areas, if each damaged area is not more than 1.00 inch (25.4 mm) long and a maximum of 30 percent of the width.

NOTE: The damaged areas in the front and the rear seal strip must not align.

(g) Make sure the fasteners for the fire seals on the latch beam are installed and tightened.

(h) If the damage found is more than the limits, replace the fire seal.

1) Do this task: Thrust Reverser Fire Seal Removal, TASK 78-31-05-000-801-H01.

2) Do this task: Thrust Reverser Fire Seal Installation, TASK 78-31-05-400-801-H01.

(i) If the damage to the bulb seal is in the area between the ends of the v-blade and adjacent to the v-blade on the inner wall barrel, repair the bulb seal.

1) Do this task: Thrust Reverser Bulb Seal Repair, TASK 78-31-05-300-802-H00.

G. Examine the Metal Fire Seals on the Aft Cowl

SUBTASK 78-31-05-210-002-H01

(1) Visually check the metal blade fire seals on the aft cowls (Figure 601).

(a) No cracks, torn or missing material or severely bent metal fire seals.

(b) Make sure there are no missing or loose fasteners for the metal fire seals.

(c) No open gap between the metal fire seals and the aft cowl fairing; the metal fire seals must contact the surface of the aft cowl fairing to maintain a seal surface.

NOTE: An open gap can be caused by missing fire seal segments, cracks in the metal seal, torn or missing material from the metal seal.

(d) Missing two or more adjacent, curved portions of the fire seal for a length of 0.05 inches (1.27 mm) below the opposite fire seal.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Worn or missing a single blade of the fire seal for a length of 0.15 inches (3.81 mm) below the opposite fire seal and a gap is exposed between the fire seal and the aft cowl fairing over the exhaust sleeve.

(f) If the damage exceeds these limits or there is an open gap and the seal surface is not maintained, replace the metal fire seals.

1) Do this task: Thrust Reverser Fire Seal Removal, TASK 78-31-05-000-801-H01.

2) Do this task: Thrust Reverser Fire Seal Installation, TASK 78-31-05-400-801-H01.

3) If there is damage to the metal seal, but the seal surface is maintained (no open gaps), do a daily visual check and replace the metal fire seals when the parts are available.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-05-410-006-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

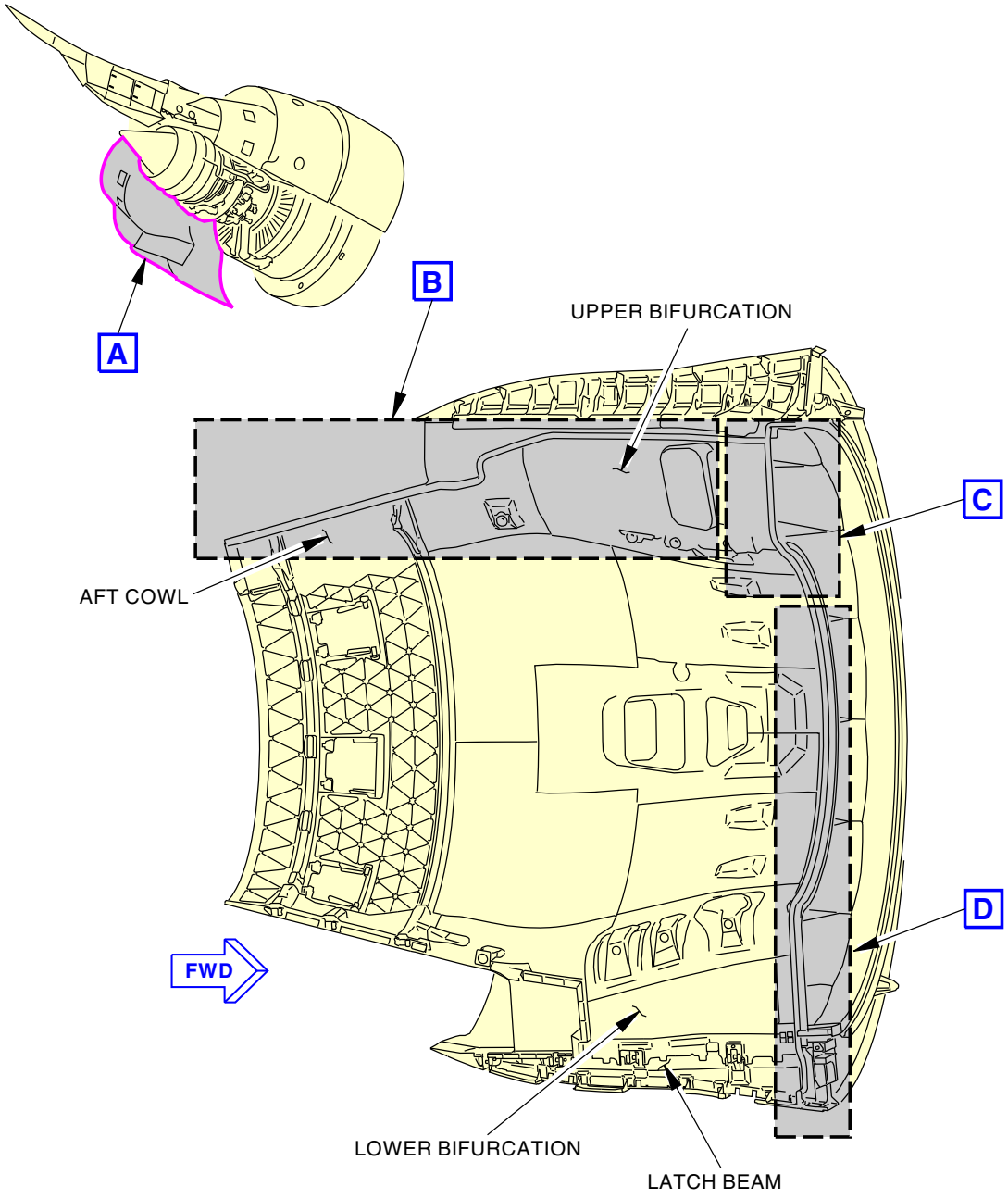
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



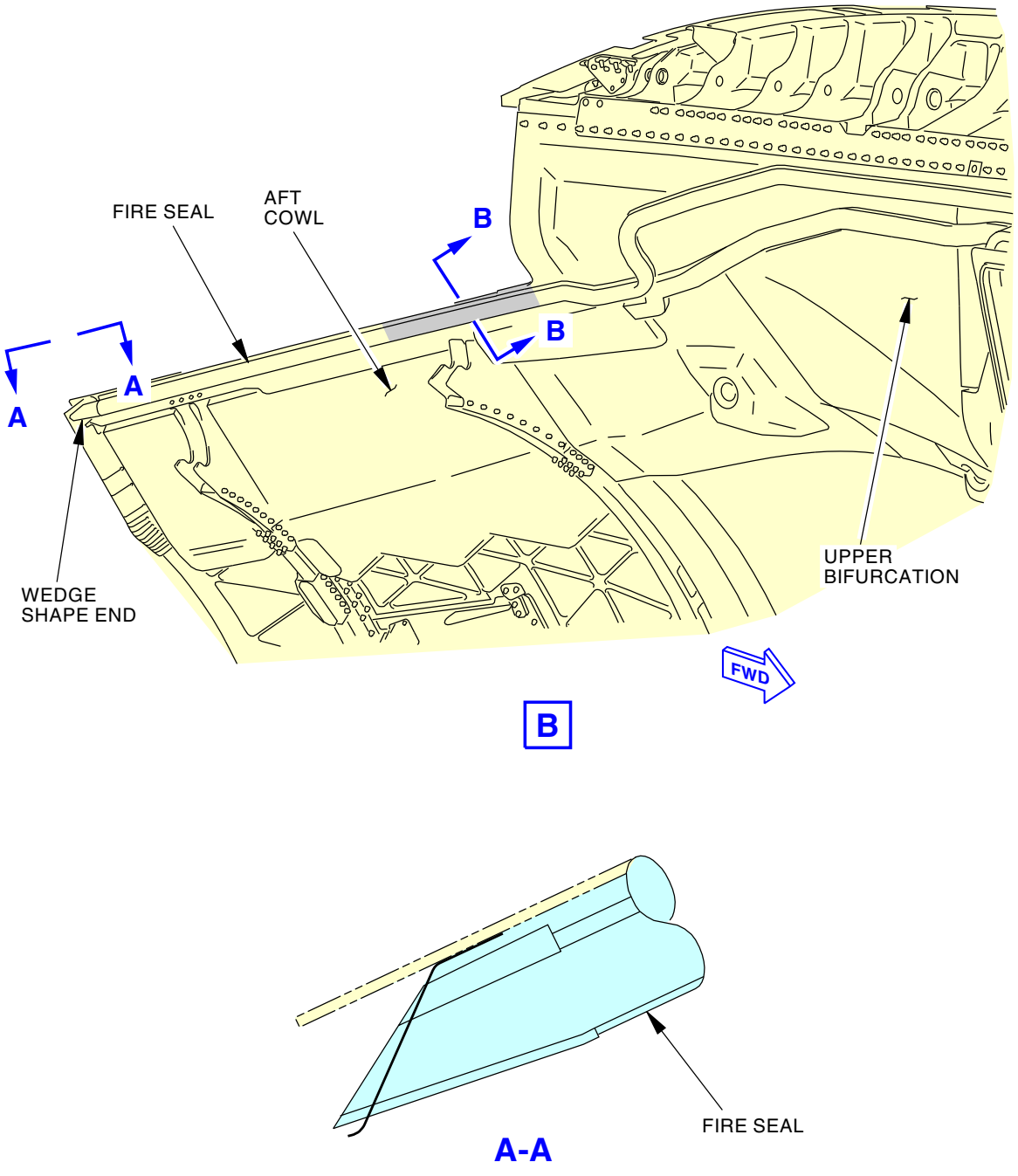
LEFT THRUST REVERSER
(INTERNAL SIDE, RIGHT THRUST REVERSER IS OPPOSITE)

A

M07359 S0004286326_V2

Thrust Reverser Fire Seal Inspection
Figure 601/78-31-05-990-801-H01 (Sheet 1 of 5)

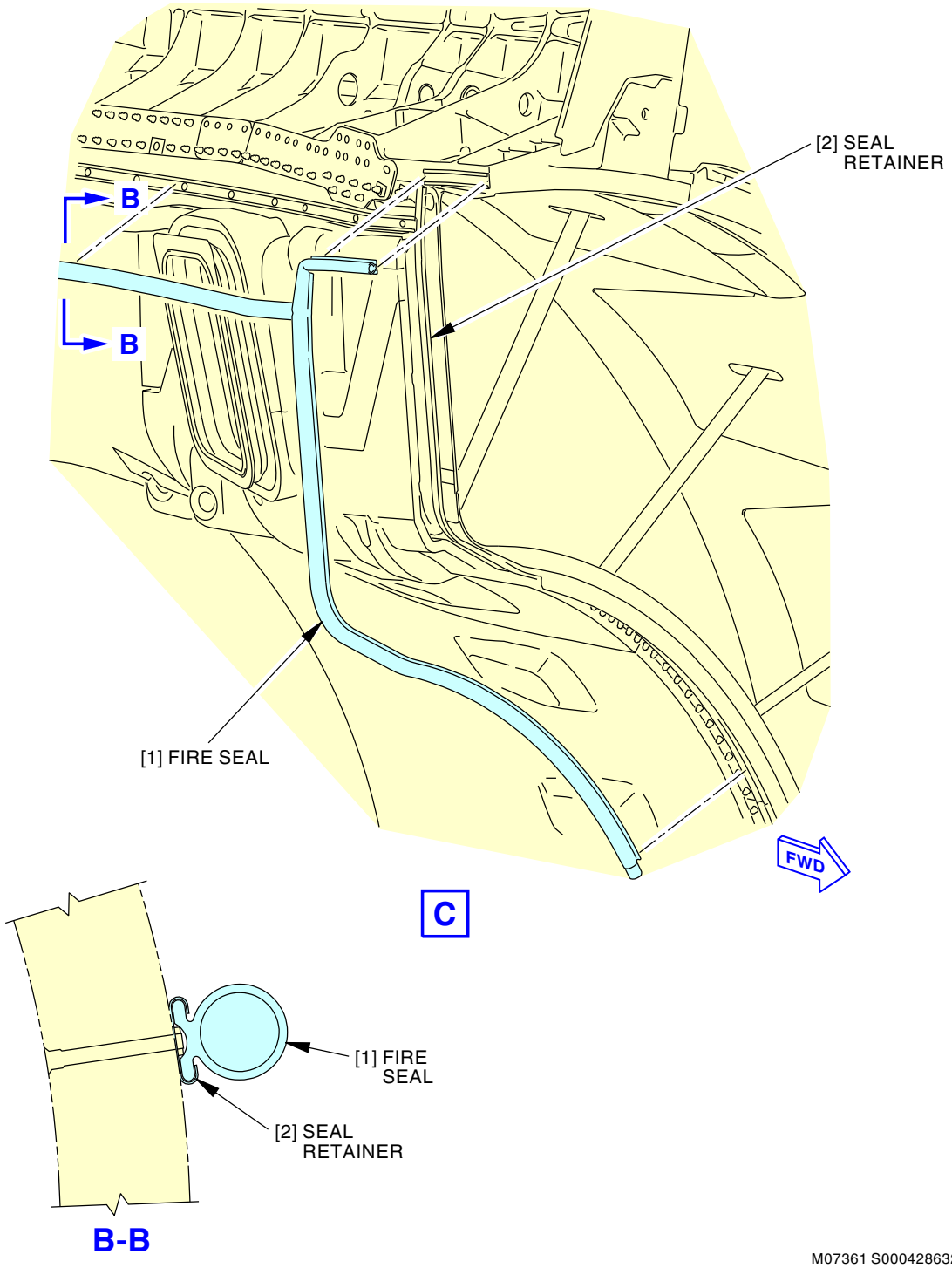
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07360 S0004286327_V2

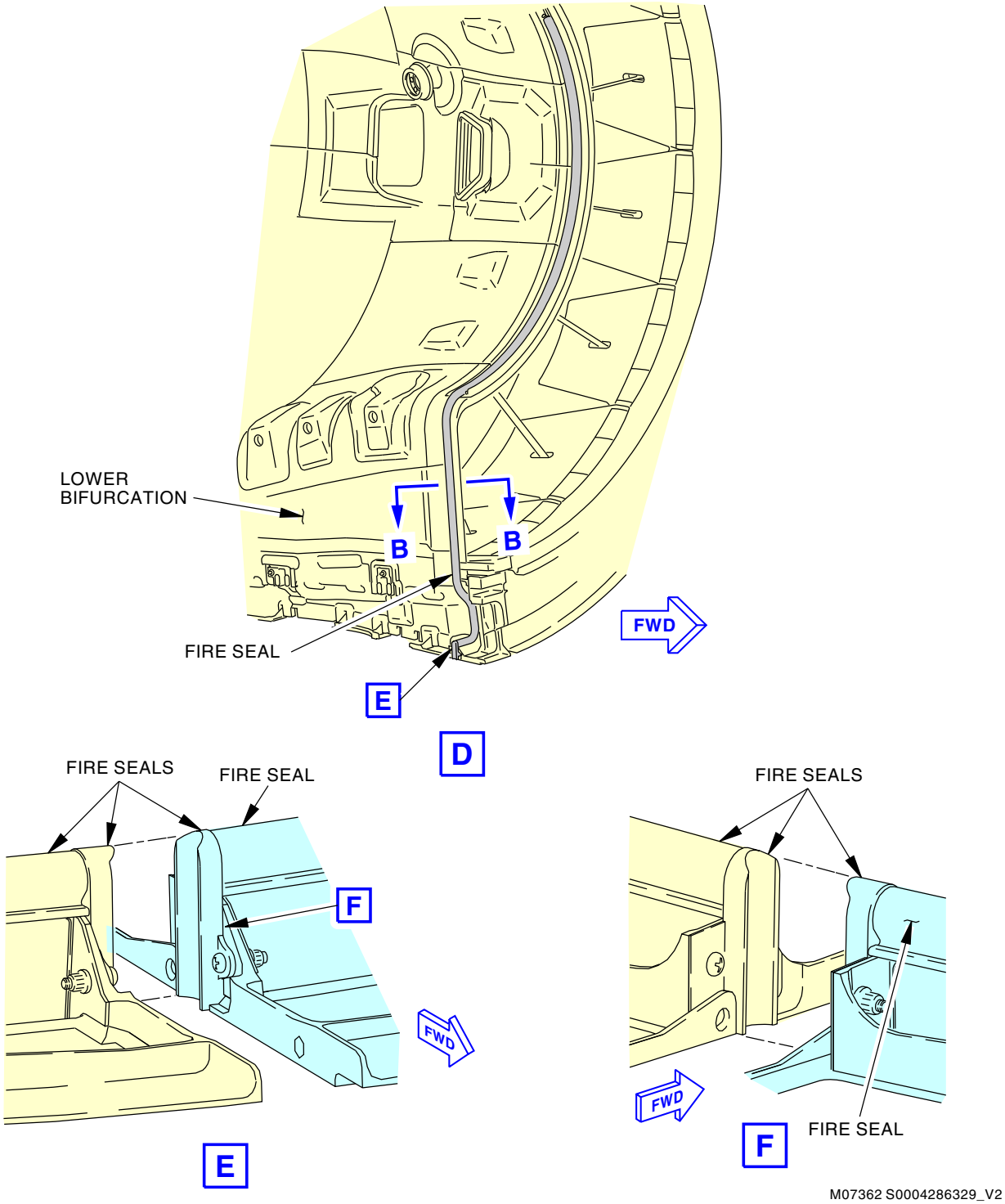
Thrust Reverser Fire Seal Inspection
Figure 601/78-31-05-990-801-H01 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



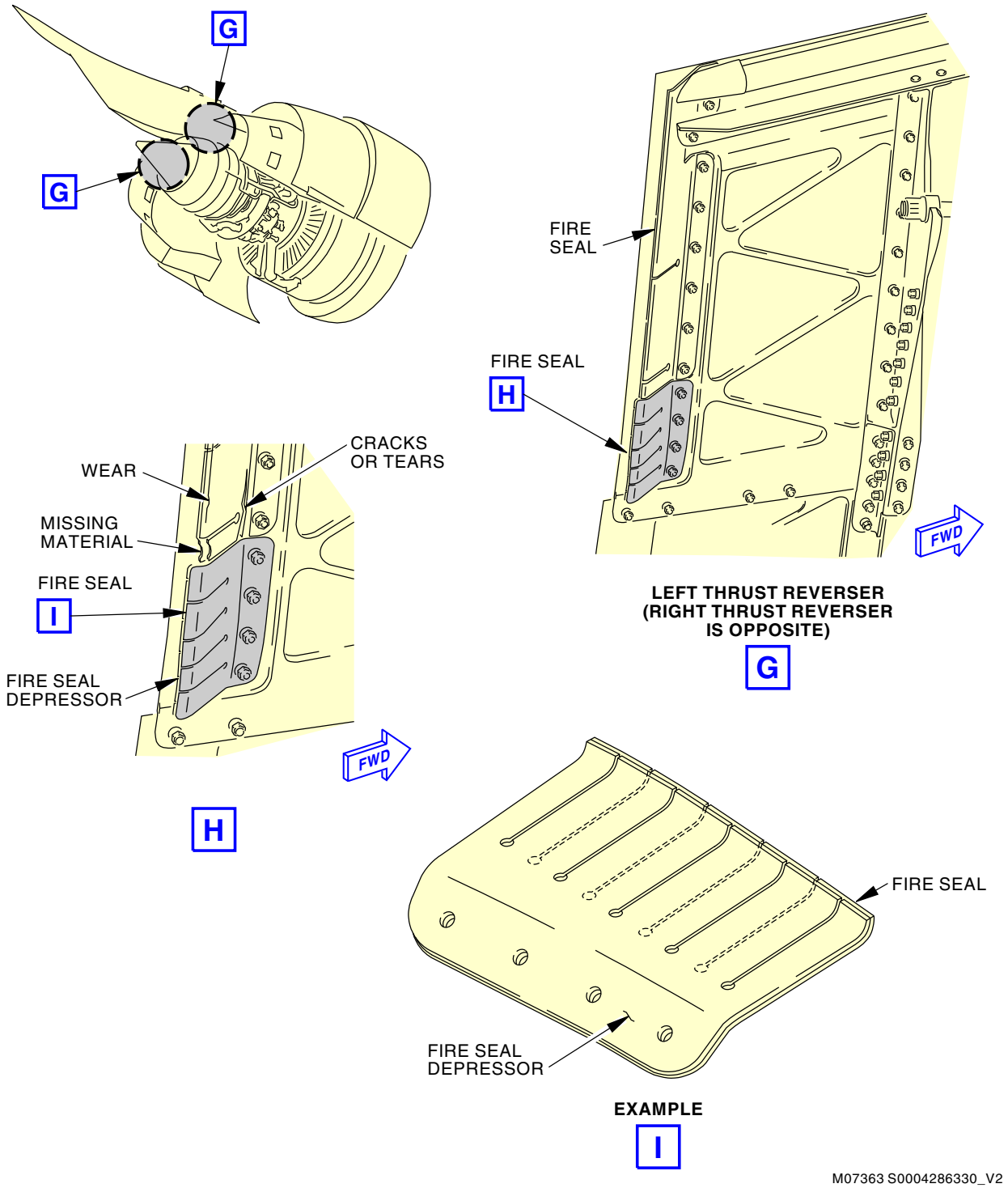
Thrust Reverser Fire Seal Inspection
Figure 601/78-31-05-990-801-H01 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Fire Seal Inspection
Figure 601/78-31-05-990-801-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Fire Seal Inspection
Figure 601/78-31-05-990-801-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER FIRE SEALS - REPAIRS

1. General

A. This procedure has one task to repair the end plug in the bulb-type fire seal.

TASK 78-31-05-300-801-H00

2. Thrust Reverser Fire Seal End Plug Repair

A. General

(1) There are two silicone rubber bulb-type fire seals assemblies that make the complete fire seal for the thrust reverser.

(a) The ends of the bulb-type fire seal are closed with a closed cell silicone foam rubber plug that is inserted into the seal and attached with adhesive.

B. Consumable Materials

Reference	Description	Specification
A00027	Adhesive - Silicone Rubber, 1 Part, RTV	BAC5010 Type 60
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00068	Alcohol - Denatured, Ethyl (Ethanol)	AMS 3002, MIL-E-51454 Type II
B00130	Alcohol - Isopropyl	TT-I-735
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G50077	Abrasive - Aluminum Oxide Paper, 240 grit or finer	
G50088	Seal - Closed Cell Silicone Foam Rubber, Hydraulic Fluid Resistant (Non-Adhesive)	BMS1-68 Grade A Form II
G50381	Abrasive - Aluminum Oxide Paper, 180 Grit	

C. Location Zones

Zone	Area
411	Engine, Left
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
421	Engine, Right
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Repair the End Plug in the Bulb-Type Fire Seal

SUBTASK 78-31-05-160-006-H00

(1) Clean the interior surface of the installed bulb seal.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(a) Wipe the interior surface of the installed bulb seal with alcohol, B00068, alcohol, B00130 or solvent, B00062 on a clean cotton wiper, G00034.

NOTE: Clean surfaces for the adhesive are required to make high strength bonds. All foreign materials such as oils, grease, waxes, or powders must be removed before the adhesive is applied.

(b) Abrade the interior surface of the installed bulb seal with aluminum oxide, 180 grit abrasive paper, G50381 or 240 grit or finer abrasive paper, G50077.

(c) Wipe the interior surface of the installed bulb seal with alcohol, B00068, alcohol, B00130 or solvent, B00062 on a clean cotton wiper, G00034 to remove the unwanted abraded material.

1) Remove excess solvent with a clean cotton wiper, G00034.

SUBTASK 78-31-05-350-001-H00

(2) Apply adhesive, A00027 or RTV 106 adhesive, A00081 into the open end of the bulb-type fire seal.

SUBTASK 78-31-05-350-002-H00

(3) Install the endplug seal, G50088 into the open end of the bulb-type fire seal.

SUBTASK 78-31-05-350-003-H00

(4) Remove any adhesive that flows out with a cotton wiper, G00034.

——— END OF TASK ———

TASK 78-31-05-300-802-H00

3. Thrust Reverser Bulb Seal Repair

(Figure 801)

A. General

(1) This is a repair for the thrust reverser bulb seal segment that is adjacent to the v-blade on the inner wall barrel of the fan duct cowl.

(2) This repair cannot be used for the bulb seal on the inner wall barrel that is in 30 degree sector either side of the centerline (CL). This bulb seal segment (fire seal) is the fire barrier.

(3) This repair cannot be used for the fire seals on the upper bifurcation or the lower bifurcation.

(4) In the inner wall barrel, adjacent to the v-blade, the fire seal serves as an aerodynamic seal. In this area, the thrust reverser v-blade and the engine v-groove is the fire barrier.

(5) This repair can be used to replace a minimum seal length of greater than 3.0 inches (76.2 millimeters).

(6) This procedure uses a length of salvaged thrust reverser fire seal.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-05-200-801-H01	Thrust Reverser Fire Seal Inspection (P/B 601)

C. Tools/Equipment

Reference	Description
STD-126	Brush - Soft-bristle, Non-metallic
STD-552	Knife - Utility
STD-764	Scraper - Non-metallic
STD-765	Scraper - Plastic
STD-1182	Tool - Seal Cutting, Hardwood or Plastic
STD-3949	Scalpel - X-ACTO Knife
STD-4069	Scraper - Sealant Removal PN: 3F1423-2, PCN911-0533 (UAL)

D. Consumable Materials

Reference	Description	Specification
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00068	Alcohol - Denatured, Ethyl (Ethanol)	AMS 3002, MIL-E-51454 Type II
B00130	Alcohol - Isopropyl	TT-I-735
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02061	Marker - Permanent, Felt Tip Pen	
G50077	Abrasive - Aluminum Oxide Paper, 240 grit or finer	
G50219	Marking Pen	
G50381	Abrasive - Aluminum Oxide Paper, 180 Grit	

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Procedure

SUBTASK 78-31-05-010-007-H00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-05-211-001-H00

(2) Make sure the length of salvaged fire seal that you use for the repair does not have wear, cracking, tears or damage.

(a) Do this task: Thrust Reverser Fire Seal Inspection, TASK 78-31-05-200-801-H01.

SUBTASK 78-31-05-350-008-H00

(3) Make sure that the damage to the bulb seal is in the area between the ends of the v-blade and adjacent to the v-blade on the inner wall barrel; this is the defined repair area for the bulb seal.

NOTE: This repair cannot be used for the bulb seal on the inner wall barrel that is in 30 degree sector either side of the centerline (CL). This bulb seal segment (fire seal) is the fire barrier. This repair cannot be used for the fire seals on the upper bifurcation or the lower bifurcation.

(a) To find the 30 degree sector either side of the centerline (CL) area where the bulb seal repair cannot be done, look for the ends of the v-blade.

SUBTASK 78-31-05-350-004-H00

(4) Remove damaged section of bulb seal.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Measure the length of the damaged section of bulb seal and add a 2.0 inch (50.4 millimeters) clearance on both sides of the damaged section, this is the total length that must be removed.

NOTE: The minimum length of bulb seal that can be replaced is 3.0 inches (76.2 millimeters).

(b) Use a permanent ink marker, G02061 or marking pen, G50219, of contrast color, to mark the length of the section that must be removed before you cut out the damaged bulb seal section.

CAUTION

ONLY USE APPROVED SCRAPERS ON THE AIRPLANE SKIN. SCRAPERS THAT ARE NOT APPROVED CAN MAKE SCRATCHES ON THE SKIN, AND CAUSE FATIGUE CRACKS.

(c) Make a clean cut across the bulb seal with wooden or plastic seal cutting tool, STD-1182, or non-metallic scraper, STD-764, or plastic scraper, STD-765 or equivalent wooden or plastic cutting tools.

(d) Pull the damaged section of bulb seal from the seal retainer.

(e) Remove any sealant that is in the retainer with a non-metallic scraper, STD-764, or plastic scraper, STD-765, or sealant removal scraper, STD-4069 or equivalent, if necessary.

SUBTASK 78-31-05-350-005-H00

(5) Make the replacement bulb seal segment (Figure 801).

(a) Measure and mark the length on a salvaged bulb seal that is equal to the length of the damaged section of bulb seal that was removed with a permanent ink marker, G02061 or marking pen, G50219, of contrast color.

NOTE: The total length that was removed was the length of the damaged section of bulb seal plus 2.0 inches (50.4 millimeters) of clearance added on both sides of the damaged section. The minimum length of bulb seal that can be replaced is 3.0 inches (76.2 millimeters).

(b) Cut a section of a salvaged bulb seal to the correct length.

1) Do this bulb seal preparation on a work bench with a X-ACTO knife scalpel, STD-3949 or utility knife, STD-552.

SUBTASK 78-31-05-350-006-H00

(6) Make the two bulb seal inserts (Figure 801).

(a) Measure and mark the length that is 3.0 inch (76.2 millimeters) long on a salvaged bulb seal with a permanent ink marker, G02061 or marking pen, G50219, of contrast color.

(b) Cut the salvaged bulb seal to make an insert.

1) Do this bulb seal preparation on a work bench with an X-ACTO knife scalpel, STD-3949 or utility knife, STD-552.

2) Remove and discard the seal foot from the insert.

3) Remove and discard a 0.375 inch (9.525 millimeters) wide strip of the seal, the full length of each 3.0 inch (76.2 millimeters) insert from the area that has been cut from the seal foot.

NOTE: These 3.0 inch (76.2 millimeters) sections will be used as inserts for the splice joints at both ends of the seal section to be inserted between the bulb seals that were not damaged.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Use a permanent ink marker, G02061 or marking pen, G50219, of contrast color, to mark the 3.0 inch (76.2 millimeters) inserts to show the center point at 1.5 inch (38.1 millimeters).

SUBTASK 78-31-05-160-001-H00

(7) Clean the exposed seal retainer.

(a) Wipe or scrub the exposed seal retainer with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(b) Wipe the exposed seal retainer with alcohol, B00130 or solvent, B00062.

SUBTASK 78-31-05-160-002-H00

(8) Clean the external surfaces of the installed bulb seal for a length 6.0 inches (152.4 millimeters) on each side of the area that has been removed.

(a) Wipe or scrub the external surface of the installed bulb seal with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(b) Wipe the external surface of the installed bulb seal with alcohol, B00068, alcohol, B00130 or solvent, B00062.

1) Remove excess solvent with a clean cotton wiper, G00034.

SUBTASK 78-31-05-160-003-H00

(9) Clean the cut end of the installed bulb seal.

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(a) Wipe the cut end of the installed bulb seal with alcohol, B00068, alcohol, B00130 or solvent, B00062.

(b) Abrade the cut end of the installed bulb seal with aluminum oxide, 180 grit abrasive paper, G50381 or 240 grit or finer abrasive paper, G50077.

(c) Wipe the cut end of the installed bulb seal with alcohol, B00068, alcohol, B00130 or solvent, B00062 to remove the unwanted abraded material.

1) Remove excess solvent with a clean cotton wiper, G00034.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-05-160-004-H00

(10) Clean the internal surface of the replacement bulb seal segment.

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(a) Wipe the internal surface of the bulb seal segment with alcohol, B00068, alcohol, B00130 or solvent, B00062.

NOTE: Clean surfaces for the adhesive are required to make high strength bonds. All foreign materials such as oils, grease, waxes, or powders must be removed before the adhesive is applied.

(b) Abrade the internal surface of the bulb seal segment with aluminum oxide, 180 grit abrasive paper, G50381 or 240 grit or finer abrasive paper, G50077.

(c) Wipe the internal surface of the bulb seal segment with alcohol, B00068, alcohol, B00130 or solvent, B00062 to remove the unwanted abraded material.

1) Remove excess solvent with a clean cotton wiper, G00034.

SUBTASK 78-31-05-160-005-H00

(11) Clean the external surface of the bulb seal insert.

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IT. KEEP IT AWAY FROM SPARKS, FLAMES, AND HEAT. IT IS POISONOUS AND FLAMMABLE. THE SOLVENT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(a) Wipe the external surface of the bulb seal insert with alcohol, B00068, alcohol, B00130 or solvent, B00062.

(b) Abrade the external surface of the bulb seal insert with aluminum oxide, 180 grit abrasive paper, G50381 or 240 grit or finer abrasive paper, G50077.

(c) Wipe the external surface of the bulb seal insert with alcohol, B00068, alcohol, B00130 or solvent, B00062 to remove the unwanted abraded material.

1) Remove excess solvent with a clean cotton wiper, G00034.

SUBTASK 78-31-05-350-007-H00

(12) Insert the replacement section into the seal retainer where the damaged section was removed.

(a) Apply RTV 106 adhesive, A00081 to one end of the first insert with a soft-bristle non-metallic brush, STD-126.

(b) Push the first insert into one side of the replacement bulb seal segment.

1) Make sure the split along the length of the insert is adjacent to the seal foot.

(c) Apply RTV 106 adhesive, A00081 to the first insert with a soft-bristle non-metallic brush, STD-126.

(d) Push the first insert into the installed bulb seal.

(e) Push the replacement bulb seal foot into the retainer.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Apply RTV 106 adhesive, A00081 to one end of the second insert with a soft-bristle non-metallic brush, STD-126.

(g) Push the second insert into the other side of the replacement bulb seal segment.

1) Make sure the split along the length of the insert is adjacent to the seal foot.

(h) Apply RTV 106 adhesive, A00081 to other side of the second insert with a soft-bristle non-metallic brush, STD-126.

(i) Push the second insert into other installed bulb seal.

(j) Seal the joints with RTV 106 adhesive, A00081 at any gaps at the splice joints.

(k) Remove any adhesive that flows out with a cotton wiper, G00034.

SUBTASK 78-31-05-410-007-H00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(13) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

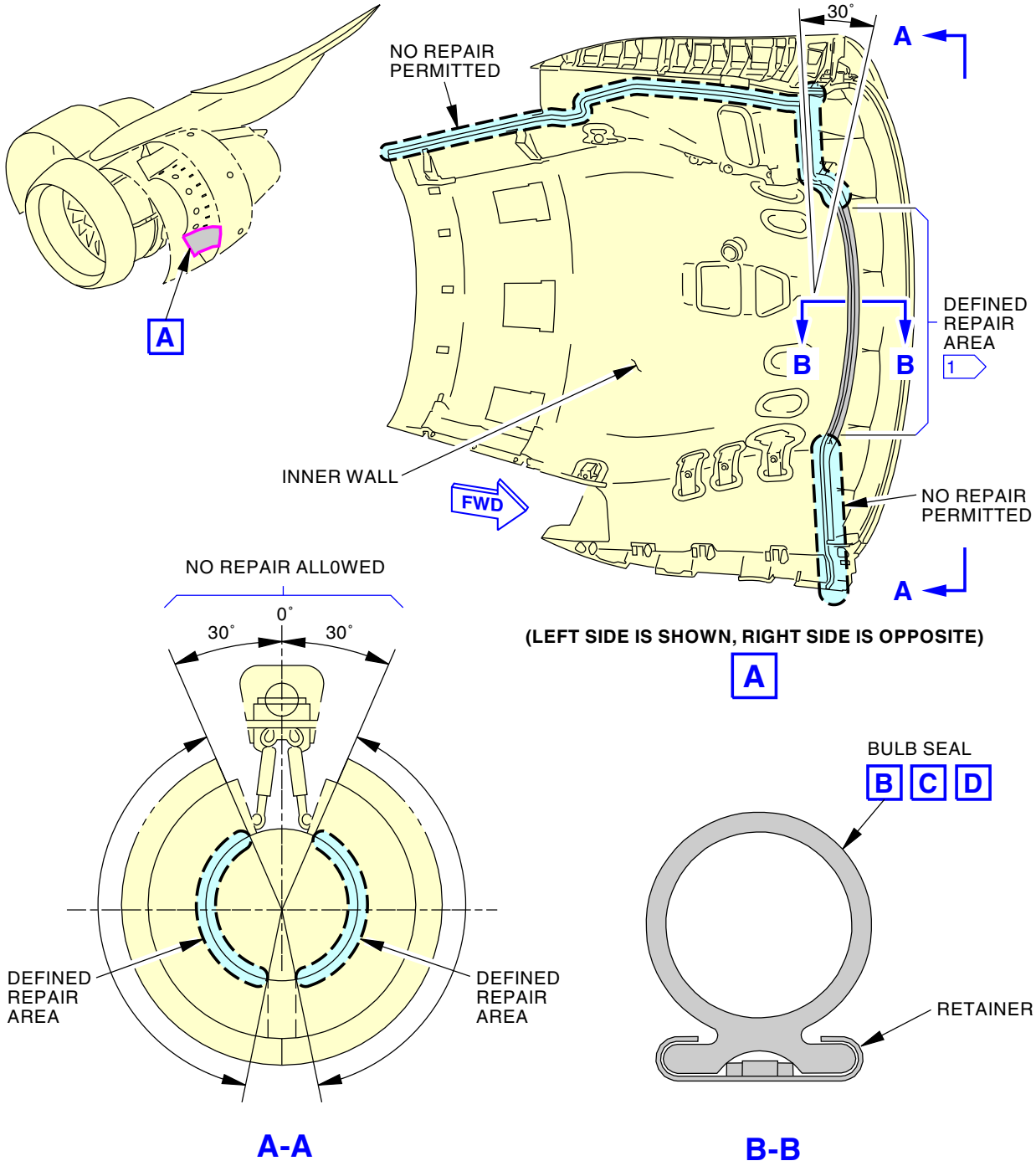
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

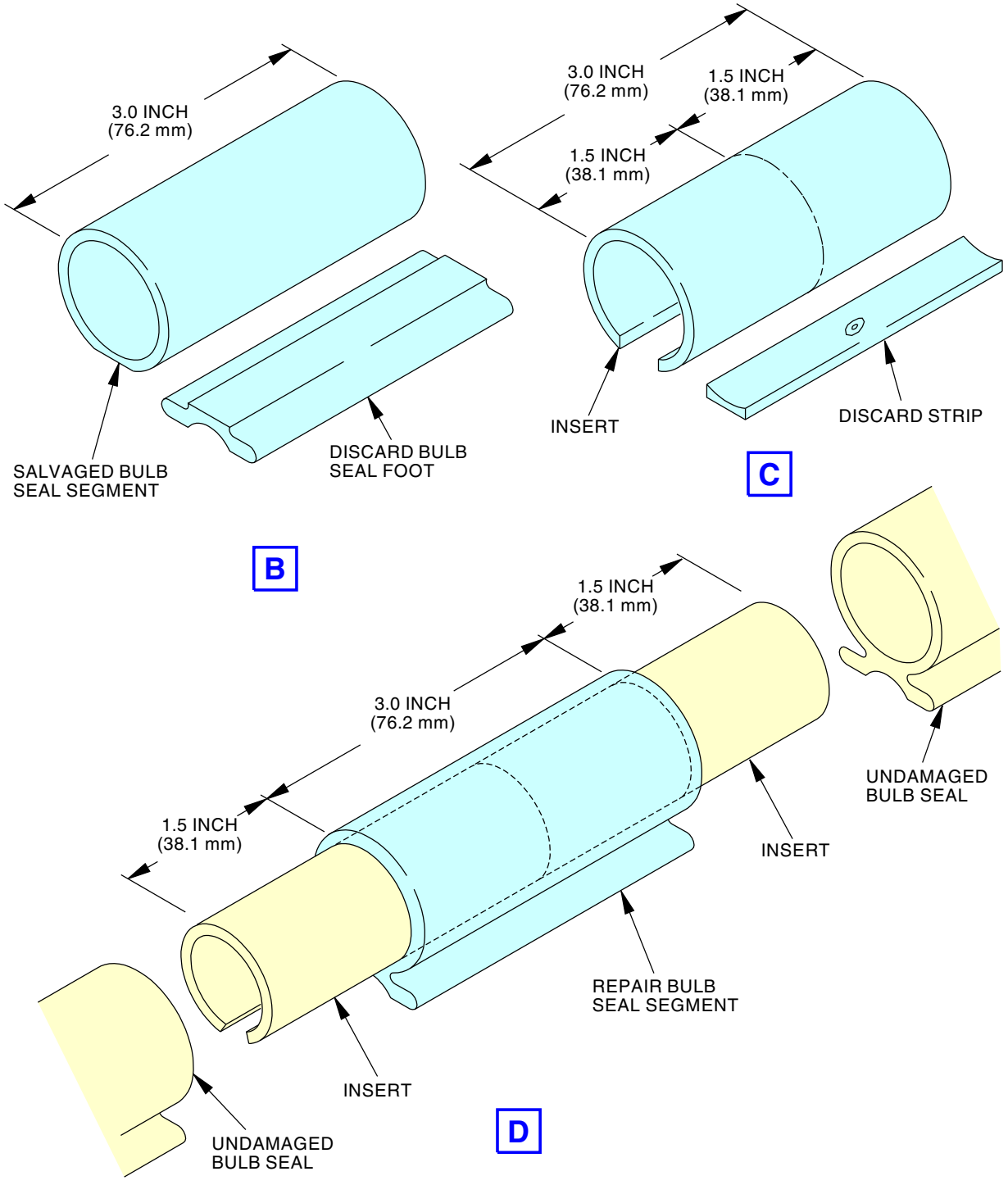


1 BULB SEAL ADJACENT TO THE V-BLADE ON THE INNER WALL BARREL CAN BE REPAIRED.

U53809 S0000206843_V2

Thrust Reverser Bulb Seal Repair
Figure 801/78-31-05-990-804-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



U53911 S0000206847_V2

Thrust Reverser Bulb Seal Repair
Figure 801/78-31-05-990-804-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER THERMAL INSULATION BLANKETS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) The first task removes the thrust reverser thermal insulation blankets.

(2) The second task installs the thrust reverser thermal insulation blankets.

B. These blankets are a thermal insulation and fire barrier layer which is necessary to keep the thrust reverser structurally serviceable and can decrease the damage and repair costs from a duct burst or a fire.

TASK 78-31-06-000-801-H01

2. Thrust Reverser Thermal Insulation Blanket Removal

(Figure 401/Figure 402/Figure 403)

A. General

(1) This task removes the thrust reverser thermal insulation blankets.

(2) There are two kinds of studs that attach the blankets.

(a) There are click bond studs that are bonded with an adhesive to the inner wall of the fan duct cowl of the thrust reverser. The click bond studs can be moved or replaced but required modification of the inner wall.

(b) There are blanket studs that are installed in the blanket.

(3) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(4) There is a small, circular, CRES thermal insulation blanket that is installed on the left thrust reverser half at approximately the center of the thrust reverser inner wall. This insulation blanket covers the plug in the inner wall for the exhaust duct for the start transient bleed valve. The exhaust duct for the start transient bleed valve is not installed in the inner wall for the GE90-100 series engines. The exhaust duct for the start transient bleed valve is only installed in the inner wall for the GE90-70/-80/-90 series engines. The inner wall is a common part for both the thrust reversers for the GE90-70/-80/-90 series engines and the GE90-100 series engines.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-12-02-000-804-H00	Thrust Reverser Cowl Opening Actuators Removal (P/B 401)
78-31-00-010-804-H01	Open the Thrust Reverser (Sling Method) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-21-000-801-H01	Thrust Reverser Lower Bifurcation Interlock Pin Removal (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
SPL-768	Sealant Removal Tool, Hardwood or Plastic Part #: ST982 Supplier: 81205
STD-653	Platform - Engine and Strut Access
STD-764	Scraper - Non-metallic
STD-1048	Stepladder - 6 foot (1.83m)

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Prepare to Remove the Thrust Reverser Thermal Insulation Blankets

SUBTASK 78-31-06-010-003-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-06-490-001-H01

(2) Use a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-06-030-001-H01

(3) If you must remove the thermal insulation blanket at the T-hook gearbox, you must disconnect the thrust reverser PDOS actuator from the fitting on the upper bifurcation of the right side thrust reverser.

(a) Refer to this task to keep the thrust reverser in the open position: Open the Thrust Reverser (Sling Method), TASK 78-31-00-010-804-H01.

1) Attach the lower sling assembly to the thrust reverser at the latch beam attach fitting.

2) Attach and operate an overhead crane or hoist to keep the thrust reverser in the open position.

WARNING MAKE SURE THAT THE HOLD-OPEN ROD FOR THE THRUST REVERSER IS ENGAGED BEFORE YOU REMOVE THE THRUST REVERSER OPENING ACTUATOR. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURIES TO PERSONNEL AND DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(b) Make sure the thrust reverser hold-open rod is installed and locked in the extended position.

(c) Refer to this task to disconnect the thrust reverser PDOS actuator: Thrust Reverser Cowl Opening Actuators Removal, TASK 71-12-02-000-804-H00.

G. Remove the Thrust Reverser Thermal Insulation Blankets

SUBTASK 78-31-06-020-001-H01

(1) If it is necessary, cut the sealant between the forward edge of the thermal insulation blankets and the vertical fire seal near the inner v-blade, and the upper and lower bifurcation.

NOTE: The sealant is used to fill the 0.000-0.250 inch (0.000-6.350 millimeters) gap between the blankets and the vertical fire seal retainers.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Cut the sealant with a sealant removal tool, SPL-768, or non-metallic scraper, STD-764.

SUBTASK 78-31-06-020-003-H01

(2) If it is necessary, cut the sealant and filler between the cutouts in the thermal insulation blankets and the attachment fittings for the PDOS actuator rodends, the T-hook gearbox and the T-hook receiver on the upper bifurcations.

NOTE: The sealant is used to fill the 0.000-0.250 inch (0.000-6.350 millimeters) gap between the blanket cutouts and the PDOS actuator fittings, the T-hook gearbox and the T-hook receiver. Gaps more than 0.250 inch (6.350 millimeters) are filled with a foam filler and sealant.

(a) Cut the sealant with a sealant removal tool, SPL-768, or non-metallic scraper, STD-764.

SUBTASK 78-31-06-020-004-H01

(3) If it is necessary, cut the fillet seal between the cutout in the thermal insulation blankets and the rectangular rubber bumper on the latch beam of the left or right thrust reverser.

(a) Cut the sealant with a sealant removal tool, SPL-768, or non-metallic scraper, STD-764.

NOTE: The sealant is used to fill the 0.1037-0.1201 inch (2.6340-3.0505 millimeters) gap between the blanket cutout and the rectangular rubber bumper.

SUBTASK 78-31-06-020-002-H01

(4) Remove the applicable thermal insulation blankets.

(a) Remove the thermal insulation blankets [10] on the left thrust reverser half (Figure 401), or

1) Remove the interlock pin assembly on the left thrust reverser before you remove the thermal insulation blankets at the lower bifurcation; refer to Thrust Reverser Lower Bifurcation Interlock Pin Removal, TASK 78-31-21-000-801-H01.

(b) Remove the thermal insulation blankets [20] on the right thrust reverser half (Figure 402).

(c) If you must remove all of the thermal insulation blankets, remove the thermal insulation blankets in the reverse sequence that the blankets were installed.

1) See the tables in the installation procedure for the correct sequence.

2) The sequence given is recommended, but you do not need to follow this sequence if you only work on some of the blankets.

CAUTION

REMOVAL OF THERMAL INSULATION BLANKETS OUT OF ORDER CAN CAUSE DAMAGE TO THE BLANKETS. DO NOT BEND OR TEAR THE BLANKETS. DAMAGED BLANKETS MUST BE REPAIRED OR REPLACED. THE BLANKETS ARE VERY STIFF.

CAUTION

LIFT THE LARGER INSULATION BLANKETS CAREFULLY. GIVE SUPPORT TO THE EDGES OF THE BLANKET. THE WEIGHT OF THE BLANKET CAN BEND, TWIST, OR BREAK IT.

(d) If you only remove some of the blankets, make a note of the blanket overlap as you remove the blankets.

NOTE: The blankets are designed to overlap along joints and seams. Some blankets are designed to fit under another blanket. There are different blanket thicknesses and blanket overlap at the fastener locations. When the blankets are installed, there can be a blanket that must be install first before the next blanket can be installed.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) To remove a blanket that is overlapped by another blanket, do these steps (Figure 403):
   a) Remove the fasteners of the blanket to be removed.
   b) Remove the fasteners of the blanket that overlaps the blanket to be removed.
   c) Push a triangular, wedge shaped piece of foam or a soft, nonabrasive cloth under the blanket that overlaps the blanket to be removed.

      NOTE: The blanket that overlaps will lift up enough to clear the click bond studs to let you remove the other blanket.

   d) Remove the blanket up and over the click bond studs.
2) Attach a numbered tag to the blankets to show the order that the blanket was removed.

(e) Be careful how you handle, transport and store the thermal blankets to prevent bends in the face of the blankets and damage to the edges.

(f) Details of the different types of fastener methods are shown in the illustrations for different locations on the thrust reverser.

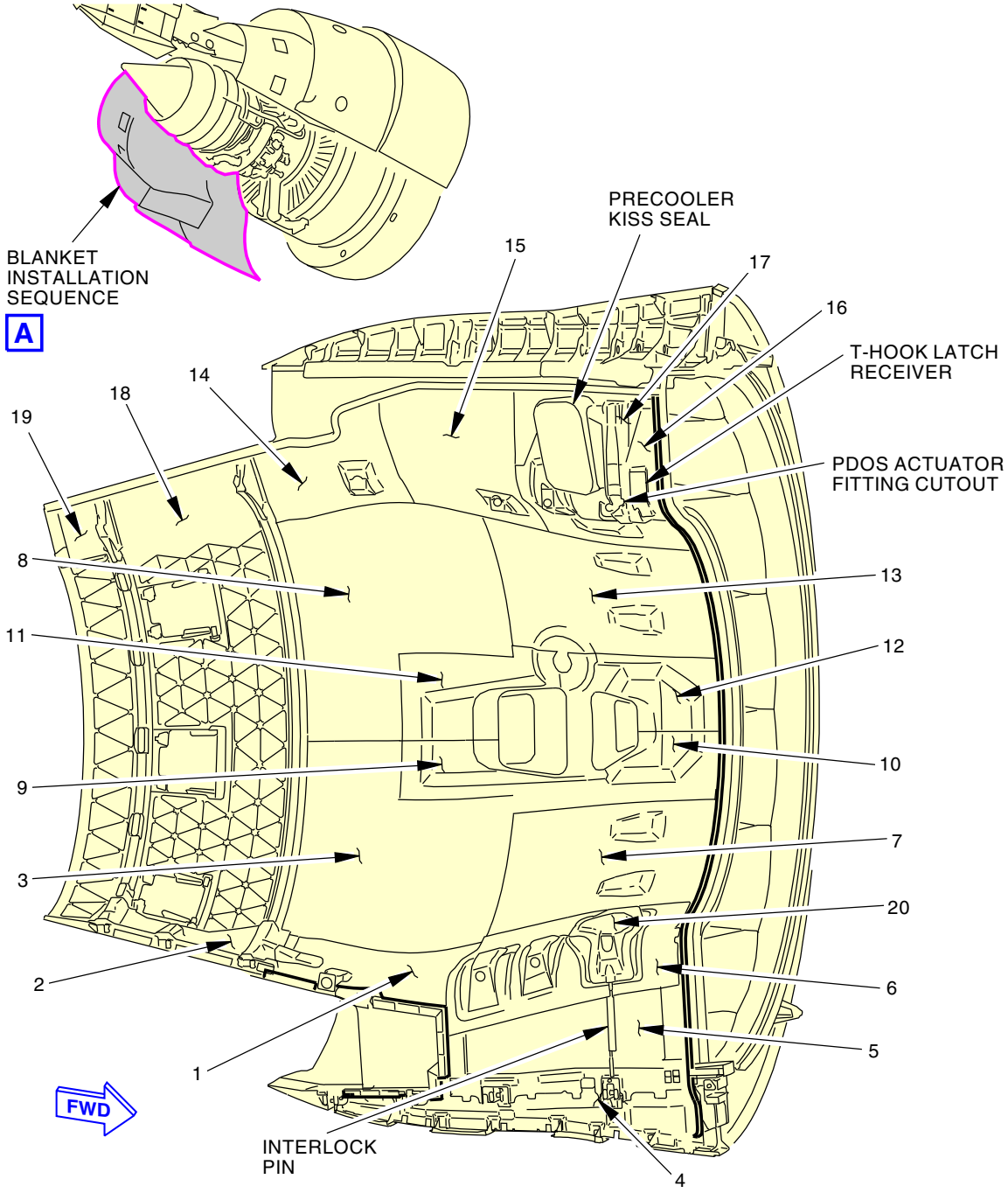
SUBTASK 78-31-06-020-005-H00

(5) If it is necessary to remove the small circular insulation blanket that covers the plug in the inner wall, remove the nuts and do not remove the bolts or the plug.

NOTE: The nuts are removed from the 12 bolts that attach the plug to the inner wall. The plug is shimmed to get a smooth aerodynamic surface on the outside of the inner wall and the gap between the plug and the inner wall is filled with sealant.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



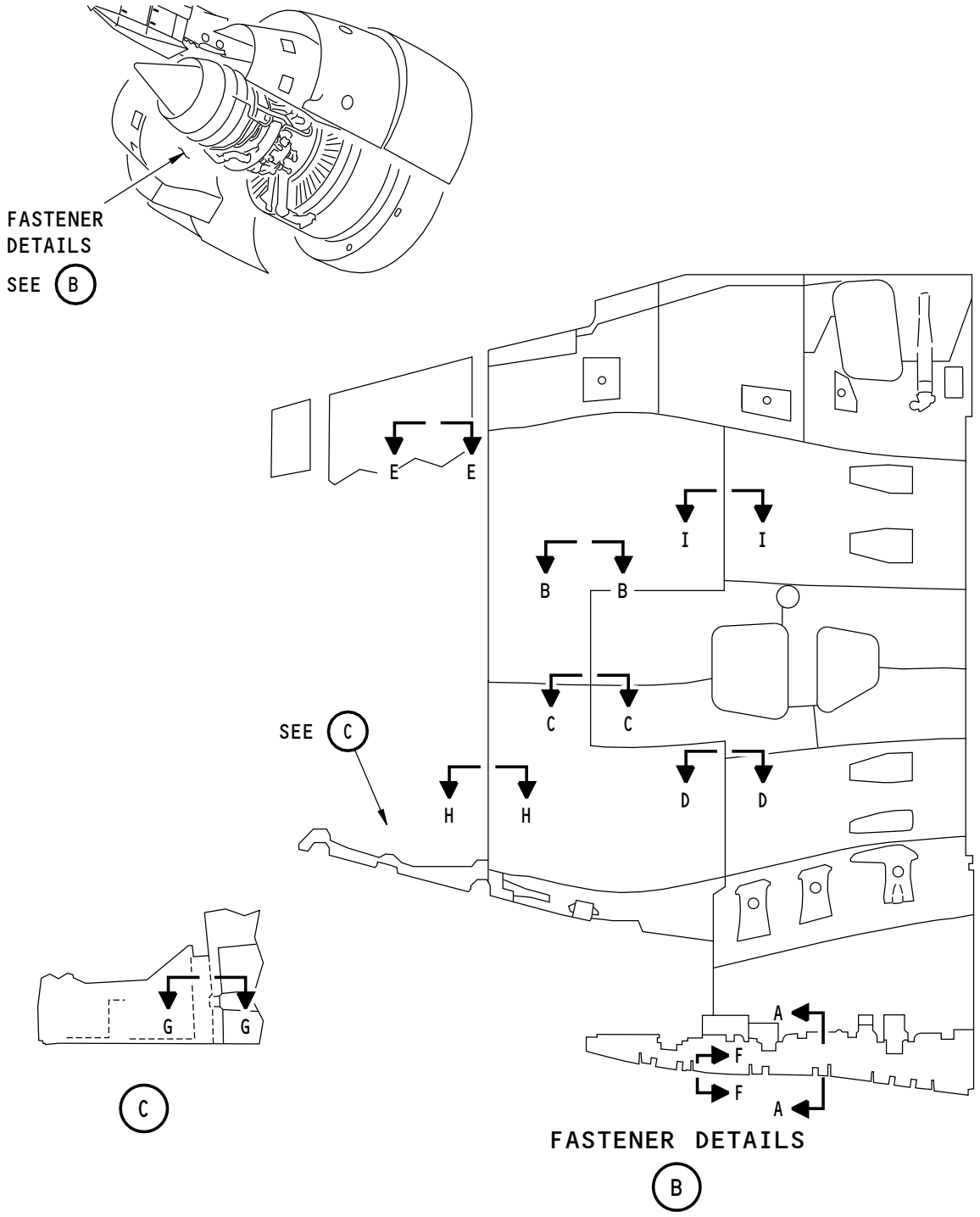
BLANKET INSTALLATION SEQUENCE

A

W53407 S0000125903_V4

Left Thrust Reverser Thermal Insulation Blankets Installation
Figure 401/78-31-06-990-801-H01 (Sheet 1 of 5)

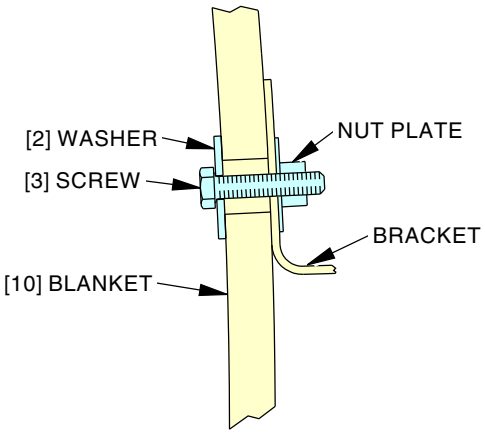
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07421 S0004286383_V3

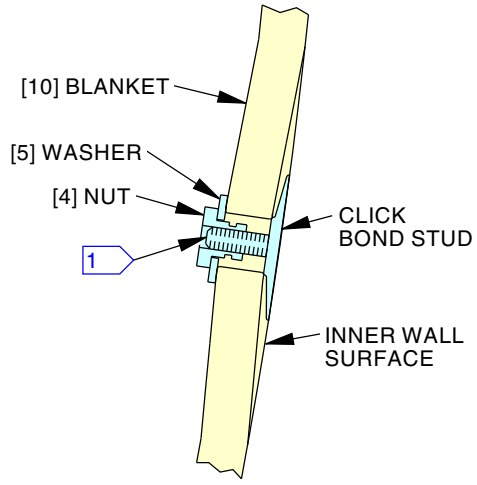
Left Thrust Reverser Thermal Insulation Blankets Installation
Figure 401/78-31-06-990-801-H01 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



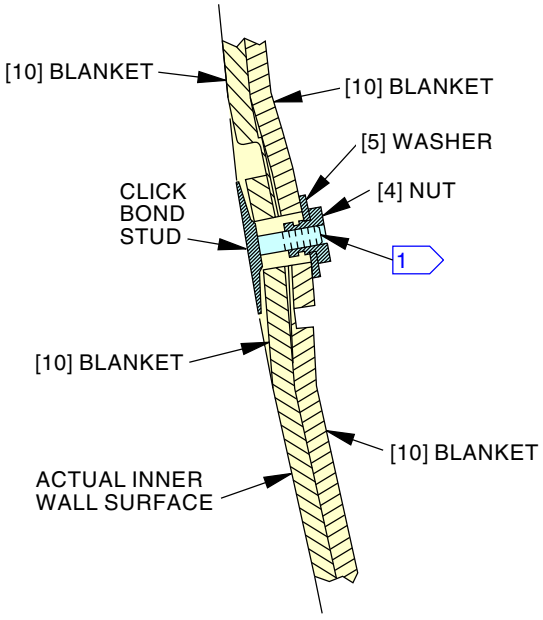
BRACKET FASTENER INSTALLATION
(25 LOCATIONS)

A-A



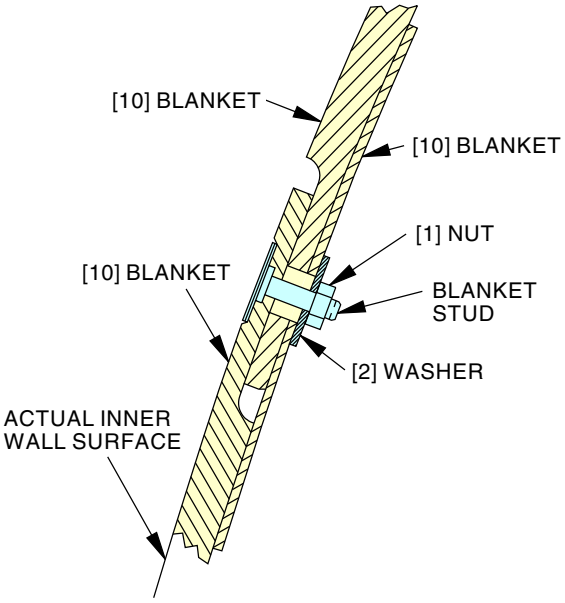
BLANKET INSTALLATION AT BOND STUD
(81 LOCATIONS)

B-B



BLANKET INSTALLATION AT BONDED STUD
(EXAMPLE, 4 BLANKET LAP JOINT SHOWN)
(1 LOCATION)

C-C



BLANKET STUD FASTENER
INSTALLATION
(EXAMPLE)
(4 LOCATIONS)

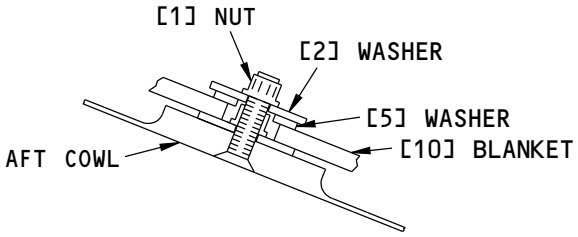
D-D

1 END OF FASTENER 0.15 INCH MAXIMUM BELOW SURFACE OF NUT

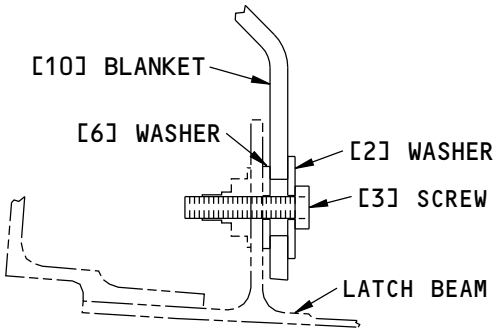
M07413 S0004286375_V2

Left Thrust Reverser Thermal Insulation Blankets Installation
Figure 401/78-31-06-990-801-H01 (Sheet 3 of 5)

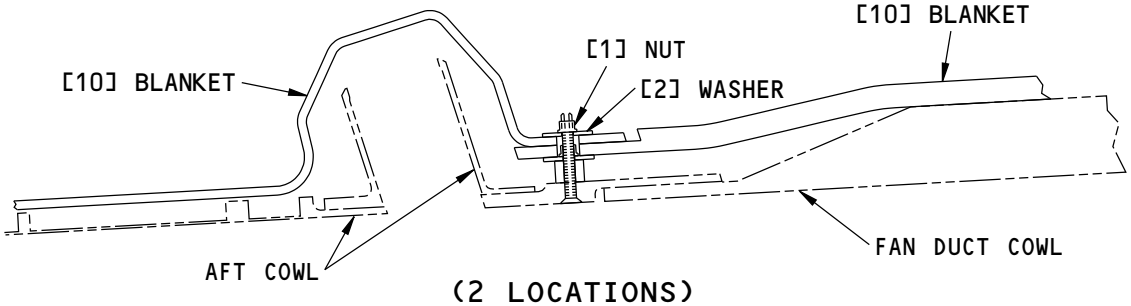
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AFT COWL STUD
FASTENER INSTALLATION
(33 LOCATIONS)
E-E



(1 LOCATION)
F-F

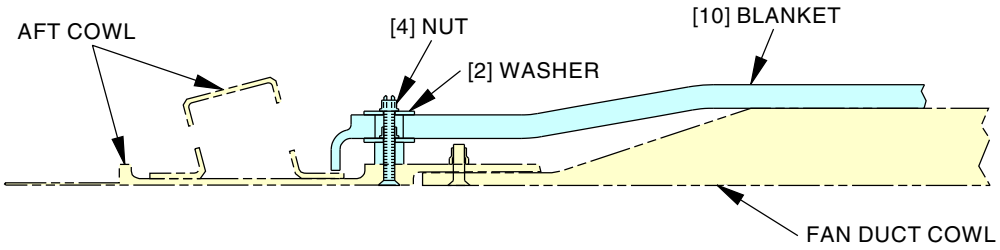


(2 LOCATIONS)
G-G

M62978 S000098913_V2

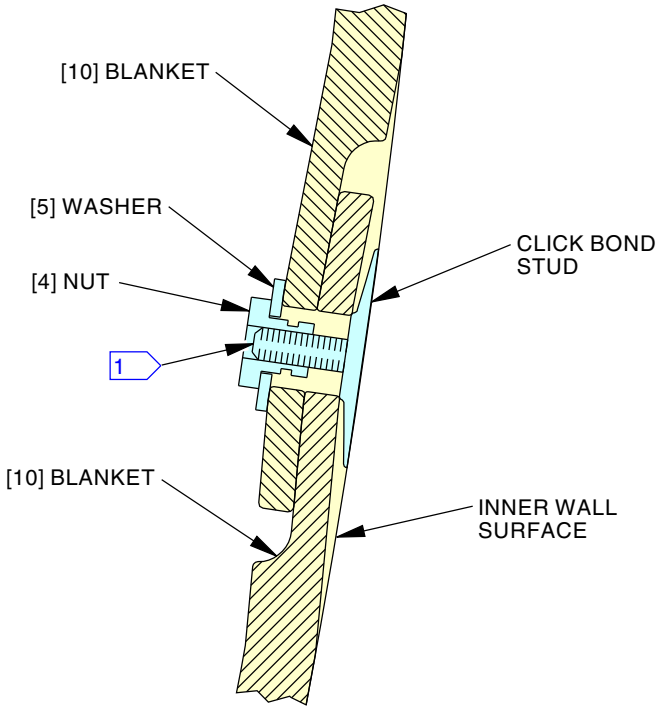
Left Thrust Reverser Thermal Insulation Blankets Installation
Figure 401/78-31-06-990-801-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(10 LOCATIONS)

H-H



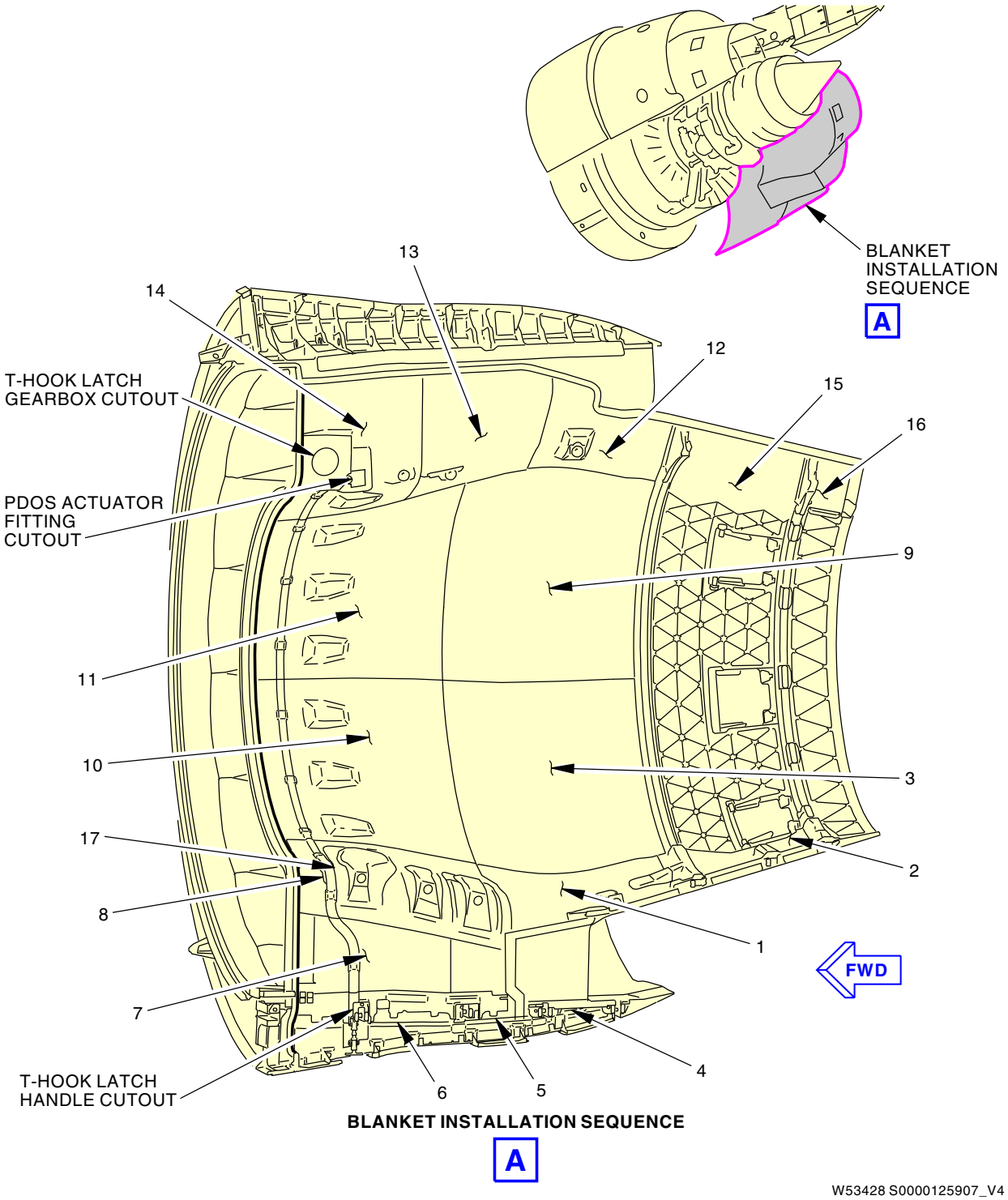
BLANKET INSTALLATION AT BOND STUD
(EXAMPLE, 2 BLANKET LAP JOINT)

I-I

W85922 S0000131272_V2

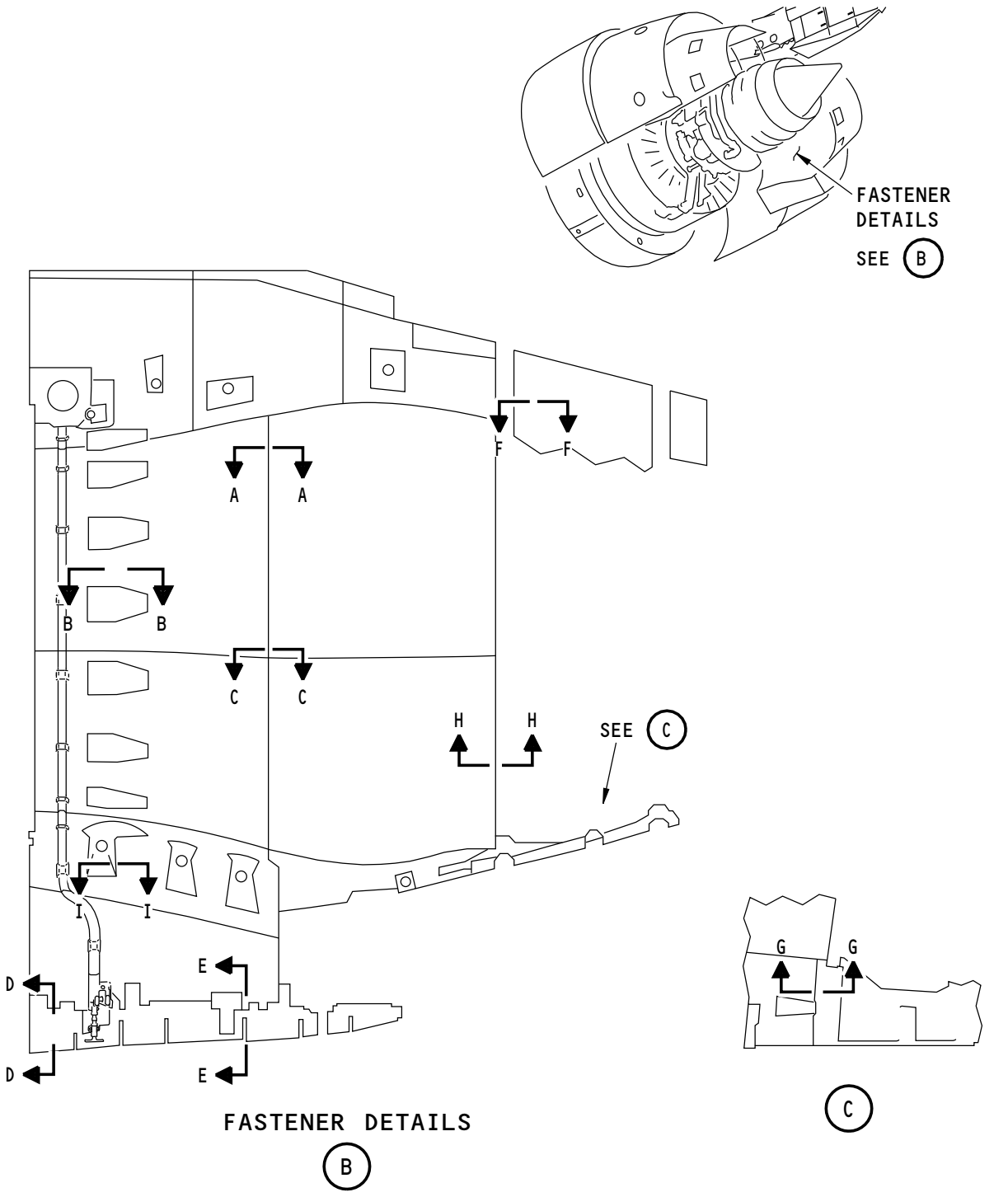
Left Thrust Reverser Thermal Insulation Blankets Installation
Figure 401/78-31-06-990-801-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Right Thrust Reverser Thermal Insulation Blankets Installation
Figure 402/78-31-06-990-807-H01 (Sheet 1 of 5)

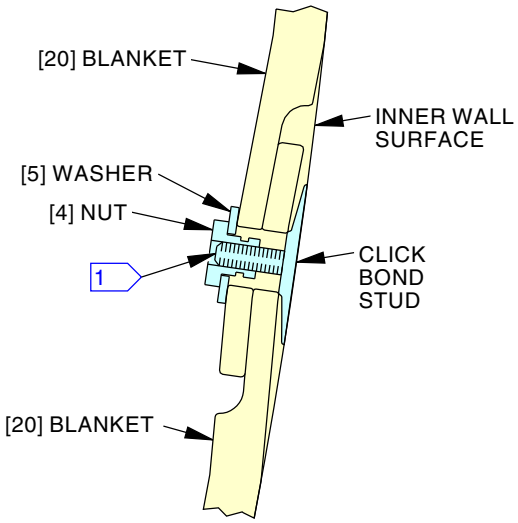
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07423 S0004286385_V3

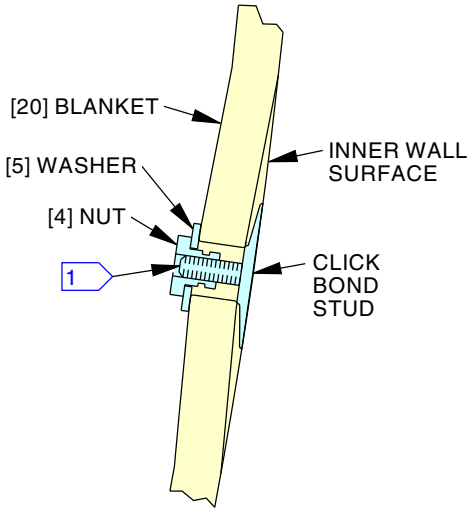
Right Thrust Reverser Thermal Insulation Blankets Installation
Figure 402/78-31-06-990-807-H01 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



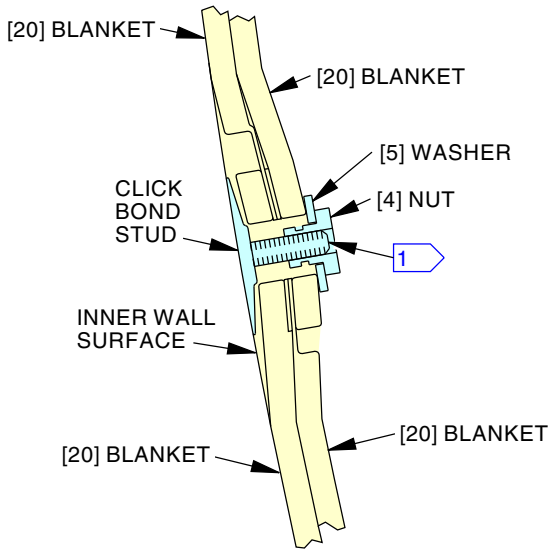
BLANKET INSTALLATION AT BOND STUD FOR 2 BLANKET LAP JOINT (37 LOCATIONS)

A-A



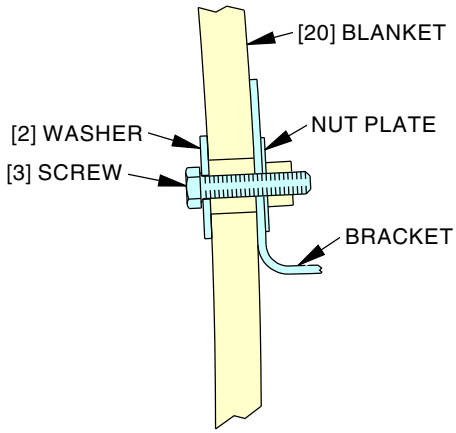
BLANKET INSTALLATION AT BOND STUD (50 LOCATIONS)

B-B



BLANKET INSTALLATION AT BOND STUD FOR 4 BLANKET LAP JOINT (1 LOCATIONS)

C-C



BRACKET FASTENER INSTALLATION (11 LOCATIONS)

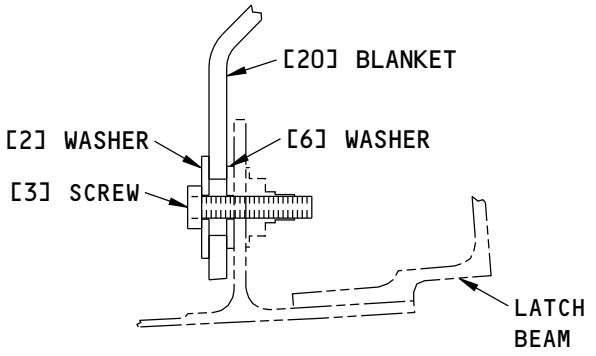
D-D

1 END OF FASTENER 0.15 INCH MAXIMUM BELOW SURFACE OF NUT

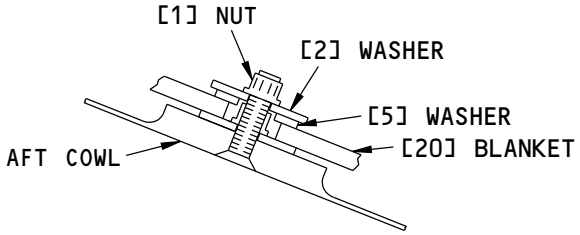
M07415 S0004286377_V2

Right Thrust Reverser Thermal Insulation Blankets Installation
Figure 402/78-31-06-990-807-H01 (Sheet 3 of 5)

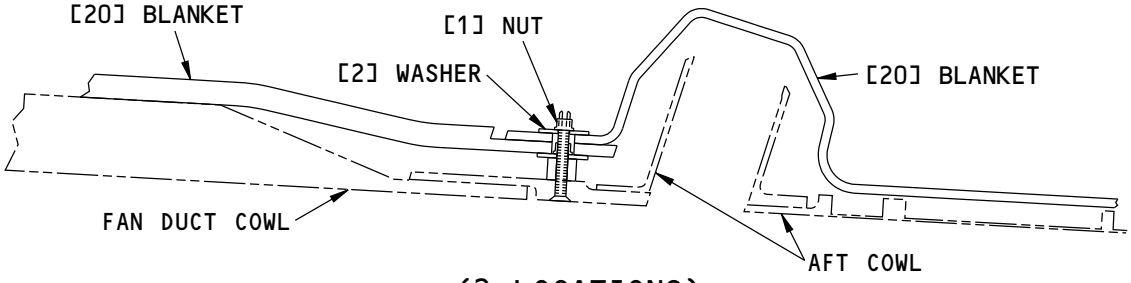
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(2 LOCATIONS)
E–E



AFT COWL STUD
FASTENER INSTALLATION
(33 LOCATIONS)
F–F

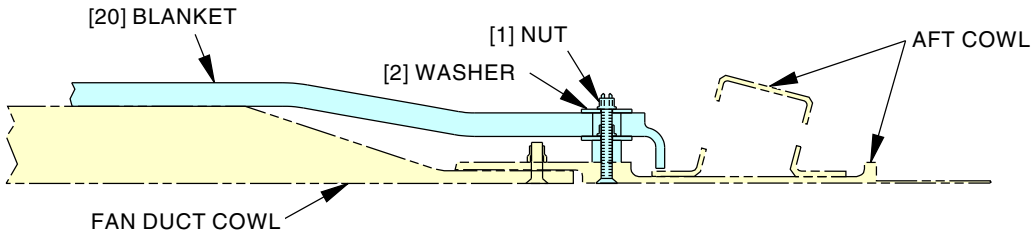


(2 LOCATIONS)
G–G

M63157 S000098940_V2

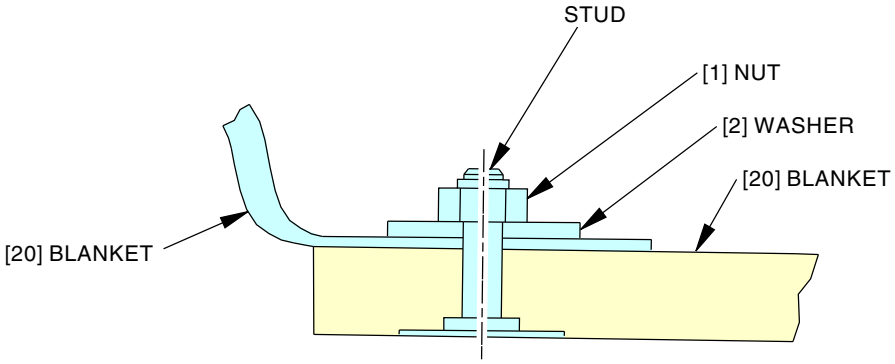
Right Thrust Reverser Thermal Insulation Blankets Installation
Figure 402/78-31-06-990-807-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(10 LOCATIONS)

H-H



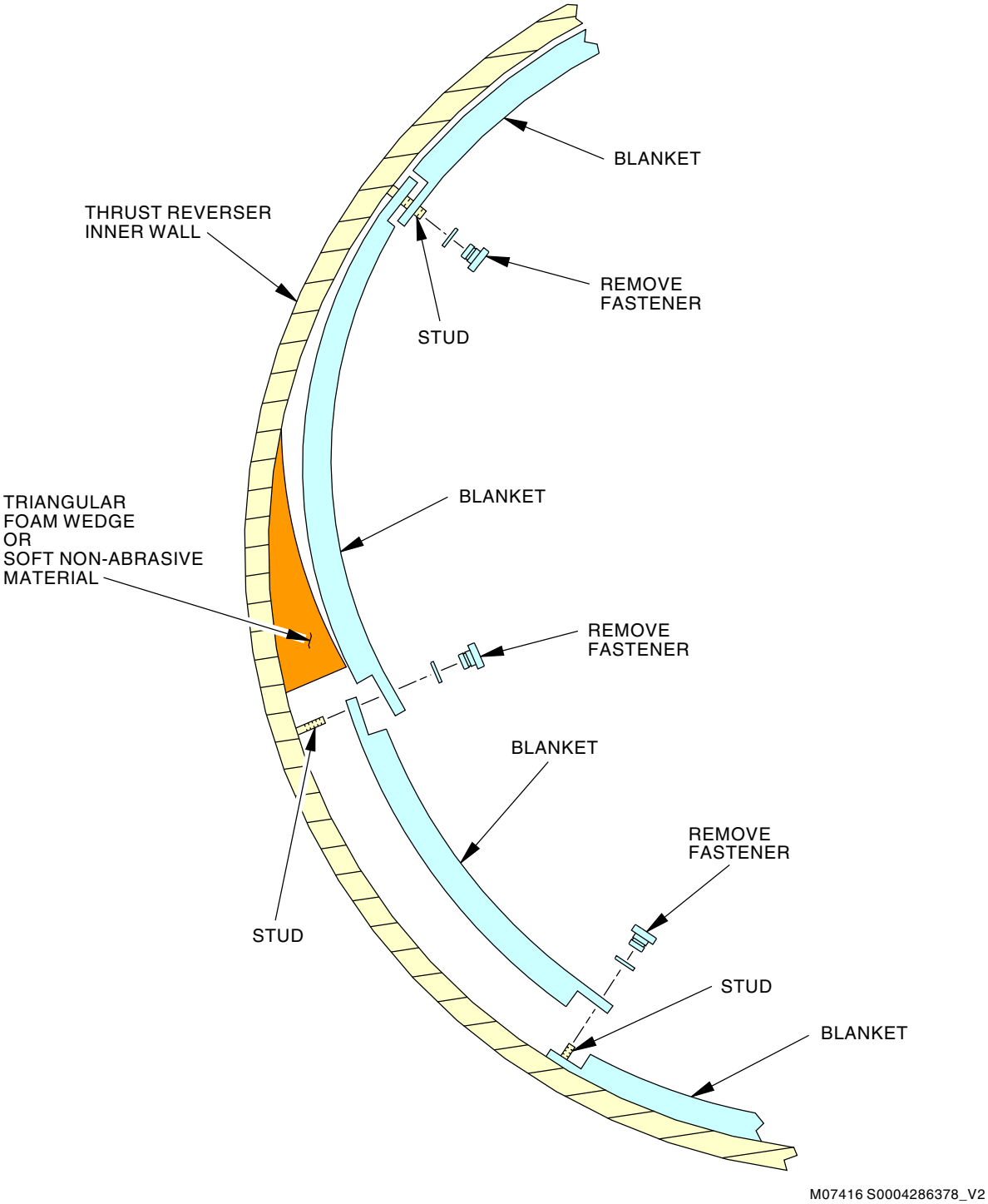
BLANKET STUD FASTENER INSTALLATION
(EXAMPLE, BLANKET TO BLANKET JOINT)

I-I

W86047 S0000131273_V2

Right Thrust Reverser Thermal Insulation Blankets Installation
Figure 402/78-31-06-990-807-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Blanket Removal (Out of Order)
Figure 403/78-31-06-990-808-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-06-400-802-H01

3. Thrust Reverser Thermal Insulation Blanket Installation

(Figure 401/Figure 402/Figure 403/Figure 404/Figure 405)

A. General

(1) This task has these procedures to install the thrust reverser thermal insulation blankets.

(a) Install the Thrust Reverser Thermal Insulation Blankets

(b) Fill the Gaps Between the Thermal Insulation Blankets and the Fire Seals, PDOS Actuator Fitting, Drain Mast Bumpers and the Molded Pressure Seals

(c) Dispatch Limits for Missing Click Bond Studs

(d) Fill and Seal the Grommet Hole with RTV106 Adhesive/Sealant

(e) Temporary Fastener for a Blanket to Blanket Installation

(2) There are different kinds of studs that attach the blankets.

(a) There are click bond studs that are bonded with an adhesive to the inner wall of the fan duct cowl of the thrust reverser. The click bond studs can be moved or replaced but required modification of the inner wall.

(b) There are blanket studs that are installed in the blanket.

(c) There are long bolts that are mounted through the aft cowl skin.

(3) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(4) There is a small, circular, CRES thermal insulation blanket that is installed on the left thrust reverser half at approximately the center of the thrust reverser inner wall. This insulation blanket covers the plug in the thrust reverser inner wall for the exhaust duct for the start transient bleed valve. The exhaust duct for the start transient bleed valve is not installed in the thrust reverser inner wall for the GE90-100 series engines. The exhaust duct for the start transient bleed valve is only installed in the thrust reverser inner wall for the GE90-70/-80/-90 series engines. The inner wall is a common part for both the thrust reversers for the GE90-70/-80/-90 series engines and the GE90-100 series engines.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
71-12-02-400-804-H00	Thrust Reverser Cowl Opening Actuators Installation (P/B 401)
78-31-00-410-804-H01	Close the Thrust Reverser (Sling Method) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-01-300-804-H01	Click-Bond Stud Replacement (P/B 801)
78-31-21-400-801-H01	Thrust Reverser Lower Bifurcation Interlock Pin Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-653	Platform - Engine and Strut Access
STD-766	Gun - Sealant
STD-810	Spatula - Fillet Smoothing, Hardwood or Plastic
STD-1048	Stepladder - 6 foot (1.83m)

D. Consumable Materials

Reference	Description	Specification
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
A00335	Adhesive - Silicone Rubber, 2 Part, RTV	BAC5010 Type 68
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00130	Alcohol - Isopropyl	TT-I-735
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
B00634	Solvent - Stabilized Limonene Cleaner	BMS11-10 Type 1, 2, or 3
C00944	Primer - Firewall - Dapco No. 1-100	BMS5-63 Type I
C00954	Primer - Adhesive Bonding - SS4004P RTV	BAC5010 PSD 6-168 Type 74
D00006	Compound - Antiseize Pure Nickel Special - Never-Seez NSBT	BAC5008
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01061	Water - Distilled	
G02061	Marker - Permanent, Felt Tip Pen	
G50088	Seal - Closed Cell Silicone Foam Rubber, Hydraulic Fluid Resistant (Non-Adhesive)	BMS1-68 Grade A Form II

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Install the Thrust Reverser Thermal Insulation Blankets

SUBTASK 78-31-06-490-002-H01

(1) Use a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-06-160-001-H01

(2) Clean the composite surface aft the vertical bulb-type fire seal and the aft portion of the vertical bulb-type fire seal to prepare for a fillet seal.

NOTE: The fillet seal is used to fill the 0.000-0.250 inch (0.000-6.350 millimeters) gap between the blankets and the vertical fire seals.

(a) Wipe or scrub the structure with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.

(b) Wipe the structure with solvent, B00148 or Limonene solvent, B00634 on a clean cotton wiper, G00034.

1) Wipe the surface dry with a clean cotton wiper, G00034 before the solvent evaporates.

(c) Continue to clean the surface with a new clean cloth and solvent until no contamination is shown on the cloth.

SUBTASK 78-31-06-160-002-H01

(3) Clean the surface where the bulb-type pressure seal bracket and the two molded foam pressure seals touch the lower bifurcation thermal insulation blankets to prepare for a fillet seal.

NOTE: The fillet seal is used to fill the 0.050-0.250 inch (1.270-6.350 millimeters) gap between the blankets and the pressure seals.

(a) Use the above steps to clean the surface.

SUBTASK 78-31-06-420-002-H00

(4) If it is necessary to install the small circular insulation blanket that covers the plug in the inner wall, install the blanket and the nuts and tighten 25-35 inch-pounds (2.8-3.9 Newton-meters).

NOTE: The nuts are installed on the 12 bolts that attach the plug to the inner wall.

SUBTASK 78-31-06-420-001-H01

(5) Install the thermal insulation blankets.

NOTE: There are 20 thermal insulation blankets on the left thrust reverser. There are 17 thermal insulation blankets on the right thrust reverser.

(a) Install the thermal insulation blankets [10] on the left thrust reverser half (Figure 401), or

(b) Install the thermal insulation blankets [20] on the right thrust reverser half (Figure 402).

(c) Be careful how you handle, transport, and store the thermal blankets to prevent bends in the face of the blankets and damage to the edges.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) If you removed all of the thermal insulation blankets, you can install the thermal insulation blankets in the sequence given in the table.

1) Refer to these tables: Table 401, Table 402.

2) The sequence given is recommended, but you do not need to follow this sequence if you only work on some of the blankets.

Table 401/78-31-06-993-806-H00 Thrust Reverser Thermal Insulation Blanket Installation Sequence

LH 315W1810-23A to -23D, -25A to -25D RH 315W1810-24A to -24F, -26A to -26F INSTALL THE THERMAL INSULATION BLANKETS WITH THIS SEQUENCE			
Left Thrust Reverser Half		**Right Thrust Reverser Half**	
Sequence	Part Number	Sequence	Part Number
1	315W1814-75	1	315W1814-76
2	315W1768-23	2	315W1768-24
3	315W1813-26	3	315W1813-27
4	315W1814-61	4	315W1814-72
5	315W1814-78	5	315W1814-71
6	315W1814-51	6	315W1814-82
7	315W1813-28	7	315W1814-79
8	315W1813-20	8	315W1814-52
9	315W1816-27	9	315W1813-21
10	315W1816-25	10	315W1813-25
11	315W1816-21	11	315W1813-24
12	315W1816-23	12	315W1818-38
13	315W1813-22	13	315W1818-40
14	315W1818-37	14	315W1818-28 or -30
15	315W1818-39	15	315W1768-26
16	315W1757-25	16	315W176828
17	315W1757-15	17	315W1814-81
18	315W1768-25	-	
19	315W1768-27	-	
20	315W1814-80		

Table 402/78-31-06-993-805-H00 Thrust Reverser Thermal Insulation Blanket Installation Sequence

LH 315W1810-23E to -23F, -25E to -25F RH 315W1810-24G to -24H, -26G to -26H INSTALL THE THERMAL INSULATION BLANKETS WITH THIS SEQUENCE			
Left Thrust Reverser Half		Right Thrust Reverser Half	
Sequence	Part Number	Sequence	Part Number
1	315W1814-75	1	315W1814-76

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Table 402/78-31-06-993-805-H00 Thrust Reverser Thermal Insulation Blanket Installation Sequence (Continued)

LH 315W1810-23E to -23F, -25E to -25F RH 315W1810-24G to -24H, -26G to -26H INSTALL THE THERMAL INSULATION BLANKETS WITH THIS SEQUENCE			
2	315W1768-23	2	315W1768-24
3	315W1813-26	3	315W1813-27
4	315W1814-61	4	315W1814-72
5	315W1814-78	5	315W1814-71
6	315W1814-83	6	315W1814-82
7	315W1813-28	7	315W1814-79
8	315W1813-20	8	315W1814-84
9	315W1816-27	9	315W1813-21
10	315W1816-25	10	315W1813-25
11	315W1816-21	11	315W1813-124
12	315W1816-23	12	315W1818-38
13	315W1813-22	13	315W1818-40
14	315W1818-37	14	315W1818-30
15	315W1818-39	15	315W1768-26
16	315W1757-25	16	315W1768-28
17	315W1757-15	17	315W1814-81
18	315W1768-25	-	-
19	315W1768-27	-	-
20	315W1814-80	-	-

CAUTION DO NOT BEND THE INSULATION BLANKETS. THE BLANKETS ARE NOT FLEXIBLE. IF BEND THE BLANKETS, YOU CAN CAUSE CRACKS OR OTHER DAMAGE.

CAUTION LIFT THE LARGER INSULATION BLANKETS CAREFULLY. GIVE SUPPORT TO THE EDGES OF THE BLANKET. THE WEIGHT OF THE BLANKET CAN BEND, TWIST, OR BREAK IT.

(e) When you install blankets that were removed out of sequence, make sure you install the blankets in the correct overlap sequence.

NOTE: Some blankets are designed to fit under another blanket. When the blankets are installed, there can be a blanket that is install first before the next blanket can be installed.

1) Remove the numbered tag from the blankets as they are installed.

2) To install a blanket that is overlapped by another blanket, do these steps:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Make sure to remove the fasteners of the blanket that overlaps the blanket to be installed.

b) Push a triangular, wedge shaped piece of foam or a soft, nonabrasive cloth under the blanket that overlaps the blanket to be installed (Figure 403).

NOTE: The blanket that overlaps will lift up enough to clear the click bond studs to let you install the other blanket.

c) Install the blanket over the studs.

(f) Place the thermal blankets in the position for the best fit with adjacent parts and blankets.

1) If the blanket fastener holes do not align with an installed inner wall stud, the inner wall stud can be moved.

(g) Install the fasteners to hold the thermal insulation blankets [10] in position on the left thrust reverser half.

NOTE: There are 20 thermal insulation blankets on the left thrust reverser. Details of the different types of fastener methods are shown in the illustrations for different locations on the thrust reverser.

1) Make sure that all the fasteners are seated correctly and hold the blanket firmly.

CAUTION

DO NOT TIGHTEN THE FASTENERS TOO MUCH. DAMAGE TO THE STUD OR THE BLANKET CAN OCCUR.

2) When you tighten all fasteners, do a check of the washer to see if it is loose or spins.

a) When the washer does not spin or is not loose, the fastener is correctly tightened.

3) Make sure the gaps between the forward edge of the thermal insulation blankets and the vertical fireseal near the inner v-blade and the upper and lower bifurcation are not more than 0.250 inch (6.350 millimeters).

a) Realign and move the blankets again to reduce the gap to the limit.

4) Install the blankets with nuts [1] and washers [2] on the four blanket studs.

a) Tighten the nut to 20-25 pound-inches (2.26-2.82 Newton-meters).

5) Install the blankets with nuts [1] and washers [2] on the bolts mounted through the aft cowl skin.

a) Tighten the nut to 20-25 pound-inches (2.26-2.82 Newton-meters).

6) Install the aft cowl blankets with nuts [1], washers [2] and washers [5] on the bolts mounted through the aft cowl skin.

a) Tighten the nut to 20-25 pound-inches (2.26-2.82 Newton-meters).

7) Install the blankets with screws [3] and washers [2] at 25 brackets and nutplates.

a) Tighten the screw to 20-25 pound-inches (2.26-2.82 Newton-meters).

8) Install the blankets with screw [3], washer [2] and washer [6] on a bracket and nutplate.

a) Tighten the screw to 20-25 pound-inches (2.26-2.82 Newton-meters).

9) Install the blankets with screws [3], washers [2] and washers [6] at the latch beam.

a) Tighten the screw to 20-25 pound-inches (2.26-2.82 Newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

10) Install the blankets with nuts [4] and washers [5] on the click-bond studs on the thrust reverser inner wall.

NOTE: These are special nuts, P/N 0090-13365 and P/N RH30CNL.

a) It is optional to apply Never-Seez NSBT compound, D00006 to the nuts.

b) Tighten the nut to 25-35 pound-inches (2.82-3.95 Newton-meters).

c) The maximum gap the top of the stud can be below the top surface of the nut is 0.15 inch (3.8 millimeters).

d) The washer [5] is correctly installed when the washer is centered on the grommet and the nut [4] is correctly installed through the washer.

e) When you cannot install nut [4] through washer [5], the nut and washer can be replaced with 0.250 inch (6.35 mm) steel nut and a steel washer with a 0.1875 inch (4.7625 mm) hole .

NOTE: When the stud is not centered in the grommet hole, the washer [5] is not centered over the grommet hole and the nut [4] cannot be installed through the washer.

11) Fill the gaps between the thermal insulation blankets and the fire seals and the pressure seals with firewall sealant; do the procedure that follows.

(h) Install the fasteners to hold the thermal insulation blankets [20] in position on the right thrust reverser half.

NOTE: There are 17 thermal insulation blankets on the right thrust reverser. Details of the different types of fastener methods are shown in the illustrations for different locations on the thrust reverser.

1) Make sure that all the fasteners are seated correctly and hold the blanket firmly.

CAUTION

DO NOT TIGHTEN THE FASTENERS TOO MUCH. DAMAGE TO THE STUD OR THE BLANKET CAN OCCUR.

2) When you tighten all fasteners, do a check of the washer to see if it is loose or spins.

a) When the washer does not spin or is not loose, the fastener is correctly tightened.

3) Make sure the gaps between the forward edge of the thermal insulation blankets and the vertical fireseal near the inner v-blade and the upper and lower bifurcation are not more than 0.250 inch (6.350 millimeters).

a) Realign and move the blankets again to reduce the gap to the limit.

4) Install the aft cowl blankets with nuts [1], and washers [2] on the 12 bolts mounted through the aft cowl skin.

a) Tighten the nut to 20-25 pound-inches (2.26-2.82 Newton-meters).

5) Install the aft cowl blankets with nuts [1], washers [2] and washers [5] on the 33 bolts mounted through the aft cowl skin.

a) Tighten the nut to 20-25 pound-inches (2.26-2.82 Newton-meters).

6) Install the blankets with screws [3] and washers [2] at 11 brackets and nutplates.

a) Tighten the screw to 20-25 pound-inches (2.26-2.82 Newton-meters).

7) Install the blankets with screw [3] and washer [6] on a bracket and nutplate.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Tighten the screw to 20-25 pound-inches (2.26-2.82 Newton-meters).

8) Install the blankets with screws [3], washers [2] and washers [6] at the latch beam.

a) Tighten the screw to 20-25 pound-inches (2.26-2.82 Newton-meters).

9) Install the blankets with nuts [4] and washers [5] on the click-bond studs on the thrust reverser inner wall.

NOTE: These are special nuts, P/N 0090-13365 and P/N RH30CNL.

a) It is optional to apply Never-Seez NSBT compound, D00006 to the nuts.

b) Tighten the nut to 25-35 pound-inches (2.82-3.95 Newton-meters).

c) The maximum gap the top of the stud can be below the top surface of the nut is 0.15 inch (3.8 millimeters).

d) The washer [5] is correctly installed when the washer is centered on the grommet and the nut [4] is correctly installed through the washer.

e) When you cannot install nut [4] through washer [5], the nut and washer can be replaced with 0.250 inch (6.35 mm) steel nut and a steel washer with a 0.1875 inch (4.7625 mm) hole (Figure 404).

NOTE: When the stud is not centered in the grommet hole, the washer [5] is not centered over the grommet hole and the nut [4] cannot be installed through the washer.

10) Fill the gaps between the thermal insulation blankets and the fire seals and the pressure seals; do the procedure that follows.

11) Fill and seal the gaps at the blanket cutout for the PDOS actuator fitting; do the procedure that follows.

(i) Install the interlock pin assembly on the right thrust reverser after the lower bifurcation, thermal insulation blankets are installed; refer to theThrust Reverser Lower Bifurcation Interlock Pin Installation, TASK 78-31-21-400-801-H01.

H. Fill the Gaps Between the Thermal Insulation Blankets and the Fire Seals, PDOS Actuator Fittings, T-Hook Gearbox Structure, T-Hook Receiver Structure, Drain Mast Bumpers, and the Molded Pressure Seals

SUBTASK 78-31-06-390-004-H01

(1) Fill all 0.000-0.250 inch (0.000-6.350 millimeters) gaps between the forward edge of the thermal insulation blankets and the retainers for the vertical bulb-type fire seal near the inner v-blade and the upper and lower bifurcation with sealant.

NOTE: No gaps more than 0.2500 inch (6.350 millimeters) are allowed.

(a) Prepare the sealant, A00160 to the manufacturers instructions.

NOTE: Type I sealant requires primer application. Type II does not require primer application; primer is optional for the adhesion to rubber.

NOTE: Select the sealant type for the cure rate below.

1) If it is necessary to use a Type I sealant, apply Dapco No. 1-100 primer, C00944 with a brush to the edge of the thermal insulation blankets and the edge of the fireseal retainers; let the primer become dry for 30 minutes minimum before application of the sealant.

(b) Apply a fillet seal to the gap with sealant, A00160 and a sealant gun, STD-766.

NOTE: To minimize entrapped air during sealant application, point the nozzle tip into the seam, keep the tip nearly perpendicular to the line of travel and force a bead of sealant ahead of the nozzle tip.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Fair the sealant fillets with a plastic or metal hardwood or plastic fillet smoothing spatula, STD-810 within 15 minutes of application.

1) Wet the tool with a solution of 1:6 to 1:5 isopropyl alcohol, B00130 and distilled water, G01061 to prevent the adhesion of the sealant to the tool.

(d) Allow the sealant to cure in-service.

NOTE: The Type II-1/2 sealant cures in 48 hours at 72-82 degrees F (22.2-27.8 degrees C) and 45-55 percent relative humidity. Type I-4 and Type II-4 sealant cures in 7 days.

SUBTASK 78-31-06-390-005-H01

(2) Fill all gaps between the lower bifurcation thermal insulation blankets and the bulb-type pressure seal and the molded pressure seals with sealant and a foam filler (Figure 405).

(a) Fill the 0.050-0.250 inch (1.270-6.350 millimeters) gaps with sealant/RTV 106 adhesive, A00081 and a sealant gun, STD-766.

NOTE: This sealant has a short work life. Exposure to the air for more than a few minutes will cause a skin to form which will prevent adhesion on the surfaces.

1) Do not apply silicone primer to the thermal insulation blankets.

2) Apply a fillet seal of sealant to the gap.

NOTE: To minimize entrapped air during sealant application, point the nozzle tip into the seam, keep the tip nearly perpendicular to the line of travel and force a bead of sealant ahead of the nozzle tip.

3) Fair the sealant fillets with a plastic or metal hardwood or plastic fillet smoothing spatula, STD-810.

a) Wet the tool with a solution of 1:6 to 1:5 isopropyl alcohol, B00130 and distilled water, G01061 to prevent the adhesion of the sealant to the tool.

4) Allow the sealant to cure in-service.

NOTE: The sealant will cure in 24 hours at 65 degrees F (18.3 degrees C). The sealant/adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. There will be the smell of acetic acid until the adhesive has cured.

(b) Fill all gaps that are more than 0.250 inch (6.350 millimeters) with a foam filler made of a closed cell, silicone foam rubber seal, G50088 and topcoat and seal with sealant/RTV 106 adhesive, A00081.

1) Cut the foam filler to the necessary size.

2) Position the foam filler to seal the gap and bond to the structure with adhesive, A00335.

3) Do not apply silicone primer to the thermal insulation blankets.

4) Apply sealant/RTV 106 adhesive, A00081 with a sealant gun, STD-766 to seal the surface of the foam filler.

a) Completely fill the gap with the foam filler.

b) Completely cover the foam filler with sealant.

5) Fair the sealant fillets with a plastic or metal hardwood or plastic fillet smoothing spatula, STD-810.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Wet the tool with a solution of 1:6 to 1:5 isopropyl alcohol, B00130 and distilled water, G01061 to prevent the adhesion of the sealant to the tool.

6) Allow the sealant to cure in-service.

NOTE: The sealant will cure in 24 hours at 65 degrees F (18.3 degrees C). The adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. There will be the smell of acetic acid until the adhesive has cured.

SUBTASK 78-31-06-390-006-H01

(3) Fill all gaps at the blanket cutout and the PDOS actuator fittings with a foam filler made of a closed cell, silicone foam rubber seal, G50088 and topcoat and seal with sealant, A00160.

(a) Cut the foam filler to the necessary size; completely fill the gaps with the foam filler.

(b) Position the foam filler to seal the gap.

(c) Prepare the sealant, A00160 to the manufacturer's instructions.

NOTE: Select the sealant type for the cure rate below.

1) If it is necessary to use a Type I sealant, apply Dapco No. 1-100 primer, C00944 with a brush to the edge of the thermal insulation blankets; let the primer become dry for 30 minutes minimum before application of the sealant.

(d) Apply an over coat of sealant, A00160 to completely cover and seal the surface of the foam filler.

(e) Apply a fillet seal of sealant, A00160 with a sealant gun, STD-766 around the blanket cutout to the PDOS actuator fitting.

(f) Fair the sealant fillets with a plastic or metal hardwood or plastic fillet smoothing spatula, STD-810.

1) Wet the tool with a solution of 1:6 to 1:5 isopropyl alcohol, B00130 and distilled water, G01061 to prevent the adhesion of the sealant to the tool.

(g) Allow the sealant to cure in-service.

NOTE: The Type II-1/2 sealant cures in 48 hours at 72-82 degrees F (22.2-27.8 degrees C) and 45-55 percent relative humidity. Type I-4 and Type II-4 sealant cures in seven days.

SUBTASK 78-31-06-390-007-H01

(4) Fill all 0.000-0.250 inch (0.000-6.350 millimeters) gaps at the blanket cutout and the structure for the T-hook gearbox and the T-hook receiver with sealant, A00160; if gaps are more than 0.250 inch (6.350 millimeters), fill the gap with a foam filler made of a closed cell, silicone foam rubber seal, G50088 and topcoat and fillet seal with sealant, A00160.

(a) Cut the foam filler to the necessary size; completely fill the gaps with the foam filler.

(b) Position the foam filler to seal the gap.

(c) Prepare the sealant, A00160 to the manufacturer's instructions.

NOTE: Select the sealant type for the cure rate below.

1) If it is necessary to use a Type I sealant, apply Dapco No. 1-100 primer, C00944 with a brush to the edge of the thermal insulation blankets; let the primer become dry for 30 minutes minimum before application of the sealant.

(d) Apply an over coat of sealant, A00160 to completely cover and seal the surface of the foam filler.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Apply a fillet seal of sealant, A00160 with a sealant gun, STD-766 around the blanket cutout for the T-hook gearbox and the T-hook receiver.

(f) Fair the sealant fillets with a plastic or metal hardwood or plastic fillet smoothing spatula, STD-810.

1) Wet the tool with a solution of 1:6 to 1:5 isopropyl alcohol, B00130 and distilled water, G01061 to prevent the adhesion of the sealant to the tool.

(g) Allow the sealant to cure in-service.

NOTE: The Type II-1/2 sealant cures in 48 hours at 72-82 degrees F (22.2-27.8 degrees C) and 45-55 percent relative humidity. Type I-4 and Type II-4 sealant cures in seven days.

SUBTASK 78-31-06-390-008-H01

(5) Fill all gaps between the blanket cutout and the drain mast bumper on the latch beam of the left or right thrust reverser.

NOTE: These rectangular rubber bumpers prevent the drain mast contact with the thrust reverser structure and dampen vibration to the drain mast. The bumpers are aft of the No.2 tension latches on the left and right thrust reverser.

(a) Apply a fillet seal of sealant, A00160 with a sealant gun, STD-766 around the blanket cutout and the rectangular rubber bumper.

(b) Fair the sealant fillets with a hardwood or plastic fillet smoothing spatula, STD-810.

1) Wet the tool with a solution of 1:6 to 1:5 isopropyl alcohol, B00130 and distilled water, G01061 to prevent the adhesion of the sealant to the tool.

(c) Allow the sealant to cure in-service.

NOTE: The Type II-1/2 sealant cures in 48 hours at 72-82° F (22.2-27.8° C) and 45-55 percent relative humidity. Type I-4 and Type II-4 sealant cures in seven days.

I. Dispatch Limits for Missing Click Bond Studs

SUBTASK 78-31-06-430-003-H01

(1) The maximum allowable flight time for conditions that follow, the grommet hole sealed with RTV106, or the installation of temporary fasteners is 4000 hours.

(a) If the click bond studs on the inner wall of the thrust reverser are crossthreaded, broken, or missing, use these dispatch limits :

1) Maximum of 5 damaged or missing studs per thrust reverser half.

2) All studs around the damaged or missing stud must not be damaged.

3) No studs on the outside edge of the total blanket installation can be missing.

4) A stud that supports the corner of an individual blanket cannot be missing.

5) No more than one fastener on each side of an individual blanket can be missing.

6) Damaged studs must be separated by a minimum of one undamaged stud.

SUBTASK 78-31-06-430-001-H01

(2) If the click bond studs are crossthreaded, broken, or missing, replace the click bond studs.

(a) Do this task: Click-Bond Stud Replacement, TASK 78-31-01-300-804-H01.

(b) If the missing or damaged stud cannot be replaced, do these steps:

1) The grommet hole of the damaged stud must be filled and sealed with sealant/RTV 106 adhesive, A00081.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) The RTV106 adhesive/sealant must be replaced with a standard fixed click bond stud within the time limit given above.

b) Make a record where each sealant filled grommet hole was installed on the blankets

2) If the missing stud supports a blanket to blanket attachment, install a temporary fastener.

a) The temporary fastener must be replaced with a standard fixed click bond stud within the time limit given above.

b) Make a record where each temporary fastener was installed on the blankets.

J. Fill and Seal the Grommet Hole with RTV106 Adhesive/Sealant

SUBTASK 78-31-06-390-003-H01

(1) Fill and seal the grommet hole with sealant/RTV 106 adhesive, A00081:

(a) Wipe or scrub inside and outside the grommet with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid, or oil.

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. SOLVENT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) Wipe or scrub the inside and outside surface of the grommet with alcohol, B00130 or solvent, B00062 on a clean cotton wiper, G00034 to remove any remaining oils.

(c) Remove the excess solvent with a clean cotton wiper, G00034.

(d) Apply SS4004P RTV primer, C00954 to the inside and outside surface of the metal grommet with a clean cotton wiper, G00034.

(e) Let the SS4004P RTV primer, C00954 become dry at 65-100 degrees F (18.3-37.8 degrees C) for 30 minutes minimum.

NOTE: The primed surface must not become contaminated.

(f) Completely fill the grommet hole with RTV 106 adhesive, A00081.

NOTE: The adhesive has a short work life. Exposure to the air for more than a few minutes will cause a skin to form which will prevent adhesion on the surfaces.

(g) Allow the adhesive to cure for 24 hours at 65 degrees F (18.3 degrees C).

NOTE: The adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. There will be the smell of acetic acid until the adhesive has cured.

(h) Make a record where each filled grommet hole was installed on the blankets.

1) Make a record in the maintenance log.

2) Make a mark around the location of the filled grommet hole on the thermal insulation blanket with a permanent ink pen or marker, G02061 with contrast color.

K. Temporary Fastener for a Blanket to Blanket Installation

SUBTASK 78-31-06-430-002-H01

(1) Install a temporary fastener to hold the blanket to blanket installation together.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Install a temporary detached click bond stud with washer and nut, or

NOTE: The click bond stud is not installed in the inner wall of the thrust reverser. Cut off the metal pin on the base of the stud.

(b) Install a temporary screw with a washer on each side of the blankets and a nut.

NOTE: The screw head is on the cold side of the blanket. Use a screw BACS12FA3K(-), two washers BACW10P392CC, and a nut BACN10YR3C or equivalent steel fasteners.

(c) Make a record where each temporary fastener was installed on the blankets.

1) Make a record in the maintenance log.

2) Make a mark around the location of the temporary fastener on the thermal insulation blanket with a permanent ink pen or marker, G02061 with contrast color.

(d) If the damaged or missing stud cannot be identified with the methods given above, the installation of the temporary fastener is not allowed.

L. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-06-430-004-H01

(1) If it is necessary, connect the PDOS actuator to the upper bifurcation fitting.

(a) Make sure the thrust reverser hold-open rod is installed and locked in the extended position.

(b) Refer to this task to connect the PDOS actuator rodend to the upper bifurcation fitting: Thrust Reverser Cowl Opening Actuators Installation, TASK 71-12-02-400-804-H00.

(c) Refer to this task to remove the sling and overhead crane or hoist from the thrust reverser: Close the Thrust Reverser (Sling Method), TASK 78-31-00-410-804-H01.

SUBTASK 78-31-06-090-001-H01

(2) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-06-410-003-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

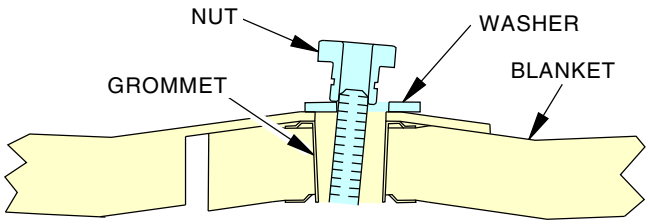
Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

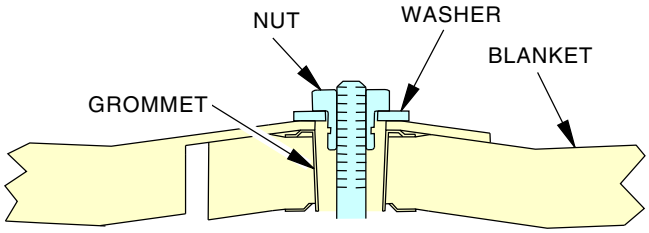
(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

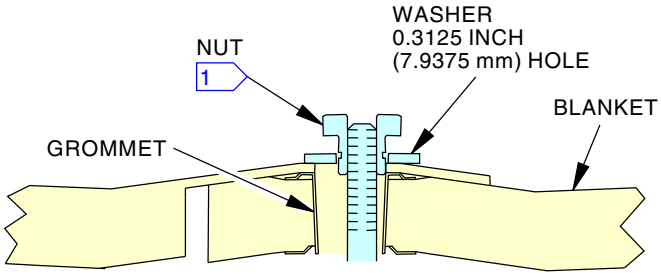
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



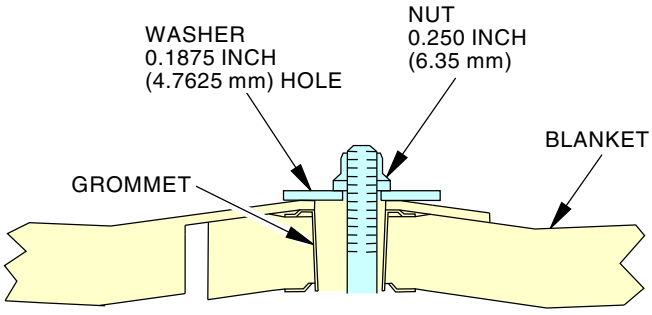
INCORRECT INSTALLATION
WASHER CLOCKED TO ONE SIDE



CORRECT INSTALLATION
WASHER CENTERED



INCORRECT INSTALLATION
STUD CLOCKED TO ONE SIDE



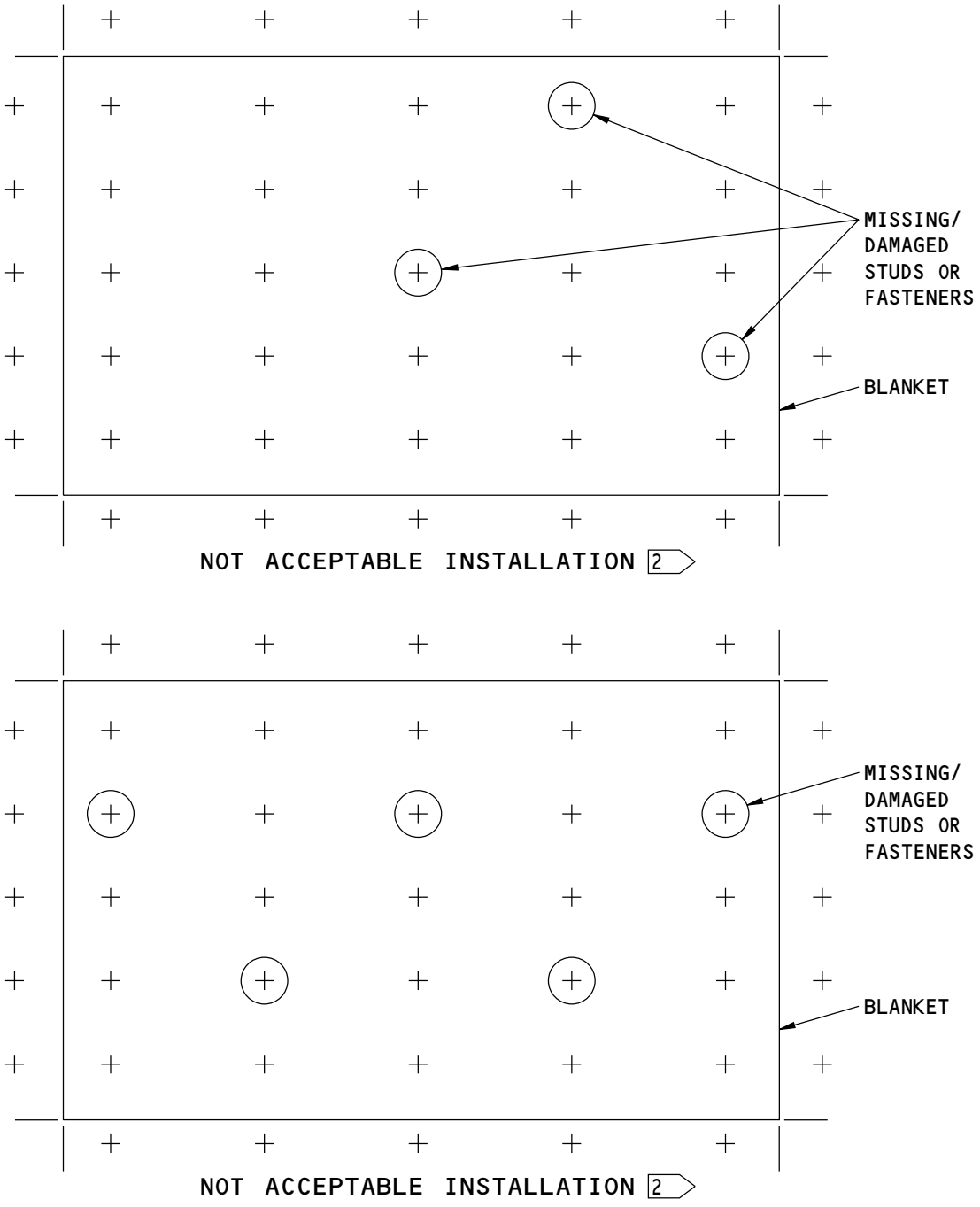
FASTENER SUBSTITUTION

1 FASTENER MAY NOT SEAT WHEN STUD IS AT EXTREME POSITION. BLANKET CANNOT BE POSITIONED CORRECTLY.

M07417 S0004286379_V2

Fastener Installation Problems
Figure 404/78-31-06-990-805-H01 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

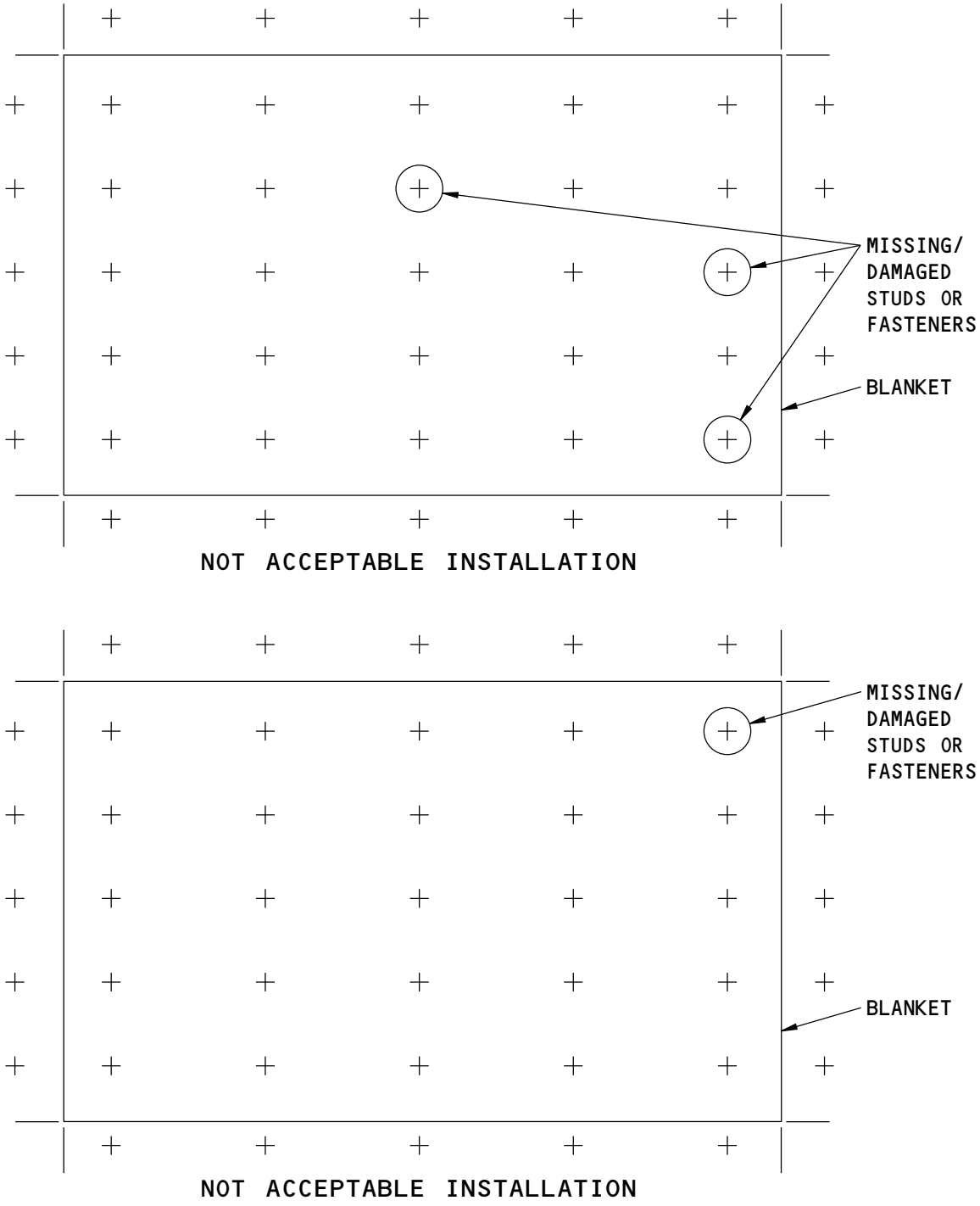


2 CAN BECOME AN ACCEPTABLE INSTALLATION IF TEMPORARY FASTENERS ARE INSTALLED FOR BLANKET TO BLANKET INSTALLATIONS

M07418 S0004286380_V1

Fastener Installation Problems
Figure 404/78-31-06-990-805-H01 (Sheet 2 of 4)

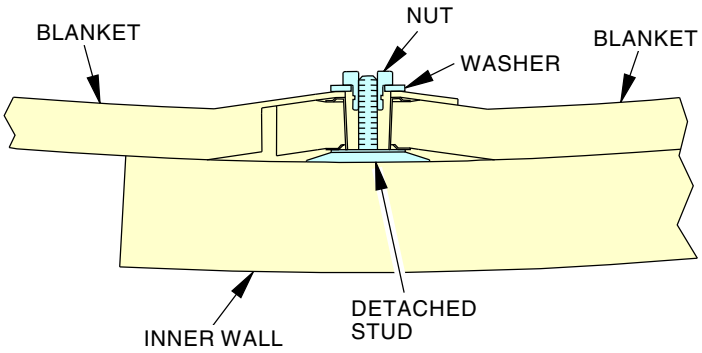
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



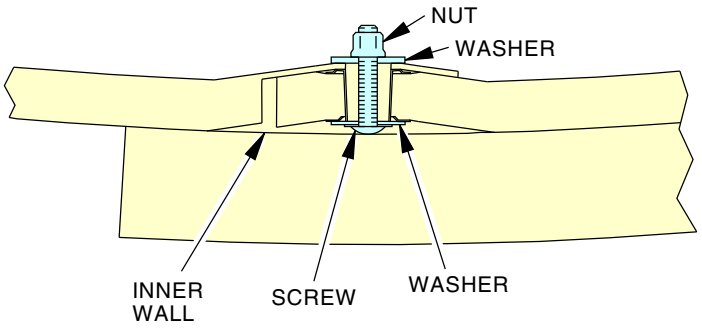
M07419 S0004286381_V1

Fastener Installation Problems
Figure 404/78-31-06-990-805-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



**ACCEPTABLE TEMPORARY FASTENER -
BLANKET TO BLANKET INSTALLATION**

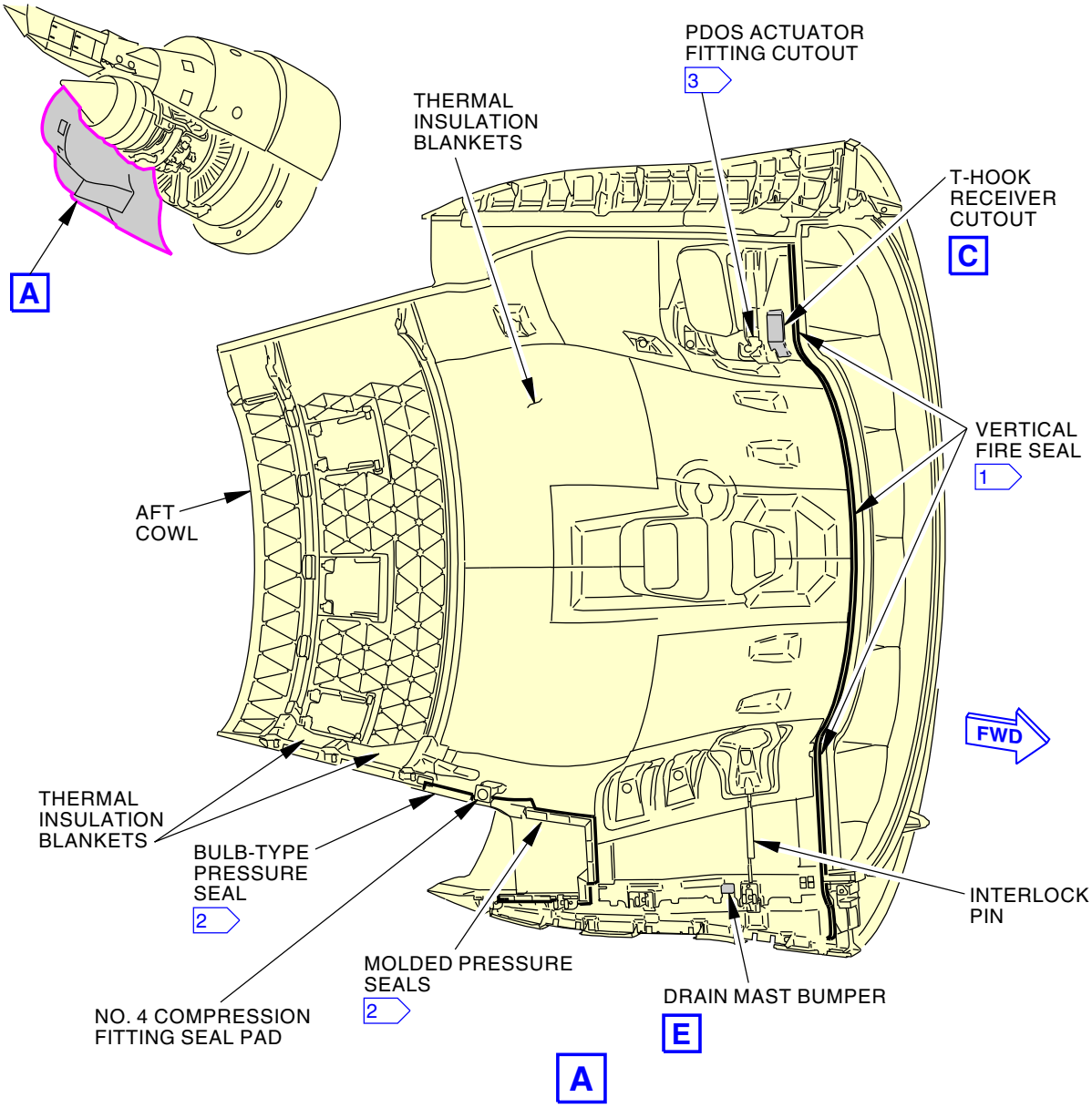


**ACCEPTABLE TEMPORARY FASTENER -
BLANKET TO BLANKET INSTALLATION**

M07420 S0004286382_V2

**Fastener Installation Problems
Figure 404/78-31-06-990-805-H01 (Sheet 4 of 4)**

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 FILL GAPS BETWEEN THE FIRE SEAL RETAINER AND THERMAL INSULATION BLANKETS WITH SEALANT

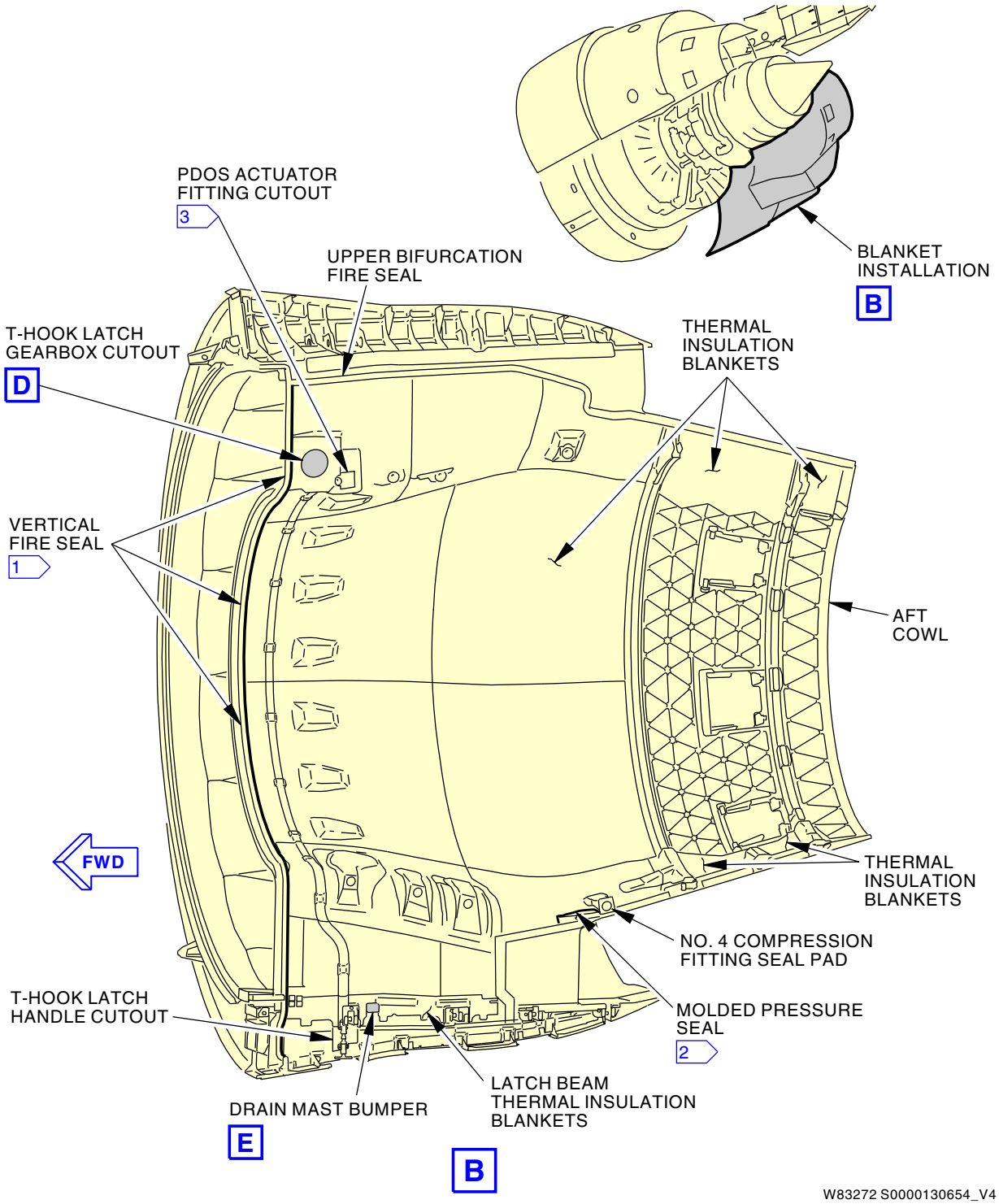
2 FILL GAPS BETWEEN THE PRESSURE SEALS AND THERMAL INSULATION BLANKETS WITH SEALANT AND FILLER

3 FILL GAPS BETWEEN PDOS ACTUATOR FITTING AND INSULATION BLANKET CUTOUT WITH FILLER AND TOPCOAT WITH SEALANT.
FILLET SEAL BLANKET CUTOUT TO PDOS FITTING WITH SEALANT.

M95052 S0000103131_V6

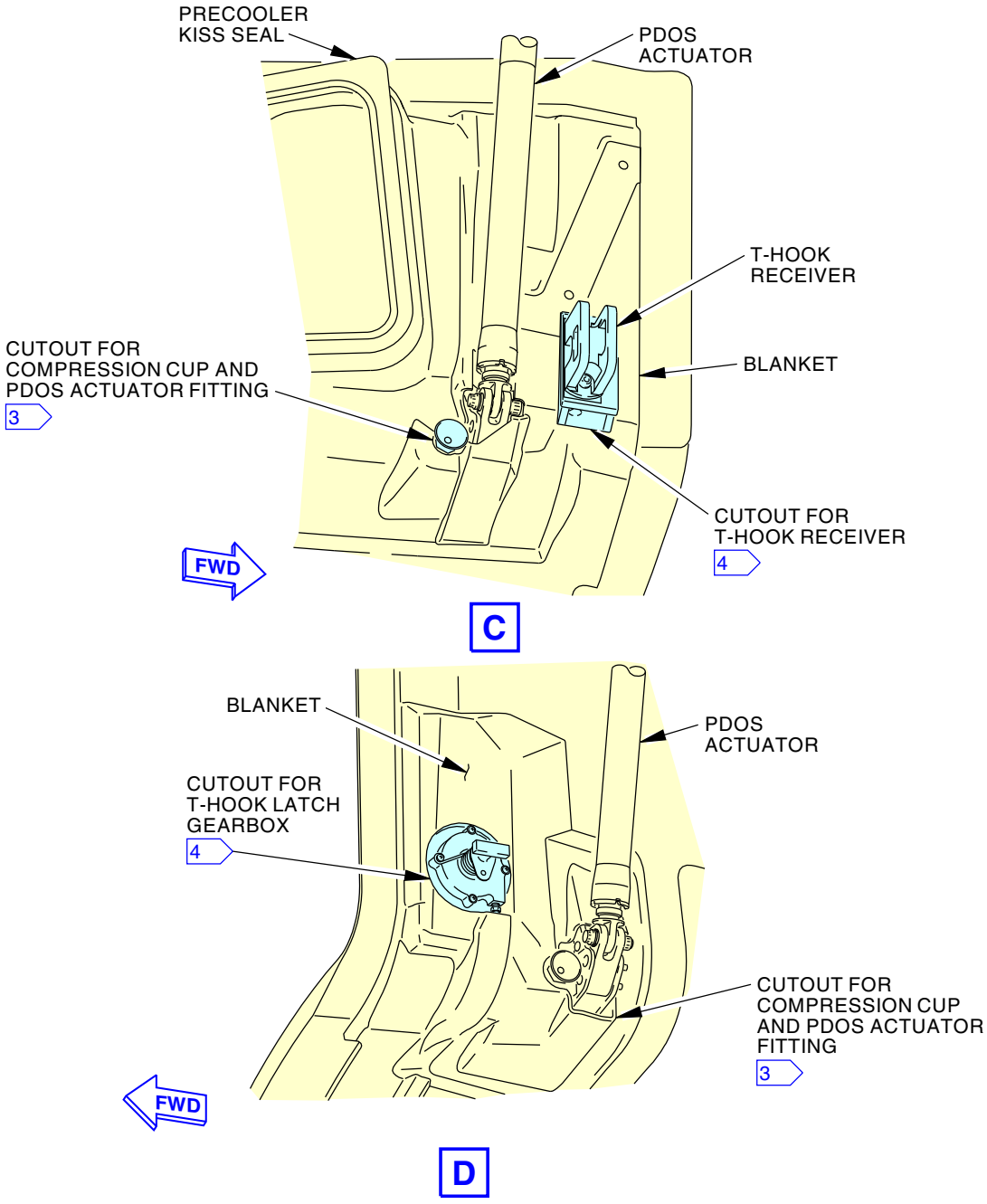
Seal and Fill Gaps
Figure 405/78-31-06-990-806-H01 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Seal and Fill Gaps
Figure 405/78-31-06-990-806-H01 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

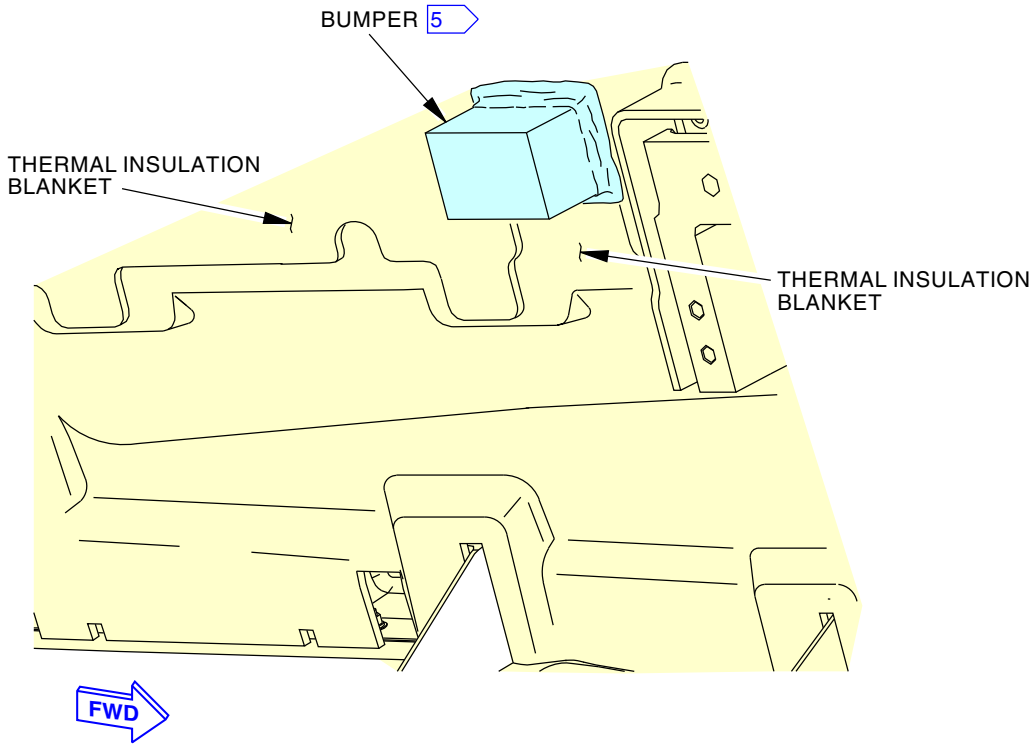


4 FILL GAPS BETWEEN STRUCTURE FOR T-HOOK RECEIVER/T-HOOK GEARBOX AND INSULATION BLANKET CUTOUT WITH FILLER AND TOP COAT WITH SEALANT. FILLET SEAL BLANKET CUTOUT TO STRUCTURE WITH SEALANT.

361715 S0000133019_V3

Seal and Fill Gaps
Figure 405/78-31-06-990-806-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



DRAIN MAST BUMPER
(LEFT THRUST REVERSER IS SHOWN,
RIGHT THRUST REVERSER IS OPPOSITE)

E

5 APPLY SEALANT TO GAP BETWEEN THE BUMPER AND THE BLANKET CUTOUT

382624 S0000133727_V2

Seal and Fill Gaps
Figure 405/78-31-06-990-806-H01 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER THERMAL INSULATION BLANKETS - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) The inspection of the thrust reverser thermal insulation blankets.

B. These blankets are a thermal insulation and fire barrier layer which is necessary to keep the thrust reverser structurally serviceable and can decrease the damage and repair costs from a duct burst or a fire.

TASK 78-31-06-200-801-H01

2. Thrust Reverser Thermal Insulation Blanket Inspection

(Figure 601 or Figure 602)

A. General

(1) This task inspects the thrust reverser metal faced thermal insulation blankets.

(2) An operator reported damage to several thermal insulation blankets from a missing borescope inspection plug on another engine model. The damaged blankets had missing material and could not be repaired. The hot compressor air caused heat damage to the thrust reverser inner wall composite structure. A visual and tap test structural inspection for delamination of the inner wall was necessary.

(3) These blankets are a thermal insulation and fire barrier layer which is necessary to keep the thrust reverser structurally serviceable and can decrease the damage and repair costs from a duct burst or a fire.

(4) The metal-faced thermal insulation blanket is made of these components; a textured, hot-side, corrosion resistant steel (CRES) skin over a glass cloth that is stitched around the thermal insulation of different densities and thicknesses and a cold side polyimide film. The metal face on the hot side of the blankets is the fire barrier and also the moisture barrier for the blanket. The polyimide sheet on the cold side of the blanket is a moisture barrier. The moisture barrier prevents the contamination of the insulation from moisture or fluid which can become less effective.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-01-000-801-H01	Thrust Reverser Removal (P/B 401)
78-31-01-300-804-H01	Click-Bond Stud Replacement (P/B 801)
78-31-01-300-823-H00	Temporary Repair of the Thrust Reverser Metal-Faced Thermal Insulation Blankets (P/B 801)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
78-31-01-300-824-H00	Permanent Repair of the Thrust Reverser Metal-faced Thermal Insulation Blankets (P/B 801)
78-31-01-350-801-H01	Bond the Seal Pad to the Thermal Insulation Blanket (P/B 801)
78-31-01-400-801-H01	Thrust Reverser Installation (P/B 401)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
NDT Part 1, 51-05-01	Tap Test Inspection of Honeycomb Sandwich Structure
NDT Part 4, 51-00-01	Bondline/Disbond Delamination Inspection in Metal Bonded Parts and Non-metal Laminates
NDT Part 4, 51-00-02	Pulse-Echo Inspection of Laminate Structure
SRM 54-31-01	Structural Repair Manual

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
426AR	Right Thrust Reverser, Right Engine

F. Prepare to Inspect the Thrust Reverser Thermal Insulation Blankets

SUBTASK 78-31-06-010-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-06-490-003-H01

(2) Use a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

G. Inspect the Metal-Faced Thrust Reverser Thermal Insulation Blankets

SUBTASK 78-31-06-210-001-H01

(1) Examine the hot side of the thermal insulation blankets for these conditions (Figure 601 or Figure 602):

(a) No tears and cuts in the metal-faced thermal insulation blanket.

1) If there is damage, replace the metal-faced thermal insulation blanket.

a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

b) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) If the damage to the thermal insulation blanket is within these damage limits, you can do a temporary repair on the metal-faced thermal insulation blanket.

NOTE: Damage is defined as any penetration through the metal face sheet. Scratches and dents are not considered damage which require repair.

a) Temporary repairs on the metal-faced thermal insulation blanket must be replaced with a permanent repair in 500 hours.

b) Damage to the inner metal sheet or hot side is less than 2 square inches (1290 square mm).

c) A tear in the inner metal sheet or hot side is shorter than 3 inches (76 mm).

d) The damaged area is more than 0.5 inch (12.7 mm) from a grommet, sharp bend or edge in the blanket.

e) Around each damaged area in all directions, there is at least 0.5 inch (12.7 mm) of undamaged blanket.

f) A maximum of two damage locations on each thrust reverser blanket; the damaged areas must be separated by more than 6.0 inches (152 mm).

g) Do this task: Temporary Repair of the Thrust Reverser Metal-Faced Thermal Insulation Blankets, TASK 78-31-01-300-823-H00.

3) You can do a permanent repair on the metal-faced thermal insulation blanket.

a) Do this task: Permanent Repair of the Thrust Reverser Metal-faced Thermal Insulation Blankets, TASK 78-31-01-300-824-H00.

(b) No missing sealant in the gaps between the thermal insulation blankets and the vertical bulb-type fire seal and retainer.

NOTE: All gaps 0.0000-0.2500 inch (0.0000-6.3500 millimeters) wide are filled with fire wall sealant, BMS 5-63. No gaps more than 0.2500 inch (12.7 millimeters).

1) To replace the missing sealant, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

(c) No missing sealant or filler in the gaps between the thermal insulation blankets and the molded pressure seals on the lower bifurcation.

NOTE: All gaps 0.0500-0.2500 inch (1.2700-6.3500 millimeters) wide are filled with sealant. All gaps that are more than 0.2500 inch (12.7000 millimeters) are filled with a foam filler made of a closed cell, silicone foam rubber and topcoated and sealed with sealant.

1) Replace the missing sealant or filler between the thermal insulation blanket and the bulb-type pressure seal and the molded pressure seals on the left thrust reverser.

2) Replace the missing sealant or filler between the thermal insulation blanket and the molded pressure seal on the right thrust reverser.

3) To replace the missing sealant or filler, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

(d) No missing sealant or filler in the gaps between the cutouts in the thermal insulation blankets and the T-hook gearbox and the T-hook receiver.

NOTE: All gaps 0.0000-0.2500 inch (0.000-6.3500 millimeters) wide are filled with a fire wall sealant, BMS5-63. All gaps that are more than 0.2500 inch (12.7000 millimeters) are filled with a foam filler made of a closed cell, silicone foam rubber and topcoated and sealed with fire wall sealant.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Replace the missing sealant or filler between the thermal insulation blanket cutout and the PDOS actuator fitting on the left and right thrust reverser.

2) Replace the missing sealant or filler between the thermal insulation blanket cutout and the structure for the T-hook receiver on the left thrust reverser.

3) Replace the missing sealant or filler between the thermal insulation blanket cutout and the structure for the T-hook gearbox on the right thrust reverser.

4) To replace the missing sealant or filler, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

(e) No missing sealant or filler in the gaps between the cutouts in the thermal insulation blankets and the PDOS actuator fittings.

NOTE: All gaps are filled with a foam filler made of a closed cell, silicone foam rubber and topcoated and sealed with fire wall sealant, BMS5-63. A fillet seal is applied at the cutout to the PDOS fitting with fire wall sealant, BMS5-63.

1) To replace the missing sealant or filler, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

(f) A blanket found with missing metal skin, missing glass cloth or missing insulation and overtemperature conditions like discoloration or scorched appearance are seen.

NOTE: A gold discoloration on the hot side of the thermal insulation blanket is acceptable. There is no need to remove the blanket.

1) If you find overtemperature conditions and missing metal skin, missing glass cloth or missing insulation, remove the damaged thermal insulation blankets.

a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

2) With the thermal insulation blankets removed, do these steps to find any damage to the thrust reverser inner wall:

a) Do a visual check of the engine side and fan duct flow side of the inner wall composite structure for the area under the blanket for discoloration or scorched appearance.

NOTE: Use the Structural Repair Manual (SRM), Allowable Damage Limits for the Thrust Reverser Skin - GE90 Engine, Acoustic Panels and Bifurcation Panels (SRM 54-31-01). The allowable limits are given for cracks in the honeycomb, cracks at an edge, nicks, gouges, scratches, holes, punctures and delamination.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) Do a non-destructive test of the engine side and fan duct flow side of the inner wall composite structure for the area under the blankets.

NOTE: For the applicable inner wall area, use the non-destructive test (NDT) manual, Bondline/Disbond Delamination Inspection in Metal Bonded Parts and Non-metal Laminates, NDT Part 4, 51-00-01 and the Pulse-Echo Inspection of Laminate Structure, NDT Part 4, 51-00-02.

NOTE: Optional to use the non-destructive test (NDT) manual, Tap Test Inspection of Honeycomb Sandwich Structure, NDT Part 1, 51-05-01. The tap test instructions in the NDT gives the tap test tool specification, reference standards to calibrate the sound you hear for different kinds of damage, and general steps for the examination and analysis of the tap test results.

NOTE: Do the non-destructive test for the area under the affected blanket and adjacent blankets. If hot air penetrates under the blanket, damaged areas can occur further away from the penetration area.

3) If delamination is found in the thrust reverser inner wall, replace the thrust reverser.

NOTE: A repair may be possible. Contact Boeing to report the kind of damage and delamination found for dispatch disposition. Document the damage with digital photographs that can be sent by e-mail, or provide a sketch of the damage that can be e-mailed or faxed.

a) Do this task: Thrust Reverser Removal, TASK 78-31-01-000-801-H01.

b) Do this task: Thrust Reverser Installation, TASK 78-31-01-400-801-H01.

4) If there is no damage to the inner wall or the damage to the inner wall is repaired, install the new thermal insulation blankets.

a) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

(g) No missing or loose fasteners, missing click-bond studs, temporary fasteners, and grommet holes filled with RTV.

1) If you find missing or temporary fasteners and grommet holes filled with RTV, you must replace them with new fasteners within the time limits.

NOTE: The time limits are in the thermal insulation blanket installation procedure.

a) For temporary fasteners and grommet holes filled with RTV, refer to this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

b) To install click-bond studs, do this task: Click-Bond Stud Replacement, TASK 78-31-01-300-804-H01.

c) To install new fasteners, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

(h) No missing sealant between the drain mast bumpers and the blanket cutouts on the latch beam of the left and right thrust reversers.

1) To replace the missing sealant, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(i) No missing No.4 compression fitting seal pad and/or no blanket foil damage to the area of the No.4 compression fittings on the left and right thrust reverser thermal insulation blankets.

NOTE: A seal pad closes the end of the blanket that covers the No. 4 compression fittings on the lower bifurcation. The seal pad, P/N 315W1814-9, is part of the blanket assembly. There is a hole in the center of the pad to allow the adjustment of the spacers under the circular compression pad. The seal pad is a closed cell, sponge rubber pad, 0.1900 inch thick and can be a white or black color. The seal pad is bonded to the CRES foil on the end of the blanket. The seal pad has been accidentally removed by some operators.

1) If there is damaged or torn CRES foil, do permanent repair of the foil around the end of the blanket before you bond the seal pad to the blanket.

a) Do this task: Permanent Repair of the Thrust Reverser Metal-faced Thermal Insulation Blankets, TASK 78-31-01-300-824-H00.

2) If the permanent repair of the damaged or torn CRES foil is not possible, replace the thermal insulation blanket.

a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

b) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

3) If there is no damaged or torn CRES foil or the permanent repair to the CRES foil is done, bond the seal pad to the blanket.

a) Do this task: Bond the Seal Pad to the Thermal Insulation Blanket, TASK 78-31-01-350-801-H01.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-06-090-002-H01

(1) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-06-410-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Close these access panels:

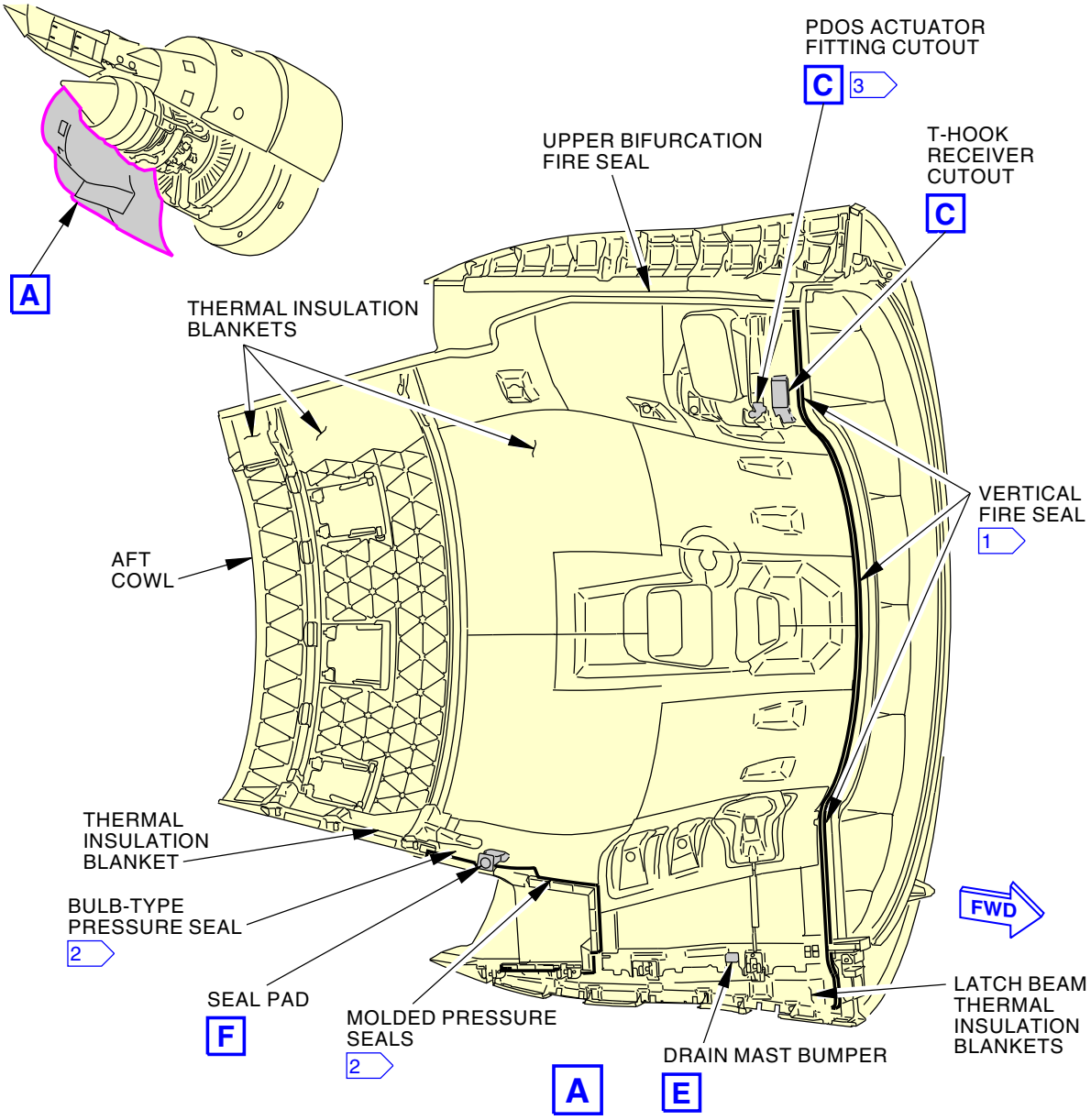
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 FILL GAPS BETWEEN THE FIRE SEAL RETAINER AND THERMAL INSULATION BLANKETS WITH SEALANT

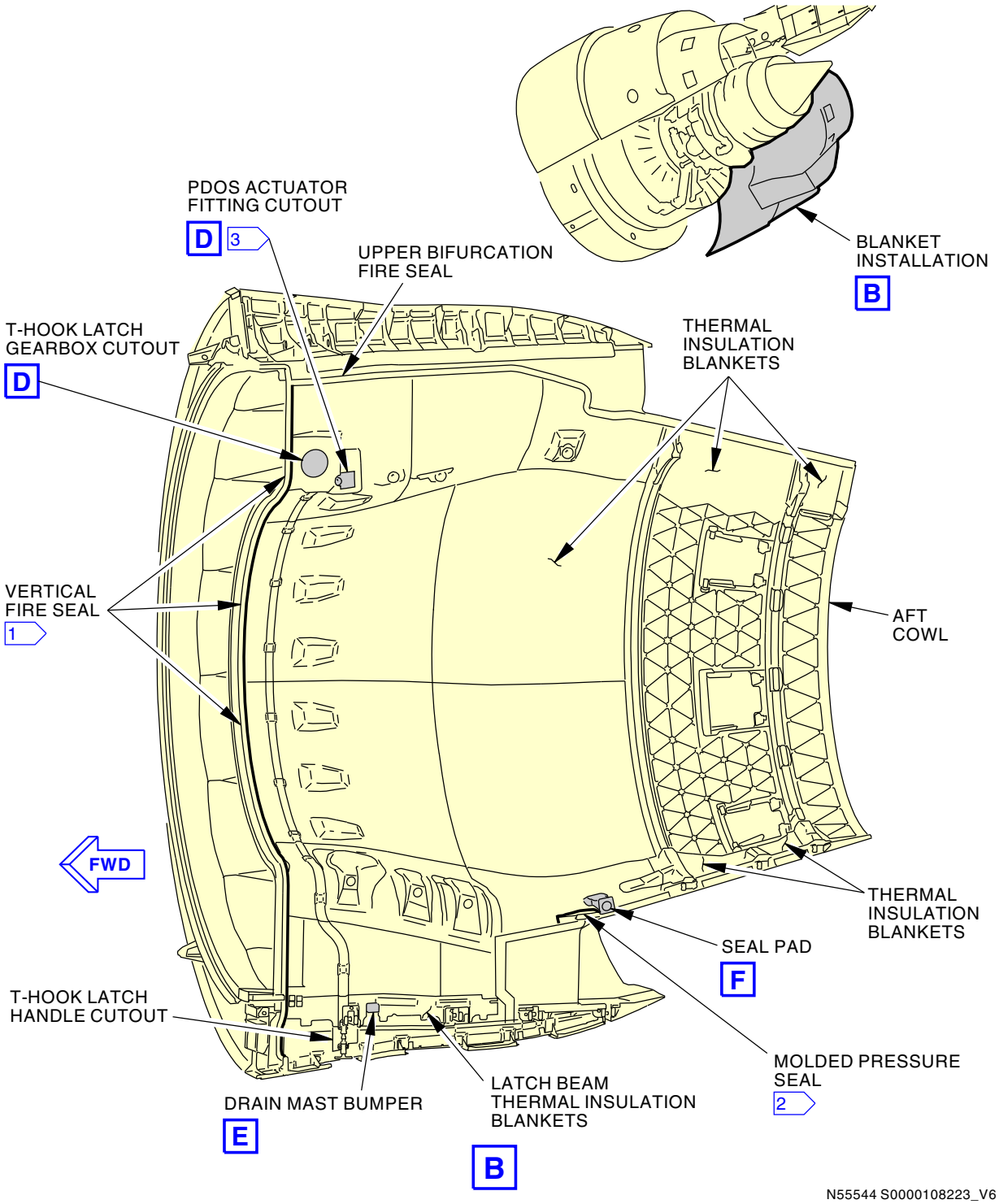
2 FILL GAPS BETWEEN THE PRESSURE SEALS AND THERMAL INSULATION BLANKETS WITH SEALANT AND FILLER

3 FILL GAPS BETWEEN PDOS ACTUATOR FITTING AND INSULATION BLANKET CUTOUT WITH FILLER AND OVER COAT FILLER WITH SEALANT. FILLET SEAL BLANKET CUTOUT TO PDOS FITTING WITH SEALANT.

M07430 S0004286392_V6

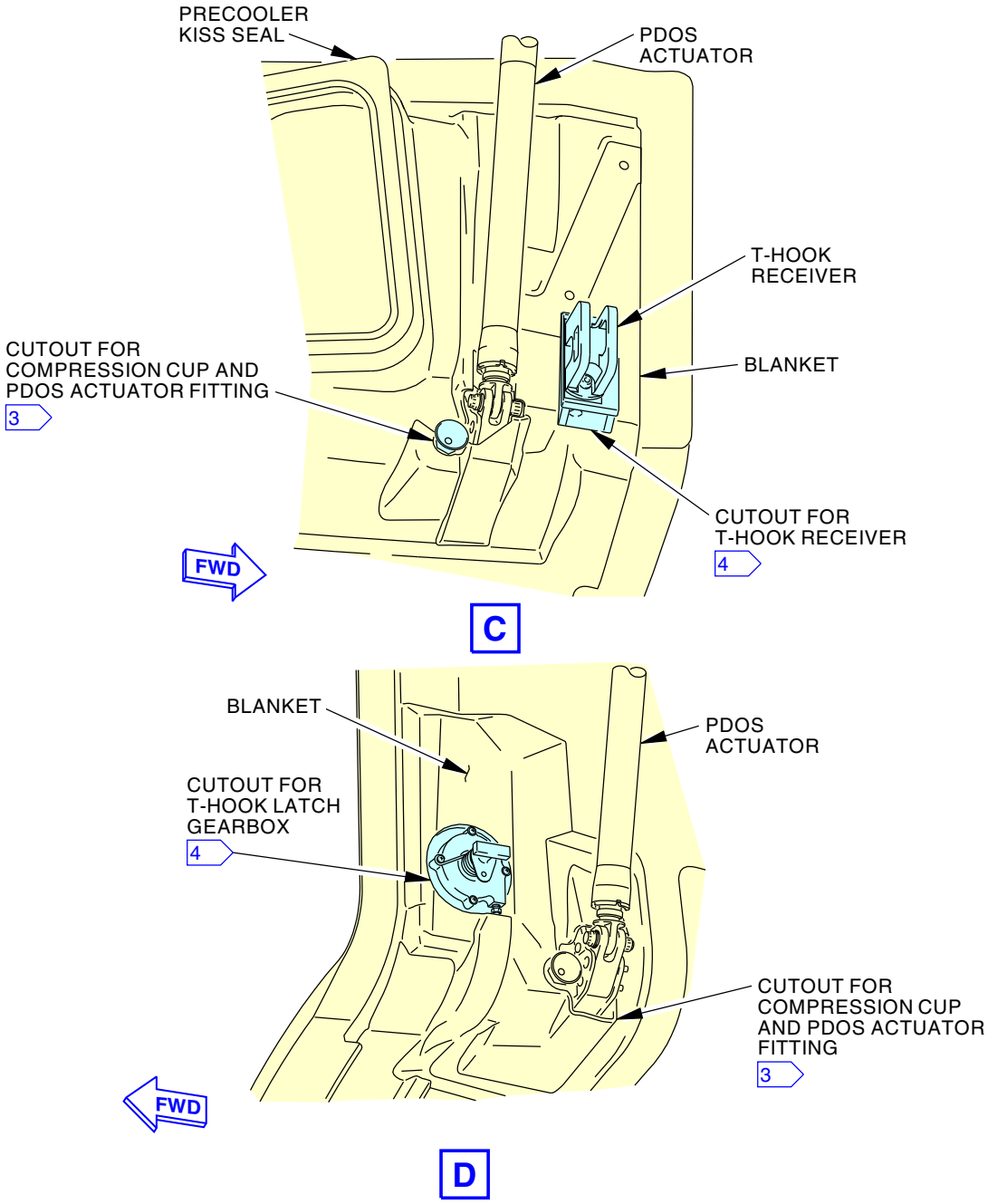
Metal-Faced Thermal Insulation Blanket Inspection
Figure 601/78-31-06-990-804-H01 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Metal-Faced Thermal Insulation Blanket Inspection
Figure 601/78-31-06-990-804-H01 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

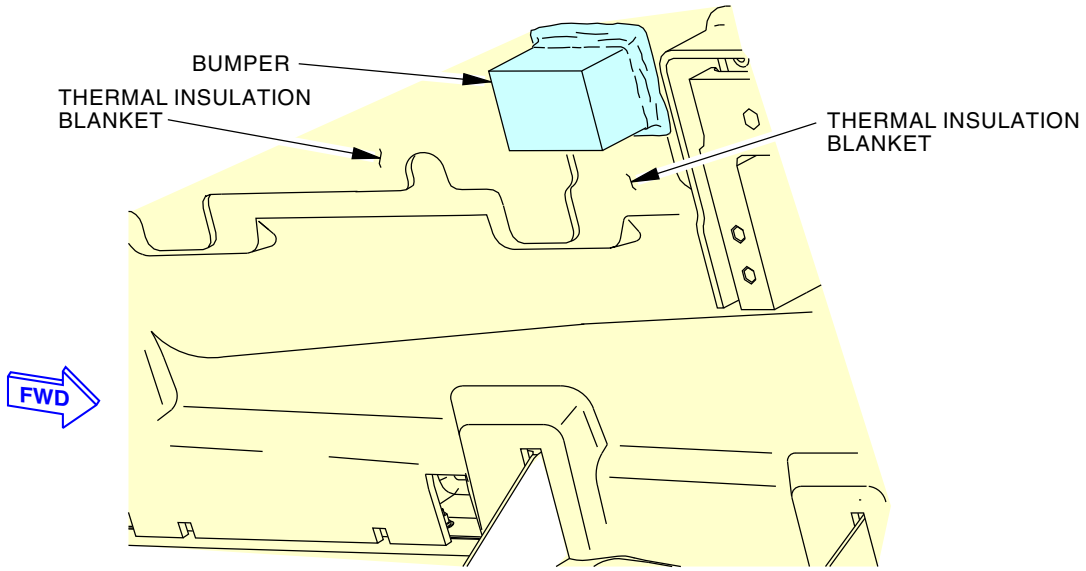


4 FILL GAPS BETWEEN STRUCTURE FOR T-HOOK RECEIVER/T-HOOK GEARBOX AND INSULATION BLANKET CUTOUT WITH FILLER AND TOP COAT WITH SEALANT. FILLET SEAL BLANKET CUTOUT TO STRUCTURE WITH SEALANT.

361715 S0000133019_V3

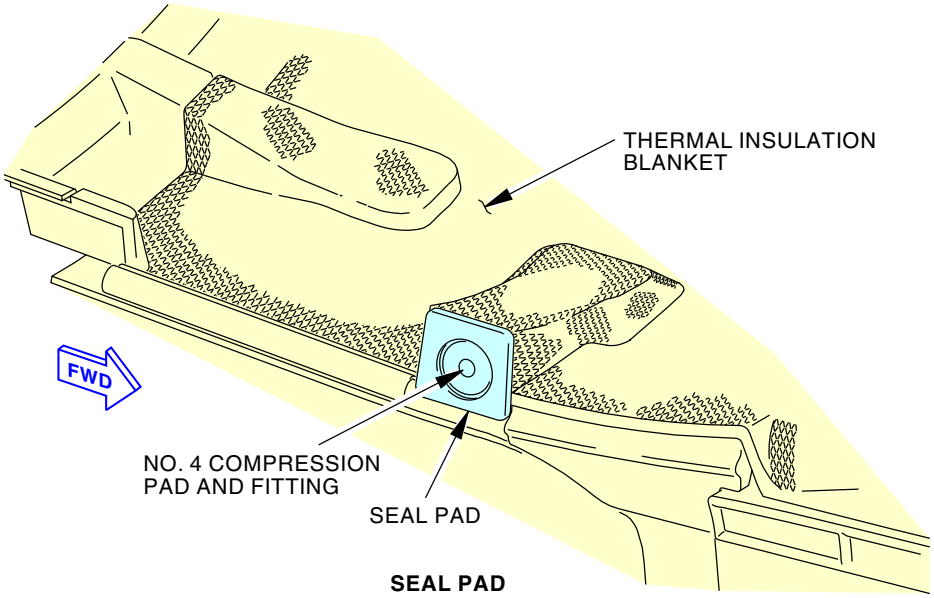
Metal-Faced Thermal Insulation Blanket Inspection
Figure 601/78-31-06-990-804-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



DRAIN MAST BUMPER
(LEFT THRUST REVERSER IS SHOWN,
RIGHT THRUST REVERSER IS OPPOSITE)

E



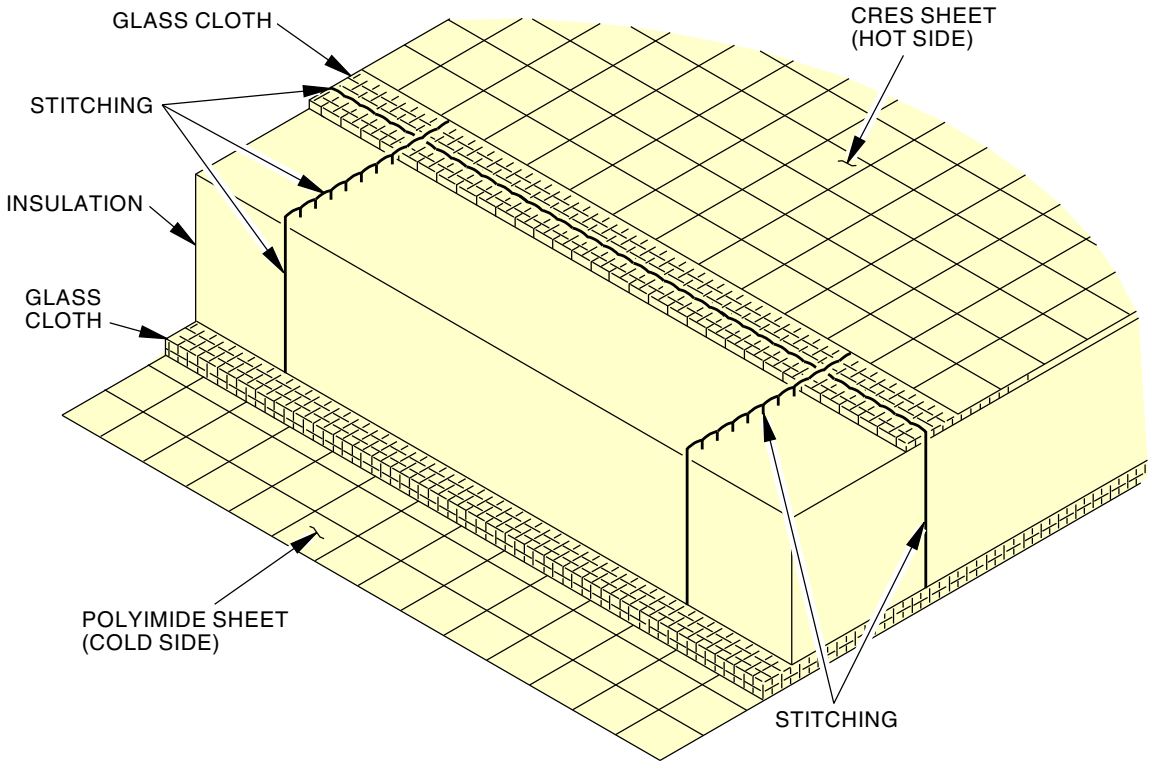
SEAL PAD
(LEFT THRUST REVERSER IS SHOWN,
RIGHT THRUST REVERSER IS OPPOSITE)

F

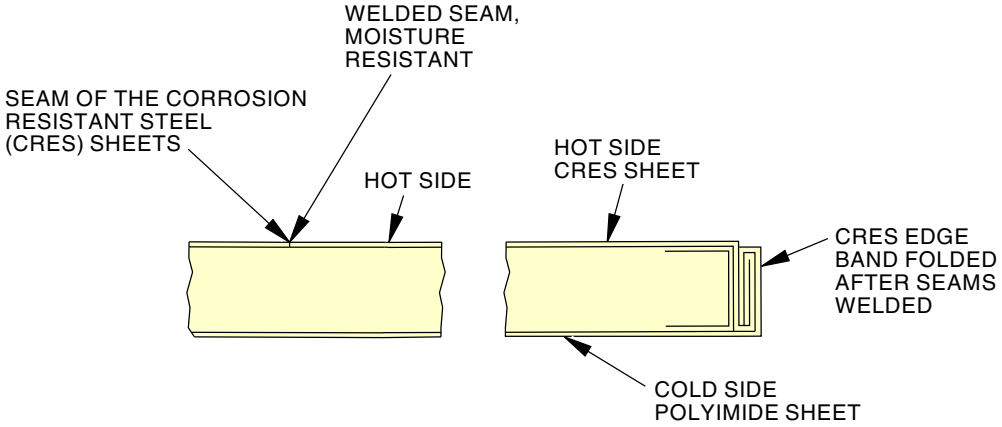
382569 S0000133726_V2

Metal-Faced Thermal Insulation Blanket Inspection
Figure 601/78-31-06-990-804-H01 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



EXAMPLE OF METAL-FACED THERMAL BLANKET CROSS-SECTION



CROSS SECTION OF METAL-FACED INSULATION BLANKET AT SEAMS AND EDGEBAND

M07431 S0004286393_V2

Metal-Faced Thermal Insulation Blanket Cross-Section Example
Figure 602/78-31-06-990-809-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER RUB STRIPS - REMOVAL/INSTALLATION

1. General

A. This procedure has four tasks:

(1) The first task removes the rub strips from the circumference of the thrust reverser torque box.

(2) The second task installs the rub strips on the circumference of the thrust reverser torque box.

(3) The third task removes the rub strips on the non-flow side of the thrust reverser translating sleeve acoustic panel.

(4) The fourth task installs the rub strips on the non-flow side of the thrust reverser translating sleeve acoustic panel.

TASK 78-31-08-000-801-H01

2. Thrust Reverser Torque Box Rub Strip Removal

(Figure 401)

A. General

(1) This task removes the rub strips from the thrust reverser torque box.

(2) The thrust reverser torque box rub strip is referred to as the rub strip in this task.

B. References

Reference	Title
27-61-00-040-801	Spoiler Deactivation (P/B 201)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Prepare for the Removal

SUBTASK 78-31-08-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS, OR MOVE ALL PERSONNEL AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Spoiler Deactivation, TASK 27-61-00-040-801.

SUBTASK 78-31-08-860-001-H01

(2) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-08-860-002-H01

(3) Make sure the reverse thrust levers are in the fully forward and down position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-08-040-002-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(4) Retract and deactivate the leading edge slats.

(a) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-08-040-003-H01

(5) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-08-010-001-H01

(6) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-08-980-001-H01

CAUTION REMOVE ALL EQUIPMENT, WORK STANDS, AND OTHER OBJECTS THAT ARE AFT OF THE THRUST REVERSER. DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(7) For the applicable thrust reverser sleeve, Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

NOTE: Extend the thrust reverser sleeve approximately 6.0 inches (152.4 mm).

SUBTASK 78-31-08-030-001-H01

(8) Remove the wire bundle and clamps for the proximity sensors on the locking hydraulic actuators and the sync lock/manual drive unit.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Remove a screw [2] and a washer [3] for each wire bundle clamp [1].

F. Remove the Thrust Reverser Rub strips

SUBTASK 78-31-08-020-001-H01

(1) Remove the forward row of rub strips [11] (Figure 401).

NOTE: These five rub strips touch the underside surface of the fan cowl panel.

(a) Remove the bolts [4], washers [5] and nuts [6].

(b) Remove the 22 brackets [7] that are attached with bolts [8], washers [5] and nuts [6].

NOTE: There are 25 brackets attached to the torque box structure.

(c) Remove three brackets [7] that are attached with bolts [9], bolts [8], washers [5] and nuts [6].

(d) Remove the five rub strips [11] and the shims [16].

1) Make a record of the installed location of the rub strip and shims on the torque box.

2) Keep the shims and the rub strips for the installation.

SUBTASK 78-31-08-020-002-H01

(2) Remove the aft row of rub strips [21].

NOTE: These five rubstrips touch the underside surface of the thrust reverser translating sleeve.

(a) Remove the 82 bolts [4], washers [5] and nuts [6].

(b) Remove the five rub strips [21] and the shims [26].

1) Make a record of the installed location of the rub strips and shims on the torque box.

2) Keep the shims and the rub strips for the installation.

SUBTASK 78-31-08-020-003-H01

(3) Remove the aft rub-strip ramps [22].

(a) Remove the bolts [4], washers [5] and nuts [6].

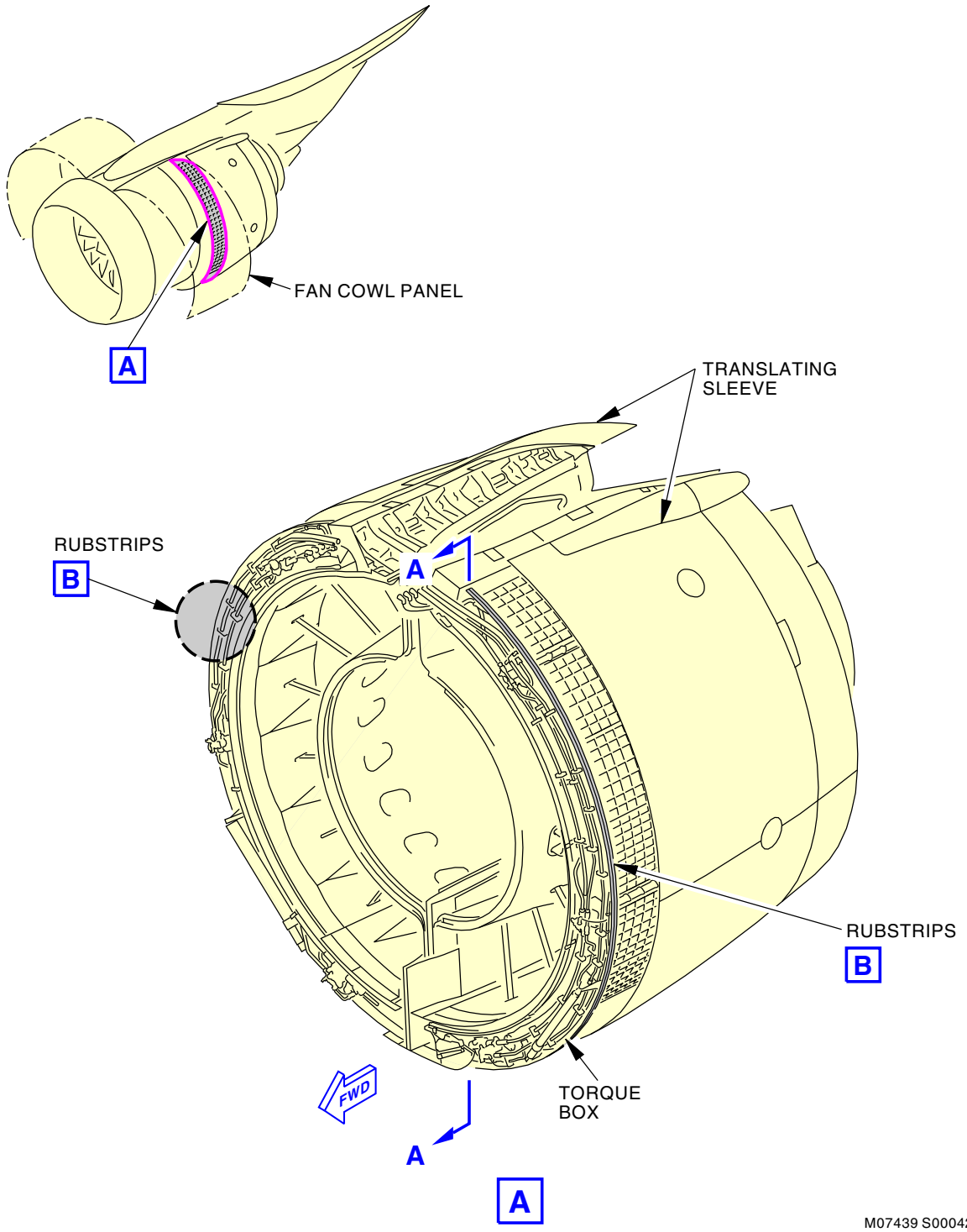
(b) Remove the four rub-strip ramps [22] and shims [27].

1) Make a record of the installed location of the rub strip ramps and shims on the torque box.

2) Keep the shims and the rub strip ramps for the installation.

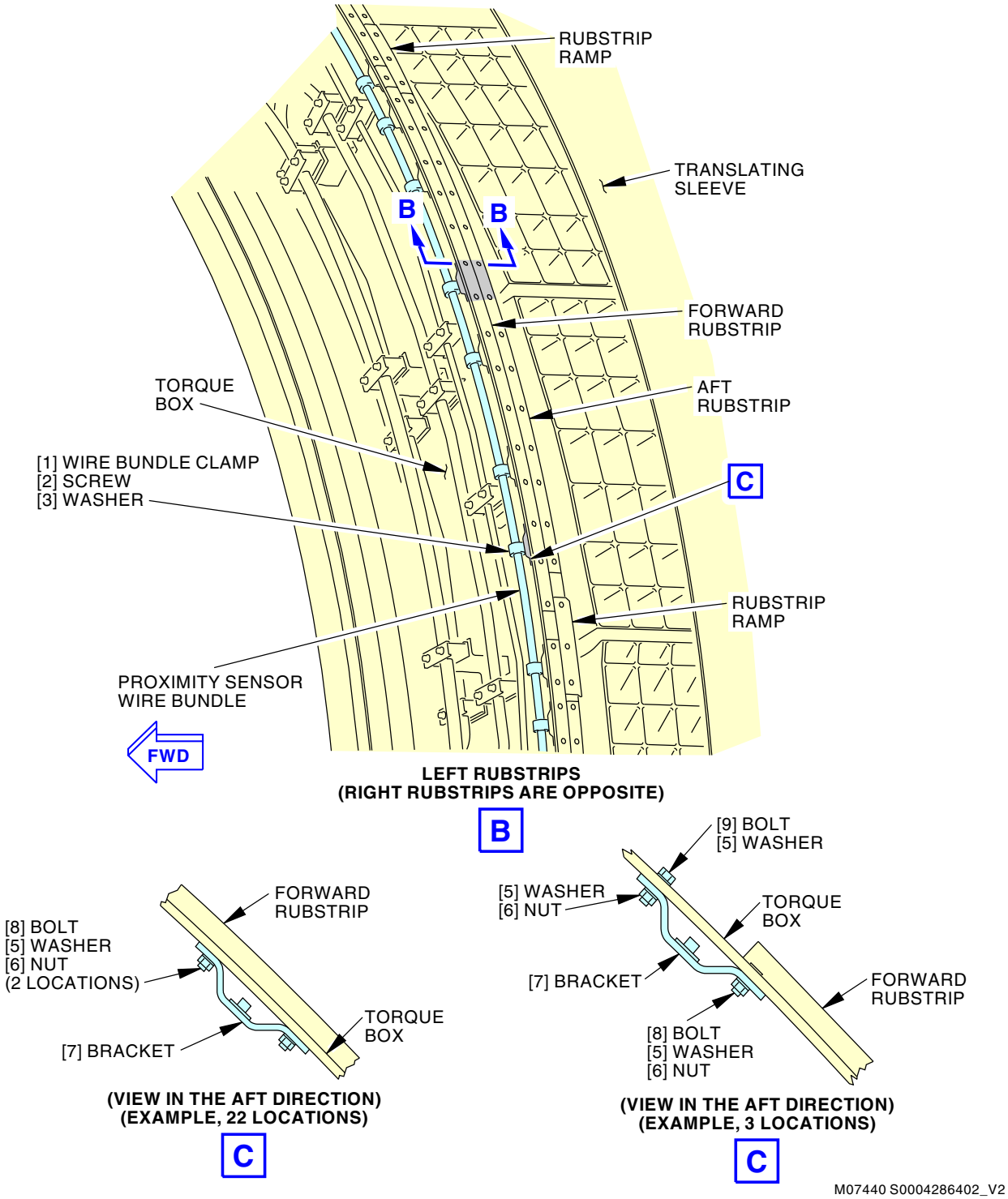
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



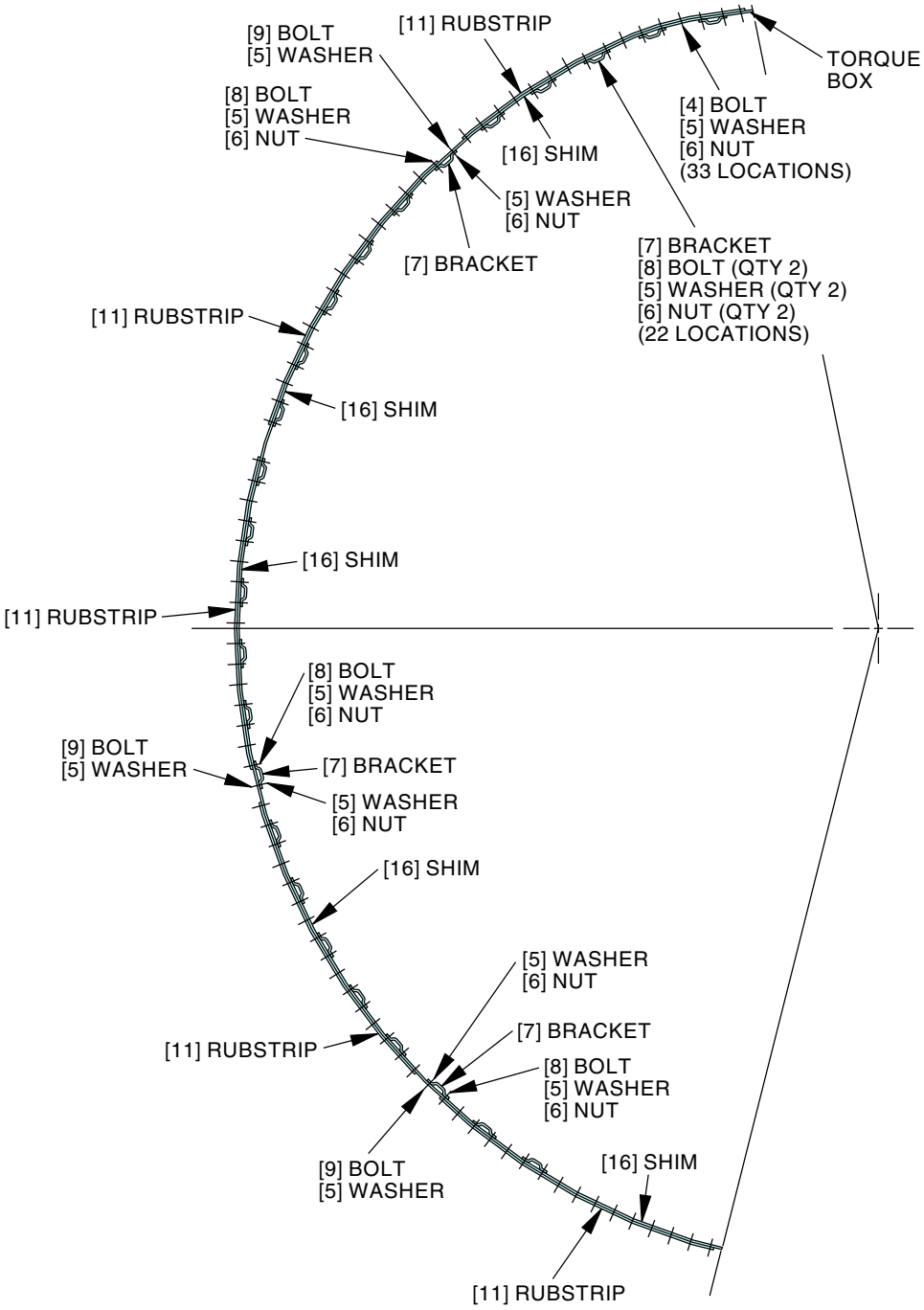
Thrust Reverser Rub strips Installation
Figure 401/78-31-08-990-801-H01 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Rub strips Installation
Figure 401/78-31-08-990-801-H01 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



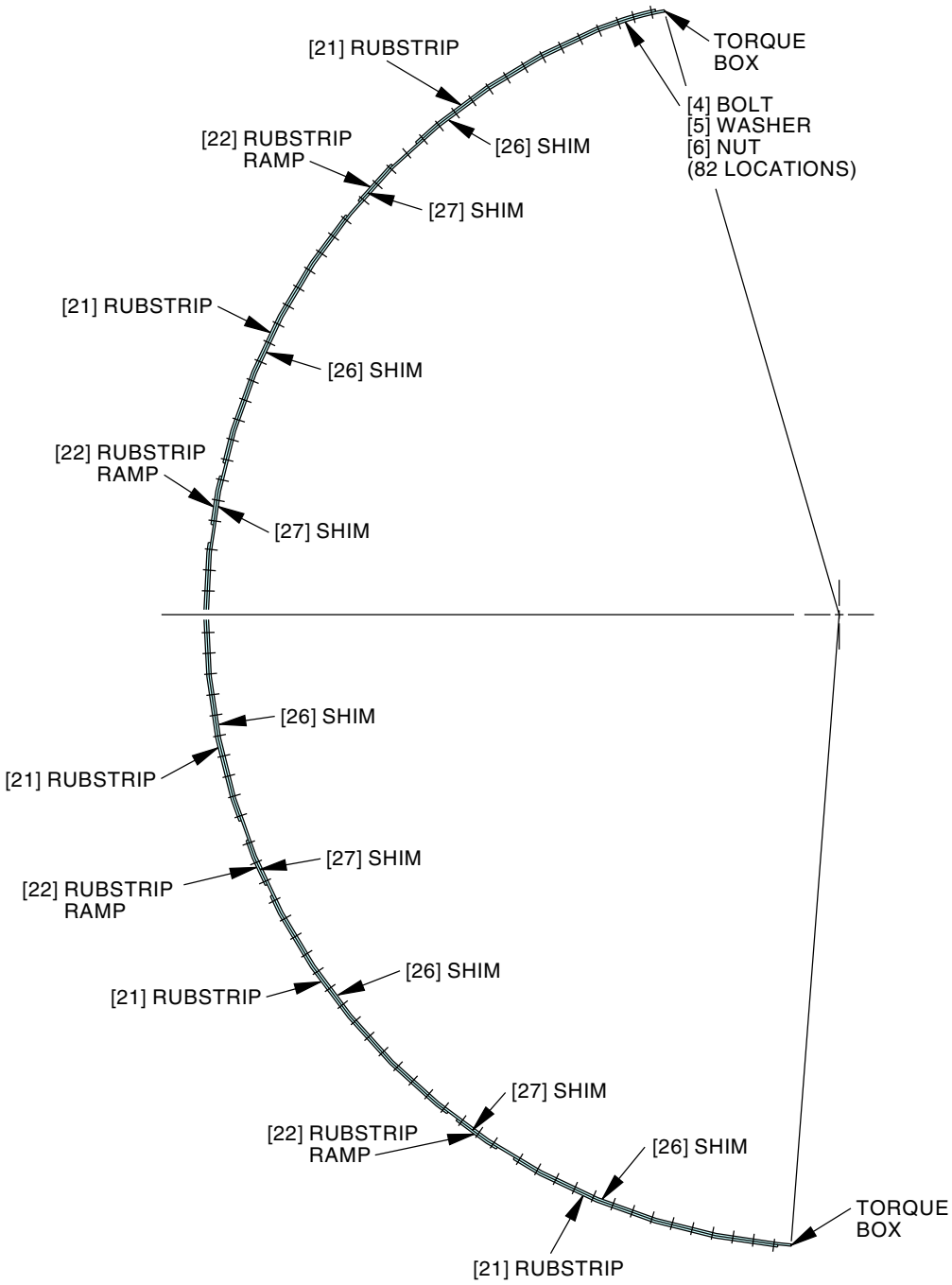
LEFT FORWARD RUBSTRIP (RIGHT FORWARD RUBSTRIP OPPOSITE)
(VIEW IN THE FORWARD DIRECTION)

A-A

M07441 S0004286403_V2

Thrust Reverser Rub strips Installation
Figure 401/78-31-08-990-801-H01 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



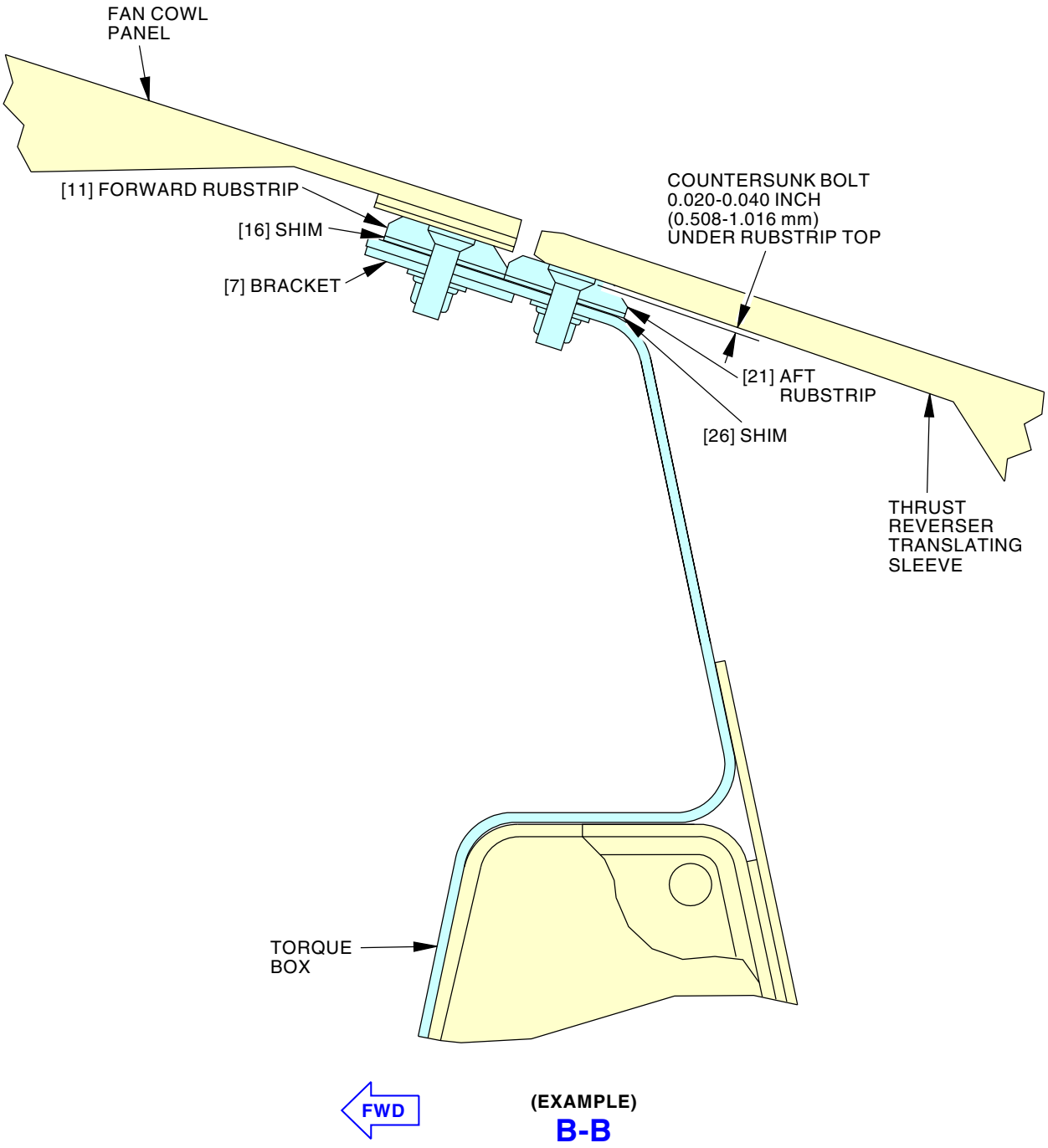
LEFT AFT RUBSTRIP (RIGHT AFT RUBSTRIP OPPOSITE)
(VIEW IN THE FORWARD DIRECTION)

A-A

M07442 S0004286404_V2

Thrust Reverser Rub strips Installation
Figure 401/78-31-08-990-801-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Rub strips Installation
Figure 401/78-31-08-990-801-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-08-400-801-H01

3. Thrust Reverser Torque Box Rub Strip Installation

(Figure 401)

A. General

(1) This task installs the rub strips on the thrust reverser torque box.

(2) The thrust reverser torque box rub strip is referred to as the rub strip in this task.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-146	Calipers - Vernier, 0 to 6 in (0 to 152 mm), Readable to 1/1000 in (.025 mm)
STD-405	Gauge - Feeler

D. Consumable Materials

Reference	Description	Specification
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Install the Thrust Reverser Rub strips

SUBTASK 78-31-08-160-001-H01

(1) Wipe the circumference of the torque box with a clean, dry cotton wiper, G00034 to remove all loose dirt, oil, grease or hydraulic fluid.

SUBTASK 78-31-08-918-001-H01

(2) Prepare the rub strips for installation (Figure 401).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Use the old rub strips and shims as a template for the new rubstrips.

1) Align the old rub strip over the new rub strip at the pilot holes.

NOTE: The cross-section of the rub strip is not symmetrical. The new rubstrip has a pilot hole, 0.1875 inch (4.763 mm) diameter, at one end of the strip. The new rubstrip ramp has a pilot hole in the middle of the ramp.

(b) If the old rub strip or shim is not available, use the hole locations in the torque box to locate the holes in the new rubstrip or shim.

(c) Make a centered mark on the new rub strip or shim for center of the attachment holes.

(d) On a bench, drill the holes with a drill rod that is 0.190-0.199 inch (4.826-5.055 mm) in diameter.

(e) Countersink the holes in the rub strip so that the head of the countersunk bolt is under the surface of the rub strip as shown.

NOTE: Use a 100 degree countersink.

SUBTASK 78-31-08-370-001-H01

(3) Prepare the primer, C00259.

NOTE: The primer is used for corrosion protection at the fastener installations.

(a) Mix the primer components (base, catalyst and thinner) in correct parts by volume per the manufacturers instructions.

(b) Let the mixed primer rest for 30 minutes if you use a Grade A or Grade B primer.

SUBTASK 78-31-08-220-001-H01

(4) Do a check of the gap between the forward rub strips [11] and the fan cowl panel.

(a) Install the rub strips [11] and shims [16] with bolts [4], washers [5], and nuts [6].

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(c) Measure the gap or interference between the fan cowl panel and the rub strip with a feeler gauge, STD-405 or vernier calipers, STD-146; the gap must be 0.000-0.020 inch (0.000-0.508 millimeter) between the rubstrip and the fan cowl panel.

(d) Do this task: Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00.

(e) Remove the rub strips [11], shims [16], bolts [4], washers [5], and nuts [6].

(f) Peel the shim to the thickness that is required for a gap of 0.000-0.020 inch (0.000-0.508 millimeter) between the fan cowl panel and the rubstrip.

SUBTASK 78-31-08-220-002-H01

(5) Do a check of the gap between the aft rub strips [21], rub-strip ramps [22] and the thrust reverser sleeve.

(a) Install the rub strips [21] and shim [26] with bolts [4], washers [5] and nuts [6].

(b) Install the rub-strip ramps [22] and shims [27] with bolts [4], washers [5], and nuts [6].

(c) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01; do not let the thrust reverser sleeve touch the rub strip.

(d) Measure the gap or interference between the thrust reverser sleeve and the rub strip with a feeler gauge, STD-405 or vernier calipers, STD-146; the gap must be 0.000-0.020 inch (0.000-0.508 millimeter) between the sleeve and the rubstrip.

(e) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

(f) Remove the rub strips [21], shims [26], bolts [4], washers [5], and nuts [6].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(g) Remove the rub-strip ramps [22], shims [27], bolts [4], washers [5], and nuts [6].

(h) Peel the shims to the thickness that is required for a gap of 0.000-0.020 inch (0.000-0.508 millimeter) between the thrust reverser sleeve and the rub strip.

SUBTASK 78-31-08-420-001-H01

(6) Install the forward row of rub strips [11].

(a) Put the rub strips [11] and shims [16] in position on the torque box.

(b) Apply primer, C00259 to the countersink, counterbore, or other recess and immediately install the fasteners.

(c) Install the bolts [4], the washers [5], and nuts [6] and tighten.

(d) Install the brackets [7] at 3 locations with bolts [9], bolts [8], washers [5] and nuts [6].

(e) Install the brackets [7] at 22 locations with bolts [8], washers [5], and nuts [6] and tighten.

NOTE: There are 25 brackets for the wire bundle clamps installed on each thrust reverser half.

SUBTASK 78-31-08-420-002-H01

(7) Install the aft row of rub strips [21].

NOTE: There are five aft rub strips and shims on each thrust reverser half.

(a) Put the rub strips [21] and shims [26] in position on the torque box.

(b) Apply primer, C00259 to the countersink, counterbore, or other recess and immediately install the fasteners.

(c) Install the bolts [4], the washers [5], and nuts [6] and tighten.

SUBTASK 78-31-08-420-003-H01

(8) Install the aft rub-strip ramps [22].

NOTE: There are four aft rub strip ramps and shims on each thrust reverser half.

(a) Put the rub-strip ramps [22] and shims [27] in position on the torque box.

(b) Apply primer, C00259 to the countersink, counterbore, or other recess and immediately install the fasteners.

(c) Install the bolts [4], the washers [5], and nuts [6] and tighten.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-08-430-001-H01

(1) Install the wire bundle and clamps for the proximity sensors on the locking hydraulic actuators and the sync lock/manual drive unit.

NOTE: There are 25 wire bundle clamps and brackets on each thrust reverser half.

(a) Position the wire bundle in the clamp.

NOTE: The lobe of the clamp is positioned forward of the clamp fastener.

(b) Install the clamps [1] with screws [2] and washers [3] on the bracket and tighten.

SUBTASK 78-31-08-980-002-H01

(2) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-31-08-410-001-H01

(3) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-08-440-001-H01

(4) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-08-440-002-H01

(5) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 78-31-08-000-802-H00

4. Thrust Reverser Translating Sleeve Rub Strip Removal

(Figure 402)

A. General

(1) This task includes the steps to remove the rub strips on the non-flow side of the thrust reverser translating sleeve acoustic panel.

(2) The thrust reverser translating sleeve rub strip is referred to as the rub strip in this task.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
78-31-00-860-819-H00	Thrust Reverser Operation - Extend (Selection) (P/B 201)
78-31-10-000-801-H01	Thrust Reverser Sleeve Removal (P/B 401)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

E. Prepare for the Removal

SUBTASK 78-31-08-860-003-H00

(1) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-08-860-004-H00

(2) Make sure the reverse thrust levers are in the fully forward and down position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-08-860-005-H00

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(3) Retract and deactivate the leading edge slats.

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-08-860-006-H00

(4) Do one of these tasks to access to the rub strips on the non-flow side of the thrust reverser translating sleeve acoustic panel:

(a) Thrust Reverser Operation - Extend (Selection), TASK 78-31-00-860-819-H00

(b) Thrust Reverser Sleeve Removal, TASK 78-31-10-000-801-H01

SUBTASK 78-31-08-010-002-H00

(5) For the left engine:

(6) Open these access panels:

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine

SUBTASK 78-31-08-010-003-H00

(7) For the right engine:

(8) Open these access panels:

Number	Name/Location
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

F. Rub Strip Removal

SUBTASK 78-31-08-000-001-H00

(1) Remove the nuts [8] (qty 10) (view A-A).

SUBTASK 78-31-08-000-002-H00

(2) Remove the washers [7] (qty 10) (view A-A).

SUBTASK 78-31-08-000-003-H00

(3) Remove the fillers [6] (qty 10) (view A-A).

SUBTASK 78-31-08-000-004-H00

(4) Remove the bolts [5] (qty 10) (view A-A).

SUBTASK 78-31-08-000-005-H00

(5) Remove the nuts [8] (qty 8) (view B-B).

SUBTASK 78-31-08-000-006-H00

(6) Remove the washers [7] (qty 8) (view B-B).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-08-000-007-H00

(7) Remove the bolts [9] (qty 8) (view B-B).

SUBTASK 78-31-08-000-008-H00

(8) Remove the rub strips [1] (qty 8).

SUBTASK 78-31-08-000-009-H00

(9) Remove the nut assy [11] (qty 2) (view C-C).

SUBTASK 78-31-08-000-010-H00

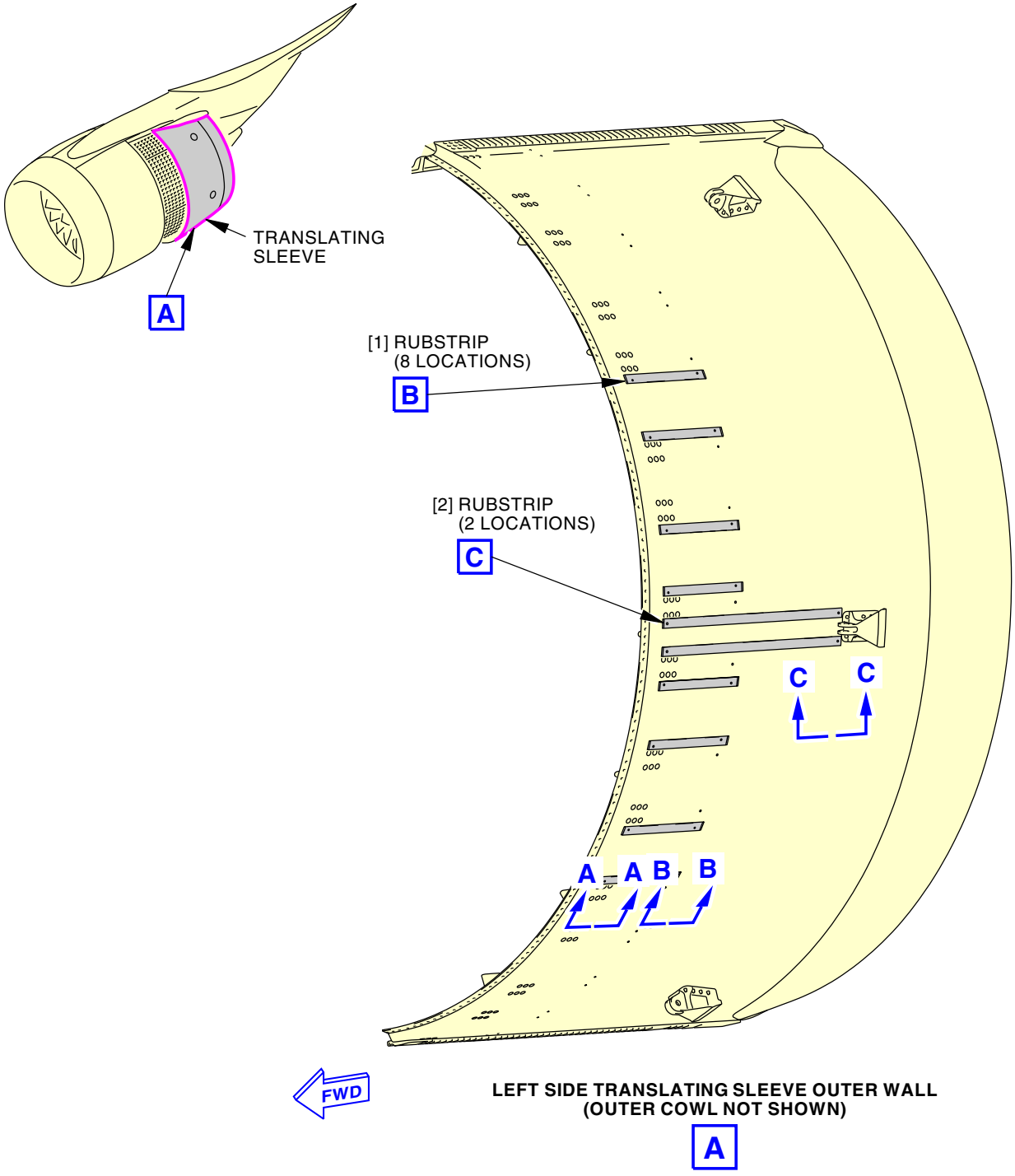
(10) Remove the bolts [10] (qty 2) (view C-C).

SUBTASK 78-31-08-000-011-H00

(11) Remove the rub strips [2] (qty 2).

——— END OF TASK ———

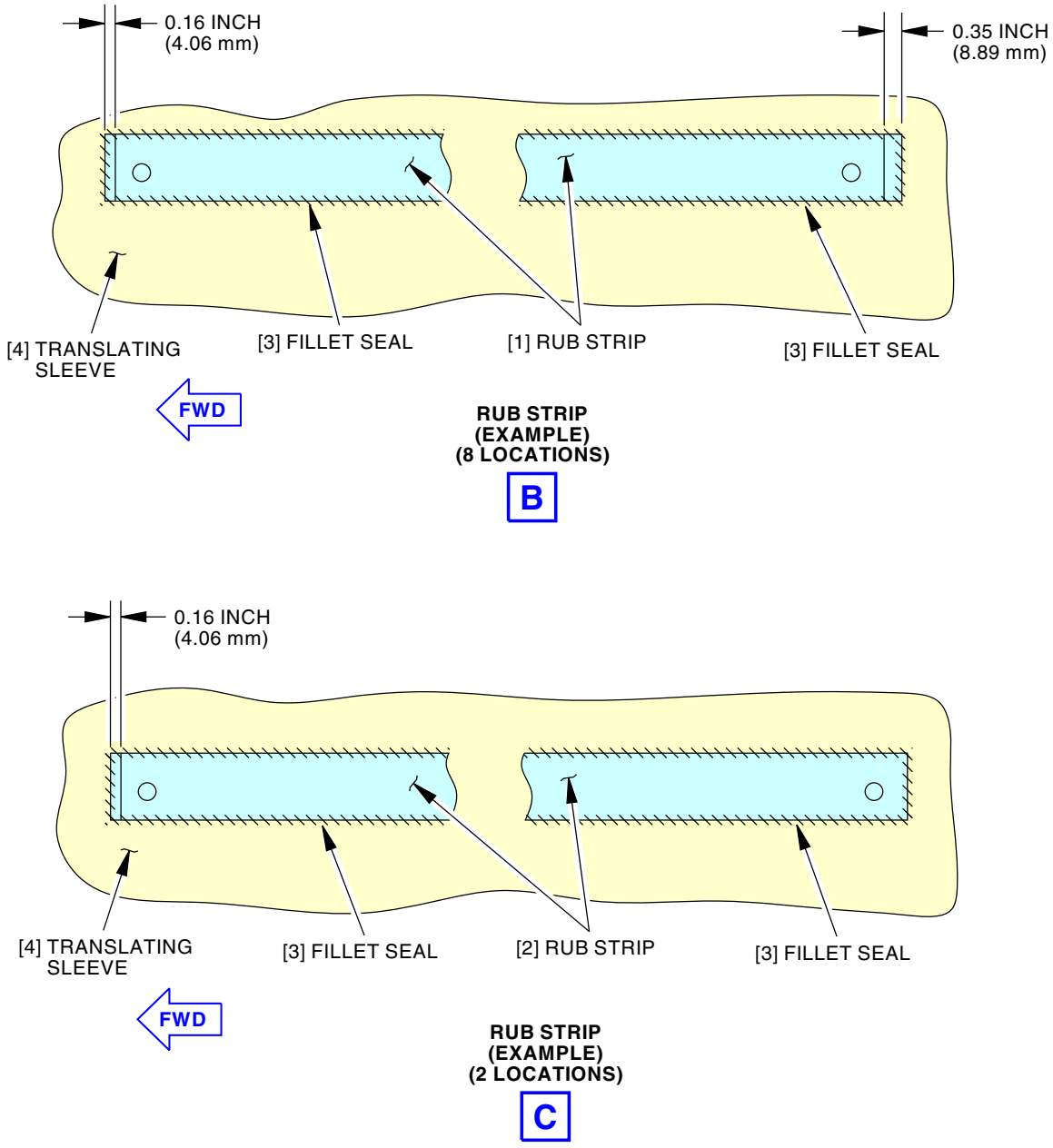
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2241967 S0000501763_V2

Thrust Reverser Translating Sleeve Rub Strip Installation
Figure 402/78-31-08-990-802-H00 (Sheet 1 of 3)

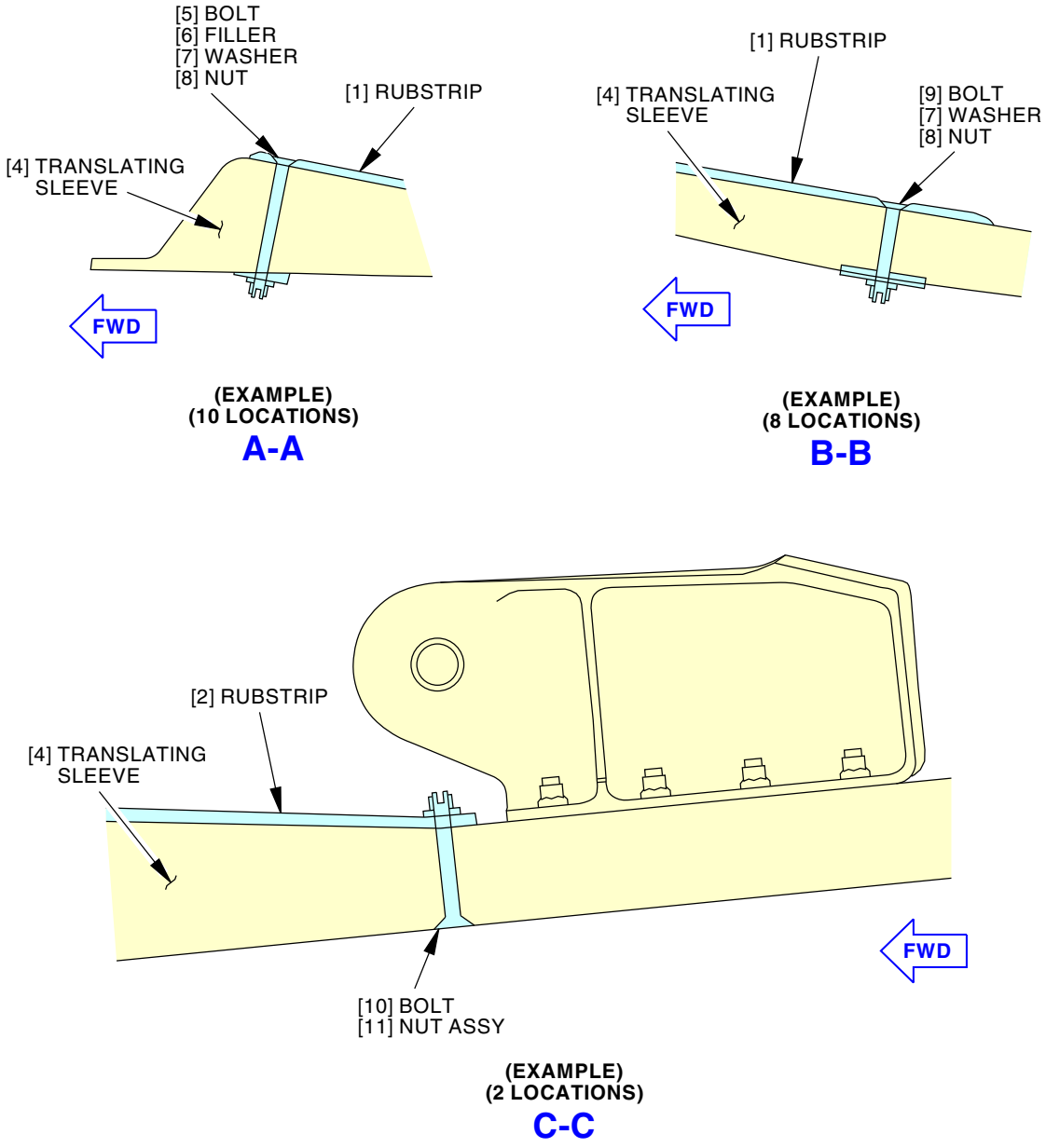
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2241973 S0000501764_V2

Thrust Reverser Translating Sleeve Rub Strip Installation
Figure 402/78-31-08-990-802-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2241986 S0000502231_V2

Thrust Reverser Translating Sleeve Rub Strip Installation
Figure 402/78-31-08-990-802-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-08-400-802-H00

5. Thrust Reverser Translating Sleeve Rub Strip Installation

(Figure 402)

A. General

(1) This task includes the steps to install the rub strips on the non-flow side of the thrust reverser translating sleeve acoustic panel.

(2) The thrust reverser translating sleeve rub strip is referred to as the rub strip in this task.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
78-31-00-860-818-H00	Thrust Reverser Operation - Retract (Selection) (P/B 201)
78-31-10-400-801-H01	Thrust Reverser Sleeve Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
A50327	Adhesive - Modified Epoxy For General Purpose Use	BMS5-92 Type III Class 2
B50078	Solvent - Aliphatic Naphtha (For Organic Coatings)	TT-N-95 Type I (Supersedes BMS3-2 Type I)

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

F. Prepare for the Installation

SUBTASK 78-31-08-400-001-H00

(1) Hold rub strips [1] (qty 8) on the translating sleeve [4] (view B):

(a) Use the existing adhesive fillet on the translating sleeve [4] as the template.

(b) Make the centered mark on the new rubstrips [1].

SUBTASK 78-31-08-140-001-H00

(2) On the bench, drill holes that are 0.1900 - 0.1930 inch in diameter on the new rubstrips [1] for holes in view A-A.

SUBTASK 78-31-08-140-002-H00

(3) Use a 100 degree countersink to countersink the holes in the rubstrip [1] so that the head of the countersunk bolt is under the surface of the rubstrip as shown in view A-A.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-08-140-003-H00

(4) On the bench, drill holes that are 0.2180 - 0.2290 inch in diameter on the new rubstrips [1] for holes in view B-B.

SUBTASK 78-31-08-140-004-H00

(5) Use a 100 degree countersink to countersink the holes in the new rubstrips [1] so that the head of the countersunk bolt is under the surface of the rubstrip as shown in view B-B.

SUBTASK 78-31-08-320-005-H00

(6) Hold rub strips [2] (qty 2) on the translating sleeve [4] (view C):

(a) Use the existing adhesive fillet on the translating sleeve [4] as the template.

(b) Make the centered mark on the new rub strips [2].

SUBTASK 78-31-08-320-006-H00

(7) On the bench, drill holes that are 0.1900 - 0.1930 inch in diameter on the new rub strips [2] for holes at both ends of the rub strips [2] (view C).

SUBTASK 78-31-08-320-007-H00

(8) Use a 100 degree countersink to countersink the holes in the rub strips [2] so that the head of the countersunk bolt is under the surface of the rub strip as shown in view A-A.

NOTE: Do not countersink holes that are shown in view C-C.

SUBTASK 78-31-08-160-002-H00

(9) Remove any existing adhesive build-up including the fillet seal (ref SOPM 20-30-03).

NOTE: A thin layer of adhesive is permissible. Make sure not to damage the translating sleeve composite material when removing the adhesive.

SUBTASK 78-31-08-160-003-H00

(10) Use aliphatic naphtha, B50078 to remove all unwanted materials (ref SOPM 20-30-03).

G. Rubstrip Installation

SUBTASK 78-31-08-420-004-H00

(1) Apply adhesive, A50327 to the rub strips and the surface of translating sleeve where it will touch with the rub strips (ref SOPM 20–50–12).

SUBTASK 78-31-08-420-005-H00

(2) Do these steps to install the rub strips [1] (view A-A and view B-B):

(a) Bond the rubstrips [1] (qty 8) to the translating sleeve.

(b) Install new bolts [5] (qty 8) and new bolts [9] (qty 8).

(c) Install the fillers [6] (qty 8) (view A-A).

(d) Install the new washers [7] (qty 16).

(e) Tighten the new nuts [8] (qty 16) with the torque of 10-12 inch-lbs.

SUBTASK 78-31-08-420-006-H00

(3) Do these steps to install the rub strips [2] (view A-A and view C-C):

(a) Bond the rub strips [2] (qty 2) to the translating sleeve.

(b) Install new bolts [5] (qty 2) and new bolts [10] (qty 2).

(c) Install the fillers [6] (qty 2) (view A-A).

(d) Install the new washers [7] (qty 2) (view A-A).

(e) Tighten the new nuts [8] (qty 2) with a torque of 10-12 inch-lbs (view A-A).

(f) Tighten the new nut assy [11] (qty 2) with a torque of 10-12 inch-lbs (view C-C).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-08-410-002-H00

(1) For the left engine:

(2) Close these access panels:

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine

SUBTASK 78-31-08-410-003-H00

(3) For the right engine:

(4) Close these access panels:

Number	Name/Location
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

SUBTASK 78-31-08-860-007-H00

(5) Do one of these tasks:

(a) Thrust Reverser Operation - Retract (Selection), TASK 78-31-00-860-818-H00

(b) Thrust Reverser Sleeve Installation, TASK 78-31-10-400-801-H01

SUBTASK 78-31-08-860-008-H00

(6) Leading Edge Slat Reactivation, TASK 27-81-00-440-801

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER PRESSURE SEALS, MISCELLANEOUS SEALS AND BUMPERS - REMOVAL/ INSTALLATION

1. General

A. This procedure has two tasks:

(1) The first task removes the pressure seals from the lower bifurcation of the thrust reverser.

(2) The second task installs the pressure seals on the lower bifurcation of the thrust reverser. This task also gives replacement instructions for seals and bumpers that are bonded to the thrust reverser.

TASK 78-31-09-000-801-H01

2. Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers Removal

(Figure 401)

A. General

(1) This task removes the pressure seals, miscellaneous seals and bumpers from the thrust reverser lower bifurcation.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-552	Knife - Utility
STD-764	Scraper - Non-metallic

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Prepare for the Procedure

SUBTASK 78-31-09-010-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Procedure

SUBTASK 78-31-09-020-001-H01

(1) Remove the bulb-type pressure seal [21] (Figure 401).

(a) Carefully cut the sealant between the thermal insulation blanket and the seal bracket with a utility knife, STD-552 or non-metallic scraper, STD-764 to prevent damage to the structure.

(b) Remove the six bolts [22] and nuts [23].

(c) Remove the bracket [24] and the seal [21].

SUBTASK 78-31-09-020-002-H01

(2) Remove the forward internal seal [38] on the latch beam fairing.

(a) Remove the five screws [40].

(b) Remove the retainer [41], channel [39] and the seal [38].

1) Carefully cut the adhesive between the fairing and the seal with a utility knife, STD-552 or non-metallic scraper, STD-764 to prevent damage to the structure.

SUBTASK 78-31-09-020-003-H01

(3) Remove the bonded pressure seal [31], pressure seal [32], pressure seal [35] and the drain mast bumper [37].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Remove the adhesive fillet seal with utility knife, STD-552 or non-metallic scraper, STD-764 which does not contain abrasives to prevent damage to the structure.

(b) If the seals are to be separated, cut the seals apart.

(c) As you pull the seal from the structure, it may be necessary to scrape the adhesive behind the seal.

SUBTASK 78-31-09-020-005-H01

(4) Remove the drain mast bumper [36] at the cutout in the left and right thermal insulation blankets.

(a) Remove the adhesive fillet seal with utility knife, STD-552 or non-metallic scraper, STD-764 which does not contain abrasives to prevent damage to the thermal insulation blankets and the latch beam structure.

(b) As you pull the bumper from the structure, it may be necessary to scrape the adhesive behind the seal.

SUBTASK 78-31-09-020-004-H01

(5) Remove the molded pressure seal [33] and pressure seal [34].

(a) Carefully cut the sealant and filler between the thermal insulation blanket and the pressure seals with a utility knife, STD-552 or non-metallic scraper, STD-764 to prevent damage to the structure.

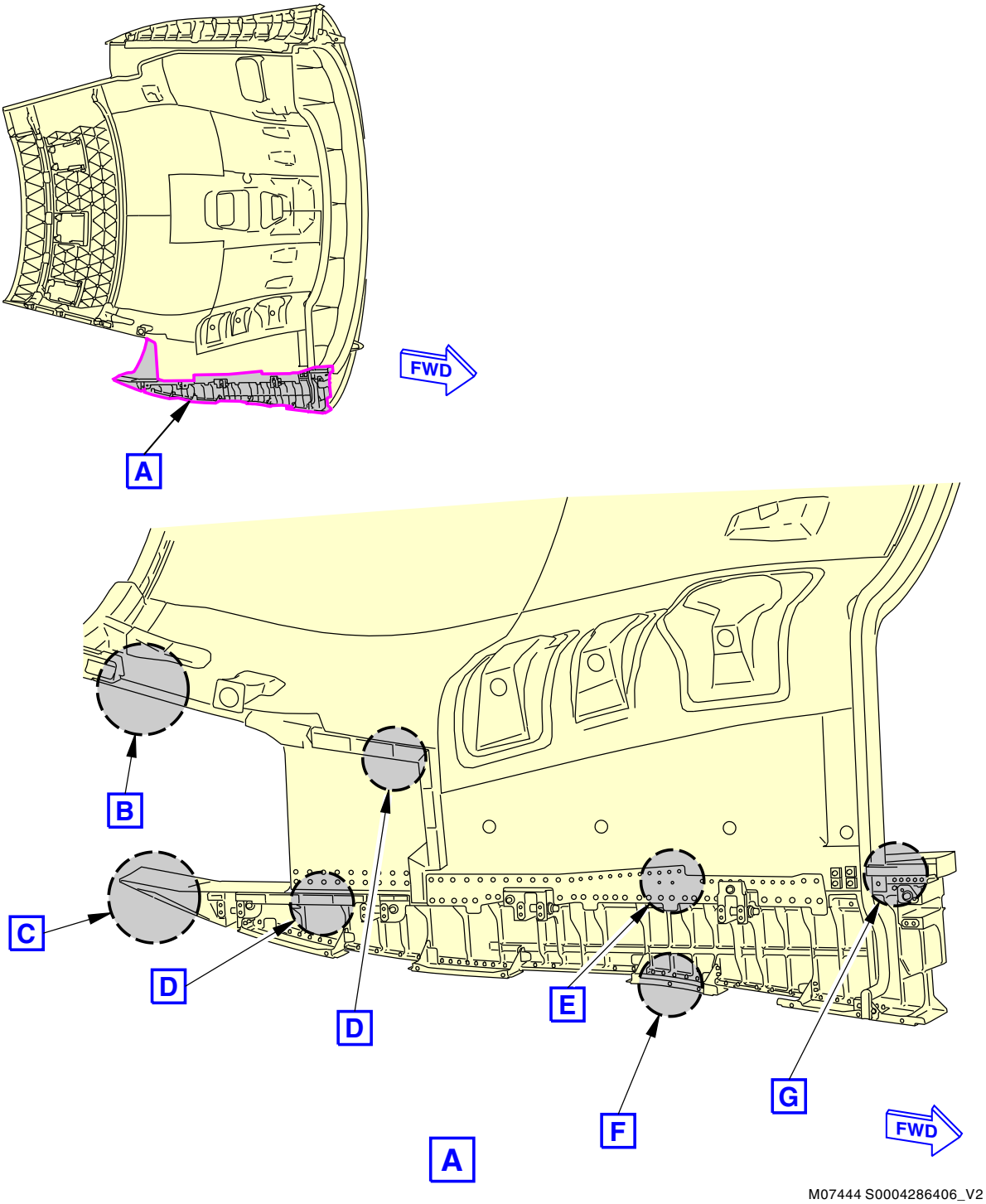
(b) Remove the adhesive fillet seal with utility knife, STD-552 or non-metallic scraper, STD-764 which does not contain abrasives to prevent damage to the structure.

(c) If the seals are to be separated, cut the seals apart.

(d) As you pull the seal from the structure, it may be necessary to scrape the adhesive behind the seal.

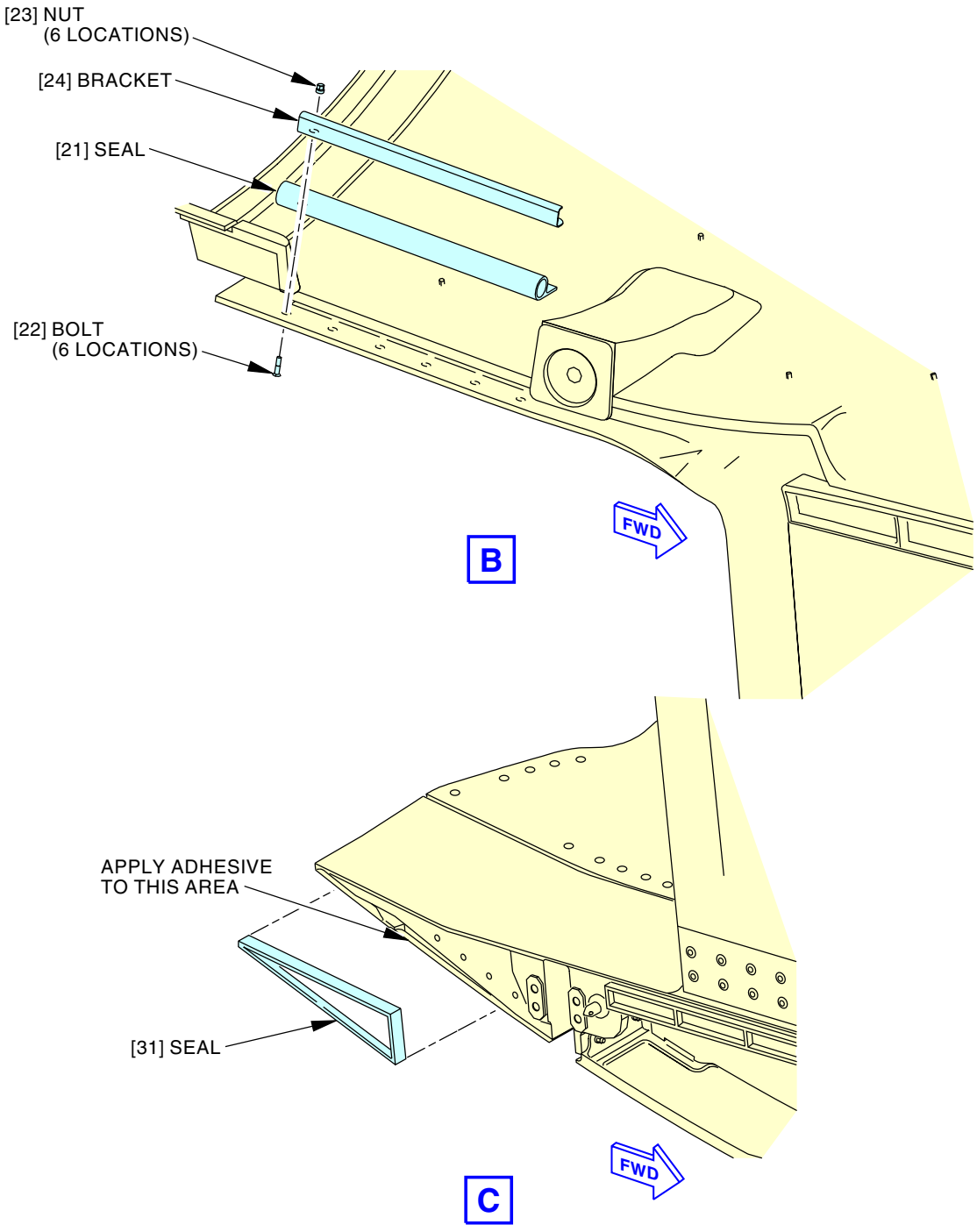
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



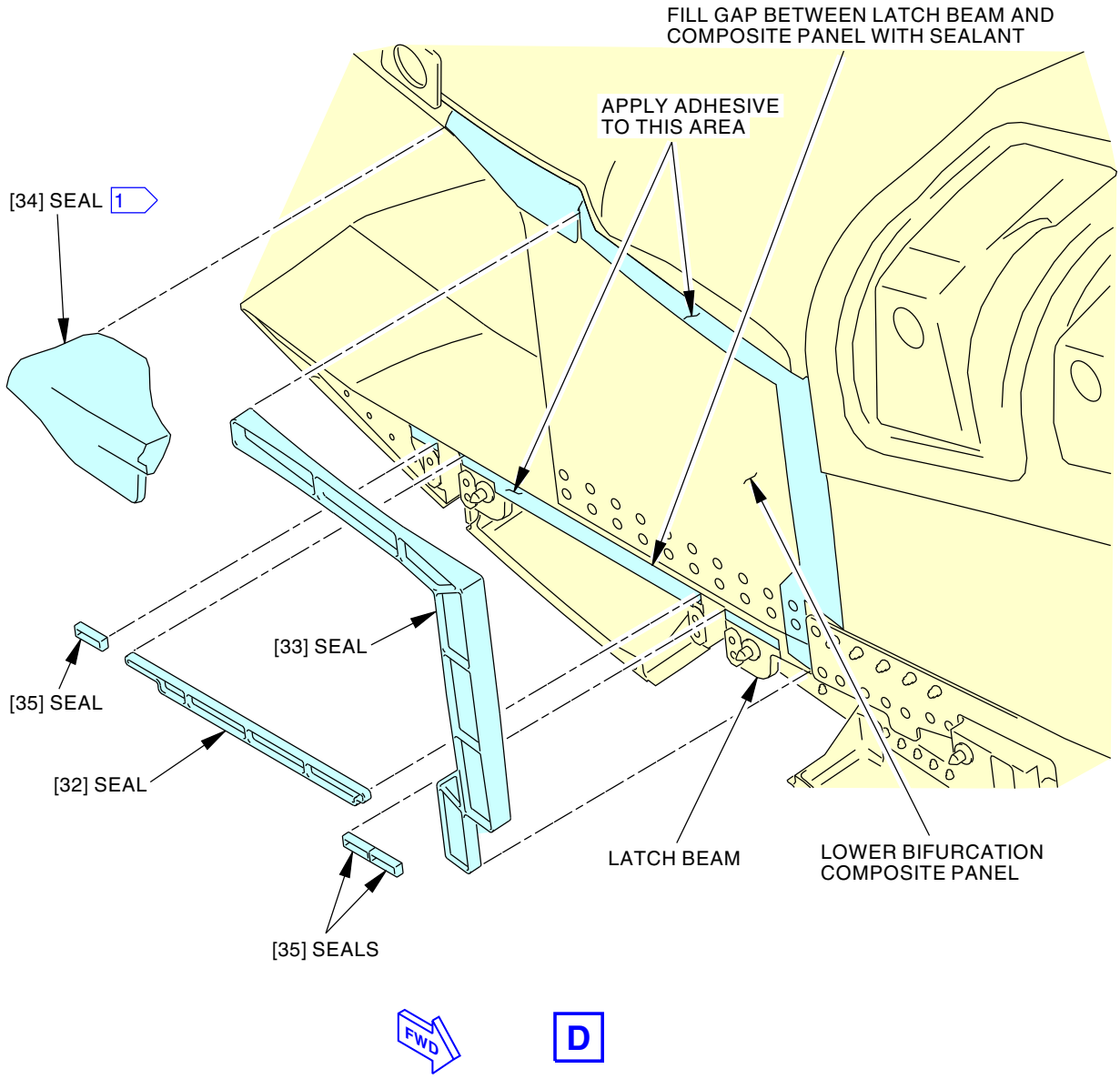
Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers
Figure 401/78-31-09-990-801-H01 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers
Figure 401/78-31-09-990-801-H01 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

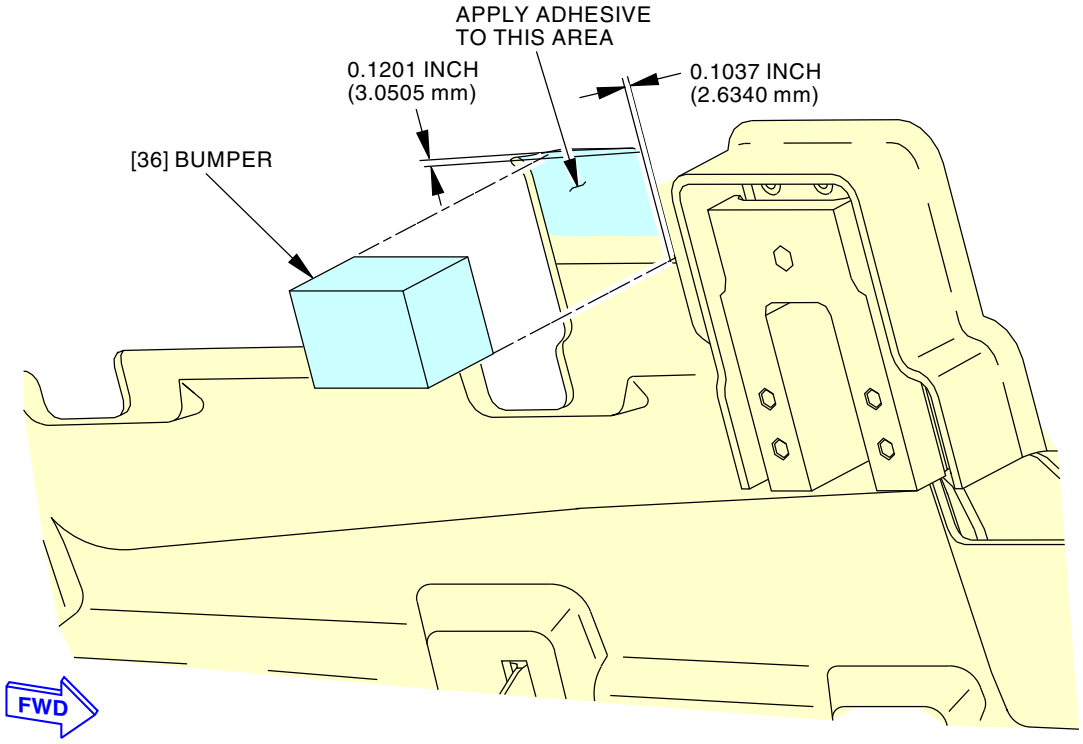


1 LEFT THRUST REVERSER SEAL IS SHOWN, RIGHT THRUST REVERSER SEAL IS OPPOSITE.

M07447 S0004286409_V2

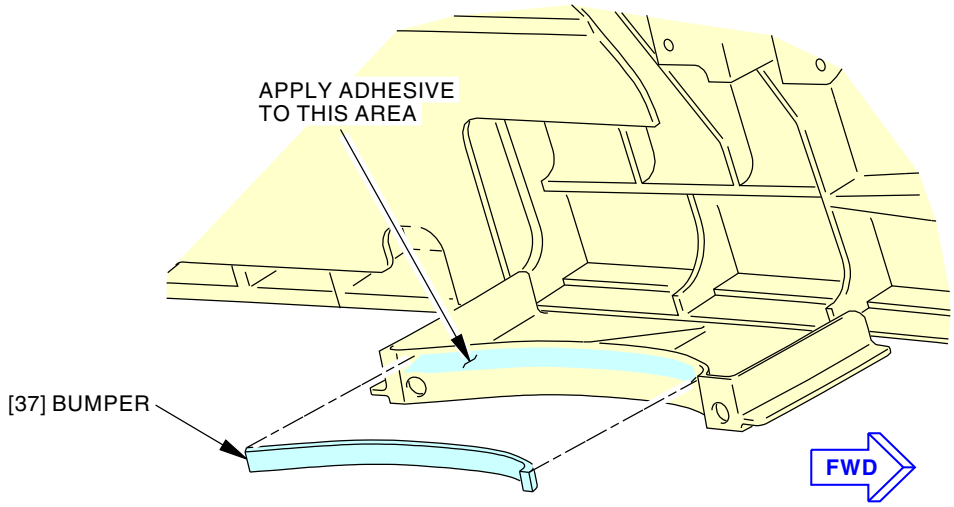
Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers
Figure 401/78-31-09-990-801-H01 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(LEFT SIDE IS SHOWN, RIGHT SIDE IS EQUIVALENT)

E



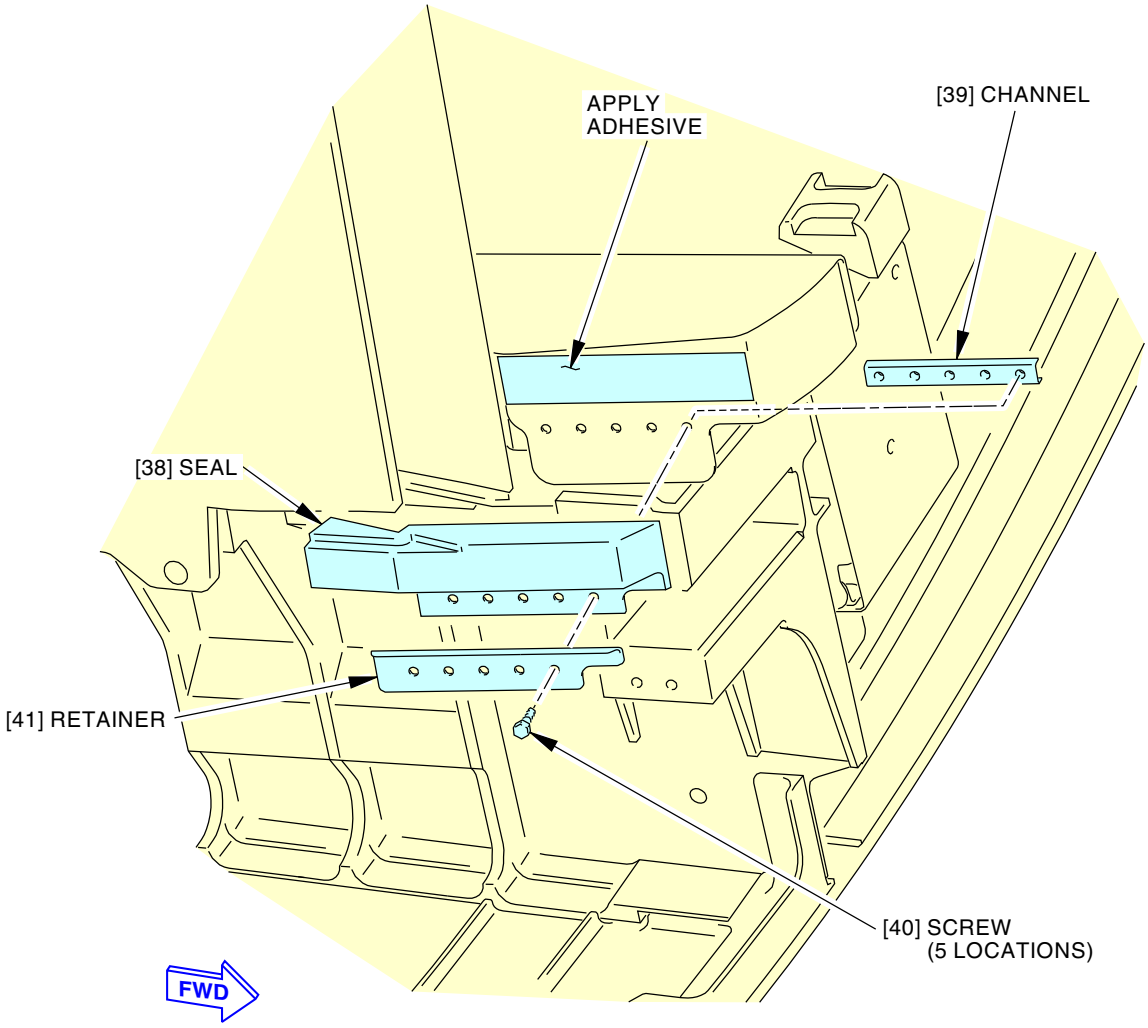
(LEFT SIDE IS SHOWN, RIGHT SIDE IS EQUIVALENT)

F

M07448 S0004286410_V3

Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers
Figure 401/78-31-09-990-801-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



G

M07449 S0004286411_V2

Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers
Figure 401/78-31-09-990-801-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-09-400-801-H01

3. Thrust Reverser Pressure Seals, Miscellaneous Seals and Bumpers Installation

(Figure 401)

A. General

(1) This task installs the pressure seals, miscellaneous seals and bumpers on the thrust reverser lower bifurcation. This task also gives replacement instructions for seals and bumpers that are bonded to the thrust reverser.

(2) The adhesive, A00335 is a two component, vulcanizing silicone rubber adhesive. Use the correct primer. Only use the primer DC1204 with adhesive DC93-076 and DC3-6999-1/2. Only use primer SS4155 with GE RTV 430.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-202	Container - Non-absorbent Glass, Metal or Polyethylene Coated Paper
STD-764	Scraper - Non-metallic
STD-809	Spatula

D. Consumable Materials

Reference	Description	Specification
A00027	Adhesive - Silicone Rubber, 1 Part, RTV	BAC5010 Type 60
A00081	Adhesive - Silicone Rubber - RTV 106	BAC5010 Type 74
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
A00335	Adhesive - Silicone Rubber, 2 Part, RTV	BAC5010 Type 68
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
B00634	Solvent - Stabilized Limonene Cleaner	BMS11-10 Type 1, 2, or 3
C00511	Primer - Adhesion	BAC5010 Type 68
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G50088	Seal - Closed Cell Silicone Foam Rubber, Hydraulic Fluid Resistant (Non-Adhesive)	BMS1-68 Grade A Form II

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Procedure

SUBTASK 78-31-09-420-001-H01

(1) Install the bulb-type pressure seal [21] (Figure 401).

NOTE: Pressure seal [21] is only installed on the left thrust reverser.

(a) Position the bracket [24] and the seal [21].

(b) Install the six bolts [22] and nuts [23].

1) Tighten the nuts to 10-15 inch-pounds (1.1-1.7 newton-meters).

(c) Apply a fillet seal with sealant/RTV 106 adhesive, A00081 and fill the gaps with closed cell, silicone foam rubber seal, G50088 between the bracket of the pressure seal [21] and the lower bifurcation thermal insulation blankets.

1) To apply the sealant and filler, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-09-420-002-H01

(2) Install the molded pressure seal [31], pressure seal [32] and pressure seal [35] on the latch beam.

NOTE: Pressure seal [31], seal [32] and seal [35] are only installed on the left thrust reverser.

(a) Clean the structure surface before you bond the seals.

1) Remove remaining adhesive with a non-metallic scraper, STD-764.

2) Wipe or scrub the structure with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.

3) Wipe the structure with solvent, B00148 or Limonene solvent, B00634 on a clean cotton wiper, G00034.

a) Wipe the surface dry with a clean cotton wiper, G00034 before the solvent becomes dry.

b) Continue to clean the surface with a clean cloth and solvent until no contamination is seen on the cloth.

(b) Apply a thin, continuous layer of primer, C00511 to the surface of the structure for adhesion.

NOTE: Only use primer DC1204 with adhesive DC93-076 and DC3-6999-1/2. Only use primer SS4155 with GE RTV 430.

1) Let the primer dry for a minimum of 60 minutes.

(c) Prepare the adhesive, A00335 to make a smooth mixture of uniform consistency and color that is free of lumps and entrapped air.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Select the correct catalyst for the applicable pot life.
2) Use a clean and dry, non-absorbent container, STD-202 to mix the adhesive.
3) Thoroughly blend the two components to this ratio; 10 parts by weight of catalyst to 100 parts by weight of base compound.
   a) Remove the surface crust from the catalyst which forms if exposed to moisture.
   b) Manually mix the components for 2-5 minutes.

(d) Bond the seal to the thrust reverser structure.
1) Apply a continuous and uniform layer of adhesive to the surface and the seal with a spatula, STD-809 or similar tool.
2) Apply and work a sufficient amount of adhesive into the composite surface until the opposite composite surface is completely wetted.
3) Install the seal to the surface with sufficient pressure to force out the air.
4) Let the adhesive cure in-service.

NOTE: Adhesive DC93-076 and GE RTV 430 will cure in 24 hours at temperatures of 60-80 degrees F (16-27 degrees C). Adhesive DC3-6999-1/2 will cure in 8 hours at temperatures of 60-80 degrees F (16-27 degrees C).

(e) Apply a fillet seal with adhesive, A00335 between the upper edge of the installed pressure seal [31] and the lower latch beam for the entire length of the seal.

(f) Apply a fillet seal with adhesive, A00335 between the upper edge of the installed pressure seal [32] and the lower latch beam for the entire length of the seal.

(g) Fill the gap between the bottom edge of the lower bifurcation composite panel and the lower latch beam with adhesive, A00335.

(h) Apply a fillet seal with adhesive, A00335 between the upper edge of the installed pressure seal [35] and the lower latch beam for the entire length of the seal.

SUBTASK 78-31-09-420-007-H01

(3) Install the drain mast bumper [36] on the latch beams.

NOTE: The bumper [36] is installed on the left and right thrust reverser. These rectangular rubber bumpers prevent the drain mast contact with the thrust reverser structure and dampen vibration to the drain mast.

(a) Clean the structure surface before you bond the seals.
1) Remove remaining adhesive with a non-metallic scraper, STD-764.
2) Wipe or scrub the structure with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.
3) Wipe the structure with solvent, B00148 or Limonene solvent, B00634 on a clean cotton wiper, G00034.
   a) Wipe the surface dry with a clean cotton wiper, G00034 before the solvent becomes dry.
   b) Continue to clean the surface with a clean cloth and solvent until no contamination is seen on the cloth.

(b) Apply a thin, continuous layer of primer, C00511 to the surface of the structure for adhesion.

NOTE: Only use primer DC1204 with adhesive DC93-076 and DC3-6999-1/2. Only use primer SS4155 with GE RTV 430.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Let the primer dry for a minimum of 60 minutes.

(c) Prepare the adhesive, A00335 to make a smooth mixture of uniform consistency and color that is free of lumps and entrapped air.

1) Select the correct catalyst for the applicable pot life.

2) Use a clean and dry, non-absorbent container, STD-202 to mix the adhesive.

3) Thoroughly blend the two components to this ratio; 10 parts by weight of catalyst to 100 parts by weight of base compound.

a) Remove the surface crust from the catalyst which forms if exposed to moisture.

b) Manually mix the components for 2-5 minutes.

(d) Bond the bumper to the thrust reverser structure.

1) Apply a continuous and uniform layer of adhesive to the surface and the bumper with a spatula, STD-809 or similar tool.

2) Put the bumper in position in the cutout with 0.1201 inch (3.0505 millimeters) on the upper edge of the bumper and 0.1037 inch (2.6340 millimeters) on the side of the bumper.

3) Install the bumper to the surface with sufficient pressure to force out the air.

4) Let the adhesive cure in-service.

NOTE: Adhesive DC93-076 and GE RTV 430 will cure in 24 hours at temperatures of 60-80 degrees F (16-27 degrees C). Adhesive DC3-6999-1/2 will cure in 8 hours at temperatures of 60-80 degrees F (16-27 degrees C).

(e) Apply a fillet seal with fire wall sealant, A00160 between the installed bumper [36]; apply the sealant around the edge of the thermal insulation blanket cutout and the bumper.

1) Refer to this task to apply the fillet seal: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-09-420-006-H01

(4) Install the molded pressure seal [33] and pressure seal [34] on the thrust reverser lower bifurcation.

NOTE: Pressure seal [33] is only installed on the left thrust reverser. Pressure seal [34] is installed on the left and right thrust reverser; the seal on the left thrust reverser interlocks with the seal on the right thrust reverser.

(a) Clean the structure surface before you bond the seals.

1) Remove remaining adhesive with a non-metallic scraper, STD-764.

2) Wipe or scrub the structure with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.

3) Wipe the structure with solvent, B00148 or Limonene solvent, B00634 on a clean cotton wiper, G00034.

a) Wipe the surface dry with a clean cotton wiper, G00034 before the solvent becomes dry.

b) Continue to clean the surface with a clean cloth and solvent until no contamination is seen on the cloth.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Apply a thin, continuous layer of primer, C00511 to the surface of the structure for adhesion.

NOTE: Only use primer DC1204 with adhesive DC93-076 and DC3-6999-1/2. Only use primer SS4155 with GE RTV 430.

1) Let the primer dry for a minimum of 60 minutes.

(c) Prepare the adhesive, A00335 to make a smooth mixture of uniform consistency and color that is free of lumps and entrapped air.

1) Select the correct catalyst for the applicable pot life.

2) Use a clean and dry, non-absorbent container, STD-202 to mix the adhesive.

3) Thoroughly blend the two components to this ratio; 10 parts by weight of catalyst to 100 parts by weight of base compound.

a) Remove the surface crust from the catalyst which forms if exposed to moisture.

b) Manually mix the components for 2-5 minutes.

(d) Bond the seal to the thrust reverser structure.

1) Apply a continuous and uniform layer of adhesive to the surface and the seal with a spatula, STD-809 or similar tool.

2) Apply and work a sufficient amount of adhesive into the composite surface until the opposite composite surface is completely wetted.

3) Install the seal to the surface with sufficient pressure to force out the air.

4) Let the adhesive cure in-service.

NOTE: Adhesive DC93-076 and GE RTV 430 will cure in 24 hours at temperatures of 60-80 degrees F (16-27 degrees C). Adhesive DC3-6999-1/2 will cure in 8 hours at temperatures of 60-80 degrees F (16-27 degrees C).

(e) Apply a fillet seal with adhesive, A00335 between the upper edge of the installed pressure seal [33] and the lower bifurcation composite panel for the entire upper length of the seal.

(f) Apply a fillet seal with adhesive, A00335 between the upper edge of the installed pressure seal [34] and the lower bifurcation composite panel for the entire length of the seal.

(g) Apply a fillet seal with sealant/RTV 106 adhesive, A00081 and fill the gaps with closed cell, silicone foam rubber seal, G50088 between the pressure seal [33] and pressure seal [34] and the lower bifurcation thermal insulation blankets.

1) To apply the sealant and filler, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-09-420-004-H01

(5) Install the bonded drain mast bumper [37].

NOTE: These foam rubber bumpers prevent the drain mast contact with the thrust reverser structure and dampen vibration to the drain mast.

(a) Clean the structure surface before you bond the seal.

1) Remove remaining adhesive with a non-metallic scraper, STD-764.

2) Wipe or scrub the structure with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Wipe the structure with solvent, B00148 or Limonene solvent, B00634 on a clean cotton wiper, G00034.
   a) Wipe the surface dry with a clean cotton wiper, G00034 before the solvent becomes dry.
   b) Continue to clean the surface with a clean cloth and solvent until no contamination is seen on the cloth.

(b) Apply a continuous layer of adhesive, A00027 to the surface and the seal.

(c) Immediately install the seal to the surface.

NOTE: The adhesive will form a skin that interferes with adhesion when exposed to the air for more than a few minutes.

1) Apply firm pressure but do not squeeze-out the adhesive.

2) The adhesive can cure under contact pressure in 24 hours at 65-100 degrees F (18-38 degrees C).

NOTE: This material releases acetic acid as it cures. The smell of acetic acid will go away when the material is fully cured. This material cures because it reacts with the moisture in the air. Do not cover this material. A minimum of 20 percent relative humidity is required.

SUBTASK 78-31-09-420-005-H01

(6) Install the forward internal seal [38] on the latch beam fairing.

(a) Clean the structure surface before you install the seal.

1) Remove remaining adhesive with a non-metallic scraper, STD-764.

2) Wipe or scrub the structure with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid or oil.

3) Wipe the structure with solvent, B00148 or Limonene solvent, B00634 on a clean cotton wiper, G00034.
   a) Wipe the surface dry with a clean cotton wiper, G00034 before the solvent becomes dry.
   b) Continue to clean the surface with a clean cloth and solvent until no contamination is seen on the cloth.

(b) Position the channel [39] and retainer [41] and the seal [38].

(c) Install the five screws [40] through the retainer [41] and seal [38] into the channel [39].

1) Equally tighten the screws until the seal flange is uniformly compressed to a thickness of 0.06 inch (1.5 millimeters) or approximately two-thirds of the original flange thickness.

(d) Apply adhesive, A00027 to the interface between the fairing and the seal.

NOTE: The adhesive will form a skin that interferes with adhesion when exposed to the air for more than a few minutes. This material releases acetic acid as it cures. The smell of acetic acid will go away when the material is fully cured. This material cures because it reacts with the moisture in the air. Do not cover this material. A minimum of 20 percent relative humidity is required.

(e) Let the adhesive cure in-service.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-09-410-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SLEEVE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser sleeve.

(2) An installation of the thrust reverser sleeve.

TASK 78-31-10-000-801-H01

2. Thrust Reverser Sleeve Removal

(Figure 401, Figure 402, and Figure 403)

A. General

(1) This task removes the thrust reverser sleeve.

(2) There are eight blocker doors on each thrust reverser sleeve. The blocker doors are the same at all eight locations. Do not alter the composite blocker doors.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-820-801-H00	Thrust Reverser Hydraulic Actuator Rod End - Adjustment (P/B 501)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
SPL-4283	Equipment - Removal, Fan Reverser Sleeve (sling only) Part #: J78015-77 Supplier: 81205
SPL-6102	Equipment - Fan Reverser Sleeve Sling Arm Attachment, GE90-115B Engine Part #: J78015-96 Supplier: 81205
STD-470	Hoist - Overhead, Capacity 10,000 Pounds
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-589	Mat - Protective Cover
STD-622	Pad - Protective

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Consumable Materials

Reference	Description	Specification
G00270	Tape - Scotch Flatback Masking 250	ASTM D6123 (Supersedes A-A-883)
G01505	Lockwire - Safety And Lock	NASM20995

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-31-10-860-001-H01

(1) Make sure the forward thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-10-860-002-H01

(2) Make sure the reverse thrust levers are in the fully forward and down position and attach DO-NOT-OPERATE tags.

SUBTASK 78-31-10-040-002-H01

(3) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-10-040-003-H01

(4) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-10-040-004-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(5) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-10-010-001-H01

(6) For the left and right fan cowl panels, do this task: Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00:

(a) Open the applicable access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-10-490-001-H01

(7) Put a protective pad, STD-622 on the leading edge of the wing at the applicable sleeve location.

NOTE: When you attach the sling assembly to the inboard sleeves, the C-beam will be above the leading edge of the wing.

SUBTASK 78-31-10-490-002-H01

(8) Position a protective cover mat, STD-589 or dunnage pad and wood pallets to support the thrust reverser sleeve after it is removed.

(a) Make sure there are enough sand bags in the dunnage pad to support the thrust reverser sleeve at all points.

NOTE: A dunnage pad is used for temporary storage of the thrust reverser sleeve during thrust reverser maintenance. A dunnage pad can be made from a layer of sand bags that are used to support the thrust reverser sleeve and prevent damage to the sleeve structure and components. The sand bags can be placed on the ground or on wood pallets. Wood pallets make it easier to move the sand bags with a fork lift truck.

SUBTASK 78-31-10-980-001-H01

CAUTION REMOVE ALL EQUIPMENT, WORK STANDS, AND OTHER OBJECTS THAT ARE AFT OF THE THRUST REVERSER. DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(9) For the applicable thrust reverser sleeve, Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-31-10-490-003-H01

WARNING DO NOT OPEN THE THRUST REVERSER TO REMOVE THE BLOCKER DOORS. YOUR WEIGHT CAN BREAK THE HOLD-OPEN RODS WHICH WILL CAUSE THE THRUST REVERSER TO CLOSE QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(WARNING PRECEDES)

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOOR AT THE TOP OF THE THRUST REVERSER. DO NOT PULL OR STAND ON THE DRAG LINK. DAMAGE TO THE EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

CAUTION MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(10) Install the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment to get access to the blocker doors.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Use boot socks over your work boots and install a protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-10-410-001-H01

(11) For the inboard sleeve on the thrust reverser, do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00:

NOTE: It is necessary to close the fan cowl panel to move the inboard thrust reverser sleeve clear of the airplane.

(a) Close the applicable access panels:

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

H. Thrust Reverser Sleeve Removal

SUBTASK 78-31-10-030-001-H01

CAUTION KEEP THE FREE ENDS OF THE DRAG LINKS AWAY FROM THE SLEEVE. THE SLEEVE CAN HIT THE DRAG LINKS WHEN YOU EXTEND THE SLEEVE. THIS CAN CAUSE DAMAGE TO THE SLEEVE AND DRAG LINK.

(1) Disconnect the drag links [1] from the blocker doors [7] (Figure 401).

NOTE: It is not necessary to remove the drag links.

(a) Remove the nut [6], washer [5], washer [8], two bushings [2], washer [4] and bolt [3].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Attach the blocker doors [7] to the sleeve in the closed position with Scotch Flatback Masking Tape 250, G00270.

NOTE: Start from the top and use tape to hold the blocker door closed. Remove the blocks from the access platform as you do each blocker door.

(c) Attach the drag links [1] to the inner wall with Scotch Flatback Masking Tape 250, G00270.

SUBTASK 78-31-10-090-001-H01

(2) Remove the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-10-860-003-H01

(3) For the inboard sleeve on the thrust reverser, manually retract the sleeve until it is no more than 3.0 inches (76.2 mm) from the fully closed position to make the sleeve removal easier.

NOTE: This will give more clearance between the sleeve and the leading edge slats and the possibility of damage is decreased. The 3.0 inch (76.2 mm) gap is necessary to give you a location to use your hands to push the sleeve rearward.

SUBTASK 78-31-10-010-002-H01

(4) Remove the applicable upper and lower access panels [27] to get access to the rod ends of the upper and lower hydraulic actuators.

(a) Remove the six bolts [26] to remove these access panels:

1) Remove the applicable access panels:

Number	Name/Location
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

SUBTASK 78-31-10-010-003-H01

(5) Remove the applicable middle access panel [30] to get access to the rod end of the hydraulic actuator.

(a) Remove the seven bolts [29] to remove these access panels:

1) Remove the applicable access panels:

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-10-030-002-H01

CAUTION: DO NOT TURN ACTUATOR ROD ENDS WHILE THEY ARE DISCONNECTED FROM THE TRANSLATING SLEEVE. THE LENGTH OF THE ACTUATOR IS CHANGED WHEN YOU TURN THE ROD END. IF YOU TURN THE ACTUATOR ROD ENDS, YOU WILL HAVE TO DO THE ACTUATOR AND TRANSLATING SLEEVE RIGGING.

(6) Disconnect the rod ends of the hydraulic actuators from the translating sleeve [28] (Figure 402).

(a) Remove the bolt [22], washer [23], bushing [24] and nut [25] which attaches the rod ends of the hydraulic actuators to the clevis [21].

(b) Make sure not to turn the actuator rod ends.

NOTE: If one or more of the thrust reverser hydraulic actuator rod ends are turned, it is possible that the actuators will not be synchronized with each other, and the RVDT and Sync Lock could be out of rig.

1) If a actuator rod end is turned, adjust the actuator (TASK 78-31-00-820-801-H00).

(c) Safety the rod ends with lockwire, G01505 to prevent movement of the rod ends.

SUBTASK 78-31-10-490-005-H01

(7) Assemble and attach the fan reverser sleeve sling and arm equipment, SPL-4283 and the arm attachment, SPL-6102 to the sleeve [28] (Figure 403).

(a) Attach the upper and middle pads to the applicable actuator access panel locations.

NOTE: The screws and washers to attach the pads are stored on the upper and middle pads. The part numbers for these fasteners are stenciled on the pads. The pads are always installed first before the strong back and lower arm.

1) The clevis slots in the pads should align in the vertical direction.

2) Install the upper pad with six screws and washers.

3) Install the middle pad with seven screws and washers.

(b) Make sure the forward flange on the lower arm is in the correct orientation to engage the deactivation pin hole in the thrust reverser sleeve.

NOTE: The lower arm is part of the lower strongback segment.

1) If the forward flange is not oriented correctly, do these steps:

a) Remove the pin and four screws to remove the clamp plate.

b) Turn the lower arm around in the strongback.

c) Install the four screws into the clamp plate.

d) Install the pin through the clamp plate to lock the lower arm.

(c) Assemble the two strongback segments together with two pins and two lynch pins.

(d) Position the overhead crane/10,000 lb capacity overhead hoist, STD-470 or equivalent equipment above the applicable thrust reverser sleeve.

NOTE: The hook height of the overhead crane/hoist for the inboard sleeve is 27 feet (8.2 meters) maximum. The hook height for the outboard sleeve is 23 feet (7.0 meters) maximum. The overhead crane/hoist or equivalent equipment is a customer furnished item.

(e) Attach the triangular plate to the overhead crane/hoist.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Attach two 2500 pound hoist or an equivalent hoists to the triangular plate.

NOTE: These hoists are a customer furnished item. Two hoists are required. Each hoist must have a capacity of 2500 pounds (1134 kilograms).

(g) For the inboard sleeve on the thrust reverser, do these steps:

1) Attach the C-beam to the 2500 pound hoist or equivalent hoist and move into position with the strongback.

2) Attach the strongback to the C-beam.

a) Insert the C-beam trunnion into the trunnion fitting on the strongback.

b) Install the trunnion retainer and lynch pin on the trunnion.

3) Move the C-beam and strongback in position and install the pins through the arm flanges and pad clevises.

(h) For the outboard sleeve on the thrust reverser, do these steps:

1) Install the clevis on the strongback fitting with the clevis pin and lynch pin.

2) Use the 2500 pound hoist or equivalent hoist to lift the strongback with the clevis.

3) Move the strongback in position to install the pins through the arm flanges and pad clevises.

(i) Install the pins through the arm flanges and pad clevises.

1) Install the two lynch pins through the pins.

(j) Install the deactivation pin from inside the sleeve with the one washer through the forward flange of the lower arm.

1) Install the washer and star wheel and tighten.

SUBTASK 78-31-10-020-001-H01

CAUTION BEFORE YOU REMOVE THE THRUST REVERSER SLEEVE, MAKE SURE THAT THE GROUND SUPPORT EQUIPMENT FULLY HOLDS ITS WEIGHT. THE THRUST REVERSER SLEEVE WEIGHS 404 POUNDS (183.3 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION MAKE SURE THAT THE TOP AND BOTTOM OF THE SLEEVE MOVE TOGETHER WHEN YOU MOVE THE SLEEVE ALONG THE TRACKS. IF THE TOP AND BOTTOM DO NOT MOVE TOGETHER, YOU CAN CAUSE DAMAGE TO EQUIPMENT.

CAUTION MOVE THE INBOARD SLEEVE REARWARD CAREFULLY. THE C-BEAM OF THE SLING CAN HIT THE WING, AND CAUSE DAMAGE TO THE EQUIPMENT OR AIRPLANE.

(8) Remove the sleeve [28]:

(a) With the weight of the sleeve [28] on the hoist, move the sleeve [28] aft from the tracks of the thrust reverser.

(b) After the sleeve [28] is clear from the airplane, attach the opposite hoist to the D-ring.

(c) Operate the hoist to lift the D-ring and turn the sleeve 90 degrees to the turtleback position.

(d) Position and lower the thrust reverser sleeve [28] on to wood pallets or a dunnage pad.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-10-090-002-H01

(9) Remove the fan reverser sleeve sling and arm equipment, SPL-4283 and the arm attachment, SPL-6102 from the sleeve [28] and put it in the storage box (Figure 403):

(a) Remove the deactivation pin, two washers and the star wheel.

(b) Remove the pins that attach the strongback arms to the middle and upper pads on the thrust reverser sleeve.

(c) Slowly move the sling away from the sleeve and lay it on the ground.

(d) For the inboard sleeve on the thrust reverser, remove the trunnion retainer and lynch pin to disconnect the strongback trunnion fitting from the C-beam.

(e) For the outboard sleeve on the thrust reverser, remove the clevis, clevis pin and lynch pin from the strongback.

(f) Remove the 2500 pound hoist or an equivalent hoists from the triangular plate.

(g) Remove the triangular plate from the overhead crane/hoist.

(h) Disassemble the strongback into two segments.

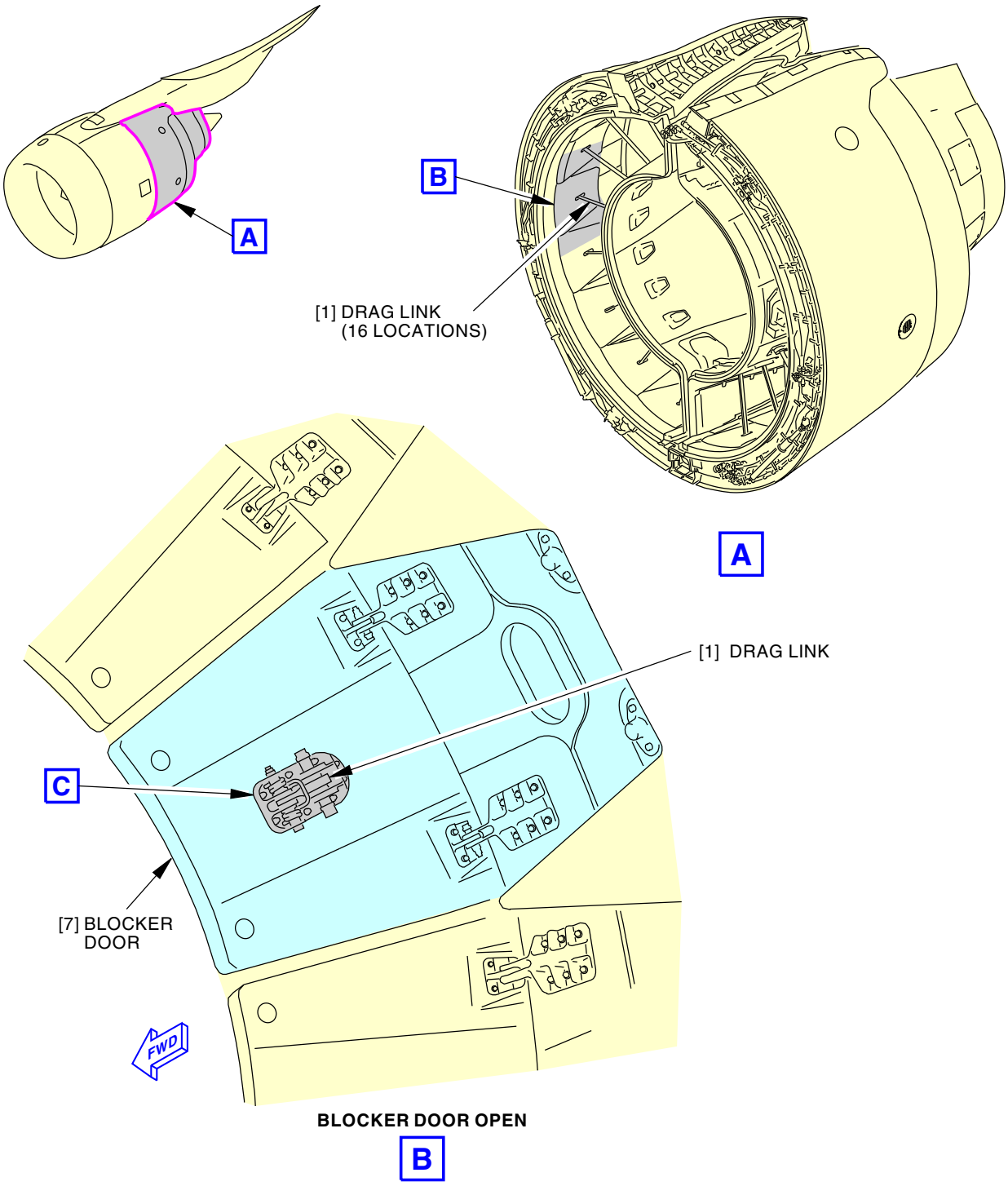
1) Stow the pins which attach the strongback segments together on the tool.

(i) Remove the upper and middle pads from the thrust reverser sleeve.

1) Stow the bolts and washers in the holes on the pads.

——— END OF TASK ———

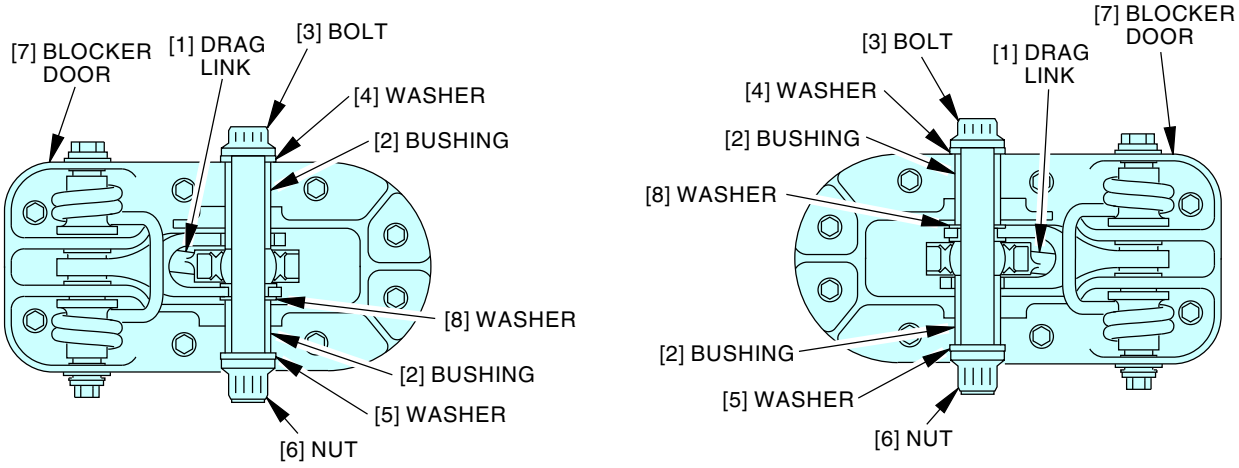
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07450 S0004286412_V2

Thrust Reverser Blocker Door Drag Links Installation
Figure 401/78-31-10-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(RIGHT SIDE)

C

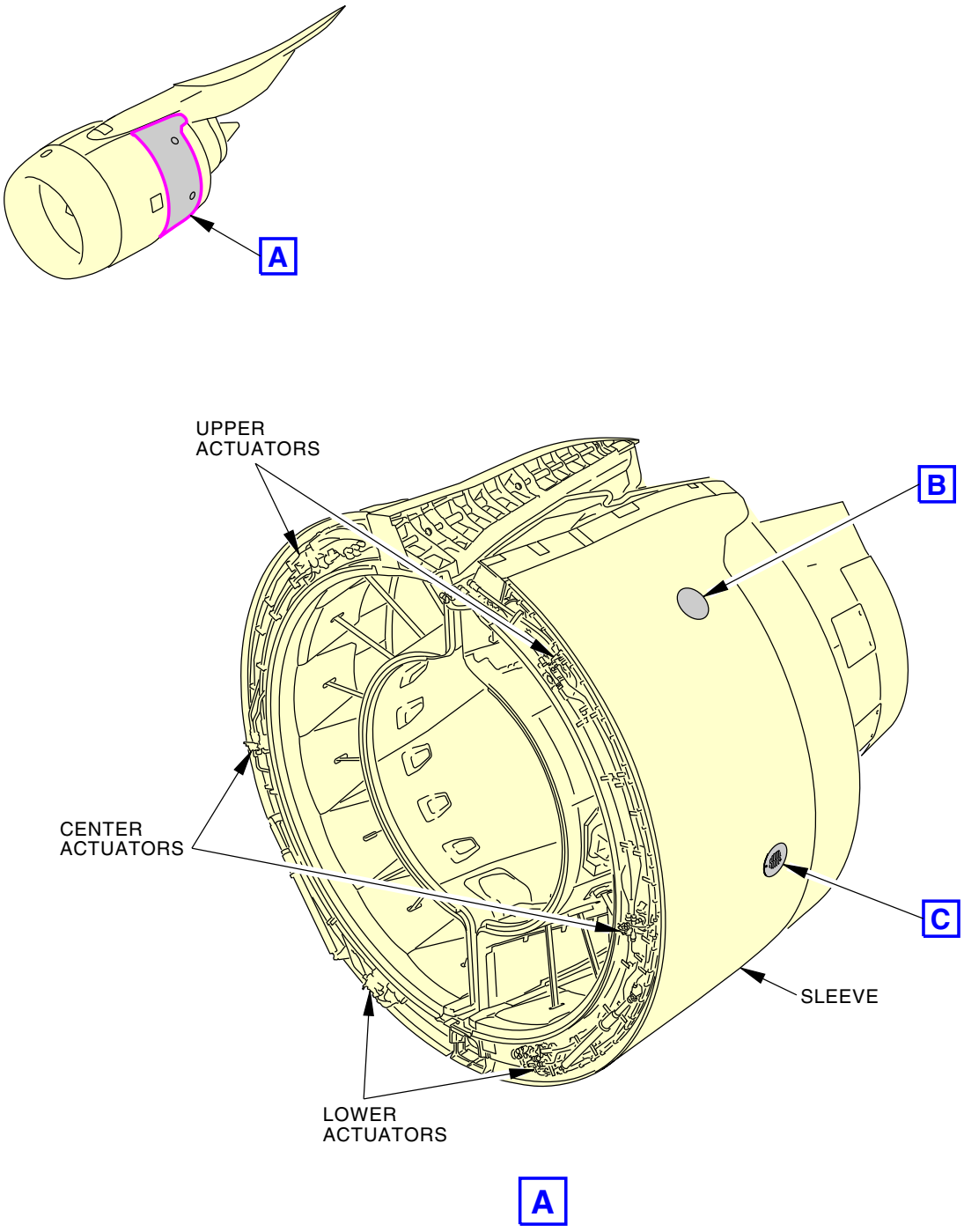
(LEFT SIDE)

C

2540603 S0000600350_V1

Thrust Reverser Blocker Door Drag Links Installation
Figure 401/78-31-10-990-801-H01 (Sheet 2 of 2)

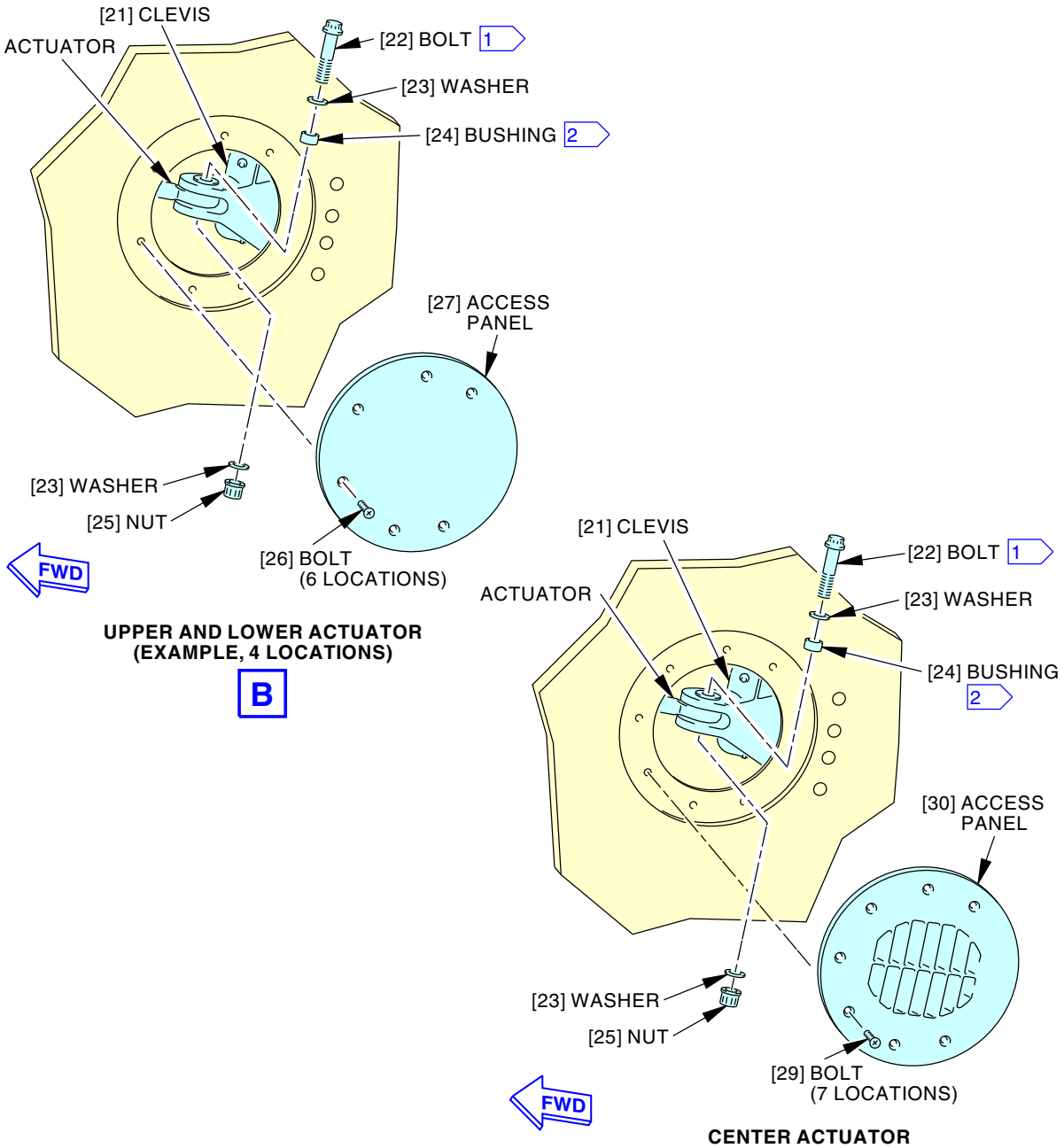
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07452 S0004286414_V2

Thrust Reverser Hydraulic Actuator Rodend Installation
Figure 402/78-31-10-990-802-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



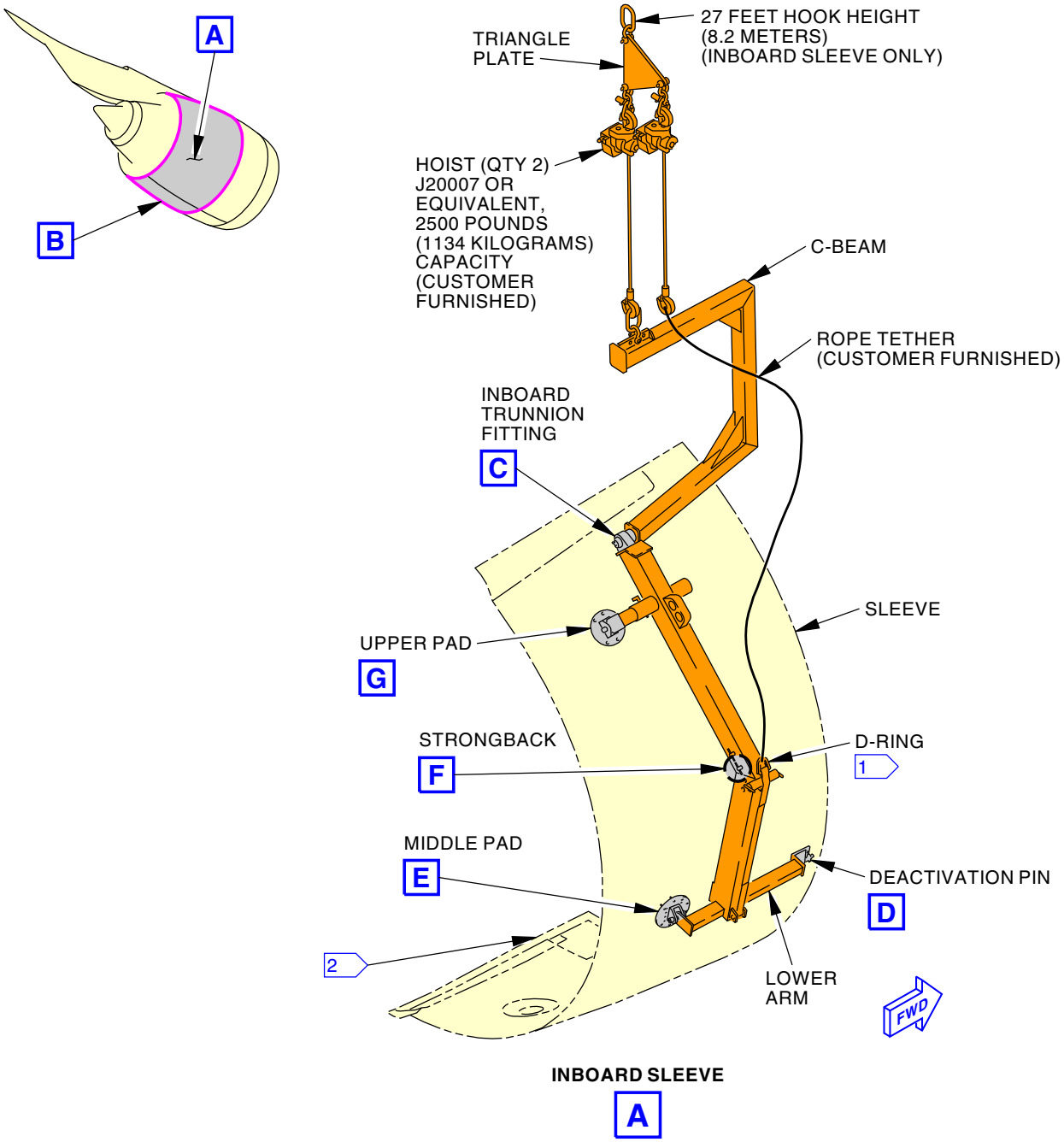
1 INSTALL THE BOLT ON THE TOP SIDE OF FITTING.

2 LEFT THRUST REVERSER SHOWN. ON THE RIGHT THRUST REVERSER, INSTALL THE BUSHING FROM THE BOTTOM SIDE.

N28359 S0000104271_V3

Thrust Reverser Hydraulic Actuator Rodend Installation
Figure 402/78-31-10-990-802-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



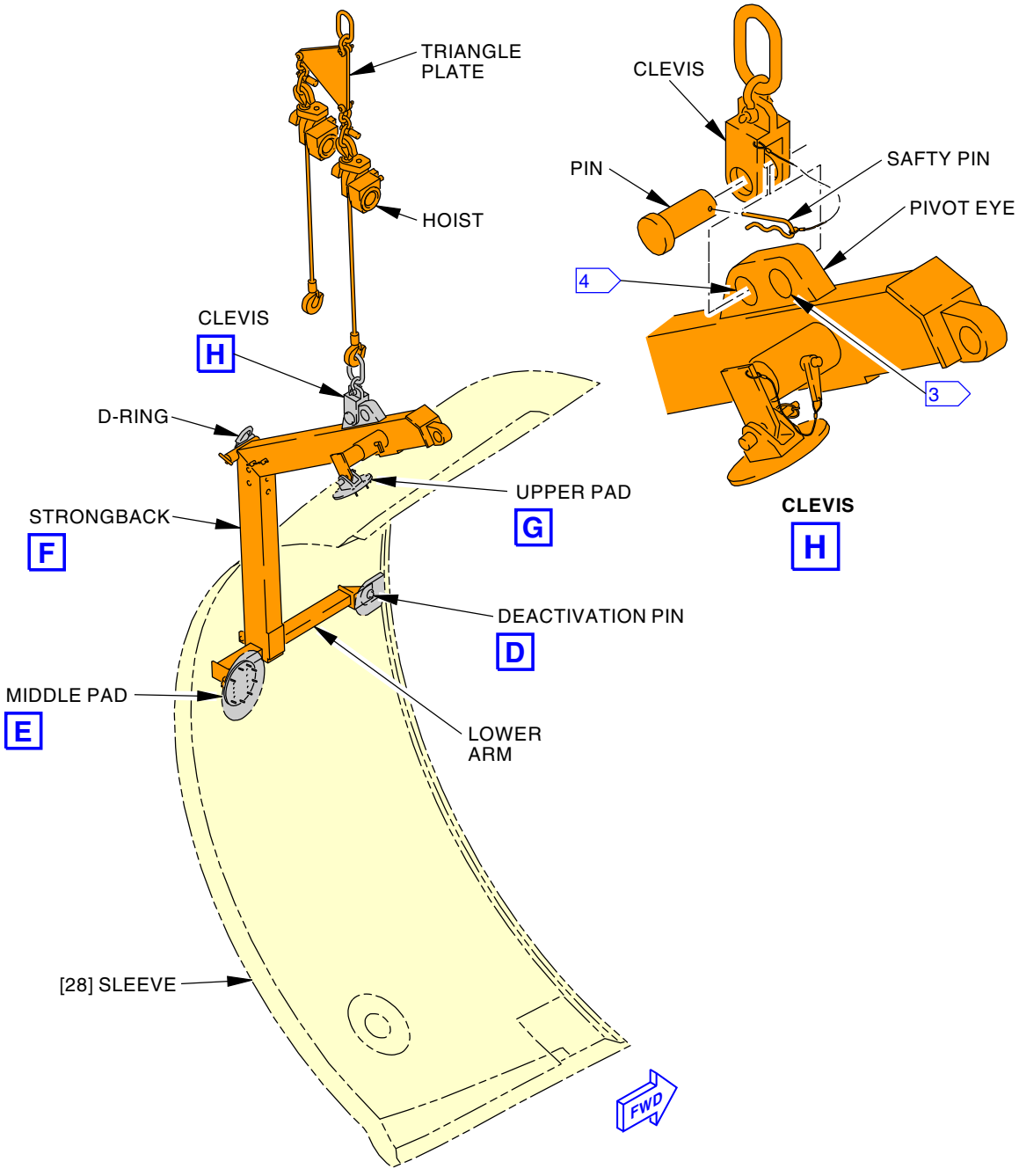
1 D-RING NOT ATTACHED TO ROPE TETHER/HOIST WHEN SLING IS USED NEAR WING LEADING EDGE.

2 LOWER EDGE OF INBOARD SLEEVE TURNS OUTBOARD 9.0 INCHES (228.6 mm) WHEN REMOVED FROM TRACK.

M07453 S0004286415_V3

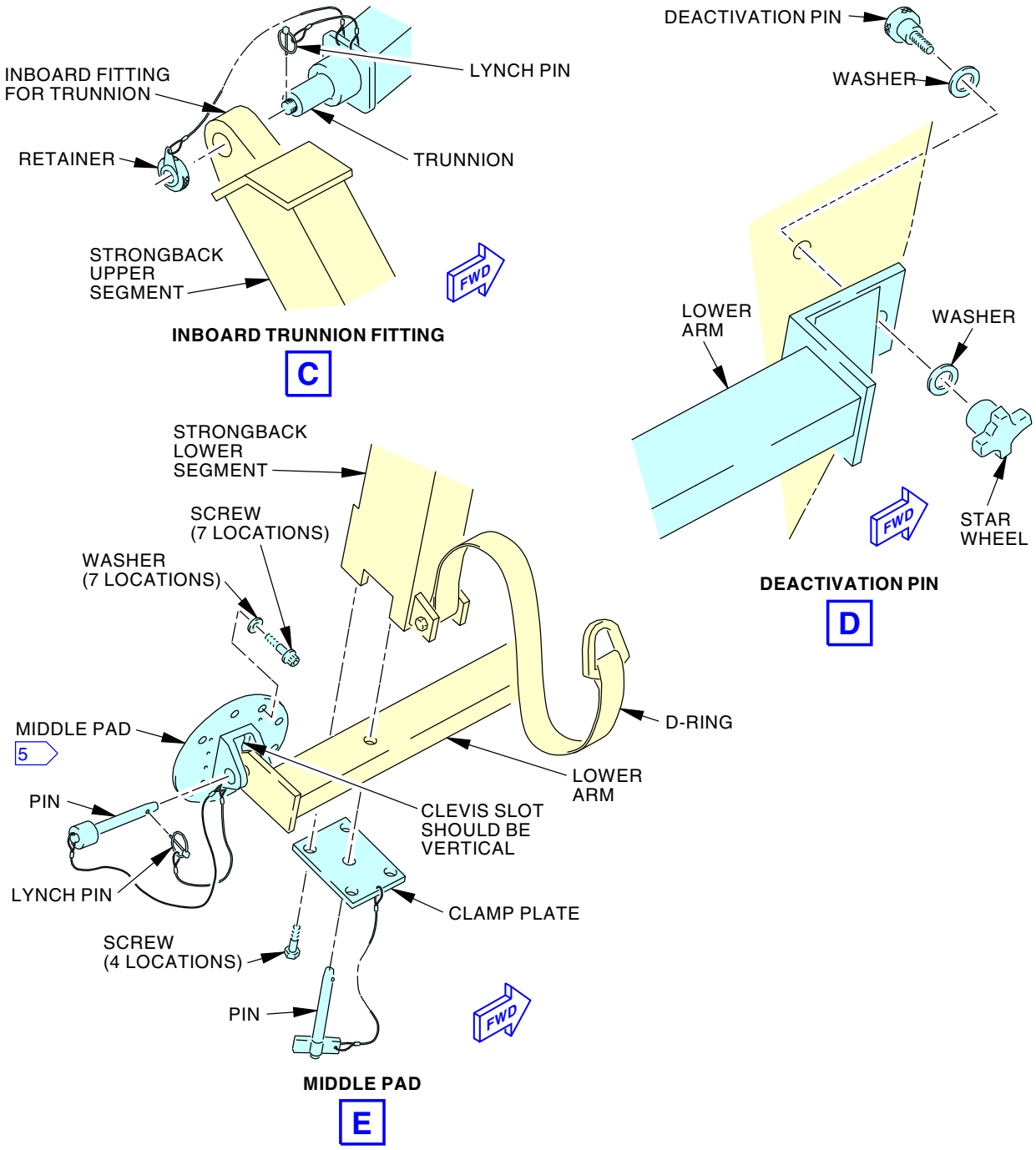
Thrust Reverser Sleeve Installation - Sling J78015-77/-96
Figure 403/78-31-10-990-803-H01 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sleeve Installation - Sling J78015-77/-96
Figure 403/78-31-10-990-803-H01 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

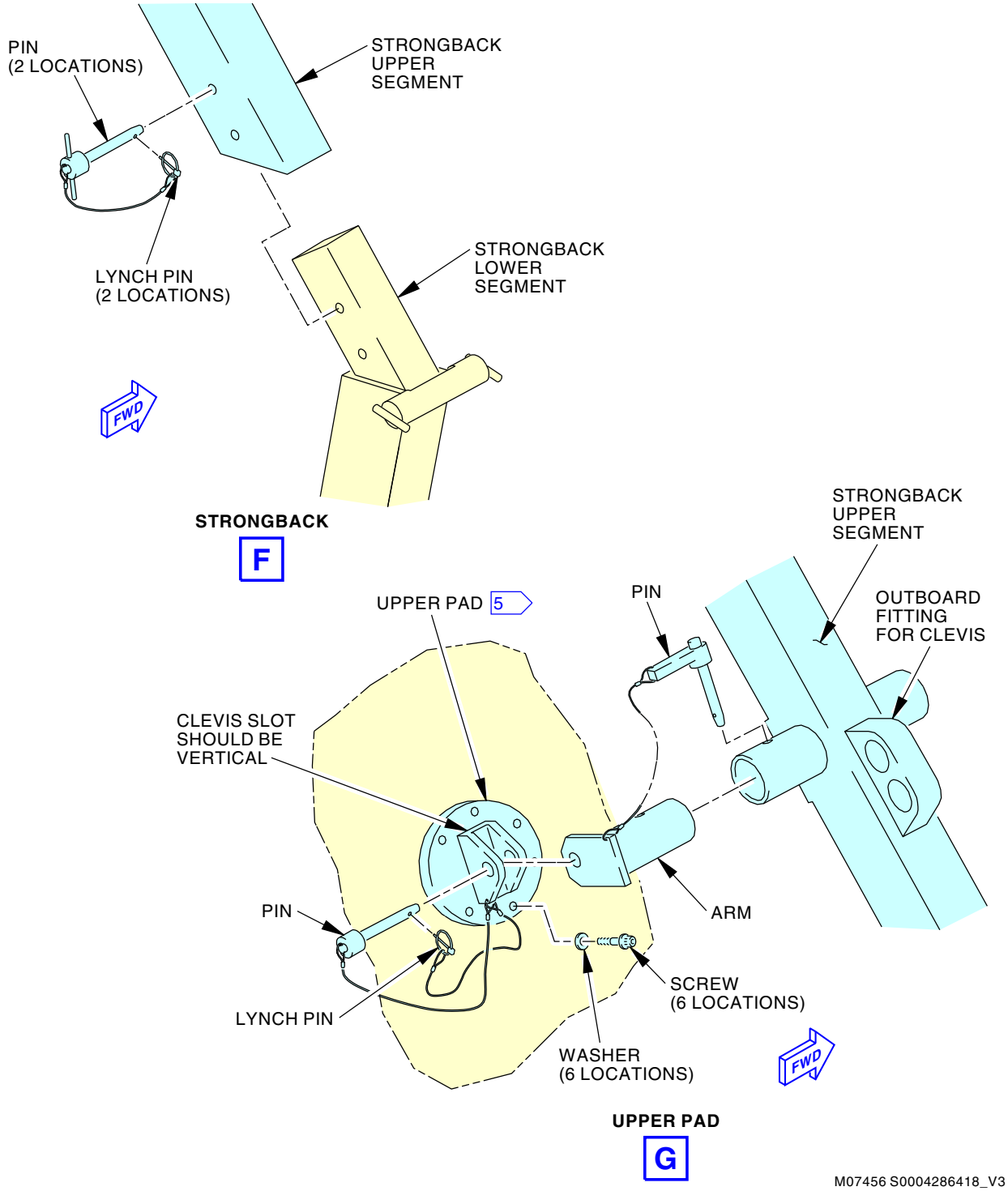


5 ATTACH PAD TO SLEEVE ACCESS HOLES BEFORE STRONGBACK/LOWER ARM IS INSTALLED

M07455 S0004286417_V3

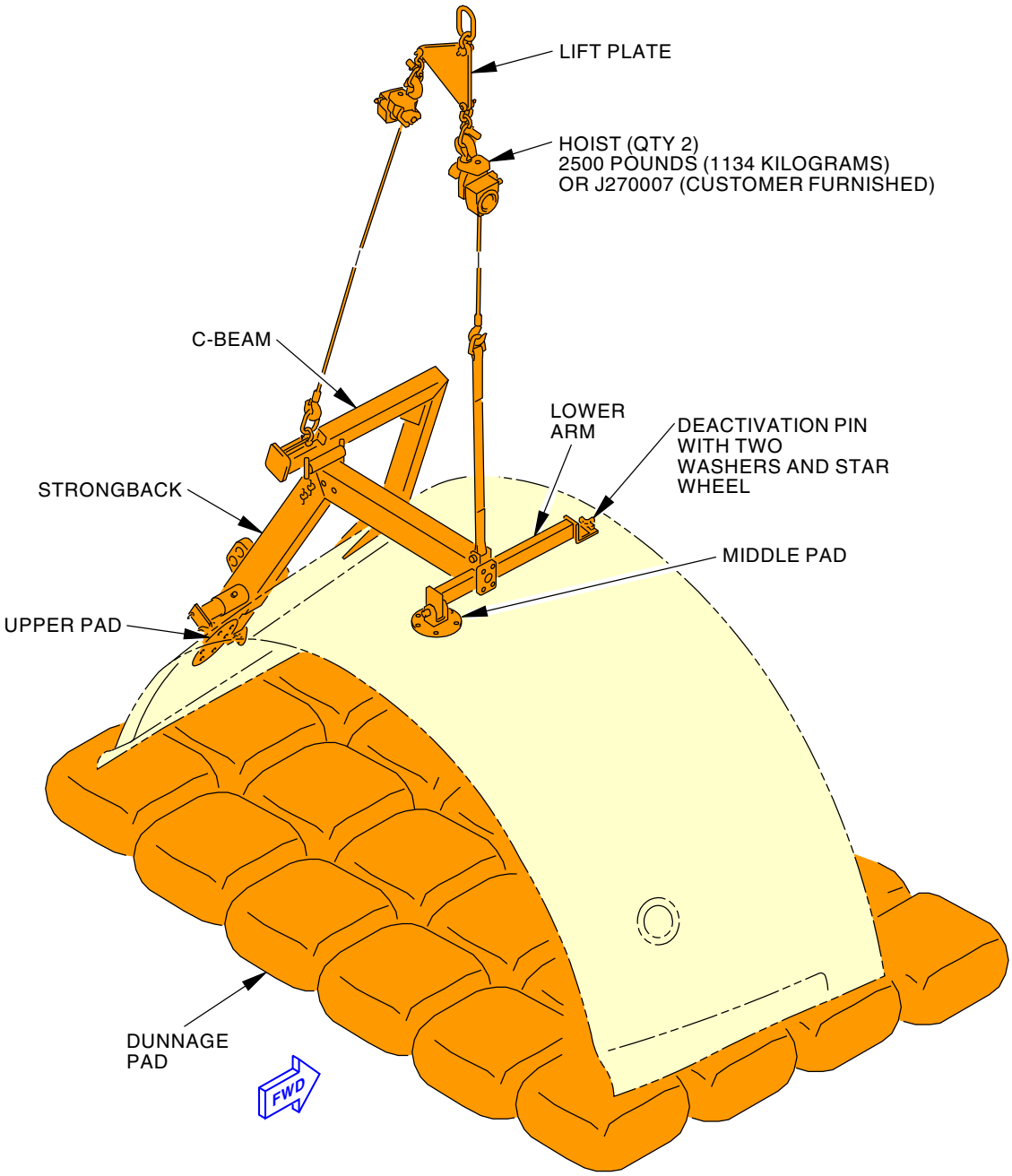
Thrust Reverser Sleeve Installation - Sling J78015-77/-96
Figure 403/78-31-10-990-803-H01 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sleeve Installation - Sling J78015-77/-96
Figure 403/78-31-10-990-803-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LAYDOWN OPERATION
(INBOARD SLEEVE IS SHOWN, OUTBOARD SLEEVE IS EQUIVALENT)

M07457 S0004286419_V3

Thrust Reverser Sleeve Installation - Sling J78015-77/-96
Figure 403/78-31-10-990-803-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-10-400-801-H01

3. Thrust Reverser Sleeve Installation

(Figure 401, Figure 402, and Figure 403)

A. General

(1) This task installs the thrust reverser sleeve.

(2) There are eight blocker doors on each thrust reverser sleeve. The blocker doors are the same at all eight locations. Do not alter the composite blocker doors.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-820-801-H00	Thrust Reverser Hydraulic Actuator Rod End - Adjustment (P/B 501)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
SPL-4283	Equipment - Removal, Fan Reverser Sleeve (sling only) Part #: J78015-77 Supplier: 81205
SPL-6102	Equipment - Fan Reverser Sleeve Sling Arm Attachment, GE90-115B Engine Part #: J78015-96 Supplier: 81205
STD-470	Hoist - Overhead, Capacity 10,000 Pounds
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-589	Mat - Protective Cover

D. Consumable Materials

Reference	Description	Specification
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

G. Prepare to Install the Thrust Reverser Sleeve

SUBTASK 78-31-10-860-004-H01

(1) Make sure the DO-NOT-OPERATE tags are attached to the forward and reverse thrust levers.

SUBTASK 78-31-10-210-001-H01

(2) Examine the tracks and track liners for damage.

(a) Make sure there is no unwanted material in the tracks.

SUBTASK 78-31-10-210-002-H01

(3) Examine the surface condition of the "Rulon J" material on the main track sliders.

NOTE: Rulon J is a low friction material that was applied to the main track sliders.

(a) No areas with bare metal can be seen.

(b) It is permitted to have small damage if the damage is not at the ends of the track or the track liners.

(c) You can add a radius of 0.005 in. (0.127 mm)-0.015 in. (0.381 mm) at the entry end of the "Rulon J" material to make it easier to install the sleeve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-10-490-006-H01

(4) If it is necessary, attach the fan reverser sleeve sling and arm equipment, SPL-4283, and the arm attachment, SPL-6102, to the sleeve [28] (Figure 403):

(a) Attach the upper and middle pads to the applicable actuator access panel locations.

NOTE: The screws and washers to attach the pads are stored on the upper and middle pads. The part numbers for these fasteners are printed on the pads.

1) The clevis slots in the pads should align in the vertical direction.

2) Install the upper pad with six screws and washers.

3) Install the middle pad with seven screws and washers.

(b) Make sure the forward flange on the lower arm is in the correct orientation to engage the deactivation pin hole in the thrust reverser sleeve.

NOTE: The lower arm is part of the lower strongback segment.

1) If the forward flange is not oriented correctly, do these steps:

a) Remove the pin and four screws to remove the clamp plate.

b) Turn the lower arm around in the strongback.

c) Install the four screws into the clamp plate.

d) Install the pin through the clamp plate to lock the lower arm.

(c) Assemble the two strongback segments together with two pins and two lynch pins.

(d) Position the overhead crane/10,000 lb capacity overhead hoist, STD-470, or equivalent equipment, above the applicable thrust reverser sleeve.

NOTE: The hook height of the overhead crane/hoist for the inboard sleeve is 27 ft (8.2 m)2 maximum. The hook height for the outboard sleeve is 23 ft (7.0 m) maximum. The overhead crane/hoist or equivalent equipment is a customer furnished item.

(e) Attach the triangular plate to the overhead crane/hoist.

(f) Attach two 2500 pound hoist or an equivalent hoists to the triangular plate.

NOTE: These hoists are a customer furnished item. Two hoists are required. Each hoist must have a capacity of 2500 lb (1134 kg).

(g) For the inboard sleeve on the thrust reverser, do these steps:

1) Attach the C-beam to the 2500 pound hoist or equivalent hoist and move into position with the strongback.

2) Attach the strongback to the C-beam.

a) Insert the C-beam trunnion into the trunnion fitting on the strongback.

b) Install the trunnion retainer and lynch pin on the trunnion.

3) Move the C-beam and strongback in position and install the pins through the arm flanges and pad clevises.

(h) For the outboard sleeve on the thrust reverser, do these steps:

1) Install the clevis on the strongback fitting with the clevis pin and lynch pin.

2) Use the 2500 pound hoist or equivalent hoist to lift the strongback with the clevis.

3) Move the strongback in position to install the pins through the arm flanges and pad clevises.

(i) Install the pins through the arm flanges and pad clevises.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Install the two lynch pins through the pins.

(j) Install the deactivation pin from inside the sleeve with the one washer through the forward flange of the lower arm.

1) Install the washer and star wheel and tighten.

H. Thrust Reverser Sleeve Installation

SUBTASK 78-31-10-420-001-H01

(1) Install the thrust reverser sleeve [28]:

CAUTION BEFORE YOU REMOVE THE THRUST REVERSER SLEEVE, MAKE SURE THAT THE GROUND SUPPORT EQUIPMENT FULLY HOLDS ITS WEIGHT. THE THRUST REVERSER SLEEVE WEIGHS 404 POUNDS (183.3 KG). INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION KEEP THE FREE ENDS OF THE DRAG LINKS AWAY FROM THE SLEEVE. THE SLEEVE CAN HIT THE DRAG LINKS WHEN YOU EXTEND THE SLEEVE. THIS CAN CAUSE DAMAGE TO THE SLEEVE AND DRAG LINK.

(a) Lift the sleeve and move in position to the rear of the thrust reverser.

CAUTION MAKE SURE THAT THE TOP AND BOTTOM OF THE SLEEVE MOVE TOGETHER WHEN YOU MOVE THE SLEEVE ALONG THE TRACKS. IF THE TOP AND BOTTOM DO NOT MOVE TOGETHER, YOU CAN CAUSE DAMAGE TO EQUIPMENT.

CAUTION ALIGN THE SLIDERS AND TRACKS BEFORE YOU TRY TO MOVE THE SLEEVE. IF YOU DO NOT ALIGN THEM, DAMAGE TO THE "RULON J" LAYER WILL DECREASE THE PERFORMANCE OF THE THRUST REVERSER.

(b) Align the sliders on the sleeve with the tracks on the thrust reverser.

(c) Install and move the sleeve forward along the tracks until you can attach the actuator rod ends.

1) Make sure the top and bottom of the sleeve move together.

SUBTASK 78-31-10-090-003-H01

(2) Remove the fan reverser sleeve sling and arm equipment, SPL-4283, and the arm attachment, SPL-6102, from the sleeve [28] and put it into the storage box (Figure 403).

(a) Remove the deactivation pin, two washers and star wheel.

(b) Remove the pins that attach the strongback arms to the middle and upper pads on the thrust reverser sleeve.

(c) Slowly move the sling away from the sleeve and lay it on the ground.

(d) For the inboard sleeve on the thrust reverser, remove the trunnion retainer and lynch pin to disconnect the strongback trunnion fitting from the C-beam.

(e) For the outboard sleeve on the thrust reverser, remove the clevis, clevis pin and lynch pin from the strongback.

(f) Remove the 2500 pound hoist or an equivalent hoists from the triangular plate.

(g) Remove the triangular plate from the overhead crane/hoist.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(h) Disassemble the strongback into two segments.

1) Stow the pins which attach the strongback segments together on the tool.

(i) Remove the upper and middle pads from the thrust reverser sleeve.

1) Stow the bolts and washers in the holes on the pads.

SUBTASK 78-31-10-430-001-H01

CAUTION

DO NOT TURN ACTUATOR ROD ENDS WHILE THEY ARE DISCONNECTED FROM THE TRANSLATING SLEEVE. THE LENGTH OF THE ACTUATOR IS CHANGED WHEN YOU TURN THE ROD END. IF YOU TURN THE ACTUATOR ROD ENDS, YOU WILL HAVE TO DO THE ACTUATOR AND TRANSLATING SLEEVE RIGGING.

(3) Attach the actuator rod ends to the three clevis [21] on the sleeve [28] (Figure 402):

(a) Remove the lockwire from the actuator rod ends.

(b) Make sure not to turn the actuator rod ends.

NOTE: If one or more of the thrust reverser hydraulic actuator rod ends are turned, it is possible that the actuators will not be synchronized with each other, and the RVDT and Sync Lock could be out of rig.

1) If a actuator rod end is turned, adjust the actuator (TASK 78-31-00-820-801-H00).

(c) Pull the actuator rod end straight out by hand to align it with the clevis [21].

(d) Install the bolt [22], washer [23], bushing [24], washer [23] and nut [25] to attach the rod end.

NOTE: Do not drop the fasteners into the thrust reverser sleeve.

NOTE: The position of the bushing [24] changes because the clevis fitting, used in the left and right thrust reverser sleeve, is the same. The clevis fitting is installed upside down in the opposite sleeve.

1) For the left thrust reverser sleeve, install the bushing [24] under the bolt head of bolt [22].

2) For the right thrust reverser sleeve, install the bushing [24] under the nut [25].

3) Install the bolt [22] with the bolt head on the top side of the clevis [21].

NOTE: The bolt head will prevent the disconnection of the rod end from the clevis if the nut was missing.

(e) Tighten the bolt [22] to 700 ±50 in-lb (79 ±6 N·m).

SUBTASK 78-31-10-980-002-H01

CAUTION

KEEP THE FREE ENDS OF THE DRAG LINKS AWAY FROM THE SLEEVE. THE SLEEVE CAN HIT THE DRAG LINKS WHEN YOU EXTEND THE SLEEVE. THIS CAN CAUSE DAMAGE TO THE SLEEVE AND DRAG LINK.

(4) Manually extend the sleeve to the fully extended position (TASK 78-31-00-980-801-H01).

SUBTASK 78-31-10-860-005-H01

WARNING

DO NOT OPEN THE THRUST REVERSER TO REMOVE THE BLOCKER DOORS. YOUR WEIGHT CAN BREAK THE HOLD-OPEN RODS WHICH WILL CAUSE THE THRUST REVERSER TO CLOSE QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(WARNING PRECEDES)

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOORS AT THE TOP OF THE THRUST REVERSER. DO NOT PULL ON THE DRAG LINKS. DO NOT PUT YOUR FEET OR WEIGHT ON THE DRAG LINKS. DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

CAUTION MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(5) Install the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment to get access to the blocker doors.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Wear boot socks on your work boots and install a protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-10-430-002-H01

(6) Install the drag links [1] to the blocker doors [7] (Figure 401):

(a) Remove the adhesive tape that was used to hold the blocker doors in the closed position.

(b) Remove the adhesive tape that was used to hold down the drag links.

(c) Align the drag link [1] with the blocker door [7].

(d) Install the bolt [3], washer [4], two bushings [2], washer [8], washer [5] and nut [6] to attach the drag link to the blocker door.

1) Install the bolt in the drag link with the bolt head up.

NOTE: If the nut is loose or missing, the bolt head will prevent the bolt from falling out of the drag link.

(e) Tighten the nut [6] to 375 in-lb (42 N·m) to 475 in-lb (54 N·m).

SUBTASK 78-31-10-090-004-H01

(7) Remove the thrust reverser blocker doors access platform (GE90), SPL-2617, or equivalent equipment.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Remove the protective mat, STD-585, in the translating sleeve.

SUBTASK 78-31-10-010-004-H01

(8) For the applicable fan cowl panel, do this task: Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Close the applicable access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-10-980-003-H01

(9) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

(a) Make sure the sleeve moves smoothly.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-10-410-002-H01

(1) Install the upper and lower access panels [27] on the thrust reverser sleeve:

NOTE: The length of the bolts can be one grip length longer or shorter but all bolts must be the same grip length.

(a) Apply grease, D00633, to the bolt shank and all threads.

(b) Install and tighten the six bolts [26] to 65 in-lb (7.3 N·m) – 100 in-lb (11.3 N·m).

(c) Remove the excess grease with a cotton wiper, G00034.

1) Install the applicable access panels:

Number	Name/Location
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

SUBTASK 78-31-10-410-003-H01

(2) Install the middle access panels [30] on the thrust reverser sleeve:

NOTE: The length of the bolts can be one grip length longer or shorter but all bolts must be the same grip length.

(a) Apply grease, D00633, to the bolt shank and all threads.

(b) Install and tighten the seven bolts [29] to 65 in-lb (7.3 N·m) – 100 in-lb (11.3 N·m).

(c) Remove the excess grease with a cotton wiper, G00034.

1) Install the applicable access panels:

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

SUBTASK 78-31-10-090-005-H01

(3) Remove the protective cover mat, STD-589, on the leading edge of the wing.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-10-940-001-H01

(4) Make sure that the work area is clean and remove all other tools and other items.

SUBTASK 78-31-10-410-004-H01

(5) For the applicable fan cowl panel, do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close the applicable access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-10-440-001-H01

(6) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-10-440-003-H01

(7) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-10-860-006-H01

(8) Remove the DO-NOT-OPERATE tags from the thrust levers.

SUBTASK 78-31-10-710-001-H01

(9) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Cycle the sleeve six times to make sure it operates correctly.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER TRACK LINERS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser auxiliary and main track liners

(2) An installation of the thrust reverser auxiliary and main track liners.

TASK 78-31-11-000-801-H01

2. Thrust Reverser Track Liners Removal

(Figure 401)

A. General

(1) The thrust reverser auxiliary and main track liners are referred to as the liners.

(2) There is a auxiliary track liner installed in a track in the hinge beam and the latch beam.

(3) There is a main track liner installed in the track in the hinge beam and the latch beam.

(4) To remove the liners, you must first remove the thrust reverser sleeve.

B. References

Reference	Title
78-31-01-000-801-H01	Thrust Reverser Removal (P/B 401)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)
78-31-10-000-801-H01	Thrust Reverser Sleeve Removal (P/B 401)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Prepare for the Removal

SUBTASK 78-31-11-010-001-H01

(1) Do this task: Thrust Reverser Sleeve Removal, TASK 78-31-10-000-801-H01.

SUBTASK 78-31-11-010-002-H01

(2) To get access to the fasteners on the latch beam, remove the thermal insulation blanket on the latch beam TASK 78-31-06-000-801-H01.

SUBTASK 78-31-11-010-003-H01

(3) To get access to the fasteners on the hinge beam, remove the middle and aft thrust reverser hinge fairings TASK 78-31-01-000-801-H01.

NOTE: These fairings give access to the thrust reverser hinge bolts.

E. Thrust Reverser Auxiliary Track Liners Removal

SUBTASK 78-31-11-020-001-H01

(1) Remove the upper auxiliary track liner [1] (Figure 401):

(a) Remove the nut [5], washer [4], washer [3], and bolt [2] from the forward end of the liner.

(b) Remove the nut [8], washer [7], radius block [6] and bolt [9] from the aft end of the liner.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION: APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

(c) Apply a force to the end of the liner to decrease the diameter a small amount so you can move the liner along the track.

(d) Remove the liner [1].

SUBTASK 78-31-11-020-002-H01

(2) Remove the lower auxiliary track liner [10]:

(a) Remove the nut [5], two washers [3], and bolt [11] from the forward end of the liner.

(b) Remove the nut [8], washer [7] and bolt [12] from the aft end of the liner.

CAUTION: APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

(c) Apply a force to the end of the liner to decrease the diameter a small amount so you can move the liner along the track.

(d) Remove the liner [10].

F. Thrust Reverser Main Track Liners Removal

SUBTASK 78-31-11-020-003-H01

(1) Remove the upper main track liner [17] (Figure 401):

(a) Remove the nut [15],washer [14], radius block [18], radius block [16], and bolt [13]from the forward end of the liner.

(b) Remove the nut [8], radius filler [19] and bolt [12] from the aft end of the liner.

CAUTION: APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

(c) Apply a force to the end of the liner to decrease the diameter a small amount so you can move the liner along the track.

(d) Remove the liner [17].

SUBTASK 78-31-11-020-004-H01

(2) Remove the lower main track liner [17]:

(a) Remove the nut [15], washer [14], radius block [18], radius block [16], washer [21] and bolt [20] from the forward end of the liner.

(b) Remove the collar [23] and bolt [22] from the aft end of the liner.

CAUTION: APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

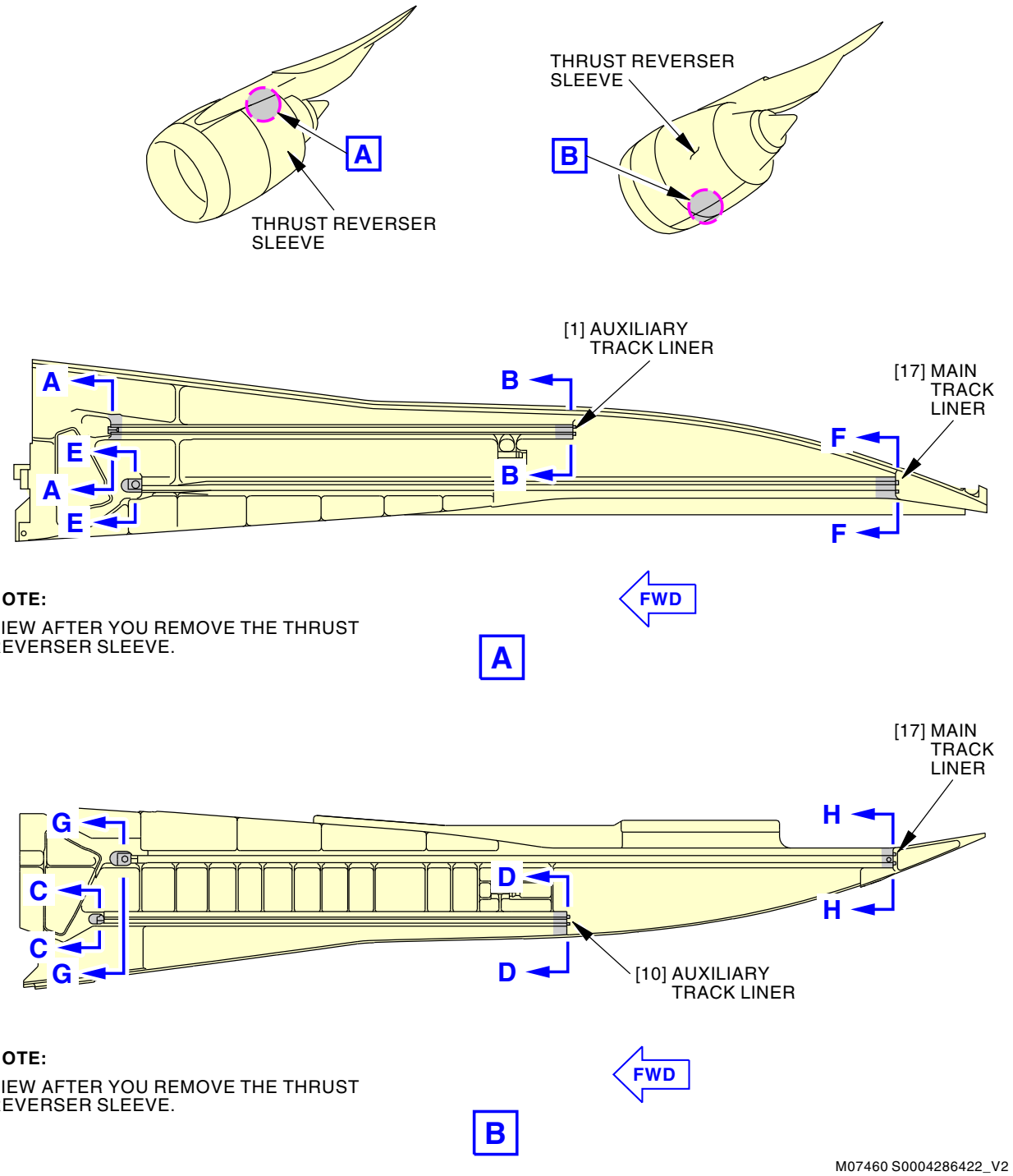
(c) Apply a force to the end of the liner to decrease the diameter a small amount so you can move the liner along the track.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Remove the liner [17].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



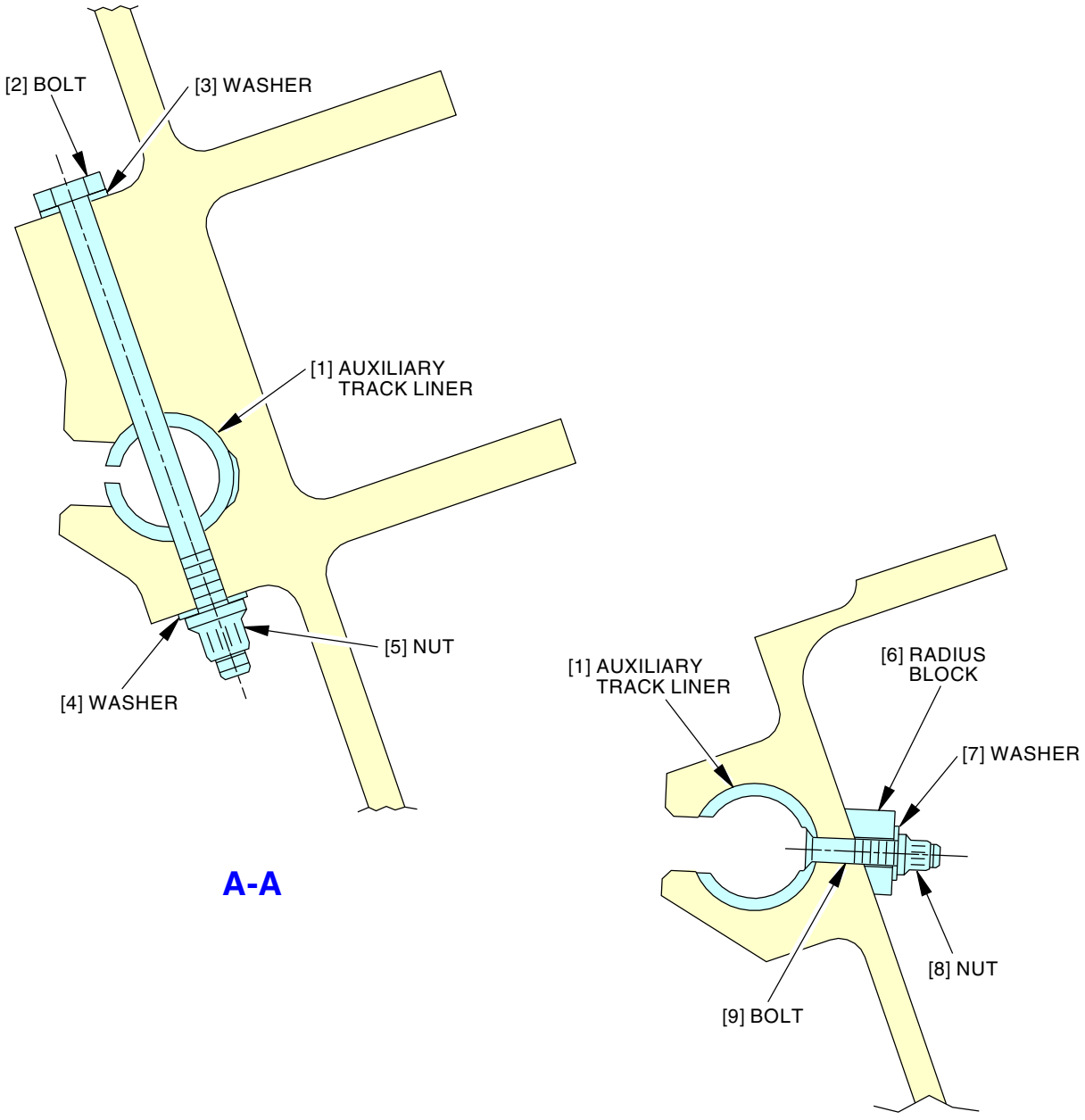
NOTE:

VIEW AFTER YOU REMOVE THE THRUST REVERSER SLEEVE.

M07460 S0004286422_V2

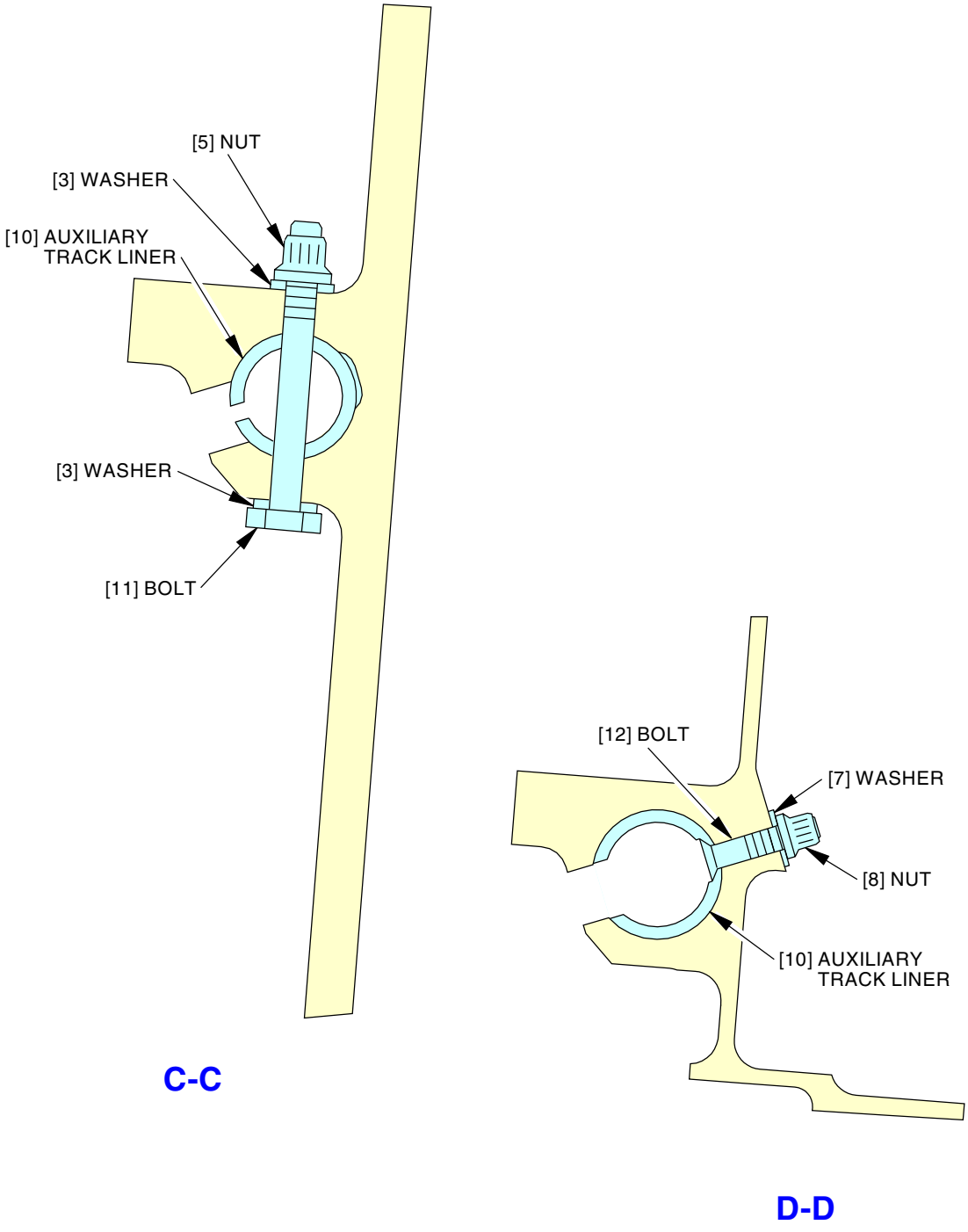
Thrust Reverser Track Liner Installation
Figure 401/78-31-11-990-801-H01 (Sheet 1 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



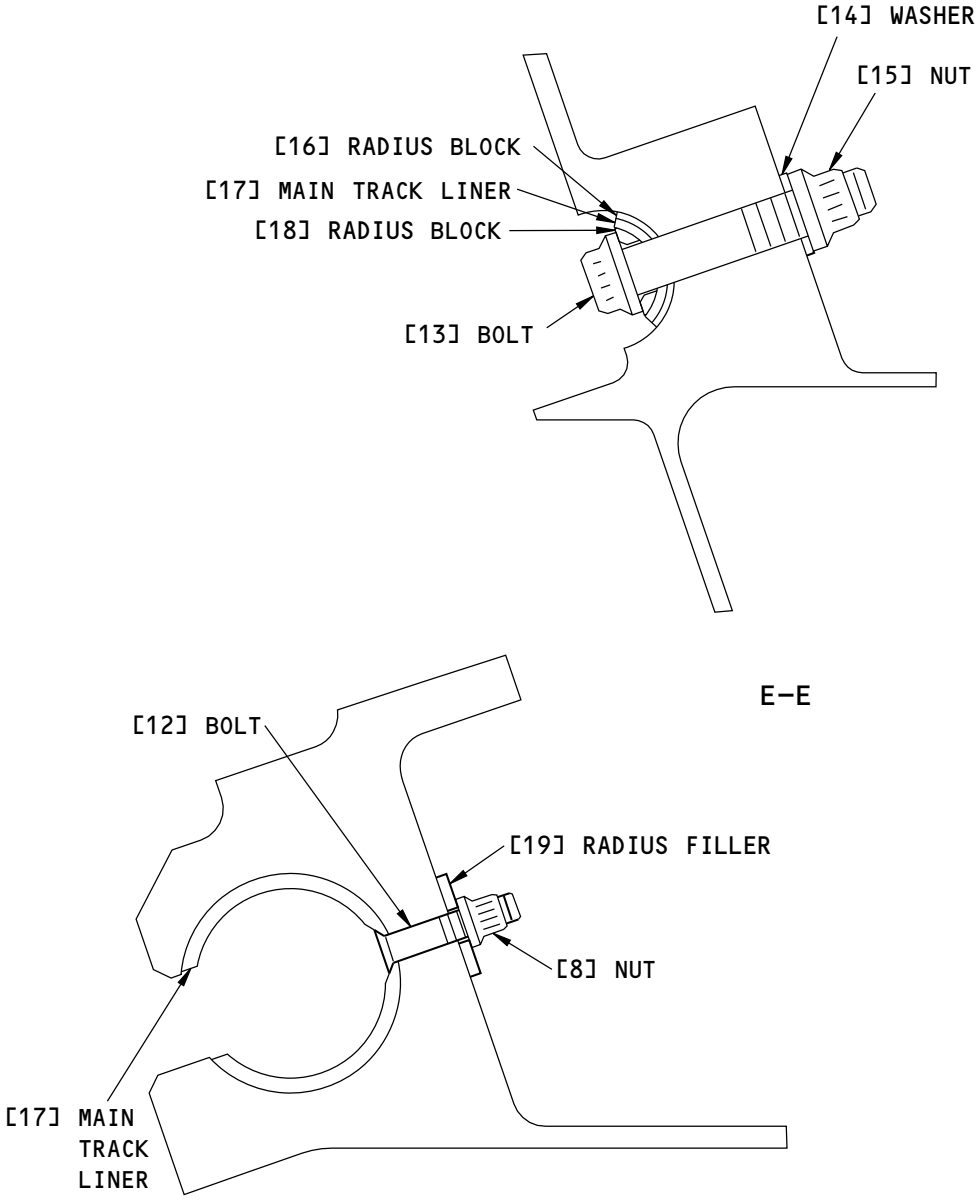
Thrust Reverser Track Liner Installation
Figure 401/78-31-11-990-801-H01 (Sheet 2 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



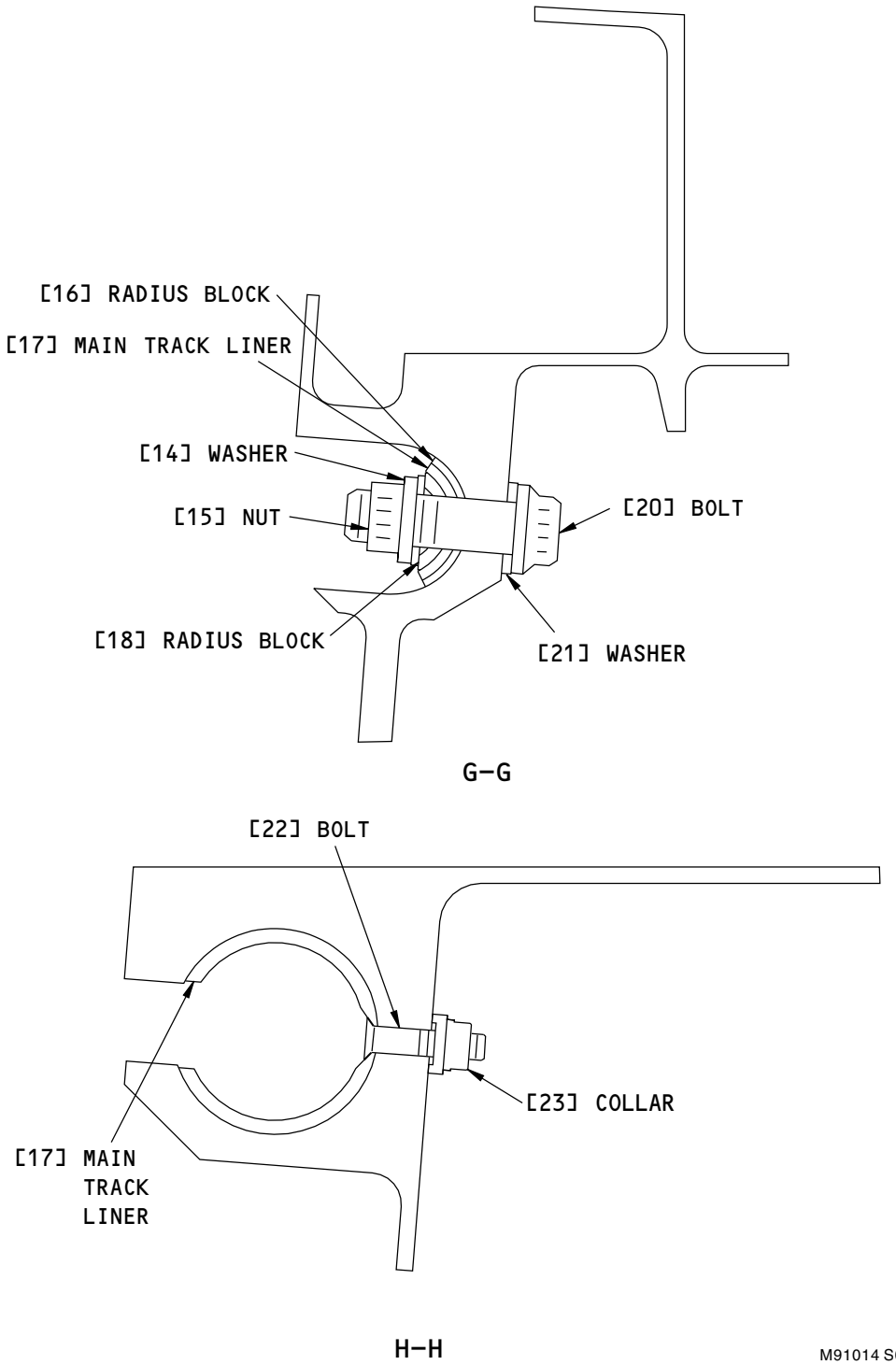
Thrust Reverser Track Liner Installation
Figure 401/78-31-11-990-801-H01 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Track Liner Installation
Figure 401/78-31-11-990-801-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Track Liner Installation
Figure 401/78-31-11-990-801-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-11-400-801-H01

3. Thrust Reverser Track Liners Installation

(Figure 401)

A. General

(1) The thrust reverser auxiliary and main track liners are referred to as the liners.

(2) There is a auxiliary track liner installed in a track in the hinge beam and the latch beam.

(3) There is a main track liner installed in a track in the hinge beam and the latch beam.

(4) After the installation of the thrust reverser sleeve, you must do the thrust reverser operational test.

B. References

Reference	Title
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-01-400-801-H01	Thrust Reverser Installation (P/B 401)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-10-400-801-H01	Thrust Reverser Sleeve Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Thrust Reverser Track Liners Installation

SUBTASK 78-31-11-420-001-H01

(1) Install the upper auxiliary liner [1] (Figure 401):

CAUTION APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

(a) Apply a force to the end of the liner to decrease the diameter a small amount so you can put the liner into the track.

(b) Move the liner along the track until you can align the bolt holes.

1) Make sure the edges of the liner stay parallel to the track.

2) Make sure the liner is tightly installed in the track to prevent contamination between the liner and track.

(c) Apply primer, C00259 to all areas of the hole, counterbore and countersink and install the bolts in the wet primer.

1) Mix the primer per the manufacturers instructions.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Install the bolt [2], countersunk washer [3] under the bolt head, washer [4], and nut [5] in the forward end of the liner.

(e) Install the bolt [9], radius block [6], washer [7], and nut [8] in the aft end of the liner.

SUBTASK 78-31-11-420-002-H01

(2) Install the lower auxiliary track liner [10]:

CAUTION APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

(a) Apply a force to the end of the liner to decrease the diameter a small amount so you can move the liner into the track.

(b) Move the liner along the track until you can align the bolt holes.

1) Make sure the edges of the liner stay parallel to the track.

2) Make sure the liner is tightly installed in the track to prevent contamination between the liner and track.

(c) Apply primer, C00259 to all areas of the hole, counterbore and countersink and install the bolts in the wet primer.

1) Mix the primer per the manufacturers instructions.

(d) Install the bolt [11], countersunk washer [3] under the bolt head, and countersunk washer [3] under nut [5] in the forward end of the liner.

(e) Install the bolt [12], washer [7], and nut [8] in the aft end of the liner.

F. Thrust Reverser Main Track Liners Installation

SUBTASK 78-31-11-420-003-H01

(1) Install the upper main track liner [17] (Figure 401):

CAUTION APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

(a) Apply a force to the end of the liner to decrease the diameter a small amount so you can put the liner into the track.

(b) Move the liner along the track until you can align the bolt holes.

1) Make sure the edges of the liner stay parallel to the track.

2) Make sure the liner is tightly installed in the track to prevent contamination between the liner and track.

(c) Apply primer, C00259 to all areas of the hole, counterbore and countersink and install the bolts in the wet primer.

1) Mix the primer per the manufacturers instructions.

(d) Install the bolt [13], radius block [18], radius block [16], washer [14], and nut [15] in the forward end of the liner.

(e) Install the bolt [12], radius filler [19], and nut [8] in the aft end of the liner.

1) If you use a new radius filler [19], drill a 0.192-0.203 inch (4.877-5.156 millimeter) diameter hole in the filler before installation.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-11-420-004-H01

(2) Install the lower main track liner [17]:

CAUTION

APPLY ONLY SUFFICIENT FORCE NECESSARY TO DECREASE THE DIAMETER OF THE LINER ENDS UNTIL YOU CAN MOVE THE LINER ALONG THE TRACK. IF YOU APPLY TOO MUCH FORCE, YOU CAN CAUSE DAMAGE TO THE LINER.

(a) Apply a force to the end of the liner to decrease the diameter a small amount so you can move the liner into the track.

(b) Move the liner along the track until you can align the bolt holes.

1) Make sure the edges of the liner stay parallel to the track.

2) Make sure the liner is tightly installed in the track to prevent contamination between the liner and track.

(c) Apply primer, C00259 to all areas of the hole, counterbore and countersink and install the bolts in the wet primer.

1) Mix the primer per the manufacturers instructions.

(d) Install the bolt [20], countersunk washer [21] under the bolt head, radius block [16], radius block [18], and washer [14] under nut [15] in the forward end of the liner.

(e) Install the bolt [22] and collar [23] in the aft end of the liner.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-11-410-001-H01

(1) Do this task: Thrust Reverser Sleeve Installation, TASK 78-31-10-400-801-H01.

SUBTASK 78-31-11-410-002-H01

(2) Install the thermal insulation blankets that were removed from the latch beam, do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-11-410-003-H01

(3) Install the thrust reverser hinge fairings that were removed from the hinge beam, do this task: Thrust Reverser Installation, TASK 78-31-01-400-801-H01.

SUBTASK 78-31-11-710-001-H01

(4) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER AUXILIARY SLIDERS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser auxiliary sliders

(2) An installation of the thrust reverser auxiliary sliders.

TASK 78-31-13-000-801-H01

2. Thrust Reverser Auxiliary Sliders Removal

(Figure 401)

A. General

(1) The thrust reverser auxiliary slider is referred to as the auxiliary slider.

(2) There is an auxiliary slider found at the top and bottom of each thrust reverser sleeve.

B. References

Reference	Title
78-31-10-000-801-H01	Thrust Reverser Sleeve Removal (P/B 401)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Prepare for the Removal

SUBTASK 78-31-13-010-001-H01

(1) Do this task: Thrust Reverser Sleeve Removal, TASK 78-31-10-000-801-H01.

E. Thrust Reverser Auxiliary Sliders Removal

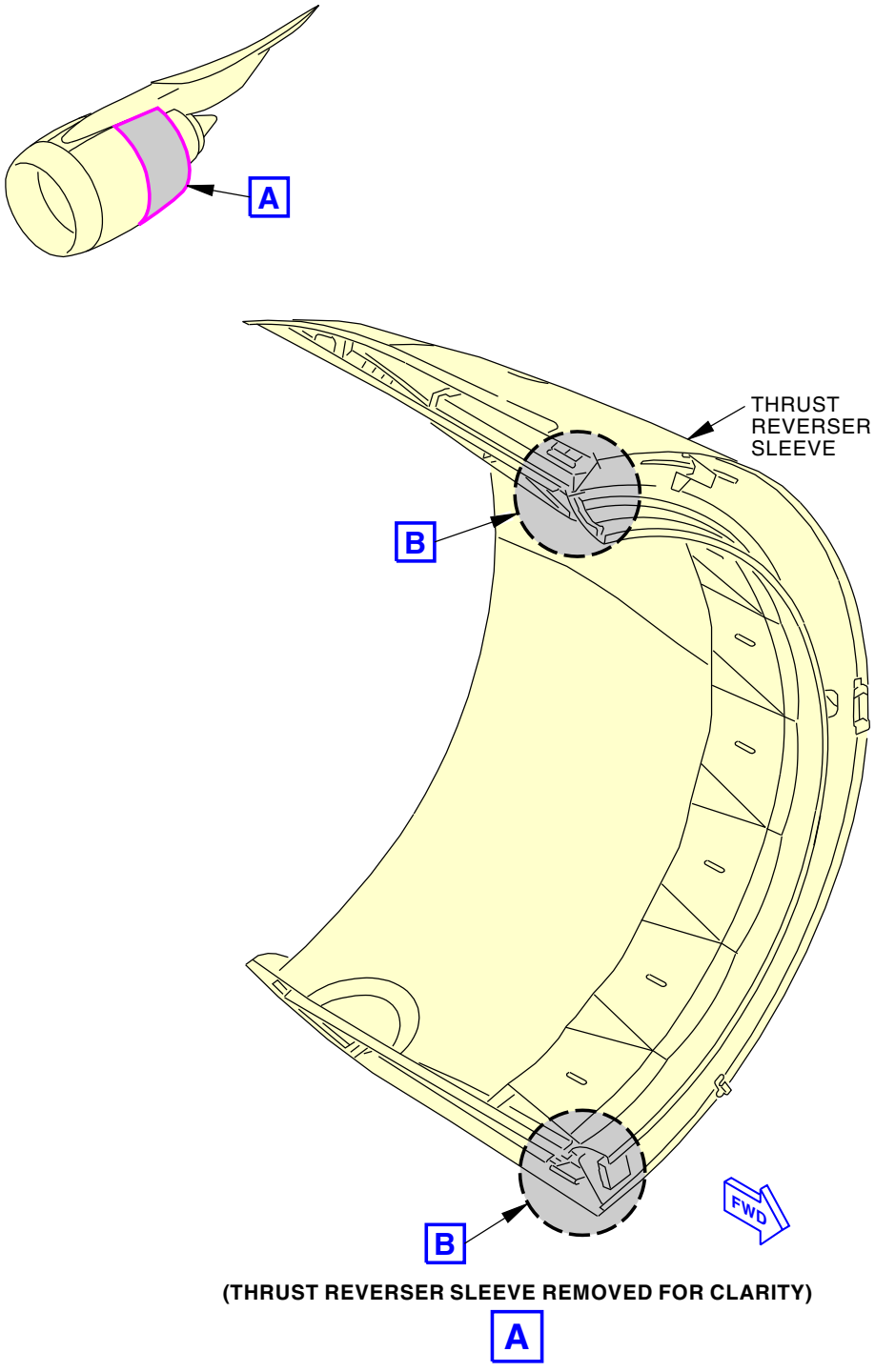
SUBTASK 78-31-13-020-001-H01

(1) Remove the auxiliary slider [1] from the fitting [2] (Figure 401):

(a) Remove the 12 nuts [5], washers [4], and bolts [3].

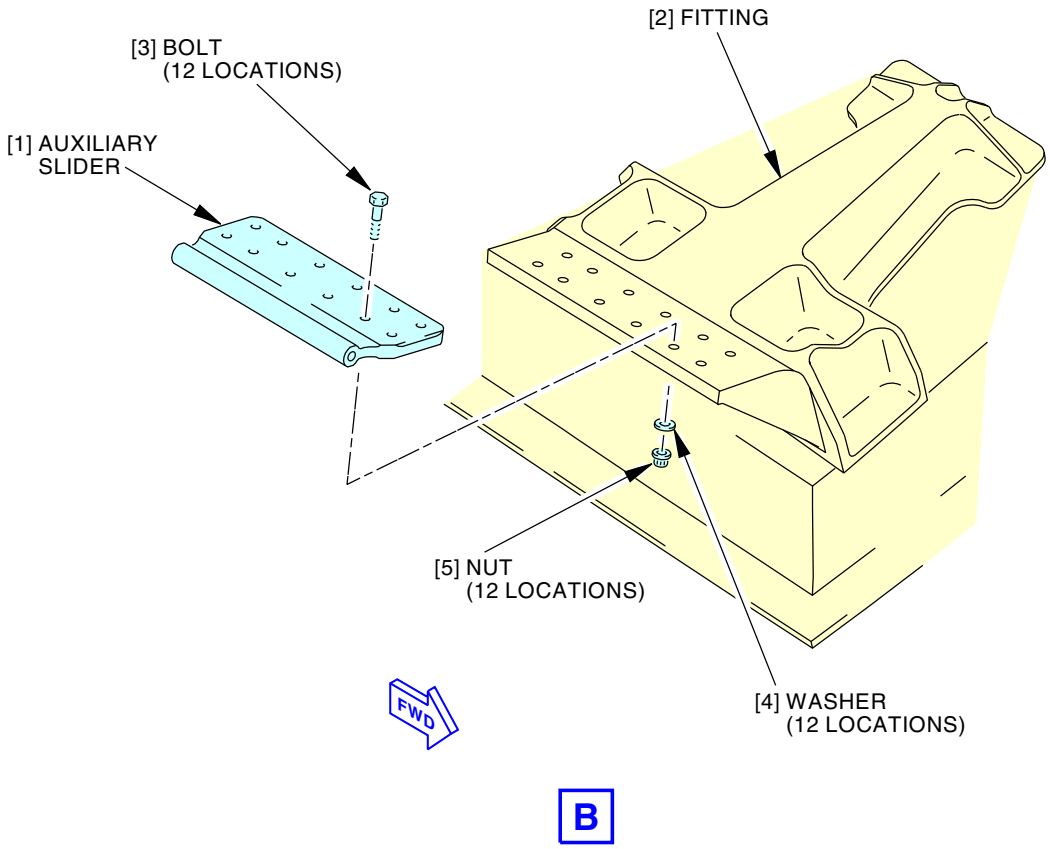
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Auxiliary Slider Installation
Figure 401/78-31-13-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07465 S0004286426_V2

Thrust Reverser Auxiliary Slider Installation
Figure 401/78-31-13-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-13-400-801-H01

3. Thrust Reverser Auxiliary Sliders Installation

(Figure 401)

A. General

(1) The thrust reverser auxiliary slider is referred to as the auxiliary slider.

(2) There is an auxiliary slider found on the outer panel of each thrust reverser sleeve.

(3) After the thrust reverser sleeve is installed, you must do the thrust reverser operational test.

B. References

Reference	Title
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-10-400-801-H01	Thrust Reverser Sleeve Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
A00436	Sealant - Fuel Tank	BMS5-45 (Supersedes BMS5-26)
G02185	Agent - Peelable Parting (Valspar - 4A-183 Green Strippable Coating)Manufacturing discontinued, use stock until depleted	
G50365	Agent - Peelable Parting (AC Products - AC962-73C) Production discontinued, use stock until depleted.	BAC5000
G50367	Agent - Peelable Parting (Aztec Chemical AZ 634-2)	MIL-PRF-6799, BAC5000
G50368	Agent - Peelable Parting (Rexco Chemical Company - Partall Coverall Film)	BAC5000
G50369	Coating - Alkaline Removable, Water Resistant	BMS15-12 Type I Class 1

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Thrust Reverser Auxiliary Sliders Installation

SUBTASK 78-31-13-420-001-H01

(1) Install the auxiliary slider [1] (Figure 401):

(a) Apply one of the parting agents that follow, to the fay surface of the auxiliary slider.

1) Rexco Partall Coverall Film peelable parting agent, G50368

2) temporary coating, G50369

3) AZ 634-2 peelable parting agent, G50367

4) AC962-73C peelable parting agent, G50365

5) Valspar 4A-183 green strippable coating, G02185

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Apply the sealant, A00436 to fay surface of the sleeve fitting [2].

1) Mix the two-part sealant to the manufacturers instructions.

(c) Apply the sealant, A00436 to the bolts.

1) Apply the sealant to the shank and threads of the bolt and immediately install the bolt with the wet sealant.

(d) Install the bolts [3] with washers [4] with under nuts [5].

1) Tighten the nuts to 65-100 inch-pounds (7.3-11.3 newton-meters).

F. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-13-410-001-H01

(1) Do this task: Thrust Reverser Sleeve Installation, TASK 78-31-10-400-801-H01.

SUBTASK 78-31-13-710-001-H01

(2) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER BLOCKER DOORS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser blocker doors

(2) An installation of the thrust reverser blocker doors.

TASK 78-31-14-000-801-H01

2. Thrust Reverser Blocker Doors Removal

(Figure 401)

A. General

(1) The blocker doors are installed on the inner surface of the thrust reverser sleeve.

(2) There are eight blocker doors on each thrust reverser sleeve. The blocker doors are the same at all eight locations.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
A50464	Tape - Vinyl, Adhesive Coated	BMS5-179
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02129	Tape - 223S (use until stock depleted)	

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-31-14-010-002-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-14-040-006-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-14-010-003-H01

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-14-040-003-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-14-860-002-H01

(5) Put the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-14-980-003-H01

(6) Manually extend the thrust reverser sleeve to pull the blocker doors to the extended position.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-31-14-490-002-H01

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOOR AT THE TOP OF THE THRUST REVERSER. DO NOT PULL OR STAND ON THE DRAG LINK. DAMAGE TO THE EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

CAUTION MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(7) Install the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment to get access to the blocker doors.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Wear boot socks over your work boots and install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser to get access to the blocker doors.

H. Thrust Reverser Blocker Doors Removal

SUBTASK 78-31-14-030-001-H01

(1) Disconnect the drag link [12] from the blocker door [1] (Figure 401).

(a) Remove the nut [13], washer [8], bushings [9], washer [19], washer [10], and bolt [11].

(b) Put a clean shop rag or cotton wiper, G00034 around the drag link [12] and attach it to the inner wall of the thrust reverser with Nitto 223S Tape, G02129 or tape, A50464.

SUBTASK 78-31-14-020-001-H01

CAUTION MAKE SURE THAT THE BEARINGS DO NOT FALL OUT OF THE HINGE FITTINGS ON THE BLOCKER DOOR. IF THE BEARINGS FALL OUT, THE BLOCKER DOORS WILL NOT OPERATE CORRECTLY AND DAMAGE CAN OCCUR.

(2) Remove the blocker door [1] from the T/R sleeve hinge fittings

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

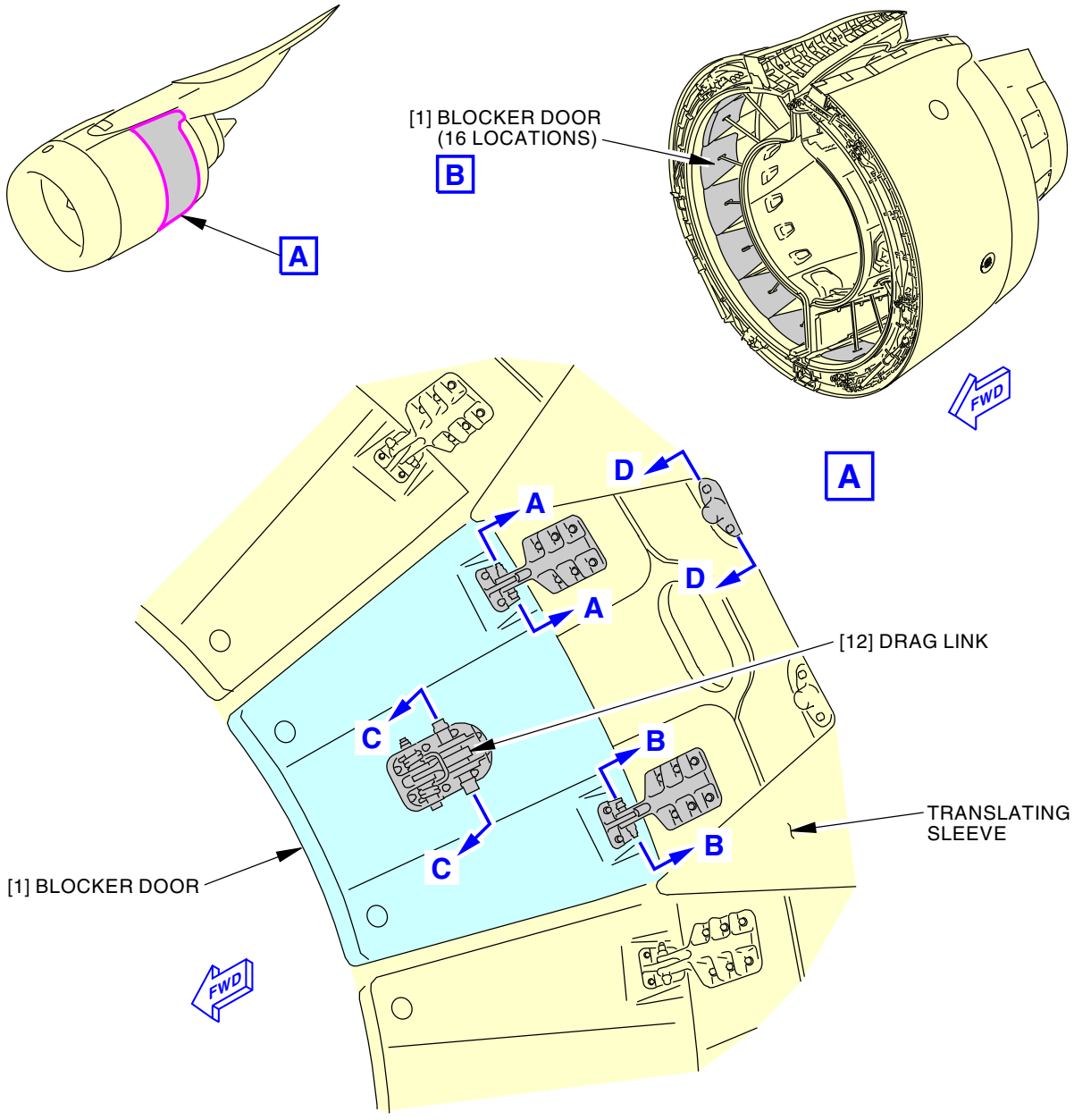
(a) Remove the nut [7], washers [3], bushing [4], washer [5], and bolt [6] from the clamped hinge.

(b) Remove the nut [7], antirotation clip [2], washer [3], bushings [4], washer [5], and bolt [6] from the unclamped hinge.

(c) Remove the blocker door [1] from the thrust reverser sleeve.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



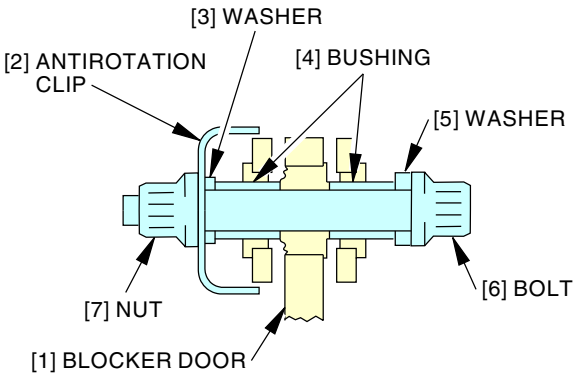
BLOCKER DOOR OPEN

B

M07466 S0004286427_V3

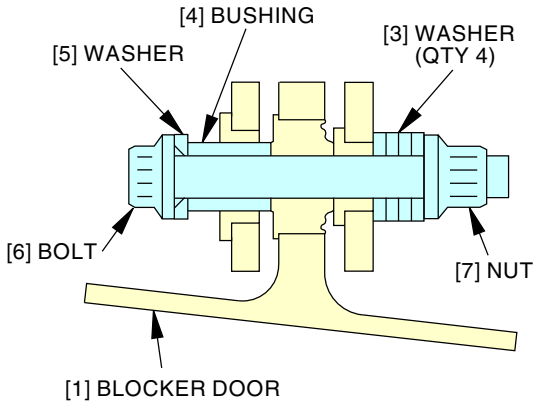
Thrust Reverser Blocker Door Installation
Figure 401/78-31-14-990-804-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



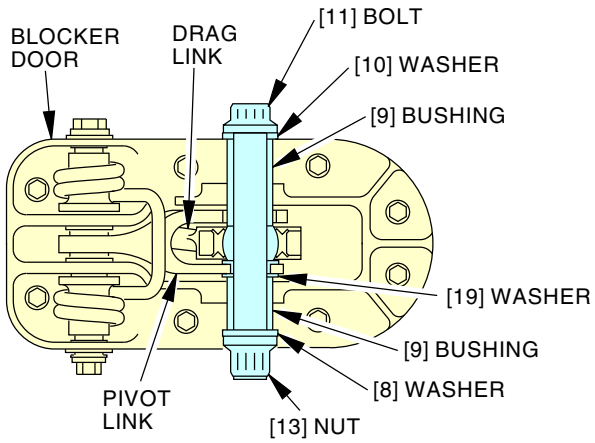
UNCLAMPED HINGE

A-A



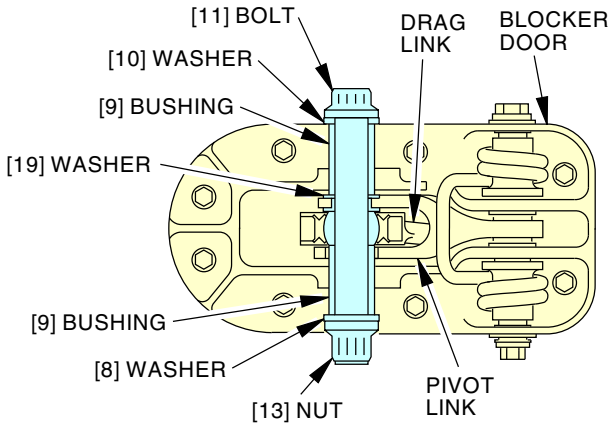
CLAMPED HINGE

B-B



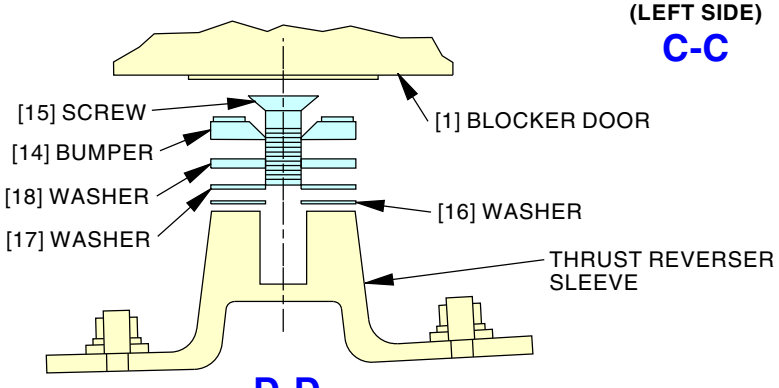
(RIGHT SIDE)

C-C



(LEFT SIDE)

C-C



D-D

M07467 S0004286428_V5

Thrust Reverser Blocker Door Installation
Figure 401/78-31-14-990-804-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-14-400-801-H01

3. Thrust Reverser Blocker Doors Installation

(Figure 401)

A. General

(1) After you install a blocker door, you must extend and retract the thrust reverser to make sure that the blocker doors operate correctly.

(2) There are eight blocker doors on each thrust reverser sleeve. The blocker doors are the same at all eight locations.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-31-00-981-801-H01	Thrust Reverser Operation - Extend (Power Method) (P/B 201)
78-31-00-981-802-H01	Thrust Reverser Operation - Retract (Power Method) (P/B 201)
78-31-14-200-802-H01	Thrust Reverser Blocker Door Inspection - Aerodynamic Smoothness (P/B 601)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
B00083	Solvent - VM&P Naphthas	TT-N-95 Type II, ASTM D-3735 Type III
D00504	Grease - Petrolatum	VV-P-236
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02020	Clay, Modeling	

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Thrust Reverser Blocker Doors Installation

SUBTASK 78-31-14-420-001-H01

CAUTION MAKE SURE THAT THE BEARINGS ARE INSTALLED IN THE HINGE FITTINGS OF THE BLOCKER DOOR. IF THE BEARINGS ARE MISSING, THE BLOCKER DOOR WILL NOT OPERATE CORRECTLY AND DAMAGE TO THE BLOCKER DOOR CAN OCCUR.

(1) Install the blocker door [1] on the T/R sleeve hinge fittings (Figure 401):

(a) Align the bolt holes in the hinge fittings on the blocker door with the holes in the sleeve hinge fittings.

(b) Install the bolt [6], washer [5], bushing [4], washers [3], and nut [7] in the clamped hinge.

1) Install the bolt in the hinge with the bolt head on the same side as the bushing [4].

2) Tighten the nut [7] to 65-100 inch-pounds (7.3-11.3 newton-meters).

(c) Before installation, bend the legs of the antirotation clip [2] around the hinge fitting.

(d) Install the bolt [6], washer [5], bushings [4], washer [3], antirotation clip [2] and nut [7] in the unclamped hinge.

1) Make sure the legs of the antirotation clip [2] are bent around the hinge fitting and do not let the clip turn.

2) Install the bolt in the hinge with the bolt head toward the centerline of the blocker door.

3) Tighten the nut [7] to 65-100 inch-pounds (7.3-11.3 newton-meters).

SUBTASK 78-31-14-211-001-H01

(2) Do these steps to make sure there is no side-to-side movement of the blocker door after the fasteners are tightened:

NOTE: This does not include the usual minimum movement of the spherical hinge bearings in their races. More than the usual side-to-side movement shows that the sleeve bushing has not pushed the hinge bearing against the flanged bushing on the clamped hinge. This shows that the nut on the hinge bolt has not been correctly tightened.

(a) Hold the blocker door [1] in the extended position.

(b) Try to move the blocker door from side to side on the hinge axis.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) If the blocker door moves from side-to-side more than the usual minimum movement, install one more washer [3] under the nut [7] on the clamped hinged.

(d) Tighten the nut [7] to 65-100 inch-pounds (7.3-11.3 newton-meters).

SUBTASK 78-31-14-220-003-H01

(3) Measure the step between the blocker door and the wedges at three places and perpendicular to the wedge fasteners.

(a) Close the blocker door and apply a 30 pound-force (133.4 newtons) load on the blocker door centerline, approximately 0.5-1.5 inch (12.7-38.1 millimeters) from the aft edge of the blocker door.

(b) The step between the blocker door and the wedges should be -0.040 to +0.040 inch (-1.016 to +1.016 millimeter).

SUBTASK 78-31-14-820-001-H01

(4) If the step between the blocker door and the wedges is not in the limits, adjust the bumpers on the thrust reverser sleeve.

(a) Open the blocker door.

(b) Apply a small amount of clay, G02020 on the two bumpers.

(c) Apply petrolatum grease, D00504 as a parting agent on the clay.

(d) Apply petrolatum grease, D00504 as a parting agent on the blocker door wear pad.

NOTE: The blocker door has two circular wear pads bonded to the back of the blocker door. These wear pads are made of corrosion resistant steel (CRES). The replaceable bumpers are mounted on the thrust reverser sleeve in the blocker door recess. The bumpers are a silicone rubber pad bonded a countersunk washer.

(e) Close the blocker door and apply a 30 pound-force (133.4 newtons) load on the blocker door centerline, approximately 0.5-1.5 inch (12.7-38.1 millimeters) from the aft edge of the blocker door.

(f) Measure the clay thickness between the bumpers and the wear pads on the back of the blocker door.

1) The gap should be 0.01 inch (0.25 millimeter).

(g) Remove all the residual clay with solvent, B00083 and a clean cotton wiper, G00034.

(h) To adjust the step between the blocker door and the wedges, add or remove the washers under the two blocker door bumpers [14] to get the correct gap.

1) Remove the screw [15] and the bumper [14].

2) Install washer [16], washer [17], washer [18] under the bumper [14] to adjust the step of the blocker door.

NOTE: The thickness of these washers are 0.016 inch (0.406 millimeter), 0.032 inch (0.813 millimeter) and 0.063 inch (1.600 millimeter).

3) Tighten the screw [15] to 50-65 inch-pounds (5.6-7.3 newton-meters).

SUBTASK 78-31-14-420-002-H01

(5) Connect the drag link [12] to the blocker door [1].

(a) Remove the adhesive tape and the shop rag from the drag link [12].

(b) Align the hole in the end of the drag link [12] with the pivot link on the blocker door [1].

(c) Install the bolt [11], washer [10], washer [19], bushings [9], washer [8] and nut [13].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Install the bolt in the drag link with the bolt head up.

NOTE: If the nut is loose or missing, the bolt head will prevent the bolt from falling out of the drag link.

2) Tighten the nut [13] to 375 in-lb (42 N·m) to 475 in-lb (54 N·m).

SUBTASK 78-31-14-090-002-H01

(6) Remove the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-14-980-004-H01

(7) Manually retract the thrust reverser sleeve to put the blocker doors into the retracted position.

(a) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-31-14-440-003-H01

(8) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-14-981-001-H01

(9) Use the power method to operate the thrust reverser a minimum of three full cycles to make sure the blocker doors operate correctly:

(a) Do this task: Thrust Reverser Operation - Extend (Power Method), TASK 78-31-00-981-801-H01.

(b) Do this task: Thrust Reverser Operation - Retract (Power Method), TASK 78-31-00-981-802-H01.

SUBTASK 78-31-14-040-005-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(10) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-14-211-002-H01

(11) Do a check of the blocker doors; Thrust Reverser Blocker Door Inspection - Aerodynamic Smoothness, TASK 78-31-14-200-802-H01.

NOTE: The blocker doors must not extend above the surface of the fan duct cowl when the thrust reverser is fully retracted.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-14-410-003-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-14-440-004-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-14-440-005-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-14-860-003-H01

(4) Remove the DO-NOT-OPERATE tags from the thrust levers.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER BLOCKER DOORS - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has two tasks:

(1) An inspection of the thrust reverser blocker doors.

(2) A check of the aerosmoothness of the installed blocker door.

TASK 78-31-14-200-801-H01

2. Thrust Reverser Blocker Door Detailed Inspection

(Figure 601)

A. General

(1) There are sixteen blocker doors on each thrust reverser, eight blocker doors on each thrust reverser half.

(2) The 315W1591 blocker door is a simplified, flat surface door with the hinge fittings and drag link attach fittings attached to the door with fasteners.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-31-14-000-801-H01	Thrust Reverser Blocker Doors Removal (P/B 401)
78-31-14-400-801-H01	Thrust Reverser Blocker Doors Installation (P/B 401)
78-31-15-000-801-H01	Thrust Reverser Blocker Door Drag Links Removal (P/B 401)
78-31-15-400-801-H01	Thrust Reverser Blocker Door Drag Links Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
STD-146	Calipers - Vernier, 0 to 6 in (0 to 152 mm), Readable to 1/1000 in (.025 mm)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Inspection

SUBTASK 78-31-14-860-001-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-14-040-001-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-14-010-004-H01

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-14-040-002-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

H. Thrust Reverser Blocker Door Detailed Inspection

SUBTASK 78-31-14-210-001-H01

(1) From the back of the thrust reverser, make a note of all thrust reverser blocker doors that have not retracted into the thrust reverser sleeve.

SUBTASK 78-31-14-980-001-H01

WARNING KEEP ALL PERSONNEL AND EQUIPMENT AWAY FROM THE AREA THAT IS AFT OF THE APPLICABLE THRUST REVERSER. IF YOU IGNORE THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER EXTENDS.

(2) Manually extend the thrust reverser approximately 15 in. (38 cm) to move the blocker doors from the stowed position.

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-31-14-869-001-H01

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOORS AT THE TOP OF THE THRUST REVERSER. DO NOT PULL ON THE DRAG LINKS. DO NOT PUT YOUR FEET OR WEIGHT ON THE DRAG LINKS. DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

CAUTION MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(3) Install the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment to get access to the blocker doors.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of translating sleeve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Use boot socks over your work boots and install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser fan duct to access the blocker doors and drag links.

SUBTASK 78-31-14-212-001-H01

(4) Examine each blocker door for cracks or damage (Figure 601).

(a) If you find damage or cracks to the composite material of the blocker door, replace the blocker door.

NOTE: Vertical cracks in the edge of the blocker door should be repaired as soon as possible to prevent water damage to the core. The edge of the door is covered with a potting compound which is a water barrier. The potting compound is not structural. The edge potting may be repair by application of BMS 5-28 Type 6 or BMS 5–28 7 potting compound.

(b) If you find damage or cracks to the hinge fittings, drag link attachment fitting or fasteners, replace the blocker door or refer to the Component Maintenance Manual for repairs.

(c) Try to move the blocker door [1] from side to side, forward to aft, or up and down at the hinge fittings with your hands.

NOTE: Hold the blocker door as close to the hinge fittings as possible.

1) If there is movement, measure the amount of axial and radial movement with vernier calipers, STD-146.

a) Axial movement (side-to-side) must not be more than 0.004 in. (0.102 mm).

b) Radial movement (up-down or forward-aft) must not be more than 0.007 in. (0.178 mm).

(d) Make sure the that the bolt [4] in the clamped hinge does not turn when you move the blocker door [1].

SUBTASK 78-31-14-430-001-H01

(5) If you find movement in the blocker door hinges that is not within limits, tighten the hinge nut [9] or add a washer under the hinge nut.

(a) Do this task: Thrust Reverser Blocker Doors Installation, TASK 78-31-14-400-801-H01.

1) Make sure the nuts on the two hinge bolts [4] are tightened to 82.5 ±17.5 in-lb (9.3 ±2.0 N·m).

2) Make sure the anti-rotation clip on the unclamped hinge is installed correctly.

3) Make sure the nut on the drag link attach bolt is tightened to 425 ±50 in-lb (48 ±6 N·m).

SUBTASK 78-31-14-210-002-H01

(6) If you find blocker doors that have not retracted into the thrust reverser sleeve, do these steps:

NOTE: These steps incorporate the intent of Boeing Maintenance Tip 78-005.

(a) Remove the bolt that connects the drag link to the blocker door.

1) Do this task: Thrust Reverser Blocker Door Drag Links Removal, TASK 78-31-15-000-801-H01.

(b) Make sure the blocker door retracts flat into the thrust reverser sleeve.

(c) If the bearing has seized, remove the ball through the slot of the uniball bearing in the drag link.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Wipe the ball and the race clean with a clean cotton wiper, G00034.

(e) Do a visual examination of the ball and the race for corrosion and damage.

1) If corrosion is present in the race, do these steps:

a) Remove the corrosion with an abrasive mat, G00251.

b) Wipe the race with a clean cotton wiper, G00034.

2) If the race is damaged, replace the spherical bearing.

3) If the ball is damaged, replace the ball.

(f) Assemble the ball and the race.

(g) Turn the ball to make sure it turns correctly.

(h) Install the bolt that connects the drag link to the blocker door [1].

1) Do this task: Thrust Reverser Blocker Door Drag Links Installation, TASK 78-31-15-400-801-H01.

SUBTASK 78-31-14-220-001-H01

(7) If you find wear in the blocker door hinges that is more than the limits, or the bolt [4] in the clamped hinge turns, or damage or cracks were found in the blocker door, do the applicable step that follows (as needed):

(a) Replace the blocker door [1].

1) Do this task: Thrust Reverser Blocker Doors Removal, TASK 78-31-14-000-801-H01.

2) Do this task: Thrust Reverser Blocker Doors Installation, TASK 78-31-14-400-801-H01.

(b) Replace all the metal components in the blocker door hinges.

1) Do a detailed dimensional examination of the blocker door hinge components with the wear limit data (Table 601).

2) Replace the hinge bolts [4], plain bushings [5] and bushings [6], flanged bushings [7], flanged bushings [8], flanged bushings [10], anti-rotation clip, washers and nuts [9] if necessary.

3) Refer to the Component Maintenance Manual to replace the hinge fittings on the blocker door.

NOTE: The 315W1591 blocker door is a simplified, flat surface, composite door with the hinge fittings and drag link attach fittings attached to the door with fasteners. The bearing races and bearing balls are installed in the hinge fittings.

4) Refer to the Component Maintenance Manual to replace the flanged bushings in the hinge fittings mounted on the translating sleeve.

Table 601/78-31-14-993-802-H00 Blocker Door Hinge Wear Limits

Part Interface								
Part A	Part B	Part Name	Design Min *[1]	Design Max *[1]	Allow Wear Dim *[1]	Wear Max Clear *[1]	Replace Part
2	3	Bearing Race ID	0.5010 (12.7254)	0.5015 (12.7381)	0.5040 (12.8016)	0.0040 (0.1016) Axial	Yes

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Table 601/78-31-14-993-802-H00 Blocker Door Hinge Wear Limits (Continued)

Part Interface		Part Name	Design Min *[1]	Design Max *[1]	Allow Wear Dim *[1]	Wear Max Clear *[1]	Replace Part
Part A	Part B						
2	3	Spherical Bearing OD	0.4995 (12.6873)	0.5000 (12.7000)	0.4970 (12.6238)	0.0040 (0.1016) Radial	Yes
3	4	Spherical Ball ID	0.2497 (6.3424)	0.2502 (6.3551)	0.2519 (6.3983)	0.0024 (0.0610)	Yes
3	4	Bolt OD	0.2490 (6.3246)	0.2495 (6.3373)	0.2473 (6.2814)	0.0024 (0.0610)	Yes
5	4	Bushing ID	0.2500 (6.3500)	0.2505 (6.3627)	0.2525 (6.4135)	0.0030 (0.0762)	Yes
6	4						
5	4	Bolt OD	0.2490 (6.3246)	0.2495 (6.3373)	0.2470 (6.2738)	0.0030 (0.0762)	Yes
6	4						
7	5	Flanged Bushing ID	0.3747 (9.5174)	0.3753 (9.5326)	0.3771 (9.5783)	0.0026 (0.0660)	Yes
8	6						
7	5	Bushing OD	0.3740 (9.4996)	0.3745 (9.5123)	0.3721 (9.4513)	0.0026 (0.0660)	Yes
8	6						
10	4	Flanged Bushing ID	0.2497 (6.3424)	0.2503 (6.3576)	0.2521 (6.4033)	0.0026 (0.0660)	Yes
10	4	Bolt OD	0.2490 (6.3246)	0.2495 (6.3373)	0.2471 (6.2763)	0.0026 (0.0660)	Yes

*[1] Dimensions in inches (millimeters)

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-14-090-001-H01

(1) Remove the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-14-080-003-H00

(2) Make sure the work area is clean and remove the protective mat, STD-585 and all other tools and equipment.

SUBTASK 78-31-14-980-002-H01

WARNING KEEP PERSONNEL AND EQUIPMENT AWAY FROM THE APPLICABLE THRUST REVERSER. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER RETRACTS.

(3) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-31-14-440-001-H01

(4) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-14-410-004-H01

(5) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

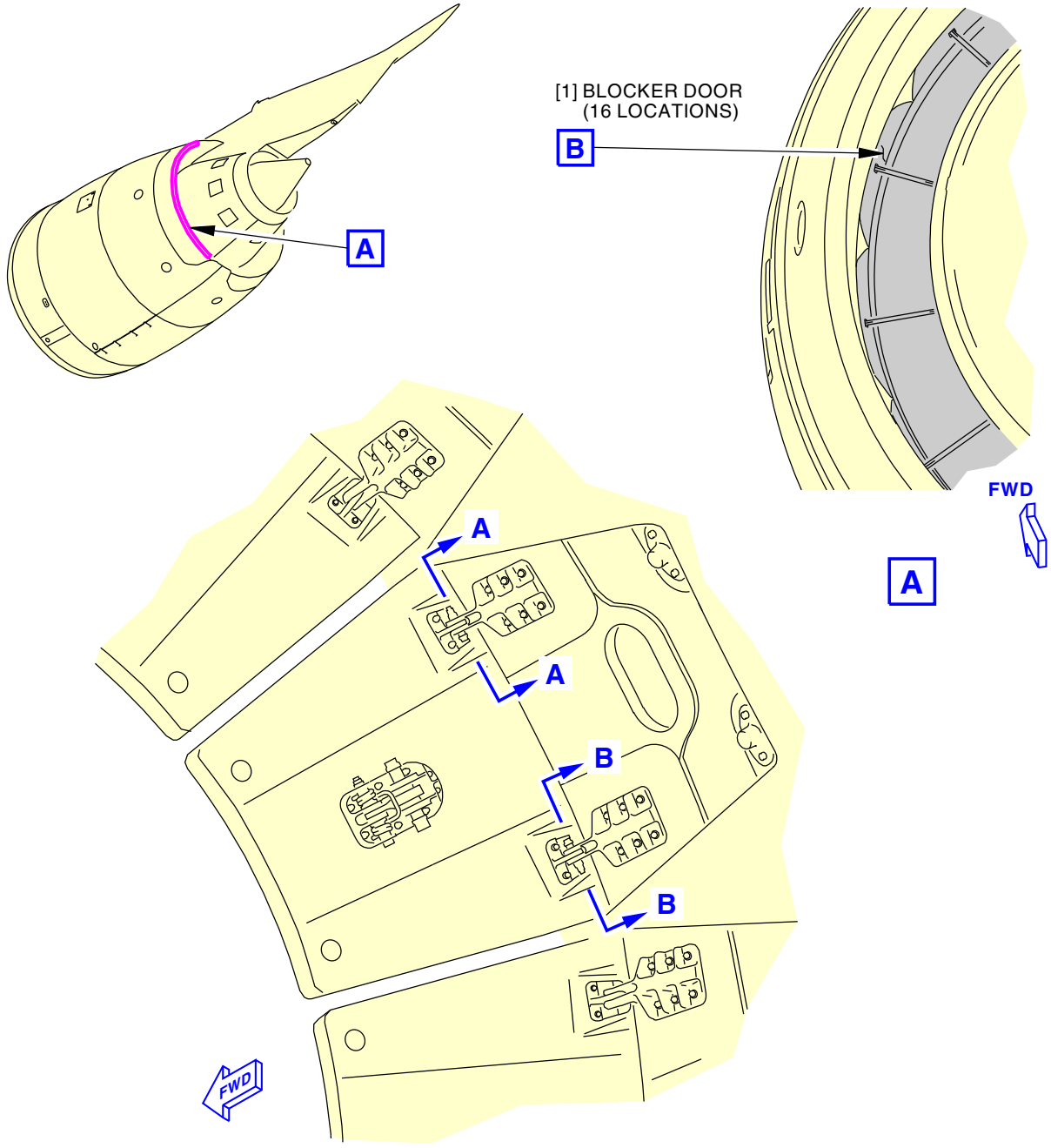
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-14-440-002-H01

(6) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



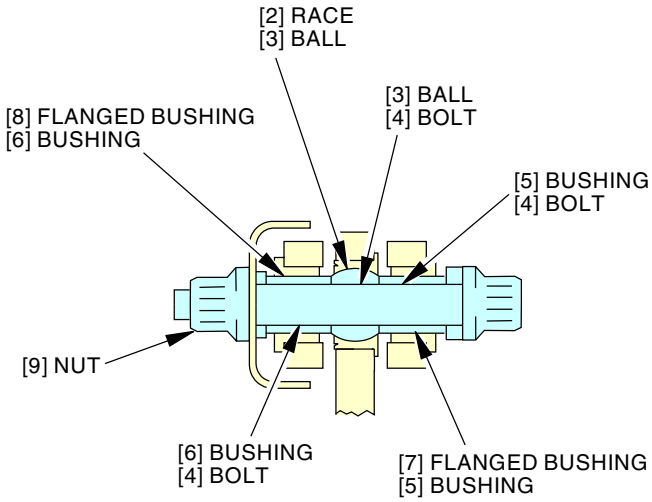
BLOCKER DOOR OPEN

B

M07470 S0004286431_V2

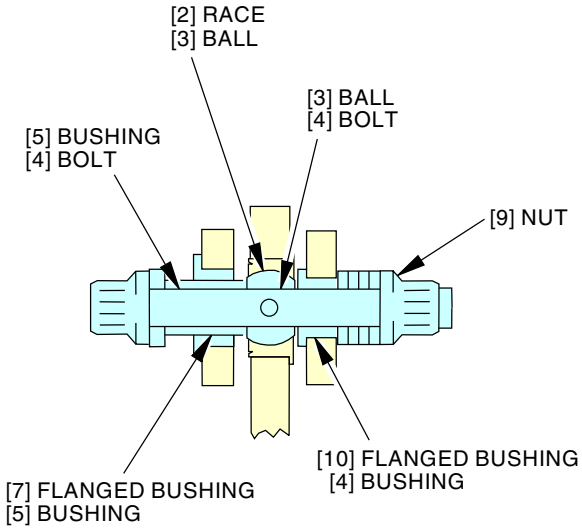
Thrust Reverser Blocker Door Detailed Inspection
Figure 601/78-31-14-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



UNCLAMPED HINGE

A-A



CLAMPED HINGE

B-B

M07471 S0004286432_V2

Thrust Reverser Blocker Door Detailed Inspection
Figure 601/78-31-14-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-14-200-802-H01

3. Thrust Reverser Blocker Door Inspection - Aerodynamic Smoothness

(Figure 602)

A. General

(1) This procedure examines the gaps and clearances of the blocker door after installation.

(2) The R78001 access platform blocks cannot be used to do this check. The R78001 blocks fit into the recess that is open when the thrust reverser sleeve is extended and the blocker door is open. This check is done with the thrust reverser closed and the thrust reverser sleeve is completely retracted.

B. References

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-14-400-801-H01	Thrust Reverser Blocker Doors Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-13606	Gauge - Wear Measurement, T/R Blocker Door Part #: G78009-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Consumable Materials

Reference	Description	Specification
A01069	Adhesive - Epoxy, 2 Part	BMS5-92 Type III
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00083	Solvent - VM&P Naphthas	TT-N-95 Type II, ASTM D-3735 Type III
B00130	Alcohol - Isopropyl	TT-I-735
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
426	Right Thrust Reverser - Right Engine

F. Prepare for the Procedure

SUBTASK 78-31-14-860-004-H01

(1) Make sure the thrust reverser closed and the thrust reverser sleeve is completely retracted.

SUBTASK 78-31-14-040-007-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(2) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-14-490-004-H01

(3) Install a protective protective mat, STD-585 on the translating sleeve.

SUBTASK 78-31-14-490-005-H01

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOOR AT THE TOP OF THE THRUST REVERSER. DO NOT PULL OR STAND ON THE DRAG LINK. DAMAGE TO THE EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(4) If it is possible, install an access platform in the fan duct to get access to the blocker doors.

NOTE: An access platform can be made with a stack of large, solid, styrofoam blocks (local purchase). Make sure the surface of the blocks are clean to prevent damage to the composite inner wall. The size of the blocks should fit in the fan duct and are of sufficient length so that the blocks are stable when you stack the blocks and stand on the blocks.

NOTE: Access platform R78001 which is used to access blocker doors and blocker door drag links for maintenance can not be used for this procedure. The R78001 platform blocks require you to extend the thrust reverser and these blocks fit into the spaces where the blocker doors are closed.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Put boot socks over your work boots.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Procedure

SUBTASK 78-31-14-220-002-H01

(1) Examine the gaps and clearances of the blocker doors to make sure they are in the limits as shown (Figure 602).

NOTE: Use a wear gauge, SPL-13606.

NOTE: All dimensions are shown in inches (millimeters).

(a) At the upper and lower end wedges that are next to the upper and lower bifurcation, it is permitted to trim the edge of the end wedge 0.100 inch (2.54 millimeters) to maintain the gap between the blocker door and the end wedge.

NOTE: Do not modify the composite blocker door. Trim the thermoplastic wedge as necessary.

1) Wipe the end wedge with a clean cotton wiper, G00034 moist with alcohol, B00130, solvent, B00062 or solvent, B00083.

2) Apply epoxy adhesive, A01069 to the trimmed edge.

a) Mix the two-part epoxy to a ratio of 100 parts by weight component A to 33 parts by weight component B.

NOTE: This epoxy has a one hour pot life below 80 degrees F (26.7 degrees C).

b) Epoxy adhesive will cure in-service in 24 hours at 80 degrees F (26.7 degrees C).

(b) Measure the step between the blocker door and the wedges at three places and perpendicular to the wedge fasteners.

1) The step between the blocker door and the wedges should be -0.040 to +0.040 inch (-1.016 to +1.016 millimeter).

(c) If the steps are not in the limits, adjust the blocker door as necessary.

1) Do this task: Thrust Reverser Blocker Doors Installation, TASK 78-31-14-400-801-H01.

H. Put the Airplane Back To the Usual Condition

SUBTASK 78-31-14-090-003-H01

(1) If it is necessary, remove the access platform.

SUBTASK 78-31-14-090-004-H01

(2) Remove the protective protective mat, STD-585 from the translating sleeve.

SUBTASK 78-31-14-942-001-H01

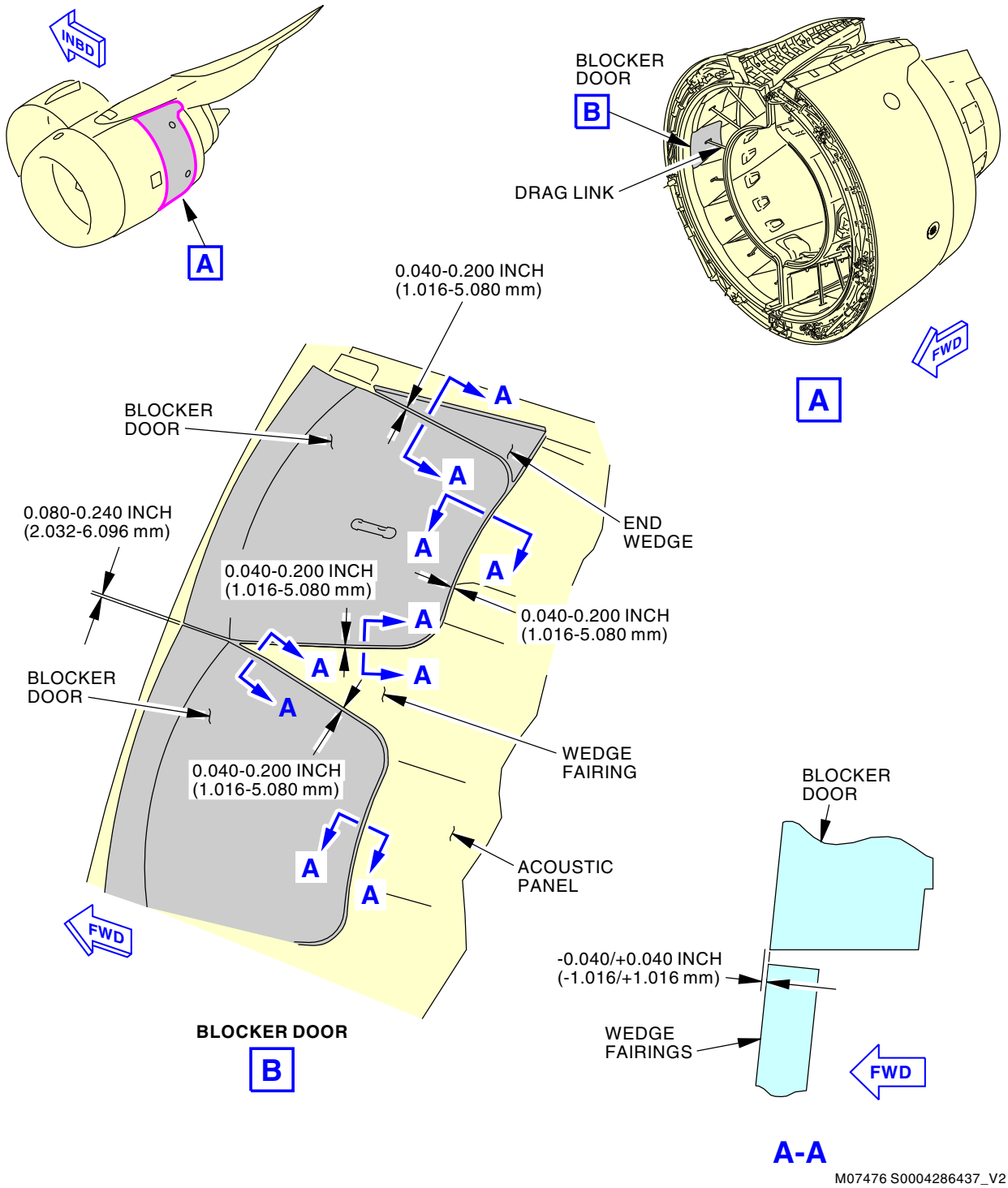
(3) Make sure that the work area is clean and remove all tools and other items.

SUBTASK 78-31-14-440-006-H01

(4) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Blocker Door Aerodynamic Smoothness
Figure 602/78-31-14-990-803-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-14-200-803-H00

4. Thrust Reverser Blocker Door and Drag Link Inspection

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) There are a total of sixteen blocker doors and sixteen drag links on each thrust reverser; eight blocker doors and eight drag links on each thrust reverser half. You must examine all sixteen blocker doors and drag links on each thrust reverser.

(2) The 315W1591 blocker door is a simplified, flat surface door with the hinge fittings and drag link attach fittings attached to the door with fasteners.

(3) This procedure does a check for wear on the sixteen blocker door drag links. If indications of wear are found, do a detailed dimensional examination.

(4) Do not go into the thrust reverser when the thrust reverser is in the open position. Your weight can damage the hold open rods or the attachment fittings on the engine fan case or attachment fittings on the thrust reverser torque box.

(5) Damage to the drag link blocker door or attachment fittings in the fan duct cowl may occur if you use the drag links as a ladder rung.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-31-14-400-801-H01	Thrust Reverser Blocker Doors Installation (P/B 401)
78-31-15-200-801-H01	Thrust Reverser Blocker Door Drag Link Detailed Inspection (P/B 601)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
STD-146	Calipers - Vernier, 0 to 6 in (0 to 152 mm), Readable to 1/1000 in (.025 mm)
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description
STD-14414	Dial Indicator - Graduations of .0001 inch

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Prepare for the Inspection

SUBTASK 78-31-14-860-005-H00

CAUTION RETRACT THE LEADING EDGE SLATS, AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF YOU DO NOT OBEY THESE PRECAUTIONS, THE FAN COWL PANELS WILL HIT THE SLATS. DAMAGE WILL OCCUR.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-14-040-008-H00

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801

SUBTASK 78-31-14-010-005-H00

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-14-040-009-H00

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Procedure

SUBTASK 78-31-14-210-003-H00

(1) From the back of the thrust reverser, make a note of all thrust reverser blocker doors that have not retracted into the thrust reverser sleeve.

SUBTASK 78-31-14-840-001-H00

WARNING DO NOT OPEN THE THRUST REVERSERS TO DO THIS INSPECTION. YOUR WEIGHT CAN BREAK THE HOLD-OPEN RODS WHICH WILL CAUSE THE THRUST REVERSER TO CLOSE QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(2) Go in the aft end of the thrust reverser fan duct to gain access to the blocker doors and drag links.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Use boot socks over your work boots and install a protective mat, STD-585 on the translating sleeve.

SUBTASK 78-31-14-210-004-H00

(3) Examine each blocker door drag link

(a) Examine the surface of each drag link for nicks, dents, gouges or other damage.

1) If the depth of the nicks, dents, or gouges is more than 0.020 in. (0.508 mm), then replace the drag link.

(b) Do a check for movement for each drag link:

NOTE: Do not use an axial movement of the drag link because of the preload spring on the blocker door pivot link that is used to keep the blocker door closed and to dampen vibration and aero-flutter.

1) With your hands as close as possible to the blocker door, try to move the drag link forward and backward.

2) With your hands as close as possible to the inner fan duct cowl, try to move the drag link forward and backward.

3) If there is movement, measure the forward and backward movement of the drag link with a dial indicator, STD-14414.

a) Radial movement (forward-backward) must not be more than 0.0035 in. (0.0889 mm).

4) Make note of the movement value and the drag link location.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-14-980-007-H00

WARNING KEEP ALL PERSONNEL AND EQUIPMENT AWAY FROM THE AREA THAT IS AFT OF THE APPLICABLE THRUST REVERSER. IF YOU IGNORE THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER EXTENDS.

(4) Manually extend the thrust reverser approximately 15 in. (38 cm) to move the blocker doors from the stowed position.

(a) Before extending the thrust reversers, make sure that the work area is clean and remove the protective mat, STD-585 and all tools and other equipment.

(b) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-31-14-480-001-H00

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOORS AT THE TOP OF THE THRUST REVERSER. DO NOT PULL ON THE DRAG LINKS. DO NOT PUT YOUR FEET OR WEIGHT ON THE DRAG LINKS. DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

CAUTION MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(5) Install the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment to get access to the blocker doors

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01

(b) Use boot socks over your work boots and install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser fan duct to access the blocker doors and drag links.

SUBTASK 78-31-14-200-001-H00

(6) Examine each blocker door for cracks or damage (Figure 604).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) If you find damage or cracks to the composite material of the blocker door, replace the blocker door.

NOTE: Vertical cracks in the edge of the blocker door should be repaired as soon as possible to prevent water damage to the core. The edge of the door is covered with a potting compound which acts as a water barrier. The potting compound is not structural. The edge potting may be repaired by applying BMS 5-28 Type 6 or BMS 5-28 Type 7 potting compound.

(b) If you find damage or cracks to the hinge fittings, drag link attachment fittings or fasteners, repair the blocker door per the Component Maintenance Manual (CMM) or replace the blocker door.

(c) Try to move the blocker door from side to side, forward to aft, or up and down at the hinge fittings with your hands.

NOTE: Hold the blocker door as close to the hinge fittings as possible.

1) If there is movement, measure the amount of axial and radial movement with vernier calipers, STD-146.

a) Axial movement (side-to-side) must not be more than 0.004 in. (0.102 mm).

b) Radial movement (up-down or forward-aft direction) must not be more than 0.007 in. (0.178 mm).

(d) Make sure that the bolt in the clamped hinge does not turn when you move the blocker door.

SUBTASK 78-31-14-420-003-H00

(7) If you find movement in the blocker door hinges that is not within limits, tighten the hinge nut or add a washer under the hinge nut.

(a) Do this task: Thrust Reverser Blocker Doors Installation, TASK 78-31-14-400-801-H01.

(b) Make sure the nuts on the two hinge bolts are tightened to 82.5 ±17.5 in-lb (9.3 ±2.0 N·m).

(c) Make sure the antirotation clip on the unclamped hinge is installed correctly.

(d) Make sure the nut on the drag link attach bolt is tightened to 425 ±50 in-lb (48 ±6 N·m).

SUBTASK 78-31-14-220-005-H00

(8) If the following issues were discovered during the blocker door or drag link inspection, do these tasks accordingly: Thrust Reverser Blocker Door Detailed Inspection, TASK 78-31-14-200-801-H01 and Thrust Reverser Blocker Door Drag Link Detailed Inspection, TASK 78-31-15-200-801-H01.

(a) The radial movement of a drag link exceeds the limits described.

(b) There are blocker doors that have not retracted into the thrust reverser sleeve.

(c) There is wear in the blocker door hinges that exceeds the limits.

(d) The bolt in the clamped hinge turns.

(e) There is damage or cracks in the blocker door.

(f) The drag link and attach fittings show excessive movement.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-14-080-001-H00

(1) Remove the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

SUBTASK 78-31-14-080-002-H00

(2) Make sure the work area is clean and remove the protective mat, STD-585 and all other tools and equipment.

SUBTASK 78-31-14-980-006-H00

WARNING KEEP PERSONNEL AND EQUIPMENT AWAY FROM THE APPLICABLE THRUST REVERSER. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER RETRACTS.

(3) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-31-14-440-007-H00

(4) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-14-410-005-H00

(5) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

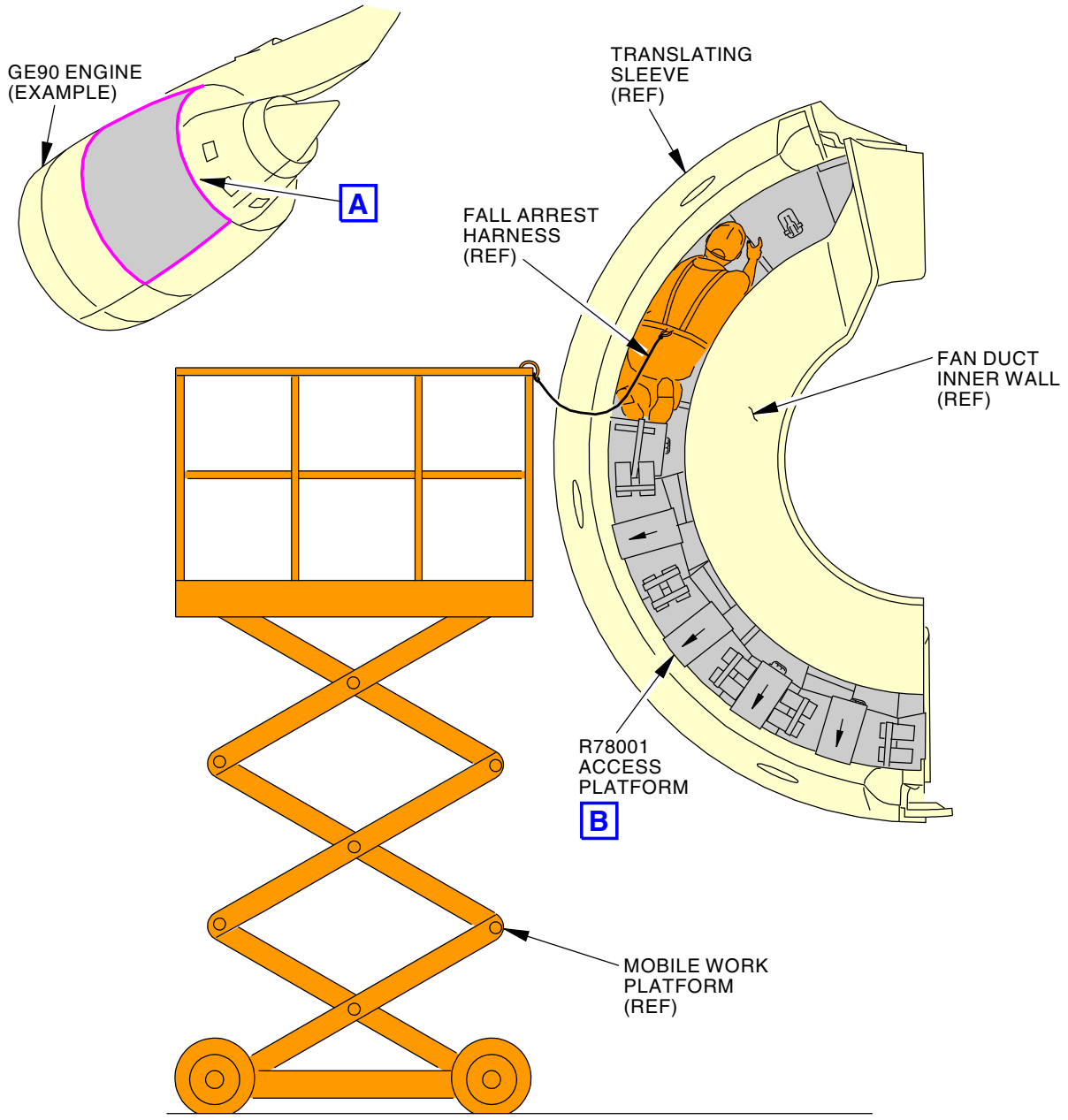
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-14-440-008-H00

(6) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



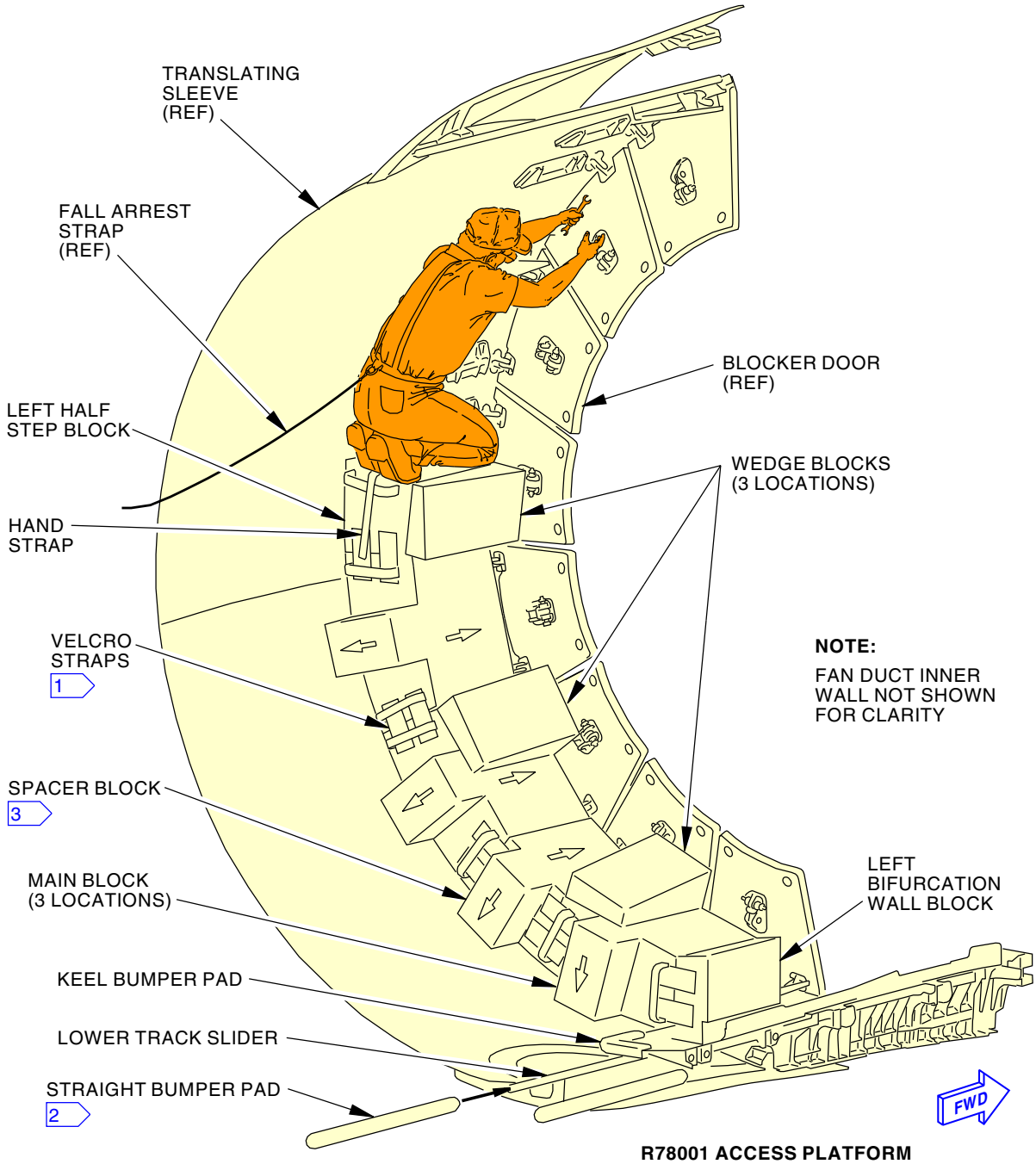
VIEW FORWARD
(LEFT SIDE SHOWN)

A

2567888 S0000615157_V1

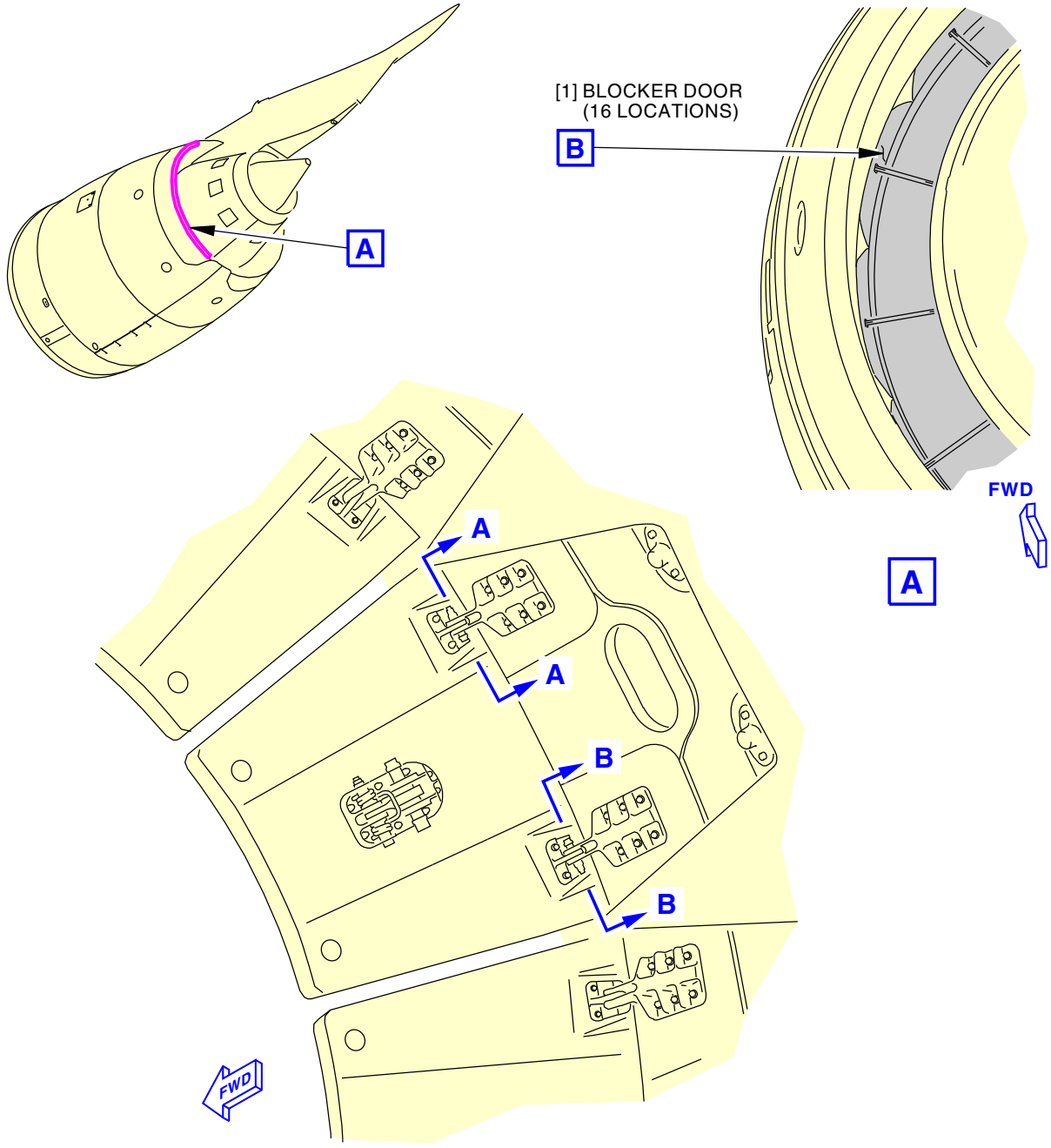
Thrust Reverser Blocker Door Access Platform Installation
Figure 603/78-31-14-990-808-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Blocker Door Access Platform Installation
Figure 603/78-31-14-990-808-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



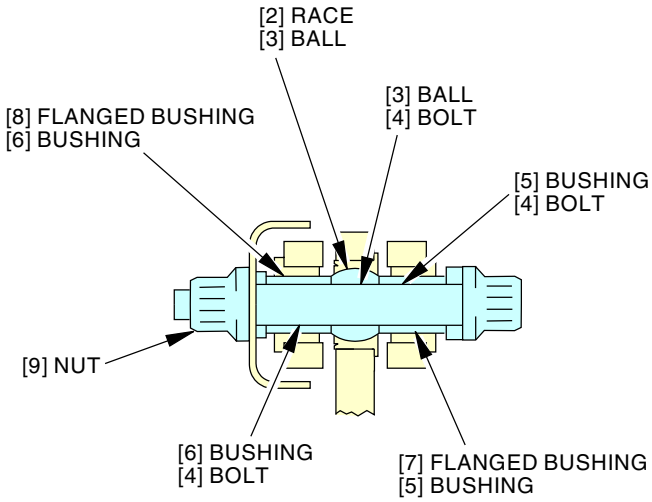
BLOCKER DOOR OPEN

B

M07470 S0004286431_V2

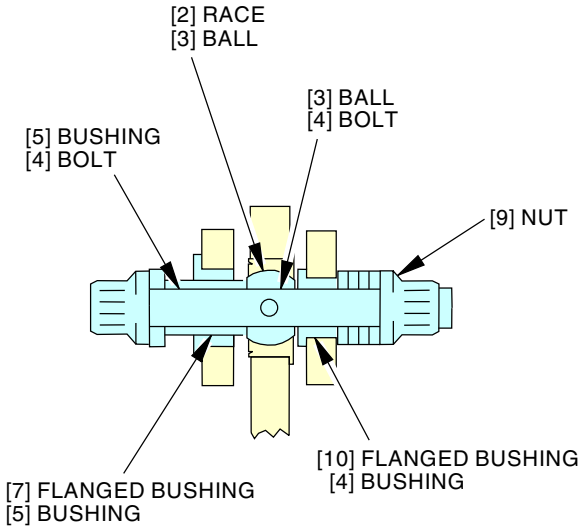
Thrust Reverser Blocker Door Inspection
Figure 604/78-31-14-990-806-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



UNCLAMPED HINGE

A-A



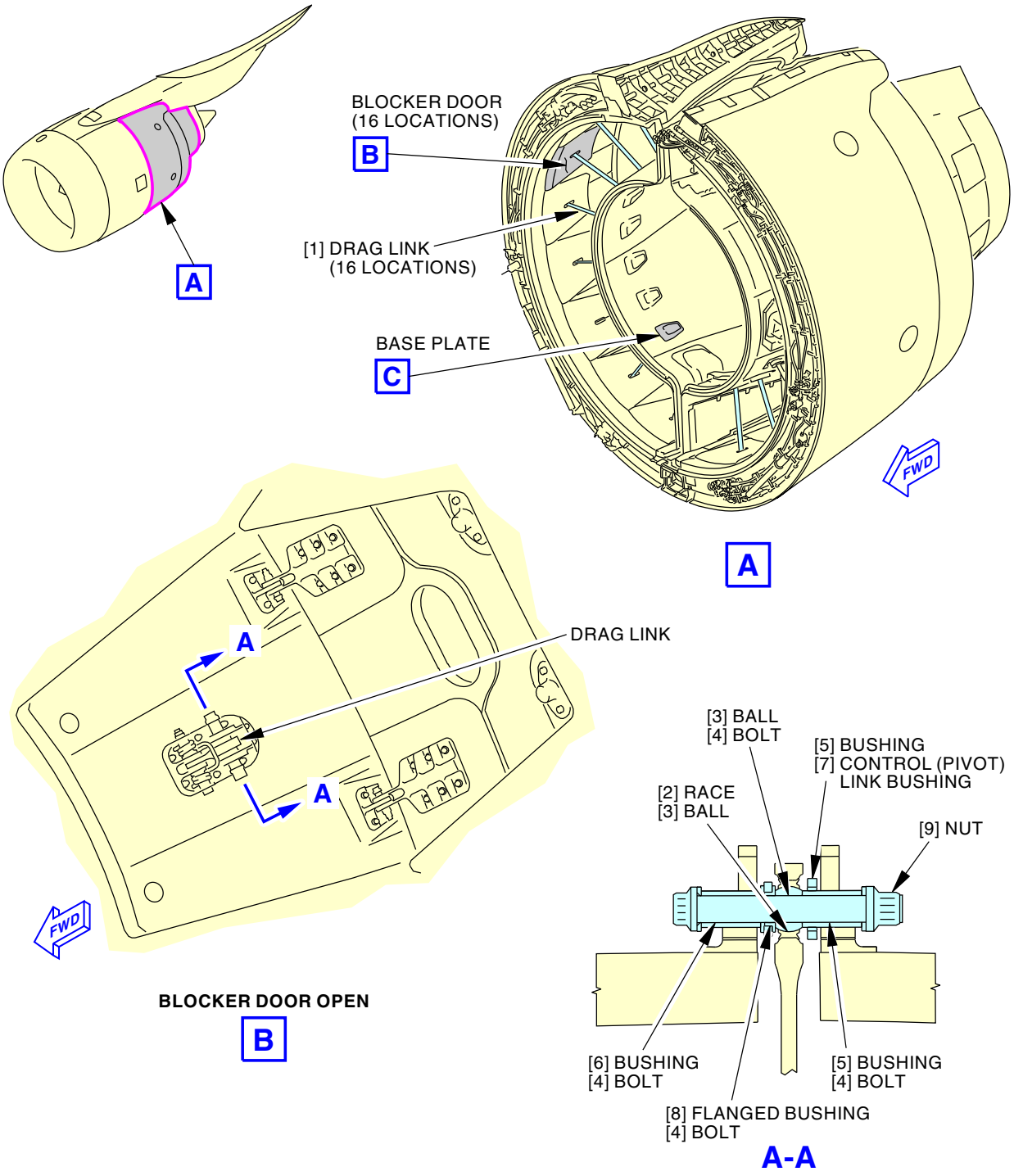
CLAMPED HINGE

B-B

M07471 S0004286432_V2

Thrust Reverser Blocker Door Inspection
Figure 604/78-31-14-990-806-H00 (Sheet 2 of 2)

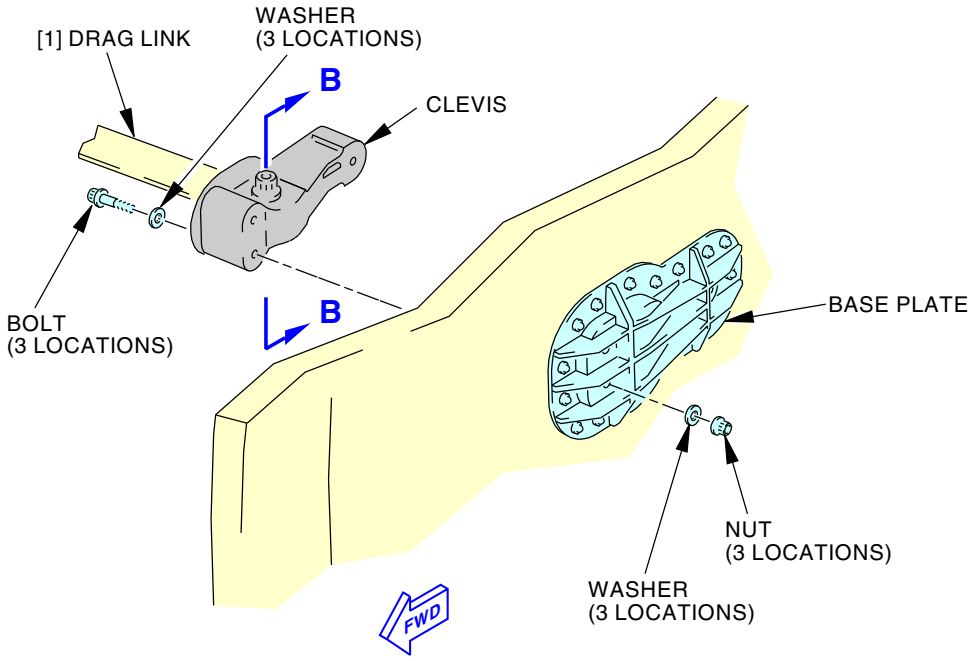
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M93371 S000099694_V3

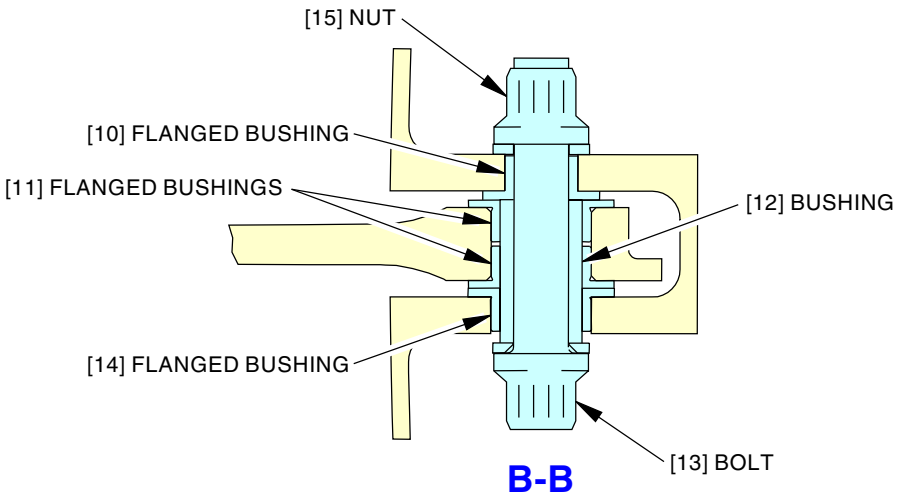
Thrust Reverser Blocker Door Drag Link Inspection
Figure 605/78-31-14-990-807-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



BASE PLATE
(EXAMPLE, 16 LOCATIONS)

C



M67068 S000099695_V3

Thrust Reverser Blocker Door Drag Link Inspection
Figure 605/78-31-14-990-807-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER BLOCKER DOOR DRAG LINKS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser blocker door drag links

(2) An installation of the thrust reverser blocker door drag links.

TASK 78-31-15-000-801-H01

2. Thrust Reverser Blocker Door Drag Links Removal

(Figure 401)

A. General

(1) For this procedure, the thrust reverser blocker door drag links are referred to as the drag links.

(2) The drag links are between the blocker doors and the inner wall of the thrust reverser fan duct.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-1312	Puller - Blind Hole Bearing, 0.2500 to 1.0625 Inch

D. Consumable Materials

Reference	Description	Specification
A50464	Tape - Vinyl, Adhesive Coated	BMS5-179
G02129	Tape - 223S (use until stock depleted)	

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Removal

SUBTASK 78-31-15-010-001-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-15-040-003-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-15-010-004-H01

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-15-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-15-980-001-H01

(5) Manually extend the thrust reverser sleeve to pull the blocker door to the extended position.

NOTE: The thrust reverser should be extended as little as possible to get access to the blocker door drag link.

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-31-15-490-001-H01

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOORS AT THE TOP OF THE THRUST REVERSER. DO NOT PULL ON THE DRAG LINKS. DO NOT PUT YOUR FEET OR WEIGHT ON THE DRAG LINKS. DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

CAUTION MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(6) Install the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment in the aft end of the thrust reverser to get access to the blocker doors.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Use boot socks over your work boots and install a protective mat, STD-585 on the translating sleeve.

H. Thrust Reverser Blocker Door Drag Links Removal

SUBTASK 78-31-15-020-001-H01

(1) Disconnect the drag link [1] from the blocker door (Figure 401):

(a) Remove the nut [6], washer [5], bushings [2], washer [16], washer [4], and bolt [3].

(b) Use adhesive Nitto 223S Tape, G02129 or tape, A50464 to hold the blocker door in the retracted position.

NOTE: When the drag link is disconnected from the blocker door, the preload spring will cause the pivot link to migrate past the fastener slot. Ensure that the pivot link is temporarily restrained in the stowed position to prevent damage.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-15-010-002-H01

(2) For the left and right thrust reversers on the applicable engine, do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

NOTE: The thrust reverser should be opened as little as possible to prevent damage to the wing and the thrust reverser sleeve.

(a) Open the applicable access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-15-010-003-H01

(3) Remove the thermal insulation blankets to get access to the drag link clevis.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

SUBTASK 78-31-15-020-002-H01

(4) Disconnect the drag link [1] from the thrust reverser inner wall:

(a) Remove the clevis [9] and drag link [1] from the thrust reverser:

1) Remove the nuts [11], washers [10], washers [8], and bolts [7].

(b) Remove the clevis [9] from the drag link [1]:

1) Remove the nut [15], washer [13], bushing [14], washer [13], and bolt [12].

2) Remove the bushing with a 0.2500 to 1.0625 inch blind hole bearing puller, STD-1312.

NOTE: This puller has two parts, a collet and a matched expander rod.

a) Get a collet that has a size of 0.3750 inch to 0.4375 inch (9.5250-11.1125 mm).

NOTE: The bushing minimum inside diameter is 0.3750 inch (9.525 mm).

b) Push the slotted side of the collet into the bushing hole.

NOTE: The slotted side has a circumferential ridge at the end of the collet.

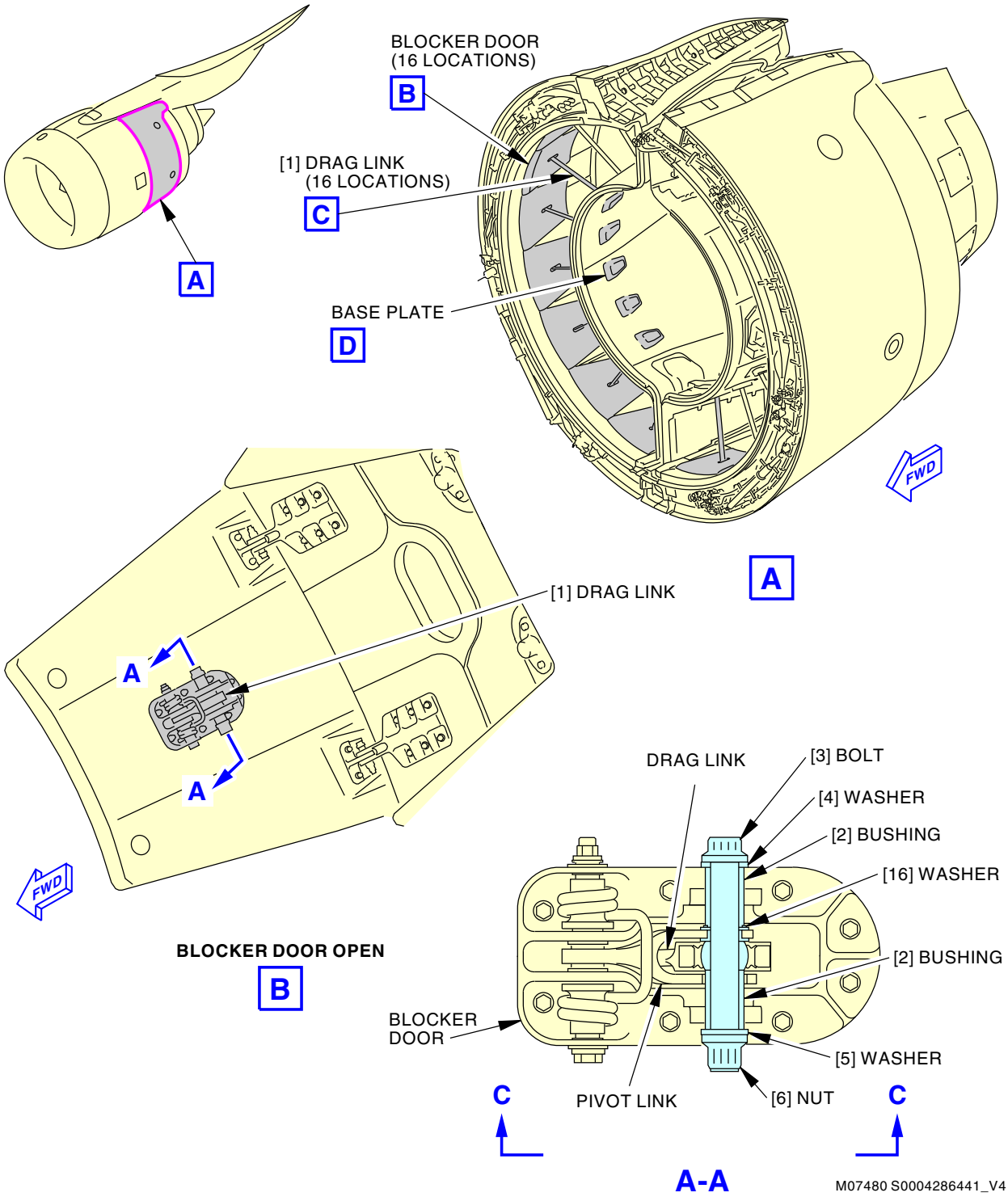
c) Thread the expander rod into the collet to increase the collet diameter until the collet is tightly secured.

d) Pull the collet to remove the bushing.

3) Disconnect the drag link [1] from the clevis [9].

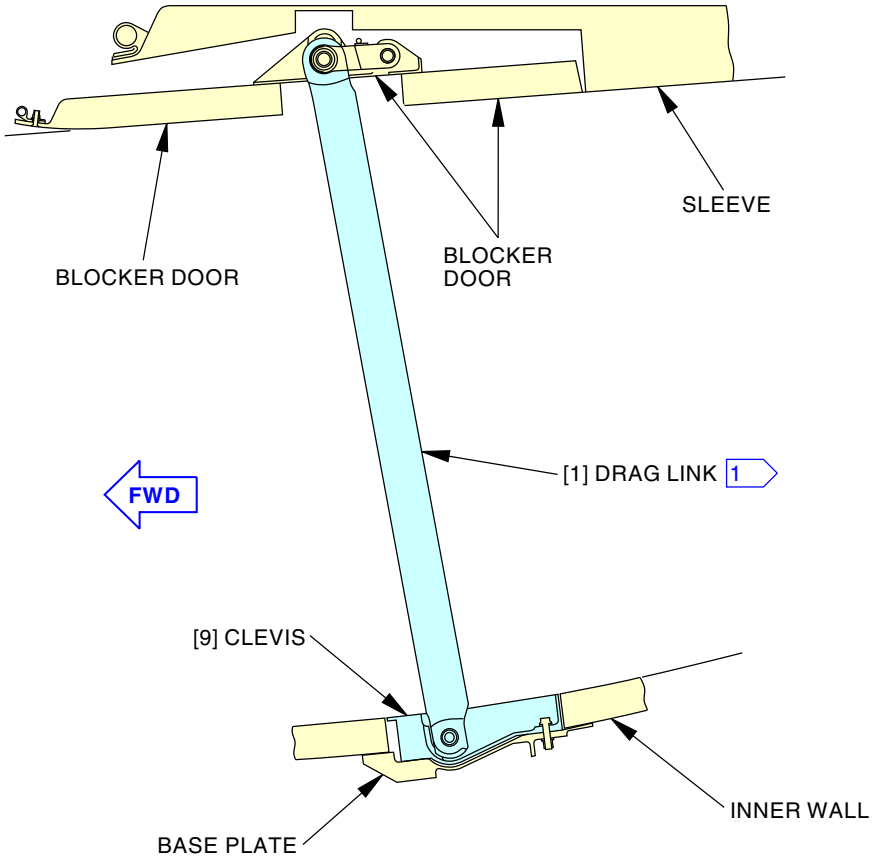
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Blocker Door Drag Links Installation
Figure 401/78-31-15-990-801-H01 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



DRAG LINK

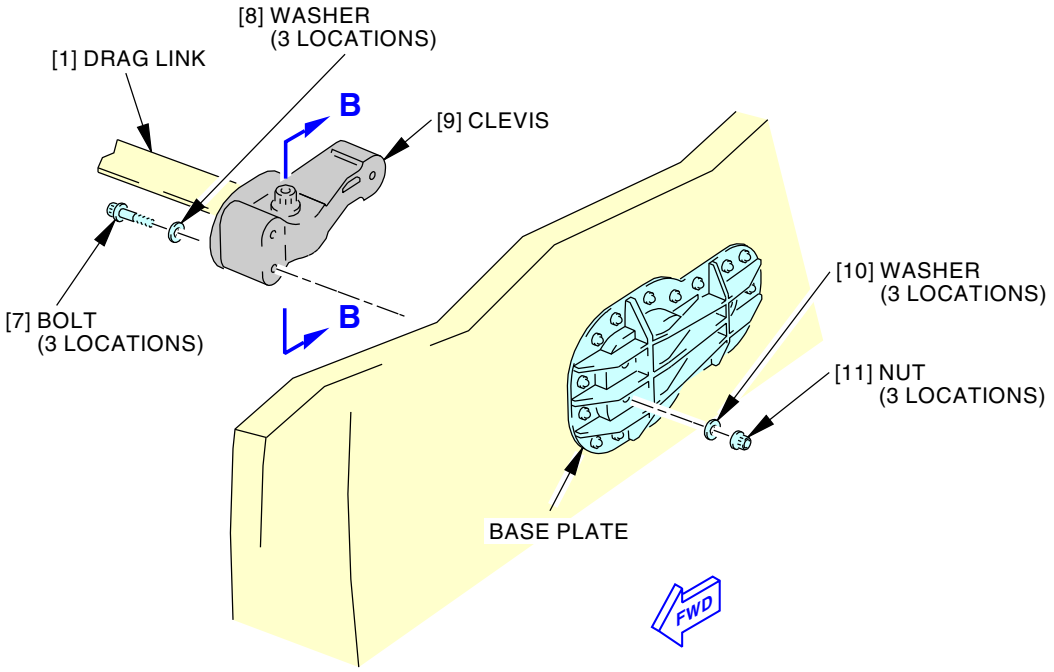
C

1 NOTE DRAG LINK FORWARD AND AFT EDGES FOR CORRECT INSTALLATION

M95067 S0000103180_V2

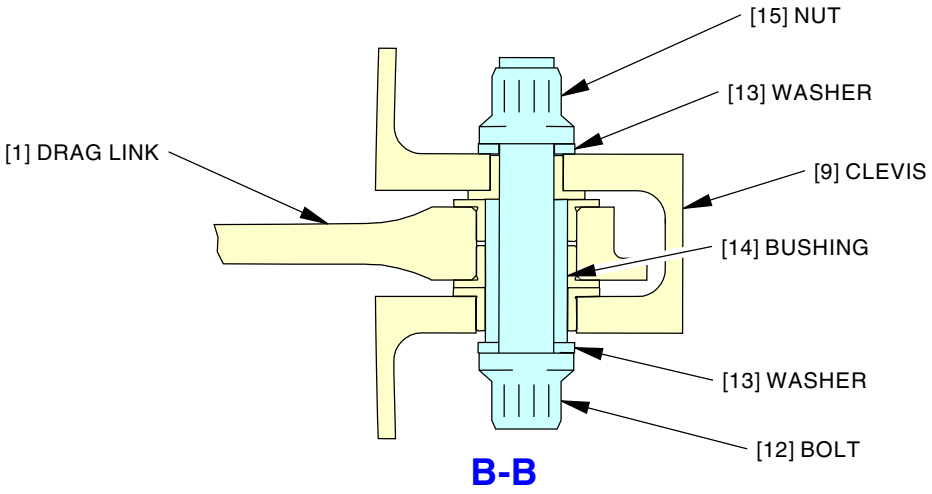
Thrust Reverser Blocker Door Drag Links Installation
Figure 401/78-31-15-990-801-H01 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



BASE PLATE

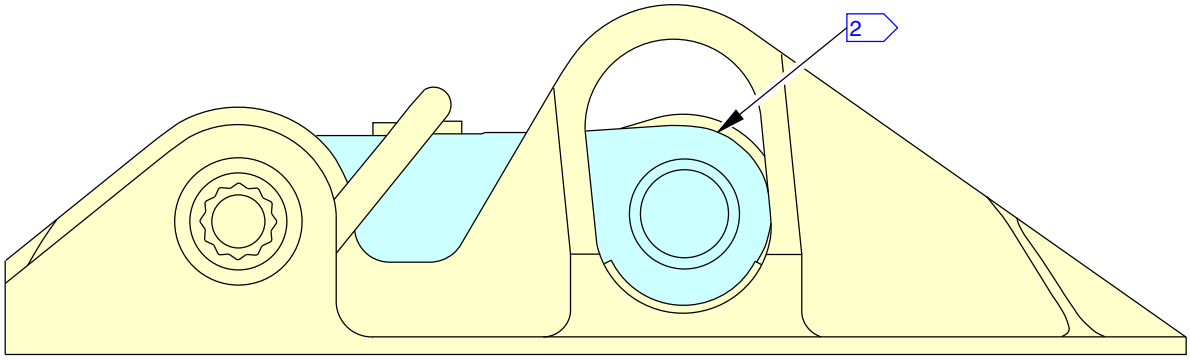
D



M07482 S0004286443_V3

Thrust Reverser Blocker Door Drag Links Installation
Figure 401/78-31-15-990-801-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



C-C

2 THE PIVOT LINK IS SHOWN IN THE STOWED POSITION, AS INSTALLED ON THE AIRCRAFT, AND SHALL BE TEMPORARILY RESTRAINED IN THIS POSITION.

2258971 S0000506411_V2

Thrust Reverser Blocker Door Drag Links Installation
Figure 401/78-31-15-990-801-H01 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-15-400-801-H01

3. Thrust Reverser Blocker Door Drag Links Installation

(Figure 401)

A. General

(1) After you install a drag link, you must extend and retract the thrust reverser to make sure the drag link operates correctly.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-800-801-H01	Thrust Reverser Blocker Door Access Platform (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-31-00-981-801-H01	Thrust Reverser Operation - Extend (Power Method) (P/B 201)
78-31-00-981-802-H01	Thrust Reverser Operation - Retract (Power Method) (P/B 201)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2617	Platform - Access, Thrust Reverser, Blocker Doors (GE90 engines) Part #: R78001-58 Supplier: 81205 Opt Part #: R78001-1 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Thrust Reverser Blocker Door Drag Links Installation

SUBTASK 78-31-15-420-001-H01

(1) Attach the drag link [1] to the thrust reverser inner wall (Figure 401):

(a) Align the drag link [1] to the clevis [9].

1) Make sure the drag link is correctly oriented with the thinner trailing edge aft.

(b) Install the bolt [12], washer [13], bushing [14], washer [13], and nut [15].

1) Install the end of the drag link [1] with the flanged bushings into the clevis fitting for the inner wall.

NOTE: The drag link has a cross section like a wing. The forward leading edge is rounded and the trailing edge is tapered. One end of the drag link has flanged bushings. The bottom of the link has a flange feature and the clevis fitting in the inner wall has an opposite feature. This feature prevents the installation of the drag link with the trailing edge forward.

2) Install the bolt in the drag link with the bolt head up.

NOTE: If the nut became loose or was missing, the bolt head would prevent the bolt from falling out of the drag link.

3) Tighten the nut to 300-400 inch-pounds (33.9-45.2 newton-meters).

(c) Align the clevis [9] to the base plate.

(d) Install the bolts [7], washers [8], washers [10], and nuts [11].

SUBTASK 78-31-15-410-003-H01

(2) Install the thermal insulation blankets.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-15-410-001-H01

(3) For the left and right thrust reversers, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

(a) Close the applicable access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-15-090-001-H01

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION BE CAREFUL WHEN YOU GET ACCESS TO THE BLOCKER DOOR AT THE TOP OF THE THRUST REVERSER. DO NOT PULL OR STAND ON THE DRAG LINK. DAMAGE TO THE EQUIPMENT CAN OCCUR.

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(4) Use the thrust reverser blocker doors access platform (GE90), SPL-2617 to get access to the blocker doors.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of the translating sleeve.

(a) Use boot socks over your work boots and make sure a protective mat, STD-585 was install on the translating sleeve.

SUBTASK 78-31-15-420-002-H01

(5) Connect the drag link [1] to the blocker door:

(a) Remove the adhesive tape from the blocker door.

(b) Align the hole in the end of the drag link [1] with the pivot link on the blocker door.

(c) Install the bolt [3], washer [4], washer [16], bushings [2], washer [5], and nut [6].

1) Tighten the nut [6] to 375 in-lb (42 N·m) to 475 in-lb (54 N·m).

SUBTASK 78-31-15-090-002-H01

(6) Remove the thrust reverser blocker doors access platform (GE90), SPL-2617 or equivalent equipment.

(a) Do this task: Thrust Reverser Blocker Door Access Platform, TASK 78-31-00-800-801-H01.

(b) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-15-980-002-H01

(7) Manually retract the thrust reverser sleeve to put the blocker doors to the retracted position.

(a) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-31-15-440-001-H01

(8) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Thrust Reverser Blocker Door Drag Link Installation Test

SUBTASK 78-31-15-710-001-H01

(1) Operate the thrust reverser a minimum of three full cycles to make sure the drag links operate correctly.

(a) Do this task: Thrust Reverser Operation - Extend (Power Method), TASK 78-31-00-981-801-H01.

(b) Do this task: Thrust Reverser Operation - Retract (Power Method), TASK 78-31-00-981-802-H01.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-15-410-004-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-15-440-003-H01

(2) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER BLOCKER DOOR DRAG LINKS - INSPECTION/CHECK

1. General

A. This procedure has this task:

(1) An examination of the thrust reverser blocker door drag links.

TASK 78-31-15-200-801-H01

2. Thrust Reverser Blocker Door Drag Link Detailed Inspection

(Figure 601)

A. General

(1) This procedure does a check for wear on the sixteen blocker door drag links.

(2) There are a total of sixteen drag links on each thrust reverser; eight drag links on each thrust reverser half.

(3) Do not go into the thrust reverser when the thrust reverser is in the open position. Your weight can damage the hold open rods or the attachment fittings on the engine fan case or attachment fittings on the thrust reverser torque box.

(4) Damage to the drag link, blocker door or attachment fittings in the fan duct cowl can occur if you use the drag links as a ladder rung.

(5) The blocker door is a simplified, flat surface door with the hinge fittings and drag link attach fittings attached to the door with fasteners.

B. References

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-15-000-801-H01	Thrust Reverser Blocker Door Drag Links Removal (P/B 401)
78-31-15-400-801-H01	Thrust Reverser Blocker Door Drag Links Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-14414	Dial Indicator - Graduations of .0001 inch

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Prepare for the Examination

SUBTASK 78-31-15-040-005-H00

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00

G. Thrust Reverser Blocker Door Drag Link Detailed Inspection

SUBTASK 78-31-15-210-001-H01

(1) From the back of the thrust reverser, make a note of all thrust reverser doors that have not retracted into the thrust reverser sleeve.

SUBTASK 78-31-15-840-001-H01

WARNING DO NOT OPEN THE THRUST REVERSERS TO DO THIS INSPECTION. YOUR WEIGHT CAN BREAK THE HOLD-OPEN RODS WHICH WILL CAUSE THE THRUST REVERSER TO CLOSE QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT

CAUTION PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(2) Go in the aft end of the thrust reverser fan duct to access to the blocker doors and drag links.

NOTE: If you do not have an access platform, you can push on the opposite sides of the inner duct walls with your hands and feet while you lift your body up against the inner wall of translating sleeve.

(a) Use boot socks over your work boots and install a protective mat, STD-585 on the translating sleeve.

SUBTASK 78-31-15-210-002-H01

(3) Examine each drag link (Figure 601):

(a) Examine the surface of each drag link [1] for nicks, dents, gouges or other damage.

1) If the depth for the nicks, dents, or gouges is more than 0.020 in. (0.508 mm), replace the drag link.

(b) Do a check for movement for each drag link [1].

NOTE: Do not use an axial movement of the drag link because of the preload spring on the blocker door pivot link that is used to keep the blocker door closed and to dampen vibration and aero-flutter.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) With your hands as close as possible to the blocker door, try to move the drag link forward and backward.
2) With your hands as close as possible to the inner fan duct cowl, try to move the drag link forward and backward.
3) If there is movement, measure the forward and backward movement of the drag link with a dial indicator, STD-14414.
   a) Radial movement (forward-backward) must not be more than 0.0035 in. (0.0889 mm).
4) Make a note of the movement value and the drag link location.

SUBTASK 78-31-15-220-002-H01

(4) If the radial movement was greater than the limits, remove the drag link [1] and the drag link attachment components.
   (a) Do this task: Thrust Reverser Blocker Door Drag Links Removal, TASK 78-31-15-000-801-H01.

SUBTASK 78-31-15-211-001-H00

(5) Do a detailed examination of the drag link spherical bearing ball [3] and race [2].
   (a) Examine the blocker door drag link [1] spherical bearing ball [3]and race [2] for pits or scratches.
      1) Turn the ball [3] until it will come out of the slot in the race [2] of the spherical bearing.
      2) Use a cotton wiper, G00034 to clean the ball [3].
      3) Use a cotton wiper, G00034 to clean the bearing race [2].
      4) Visually inspect the ball [3] and race [2] for pits or scratches.
         a) If damage is found on the ball, replace the spherical bearing ball [3].
         b) If damage is found on the race, replace the spherical bearing race [2] per BAC 5435.
      5) Install the ball [3] in the spherical bearing race [2].

         NOTE: Re-application of the solid film lubricant is not necessary.
   (b) Do this task: Thrust Reverser Blocker Door Drag Links Installation, TASK 78-31-15-400-801-H01.

      NOTE: Ensure that the Thrust Reverser Blocker Door Drag Link Installation Test is completed to make sure the drag links operate correctly.

SUBTASK 78-31-15-220-001-H01

(6) Do a detailed dimensional examination of the drag link [1] or the drag link attachment components with the wear limit data (Table 601).

   NOTE: You have the option to either replace the hardware or repair and re-install it. This step can be made optional at your discretion if you decide to discard the parts.

   (a) Replace the bolts [4], bolts [13], plain bushings [5], bushings [6], bushings [12], pivot link bushings [7], flanged bushings [8], flanged bushings [10], flanged bushings [11], flanged bushings [14], washers, nuts [9] and nuts [15] as necessary.
   (b) Use the Component Maintenance Manual to replace the bearing race, bearing ball and flanged bushings in the drag link, to replace the flanged bushings in the blocker door pivot link, and to replace the flanged bushings in the drag link anchor fitting.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Table 601/78-31-15-993-802-H00 Blocker Door Drag Link Wear Limits

Part Interface		Part Name	Design Min *[1]	Design Max *[1]	Allow Wear Dim *[1]	Wear Max Clear *[1]	Replace
Part A	Part B						
2	3	Bearing Race ID	0.8455 (21.4757)	0.8460 (21.4884)	0.8485 (21.5519)	0.0040 (0.1016) Axial	Yes
2	3	Spherical Ball OD	0.8440 (21.4376)	0.8445 (21.4503)	0.8415 (21.3741)	0.0040 (0.1016) Radial	Yes
3	4	Spherical Ball ID	0.5000 (12.7000)	0.5005 (12.7127)	0.5035 (12.7889)	0.0040 (0.1016)	Yes
3	4	Bolt OD	0.4985 (12.6619)	0.4995 (12.6873)	0.4960 (12.5984)	0.0040 (0.1016)	Yes
5	7	Bushing ID	0.6870 (17.4498)	0.6877 (17.4676)	0.6899 (17.5235)	0.0034 (0.8636)	Yes
5	7	Control Link Bushing OD	0.6860 (17.4244)	0.6865 (17.4371)	0.6836 (17.3634)	0.0034 (0.8636)	Yes
5	4	Bushing ID	0.5000 (12.7000)	0.5005 (12.7127)	0.5035 (12.7889)	0.0040 (0.1016)	Yes
6	4						
5	4	Bolt OD	0.4985 (12.6619)	0.4995 (12.6873)	0.4960 (12.5984)	0.0033 (0.0838)	Yes
6	4						
8	4	Flanged Bushing ID	0.5001 (12.7025)	0.5007 (12.7178)	0.5028 (12.7711)	0.0033 (0.0838)	Yes
8	4	Bolt OD	0.4985 (12.6619)	0.4995 (12.6873)	0.4960 (12.5984)	0.0040 (0.1016)	Yes
10	12	Flanged Bushing ID	0.5625 (14.2875)	0.5635 (14.3129)	0.5665 (14.3891)	0.0050 (0.1270)	Yes
10	12	Bushing OD	0.5610 (14.2494)	0.5615 (14.2621)	0.5575 (14.1605)	0.0050 (0.1270)	Yes
12	13	Bushing ID	0.3750 (9.5250)	0.3755 (9.5377)	0.3785 (9.6139)	0.0040 (0.1016)	Yes
12	13	Bolt OD	0.3735 (9.4869)	0.3745 (9.5123)	0.3706 (9.4132)	0.0040 (0.1016)	Yes
14	13	Flanged Bushing ID	0.3750 (9.5250)	0.3757 (9.5428)	0.3789 (9.6241)	0.0044 (0.1118)	Yes
14	13	Bolt OD	0.3735 (9.4869)	0.3745 (9.5123)	0.3710 (9.4234)	0.0044 (0.1118)	Yes
11	12	Flanged Bushing ID	0.5625 (14.2875)	0.5635 (14.3129)	0.5665 (14.3891)	0.0050 (0.1270)	Yes
11	12	Bushing OD	0.5610 (14.2494)	0.5615 (14.2621)	0.5575 (14.1605)	0.0050 (0.1270)	Yes

*[1] Dimension in inches (millimeters)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-15-210-003-H01

(7) If you find blocker doors that have not retracted into the thrust reverser sleeve, do these steps from Boeing Maintenance Tip 78-005:

(a) Remove the bolt [4] that connects the drag link [1] to the blocker door pivot link.

(b) Make sure the blocker door retracts flat into the thrust reverser sleeve.

(c) If the drag link bearing has seized, remove the bearing ball [3] through the slot of the uniball bearing in the drag link [1].

(d) Wipe the bearing ball [3] and the bearing race [2] clean with a clean cotton wiper, G00034.

(e) Do a visual examination of the bearing ball [3] and the bearing race [2] for corrosion and damage.

(f) If you find corrosion in the race [2], do these steps:

1) Remove the corrosion with an abrasive mat, G00251 mat.

2) Wipe the race [2] with a clean cotton wiper, G00034.

3) If the race [2] is damaged, replace the drag link [1].

4) If the ball [3] is damaged, replace the bearing ball.

(g) Assemble the bearing ball [3] and the bearing race [2].

(h) Turn the bearing ball [3] to make sure it turns correctly.

(i) Install the bolt [4] that connects the drag link [1] to the blocker door pivot link.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-15-080-001-H00

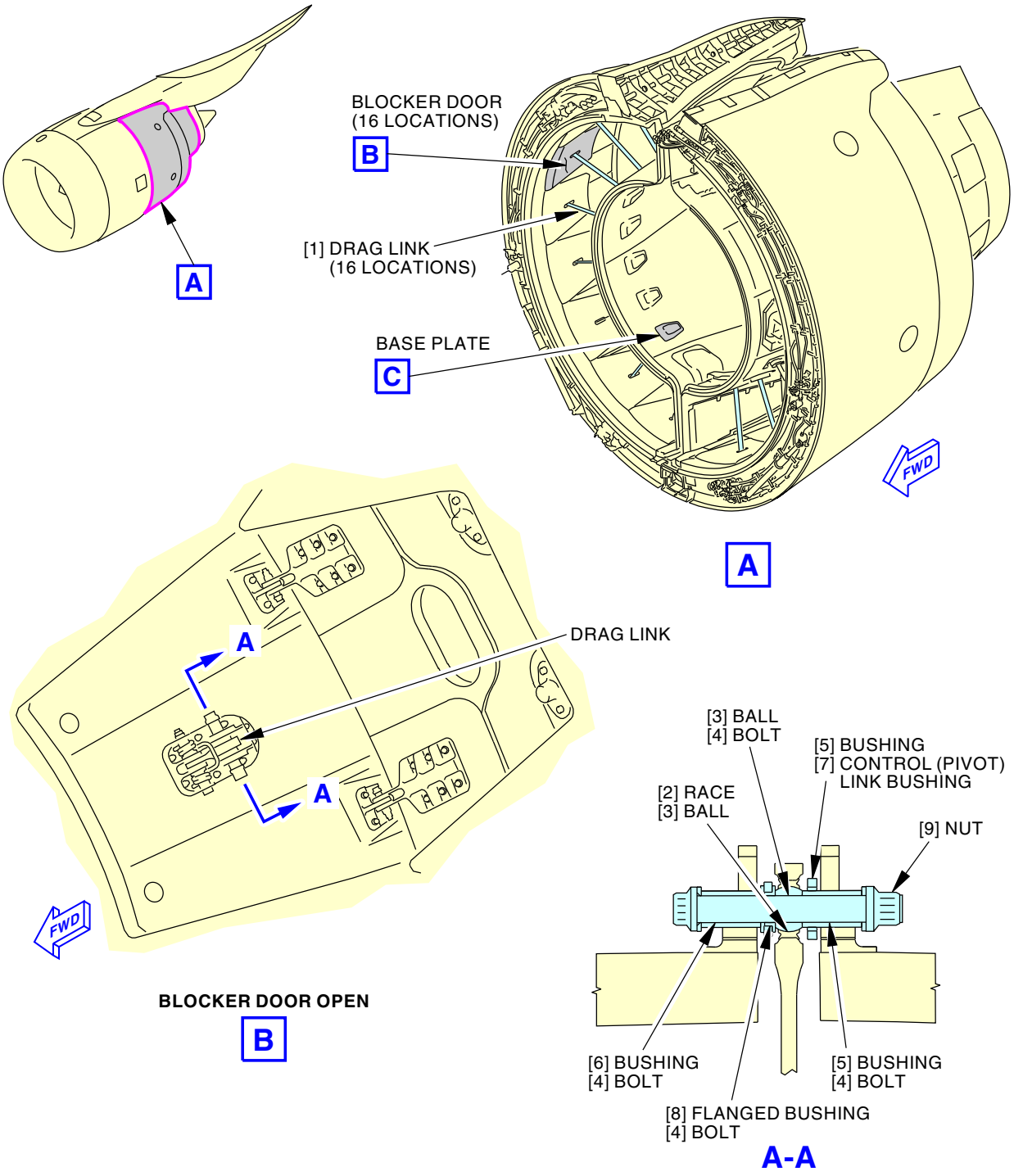
(1) Make sure that the work area is clean and remove the protective mat, STD-585 and all other tools and equipment.

SUBTASK 78-31-15-440-005-H00

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00

END OF TASK

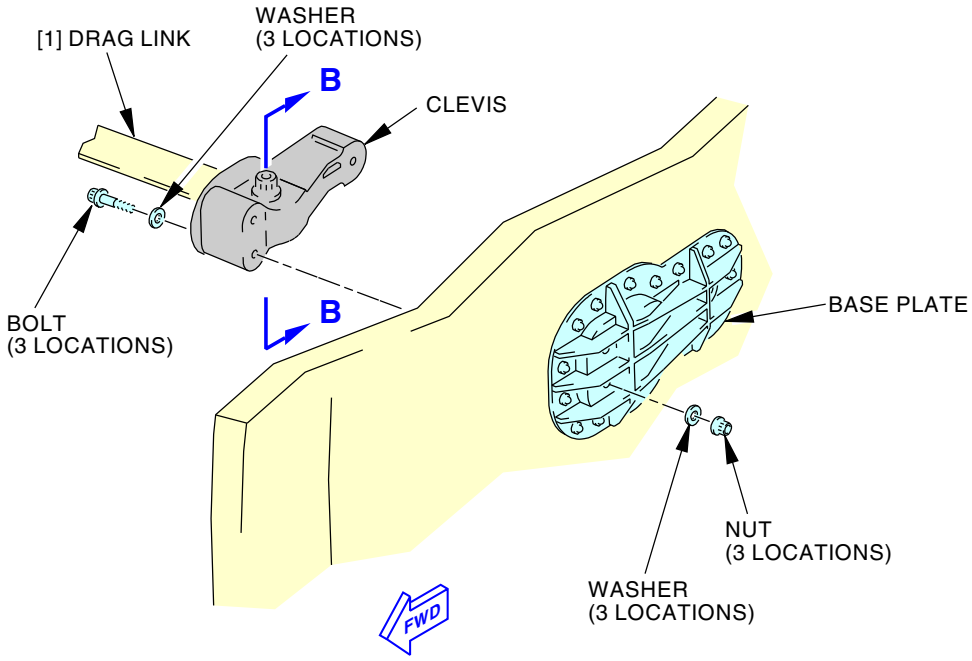
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M93371 S000099694_V3

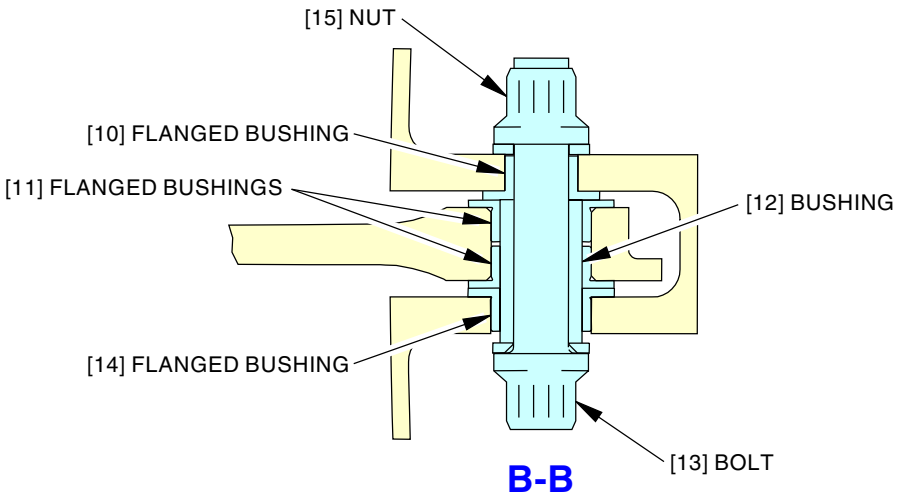
Thrust Reverser Blocker Door Drag Links Inspection
Figure 601/78-31-15-990-803-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



BASE PLATE
(EXAMPLE, 16 LOCATIONS)

C



M67068 S000099695_V3

Thrust Reverser Blocker Door Drag Links Inspection
Figure 601/78-31-15-990-803-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER CASCADE SEGMENTS - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser cascade segments.

(2) An installation of the thrust reverser cascade segments.

TASK 78-31-16-000-801-H01

2. Thrust Reverser Cascade Segments Removal

(Figure 401/Figure 402)

A. General

(1) This task is the removal procedure for the thrust reverser cascade segments.

(2) The cascade segments are installed behind the outer skin of the thrust reverser sleeve.

B. References

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-860-819-H00	Thrust Reverser Operation - Extend (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-727	Punch - Center

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Prepare for the Removal

SUBTASK 78-31-16-010-001-H01

WARNING OBEY THE INSTRUCTIONS IN THE PROCEDURE WHEN YOU EXTEND THE THRUST REVERSER. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR IF YOU EXTEND THE THRUST REVERSERS INCORRECTLY.

(1) Do this task: Thrust Reverser Operation - Extend (Selection), TASK 78-31-00-860-819-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-16-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(2) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00

F. Thrust Reverser Cascade Segments Removal

SUBTASK 78-31-16-020-001-H01

CAUTION DO NOT LIFT OR MOVE THE THRUST REVERSER HALF UNLESS THREE CASCADE SEGMENTS ARE INSTALLED. BETWEEN THE INSTALLED SEGMENTS, NO MORE THAN TWO CASCADE SEGMENTS CAN BE MISSING. DAMAGE TO THE THRUST REVERSER STRUCTURE CAN OCCUR.

(1) Remove the cascade segment [3] (Figure 401):

(a) Remove the bolts [2] and washers [7] that attaches the cascade segment to the torque box [1].

(b) Remove the bolts [5] and washers [6] that attaches the cascade segment to the aft mounting ring [4].

(c) Remove the cascade segment.

(d) Keep any shim that was installed between the cascade segment forward attachment flange and the torque box; the shim may be used to install the new cascade segment.

SUBTASK 78-31-16-020-002-H01

(2) Remove the actuator guide brackets from the cascade segments, if it is necessary (Figure 402).

NOTE: Actuator guide brackets are mounted on cascade segments 1 and 2, 4 and 5, 7and 8, 9 and 10, 12 and 13, 15 and 16. Do these steps off wing, on a bench. New cascades do not have the brackets installed.

(a) Remove the two blind bolt fasteners [35].

1) Carefully drill out the stem and lock ring to remove the manufactured head of the blind bolt.

a) Use a 0.1875 inch (4.7625 mm) diameter drill rod.

b) Use a center punch, STD-727 the push out the blind bolt.

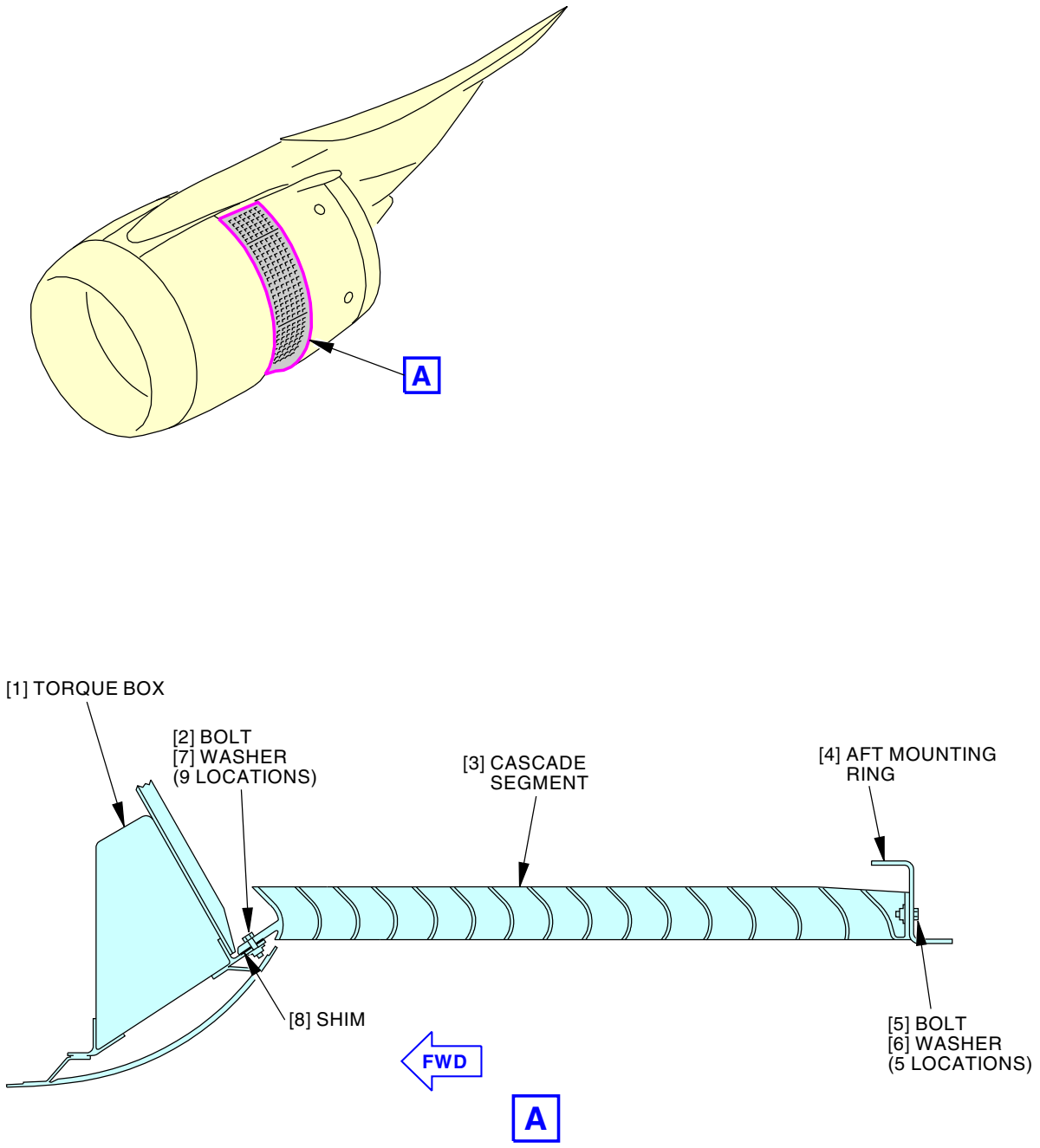
(b) Remove the bracket [21], bracket [22], bracket [23], bracket [24], bracket [25], bracket [26], bracket [27], bracket [28], bracket [29], bracket [30], bracket [31], bracket [32], bracket [33] or bracket [34].

1) Keep the bracket for installation on the new cascade segment.

(c) Discard the blind bolt fasteners [35] and washers [36].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07488 S0004286446_V2

Thrust Reverser Cascade Segments Installation
Figure 401/78-31-16-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-16-400-801-H01

3. Thrust Reverser Cascade Segments Installation

(Figure 401/Figure 402)

A. General

(1) This task is the installation procedure for the thrust reverser cascade segments.

(2) You must install the correct cascade segment in the correct location for the left or right engine installation. The cascade segment installation for the left engine is different from the cascade segment installation for the right engine. If the cascade segments are installed in the incorrect location, the reverse thrust airflow from the segment could cause engine ingestion of unwanted materials and cause damage to the engine and affect the control surfaces.

B. References

Reference	Title
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-860-818-H00	Thrust Reverser Operation - Retract (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-122	Brush
STD-371	Gauge - Feeler, 0.0 to 0.5 in (0.0 to 12.7 mm), Readable to 1/1000 in (.025 mm)

D. Consumable Materials

Reference	Description	Specification
A00134	Adhesive - Synthetic Rubber, Buna-N, 1 Part, Fuel Resistant	BMS5-14
A00272	Adhesive - Cyanoacrylate For Non-Structural Bonding	BMS5-36 Type II
B00130	Alcohol - Isopropyl	TT-I-735
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G50020	Mat - Abrasive, Non-Woven, Aluminum Oxide, 280 - 400 grit	A-A-58054 Type I Grade A
G50077	Abrasive - Aluminum Oxide Paper, 240 grit or finer	

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Thrust Reverser Cascade Segments Installation

SUBTASK 78-31-16-860-001-H01

CAUTION

INSTALL THE CASCADE SEGMENTS IN THE CORRECT POSITION ON THE THRUST REVERSER. IF YOU INSTALL THE CASCADE SEGMENTS IN THE INCORRECT POSITION, DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Use the table to identify the correct cascade segment [3] for the applicable engine and cascade segment position (Table 401).

NOTE: The cascade segment installation for the left engine is different from the cascade segment installation for the right engine. If the cascade segments are installed in the incorrect location, the reverse thrust airflow from the segment could cause engine ingestion of unwanted materials and cause damage to the engine and affect the control surfaces.

NOTE: The cascade segment positions are viewed from the rear of the engine looking forward and move counterclockwise around the engine. Position 1 is at 11:00 o'clock, position 8 is at 7:00 o'clock, position 9 is at 5:00 o'clock and position 16 is at 1:00 o'clock.

Table 401/78-31-16-993-801-H01 Cascade Segment Position

Left Engine		Right Engine	
Position	Part Number	Position	Part Number
1	S315W112-11	1	S315W112-11
2	S315W112-11	2	S315W112-13
3	S315W112-11	3	S315W112-13
4	S315W112-17	4	S315W112-17
5	S315W112-11	5	S315W112-12
6	S315W112-11	6	S315W112-12
7	S315W112-13	7	S315W112-15
8	S315W112-17	8	S315W112-19
9	S315W112-20	9	S315W112-18
10	S315W112-16	10	S315W112-14
11	S315W112-12	11	S315W112-11
12	S315W112-12	12	S315W112-11
13	S315W112-18	13	S315W112-18
14	S315W112-14	14	S315W112-11
15	S315W112-14	15	S315W112-11
16	S315W112-11	16	S315W112-11

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-16-420-001-H01

(2) If it is necessary, install the actuator guide bracket [21], bracket [22], bracket [23], bracket [24], bracket [25], bracket [26], bracket [27], bracket [28], bracket [29], bracket [30], bracket [31], bracket [32], bracket [33] or bracket [34] on the cascade segment [3] (Figure 402).

NOTE: Actuator guide brackets are mounted on cascade segments 1 and 2, 4 and 5, 7 and 8, 9 and 10, 12 and 13, 15 and 16. Do these steps off wing, on a bench before you install the cascade segment on the thrust reverser.

(a) Put the bracket in the correct position on the cascade segment; the dimensions for the position of the bracket from the end of the segment are shown on Figure 402.

1) Align the bracket with the end of the cascade segment.

(b) If you install a new actuator guide bracket, use the pilot holes in the new bracket to drill the holes through bracket.

1) The holes in the bracket are 0.1995-0.2020 inch (5.0673-5.1308 mm) in diameter.

2) If you also install a new cascade segment, drill through the bracket and through the cascade segment.

(c) If you install a new cascade segment, use the holes in the old actuator guide bracket to drill the holes through the cascade segment.

1) The holes in the cascade segment are 0.1995-0.2020 inch (5.0673-5.1308 mm) in diameter.

2) Use a sharp, carbide drill rod to drill through the composite material of the cascade segment.

NOTE: Refer to the Structural Repair Manual (SRM) 51-30-05 for selection of the general tools and equipment for repairs. SRM 51-20-08 for the general procedure to drill holes in composite structure. SRM 54-20-08 for the procedure to deburr the holes in composite structure.

(d) Install the two blind bolt fasteners through the bracket and the cascade segment.

NOTE: Use the single action installation tool recommended by the manufacturer of the blind bolt fastener.

1) Install the blind bolt fastener [35] through the bracket on the nearside with washer [36] on the far side on the blind bolt sleeve.

NOTE: The washer is installed between the cascade segment and the bulb that is formed on the blind side.

2) The top of the stem of the installed blind bolt must meet these requirements:

a) The top of the stem of the blind bolt must not be more than 0.012 inch (0.3048 mm) above the top surface of the manufactured head.

b) The top of the stem of the blind bolt must not be more than 0.012 inch (0.3048 mm) below the top surface of the manufactured head.

3) The lock ring of the installed blind bolt must meet these requirements:

NOTE: The lock ring is located between the stem and the manufactured head.

a) The lock ring of the blind bolt must not be more than 0.022 inch (0.559 mm) above the top surface of the manufactured head.

b) The lock ring of the blind bolt must not be more than 0.022 inch (0.559 mm) below the top surface of the manufactured head.

4) There must be no gap at the fastener shank.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-16-420-002-H01

(3) Install the cascade segment [3] (Figure 401):

(a) Apply grease, D00633 to the shanks and threads of the bolts.

(b) Install the bolts [5] and washers [6] with one or two threads to hold the cascade segment [3] in position.

(c) Install the bolts [2] and washers [7] with one or two threads to hold the cascade segment [3] in position.

(d) At the aft mounting ring [4], tighten the bolts [5] to 65-100 inch-pounds (7.3-11.3 newton-meters).

(e) Apply a load to the cascade segment, approximately 4.5-5.5 inches (114.3-139.7 millimeters) aft of the forward attachment bolts.

1) The load must not be more than 25 pounds-force (111 newtons).

(f) Measure the gap between the cascade segment and the torque box with a 0.0 to 0.5 in (0.0 to 12.7 mm) feeler gauge, STD-371.

1) Make a record of the best fit areas (least gap) between the attachment flange of the cascade segment and the torque box.

2) If the gap is less than 0.010 inch (0.254 millimeter), continue the procedure to tighten the bolts at the forward torque box.

3) If the gap is between 0.010-0.030 inch (0.254-0.762 millimeter), install a tapered shim [8] between the torque box and the forward attachment flange of the cascade segment.

NOTE: Use non-metallic shim stock, BACS40V014B014, to make the tapered shim. The shim stock is a phenolic base with polyimide laminations which does not require application of a finish.

a) Fit the shim stock to the areas of best fit on the torque box to find the tapered shape.

NOTE: Areas of best fit are the areas with the smallest gap between torque box and the cascade segment.

b) Machine or sand the shim stock to make the tapered shape with an abrasive 280 - 400 grit abrasive mat, G50020 or 240 grit or finer abrasive paper, G50077 paper.

c) Fit the shim on the torque box again to mark the holes for the fasteners.

d) Drill full size fastener holes, 0.25 inch (6.35 millimeters) in the shim.

e) Deburr the holes and the edges of the shim; do not countersink or break the edges of the drilled holes.

f) It is optional to bond the shim to the torque box with rubber adhesive, A00134 or cyanoacrylate adhesive, A00272:

<1> Wipe the surface of the torque box with a clean, dry cotton wiper, G00034 to remove all loose dirt, grease, oil, hydraulic fluid or other unwanted materials.

<2> Clean the surface with cotton wiper, G00034 moist with alcohol, B00130 and continue to clean the surface with a new cloth and alcohol until the cloth does not show any contamination.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

<3> If you use the synthetic rubber adhesive, A00134, apply a thin, even coat to both surfaces with a brush, STD-122, wait 10 minutes to allow the adhesive to air dry or until it is tacky to the touch, then install the shim with light pressure.

<a> Thin the adhesive, A00134 50 percent with solvent, B00148 to make it easier to apply.

WARNING DO NOT GET THE ADHESIVE IN YOUR EYES OR ON YOUR SKIN. WEAR SAFETY GLASSES TO PROTECT YOUR EYES. WEAR POLYETHYLENE GLOVES TO PROTECT YOUR HANDS. INJURIES TO PERSONNEL COULD OCCUR.

<4> If you use cyanoacrylate adhesive, A00272, apply a thin coat from the container on one surface and immediately install the shim and make your adjustments to the shim within seconds of installation before the adhesive sets.

NOTE: Wear polyethylene gloves to protect your hands. Do not use rubber or cloth gloves because the cyanoacrylate adhesive will bond these materials together.

<5> After the tapered shim is installed, the maximum gap between the torque box and the cascade segment must not be more than 0.010 inch (0.254 millimeter) before the bolts at the forward torque box are tightened.

<6> With the tapered shim installed, continue the procedure and tighten the bolts at the forward torque box.

g) If the gap is more than 0.030 inch (0.762 millimeter), contact Boeing or install another cascade segment with the same part number.

(g) At the forward torque box, tighten the bolts [2] at the best fit areas (least gap) first.

1) Tighten the bolts to 65-100 inch-pounds (7.3-11.3 newton-meters).

(h) After all the bolts on the cascade segment are tightened, loosen the all the bolts [5] and bolts [2] one-half turn.

(i) Tighten the bolts [5] and bolts [2] again.

SUBTASK 78-31-16-930-001-H01

(4) If the cascade segments were changed for the engine location, make a record on the thrust reverser data plate to show the thrust reverser part number has changed and include the calendar date, mm/dd/yy.

NOTE: If the cascade segments were changed for the engine location, the thrust reverser has changed configuration. As an example, the part number for the left thrust reverser on the left engine is different from the left thrust reverser on the right engine. The part number for the right thrust reverser on the left engine is different from the right thrust reverser on the right engine. Use the illustrated parts catalog to find the applicable part number for the thrust reverser or contact Boeing.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-16-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

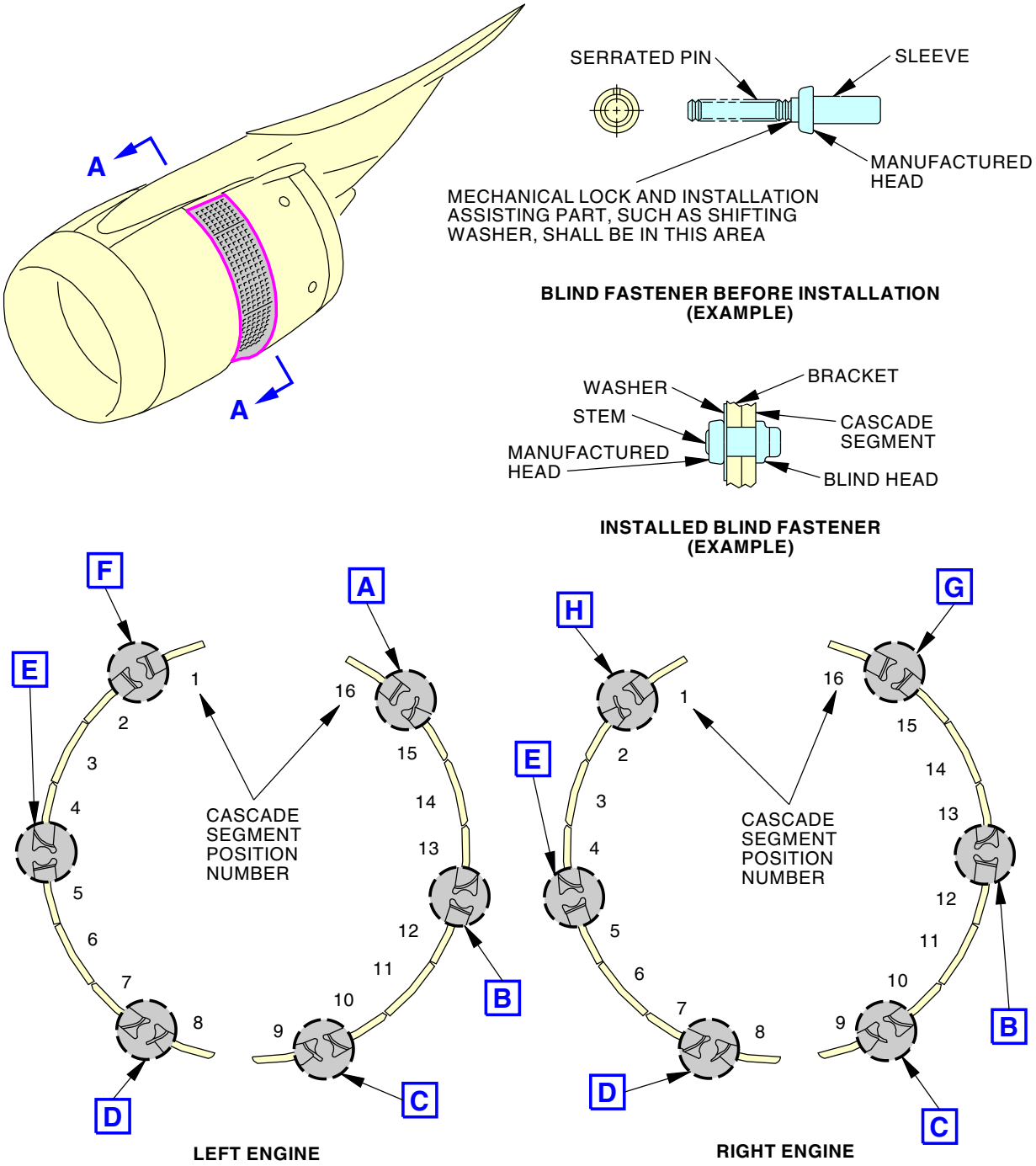
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-16-410-001-H01

(2) Do this task: Thrust Reverser Operation - Retract (Selection), TASK 78-31-00-860-818-H00.

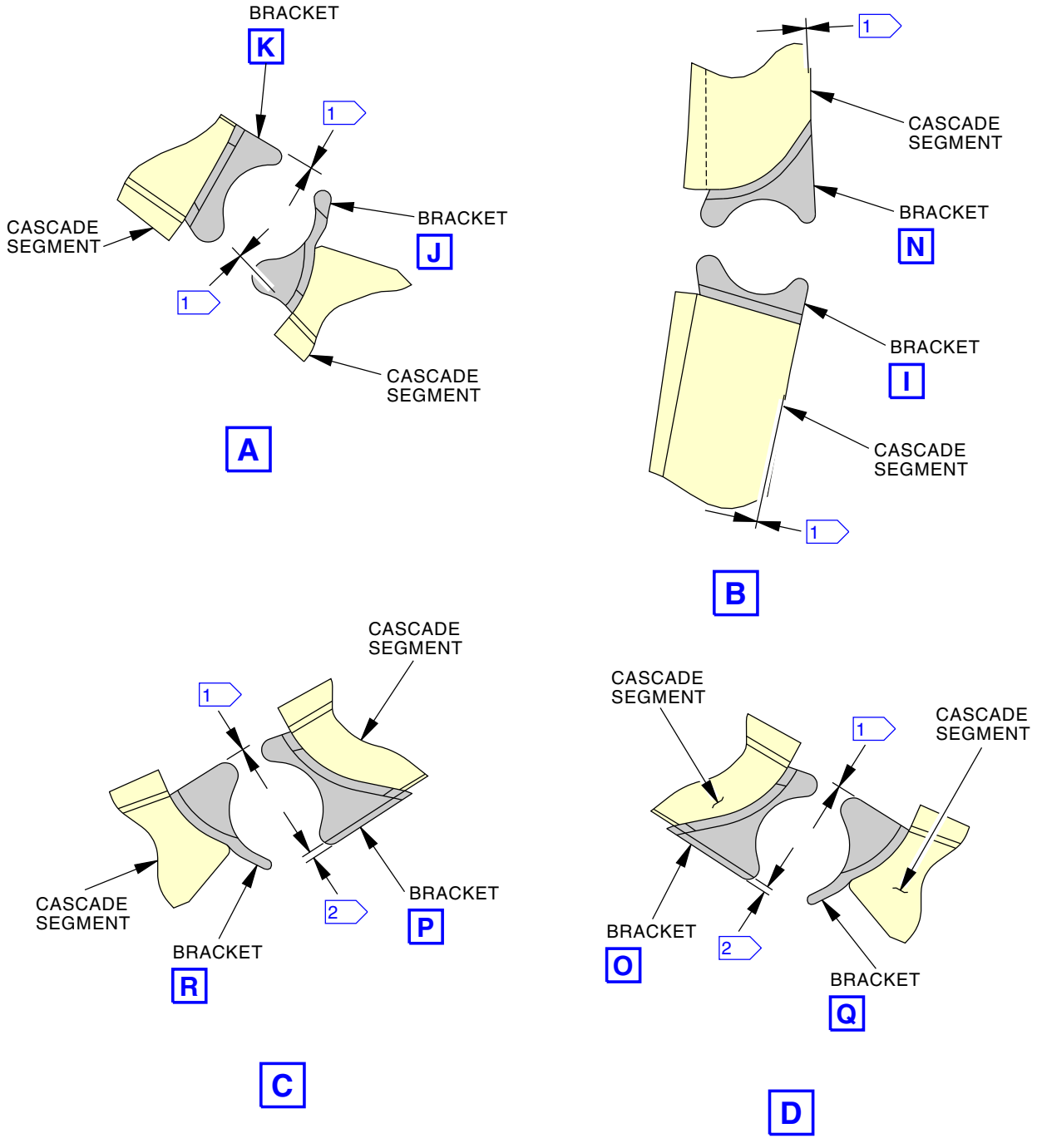
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Positions of the Cascade Segments and Actuator Guide Brackets
Figure 402/78-31-16-990-802-H01 (Sheet 1 of 5)

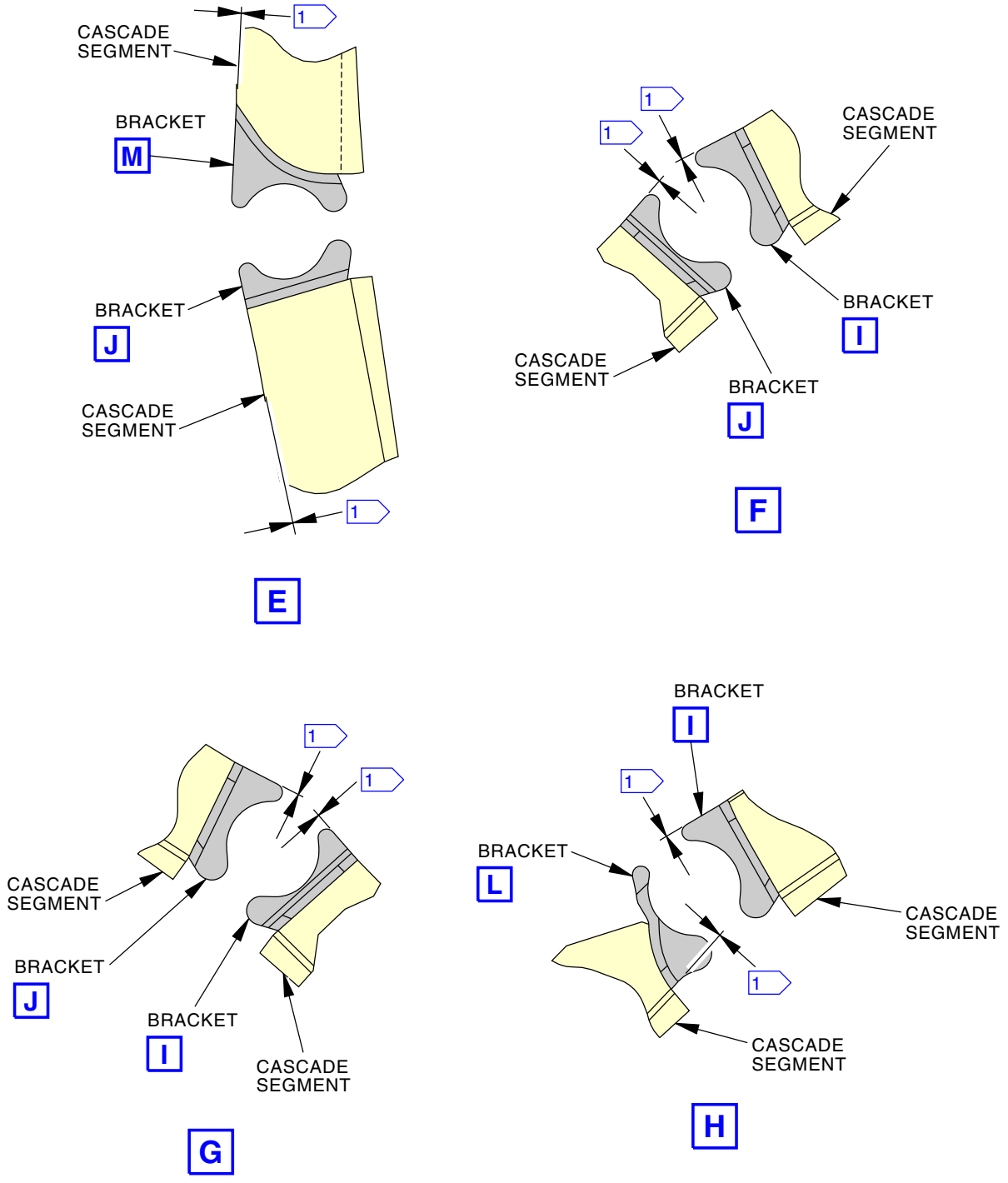
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07490 S0004286448_V2

Positions of the Cascade Segments and Actuator Guide Brackets
Figure 402/78-31-16-990-802-H01 (Sheet 2 of 5)

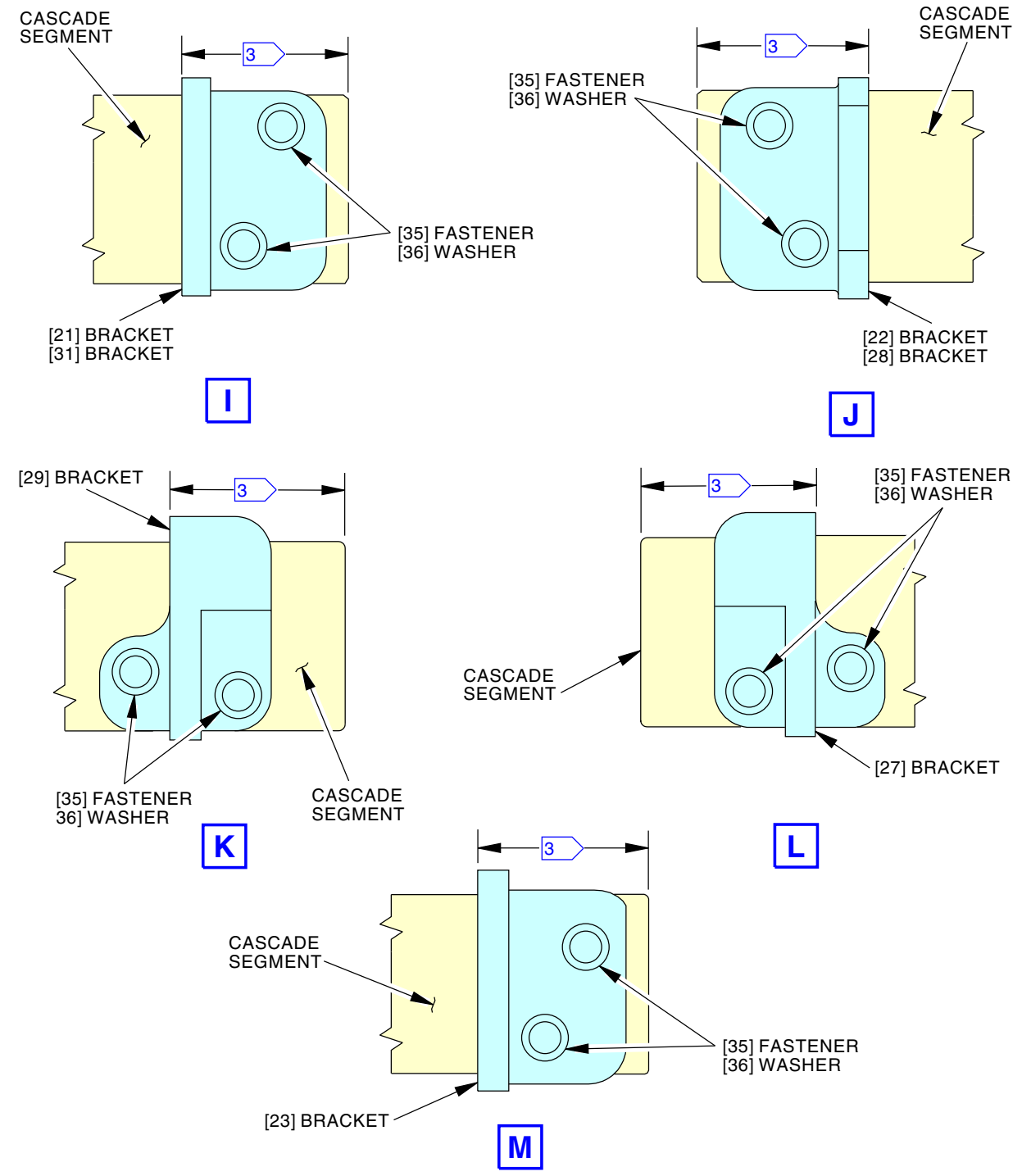
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07491 S0004286449_V2

Positions of the Cascade Segments and Actuator Guide Brackets
Figure 402/78-31-16-990-802-H01 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

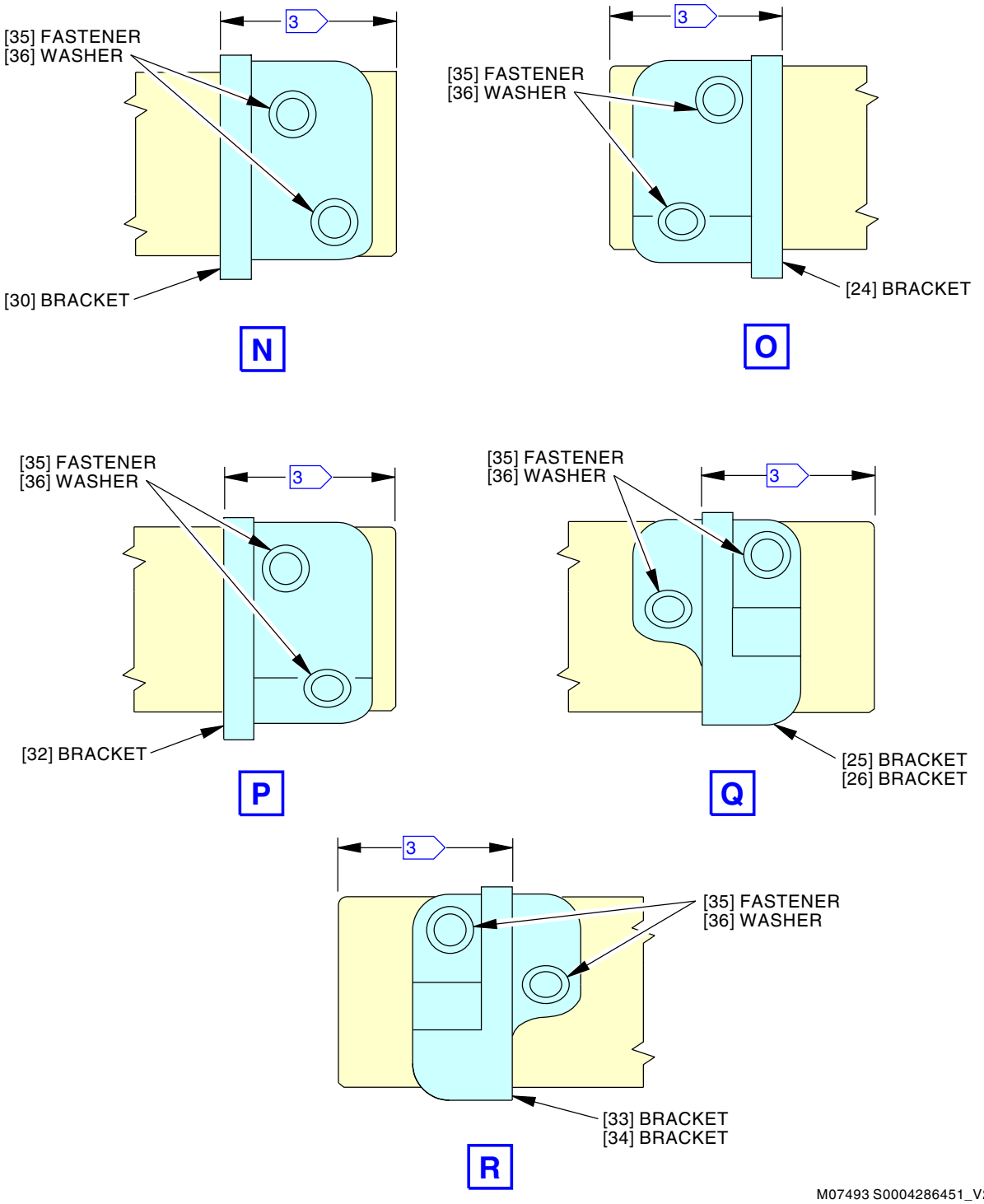


3 DIMENSION IS 2.088 INCHES (53.035 mm)

M07492 S0004286450_V2

Positions of the Cascade Segments and Actuator Guide Brackets
Figure 402/78-31-16-990-802-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Positions of the Cascade Segments and Actuator Guide Brackets
Figure 402/78-31-16-990-802-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER CASCADE SEGMENTS - INSPECTION/CHECK

1. General

A. This procedure has this task:

(1) An examination of the thrust reverser cascade segments.

TASK 78-31-16-200-801-H01

2. Thrust Reverser Cascade Segments Examination

(Figure 601)

A. General

(1) The cascade segments are made of a graphite/epoxy material. The cascade segments are mounted between the forward torque box and the aft mounting ring. When the thrust reverser is stowed, the cascade segments are located between the outer and inner skin of the thrust reverser sleeve.

(2) During reverse thrust, the strongbacks transfer the thrust load from the cascade vanes to the forward torque box through the attachment flanges.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-860-818-H00	Thrust Reverser Operation - Retract (Selection) (P/B 201)
78-31-00-860-819-H00	Thrust Reverser Operation - Extend (Selection) (P/B 201)
78-31-16-000-801-H01	Thrust Reverser Cascade Segments Removal (P/B 401)
78-31-16-400-801-H01	Thrust Reverser Cascade Segments Installation (P/B 401)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
424AR	Right Fan Cowl Panel, Right Engine

E. Prepare for the Procedure

SUBTASK 78-31-16-860-002-H01

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-16-040-002-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-16-010-003-H01

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-16-010-002-H01

(4) Do this task: Thrust Reverser Operation - Extend (Selection), TASK 78-31-00-860-819-H00.

SUBTASK 78-31-16-040-003-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(5) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

F. Procedure

SUBTASK 78-31-16-210-001-H01

(1) Examine the cascade segments for damage, tears, cracks or delaminated areas in the cascade vanes, strongbacks and attachment flanges (Figure 601).

(a) If damage, tears, cracks or delaminated areas in the cascade vanes, strongbacks or attachment flanges is found, replace the cascade segment.

NOTE: To find repair disposition, contact Boeing to report the kind of damage and delamination found. If possible, document the damage with digital photographs that can be sent by e-mail, or provide a sketch of the damage that can be faxed.

1) Do this task: Thrust Reverser Cascade Segments Removal, TASK 78-31-16-000-801-H01.

2) Do this task: Thrust Reverser Cascade Segments Installation, TASK 78-31-16-400-801-H01.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-16-410-002-H01

(1) Make sure that the work area is clean and remove all other tools and other items.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-16-440-002-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-16-860-003-H01

(3) Do this task: Thrust Reverser Operation - Retract (Selection), TASK 78-31-00-860-818-H00.

SUBTASK 78-31-16-410-003-H01

(4) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

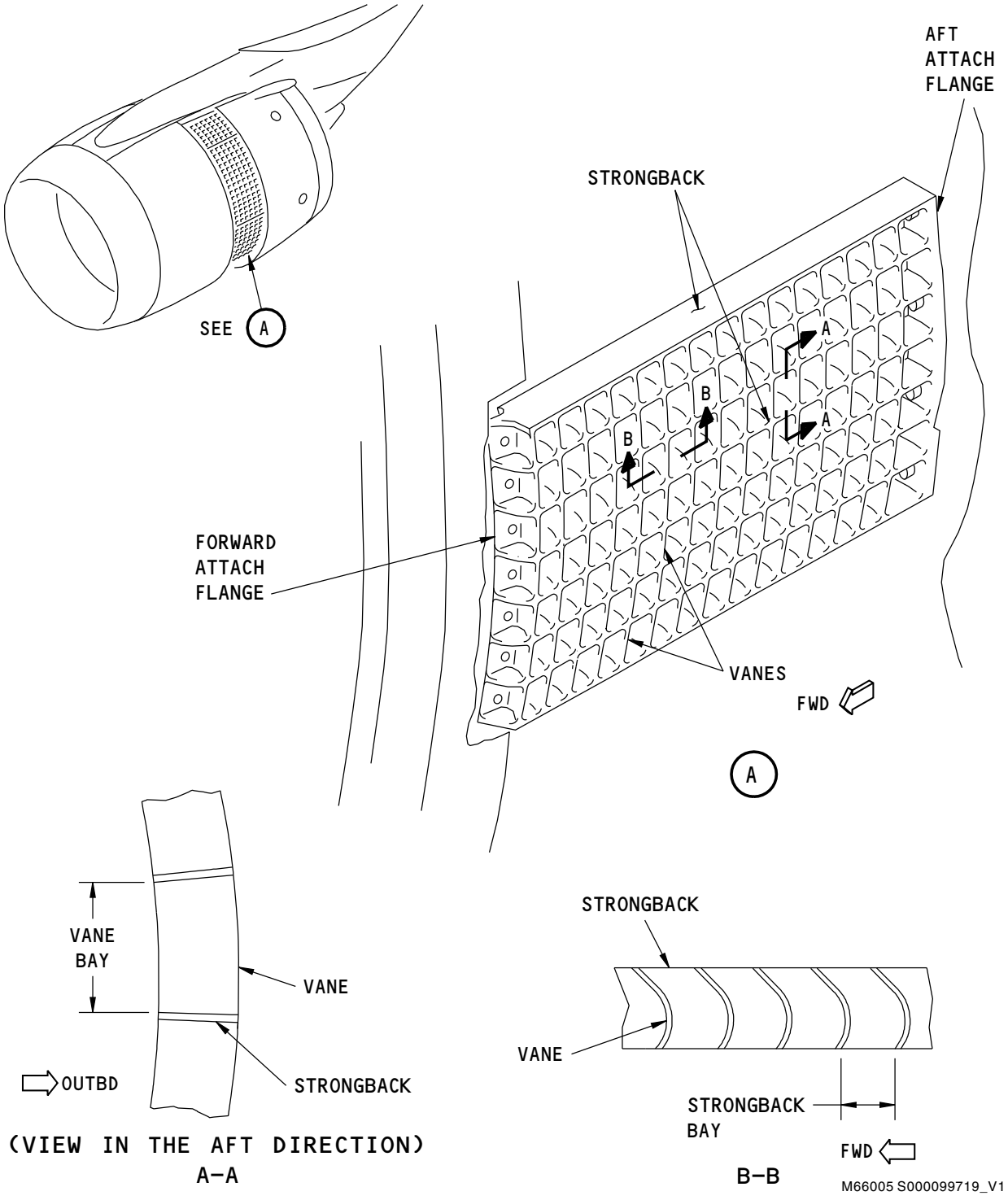
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-16-440-003-H01

(5) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Cascade Segment Inspection
Figure 601/78-31-16-990-803-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER PRESSURE RELIEF DOORS - REMOVAL/INSTALLATION

1. General

A. This procedure has three tasks:

(1) To remove the thrust reverser pressure relief door.

(2) To install the thrust reverser pressure relief door.

(3) To replace the latches on the pressure relief door.

TASK 78-31-17-000-801-H01

2. Thrust Reverser Pressure Relief Door Removal

(Figure 401)

A. General

(1) This procedure removes the pressure relief door.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Prepare for the Removal

SUBTASK 78-31-17-010-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Thrust Reverser Pressure Relief Door Removal

SUBTASK 78-31-17-020-001-H01

(1) Remove the pressure relief door [1] (Figure 401).

(a) Open the pressure relief door.

1) Use a screw driver to open the two pressure relief door latches.

(b) Remove two countersunk bolts [6] and nuts [5] to remove the two hinge fittings [3] from the aft cowl.

1) Hold the door as the countersunk bolts are removed.

2) Remove the hinge fittings [3] and the flat washers [16], washers [17], washers [18] from the hinges [2].

3) Discard the nuts [5]; do not reuse.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-17-400-801-H01

3. Thrust Reverser Pressure Relief Door Installation

(Figure 401)

A. General

(1) This procedure installs the pressure relief door.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
D00633	Grease - Aircraft General Purpose	BMS3-33

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Thrust Reverser Pressure Relief Door Installation

SUBTASK 78-31-17-420-001-H01

(1) Temporarily install the pressure relief door [1] (Figure 401).

(a) Apply grease, D00633 to the bore of the hinge bushing for the two hinge fittings [3].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Insert the hinge [2] into the hinge bushing of the two hinge fittings [3] with additional flat washer [16], washer [17], washer [18] to center the door in the opening of the aft cowl.

NOTE: Use these flat washers, NAS1149V0416M, NAS1149V0432M and NAS1149V0463M to adjust the door center. The thickness of these flat washers is 0.016 inch (0.406 millimeter), 0.032 inch (0.813 millimeter) and 0.063 inch (1.600 millimeter).

(c) Install the bolts [6] and nuts [5] to attach the hinge fitting [3] and the pressure relief door [1] to the aft cowl.

NOTE: The gap clearances at the latch edge of the door and the back edge of the door are adjusted at the hinge fitting when the door is installed.

1) Hand tighten the nuts [5] at this time.

(d) Close the pressure relief door [1].

SUBTASK 78-31-17-220-001-H01

(2) Do a check of the door clearances.

(a) Measure the door end play with the door closed and latched.

1) The end play of the door must be 0.001-0.017 inch (0.025 -0.431 millimeter) with the door in the closed position.

2) Make a record of the door end play.

(b) Measure the gap clearance around the door on four sides.

1) The gap clearance must not be more than 0.090 ± 0.050 inch (2.286 ± 1.270 millimeters).

2) Make a record of the gap clearance around the door for each of the four sides.

(c) Measure the step mismatch (flushness of the door) between the door and the skin surface.

1) The step mismatch must be within 0.000 ± 0.030 inch (0.000 ± 0.762 millimeter).

2) Make a record of the step mismatch between the door and the skin surface of the aft cowl structure.

(d) If the step mismatch, the gap clearance around the door edges, and the door end play are in the limits, tighten the nuts [5] to 25-35 inch-pounds (2.8-3.9 newton-meters).

(e) If the step mismatch, the gap clearance around the door edges or the door end play are not in the limits, do the adjustment of the pressure relief door.

SUBTASK 78-31-17-420-002-H01

(3) Adjust the pressure relief door [1].

(a) Remove the door [1] to adjust the step mismatch and the gap clearance.

1) Remove the bolts [6] and nuts [5] to remove the two hinge fittings [3].

2) Remove the door [1] from the aft cowl.

(b) Do the calculations to find the number of washers for the gap clearance.

1) Adjust the type and number of flat washer [16], washer [17], washer [18] between the hinge [2] and the hinge fitting [3] so that the gap clearance is equal on both sides of the door.

(c) Adjust the step mismatch between the door and the aft cowl skin.

1) Remove the countersunk bolts [15] and countersunk bolts [14], washers [8] and nuts [7] to remove the hinge [2].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Remove the tapered filler [20] and the shim [19] under the hinge [2].

3) Do the calculations to find the shim [19] thickness for the step mismatch.

4) Peel the thickness of shim [19] to get the correct step mismatch between the door and the aft cowl skin.

NOTE: The shim is laminated corrosion resistant steel (CRES). A new shim is 0.062 inch (1.575 millimeters) thick with a laminated section 0.030 inch (0.762 millimeter) thick and a solid section 0.032 inch (0.813 millimeter) thick. The thickness of each lamination is 0.003 inch (0.076 millimeter).

a) Apply primer, C00259 to finish the shim [19] before it is installed.

5) Install the long countersunk bolts [15] and short countersunk bolts [14] through the door, the tapered filler [20], the shim [19] and the hinge [2].

6) Install the washers [8] and the nuts [7] and tighten the nuts to 25-35 inch-pounds (2.8-3.9 newton-meters).

(d) Adjust the door gap clearance at the latch edge and the back edge of the door.

NOTE: Each door hinge has two slotted fastener holes which permits the adjustment of the door forward and aft for the gap clearance.

1) Put the flat washer [16], washer [17], washer [18] on the hinge [2].

2) Put the hinge fitting [3] on the hinge [2].

3) Put the door [1] in position in the aft cowl.

4) Install the bolts [6] and nuts [5] to install the hinge fittings [3] on the aft cowl, but loosely tighten the nuts.

5) Move the door forward or aft, relative to the hinge [2], to get the gap clearance at the latch edge and the back edge of the door.

6) Tighten the nuts [5] to 25-35 inch-pounds (2.8-3.9 newton-meters).

(e) Do a check of the step mismatch between the door and the aft cowl skin surface, the gap clearance around the door on four sides again.

(f) Install two spring pins [4] through each hinge [2], through the shim [19] into the tapered filler [20].

NOTE: Each door hinge has two slotted fastener holes. There are four smaller dimples for the installation of spring pins in the hinge. The dimples are on each side of the slotted fastener holes. Once the door is adjusted for the correct gap clearances around the edges of the door and the nuts are tightened, the spring pins will maintain the correct position of the hinge on the door.

1) Drill two 0.062-0.065 inch (1.575-1.651 millimeter) holes through the hinge [2] through the shim [19] into the tapered filler [20].

NOTE: You can use the hole locations that were previously drilled or you can drill new holes, but you must maintain the gap clearance around the edge of the door. You must drill through the shim into the tapered filler. Do not drill the holes into the hinge, shim, and tapered filler until it is necessary.

a) Drill the holes at the diagonal dimple positions on the hinge [2].

2) Install the two spring pins [4].

NOTE: The spring pins are 0.75 inch (19.05 mm) long.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) If you cannot maintain the gap clearance around the edge of the door with the hole locations that were previously drilled, you must drill new holes at diagonal corners.

(g) Close the pressure relief door [1].

SUBTASK 78-31-17-820-001-H01

(4) If it is necessary, adjust the shims under the latches to get the end play between the door [1] and the aft cowl skin.

(a) Do this task: Replace the Thrust Reverser Pressure Relief Door Latch, TASK 78-31-17-900-801-H01.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-17-410-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

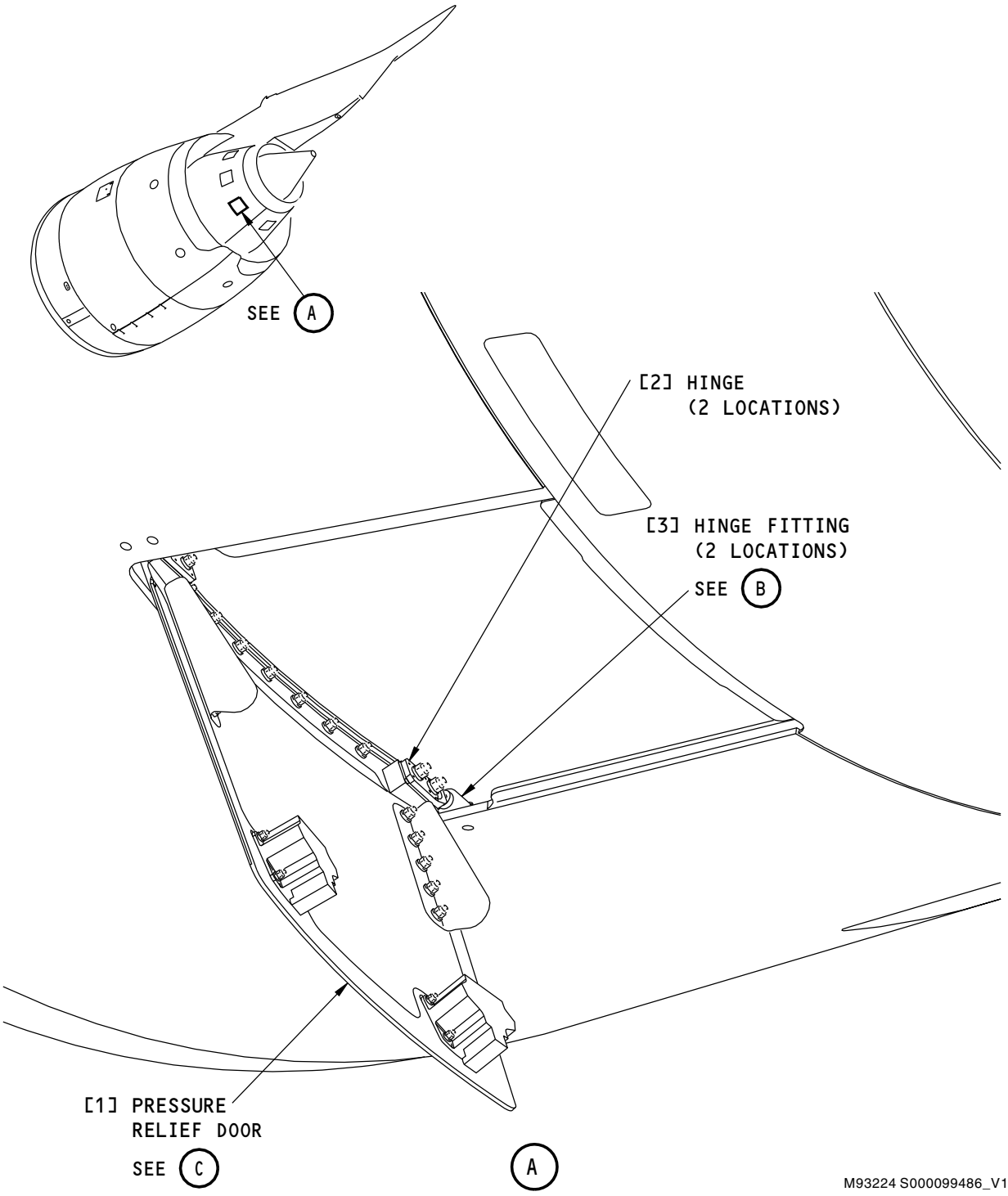
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

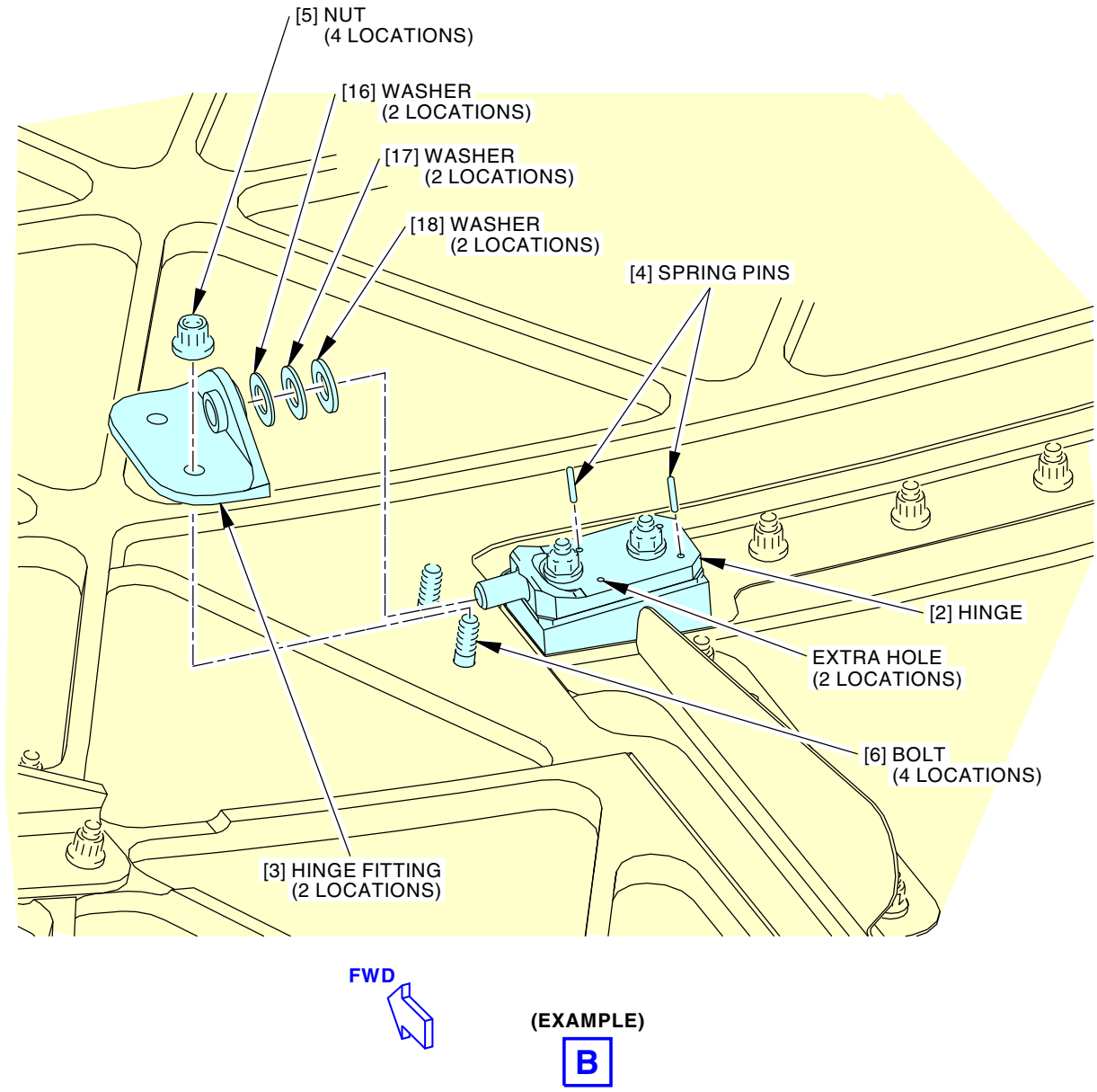
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Pressure Relief Door Installation
Figure 401/78-31-17-990-802-H01 (Sheet 1 of 4)

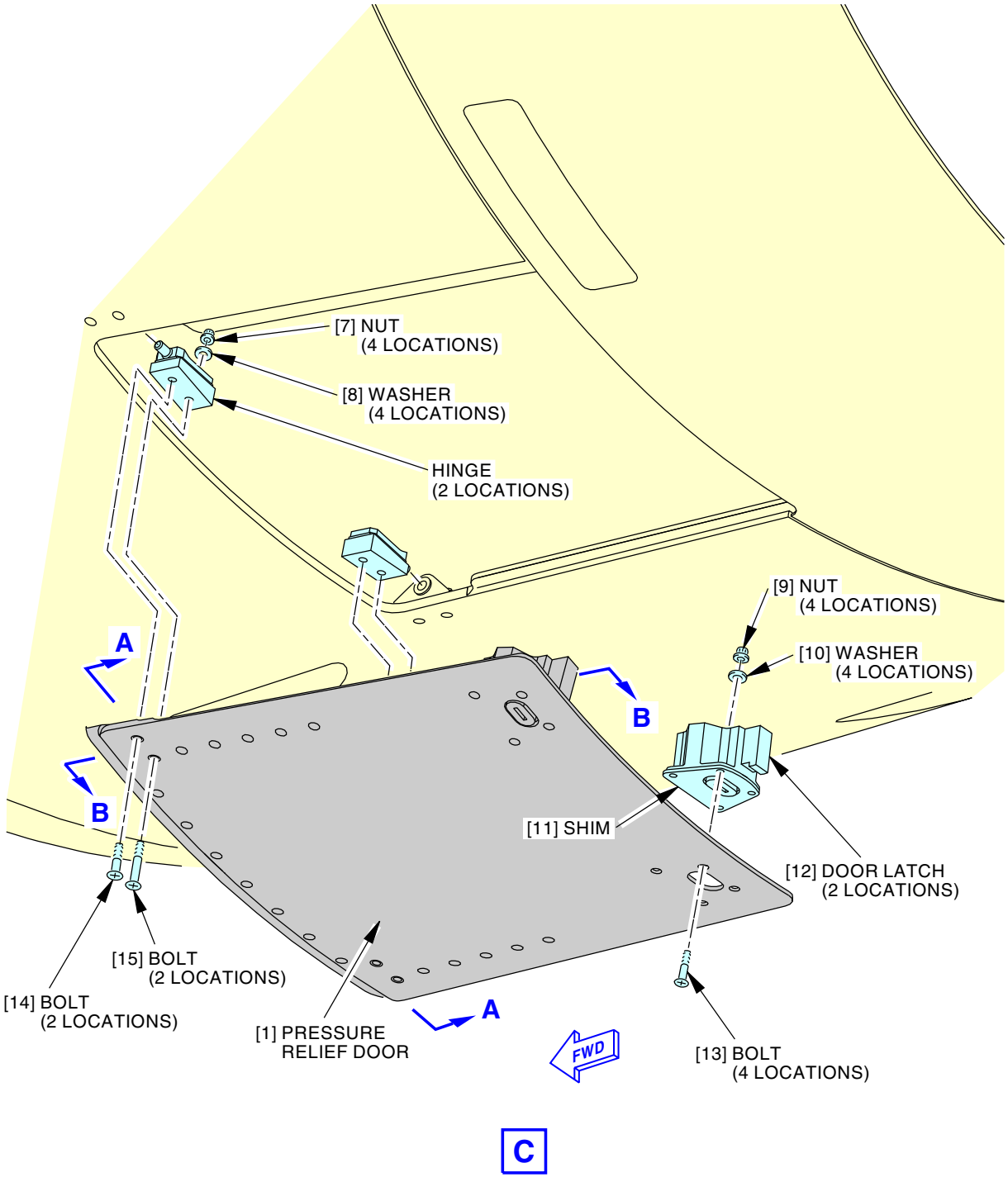
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07498 S0004286453_V2

Thrust Reverser Pressure Relief Door Installation
Figure 401/78-31-17-990-802-H01 (Sheet 2 of 4)

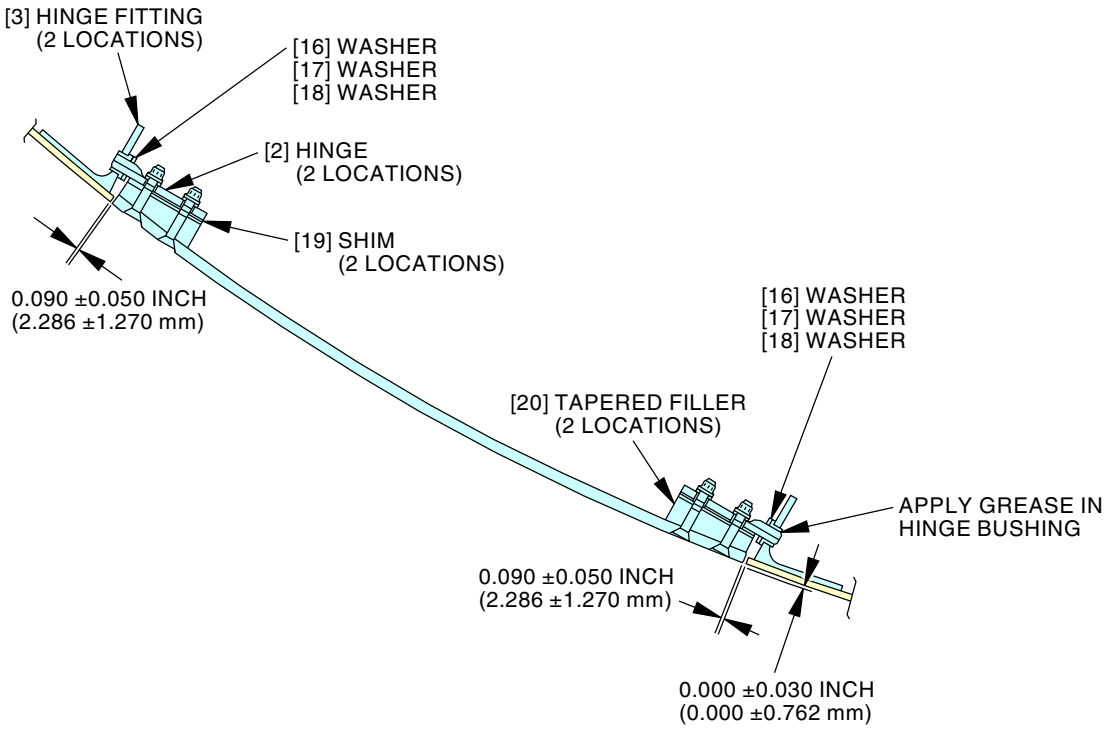
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



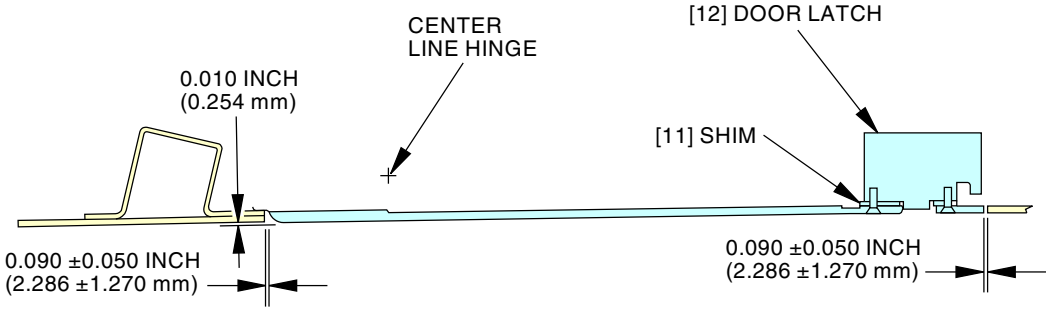
M07497 S0004286452_V2

Thrust Reverser Pressure Relief Door Installation
Figure 401/78-31-17-990-802-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



A-A



B-B

M07499 S0004286454_V2

Thrust Reverser Pressure Relief Door Installation
Figure 401/78-31-17-990-802-H01 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-17-900-801-H01

4. Replace the Thrust Reverser Pressure Relief Door Latch

A. General

(1) This task removes and installs the latches on the pressure relief door.

B. Consumable Materials

Reference	Description	Specification
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

D. Procedure

SUBTASK 78-31-17-020-002-H01

(1) Remove the latch [12].

(a) Open the pressure relief door.

(b) Remove the bolts [13], washers [10], and nuts [9] at four locations.

(c) Remove the latch [12] and the shim [11].

SUBTASK 78-31-17-420-003-H01

(2) Install the latch [12].

(a) Position the latch [12] and the shim [11].

(b) Temporarily install the bolts [13], washers [10], and nuts [9] at four locations.

(c) Close the pressure relief door and engage the latches.

(d) Measure the step clearance between the door latch release handle and the door skin.

1) The step mismatch must not be more than 0.010 inch (0.254 mm).

2) The door latches must hold the door in the closed position without movement.

(e) Open the pressure relief door and remove the latch [12] and the shim [11].

(f) Peel the shim [11] thickness to get the correct clearance between the door latch release handle and the door skin.

NOTE: The shim is a laminated corrosion resistant steel (CRES) shim. A new shim is 0.090 inch (2.286 millimeters) thick with a laminated section 0.070 inch (1.778 millimeter) thick and a solid section 0.020 inch (0.508 millimeter) thick. The thickness of each lamination is 0.002 inch (0.051 millimeter).

(g) Finish the shim [11] with primer, C00259 and install the shim wet or dry.

(h) Position the latch [12] and the adjusted shim [11].

(i) Install the bolts [13], washers [10], and nuts [9] at four locations.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Tighten the nuts to 12-15 pound-inches (1.4-1.7 newton-meters).

(j) Close the pressure relief door and engage the latches.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER PRESSURE RELIEF DOORS - ADJUSTMENT/TEST

1. General

A. This procedure has one task:

(1) To measure the load to open the pressure relief door latch.

TASK 78-31-17-720-801-H01

2. Thrust Reverser Pressure Relief Door Latch Test

(Figure 501)

A. References

Reference	Title
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-17-900-801-H01	Replace the Thrust Reverser Pressure Relief Door Latch (P/B 401)

B. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-5	Adapter - Load Test, Pressure Relief Door Latch Part #: B71044-28 Supplier: 81205 Opt Part #: B71044-10 Supplier: 81205
SPL-4410	Adapter Equipment - Load Test, Pressure Relief Door Latch Part #: B71044-28 Supplier: 81205 Opt Part #: B71044-10 Supplier: 81205
STD-797	Socket - 13/16 in, 12 Point, for use with B71044-10 Pressure Relief Door Latch Load Tst Adapter Equipment
STD-1011	Wrench - Torque, 0 to 100 ft-lbs (0 to 135.58 N·m)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
417	Left Thrust Reverser Aft Cowl Assembly - Left Engine
418	Right Thrust Reverser Aft Cowl Assembly - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
427	Left Thrust Reverser Aft Cowl Assembly - Right Engine
428	Right Thrust Reverser Aft Cowl Assembly - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Prepare for the Removal

SUBTASK 78-31-17-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

E. Thrust Reverser Pressure Relief Door Test

SUBTASK 78-31-17-720-002-H01

(1) Do a check of the two latches on the pressure relief door to make sure they release at the correct force (Figure 501):

NOTE: You must examine each latch with the opposite latch released.

(a) Install the pressure relief door latch load test adapter, SPL-5 or adapter equipment, SPL-4410 on the outside surface of the pressure relief door.

1) Use a screwdriver to release the two latches to open the pressure relief door.

2) Remove the two bolts, washers and nuts that are closest to the edge of the door that hold one pressure relief latch.

3) Install the adapter block to the door with two long screws, washers and nuts from the equipment set, through the holes of the latch.

NOTE: The screws are tightened only finger tight.

4) Close the pressure relief door and engage the one latch under the adapter block.

NOTE: The other latch should remain released during the test.

5) Put the pivot support pad on the outside surface of the adjacent structure.

6) Pin the pivot support clevis to the adapter block.

NOTE: The pin is attached to the block with a lanyard.

(b) Install a torque wrench, STD-1011 with a 13/16 inch socket - 13/16 in, 12 point, STD-797 on the bolthead on the side of the pivot support.

(c) Turn the wrench to apply a torque of 14.6-19.6 pound-feet (19.8-26.6 newton-meters) to open the closed latch.

NOTE: The force applied by the adapter to the latch is 88-118 pounds (391-525 newtons) at these torque values.

(d) Remove the pressure relief door latch load test adapter, SPL-5 or adapter equipment, SPL-4410 from the latch that was examined.

(e) Install the bolt, washer and nut through the door and latch at two locations.

1) Tighten the nuts to 12-15 pound-inches (1.4-1.7 newton-meters).

(f) Install the pressure relief door latch load test adapter, SPL-5 or adapter equipment, SPL-4410 on the latch that was not examined.

1) Use the procedure given above.

2) Make sure the latch that was first examined is opened.

(g) Apply a torque of 14.6-19.6 pound-feet (19.8-26.6 newton-meters) to open the remaining closed latch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(h) If the torque to open each latch is not 14.6-19.6 pound-feet (19.8-26.6 newton-meters), replace the latch.

1) Do this task: Replace the Thrust Reverser Pressure Relief Door Latch, TASK 78-31-17-900-801-H01.

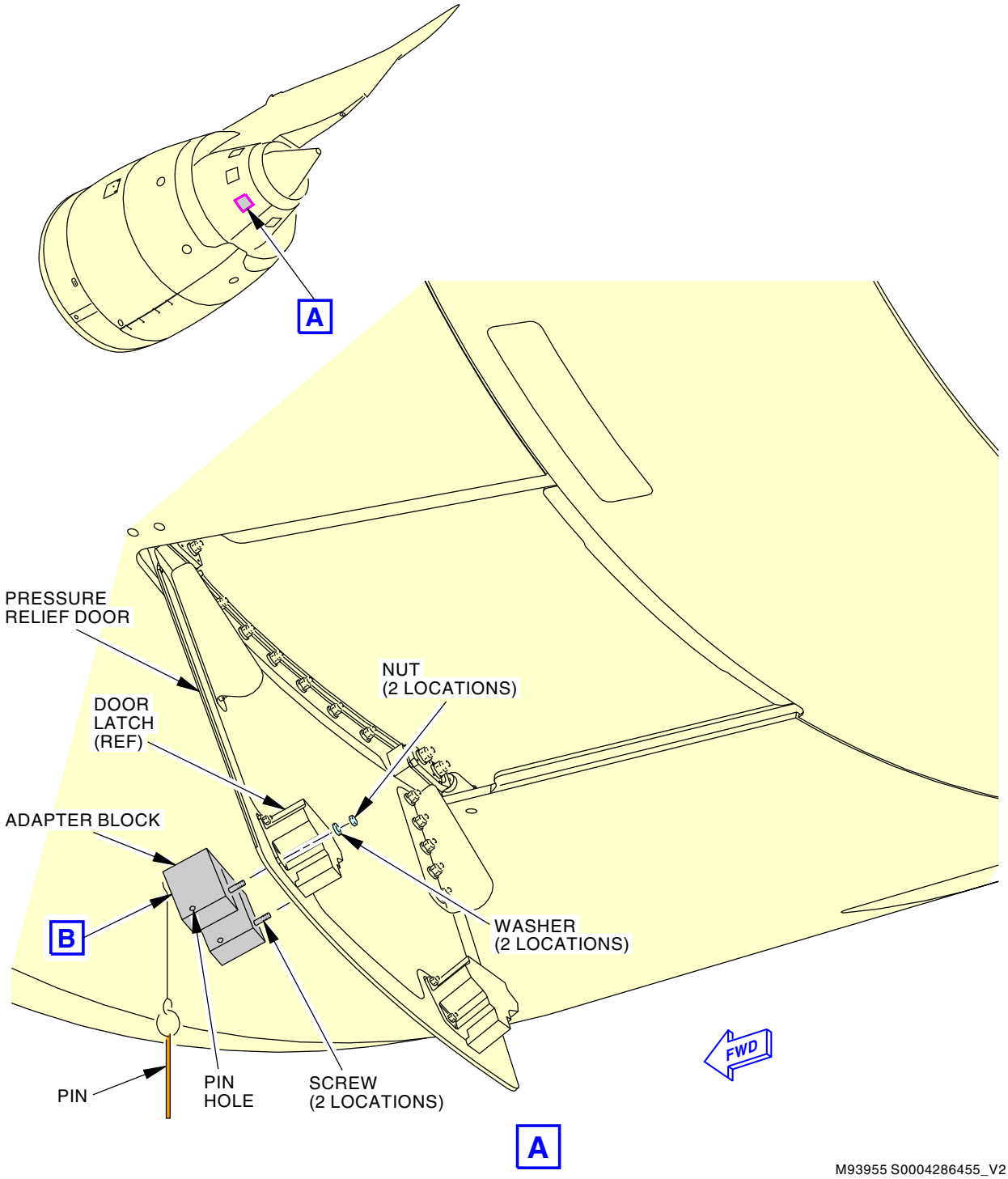
F. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-17-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

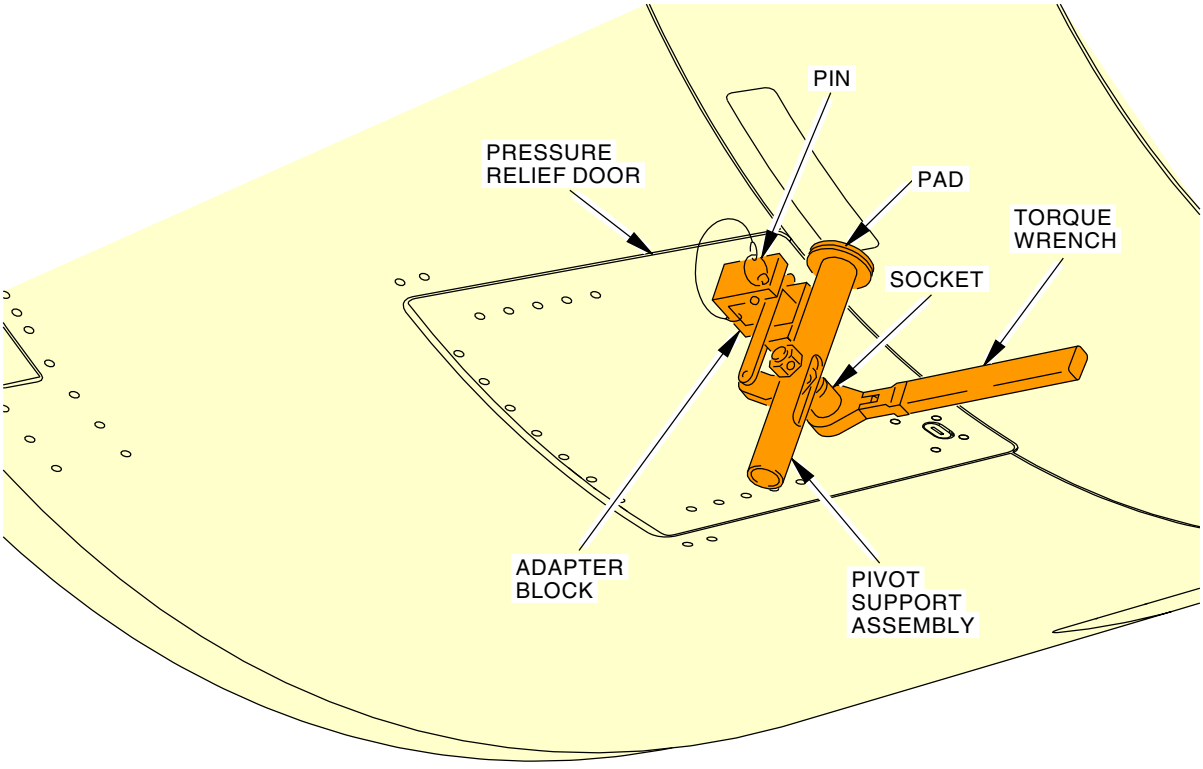
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Pressure Relief Door Adjustment
Figure 501/78-31-17-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07501 S0004286456_V2

Thrust Reverser Pressure Relief Door Adjustment
Figure 501/78-31-17-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER BULLNOSE SEAL - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser bullnose seal.

(2) An installation of the thrust reverser bullnose seal.

TASK 78-31-18-000-801-H01

2. Thrust Reverser Bullnose Seal Removal

A. General

(1) This task is the removal procedure for the thrust reverser bullnose seal.

(2) The thrust reverser bullnose seal will be referred to as the bullnose seal in this procedure.

(3) The bullnose seal is on the forward edge of the inner wall of the thrust reverser sleeve.

(4) To get access to the bullnose seal, you must remove the thrust reverser sleeve.

B. References

Reference	Title
78-31-10-000-801-H01	Thrust Reverser Sleeve Removal (P/B 401)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Prepare for the Removal

SUBTASK 78-31-18-010-001-H01

(1) Do this task: Thrust Reverser Sleeve Removal, TASK 78-31-10-000-801-H01.

E. Thrust Reverser Bullnose Seal Removal

SUBTASK 78-31-18-020-001-H01

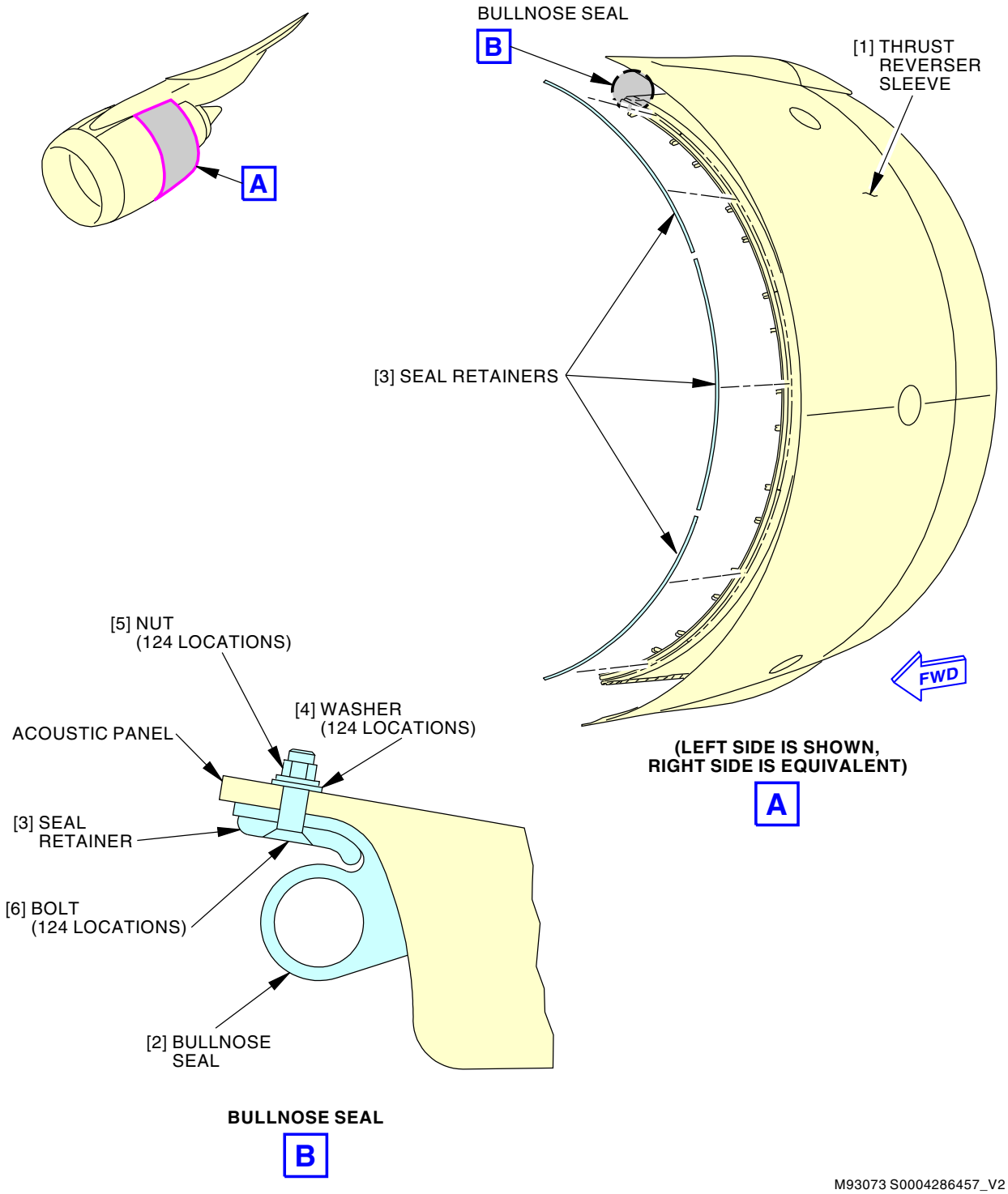
(1) Remove the bullnose seal [2] (Figure 401):

(a) Remove the three seal retainers [3].

1) Remove the 124 bolts [6], washers [4] and nuts [5].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M93073 S0004286457_V2

Thrust Reverser Bullnose Seal Installation
Figure 401/78-31-18-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-18-400-801-H01

3. Thrust Reverser Bullnose Seal Installation

(Figure 401)

A. General

(1) This task is the installation procedure for the thrust reverser bullnose seal.

(2) After you install the bullnose seal, you must install the thrust reverser sleeve and do the operational test for the thrust reverser.

B. References

Reference	Title
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-10-400-801-H01	Thrust Reverser Sleeve Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
A00436	Sealant - Fuel Tank	BMS5-45 (Supersedes BMS5-26)
G00365	Paper	

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Thrust Reverser Bullnose Seal Installation

SUBTASK 78-31-18-420-001-H01

(1) Install the bullnose seal [2] (Figure 401):

(a) If it is necessary to replace a seal retainer [3], drill and countersink the holes through the new seal retainer.

NOTE: Countersunk holes in the aluminum seal retainer were drilled in a fixture during assembly. The holes were drilled perpendicular to the surface contour of the retainer. The holes are 0.190-0.194 inch (4.83-4.93 millimeter) diameter and the countersink depth is 0.342 inch X 100 degrees (8.687 millimeters X 100 degrees).

1) Use a template made of plastic coated paper, G00365, the same length and width as the retainer to be replaced, to mark the location of the holes, or

2) Use one of the other seal retainers to mark the location of the holes.

NOTE: If you use the seal retainer at the top or the bottom of the sleeve, make sure you find the location of the first hole from the edge of the acoustic panel or from the end of the old seal retainer.

3) The edge of the installed seal retainer must be parallel with the edge of the acoustic panel within 0.030 inch (0.762 millimeter) for the entire length of the installed seal retainer.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Mark the location of the holes through the new seal foot.

NOTE: Make sure you find the location of the first hole from the edge of the acoustic panel and from the end of the old seal. The holes in the bullnose seal and the seal retainer were drilled in a fixture during assembly. The holes were drilled perpendicular to the surface of the seal foot. The holes are 0.190-0.194 inch (4.83-4.93 millimeter) diameter. For a complete bullnose seal replacement, there are 124 fastener holes.

1) Use a template made of plastic coated paper, G00365, the same length and width as the retainer, to mark the location of the holes through the new seal foot, or

2) Use the seal retainer or the old bullnose seal to mark the location of the holes through the new seal foot.

3) The edge of the installed bullnose seal foot must be parallel with the edge of the acoustic panel within 0.030 inch (0.762 millimeter) for the entire length of the installed bullnose seal.

(c) Punch or drill holes through the new bullnose seal foot.

(d) Put the bullnose seal [2] in its position on the thrust reverser sleeve [1].

(e) Install the three seal retainers [3] with a gap of 0.06 inch (1.52 mm) between the ends of the retainers.

1) Apply sealant, A00436 to the bolt shank and threads and install the bolts with wet sealant.

a) Mix the 2 part sealant to the manufacturers instructions.

2) Install the 124 bolts [6] with washers [4] under the nuts [5].

a) Tighten to 15-25 inch-pounds (1.7-2.8 newton-meters).

F. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-18-410-001-H01

(1) Do this task: Thrust Reverser Sleeve Installation, TASK 78-31-10-400-801-H01.

SUBTASK 78-31-18-741-001-H01

(2) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER BULLNOSE SEAL - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has this task:

(1) An inspection of the thrust reverser bullnose seal.

TASK 78-31-18-200-801-H01

2. Thrust Reverser Bullnose Seal Inspection

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) You must manually extend the thrust reverser sleeve approximately 6-8 inches (152-203 mm) to see the bullnose seal.

(2) The bullnose seal is installed along the full length of the inner wall of the translating sleeve radially out from the blocker door seals and radially in from the cascade segments.

(3) The bullnose seal prevents aerodynamic pressurization between the inner and outer walls of the translating sleeve from the fan exhaust. The loss of more than 65 percent of the bullnose seal may allow separation of the sleeve outer wall from the auxiliary slider block.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-31-18-000-801-H01	Thrust Reverser Bullnose Seal Removal (P/B 401)
78-31-18-400-801-H01	Thrust Reverser Bullnose Seal Installation (P/B 401)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

E. Prepare for the Inspection

SUBTASK 78-31-18-010-002-H01

CAUTION: RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805

SUBTASK 78-31-18-040-002-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-31-18-040-003-H01

WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-18-010-005-H01

(4) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Procedure

SUBTASK 78-31-18-010-003-H01

WARNING: KEEP ALL PERSONNEL AND EQUIPMENT AWAY FROM THE AREA THAT IS AFT OF THE APPLICABLE THRUST REVERSER. IF YOU IGNORE THIS INSTRUCTION, INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER EXTENDS.

(1) Manually extend the thrust reverser sleeve approximately 6-8 inches (152-203 mm) to get access to the bullnose seal.

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-31-18-211-001-H01

(2) Look through the cascade segments to examine the bullnose seal for damage as follows (Figure 601):

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Look for material on the seal that is missing.

1) Not more than 10 percent of the bullnose seal, on each thrust reverser half, can be missing or damaged.

(b) Look for cuts, gouges, and holes that extend through the seal.

(c) If you find damage that is more than the limits, replace the bullnose seal.

NOTE: A maximum of 10 percent of the seal can be missing or damaged on each thrust reverser half. If repair or replacement cannot be done immediately, Boeing recommends inspection of the seal every 10 days to make sure the seal damage is not more than the maximum limit.

1) Do this task: Thrust Reverser Bullnose Seal Removal, TASK 78-31-18-000-801-H01.

2) Do this task: Thrust Reverser Bullnose Seal Installation, TASK 78-31-18-400-801-H01.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-18-410-002-H01

WARNING KEEP PERSONNEL AND EQUIPMENT AWAY FROM THE APPLICABLE THRUST REVERSER. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR WHEN THE THRUST REVERSER RETRACTS.

(1) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-31-18-410-005-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-18-440-003-H01

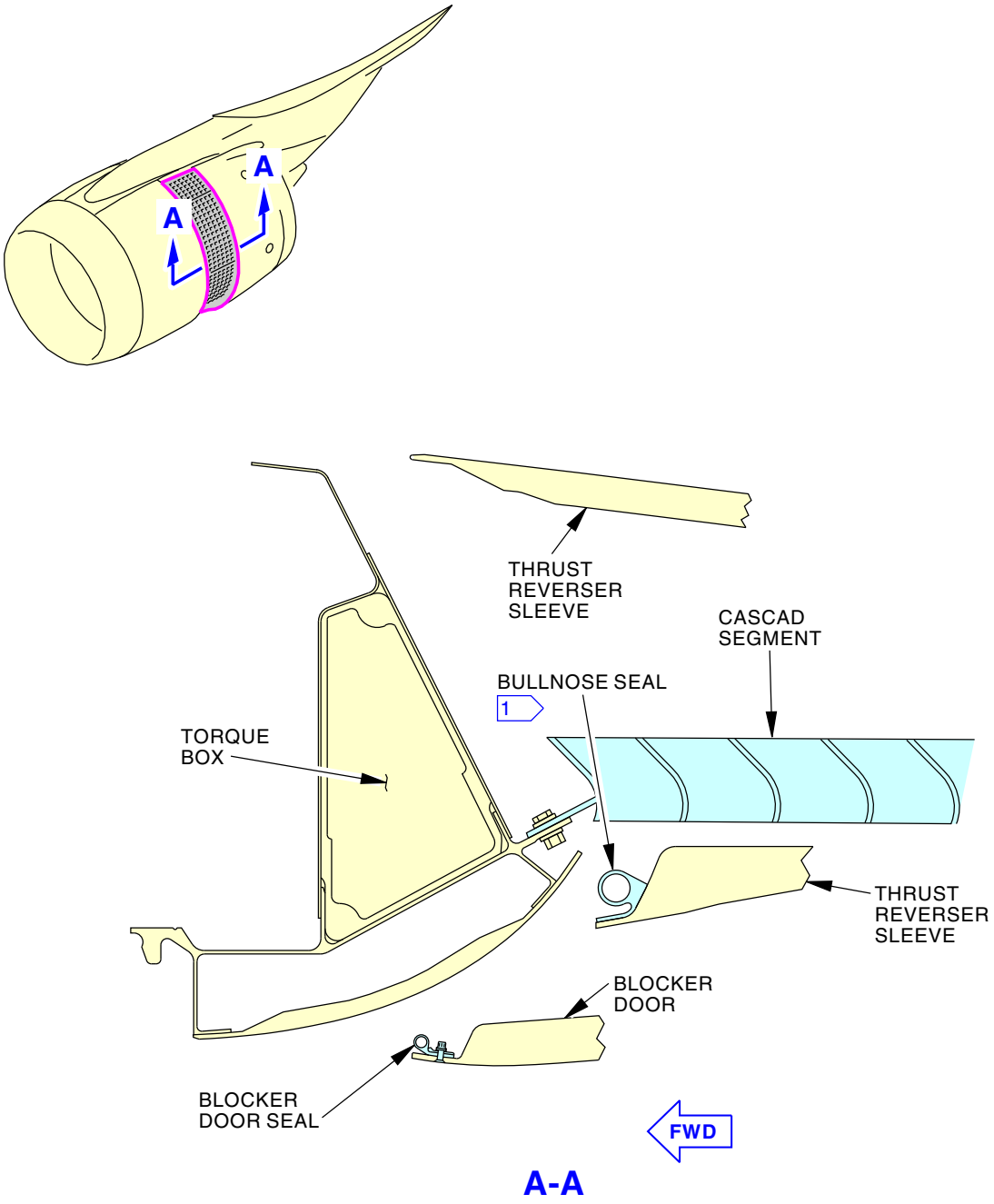
(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-18-440-001-H01

(4) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 LOOK THROUGH THE CASCADE SEGMENT TO EXAMINE THE BULLNOSE SEAL.

M07503 S0004286458_V2

Thrust Reverser Bullnose Seal Inspection
Figure 601/78-31-18-990-803-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER BULLNOSE SEAL - REPAIRS

1. General

A. This procedure has this task:

(1) Repair of the thrust reverser bullnose seal.

TASK 78-31-18-300-801-H01

2. Thrust Reverser Bullnose Seal Repair

A. General

(1) The bullnose seal is on the forward edge of the inner wall of the thrust reverser sleeve.

(2) To get access to the bullnose seal, you must remove the thrust reverser sleeve.

(3) Clean surfaces for the adhesive are required to get the high strength bond to hold the fabric splice to the bullnose seal. All unwanted materials such as oils, greases, waxes or dirt must be removed.

(4) This procedure cannot be used to repair the bulb-type fire seals found on the thrust reverser. The bulb-type fire seals must be replaced if damaged.

B. References

Reference	Title
78-31-10-000-801-H01	Thrust Reverser Sleeve Removal (P/B 401)
78-31-10-400-801-H01	Thrust Reverser Sleeve Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-549	Knife - Putty, Broad Blade
STD-552	Knife - Utility

D. Consumable Materials

Reference	Description	Specification
A00027	Adhesive - Silicone Rubber, 1 Part, RTV	BAC5010 Type 60
B00083	Solvent - VM&P Naphthas	TT-N-95 Type II, ASTM D-3735 Type III
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02276	Fabric - Dacron, 220/50 Mesh (Mohawk Dacron Fabrics - D2000 Fabric)	
G50078	Abrasive - Aluminum Oxide Paper, 320 grit or finer	

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
426	Right Thrust Reverser - Right Engine

F. Prepare for the Repair

SUBTASK 78-31-18-010-004-H01

(1) Do this task: Thrust Reverser Sleeve Removal, TASK 78-31-10-000-801-H01.

G. Procedure

SUBTASK 78-31-18-350-001-H01

(1) Repair the bullnose seal (Figure 801):

(a) Find the size of the replacement seal segment.

NOTE: The shape of the bullnose seal is half a circle (180 degrees) when put on a bench. The length of the bullnose seal is approximately 183.2 inches (4653.3 millimeters).

1) Use seal segment replacements at approximately 30 degree increments (0-30 degrees, 30-60 degrees, 60-90 degrees, 90-120 degrees, 120-150 degrees, 150-180 degrees).

2) Make sure dimension "X" from the splice butt-joint to the two adjacent fastener holes is equal.

(b) Wipe or scrub the outside the bullnose seal with a clean cotton wiper, G00034 to remove all loose soil, grease, hydraulic fluid, or oil.

(c) Use a utility knife, STD-552 to cut through the bullnose seal to remove the damaged segment.

1) Make sure the cut for the butt-joint is perpendicular and straight.

(d) Use a utility knife, STD-552 to cut a replacement segment from a serviceable bullnose seal.

1) Make sure the cut for the butt-joint is perpendicular and straight.

2) Make sure there is no gap between the replacement segment and the two remaining parts of the bullnose seal.

(e) Lightly sand the cut edges of the three seals with an 320 grit or finer abrasive paper, G50078 aluminum oxide paper to remove all unwanted material.

WARNING

DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. SOLVENT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(f) Use a clean cotton wiper, G00034 and solvent, B00083 to clean the area to be spliced on all three seals.

1) Continue to clean the surface with solvent and a clean cloth until no contamination is seen on the cloth.

2) Remove the excess solvent with a clean cloth before it evaporates.

(g) Cut two pieces of Dacron D2000 Dacron Fabric, G02276 for the two splices.

1) Make the width of the fabric 2.0 inches (50.8 millimeters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Make sure the length of the fabric is sufficient to go fully around the seal.

CAUTION

IMMEDIATELY APPLY THE FABRIC TO THE BULLNOSE SEAL AFTER YOU APPLY THE ADHESIVE. THE FABRIC WILL NOT BOND CORRECTLY UNLESS YOU INSTALL THE FABRIC IMMEDIATELY

(h) Apply the fabric to the splices on both sides of the replacement seal segment.

1) Apply the adhesive, A00027 on the surfaces to be bonded, approximately 1.0 inch (25.4 millimeters) on each side of the splice.

NOTE: The adhesive is a one component, vulcanizing, silicone rubber adhesive. A primer is not necessary for silicone rubber.

a) Apply a thin, uniform layer of adhesive, 0.010-0.020 inch (0.254-0.508 millimeter) thick, with a broad blade putty knife, STD-549.

2) Immediately wrap the Dacron fabric around the seal, follow the seal contour, without any wrinkles or folds in the fabric.

NOTE: Immediately after the adhesive is applied, the adhesive will begin to cure and within a few minutes, form a skin on the surface of the adhesive. The fabric will not adhere properly if a skin has formed on the adhesive.

3) Make sure the fabric extends 1.0 inch (25.4 millimeters) on each side of the splice.

4) Make sure the surface of the fabric does not have notches, folds or wrinkles.

5) Make sure the surface of the fabric is smooth and uniform across the splice and adjacent to the splice.

6) Make sure the fabric completely wraps around the bullnose seal.

7) Use a clean, dry cotton wiper, G00034 to remove the unwanted adhesive.

(i) Do not touch the repaired bullnose seal for a minimum of 24 hours.

NOTE: The adhesive must cure at 65-100 degrees F (18.3-37.7 degrees C). The adhesive requires a minimum of 20 percent relative humidity to cure. Because the adhesive requires moisture from the air to cure, do not cover the adhesive. There will be the smell of acetic acid until the adhesive has cured.

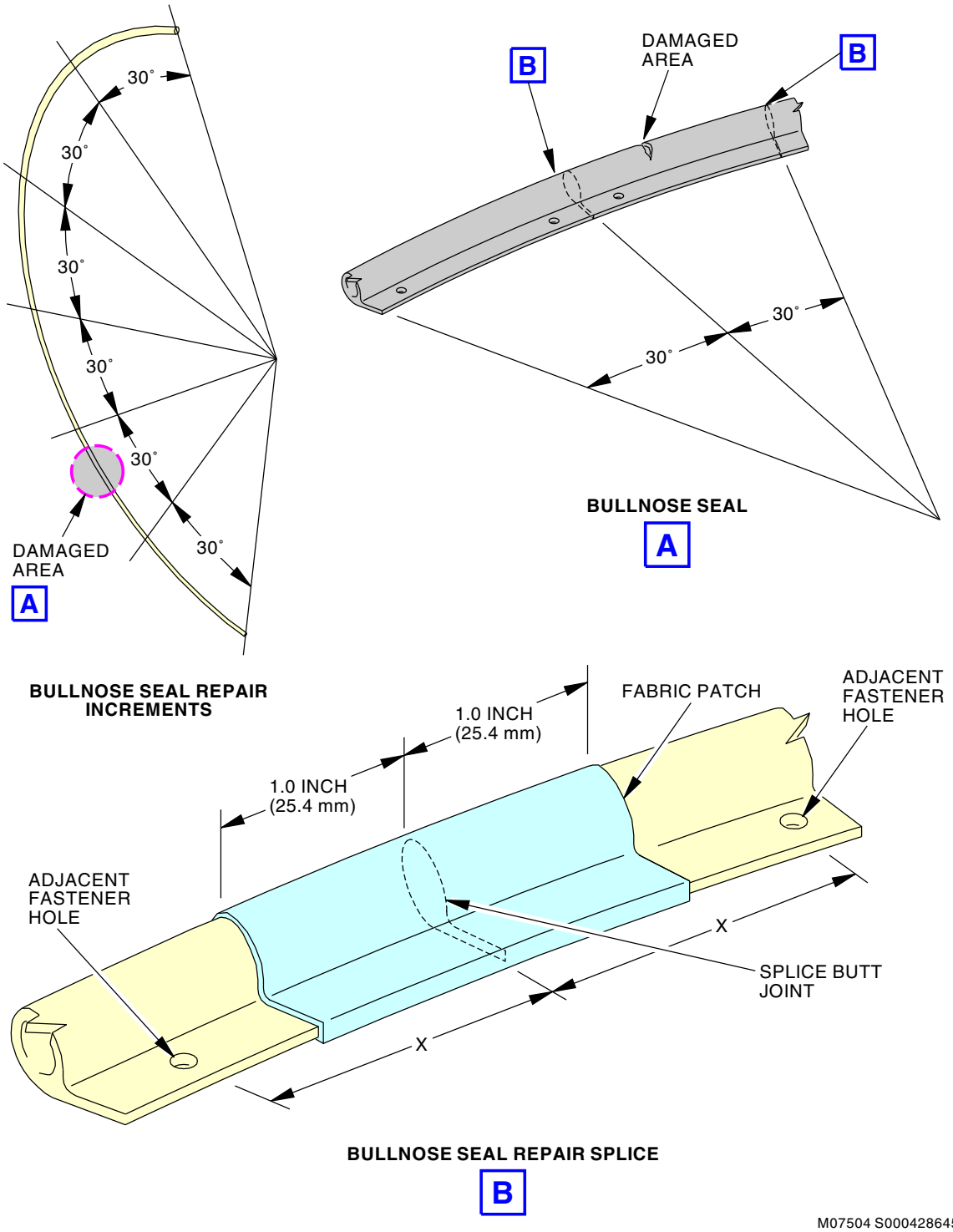
H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-18-410-004-H01

(1) Do this task: Thrust Reverser Sleeve Installation, TASK 78-31-10-400-801-H01.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07504 S0004286459_V2

Thrust Reverser Bullnose Seal Repair
Figure 801/78-31-18-990-802-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER LATCH ACCESS DOORS - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) To remove the thrust reverser latch access doors.

(2) To install the thrust reverser latch access doors.

TASK 78-31-19-000-801-H01

2. Thrust Reverser Latch Access Doors Removal

A. General

(1) This procedure removes the latch access doors.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Prepare for the Removal

SUBTASK 78-31-19-010-005-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Thrust Reverser Latch Access Doors Removal

SUBTASK 78-31-19-020-001-H01

(1) Remove the forward latch access door [8] (Figure 401).

(a) Remove countersunk bolts [7] and collars [3] at each hinge fitting.

1) Use a locking pliers and allen wrench to remove the bolt or drill out the collar.

2) Discard the collars.

(b) Remove the access door from the thrust reverser latch beam as the countersunk bolts are removed.

1) Remove the shims [1] under the hinge fittings.

(c) Do a check for thread damage on the bolts.

1) Replace the bolts if there is thread damage.

SUBTASK 78-31-19-020-002-H01

(2) Remove the center latch access door [19].

(a) Remove countersunk bolts [15] and collars [3] at each hinge fitting.

1) Use a locking pliers and allen wrench to remove the bolt or drill out the collar.

2) Discard the collars.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Remove the access door from the thrust reverser latch beam as the countersunk bolts are removed.

1) Remove the shims [12] under the hinge fitting.

(c) Do a check for thread damage on the bolts.

1) Replace the bolts if there is thread damage.

SUBTASK 78-31-19-020-003-H01

(3) Remove the aft latch access door [25].

(a) Remove countersunk bolts [24] and collars [3] at each hinge fitting.

1) Use a locking pliers and allen wrench to remove the bolt or drill out the collar.

2) Discard the collars.

(b) Remove the access door from the thrust reverser latch beam as the countersunk bolts are removed.

1) Remove the shims [21] under the hinge fitting.

(c) Do a check for thread damage on the bolts.

1) Replace the bolts if there is thread damage.

——— END OF TASK ———

TASK 78-31-19-400-801-H01

3. Thrust Reverser Latch Access Doors Installation

A. General

(1) This procedure installs the latch access doors.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-01-830-801-H01	Thrust Reverser Adjustment (P/B 501)

C. Tools/Equipment

Reference	Description
STD-6566	Gage - Dial Push/Pull, DPP-25 (DPP-125N), 25 lb (11.3 kg) Capacity

D. Consumable Materials

Reference	Description	Specification
A00436	Sealant - Fuel Tank	BMS5-45 (Supersedes BMS5-26)
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Thrust Reverser Latch Access Doors Installation

SUBTASK 78-31-19-820-001-H01

(1) Temporarily install the applicable latch access door (Figure 401).

(a) Align the door hinge fitting and the shim with the holes in the latch beam.

(b) Install temporary fasteners to hold the door on the latch beam.

SUBTASK 78-31-19-410-001-H01

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

SUBTASK 78-31-19-220-001-H01

(3) Do a check of the clearances for the latch access door.

(a) Close the latch access door.

(b) Measure the step difference between the door and the structure around the door.

NOTE: This is for the shim installation between the door hinge and latch beam structure.

1) The maximum shim gap is 0.050 inch (1.270 millimeter).

2) The maximum gap before fastener installation is 0.010 inch (0.254 millimeter).

(c) Make sure the door is not loose when closed and latched.

1) If the door is loose, the door latch may have to be adjusted.

(d) Make sure the door closes with light hand pressure and there is no preload between the door and the latch beam/latch beam fairing structure around the door when the door is closed and latched.

NOTE: A preload condition exists if the door panel must deform or bend or interfere with the adjacent structure in order to latch.

SUBTASK 78-31-19-010-004-H01

(4) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-19-420-001-H01

(5) Remove the temporary fasteners that hold the forward, center, or aft latch access door to the latch beam.

SUBTASK 78-31-19-420-002-H01

(6) Install the forward latch access door [8].

(a) Install new shims [1] between the latch beam and door hinge if it is necessary.

1) Use a 0.033 inch (0.838 millimeter) thick shim for gaps that are less than 0.033 inch (0.838 millimeter).

NOTE: Use BACS40R007B025F for the 0.033 inch (0.838 millimeter) thick shim. This is an aluminum laminated shim with 11 laminations that are 0.003 inch (0.076 millimeter) thick.

2) Use a 0.062 inch (1.575 millimeter) thick shim for gaps that are more than 0.033 inch (0.838 millimeter).

NOTE: Use BACS40R007C025F for the 0.062 inch (1.575 millimeter) thick shim. This is an aluminum laminated shim with 10 laminations that are 0.003 inch (0.076 millimeter) thick and a solid part that is 0.030 inch (0.762 millimeter) thick.

3) Remove the shim laminations to get the correct step/gap.

(b) Apply sealant, A00436 to both sides of the shim before it is installed.

1) Mix the two-part sealant to the manufacturers instructions.

(c) Align the door hinge fittings and the shims [1] with the holes in the latch beam.

(d) Install the countersunk bolts [7] and collars [3].

1) Replace the bolt if there is thread damage.

2) Apply sealant, A00436 to the entire bolt shank and threads and immediately install the bolt.

a) It is optional to apply sealant to all areas of the countersink, counterbore or hole.

b) Apply an additional bead of sealant to the bolt threads approximately one-third from the end of bolt before you install the nut.

3) Make sure the bolt is completely seated in the structure before you tighten the collar.

a) There should be no gap at the bolt head.

4) Install the collar on the bolt finger tight to make sure the collar is correctly engaged on the bolt.

5) Tighten the collar hex 15-30 inch-pounds (1.7-3.4 newton-meters); the hex will break off and leave a collar and washer.

a) Do not use an impact wrench.

b) A continuous extrusion of sealant is required around the fastener head.

c) Extrusion of sealant at the base of the collar must be seen but does not need to be continuous.

6) Remove excess extruded sealant with a dry cotton wiper, G00034.

7) Make sure there is no gap at the countersunk bolt head or the collar.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-19-420-003-H01

(7) Install the center latch access door [19].

(a) Install new shims [12] between the latch beam and door hinge if it is necessary.

1) Use the 0.033 inch (0.838 millimeter) thick shim for gaps that are less than 0.033 inch (0.838 millimeter).

NOTE: Use BACS40R007B025F for the 0.033 inch (0.838 millimeter) thick shim. This is an aluminum laminated shim with 11 laminations that are 0.003 inch (0.076 millimeter) thick.

2) Use the 0.062 inch (1.575 millimeter) thick shim for gaps that are more than 0.033 inch (0.838 millimeter).

NOTE: Use BACS40R007C025F for the 0.062 inch (1.575 millimeter) thick shim. This is an aluminum laminated shim with 10 laminations that are 0.003 inch (0.076 millimeter) thick and a solid part that is 0.030 inch (0.762 millimeter) thick.

3) Make sure the shims for the center latch access door keeps the same hinge center line between the forward and aft hinges.

4) Remove the shim laminations to get the correct step/gap.

(b) Apply sealant, A00436 to both sides of the shim before it is installed.

1) Mix the two-part sealant to the manufacturers instructions.

(c) Align the door hinge fittings and the shims [12] with the holes in the latch beam.

(d) Install the countersunk bolts [15] and collars [3].

1) Replace the bolt if there is thread damage.

2) Apply sealant, A00436 to the entire bolt shank and threads and immediately install the bolt.

a) It is optional to apply sealant to all areas of the countersink, counterbore or hole.

b) Apply an additional bead of sealant to the bolt threads approximately one-third from the end of bolt before you install the nut.

3) Make sure the bolt is completely seated in the structure before you tighten the collar.

a) There should be no gap at the bolt head.

4) Install the collar on the bolt finger tight to make sure the collar is correctly engaged on the bolt.

5) Tighten the collar hex to 15-30 inch-pounds (1.7-3.4 newton-meters); the hex will break off and leave the collar and washer.

a) Do not use an impact wrench.

b) A continuous extrusion of sealant is required around the fastener head.

c) Extrusion of sealant at the base of the nut must be seen but does not need to be continuous.

6) Remove excess extruded sealant with a dry cotton wiper, G00034.

7) Make sure there is no gap at the countersunk bolt head or the collar.

SUBTASK 78-31-19-420-004-H01

(8) Install the aft latch access door [25].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Install new shims [21] between the latch beam and door hinge if it is necessary.

1) Use a 0.033 inch (0.838 millimeter) thick shim for gaps that are less than 0.033 inch (0.838 millimeter).

NOTE: Use BACS40R007B025F for the 0.033 inch (0.838 millimeter) thick shim. This is an aluminum laminated shim with 11 laminations that are 0.003 inch (0.076 millimeter) thick.

2) Use a 0.062 inch (1.575 millimeter) thick shim for gaps that are more than 0.033 inch (0.838 millimeter).

NOTE: Use BACS40R007C025F for the 0.062 inch (1.575 millimeter) thick shim. This is an aluminum laminated shim with 10 laminations that are 0.003 inch (0.076 millimeter) thick and a solid part that is 0.030 inch (0.762 millimeter) thick.

3) Remove the shim laminations to get the correct step/gap.

(b) Apply sealant, A00436 to both sides of the shim before it is installed.

1) Mix the two-part sealant to the manufacturers instructions.

(c) Align the door hinge fittings and the shims [21] with the holes in the latch beam.

(d) Install the countersunk bolts [24] and collars [3].

1) Replace the bolt if there is thread damage.

2) Apply sealant, A00436 to the entire bolt shank and threads and immediately install the bolt.

a) It is optional to apply sealant to all areas of the countersink, counterbore or hole.

b) Apply an additional bead of sealant to the bolt threads approximately one-third from the end of bolt before you install the nut.

3) Make sure the bolt is completely seated in the structure before you tighten the collar.

a) There should be no gap at the bolt head.

4) Install the collar on the bolt finger tight to make sure the collar is correctly engaged on the bolt.

5) Tighten the collar hex to 15-30 inch-pounds (1.7-3.4 newton-meters); the hex will break off and leave the collar and washer.

a) Do not use an impact wrench.

b) A continuous extrusion of sealant is required around the fastener head.

c) Extrusion of sealant at the base of the nut must be seen but does not need to be continuous.

6) Remove excess extruded sealant with a dry cotton wiper, G00034.

7) Make sure there is no gap at the countersunk bolt head or the collar.

SUBTASK 78-31-19-820-002-H01

CAUTION DO A CHECK OF THE FIT AND FLUSHNESS OF THE CLOSED LATCH ACCESS DOORS TO THE FAIRINGS AROUND THE DOOR OPENINGS. IF THE FIT AND FLUSHNESS ARE NOT CORRECT, DAMAGE TO THE DOORS CAN OCCUR.

(9) Do a check of the latch access door and the latch beam.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Close each thrust reverser latch access door and check that all door latches can be closed with no more than 20 pounds (89 newtons) maximum force.

1) While holding the door closed with your hand, measure the force needed to close each latch with a push pull gage, dial gage, STD-6566 or equivalent.

2) Make sure you check every latch.

3) If more than 20 pounds (89 newtons) of force is required to close the latch, adjust the force to close the latch Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

4) If the force to close the latch is 20 pounds (89 newtons) force or less, then continue.

(b) Make sure the door is not loose when closed and latched.

(c) Make sure there is no preload between the door and the latch beam/latch beam fairing structure around the door when the door is closed and latched.

(d) If the latch access door will not close, make sure that the tension latches are closed and latched.

NOTE: The latch access doors have fittings which will prevent the closure of the access door if the tension latches are not closed and latched.

1) Make sure that all of the latch bolts have properly engaged the latch trigger and that the latch bolt is fully engaged with the door (Figure 402).

a) Apply hand pressure to the exterior surface of the door adjacent to each door latch as you latch all of the door latches.

b) Apply firm finger pressure to each latch bolt to make sure the bolt is fully engaged.

(e) Adjust the adjustment screw on the door latches as necessary.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-19-410-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

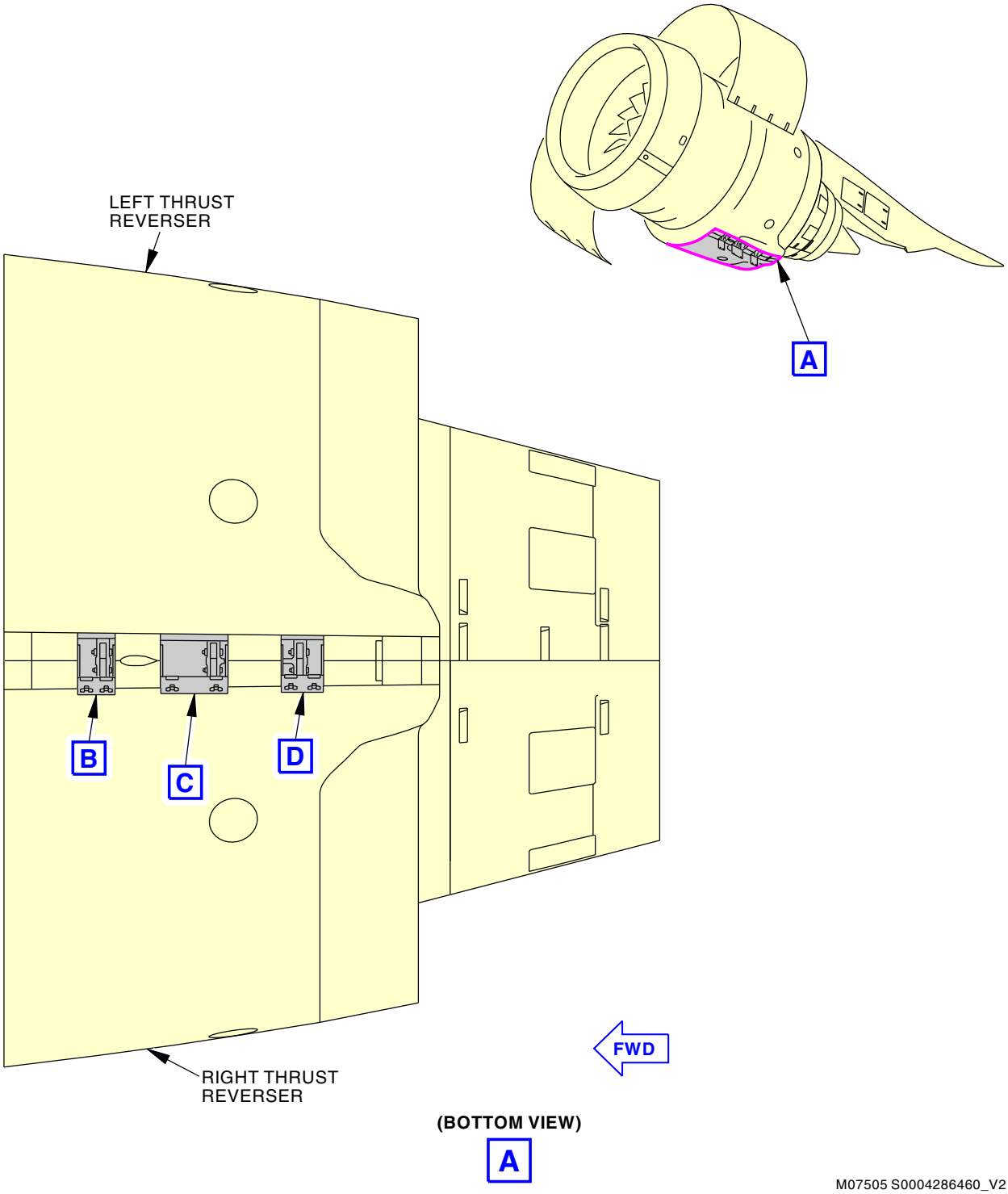
Number	Name/Location
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

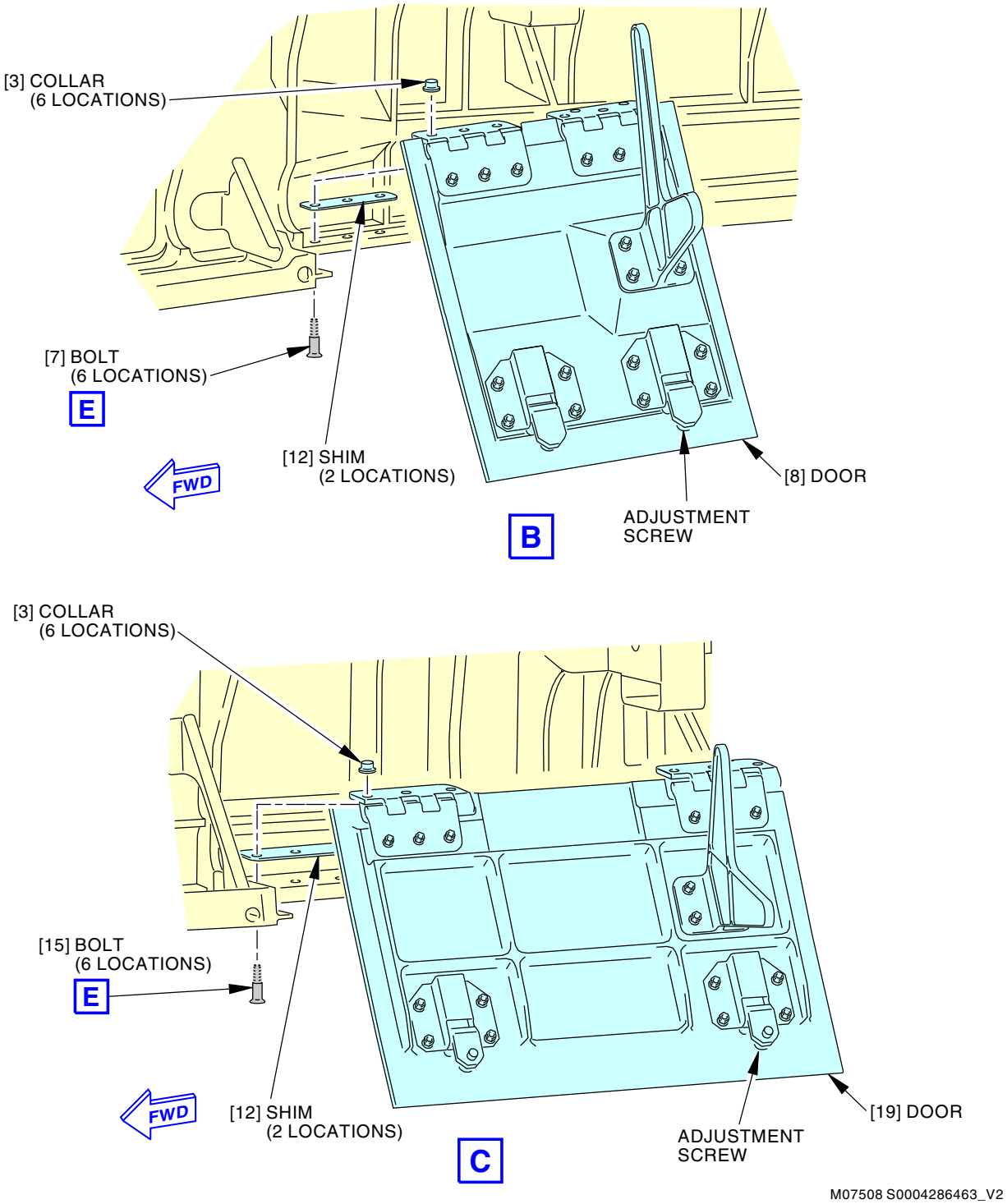
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



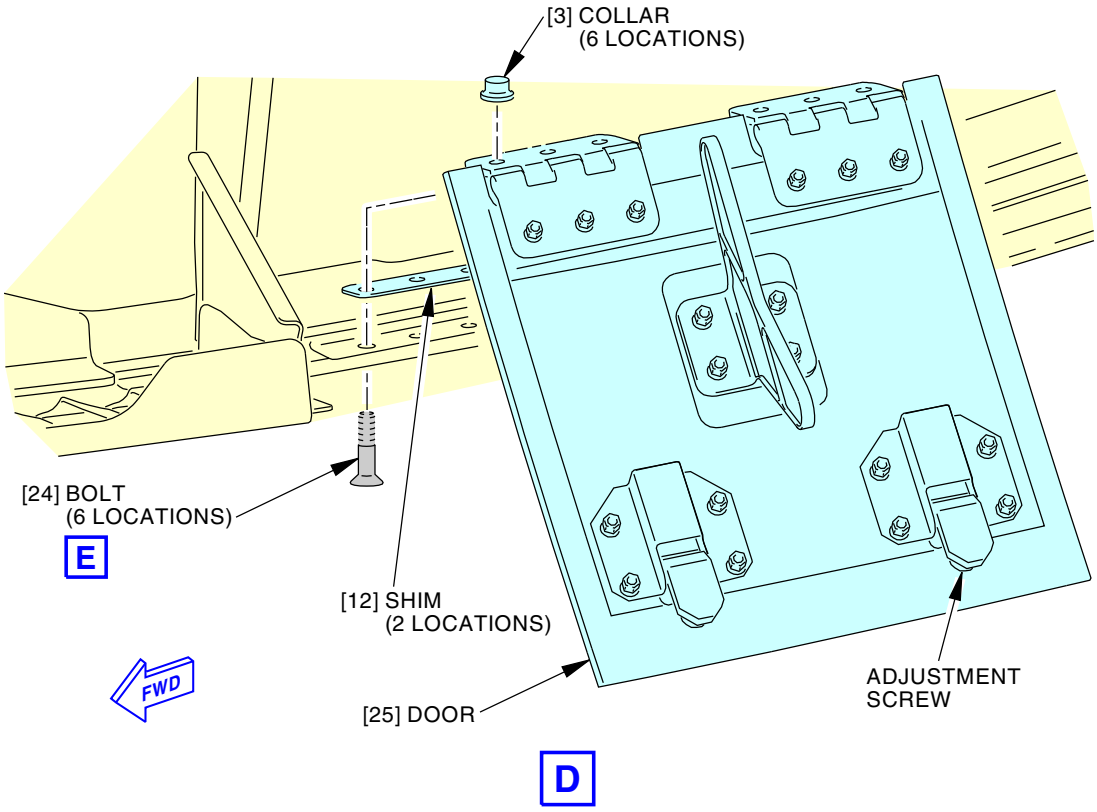
Thrust Reverser Latch Access Doors Installation
Figure 401/78-31-19-990-801-H01 (Sheet 1 of 3)

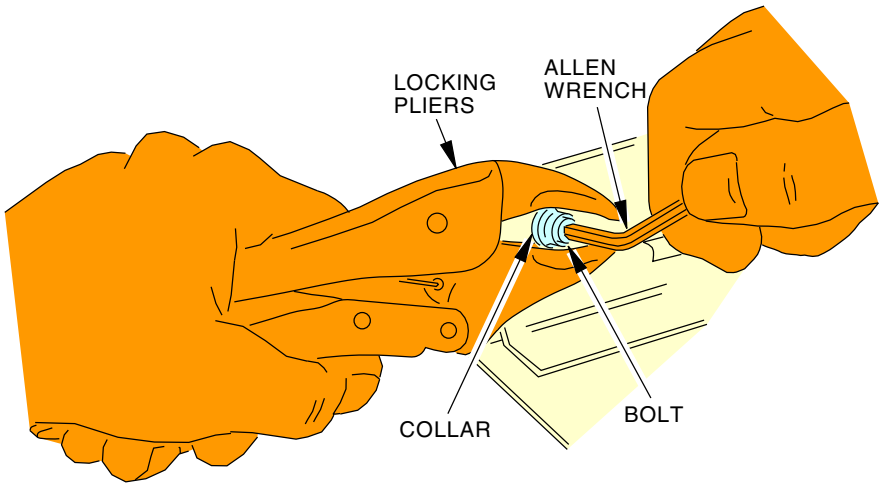
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Latch Access Doors Installation
Figure 401/78-31-19-990-801-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





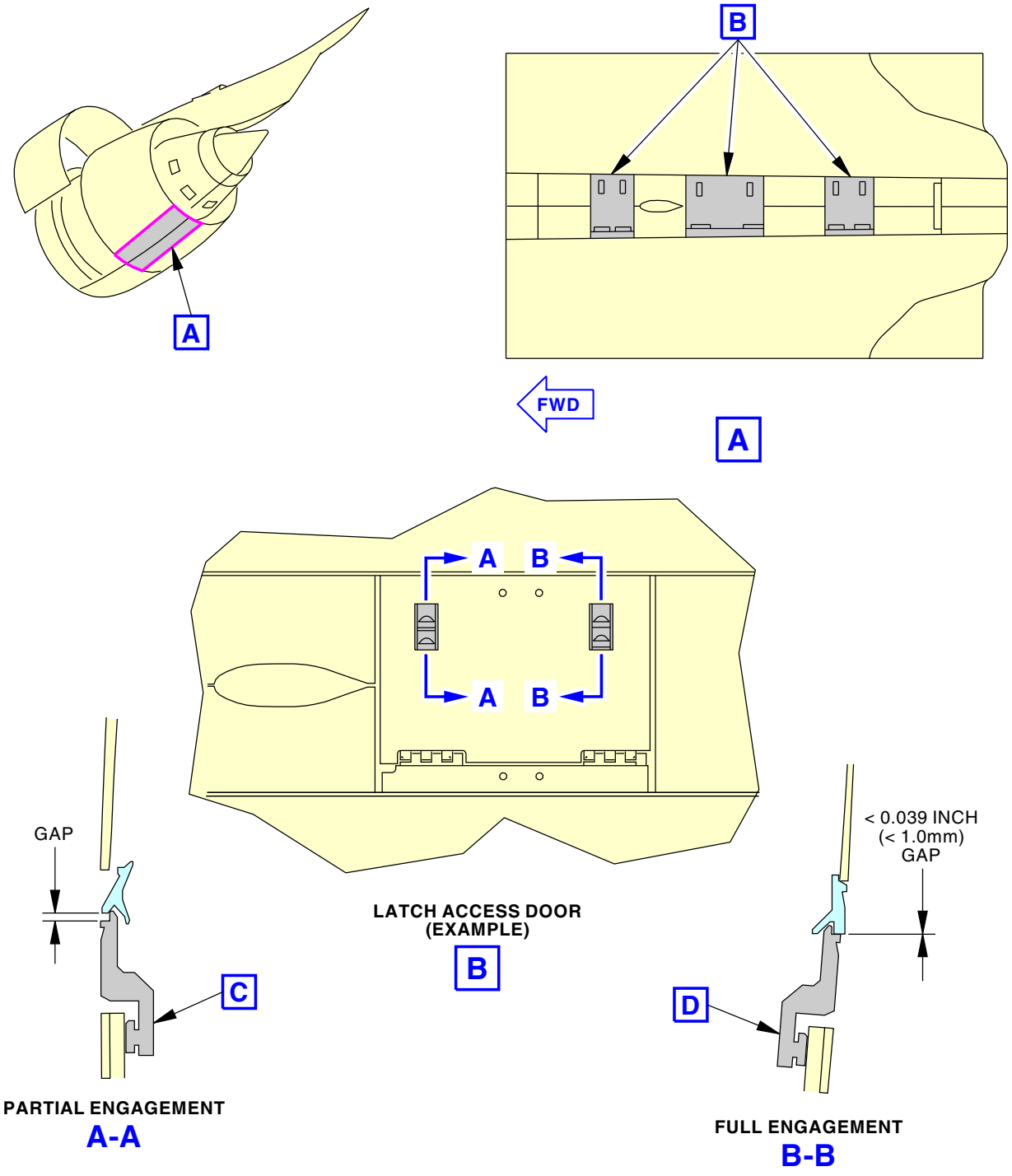
BOLT REMOVAL
(EXAMPLE)

E

M07511 S0004286466_V2

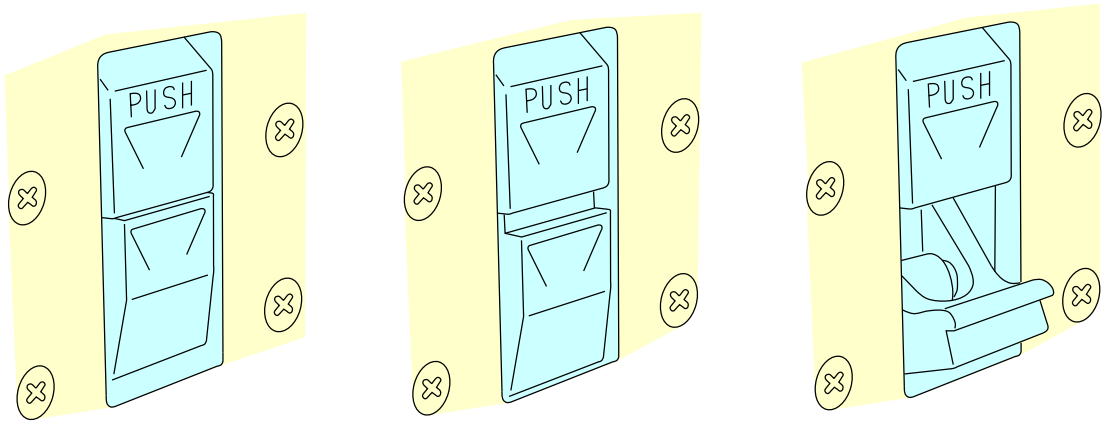
Thrust Reverser Latch Access Doors Installation
Figure 401/78-31-19-990-801-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Latch Closure
Figure 402/78-31-19-990-802-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



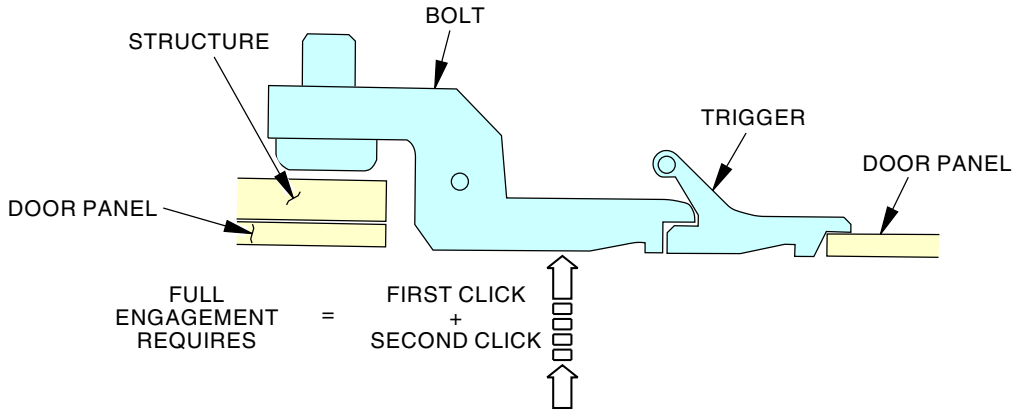
FULLY CLOSED
< 0.039 INCH GAP
(< 1.0 mm GAP)

PARTIALLY CLOSED

FULLY OPEN

LATCH SEQUENCE

C



CLOSE LATCH OPERATION

D

1547651 S0000283394_V3

Latch Closure
Figure 402/78-31-19-990-802-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER UPPER BIFURCATION T-HOOK LATCH, GEARBOX, CABLE AND HANDLE AND RECEIVER - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) Remove the T-hook, gearbox, cable and handle on the upper bifurcation of the right side thrust reverser.

(2) Install the T-hook, gearbox, cable and handle on the upper bifurcation of the right side thrust reverser.

(3) Remove the gearbox assembly.

(4) Install the gearbox assembly.

(5) Remove the T-handle, turnbuckle adjuster and push-pull cable from the installed cable housing and gearbox assembly.

(6) Install the T-handle, turnbuckle adjuster and push-pull cable from the installed cable housing and gearbox assembly.

(7) Remove the T-hook.

(8) Install the T-hook.

(9) Remove the T-hook receiver.

(10) Install the T-hook receiver.

TASK 78-31-20-000-801-H01

2. Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Assembly Removal (Selections)

A. Procedure

SUBTASK 78-31-20-020-025-H00

(1) Do one of these tasks to remove the T-hook latch, gearbox, cable and handle:

(a) To remove the complete T-hook, gearbox, cable and handle assembly, do this task: T-Hook, Gearbox, Cable and Handle Assembly Removal, TASK 78-31-20-000-806-H00.

(b) To remove the T-hook, do this task: T-Hook Removal, TASK 78-31-20-000-804-H00.

(c) To remove the gearbox, do this task: Gearbox Assembly Removal, TASK 78-31-20-000-805-H00.

(d) To remove the handle latch control assembly and push-pull cable, do this task: Handle Latch Control Assembly and Push-Pull Cable Removal, TASK 78-31-20-000-803-H00.

(e) To remove the T-hook latch receiver, do this task: T-Hook Latch Receiver Removal, TASK 78-31-20-000-802-H01.

——— END OF TASK ———

TASK 78-31-20-400-801-H01

3. Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Assembly Installation (Selections)

A. Procedure

SUBTASK 78-31-20-420-040-H00

(1) Do one of these tasks to remove the T-hook latch, gearbox, cable and handle:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) To install the complete T-hook, gearbox, cable and handle assembly, do this task: T-Hook, Gearbox, Cable and Handle Assembly Installation, TASK 78-31-20-400-806-H00.

(b) To install only the T-hook, do this task: T-Hook Installation, TASK 78-31-20-400-804-H00.

(c) To install only the gearbox, do this task: Gearbox Assembly Installation, TASK 78-31-20-400-805-H00.

(d) To install only the handle latch control assembly and push-pull cable, do this task: Handle Latch Control Assembly and Push-Pull Cable Installation, TASK 78-31-20-400-803-H00.

(e) To remove only the T-hook latch receiver, do this task: T-Hook Latch Receiver Installation, TASK 78-31-20-400-802-H01.

——— END OF TASK ———

TASK 78-31-20-000-806-H00

4. T-Hook, Gearbox, Cable and Handle Assembly Removal

(Figure 401 or Figure 402)

A. General

(1) This task gives the procedure to remove the T-hook, gearbox, cable and handle on the upper bifurcation on the right side thrust reverser.

(2) The gearbox, cable and handle are removed as one piece unit from the inside of the thrust reverser inner wall.

(3) The T-hook nut is removed before the gearbox, cable and handle are removed. The T-hook is retained on the gearbox by the gearbox spring.

(4) You will need a standard 0.75 in. (19.05 mm) socket and a wrench to remove the T-hook. The nut which attaches the T-hook is in the fan duct at the inner wall of the upper bifurcation in the right side thrust reverser.

(5) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(6) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(7) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

(8) To remove the T-hook, the T-hook must not not turn as the nut is removed. Two people are necessary to remove the nut and washer from the T-hook.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-12-02-000-804-H00	Thrust Reverser Cowl Opening Actuators Removal (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
78-31-00-010-804-H01	Open the Thrust Reverser (Sling Method) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-01-300-804-H01	Click-Bond Stud Replacement (P/B 801)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
SPL-768	Sealant Removal Tool, Hardwood or Plastic Part #: ST982 Supplier: 81205
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)
STD-3724	Wrench

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Prepare for the Removal

SUBTASK 78-31-20-040-007-H00

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-20-040-008-H00

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-040-009-H00

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-20-860-014-H00

(4) Put the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-20-010-020-H00

(5) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-20-860-015-H00

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

(6) Make sure the thrust reverser sleeve is retracted and the thrust reverser is closed.

G. Upper Bifurcation T-Hook, Gearbox, Cable and Handle Removal

SUBTASK 78-31-20-010-021-H00

(1) Open the right thrust reverser with a sling.

NOTE: To remove the thermal insulation blanket and the T-hook gearbox, it is necessary to disconnect the PDOS actuator from the inner wall fitting.

(a) Refer to this task: Open the Thrust Reverser (Sling Method), TASK 78-31-00-010-804-H01.

(b) Open the applicable thrust reversers:

Number	Name/Location
416AR	Right Thrust Reverser, Left Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-20-490-022-H00

(2) Use a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-20-490-023-H00

(3) Get a standard 0.750 in. (19.050 mm) socket and wrench, STD-3724 to remove the T-hook nut.

NOTE: Most standard hand tools that can be found in a mechanics tool box are not listed in the equipment paragraph.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-490-024-H00

CAUTION

PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(4) Install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser to get access to the T-hook.

(a) Wear boot socks over your work boots.

SUBTASK 78-31-20-490-025-H00

CAUTION

MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(5) Install access platform or equivalent equipment to get access to the upper bifurcation of the fan duct.

NOTE: Access platform R78001 which is used to access blocker doors and blocker door drag links for maintenance can not be used. The R78001 platform blocks require you to extend the thrust reverser and these blocks fit into the spaces where the blocker doors are closed. The access hole for the T-hook is forward of the open blocker doors.

(a) If an access platform is not available, you can make an access platform from a stack of large, solid, styrofoam blocks which are local procurement.

1) Make sure the size of the styrofoam blocks are of sufficient width and thickness so that you can wedge the blocks into the fan duct.

2) Make sure the size of the styrofoam blocks are of sufficient length so that the blocks are stable when you stack the blocks in the fan duct and stand on the blocks.

3) Cut or trim the blocks as it is necessary to make the blocks fit in the fan duct.

4) Make sure the surface of the blocks are clean to prevent damage to the composite inner walls.

(b) If you do not have an access platform, try these steps to use your body to get to the top of the fan duct.

1) Push your back against the inner wall of the translating sleeve and push on the opposite side of the inner duct wall with your legs.

2) Use your hands and arms to help you move or slide your back upward a small amount while you maintain the position of your feet.

3) One at a time, move your legs upward a small amount as you maintain the pressure on your back.

4) Continue to repeat these steps until you get to the top of the fan duct.

5) Continue to maintain the pressure on your back with your legs as you work on the T-hook nut.

SUBTASK 78-31-20-010-022-H00

(6) Climb into the fan duct of the right side thrust reverser and climb towards the forward part of the upper bifurcation.

NOTE: Do not use the drag links as a ladder; damage to the drag links will occur.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-020-026-H00

(7) Remove the nut [25] and washer [26] for the T-hook [19] with a 0.750 in. (19.050 mm) socket and the wrench.

NOTE: The T-hook is retained on the gearbox by the gearbox spring.

NOTE: The T-hook must not turn as the nut is removed. Two people are necessary to remove the nut and washer from the T-hook.

(a) The first person must hold the T-hook handle.

(b) The second person must remove the nut on the T-hook.

SUBTASK 78-31-20-030-003-H00

(8) Disconnect the PDOS actuator from the upper bifurcation inner wall fitting.

(a) Refer to this task: Thrust Reverser Cowl Opening Actuators Removal, TASK 71-12-02-000-804-H00.

SUBTASK 78-31-20-020-027-H00

(9) To get access to the T-hook, gearbox and cable, use a sealant removal tool, SPL-768 to cut the sealant/filler around the blanket cutout for the gearbox and remove the thermal insulation blankets.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

SUBTASK 78-31-20-020-028-H00

(10) Remove the T-hook gearbox, cable and handle as follows:

(a) Remove the four bolts [6] and four washers [5] to remove the T-hook handle [1] from the latch beam mount.

(b) Remove 10 nuts [27] to remove the 10 clamps [23] and push-pull cable housing [2] from the click bond studs [28] on the inner wall.

(c) Remove one long bolt [18] and washer [17], washer [16], bushing [15] and washer [14] to disconnect the spring [13] and gearbox [3].

(d) Remove the remaining short three bolts [21] and three washers [20] from the gearbox.

(e) Remove the T-hook [19] and gearbox [3], the spacer [12] under the gearbox, a plain bushing [22] and washer [24].

SUBTASK 78-31-20-020-029-H00

(11) Remove the 10 clamps [23] from the push-pull cable housing [2] for the installation.

SUBTASK 78-31-20-020-030-H00

(12) To remove the spring [13] from the T-hook [19], remove the nut [54], washer [53], bushing [52] and bolt [51].

NOTE: The bolt has a countersunk head with a hex drive in the shank.

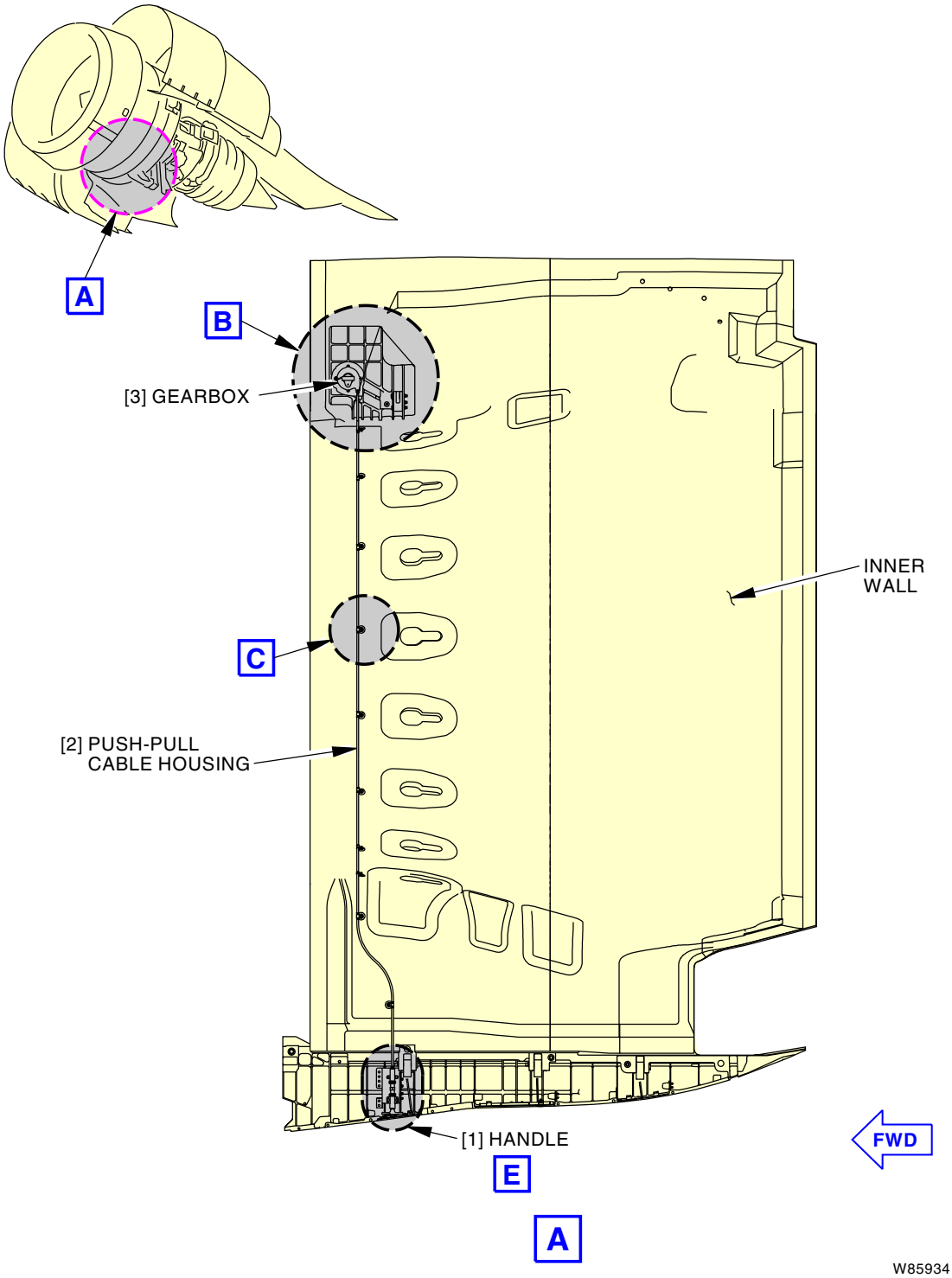
(a) Discard the nut.

SUBTASK 78-31-20-350-002-H00

(13) If the click-bond studs must be replaced, refer to the Click-Bond Stud Replacement, TASK 78-31-01-300-804-H01.

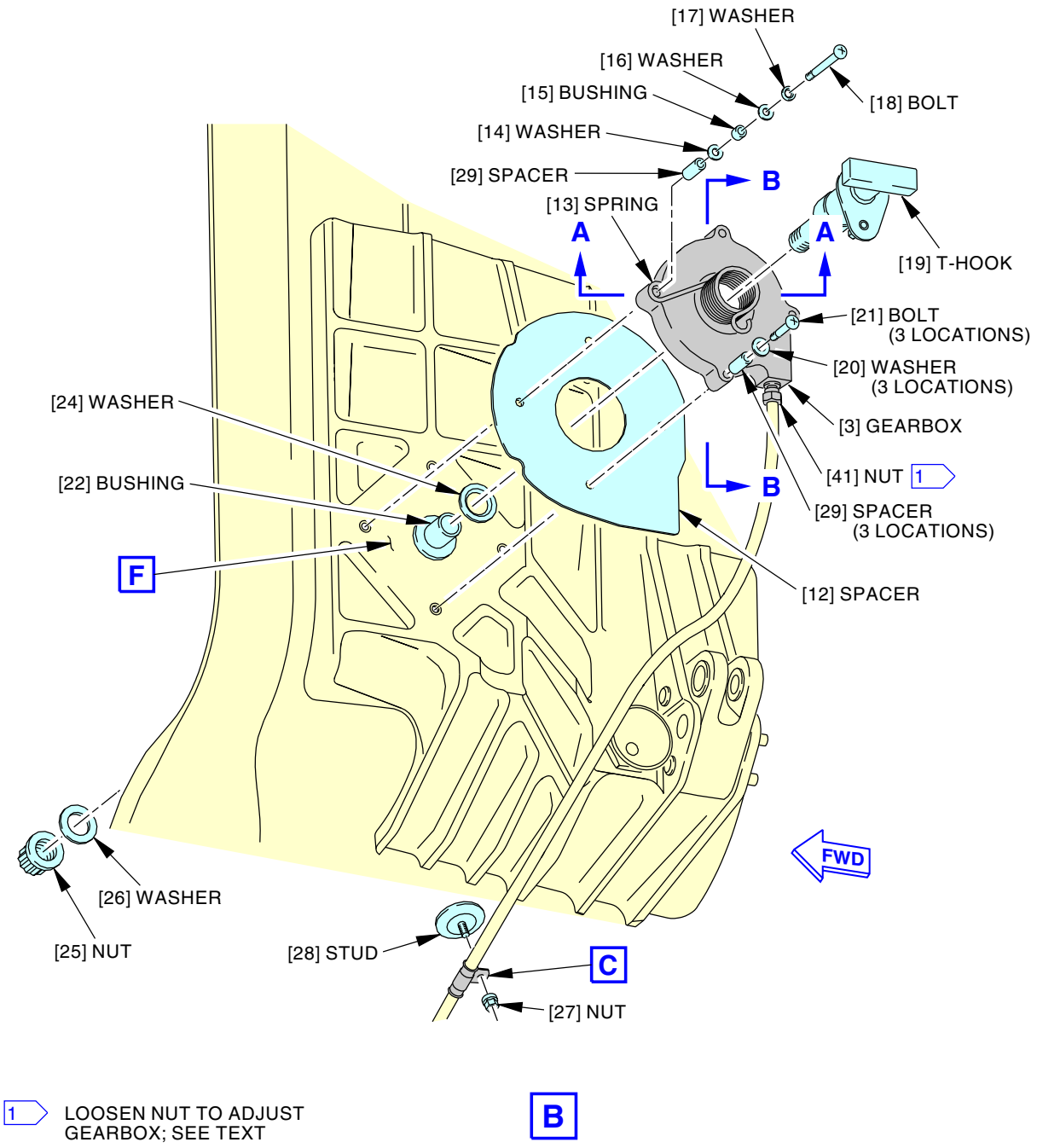
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



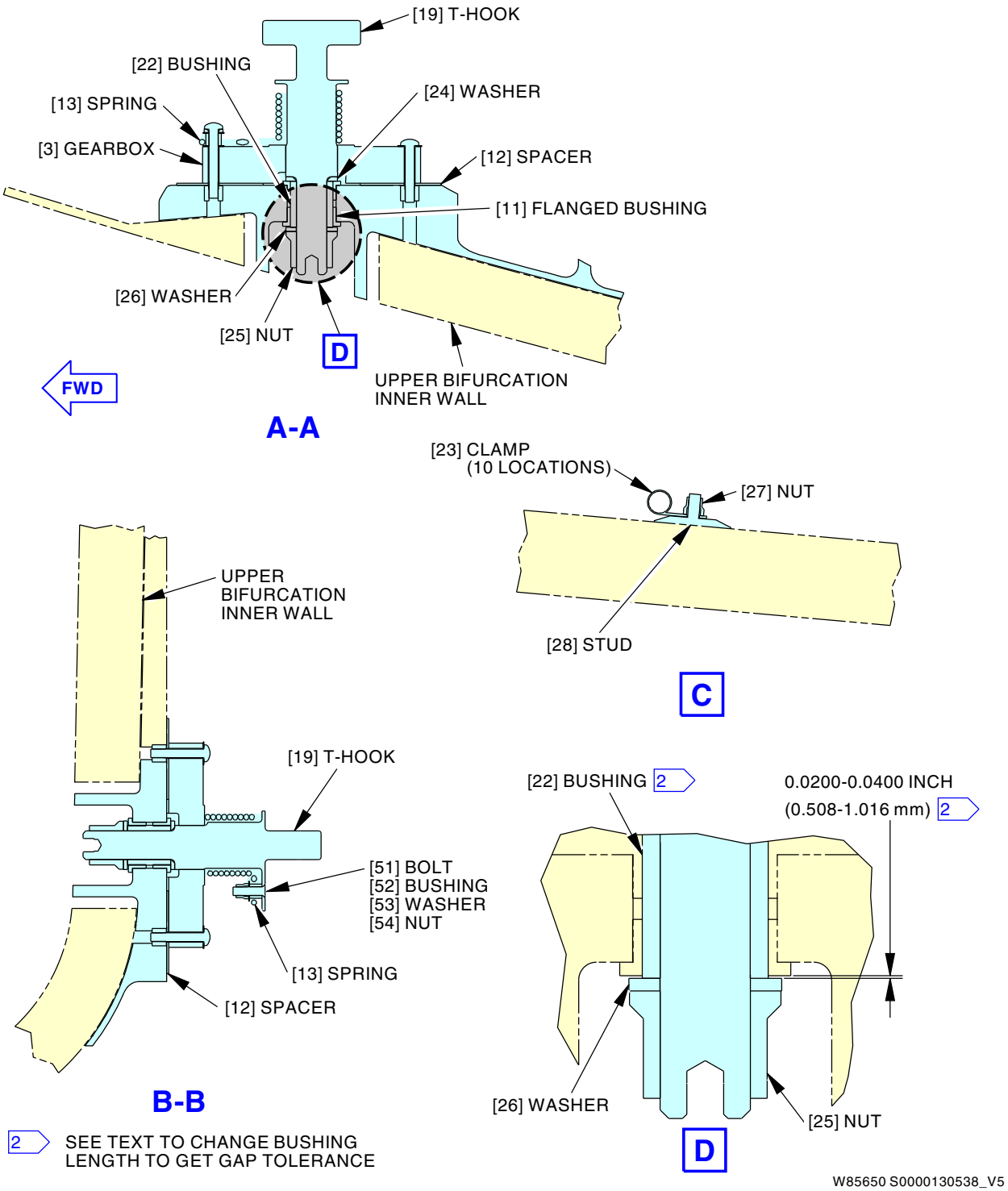
Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Installation
Figure 401/78-31-20-990-809-H00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



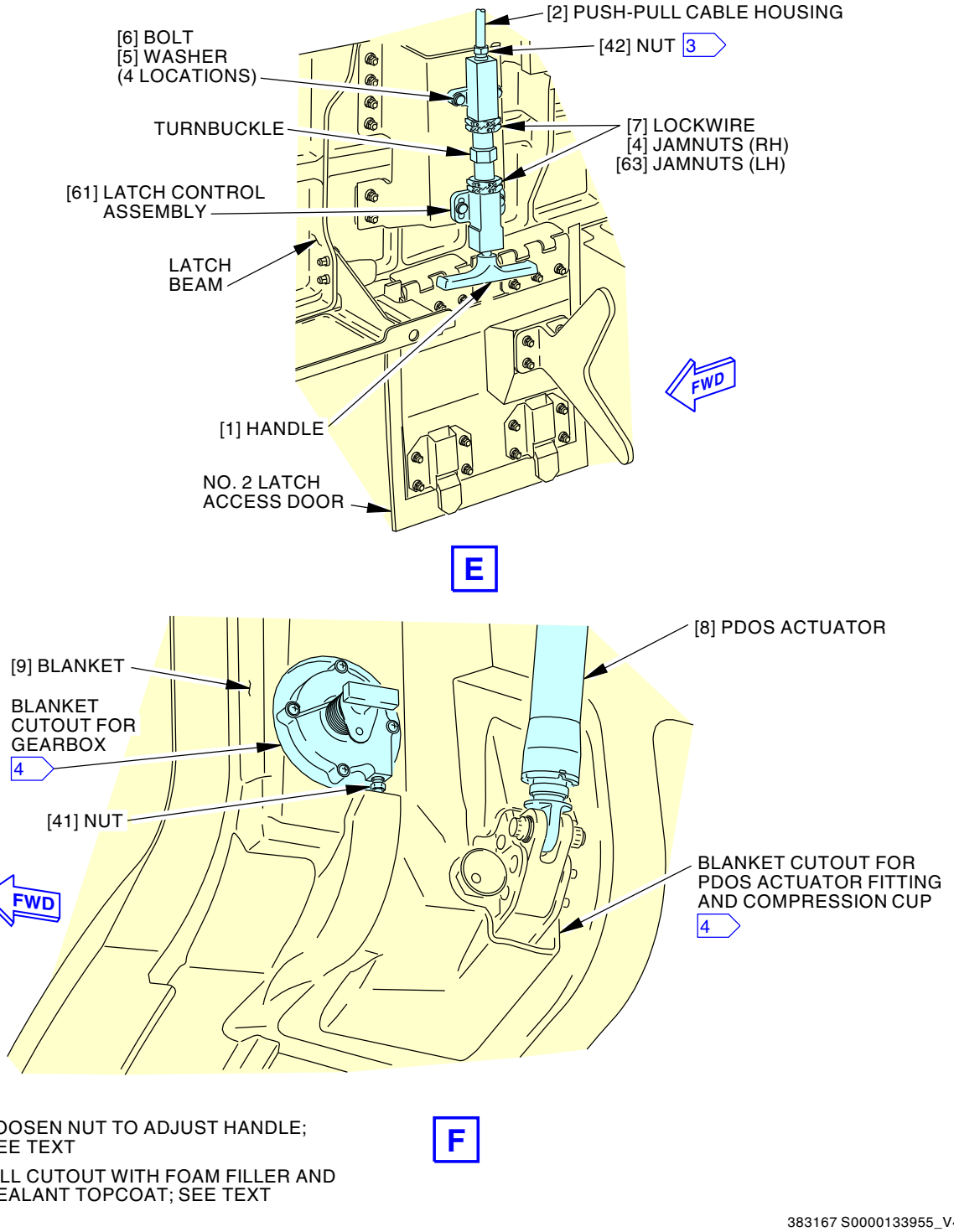
Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Installation
Figure 401/78-31-20-990-809-H00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



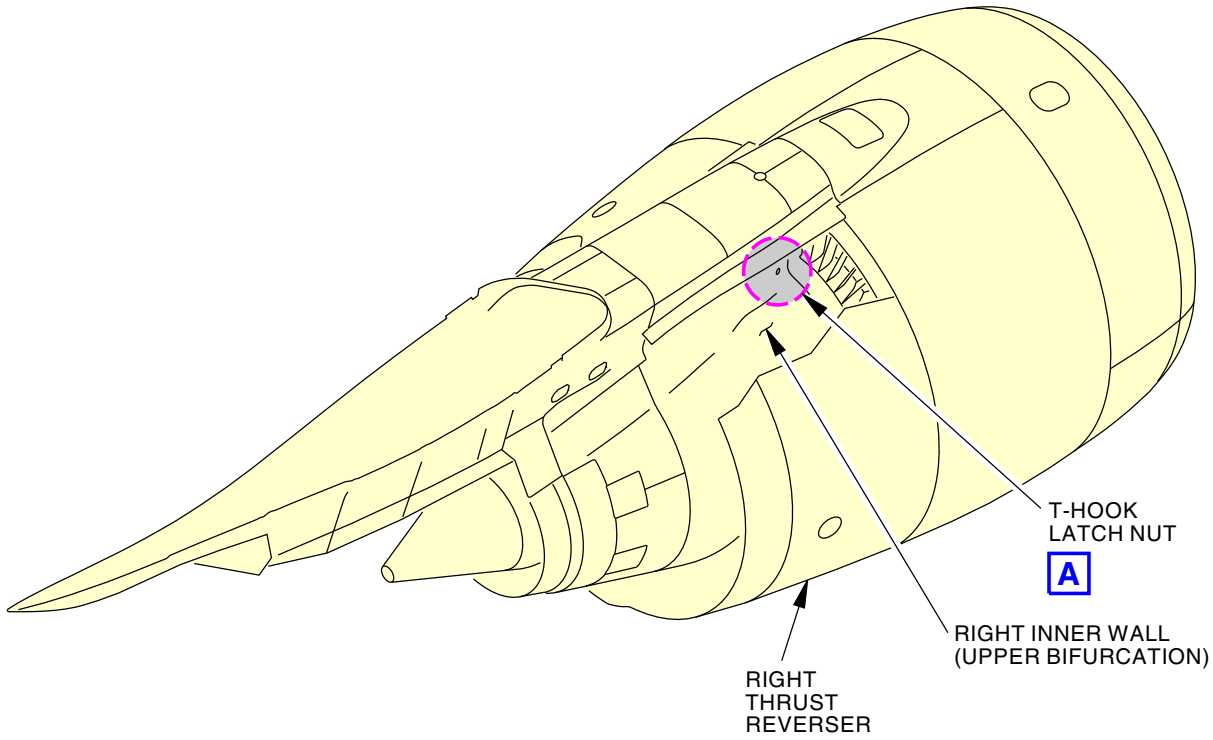
Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Installation
Figure 401/78-31-20-990-809-H00 (Sheet 3 of 4)

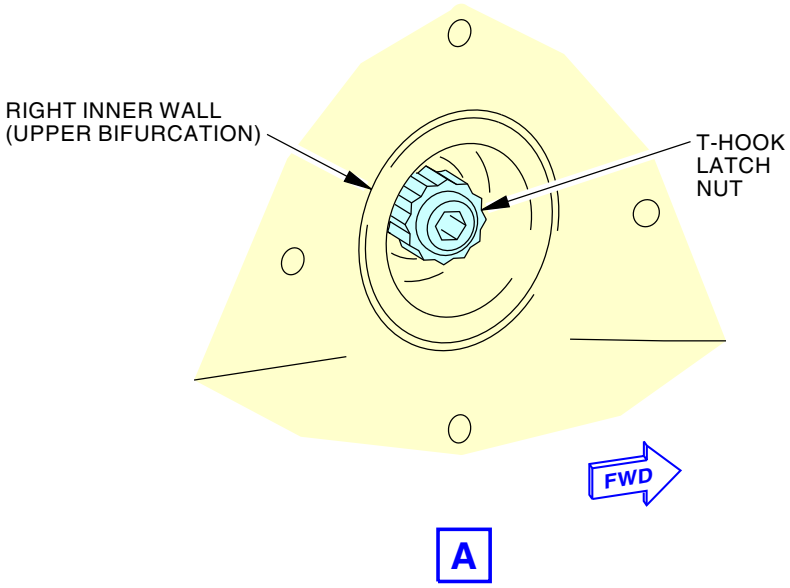
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Installation
Figure 401/78-31-20-990-809-H00 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





W85535 S0000130651_V3

T-Hook Latch - Right Fan Duct Location
Figure 402/78-31-20-990-810-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-20-400-806-H00

5. T-Hook, Gearbox, Cable and Handle Assembly Installation

(Figure 401 or Figure 402)

A. General

(1) This task gives the procedure to install the T-hook, gearbox, cable and handle assembly on the upper bifurcation on the right side thrust reverser.

(2) The T-hook, gearbox, cable and handle are installed as one piece unit from the inside of the thrust reverser inner wall.

(3) The T-hook nut is installed after the gearbox, cable and handle are installed. The T-hook is retained on the gearbox by the gearbox spring.

(4) You will need a standard 0.75 in. (19.05 mm) socket and a wrench to install the T-hook nut. The nut which attaches the T-hook is in the fan duct at the inner wall of the upper bifurcation in the right side thrust reverser.

(5) You must not close, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(6) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(7) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of hold open equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
71-12-02-400-804-H00	Thrust Reverser Cowl Opening Actuators Installation (P/B 401)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-804-H01	Close the Thrust Reverser (Sling Method) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-01-300-804-H01	Click-Bond Stud Replacement (P/B 801)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-20-820-801-H01	Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment (P/B 501)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-653	Platform - Engine and Strut Access
STD-1013	Wrench - Torque, 0 to 1200 in-lbs (0 to 135.6 N·m)
STD-1048	Stepladder - 6 foot (1.83m)

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Upper Bifurcation T-Hook, Gearbox, Cable and Handle Installation

SUBTASK 78-31-20-490-026-H00

(1) Use the a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-20-420-041-H00

(2) To install the spring [13] on the T-hook [19], position the spring on the T-hook, put the bushing [52] in the loop on the spring and install the bolt [51], washer [53] and a new nut [54].

SUBTASK 78-31-20-420-042-H00

(3) Install the T-hook gearbox, cable and handle as follows:

(a) Loosen the nut [41] and turn the gearbox [3] to sit on the fitting; do not tighten the nut at this time.

(b) Position the spacer [12] between the fitting on the upper bifurcation and the base of the gearbox [3].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Install the three bolts [21] and three washers [20] and three spacers [29] to attach the gearbox [3] and T-hook [19] to the fitting.

NOTE: These short bolts are installed at the top, bottom and right side of the gearbox. These bolts are hand tightened and are loose at this time. The gearbox bolts will be tightened after the T-hook nut is tightened.

1) Tighten the bolts with your hand, do not apply the final torque until the T-hook nut is tightened to the final torque.

(d) Install the correct plain bushing [22].

NOTE: There must be an installed gap between 0.0200 in. (0.5080 mm) and 0.0400 in. (1.0160 mm) between the flanged bushing [11] in the upper bifurcation fitting and the washer [26] under the nut [25]

Table 401/78-31-20-993-804-H00 T-Hook Gearbox Bushings

Plain Bushing Part Number	Bushing Length
BACB28AK10-094	0.94 inch (23.88 millimeters)
BACB28AK10-095	0.95 inch (24.13 millimeters)
BACB28AK10-096	0.96 inch (24.38 millimeters)
BACB28AK10-097	0.97 inch (24.64 millimeters)
BACB28AK10-098	0.98 inch (24.89 millimeters)

1) Refer to the table:Table 401.
2) Install the washer [24] and plain bushing [22] on the shank of the T-hook [19].
3) Put the T-hook [19] through the gearbox [3] and spacer [12].
4) Install the nut [25] and washer [26] on the T-hook [19].

NOTE: The nut is hand tightened at this time.

5) Do a check of the installed gap between the flanged bushing [11] in the upper bifurcation fitting and the washer [26] under the nut [25].
6) If the installed gap is not between 0.0200 in. (0.5080 mm) and 0.0400 in. (1.0160 mm), replace the plain bushing [22].
   a) Remove the nut [25], washer [26], washer [24], the plain bushing [22] and the T-hook [19].
   b) Find the plain bushing [22] which will give the installed gap between 0.0200 in. (0.5080 mm) and 0.0400 in. (1.0160 mm).
   c) Install the plain bushing [22] and washer [24] on the T-hook [19].
   d) Install the nut [25] and washer [26] on the T-hook [19].

   NOTE: The nut is hand tightened at this time.
7) Do a check of the installed gap between the flanged bushing [11] in the upper bifurcation fitting and the washer [26] under the nut [25] again.
   a) Repeat the steps above until you get the correct installed gap between 0.0200 in. (0.5080 mm) and 0.0400 in. (1.0160 mm).

(e) Install the spring [13] on the gearbox [3] with the remaining long bolt [18].

NOTE: This bolt is installed at the left side of the gearbox. This bolt is hand tightened and is loose at this time.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Put the thick washer [17] under the bolthead, a thin washer [16], the plain bushing [15], and a thin washer [14] on the long bolt.
2) Pull the spring [13] into position and install the bolt [18], bushing [15] and washer [17],washer [16] and washer [14] through the spring [13], spacer [29] and gearbox [3] into the fitting.
3) Tighten the bolts with your hand, do not apply the final torque until the T-hook nut is tightened to the final torque.

(f) Install the push-pull cable housing [2] to the 10 studs [28] on the inner wall.
1) If the click-bond stud must be replaced, refer to the Click-Bond Stud Replacement, TASK 78-31-01-300-804-H01.
2) Start from the top click-bond stud and position the cable on the inner wall.
3) Put the clamp [23] on the push-pull cable housing [2] and install the clamp [23] on the click bond stud [28].
4) Install the nut [27] and tighten between 20.0 in-lb (2 N·m) and 25.0 in-lb (3 N·m).
5) Complete the installation of the clamps from the top click-bond stud to the bottom click-bond stud.

(g) Install the T-hook handle [1] on the latch beam mount.
1) Loosen the nut [42] and turn the handle so that it sits on the fitting.
2) Install and tighten the four bolts [6] and four washers [5].
3) Tighten the nut [42] between 35.0 in-lb (4.0 N·m) and 45.0 in-lb (5 N·m) and install lockwire [7].

(h) Tighten the nut [41] between 35.0 in-lb (4.0 N·m) and 45.0 in-lb (5 N·m) and install lockwire [7].

SUBTASK 78-31-20-980-003-H00

CAUTION DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

(4) Extend the T-hook handle approximately 1.25 in. (31.75 mm) before you tighten the T-hook nut [25].

NOTE: Extend the T-hook handle to turn the T-hook to approximately the 45 degree position so that the T-hook nut can be correctly tightened. The T-hook nut can not be correctly tightened when the T-hook is in the vertical position or horizontal position.

(a) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down.

SUBTASK 78-31-20-490-027-H00

(5) Get a standard 0.75 in. (19.05 mm) socket and a torque wrench, STD-1013 to tighten the T-hook nut.

NOTE: Most standard hand tools that can be found in a mechanics tool box are not listed in the equipment paragraph.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-490-028-H00

CAUTION

PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(6) Install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser to get access to the T-hook.

(a) Wear boot socks over your work boots.

SUBTASK 78-31-20-490-029-H00

CAUTION

MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(7) Install access platform or equivalent equipment to get access to the upper bifurcation of the fan duct.

NOTE: Access platform R78001 which is used to access blocker doors and blocker door drag links for maintenance can not be used. The R78001 platform blocks require you to extend the thrust reverser and these blocks fit into the spaces where the blocker doors are closed. The access hole for the T-hook is forward of the open blocker doors.

(a) If an access platform is not available, you can make an access platform from a stack of large, solid, styrofoam blocks which are local procurement.

1) Make sure the size of the styrofoam blocks are of sufficient width and thickness so that you can wedge the blocks into the fan duct.

2) Make sure the size of the styrofoam blocks are of sufficient length so that the blocks are stable when you stack the blocks in the fan duct and stand on the blocks.

3) Cut or trim the blocks as it is necessary to make the blocks fit in the fan duct.

4) Make sure the surface of the blocks are clean to prevent damage to the composite inner walls.

(b) If you do not have an access platform, try these steps to use your body to get to the top of the fan duct.

1) Push your back against the inner wall of the translating sleeve and push on the opposite side of the inner duct wall with your legs.

2) Use your hands and arms to help you move or slide your back upward a small amount while you maintain the position of your feet.

3) One at a time, move your legs upward a small amount as you maintain the pressure on your back.

4) Continue to repeat these steps until you get to the top of the fan duct.

5) Continue to maintain the pressure on your back with your legs as you work on the T-hook nut.

SUBTASK 78-31-20-420-044-H00

(8) Climb into the fan duct of the right side thrust reverser and climb towards the forward part of the upper bifurcation.

NOTE: Do not use the drag links as a ladder; damage to the drag links will occur.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-420-043-H00

(9) Install the nut [25] and washer [26] on the T-hook [19].

NOTE: The T-hook is retained on the gearbox by the gearbox spring.

(a) Tighten the nut from 900 in-lb (102 N·m) to1000 in-lb (113 N·m) with a 0.75 in. (19.05 mm) socket and torque wrench, STD-1013.

SUBTASK 78-31-20-980-004-H00

(10) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle completely down.

SUBTASK 78-31-20-420-045-H00

(11) Tighten the bolt [18] and three bolts [21] which attach the gearbox [3] and T-hook [19] to the fitting.

(a) Tighten the bolts between 31.5 in-lb (3.6 N·m) and 38.5 in-lb (4.3 N·m).

SUBTASK 78-31-20-410-011-H00

(12) Install the thermal insulation blankets [9] and fill the gaps at the blanket cutouts.

(a) Refer to this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

NOTE: Fill gaps at the blanket cutout and the structure for the T-hook gearbox with fire wall sealant. If gaps are large, fill the gap with a foam filler made of a closed cell, silicone foam rubber seal. Topcoat and fillet seal the foam filler with fire wall sealant; see the blanket installation procedure.

SUBTASK 78-31-20-430-003-H00

(13) Connect the PDOS actuator [8] to the fitting on the upper bifurcation inner wall.

(a) Refer to this task: Thrust Reverser Cowl Opening Actuators Installation, TASK 71-12-02-400-804-H00.

SUBTASK 78-31-20-410-012-H00

(14) Do this task: Close the Thrust Reverser (Sling Method), TASK 78-31-00-410-804-H01.

SUBTASK 78-31-20-090-015-H00

(15) Remove the access platform or equivalent equipment.

NOTE: The PDOS is not designed to open the thrust reverser with additional weight.

SUBTASK 78-31-20-090-016-H00

(16) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-20-010-023-H00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(17) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-20-820-010-H00

(18) Do the adjustment of the T-hook latch.

(a) Refer to this task: Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment, TASK 78-31-20-820-801-H01

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-20-090-017-H00

(1) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-20-410-013-H00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-20-860-016-H00

(3) Remove the DO-NOT-OPERATE tags on the thrust levers.

——— END OF TASK ———

TASK 78-31-20-000-805-H00

6. Gearbox Assembly Removal

(Figure 401 or Figure 402)

A. General

(1) This task gives the procedure to remove the gearbox on the upper bifurcation on the right side thrust reverser.

(2) The T-hook is removed before the gearbox is removed. The T-hook is retained on the gearbox by the gearbox spring.

(3) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(4) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(5) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

B. References

Reference	Title
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
SPL-768	Sealant Removal Tool, Hardwood or Plastic Part #: ST982 Supplier: 81205
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Consumable Materials

Reference	Description	Specification
A01067	compound - marking compound (temporary) - Action Marker (blk,wht w/tips 33,44,55)	

E. Gearbox Removal

SUBTASK 78-31-20-490-013-H00

(1) Use the a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-20-860-008-H00

(2) Make sure that the T-handle is in the closed position and locked.

SUBTASK 78-31-20-030-002-H00

(3) Remove the T-hook before the gearbox is removed.

(a) Do this task: T-Hook Removal, TASK 78-31-20-000-804-H00.

SUBTASK 78-31-20-020-014-H00

(4) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01

(a) To get access to the gearbox, use a sealant removal tool, SPL-768 to cut the sealant/filler around the blanket cutout for the gearbox and remove the thermal insulation blanket.

SUBTASK 78-31-20-020-022-H00

(5) Remove the lockwire and the nut [41] on the push-pull cable housing [2] from the gearbox [3].

SUBTASK 78-31-20-020-015-H00

(6) Remove one long bolt [18] and washer [17], washer [16], bushing [15] and washer [14] to disconnect the spring [13] and gearbox [3].

(a) Remove the spring [13] from the gearbox.

SUBTASK 78-31-20-020-016-H00

(7) Remove the remaining short three bolts [21] and three washers [20] from the gearbox.

SUBTASK 78-31-20-020-017-H00

(8) You must find the rotational position of the gear in the gearbox so that the T-hook will be horizontal when the T-handle is in the closed and locked position (Figure 403).

NOTE: The push-pull cable will pull out of the gearbox as the gearbox is removed.

(a) Get a compound - Action Marker (blk,wht w/tips 33,44,55), A01067 to make a temporary mark on the gearbox to show the final position of the flat in the gear hole in the gearbox as the gear turns clockwise in the gearbox.

(b) Move the gearbox upward to remove the gearbox [3], the spacer [12] under the gearbox, a plain bushing [22] and washer [24].

(c) As the gearbox is pulled up, look at the position of the flat in the gear hole in the gearbox as the gear turns clockwise in the gearbox.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

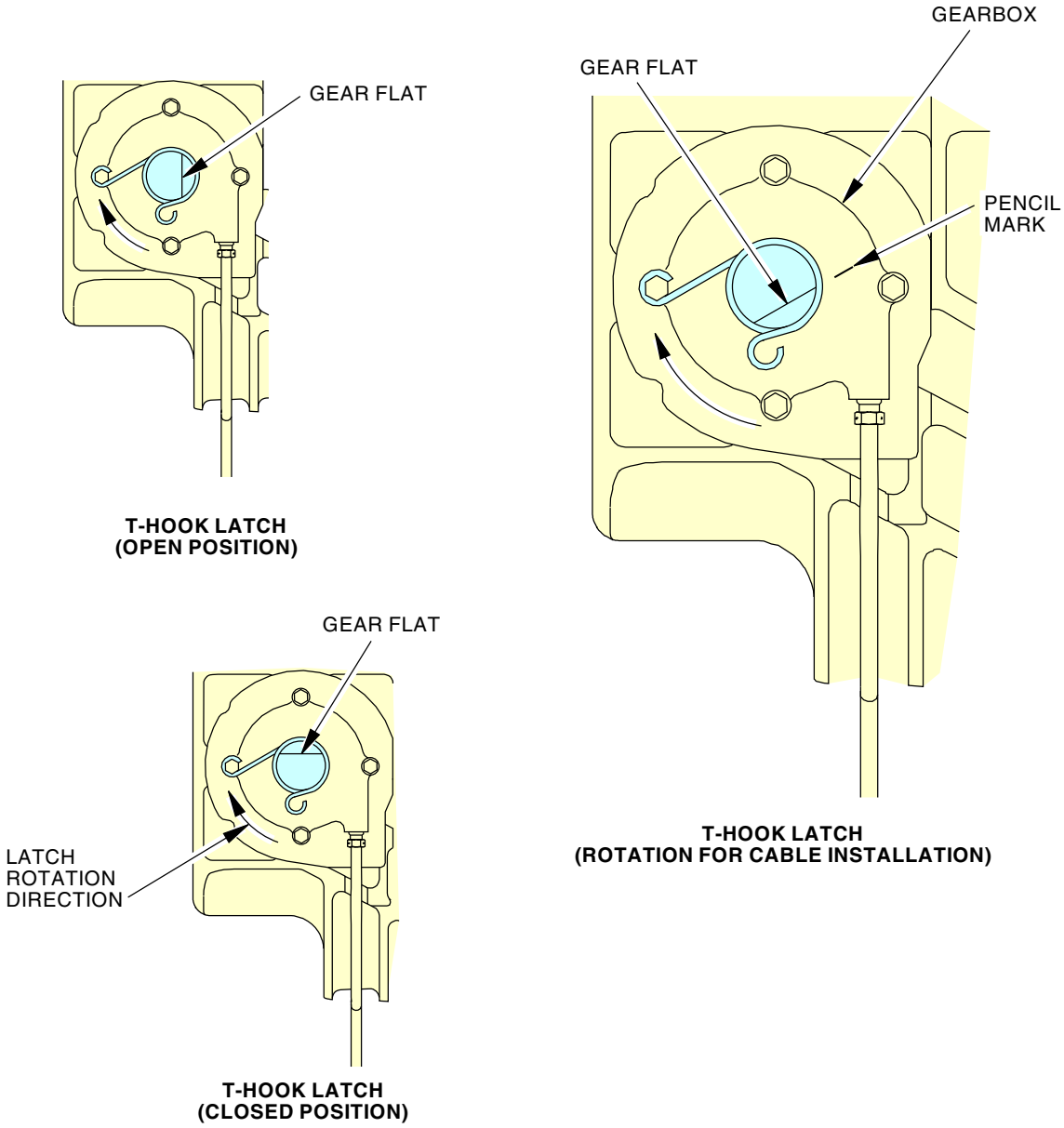
(d) Make a mark on the gearbox that aligns with the flat surface in the gear hole where the gear stops.

NOTE: This is the approximate rotational position that the gear must be set before the cable is installed into the gearbox and the cable engages the internal gear. The gear hole has a flat surface or key that engages a flat on the top of the shaft of the T-hook. The flat on the top of the shaft of the T-hook is opposite of the flange that the spring is attached.

NOTE: The gear hole flat must turn counterclockwise so that the flat is on the top side of the gear. This will make sure that the T-hook will be in the horizontal position when the cable is completely installed in the gearbox. The gear hole flat will turn clockwise past the vertical position because of the length of cable that is wrapped around the gear.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1390982 S0000252430_V3

Gearbox Assembly Installation
Figure 403/78-31-20-990-811-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-20-400-805-H00

7. Gearbox Assembly Installation

(Figure 401 or Figure 402)

A. General

(1) This task gives the procedure to install the gearbox on the upper bifurcation on the right side thrust reverser.

(2) You must not close, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(3) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(4) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of hold open equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

B. References

Reference	Title
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

D. Consumable Materials

Reference	Description	Specification
G50225	Lockwire - MS20995C20, Corrosion Resistant Steel - 0.020 Inch (0.508 mm) Diameter	NASM20995

E. Gearbox Installation

SUBTASK 78-31-20-490-014-H00

(1) Use a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-420-020-H00

(2) Disconnect the nut [41] and turn the gearbox [3] to sit on the fitting; do not tighten the nut at this time.

SUBTASK 78-31-20-420-021-H00

(3) You must set the rotational position of the gear in the gearbox so that the T-hook will be horizontal when the T-handle is in the closed and locked position (Figure 403).

NOTE: This is the approximate rotational position that the gear must be set before the cable is installed into the gearbox and the cable engages the internal gear. The gear hole has a flat surface or key that engages a flat on the top of the shaft of the T-hook.

NOTE: The gear hole flat must turn counterclockwise so that the flat is on the top side of the gear. This will make sure that the T-hook will be in the horizontal position when the cable is completely installed in the gearbox.

(a) Turn the flat in the gear hole clockwise until the flat is aligned with the temporary mark on the gearbox.

NOTE: The gear hole flat will turn clockwise past the vertical position because of the cable length that is wrapped around the gear.

SUBTASK 78-31-20-420-022-H00

(4) Position the push-pull cable [70] in the gearbox [3].

SUBTASK 78-31-20-420-023-H00

(5) Position the spacer [12] between the fitting on the upper bifurcation and the base of the gearbox [3].

SUBTASK 78-31-20-420-024-H00

(6) Push the gearbox [3] on to the push-pull cable [70].

NOTE: The gear hole flat in the gear will turn counterclockwise.

SUBTASK 78-31-20-420-025-H00

(7) Install the three bolts [21] and three washers [20] and three spacers [29] to attach the gearbox [3] to the fitting.

NOTE: These short bolts are installed at the top, bottom and right side of the gearbox. These bolts are hand tightened at this time. The gearbox bolts will be tightened after the T-hook nut is tightened.

(a) Tighten the bolts with your hand, do not apply the final torque until the T-hook nut is tightened to the final torque.

SUBTASK 78-31-20-420-026-H00

(8) Install the spring [13] on the gearbox [3] with the remaining long bolt [18].

NOTE: This bolt is installed at the left side of the gearbox. This bolt is hand tightened at this time.

(a) Put the thick washer [17] under the bolthead, a thin washer [16], the plain bushing [15], and a thin washer [14] on the long bolt.

(b) Pull the spring [13] into position and install the bolt [18], bushing [15] and washer [17], washer [16] and washer [14] through the spring [13], spacer [29] and gearbox [3] into the fitting.

(c) Tighten the bolts with your hand, do not apply the final torque until the T-hook nut is tightened to the final torque.

SUBTASK 78-31-20-420-027-H00

(9) Install the T-hook after the gearbox is installed.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: T-Hook Installation, TASK 78-31-20-400-804-H00.

(b) Keep the thrust reverser open so that the gearbox bolts can be tightened.

NOTE: The bolts that attach the gearbox were hand tightened during the installation of the gearbox. The gearbox bolts are tightened after the T-hook nut is tightened.

SUBTASK 78-31-20-420-028-H00

(10) Tighten the long bolt [18] and three bolts [21] which attaches the gearbox [3] to the fitting.

(a) Tighten these bolts to 31.5 in-lb (3.6 N·m) to 38.5 in-lb (4.3 N·m).

SUBTASK 78-31-20-420-029-H00

(11) Install the nut [41] on the push-pull cable housing [2] into the gearbox [3].

(a) Tighten the nut to 35.0 ±5.0 in-lb (4.0 ±0.6 N·m) and install MS20995C20 lockwire, G50225 between the nut and the gearbox.

SUBTASK 78-31-20-420-030-H00

(12) Install the thermal insulation blankets around the gearbox.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

NOTE: Use the instructions in the installation procedure to make sure that the gaps between the gearbox and the blanket cutout are filled with foam filler and sealant. Fill gaps at the blanket cutout and the structure for the gearbox with fire wall sealant. If gaps are large, fill the gap with a foam filler made of a closed cell, silicone foam rubber seal. Topcoat and fillet seal the foam filler with fire wall sealant.

SUBTASK 78-31-20-430-002-H00

(13) Complete the T-hook procedure to adjust the T-hook and to close the thrust reversers.

NOTE: The T-hook vertical position by the adjustment of the turnbuckle on the latch control assembly when the T-handle is extended to the open position. The jamnuts on each side of the control assembly are tightened and lockwire is installed.

(a) Do this task: T-Hook Installation, TASK 78-31-20-400-804-H00.

SUBTASK 78-31-20-090-011-H00

(14) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

——— END OF TASK ———

TASK 78-31-20-000-803-H00

8. Handle Latch Control Assembly and Push-Pull Cable Removal

(Figure 404)

A. General

(1) This task gives the procedure to remove the latch control assembly and push-pull cable from the installed cable housing and the gearbox on the right side thrust reverser.

(2) The latch control assembly and push-pull cable are removed as one piece unit from the thrust reverser inner wall. The cable housing and the gearbox remain installed.

(3) You must not open, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(4) Do not open the thrust reverser if the thrust reverser sleeves are extended to the deploy position. Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(5) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

B. References

Reference	Title
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

D. Consumable Materials

Reference	Description	Specification
A01067	compound - marking compound (temporary) - Action Marker (blk,wht w/tips 33,44,55)	

E. Access Panels

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

F. Prepare for the Removal

SUBTASK 78-31-20-040-004-H00

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-20-860-006-H00

(2) Put the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-20-010-015-H00

(3) Open the left thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

(b) Open these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

G. Latch Control Assembly and Push-Pull Cable Removal

SUBTASK 78-31-20-490-012-H00

(1) Use a work platform, COM-1525 or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 or the equivalent equipment to get access to the gearbox on the upper bifurcation of the inner wall.

SUBTASK 78-31-20-020-013-H00

(2) Remove the bolt [51], bushing [52], washer [53] and nut [54] to disconnect the spring [13] from the T-hook [19].

NOTE: If the spring is attached, the spring force will turn the T-hook back to the horizontal position after the push-pull cable is removed from the gearbox.

SUBTASK 78-31-20-020-009-H00

(3) Disengage the nut [42] on the push-pull cable housing [2] to disconnect the push-pull cable housing [2] from the lower control housing [62].

SUBTASK 78-31-20-020-010-H00

(4) Remove the four bolts [6] and four washers [5] that attaches the control housing [62] to the latch beam.

SUBTASK 78-31-20-020-011-H00

(5) Pull the push-pull cable [70] with the latch control assembly [61] out of the gearbox [3] and out from the push-pull cable housing [2].

(a) Get a compound - Action Marker (blk,wht w/tips 33,44,55), A01067 to make a temporary mark on the gearbox.

(b) As the cable is pulled out, look at the T-hook position as the T-hook turns clockwise in the gearbox.

(c) Make a temporary mark on the gearbox that aligns with the long flat surface of the T-hook were the T-hook stops.

NOTE: The T-hook will turn clockwise past the vertical position because of the length of cable that is wrapped around the gear. This is the approximate rotational position that the T-hook must be set when the cable is installed into the gearbox. The T-hook must turn back to the horizontal position when the cable is completely installed and the T-handle is in the closed and locked position.

SUBTASK 78-31-20-020-012-H00

(6) If it is necessary, disassemble the latch control assembly [61] on a clean bench.

(a) Press out the spring pin [66] that attaches the handle [1] to the slider [68].

(b) Pull the slider [68] from the control housing [64].

(c) Drill out the rivet [69] and remove the slider [68] from the push-pull cable [70].

(d) Loosen the two jam nut (LH)s [63] and unthread and remove the control housing [62] from the turnbuckle [72].

(e) Unthread and remove the two jam nut (RH)s [4] from the turnbuckle [72].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Loosen the two jam nut (RH)s [4] and unthread and remove the turnbuckle [72] from the control housing [64].

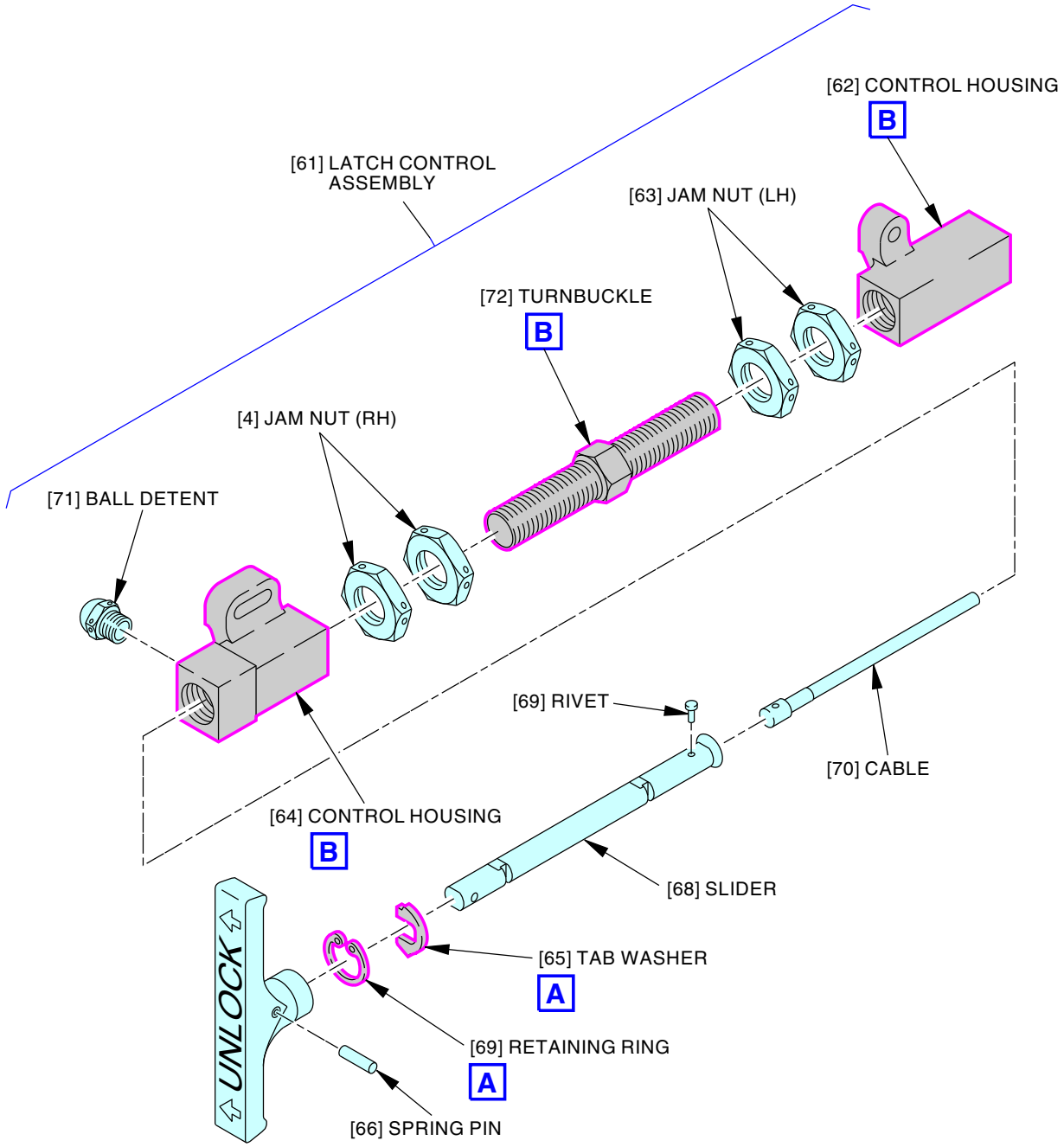
(g) Unthread and remove the two jam nut (RH)s [4] from the turnbuckle [72].

(h) Remove the lockwire from the ball detent [71] and remove the ball detent [71] from the control housing [64].

(i) Remove the internal retaining ring [67] and tab washer [65] from the control housing [64].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

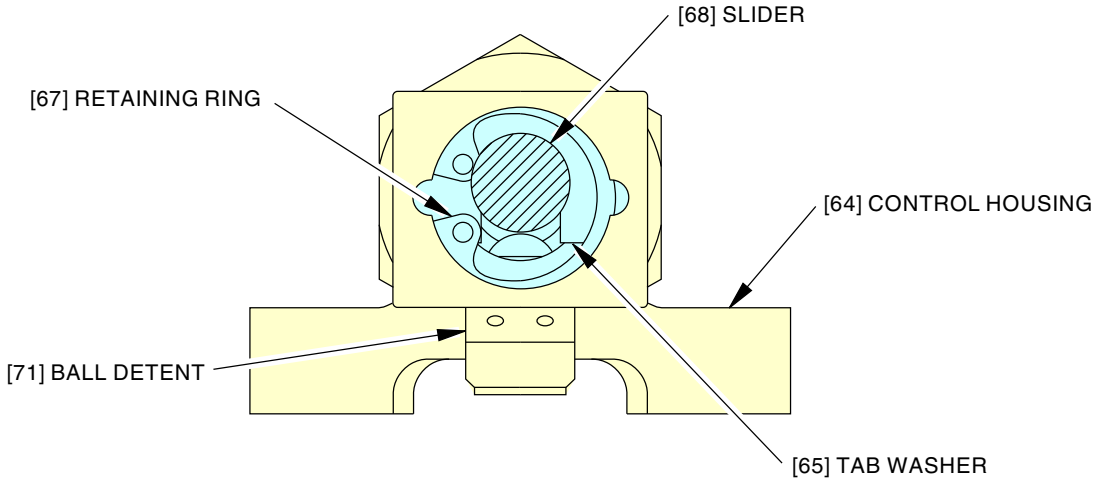


LATCH CONTROL ASSEMBLY

1369339 S0000247699_V2

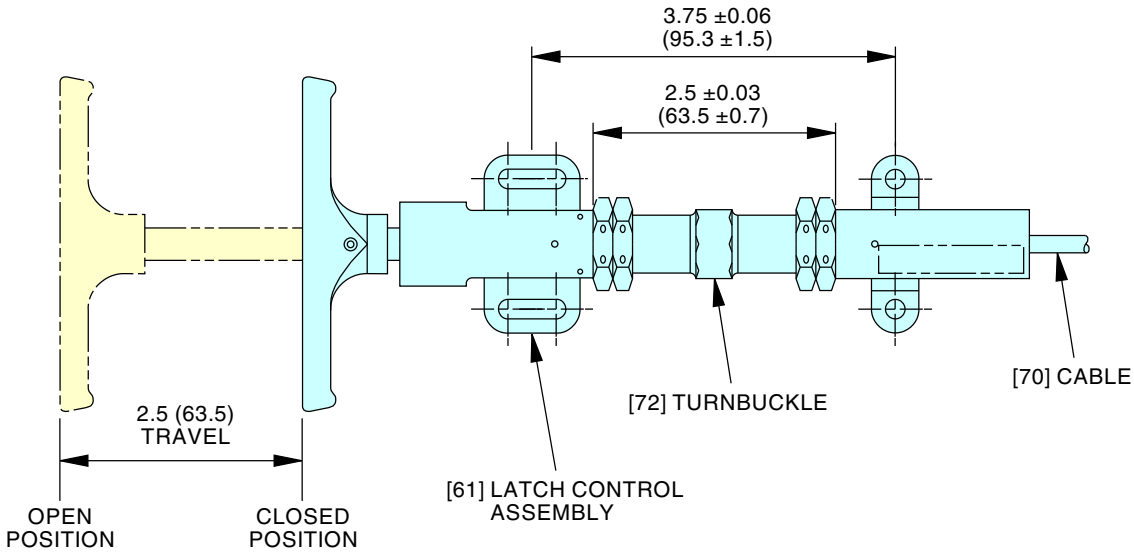
Handle Latch Control Assembly
Figure 404/78-31-20-990-807-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



RETAINING RING LUG POSITION

A



CONTROL ASSEMBLY ADJUSTMENT DIMENSION

B

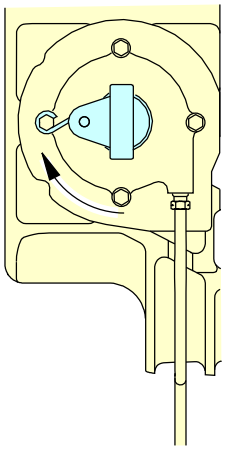
NOTE:

DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESIS).

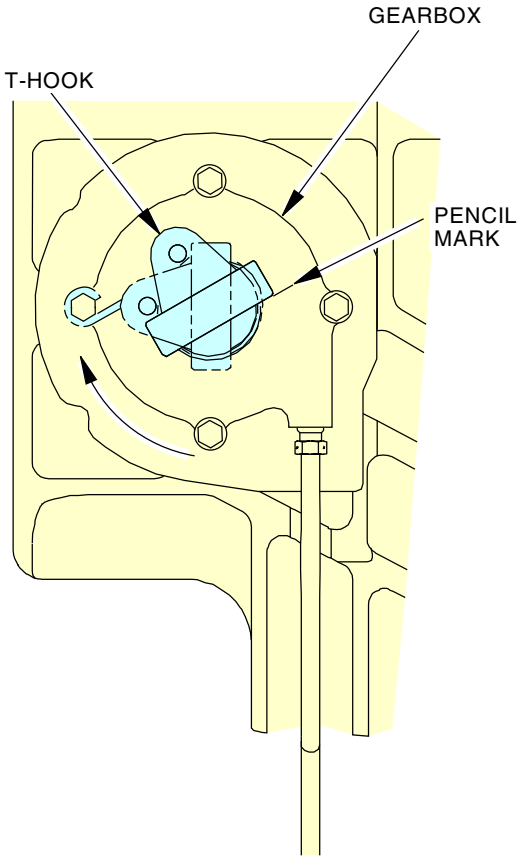
1368907 S0000247701_V2

Handle Latch Control Assembly
Figure 404/78-31-20-990-807-H00 (Sheet 2 of 2)

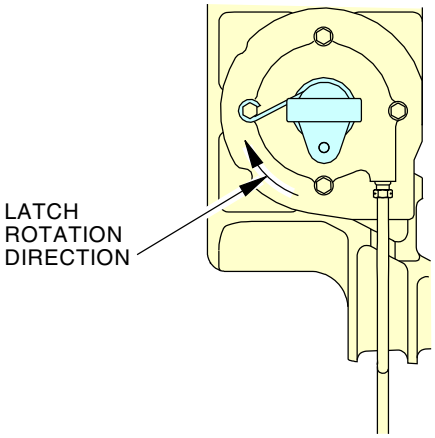
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



T-HOOK LATCH
(OPEN POSITION)



T-HOOK LATCH
(ROTATION FOR CABLE INSTALLATION)



T-HOOK LATCH
(CLOSED POSITION)

1382933 S0000251827_V3

T-Hook Latch Gearbox Rotation Position
Figure 405/78-31-20-990-808-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-20-400-803-H00

9. Handle Latch Control Assembly and Push-Pull Cable Installation

(Figure 404)

A. General

(1) This task gives the procedure to install the latch control assembly and the push-pull cable on the right side thrust reverser.

(2) The latch control assembly and push-pull cable are installed as one piece unit to the cable housing on the thrust reverser inner wall.

(3) You must not close, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(4) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

(5) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of hold open equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-20-820-802-H01	Thrust Reverser Upper Bifurcation T-Hook Latch Receiver Adjustment (P/B 501)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-133	Brush - Stiff Bristle, Non-metallic
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)
STD-1236	Brush - Brass Bristles
STD-4449	Air Source - Dry, Filtered, 0-25 PSI +/- 1 PSI
STD-6935	Air Source - Regulated, Dry Filtered, Compressed 30 PSIG Maximum Pressure

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Consumable Materials

Reference	Description	Specification
B00722	Solvent - Stoddard	MIL-PRF-680 Type I or II (Supersedes P-D-680 Type I or II)
D00001	Compound - Pipe Joint And Thread Sealing, Lead Free, General Purpose	TT-S-1732
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)
D50125	Grease - Extreme Low Temperature, Dow Corning 33	
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00363	Abrasive - Coated Cloth, Crocus	
G00744	Cloth - Emery	
G50225	Lockwire - MS20995C20, Corrosion Resistant Steel - 0.020 Inch (0.508 mm) Diameter	NASM20995
G50316	Cloth - Clean, Dry, Lint-free, White, Cotton	

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Latch Control Assembly and Push-Pull Cable Installation

SUBTASK 78-31-20-420-011-H00

(1) If it is necessary, assemble the latch control assembly [61].

(a) Apply grease, D00013 inside the control housing [62] and the control housing [64] and the turnbuckle [72] on the portions without threads.

(b) Apply grease, D00013 to all surfaces of the tab washer [65].

(c) Put the tab washer [65] in the control housing [64].

(d) Put the retaining ring [67] in the control housing [64].

1) Put the lugs of the retaining ring in the position as shown to prevent interference with the slider [68].

(e) Install the ball detent [71] into the control housing [64].

1) Tighten ball detent [71] between 30.0 in-lb (3.4 N·m) and 40.0 in-lb (4.5 N·m) and install MS20995C20 lockwire, G50225 between the ball detent and the control housing.

2) Clean the surfaces to be sealed with solvent, B00722 and a clean cotton wiper, G00034 to make sure the surfaces are free of grease and contamination.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Apply adhesive RTV 730 to seal the end of the ball detent.
   a) Do not let the RTV go into the housing to prevent the operation of the mechanism.

(f) Apply a light coat of anti-seize compound, D00001 (TT-S-1732) to the threads of the control housing [64].

(g) Install two jam nut (RH)s [4] on one end of the turnbuckle [72].

(h) Install two jam nut (LH)s [63] to the other end of the turnbuckle [72].

(i) Install the turnbuckle [72] on the control housing [62].
   1) Do not tighten the jam nuts at this time.

(j) Install the turnbuckle [72] on the control housing [64].
   1) Do not tighten the jam nuts at this time.

(k) Examine the push-pull cable [70] before the cable is installed in the push-pull cable housing [2].
   1) Remove any dirt and caked-on grease from cable by brushing perpendicular to the centerline of the cable, with a hard fiber, plastic bristle brush, STD-133 or brass bristles brush, STD-1236brass bristles brush, STD-1236.
      a) Do not use a steel bristle brush on the cable.
      b) Do not use solvent on the cable.
         NOTE: The solvent will remove the internal lubricant in the cable and the cable can not be used.
   2) Blow loose dirt particles from the cable with an oil-free, clean dry air from a compressed air supply, STD-4449 or regulated air source, STD-6935, not more than 25 psi (172 kPa).
   3) Wipe the cable with a dry, clean, lint-free cotton cloth, G50316.

(l) Clean the push-pull cable [70] with a 240 grit emery cloth, G00744.
   1) With a straight back and forth movement, move the cloth along the axis of the cable helix surface until the surface is free of pits and burrs and is shiny.
   2) Rotation of the back and forth movement stroke or rotation of the polish lines is not allowed.

(m) Clean the surface again with a crocus cloth or abrasive cloth, G00363

(n) After the polish of the surface is complete, remove the grit and dust from the cable assembly with oil-free, clean dry air from a compressed air supply, STD-4449 or a regulated air source, STD-6935, not more than 25 psi (172 kPa).

(o) Put the slider [68] on the push-pull cable [70] and attach the parts together with a rivet [69].
   1) Make sure that the height of the rivet is not more than 0.032 in. (0.813 mm) after both sides of the rivet are peened.

SUBTASK 78-31-20-830-001-H00

(2) Make sure that the latch control assembly [61] is adjusted to the initial adjustment value of 3.75 ±0.06 in. (95.25 ±1.52 mm) between the attachment lugs as shown (Figure 404).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-830-002-H00

(3) Make sure that the turnbuckle [72] between the control housing [62] and the control housing [64] is adjusted to the initial adjustment value of 2.5 ±0.0 in. (63.50 ±0.76 mm) as shown (Figure 404).

NOTE: In the adjustment procedure, the initial adjustment values will change as the turnbuckle is turned to adjust the length of the latch control assembly which moves the T-handle and cable to change the position of the T-hook to the left or right of the vertical centerline of the gearbox bolts.

SUBTASK 78-31-20-420-012-H00

(4) Apply Dow Corning 33 grease, D50125 to the push-pull cable [70].

SUBTASK 78-31-20-420-018-H00

(5) Turn the T-hook clockwise until the T-hook aligns with the temporary mark on the gearbox.

NOTE: This is the approximate rotational position that the T-hook must be set when the cable is installed into the gearbox and the cable engages the internal gear. The T-hook must turn counterclockwise to the horizontal position when the cable is completely installed and the T-handle is in the closed and locked position.

SUBTASK 78-31-20-420-013-H00

(6) Push the push-pull cable [70] into the push-pull cable housing [2] and up into the gearbox [3].

NOTE: The T-hook will begin to turn counterclockwise when the cable engages the gear in the gearbox.

(a) Make sure that the T-hook turns to the horizontal position.

NOTE: If the T-hook turned counterclockwise past the horizontal position, the T-hook was not in the correct position when the cable engaged the gear in the gearbox.

SUBTASK 78-31-20-420-019-H00

(7) Install the latch control assembly [61] on the latch beam mount.

(a) Loosen the nut [42] and turn the latch control assembly [61] so that it sits on the fitting.

(b) Install the four bolts [6] and four washers [5].

1) Tighten the bolts with your hand at this time.

SUBTASK 78-31-20-420-014-H00

(8) Apply the anti-seize compound, D00001 (TT-S-1732) to the nut [42] on the push-pull cable housing [2].

SUBTASK 78-31-20-420-015-H00

(9) Put the handle [1] in the extended and unlocked position shown.

SUBTASK 78-31-20-420-016-H00

(10) With your hand, apply a 15.0 in-lb (1.69 N·m) torque to the T-hook to apply tension to the cable to remove the slack from the cable.

SUBTASK 78-31-20-420-017-H00

(11) Tighten the nut [42] to 30.0 in-lb (3.4 N·m) to 40.0 in-lb (4.5 N·m) and install lockwire [7] (MS20995C20 lockwire, G50225) between the nut [42] and the control housing [64].

SUBTASK 78-31-20-420-037-H00

(12) To install the spring [13] on the T-hook [19], position the spring on the T-hook, put the bushing [52] in the loop on the spring and install the bolt [51], washer [53] and a new nut [54].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-820-009-H00

(13) Do this task: Thrust Reverser Upper Bifurcation T-Hook Latch Receiver Adjustment, TASK 78-31-20-820-802-H01.

NOTE: The length of the latch control assembly will change as the turnbuckle is turned. This moves the open position of the T-handle and cable to change the position of the T-hook to the left or right of the vertical centerline of the gearbox bolts. The adjustment length of the latch control assembly is approximately 0.50 in. (12.70 mm) in the up and down directions.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-20-090-010-H00

(1) Remove the work platform, COM-1525 or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 or equivalent equipment.

SUBTASK 78-31-20-410-009-H00

(2) Do these tasks in sequence to safely close the left or right thrust reverser on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-20-860-007-H00

(3) Remove the DO-NOT-OPERATE tags on the thrust levers.

END OF TASK

TASK 78-31-20-000-804-H00

10. T-Hook Removal

(Figure 401 or Figure 402)

A. General

(1) This task gives the procedure to remove the T-hook on the upper bifurcation on the right side thrust reverser.

(2) The T-hook nut is removed before the gearbox is removed. The T-hook is retained on the gearbox by the gearbox spring.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(3) You will need a standard 0.75 in. (19.05 mm) socket and a wrench to remove the T-hook. The nut which attaches the T-hook is in the fan duct at the inner wall of the upper bifurcation in the right side thrust reverser.

(4) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-804-H01	Open the Thrust Reverser (Sling Method) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
426AR	Right Thrust Reverser, Right Engine

E. Prepare for the Removal

SUBTASK 78-31-20-860-009-H00

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-31-20-040-005-H00

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-040-006-H00

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-20-860-010-H00

(4) Put the DO-NOT-OPERATE tags on the thrust levers.

SUBTASK 78-31-20-010-016-H00

(5) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-31-20-860-011-H00

WARNING DO NOT GO IN THE THRUST REVERSER FAN DUCT WHEN THE THRUST REVERSER IS OPEN. IF YOU DO, YOUR WEIGHT CAN CAUSE THE FAILURE OF THE HOLD-OPEN ROD. THE THRUST REVERSER WILL FAIL TO THE CLOSED POSITION QUICKLY, WHICH CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

(6) Make sure the thrust reverser sleeve is retracted and the thrust reverser is closed.

F. Gearbox Removal

SUBTASK 78-31-20-010-017-H00

(1) Open the right thrust reverser with a sling.

NOTE: To remove the thermal insulation blanket and the T-hook gearbox, it is necessary to disconnect the PDOS actuator from the inner wall fitting.

(a) Do this task: Open the Thrust Reverser (Sling Method), TASK 78-31-00-010-804-H01

(b) Open the applicable thrust reversers:

Number	Name/Location
416AR	Right Thrust Reverser, Left Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-20-490-015-H00

(2) Use the a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-20-490-016-H00

(3) Get a standard 0.75 in. (19.05 mm) socket and wrench to remove the T-hook nut.

NOTE: Most standard hand tools that can be found in a mechanics tool box are not listed in the equipment paragraph.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-490-017-H00

CAUTION

PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(4) Install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser to get access to the T-hook.

(a) Wear boot socks over your work boots.

SUBTASK 78-31-20-860-012-H00

CAUTION

MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(5) Install access platform or equivalent equipment to get access to the upper bifurcation of the fan duct.

NOTE: Access platform R78001 which is used to access blocker doors and blocker door drag links for maintenance can not be used. The R78001 platform blocks require you to extend the thrust reverser and these blocks fit into the spaces where the blocker doors are closed. The access hole for the T-hook is forward of the open blocker doors.

(a) If an access platform is not available, you can make an access platform from a stack of large, solid, styrofoam blocks which are local procurement.

1) Make sure the size of the styrofoam blocks are of sufficient width and thickness so that you can wedge the blocks into the fan duct.

2) Make sure the size of the styrofoam blocks are of sufficient length so that the blocks are stable when you stack the blocks in the fan duct and stand on the blocks.

3) Cut or trim the blocks as it is necessary to make the blocks fit in the fan duct.

4) Make sure the surface of the blocks are clean to prevent damage to the composite inner walls.

(b) If you do not have an access platform, try these steps to use your body to get to the top of the fan duct.

1) Push your back against the inner wall of the translating sleeve and push on the opposite side of the inner duct wall with your legs.

2) Use your hands and arms to help you move or slide your back upward a small amount while you maintain the position of your feet.

3) One at a time, move your legs upward a small amount as you maintain the pressure on your back.

4) Continue to repeat these steps until you get to the top of the fan duct.

5) Continue to maintain the pressure on your back with your legs as you work on the T-hook nut.

SUBTASK 78-31-20-020-018-H00

(6) Climb into the fan duct of the right side thrust reverser and climb towards the forward part of the upper bifurcation.

NOTE: Do not use the drag links as a ladder; damage to the drag links will occur.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-020-019-H00

(7) Remove the nut [25] and washer [26] for the T-hook [19] with a 0.75 in. (19.05 mm) socket and the wrench.

NOTE: The bushing [22] can be removed after the T-hook is removed.

NOTE: The T-hook is retained on the gearbox by the gearbox spring.

NOTE: The T-hook must not turn as the nut is removed. Two people are necessary to remove the nut and washer from the T-hook.

(a) The first person must hold the T-hook handle.

(b) The second person must remove the nut on the T-hook.

SUBTASK 78-31-20-020-020-H00

(8) To remove the spring [13] from the T-hook [19], remove the nut [54], washer [53], bushing [52] and bolt [51].

NOTE: The bolt has a countersunk head with a hex drive in the shank.

(a) Discard the nut.

SUBTASK 78-31-20-020-021-H00

(9) Remove the T-hook [19] from the gearbox; washer [24] remains installed under the gearbox.

SUBTASK 78-31-20-020-023-H00

(10) Remove the bushing [22] from the upper bifurcation inner wall.

SUBTASK 78-31-20-020-024-H00

(11) If it is necessary, you can remove the gearbox [3] at this time.

(a) Do this task: Gearbox Assembly Removal, TASK 78-31-20-000-805-H00.

——— END OF TASK ———

TASK 78-31-20-400-804-H00

11. T-Hook Installation

(Figure 401 or Figure 402)

A. General

(1) This task gives the procedure to install the T-hook in the gearbox on the upper bifurcation on the right side thrust reverser.

(2) The T-hook nut is installed after the gearbox, cable and handle are installed. The T-hook is retained on the gearbox by the gearbox spring.

(3) You will need a standard 0.75 in. (19.05 mm) socket and a wrench to install the T-hook nut. The nut which attaches the T-hook is in the fan duct at the inner wall of the upper bifurcation in the right side thrust reverser.

(4) You must not close, extend, or lift the thrust reverser if more than six cascade segments are removed from each thrust reverser half. You must install a minimum of three cascade segments, equally spaced on the circumference of each thrust reverser half. There must not be more than two cascade segments missing between the installed segments. The cascade segments are part of the thrust reverser structure.

(5) Do not extend the thrust reverser sleeves to the deploy position if the thrust reverser is open. If you do not obey these instructions, damage to the strut and the thrust reverser sleeves could occur.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(6) When you work under the thrust reverser, hold the thrust reverser in the open position with a minimum of two pieces of hold open equipment at all times. There are three pieces of equipment that can hold open the thrust reverser: the hold open rods, the PDOS actuator, and the ground support equipment (GSE) sling with an overhead crane/hoist or equivalent equipment.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-804-H01	Close the Thrust Reverser (Sling Method) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-20-820-801-H01	Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment (P/B 501)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-585	Mat - Protective, Closed Cell Neoprene, 30-50 duro, Weather and Oil Resistant, 3/8 Inch Min Thickness, Minimum 42x60 Inches with Warning Streamers
STD-653	Platform - Engine and Strut Access
STD-1013	Wrench - Torque, 0 to 1200 in-lbs (0 to 135.6 N·m)
STD-1048	Stepladder - 6 foot (1.83m)

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. T-Hook Installation

SUBTASK 78-31-20-420-038-H00

(1) If it is necessary, install the gearbox [3] first.

(a) Do this task: Gearbox Assembly Installation, TASK 78-31-20-400-805-H00.

NOTE: If the gearbox is installed as an individual component, the bolts that attach the gearbox will be hand tightened until the T-hook nut is tightened.

SUBTASK 78-31-20-490-018-H00

(2) Use the a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-20-420-031-H00

(3) To install the spring [13] on the T-hook [19], position the spring on the T-hook, put the bushing [52] in the loop on the spring and install the bolt [51], washer [53] and a new nut [54].

SUBTASK 78-31-20-420-032-H00

(4) Install the correct plain bushing [22].

NOTE: There must be an installed gap of 0.02 in. (0.508 mm) to 0.04 in. (1.016 mm) between the flanged bushing [11] in the upper bifurcation fitting and the washer [26] under the nut [25].

NOTE: You can use the plain bushing BACB28AK10-098 to get the correct gap.

(a) Install the washer [24] and plain bushing [22] on the shank of the T-hook [19].

(b) Put the T-hook [19] through the gearbox [3] and spacer [12].

(c) Install the nut [25] and washer [26] on the T-hook [19].

NOTE: The T-hook nut is hand tightened at this time.

SUBTASK 78-31-20-420-033-H00

(5) Do a check of the installed gap between the flanged bushing [11] in the upper bifurcation fitting and the washer [26] under the nut [25].

(a) If the installed gap is not between 0.02 in. (0.508 mm) and 0.04 in. (1.016 mm), replace the plain bushing [22].

1) Remove the nut [25], washer [26], washer [24], the plain bushing [22] and the T-hook [19].

2) Find the plain bushing [22] which will give an installed gap between 0.02 in. (0.508 mm) and 0.04 in. (1.016 mm).

3) Install the plain bushing [22] and washer [24] on the T-hook [19].

4) Install the nut [25] and washer [26] on the T-hook [19].

NOTE: The T-hook nut is hand tightened at this time.

(b) Do a check of the installed gap between the flanged bushing [11] in the upper bifurcation fitting and the washer [26] under the nut [25] again.

1) Repeat the steps above until you get the correct installed gap between 0.02 in. (0.508 mm) and 0.04 in. (1.016 mm).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-420-034-H00

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

(6) Extend the T-hook handle approximately 1.25 in. (31.75 mm) before you tighten the T-hook nut [25].

NOTE: Extend the T-hook handle to turn the T-hook to approximately the 45 degree position so that the T-hook nut can be correctly tightened. The T-hook nut can not be correctly tightened when the T-hook is in the vertical position or horizontal position.

(a) Push the T-handle in toward the latch access door hinges and pull the T-hook latch handle down.

SUBTASK 78-31-20-490-019-H00

(7) Get a standard 0.75 in. (19.05 mm) socket and a torque wrench, STD-1013 to tighten the T-hook nut.

NOTE: Most standard hand tools that can be found in a mechanics tool box are not listed in the equipment paragraph.

SUBTASK 78-31-20-490-020-H00

CAUTION

PUT BOOT SOCKS ON YOUR BOOTS TO PREVENT DAMAGE TO THE INNER WALL. IF YOU DO NOT PUT ON BOOT SOCKS, MAKE SURE THAT YOUR BOOTS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE.

(8) Install a protective mat, STD-585 on the translating sleeve when you go in the aft end of the thrust reverser to get access to the T-hook.

(a) Wear boot socks over your work boots.

SUBTASK 78-31-20-490-021-H00

CAUTION

MAKE SURE THAT THE PLATFORM BLOCKS ARE CLEAN. CONTAMINATION CAN CAUSE DAMAGE TO THE INNER WALL OF THE TRANSLATING SLEEVE AND FAN DUCT COWL.

(9) Install access platform or equivalent equipment to get access to the upper bifurcation of the fan duct.

NOTE: Access platform R78001 which is used to access blocker doors and blocker door drag links for maintenance can not be used. The R78001 platform blocks require you to extend the thrust reverser and these blocks fit into the spaces where the blocker doors are closed. The access hole for the T-hook is forward of the open blocker doors.

(a) If an access platform is not available, you can make an access platform from a stack of large, solid, Styrofoam blocks which are local procurement.

1) Make sure the size of the Styrofoam blocks are of sufficient width and thickness so that you can wedge the blocks into the fan duct.

2) Make sure the size of the Styrofoam blocks are of sufficient length so that the blocks are stable when you stack the blocks in the fan duct and stand on the blocks.

3) Cut or trim the blocks as it is necessary to make the blocks fit in the fan duct.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

4) Make sure the surface of the blocks are clean to prevent damage to the composite inner walls.

(b) If you do not have an access platform, try these steps to use your body to get to the top of the fan duct.

1) Push your back against the inner wall of the translating sleeve and push on the opposite side of the inner duct wall with your legs.

2) Use your hands and arms to help you move or slide your back upward a small amount while you maintain the position of your feet.

3) One at a time, move your legs upward a small amount as you maintain the pressure on your back.

4) Continue to repeat these steps until you get to the top of the fan duct.

5) Continue to maintain the pressure on your back with your legs as you work on the T-hook nut.

SUBTASK 78-31-20-420-035-H00

(10) Climb into the fan duct of the right side thrust reverser and climb towards the forward part of the upper bifurcation.

NOTE: Do not use the drag links as a ladder; damage to the drag links will occur.

SUBTASK 78-31-20-420-036-H00

(11) Install the nut [25] and washer [26] on the T-hook [19].

NOTE: The T-hook is retained on the gearbox by the gearbox spring.

(a) Tighten the nut between 900 in-lb (102 N·m) to 1000 in-lb (113 N·m) with a 0.75 in. (19.05 mm) socket and torque wrench, STD-1013.

SUBTASK 78-31-20-420-039-H00

(12) If it is necessary, tighten the long bolt [18] and three bolts [21] for the gearbox [3].

NOTE: If the gearbox was installed as an individual component, the bolts that attach the gearbox were only hand tightened until the T-hook nut was tightened.

(a) Do this task: Gearbox Assembly Installation, TASK 78-31-20-400-805-H00.

SUBTASK 78-31-20-010-018-H00

(13) Do this task: Close the Thrust Reverser (Sling Method), TASK 78-31-00-410-804-H01.

SUBTASK 78-31-20-090-012-H00

(14) Remove the access platform or equivalent equipment.

NOTE: The PDOS is not designed to open the thrust reverser with additional weight.

SUBTASK 78-31-20-090-013-H00

(15) Remove the protective mat, STD-585 in the translating sleeve.

SUBTASK 78-31-20-010-019-H00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(16) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-20-820-008-H00

(17) Do the adjustment of the T-hook latch.

(a) Refer to this task: Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment, TASK 78-31-20-820-801-H01

F. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-20-090-014-H00

(1) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-20-410-010-H00

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-31-20-860-013-H00

(3) Remove the DO-NOT-OPERATE tags on the thrust levers.

——— END OF TASK ———

TASK 78-31-20-000-802-H01

12. T-Hook Latch Receiver Removal

(Figure 406)

A. General

(1) This task gives the procedure to remove the T-hook latch receiver on the upper bifurcation on the left thrust reverser.

(2) The receiver is installed forward of the precooler inlet duct and the PDOS actuator.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
SPL-768	Sealant Removal Tool, Hardwood or Plastic Part #: ST982 Supplier: 81205
STD-653	Platform - Engine and Strut Access
STD-764	Scraper - Non-metallic
STD-1048	Stepladder - 6 foot (1.83m)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Prepare for the Removal

SUBTASK 78-31-20-010-007-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-490-007-H01

(2) Use the a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-20-010-008-H01

(3) Remove all foam filler and fire wall sealant from the blanket cutout around the T-hook receiver [34].

(a) Refer to this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

NOTE: Cut the filler and sealant with a sealant removal tool, SPL-768, or non-metallic scraper, STD-764.

G. Remove the T-Hook Latch Receiver

SUBTASK 78-31-20-020-004-H01

(1) Remove the receiver [34].

(a) Remove two bolts [35] and two washers [36].

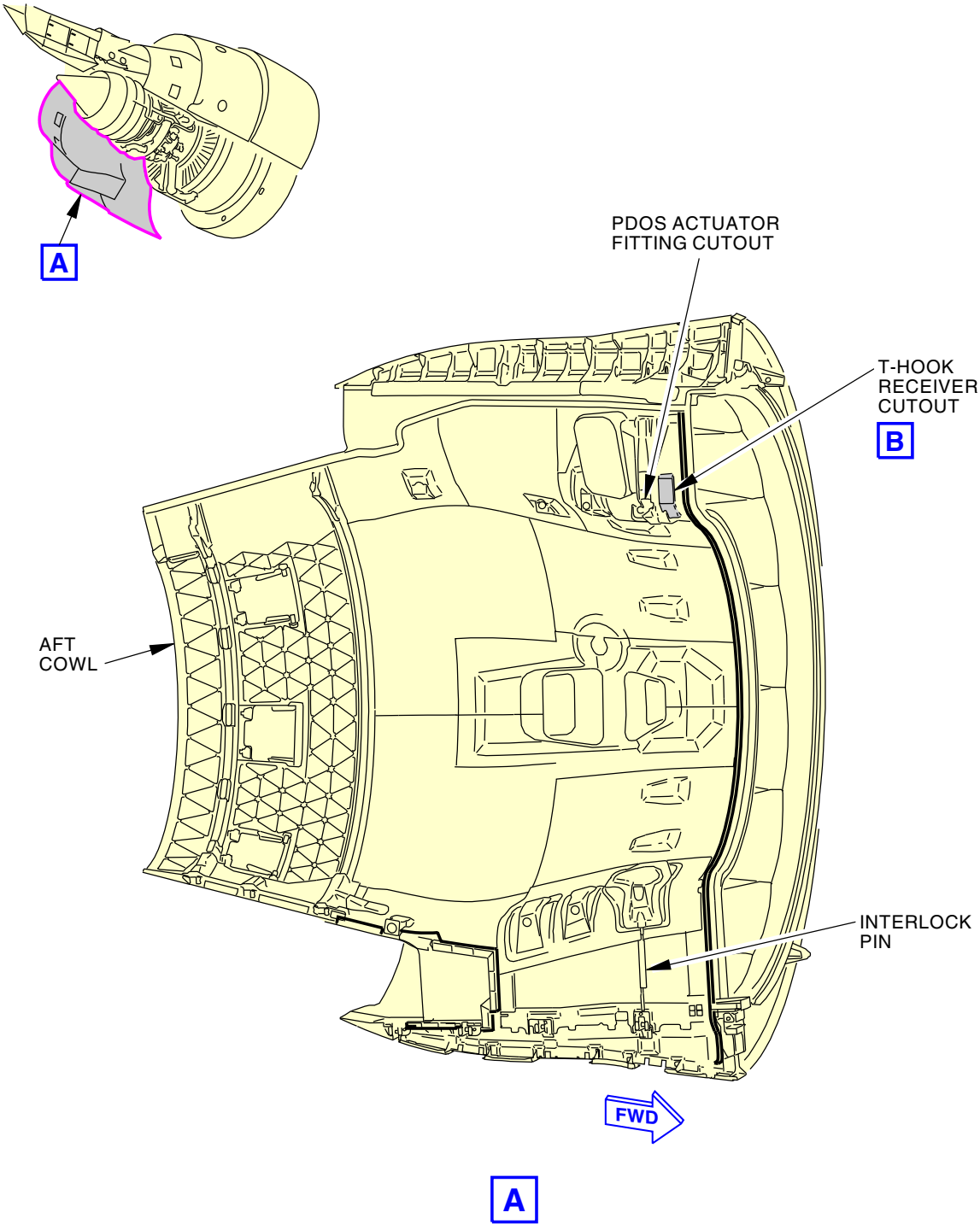
(b) Remove the spacer [31], spacer [32] or spacer [33], the large spacer [39] and the receiver [34].

(c) Keep all spacers for the installation procedure.

NOTE: There can be a stack of spacers with the same length and width and a single, large spacer with bent edges and offset mount holes.

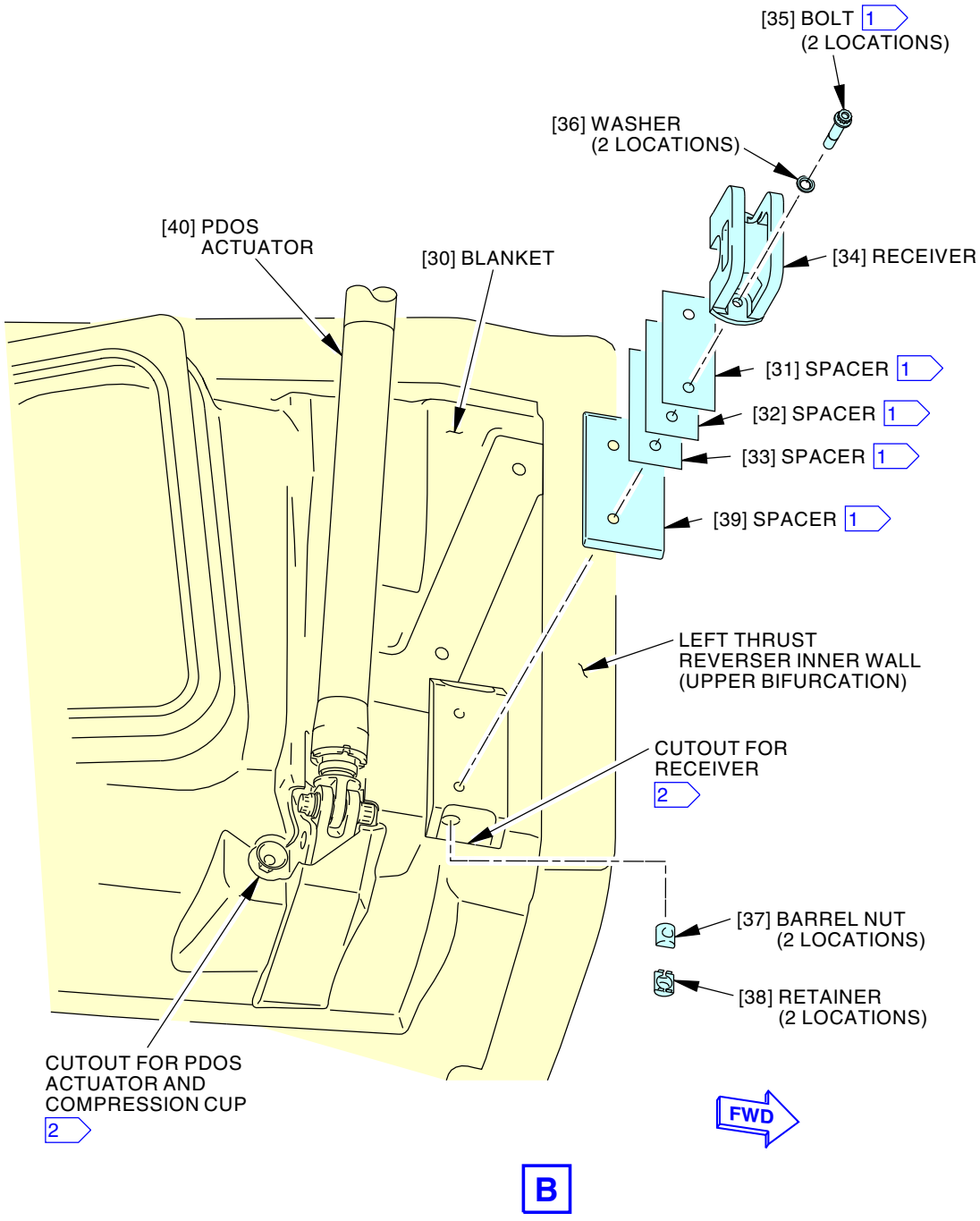
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Upper Bifurcation T-Hook Latch Receiver Installation
Figure 406/78-31-20-990-803-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 SEE TEXT FOR THE THICKNESS OF SPACER STACKUP AND THE BOLT GRIP LENGTH
2 FILL CUTOUT WITH FOAM FILLER AND SEALANT TOPCOAT; SEE TEXT

W96018 S0000130540_V2

Upper Bifurcation T-Hook Latch Receiver Installation
Figure 406/78-31-20-990-803-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-20-400-802-H01

13. T-Hook Latch Receiver Installation

(Figure 406)

A. General

(1) This task gives the procedure to install the T-hook latch receiver on the upper bifurcation on the left thrust reverser.

(2) The receiver is installed forward of the precooler inlet duct and the PDOS actuator.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-20-820-801-H01	Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment (P/B 501)
78-31-20-820-802-H01	Thrust Reverser Upper Bifurcation T-Hook Latch Receiver Adjustment (P/B 501)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Upper Bifurcation T-Hook Latch Receiver Installation

SUBTASK 78-31-20-490-008-H01

(1) Use the a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation of the inner wall.

SUBTASK 78-31-20-420-003-H01

(2) Do a check of the self-locking feature of the barrel nut [37] in the mount fitting.

(a) If the bolt can be turned completely through the barrel nut in the mount fitting with finger pressure, replace the barrel nut.

NOTE: The barrel nut has a self-locking feature that can become worn. The barrel nut is held in the hinge fitting with a retainer. The retainer fits on the flat surface of the barrel nut. The curved part of the retainer has a raised top that indexes the retainer to the hole for the hinge bolt in the hinge fitting.

1) Pushed out or pulled out the barrel nut [37] and retainer [38] from the top and bottom holes of the mount fitting.

2) Replace the barrel nut and use the retainer again.

3) Push the barrel nut [37] and retainer [38] into the hinge fitting with the round side of the barrel nut toward the mount surface.

NOTE: The barrel nut is correctly positioned when the raised top of the retainer pops into the opposite side of the hinge bolt hole.

SUBTASK 78-31-20-860-004-H01

(3) On the right side thrust reverser, pull the T-hook latch handle down to the fully extended position to keep the T-hook in the vertical (open) position.

NOTE: Push the handle in towards the latch beam while you pull the handle down to get through the release mechanism. Do not twist the T-handle. You can damage the T-handle or the push-pull cable.

SUBTASK 78-31-20-820-005-H01

(4) Make sure the T-hook is in the vertical position and the centerline of the T-hook is aligned with the centerline of the top and bottom mount bolts for the T-hook gearbox.

(a) If necessary, do the adjustment of the T-hook; refer to the Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment, TASK 78-31-20-820-801-H01.

SUBTASK 78-31-20-420-004-H01

(5) Find the correct combination of spacers to install under the T-hook receiver.

(a) Do this task: Thrust Reverser Upper Bifurcation T-Hook Latch Receiver Adjustment, TASK 78-31-20-820-802-H01.

SUBTASK 78-31-20-420-005-H01

(6) Complete the installation of the T-hook receiver.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Table 402/78-31-20-993-801-H01 T-Hook Receiver Bolt Grip Lengths

Spacer Stackup Combinations	Bolt BACB30LE6K* Grip Length
0.0	17
0.0500 inch (1.2700 mm)	18
0.1000 inch (2.5400 mm)	18
0.1500 inch (3.8100 mm)	19
0.2000 inch (5.0800 mm)	20
0.2500 inch (6.3500 mm)	21
0.3000 inch (7.6200 mm)	22
0.3500 inch (8.8900 mm)	22
0.4000 inch (10.1600 mm)	23
0.4500 inch (11.4300 mm)	24
0.5000 inch (12.7000 mm)	25

(a) Remove the receiver [34] and the two bolts and washers.

(b) Select the correct bolt grip length for the thickness of the combination of spacers from the table.

1) Refer to the table: Table 402.

(c) Put the the large spacer [39] on the mount fitting with the bent edges toward the fitting.

(d) Position the receiver [34] with the combination of spacer [31], spacer [32] or spacer [33] between the receiver and the large spacer [39].

(e) Install two bolts [35] and two washers [36].

1) Tighten to 369-451 inch-pounds (41.7-50.9 Newton-meters).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-20-420-006-H01

(1) Fill gaps at the blanket cutout and the structure for the T-hook receiver with fire wall sealant; if gaps are large, fill the gap with a foam filler made of a closed cell, silicone foam rubber seal and topcoat and fillet seal with fire wall sealant.

(a) Refer to the task: Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-20-090-006-H01

(2) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-20-410-005-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER UPPER BIFURCATION T-HOOK LATCH, GEARBOX, CABLE AND HANDLE AND RECEIVER - ADJUSTMENT/TEST

1. General

A. This task gives the procedure to adjust the T-hook tension latch to the vertical, open position, on the right thrust reverser.

TASK 78-31-20-820-801-H01

2. Thrust Reverser Upper Bifurcation T-Hook Latch, Gearbox, Cable and Handle Adjustment

(Figure 501)

A. General

(1) This task gives the procedure to adjust the T-hook in the vertical, open position to the T-hook receiver.

(2) The T-hook gearbox is on the inner wall on the upper bifurcation of the right thrust reverser.

(3) A turnbuckle and jamnuts on the handle body are used to adjust the T-hook to the vertical position with the handle pulled down to the open position.

(4) The T-hook receiver is on the inner wall on the upper bifurcation of the left thrust reverser.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

D. Consumable Materials

Reference	Description	Specification
G01505	Lockwire - Safety And Lock	NASM20995

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Adjustment

SUBTASK 78-31-20-010-006-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-490-009-H01

(2) Use the a work platform, COM-1525 or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 or equivalent equipment to get access to the upper bifurcation of the inner wall.

H. T-Hook Latch Adjustment

SUBTASK 78-31-20-820-007-H01

CAUTION

DO NOT TWIST OR TURN THE HANDLE. YOU WILL CAUSE DAMAGE TO THE T-HOOK LATCH.

(1) Pull down on the T-hook latch handle to keep the T-hook in the vertical (open) position.

NOTE: Push the T-handle in towards the latch access door hinges while you pull the handle down to get past the detent mechanism. Do not twist the T-handle. You can damage the T-handle or the push-pull cable.

SUBTASK 78-31-20-820-003-H01

(2) Adjust the turnbuckle feature on the body of the handle latch control assembly to adjust the vertical (open) position of the T-hook.

(a) Remove all lockwire from the jamnuts on the turnbuckle feature between the upper and lower control assemblies.

(b) Loosen the jamnuts.

(c) Loosen the two bolts in the slotted lugs at the lower control assembly which is the closest to the T-handle.

(d) Adjust the turnbuckle feature so that the centerline of the T-hook is aligned with the centerline of the upper and lower mount bolts.

NOTE: The length of the handle latch control assembly will change as the turnbuckle is turned. The lower control assembly moves up or down. This moves the position of the T-handle and cable up or down to turn the T-hook to the left or right of the vertical centerline of the gearbox bolts. The adjustment length of the handle latch control assembly is approximately 0.50 in. (12.70 mm) in the up and down directions.

(e) Tighten the two bolts in the slotted lugs at the lower control assembly which is the closest to the T-handle.

(f) Tighten the jamnuts to 55.0 in-lb (6.2 N·m) to 65.0 in-lb (7.3 N·m).

(g) Install lockwire at the jamnuts at the top and bottom of the turnbuckle feature between the upper and lower control assemblies.

1) Install monel lockwire, G01505 with a diameter of 0.022 in. (0.559 mm) through the lockwire holes in the jamnuts.

2) Lock wire each pair of jamnuts together and to the edge holes in the upper and lower control assemblies.

SUBTASK 78-31-20-820-006-H01

(3) Push the T-hook latch handle up to retract the T-handle into the control assemblies which will return the T-hook to the horizontal (closed) position.

NOTE: Push the T-handle in towards the latch access door hinges while you push the handle up to get past the detent mechanism. Do not twist the T-handle. You can damage the T-handle or the push-pull cable.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-20-090-007-H01

(1) Remove the work platform, COM-1525 or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 or equivalent equipment.

SUBTASK 78-31-20-410-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

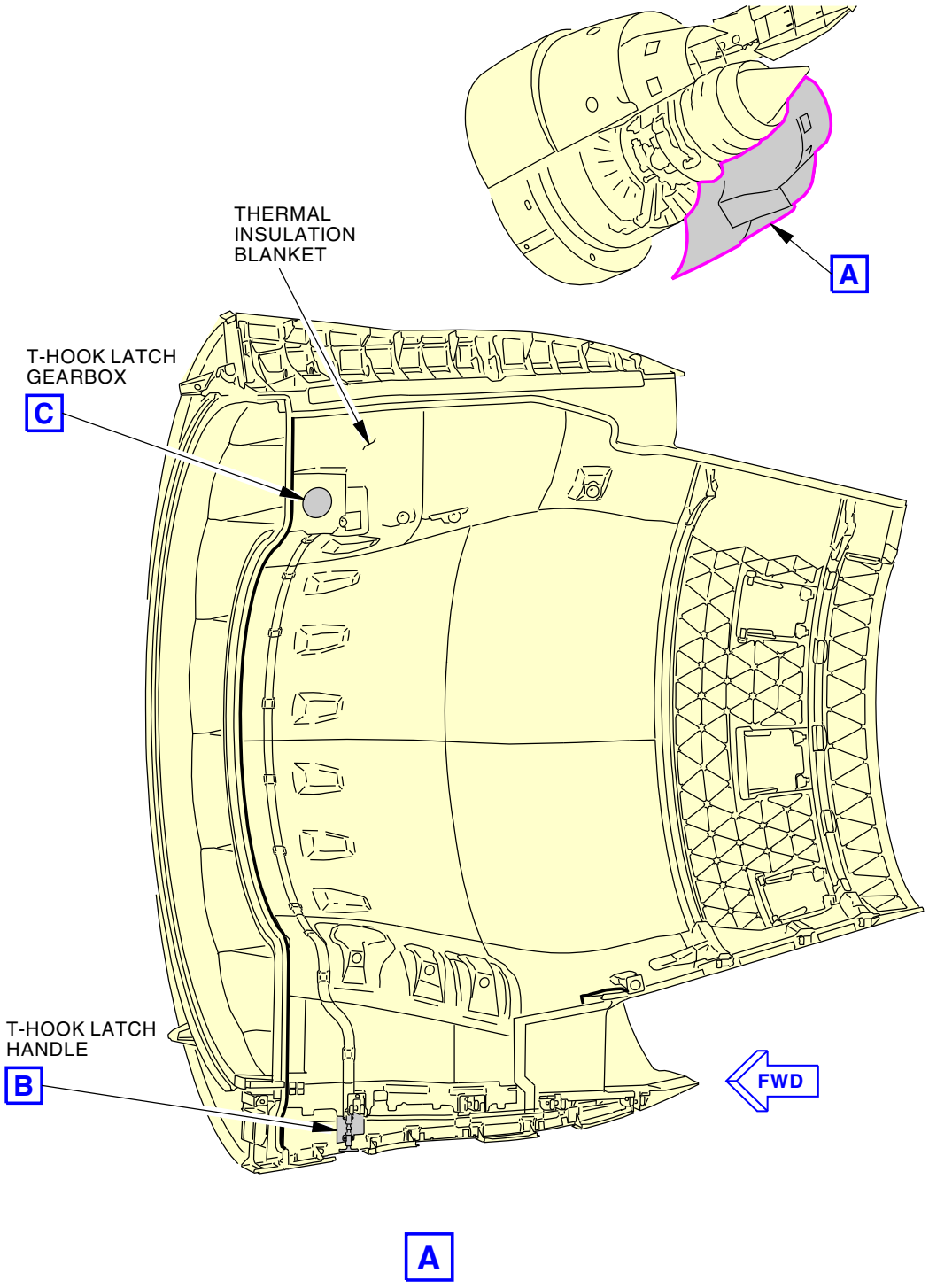
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

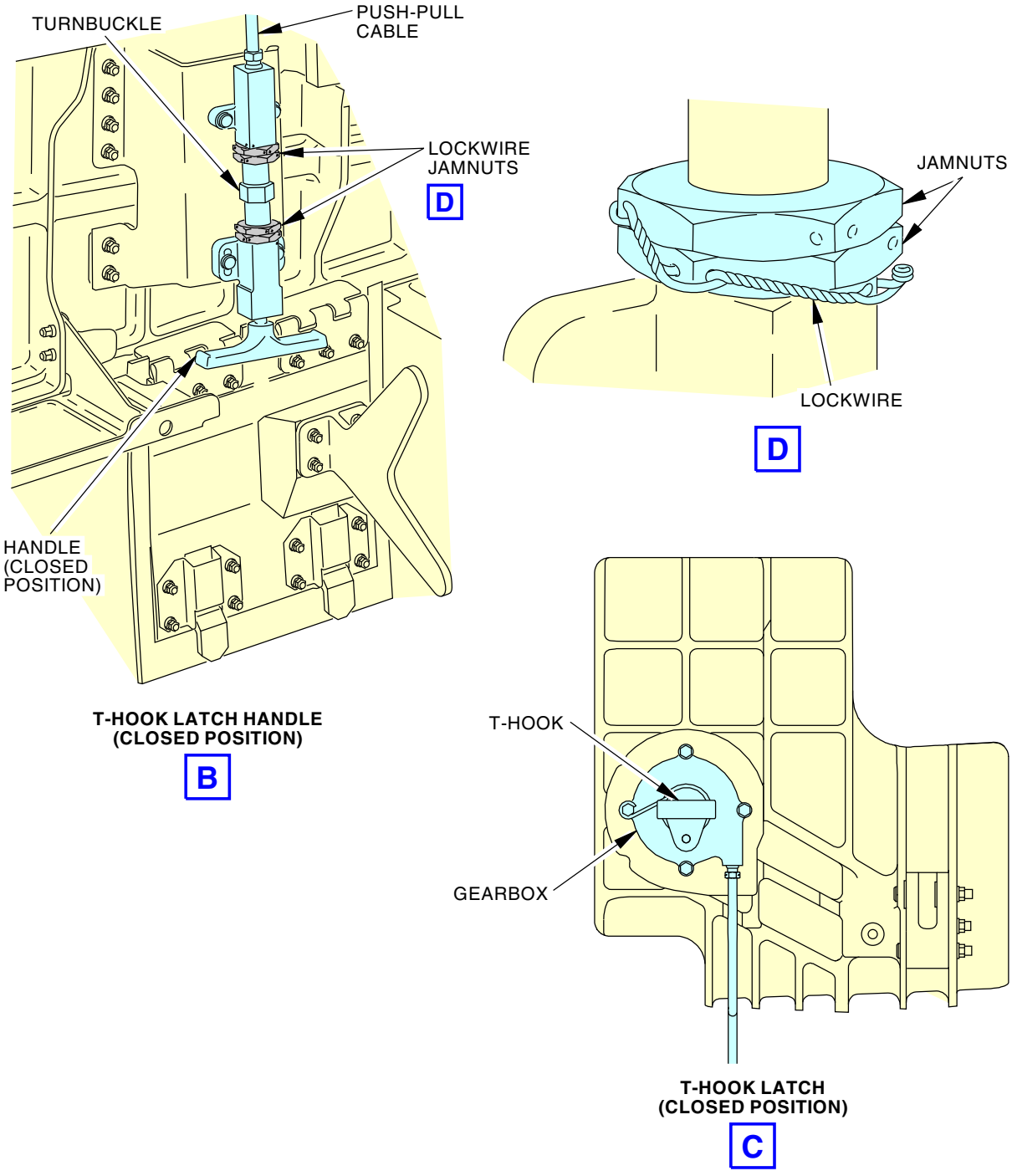
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



W85017 S0000131510_V3

T-Hook Latch Adjustment
Figure 501/78-31-20-990-804-H01 (Sheet 1 of 3)

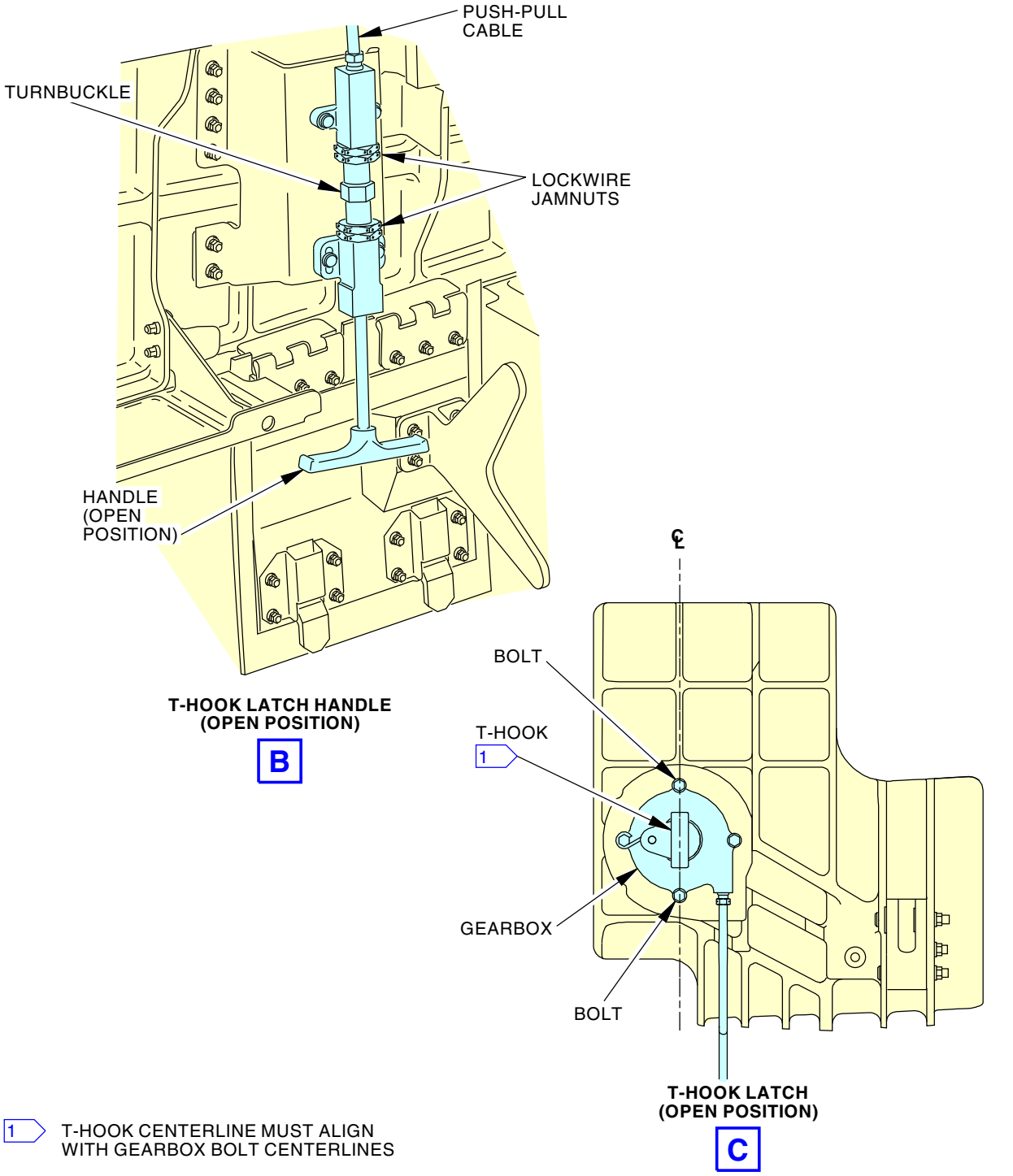
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



W85086 S0000130558_V4

T-Hook Latch Adjustment
Figure 501/78-31-20-990-804-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



T-Hook Latch Adjustment
Figure 501/78-31-20-990-804-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-20-820-802-H01

3. Thrust Reverser Upper Bifurcation T-Hook Latch Receiver Adjustment

(Figure 502)

A. General

(1) This task gives the procedure to adjust the T-hook receiver on the upper bifurcation of the left side thrust reverser.

(2) The receiver is installed forward of the precooler inlet duct and the PDOS actuator.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-20-000-802-H01	T-Hook Latch Receiver Removal (P/B 401)
78-31-20-400-802-H01	T-Hook Latch Receiver Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1525	Platform - Work, General Purpose Part #: 1190-8000 Supplier: 00994 Opt Part #: 8601-010 Supplier: 00994 Opt Part #: AM-2849 Supplier: 9M323 Opt Part #: MODEL 137 Supplier: 2S363
STD-146	Calipers - Vernier, 0 to 6 in (0 to 152 mm), Readable to 1/1000 in (.025 mm)
STD-596	Micrometer - Depth, 0.0 to 1.07 in (0.0 to 25.0 mm)
STD-653	Platform - Engine and Strut Access
STD-1048	Stepladder - 6 foot (1.83m)

D. Consumable Materials

Reference	Description	Specification
B00083	Solvent - VM&P Naphthas	TT-N-95 Type II, ASTM D-3735 Type III
D00504	Grease - Petrolatum	VV-P-236
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02020	Clay, Modeling	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Adjustment

SUBTASK 78-31-20-010-013-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-490-010-H01

(2) Use the a work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048 to get access to the upper bifurcation.

SUBTASK 78-31-20-860-005-H01

(3) Make sure the T-hook latch handle is down to the fully extended position to put the T-hook in the vertical (open) position.

NOTE: The T-hook remains in the vertical (open) position during the gap measurement.

(a) If it is necessary, pull the T-handle down as you push the handle in towards the latch access door hinges to get past the release mechanism.

NOTE: Do not twist the T-handle, you can damage the T-handle or the push-pull cable.

H. Upper Bifurcation T-Hook Receiver Adjustment

SUBTASK 78-31-20-020-006-H01

(1) Remove the T-hook receiver and the spacers.

(a) Do this task: T-Hook Latch Receiver Removal, TASK 78-31-20-000-802-H01.

SUBTASK 78-31-20-420-008-H01

(2) Install the T-hook receiver without the spacers under the T-hook receiver and with temporary bolts and washers.

(a) Position the receiver on the mount fitting without the spacers.

(b) Install two bolts and washers and tighten the bolts finger tight at this time.

1) If the original bolts are too long, use a short bolt at this time.

NOTE: Use a short bolt, BACB30LE6K17.

SUBTASK 78-31-20-820-004-H01

(3) Adjust the T-hook receiver.

(a) Find the gap between the T-hook and the T-hook receiver on the left and right thrust reverser halves:

NOTE: You must use a parting agent with the clay. You must clean the parts with solvent and a cloth after the measurements.

1) Use clay, G02020 to find the gaps:

a) On the right side thrust reverser, apply a piece of clay which is 0.40 inch (10.16 millimeters) thick in the center of the T-hook receiver between the two fasteners.

b) On the left side thrust reverser, apply petrolatum grease, D00504 as a parting agent on the T-hook.

c) Go to the step to close the thrust reverser and close the latches.

2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

a) Close the v-band latch, the 5 thrust reverser centerline latches, the 3 aft cowl centerline latches, and the 4 deflection limiter latches.

b) Do not close the T-hook latch at this time.

NOTE: The T-hook must remain in the vertical position when the gap measurements are made. If the T-hook turns to the horizontal position, the T-hook will wipe the clay and the correct gap will not be measured.

c) Do not close the latch access doors at this time.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

d) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

3) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

a) Open the 4 deflection limiter latches, the 3 aft cowl centerline latches, the 5 thrust reverser centerline latches, T-hook latch and the v-band latch.

4) Measure the thickness of the clay, G02020 between the T-hook and the T-hook receiver on the left and right thrust reverser halves:

a) Use 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay.

b) Be careful you do not deform the clay as you measure it to prevent a false value.

c) Make a record of the thickness value.

5) Find the combination of spacers to install under the T-hook receiver.

NOTE: The combination of spacers to install under the receiver will give you the correct bolt grip length.

Table 501/78-31-20-993-802-H01 T-Hook Receiver Spacers

Spacer Part Number	Spacer Nominal Thickness
315W1728-2 (Large spacer with bent edges)	0.025 inch (0.635 mm)
315W1728-3	0.050 inch (1.270 mm)
315W1728-4	0.125 inch (3.175 mm)
315W1728-5	0.010 inch (0.254 mm)

a) Compare the thickness value from the clay with the required thickness of 0.1550-0.1750 inch (3.9370-4.4450 millimeters).

b) Calculate the total thickness for the combination of spacers from the table.

<1> You must use the large spacer with the bent edges and a combination of small spacers when you calculate the total thickness.

<2> Refer to the table: T-Hook Receiver Spacers/Table 501.

SUBTASK 78-31-20-160-001-H01

WARNING

DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Remove all the residual clay and parting agent from the T-hook and the T-hook receiver with solvent, B00083 and a clean cotton wiper, G00034.

SUBTASK 78-31-20-020-007-H01

(5) Remove the temporary bolts and washers and the T-hook receiver.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-20-420-007-H01

(6) Install the T-hook receiver with the combination of spacers and correct bolt grip length.

(a) Do this task: T-Hook Latch Receiver Installation, TASK 78-31-20-400-802-H01.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-20-090-008-H01

(1) Remove the work platform, COM-1525, or engine and strut access platform, STD-653 or 6 foot (1.83m) stepladder, STD-1048.

SUBTASK 78-31-20-410-008-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

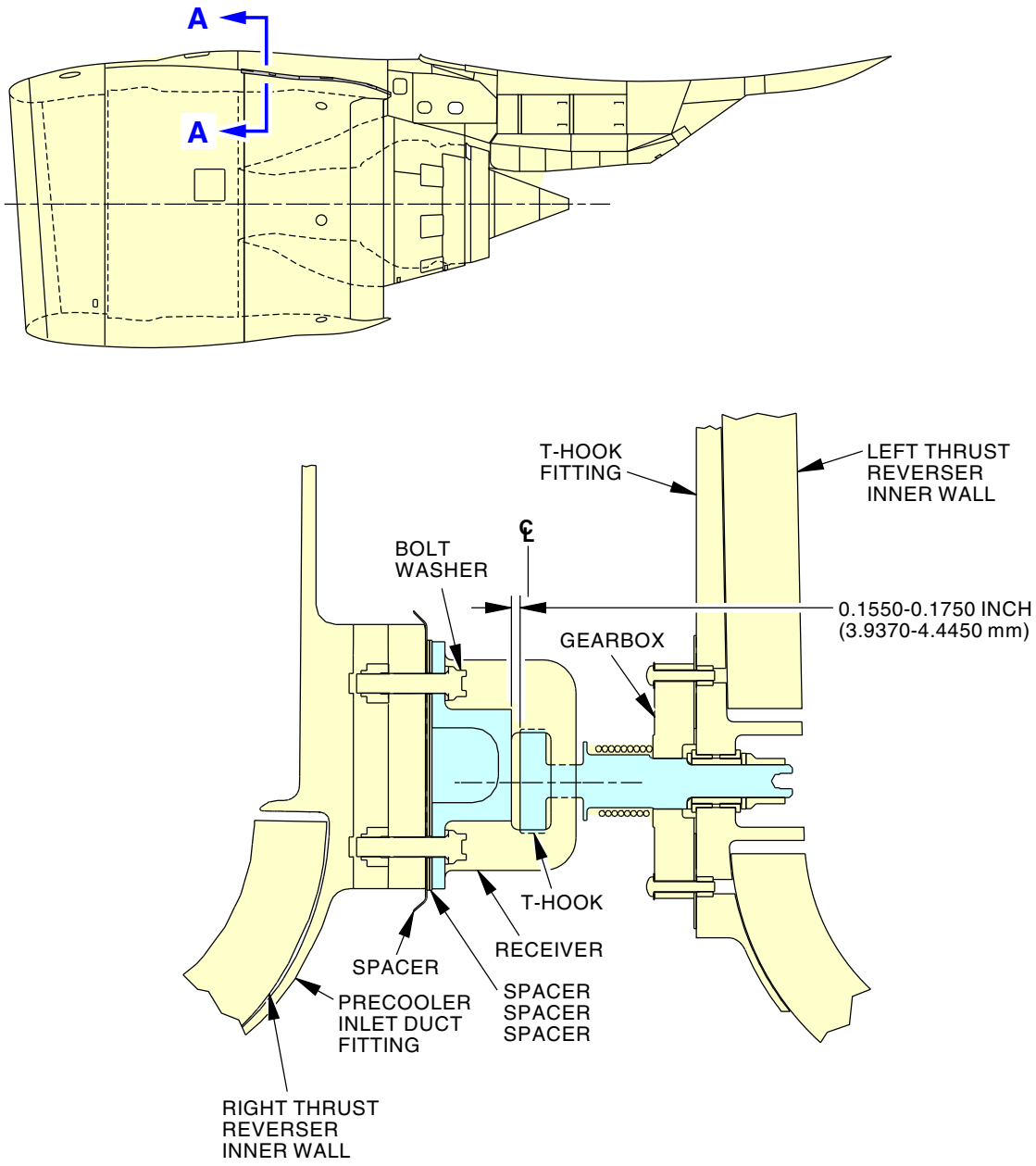
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER CLOSED AND LATCHES CLOSED
(VIEW IN THE FORWARD DIRECTION)

A-A

352918 S0000132742_V3

T-Hook Receiver Adjustment
Figure 502/78-31-20-990-805-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER LOWER BIFURCATION INTERLOCK PIN AND FITTING - REMOVAL/INSTALLATION

1. General

A. These tasks give the procedure to remove and install the interlock pin and fitting on the lower bifurcations of the left and right thrust reverser.

TASK 78-31-21-000-801-H01

2. Thrust Reverser Lower Bifurcation Interlock Pin Removal

(Figure 401)

A. General

(1) This task gives the procedure to remove the interlock pin assembly on the lower bifurcation of the left thrust reverser.

(2) The interlock pin is installed between the No.1 compression fitting and the No.2 latch bolt fitting.

B. References

Reference	Title
20-10-05-000-801	Turnbuckle Locking Clips Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Prepare for the Removal

SUBTASK 78-31-21-010-001-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-21-010-002-H01

(2) Remove the thermal insulation blanket at the lower bifurcation No.2 compression fitting.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

F. Remove the Lower Bifurcation Interlock Pin

SUBTASK 78-31-21-030-001-H01

(1) Remove the four clips [3] from the upper and lower turnbuckles [2].

(a) Do this task: Turnbuckle Locking Clips Removal, TASK 20-10-05-000-801.

SUBTASK 78-31-21-020-001-H01

(2) Remove the interlock pin [1].

(a) Remove the turnbuckles [2] from the bracket assembly [5] and the interlock pin [1].

(b) Remove the bracket assembly [5] from the No.2 latch bolt fitting.

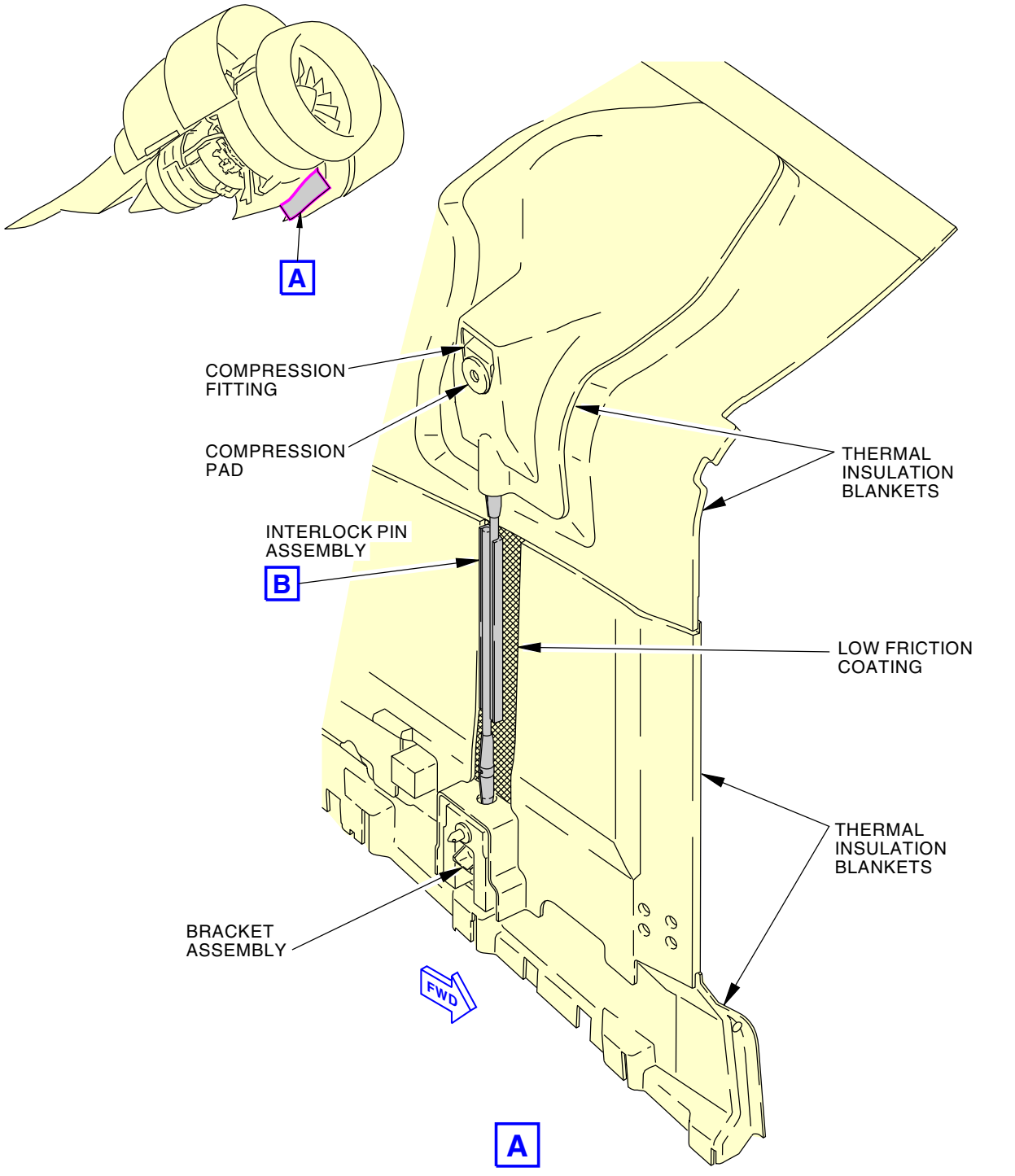
(c) Remove the rod assembly [4].

(d) Remove the interlock pin [1] from the lower bifurcation compression fitting.

(e) Remove the spring [6] from the interlock pin [1].

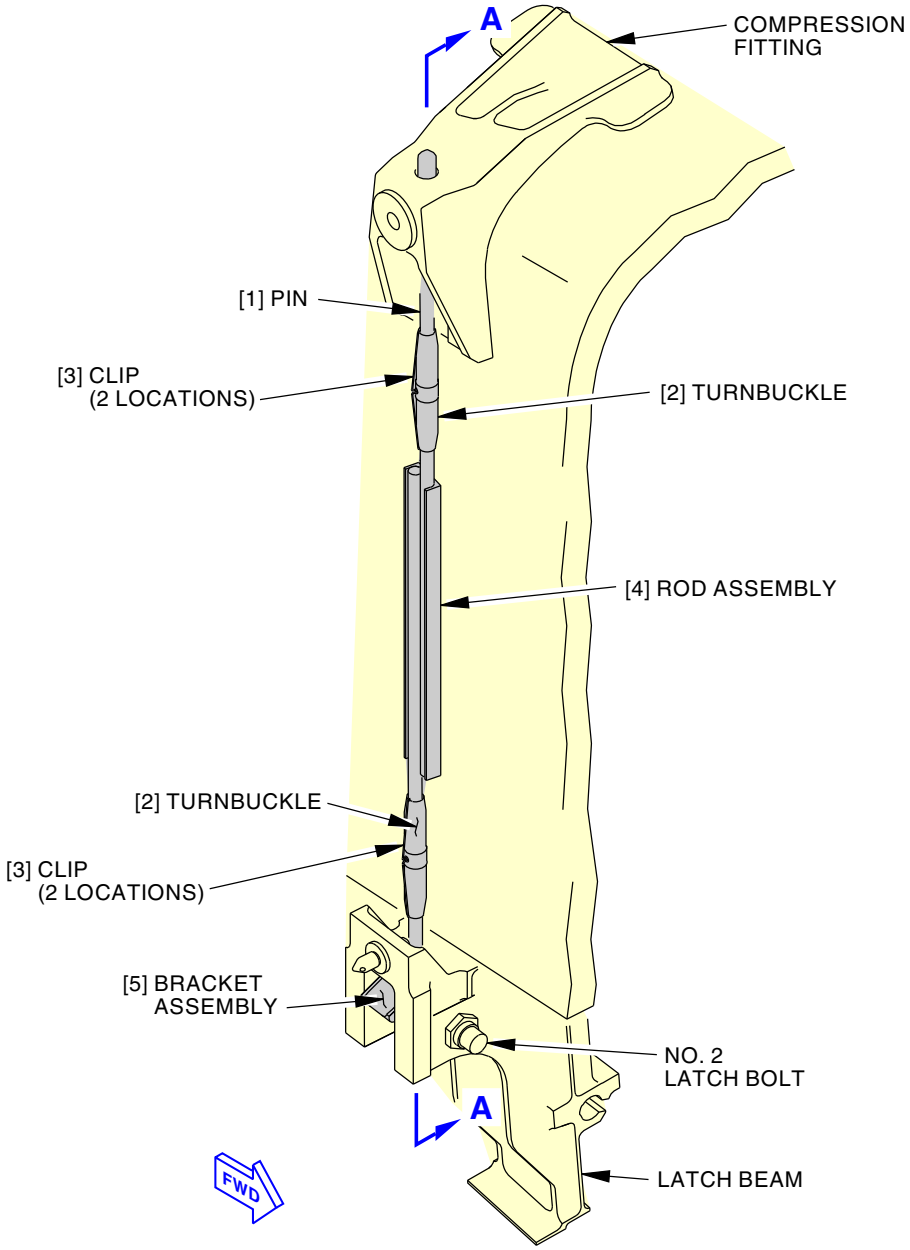
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Interlock Pin Assembly Installation
Figure 401/78-31-21-990-801-H01 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



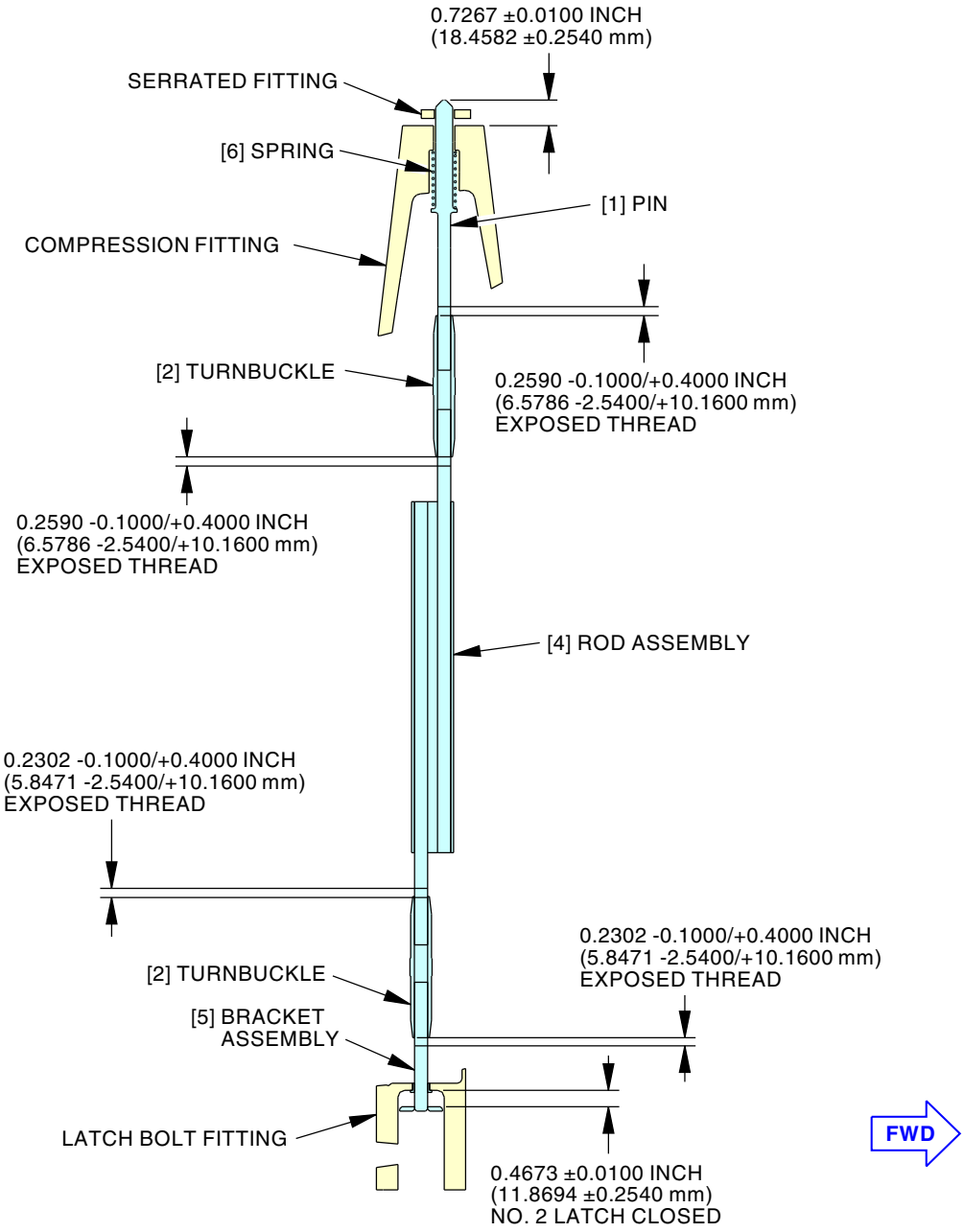
INTERLOCK PIN ASSEMBLY
(BLANKETS REMOVED FOR CLARITY)

B

383812 S0000134829_V2

Interlock Pin Assembly Installation
Figure 401/78-31-21-990-801-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



A-A

W88456 S0000131900_V3

Interlock Pin Assembly Installation
Figure 401/78-31-21-990-801-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-21-400-801-H01

3. Thrust Reverser Lower Bifurcation Interlock Pin Installation

(Figure 401)

A. General

(1) This task gives the procedure to install the interlock pin on the lower bifurcation of the left thrust reverser.

(2) The interlock pin is installed between the No.1 compression fitting and the No.2 latch bolt fitting.

B. References

Reference	Title
20-10-05-400-801	Turnbuckle Locking Clips Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-21-820-801-H01	Thrust Reverser Lower Bifurcation Interlock Pin Adjustment (P/B 501)

C. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Interlock Pin Installation

SUBTASK 78-31-21-160-002-H01

(1) Use alcohol, B00130 and a clean cotton wiper, G00034 to remove all dirt, grease, oil or unwanted material from the low friction coating on the lower bifurcation thermal insulation blanket.

NOTE: The low friction coating can become worn from dirt, grease, oil or unwanted material and the movement of the interlock pin rod assembly.

SUBTASK 78-31-21-420-001-H01

(2) Install the interlock pin [1].

(a) Install the spring [6] on the interlock pin [1].

(b) Install the two turnbuckles [2] on the rod assembly [4].

(c) Install the bracket assembly [5] through the bushing in the No.2 latch bolt fitting and the hole in the thermal insulation blanket.

(d) Install the interlock pin [1] and spring [6] through the lower bifurcation No.2 compression fitting.

(e) Install the lower turnbuckle [2] on the bracket assembly [5] and the upper turnbuckle [2] in the interlock pin [1].

SUBTASK 78-31-21-830-001-H01

(3) Adjust the turnbuckles so that the length of exposed threads on each side of the turnbuckles on the interlock pin, the rod assembly and the bracket assembly are in the limits given.

(a) Do this task: Thrust Reverser Lower Bifurcation Interlock Pin Adjustment, TASK 78-31-21-820-801-H01

SUBTASK 78-31-21-430-001-H01

(4) Install the four clips [3] on the upper and lower turnbuckles.

(a) Do this task:Turnbuckle Locking Clips Installation, TASK 20-10-05-400-801.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-21-410-001-H01

(1) Install the thermal insulation blanket on the compression fitting.

(a) Refer to the Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01

SUBTASK 78-31-21-410-002-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

TASK 78-31-21-000-802-H01

4. Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal

(Figure 402)

A. General

(1) This task gives the procedure to remove the serrated fitting on the lower bifurcation of the right side thrust reverser.

(2) The interlock pin serrated fitting is installed on the No.1 compression fitting on the right side thrust reverser.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)

C. Consumable Materials

Reference	Description	Specification
G02145	Tape - Aluminum Foil	BMS8-289

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Prepare for the Removal

SUBTASK 78-31-21-010-003-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-21-010-004-H01

(2) Remove the thermal insulation blanket at the lower bifurcation No.1 compression fitting.

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Interlock Pin Fitting Removal

SUBTASK 78-31-21-020-002-H01

(1) Remove the serrated fitting [23] for the interlock pin from the serrated plate [21] on the compression fitting [22].

NOTE: The aluminum foil tape is used to give a reference of the position of the serrated fitting before you remove the fitting and can help you when you adjust the fitting. The aluminum foil tape was chosen because it will give a sharp and defined edge.

(a) Apply a strip of aluminum foil tape, G02145 to the back edge of the serrated fitting.

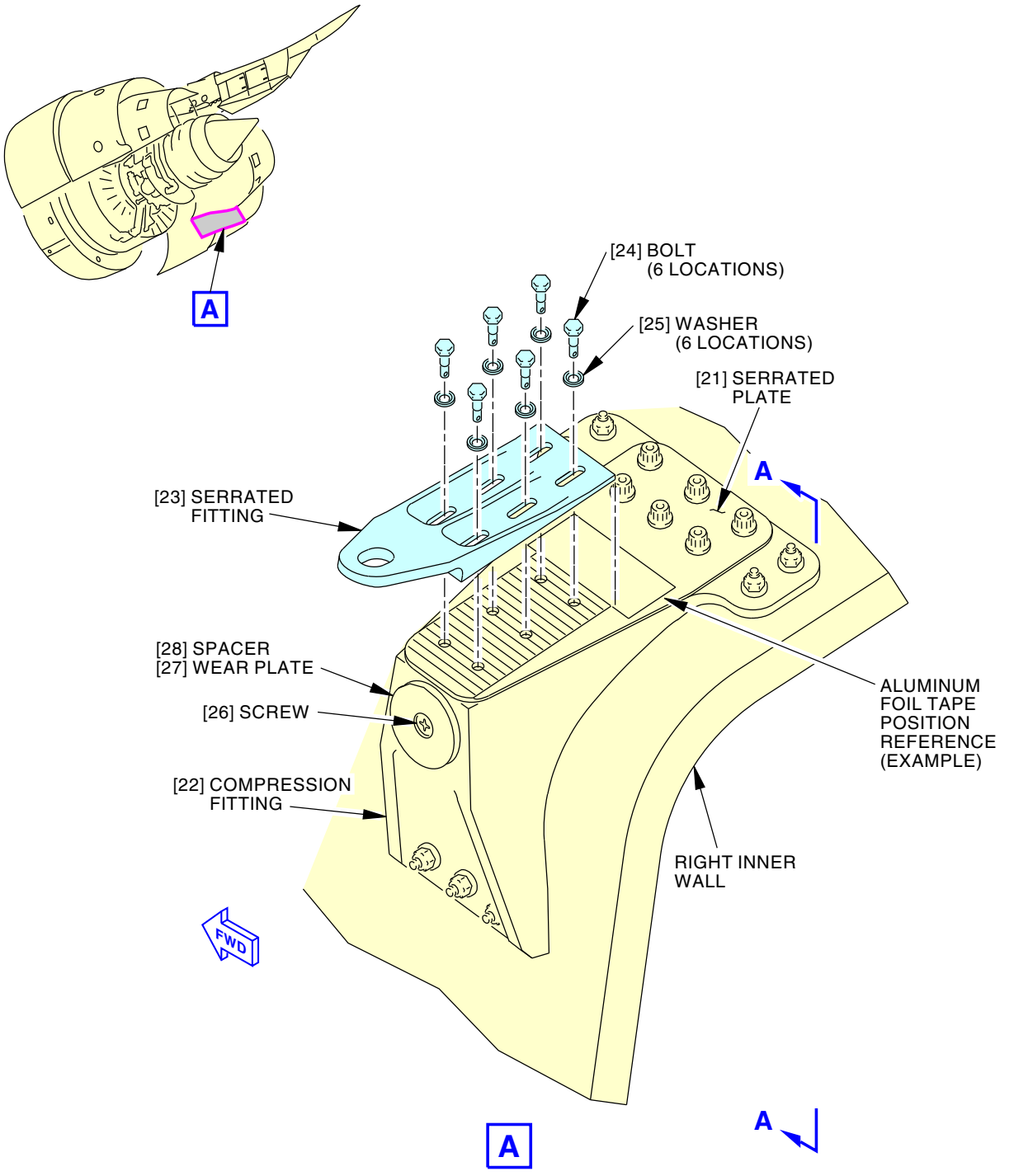
(b) Remove the safety cable [29] or lockwires [30] between the bolts [24].

(c) Remove the six bolts [24] and six washers [25].

(d) Remove the serrated fitting [23] from the serrated plate [21].

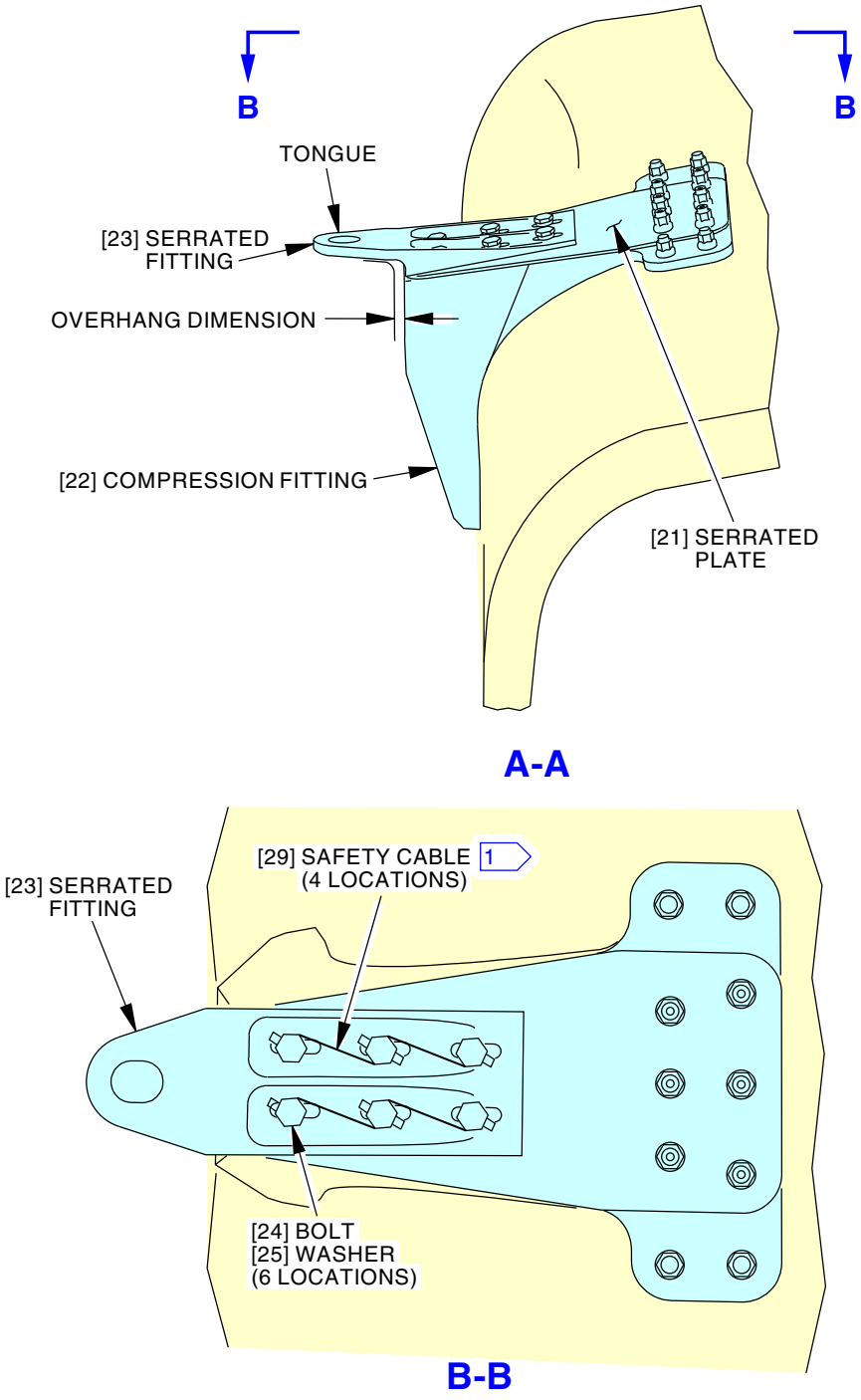
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Interlock Pin Fitting Installation
Figure 402/78-31-21-990-802-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 LOCKWIRE, MS20995C41, DOUBLE TWIST, OPTIONAL

W96072 S0000132119_V3

Interlock Pin Fitting Installation
Figure 402/78-31-21-990-802-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-21-400-802-H01

5. Thrust Reverser Lower Bifurcation Interlock Pin Fitting Installation

(Figure 402)

A. General

(1) This task gives the procedure to install the interlock pin serrated fitting on the lower bifurcation of the right side thrust reverser.

(2) The interlock pin serrated fitting is installed on the No.1 compression fitting on the right side thrust reverser.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-41-00-910-802-H01	Safety Cable Installation (P/B 201)
70-41-00-910-803-H00	Lockwire Installation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-21-820-802-H01	Thrust Reverser Lower Bifurcation Interlock Pin Fitting Adjustment (P/B 501)

C. Tools/Equipment

Reference	Description
STD-1096	Micrometer - Depth, 0-1 inch, Readable to 1/1000 inch
STD-1097	Caliper - Vernier, 0-6 inch, Readable to 1/1000 inch

D. Consumable Materials

Reference	Description	Specification
G00440	Lockwire - MS20995C41, Corrosion Resistant Steel - 0.041 Inch (1.0414 mm) Diameter	NASM20995
G02473	Cable, Safety Kit	AS3510-03()K

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
426AR	Right Thrust Reverser, Right Engine

G. Interlock Pin Fitting Installation

SUBTASK 78-31-21-030-002-H01

(1) Remove the wear plates and spacers from the forward compression fittings (No.1).

NOTE: The measurement of the gap between the forward compression fittings on the lower bifurcation of the left and right side thrust reversers is done with the wear plates and spacers removed from the compression fittings.

(a) Remove the wear plate [27], spacer [28] and screw [26] from the forward compression fitting (No.1) of the left side thrust reverser.

1) Make sure this spacer is identified to be install on the left side thrust reverser.

(b) Remove the wear plate [27], spacer [28] and screw [26] from the forward compression fitting (No.1) of the right side thrust reverser.

1) Make sure this spacer is identified to be install on the right side thrust reverser.

SUBTASK 78-31-21-820-002-H01

(2) Find the overhang dimension of the serrated fitting to the vertical surface of the compression fitting.

(a) Refer to this task to find the serrated fitting overhang dimension: Thrust Reverser Lower Bifurcation Interlock Pin Fitting Adjustment, TASK 78-31-21-820-802-H01.

SUBTASK 78-31-21-420-002-H01

(3) Install the serrated fitting [23] for the interlock pin on the serrated plate [21] on the compression fitting [22].

(a) Install the serrated fitting [23] on the serrated plate [21] at the overhang dimension.

1) Use a depth micrometer (0-1 inch, readable to 1/1000 inch), STD-1096 or a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 to set the dimension.

NOTE: There is a short, flat, vertical surface below the radius of the tongue on the serrated fitting. Set the overhang as close as possible to the calculated dimension; the serrations on the fitting and the plate are 0.0357 inch (0.9068 millimeter) apart.

(b) Install the six bolts [24] and six washers [25].

1) Tighten the bolts to 31-39 inch pounds (3.5-4.4 newton-meters).

(c) Install safety cable [29] at four locations between the bolts [24] as shown.

1) Use corrosion resistant steel (cres) safety cable, G02473 and ferrule.

NOTE: The safety cable comes as a kit which has cable that is 0.040-0.046 inch (1.016-1.168 millimeter) in diameter, 18 inches (457.2 millimeters) in length.

a) Refer to this task: Safety Cable Installation, TASK 70-41-00-910-802-H01.

2) If safety cable is not available, use corrosion resistant steel (cres) MS20995C41 lockwire, G00440, installed double twist method.

a) Refer to this task: Lockwire Installation, TASK 70-41-00-910-803-H00.

SUBTASK 78-31-21-430-002-H01

(4) After the serrated fitting is installed at the correct overhang dimension, install the wearplate and spacers on the forward compression fittings (No.1).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Install the wear plate [27], spacer [28] and screw [26] on the forward compression fitting (No.1) of the left side thrust reverser.

1) Tighten the screw to 72-88 inch pounds (8.1-9.9 newton-meters).

(b) Install the wear plate [27], spacer [28] and screw [26] on the forward compression fitting (No.1) of the right side thrust reverser.

1) Tighten the screw to 72-88 inch pounds (8.1-9.9 newton-meters).

(c) Remove the aluminum foil tape.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-21-410-003-H01

(1) Install the thermal insulation blankets.

(a) Refer to the Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01

SUBTASK 78-31-21-410-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER LOWER BIFURCATION INTERLOCK PIN AND FITTING - ADJUSTMENT/TEST

1. General

A. This task gives the procedure to adjust the interlock pin on the lower bifurcation of the left thrust reverser.

B. The position of the interlock pin fitting is adjusted when the thrust reverser halves are adjusted; refer to Thrust Reverser Adjustment, TASK 78-31-01-830-801-H01.

TASK 78-31-21-820-801-H01

2. Thrust Reverser Lower Bifurcation Interlock Pin Adjustment

(Figure 501)

A. General

(1) This task gives the procedure to adjust the interlock pin on the lower bifurcation of the left side thrust reverser.

(2) The interlock pin is installed between the No.1 compression fitting and the No.2 latch bolt fitting.

B. References

Reference	Title
20-10-05-000-801	Turnbuckle Locking Clips Removal (P/B 401)
20-10-05-400-801	Turnbuckle Locking Clips Installation (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-750	Ruler - Steel
STD-1097	Caliper - Vernier, 0-6 inch, Readable to 1/1000 inch

D. Consumable Materials

Reference	Description	Specification
G50092	Compound - Metrology Casting Material - ReproRubber Quick Setting Putty	
G50230	Glove - Vinyl	

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Adjustment

SUBTASK 78-31-21-010-005-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Adjust the Interlock Pin

SUBTASK 78-31-21-830-002-H01

(1) Use ReproRubber Quick Setting Putty compound, G50092 to make a spacer for the No.2 latch in the closed position.

NOTE: When the No.2 latch is closed, the gap between the bottom of the No.2 latch bolt fitting and the top of the bracket assembly is 0.4573-0.4773 inch (11.6154-12.1234 millimeters).

NOTE: Do not use clay as a spacer as it can deform when you make the measurements later in the procedure. The spring force on the interlock pin is approximately 10 pounds. The reprorubber spacer is used to put the bracket assembly on the interlock pin in the correct position, against the interlock pin spring force, when you measure the length that the interlock pin extends above the compression fitting.

(a) Make a ball of reprorubber which is 0.50 inch (12.70 millimeters) thick.

NOTE: The reprorubber will deform and fill the gap between the bottom of the No.2 latch bolt fitting and the top of the bracket assembly. It is not necessary to use a parting agent with reprorubber. It is not necessary to clean these parts with solvent and a cloth after the measurements.

WARNING

DO NOT GET THESE MATERIALS IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THESE MATERIALS. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES WHEN YOU USE THESE MATERIALS. KEEP THESE MATERIALS AWAY FROM SPARKS, FLAME, AND HEAT. THESE MATERIALS ARE POISONOUS AND FLAMMABLE. THEY CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

1) Use vinyl glove, G50230 to mix the compound; do not use latex gloves or rubber gloves because these materials can prevent the set of the compound.

2) Follow the manufacturers directions when you mix the 2 part compound.

NOTE: In general, you will knead two equal size balls of catalyst putty and base putty together for 30-45 seconds. Manipulation time to put the reprorubber on the bottom of the No.2 latch bolt fitting and the top of the bracket assembly is 3 to 4 minutes; reprorubber will become hard in 8 to 10 minutes. Prepare the amounts of the two compounds before you start to mix the compounds together.

NOTE: Reprorubber is affected by the outside temperature. Cold temperatures will increase the time for the reprorubber to become hard. Warm temperatures will decrease the time for the reprorubber to become hard.

3) On the left side thrust reverser, press the reprorubber firmly in the No.2 latch bolt fitting around the rod portion of the bracket assembly.

4) Immediately go to the step to close the thrust reverser and close the latches; reprorubber will become hard quickly.

SUBTASK 78-31-21-860-001-H01

(2) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

(a) Close the v-band latch, the 5 thrust reverser centerline latches, the 3 aft cowl centerline latches, and the 4 deflection limiter latches.

(b) Do not close the latch access doors at this time.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

SUBTASK 78-31-21-860-002-H01

(3) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

(a) Open the 4 deflection limiter latches, the 3 aft cowl centerline latches, the 5 thrust reverser centerline latches, and the v-band latch.

SUBTASK 78-31-21-220-001-H01

(4) Do a check of the length the interlock pin extends above the compression fitting with the thrust reverser open.

(a) Push the bracket assembly upward against the spring force until it touches the reprorubber spacer.

(b) Measure the length the interlock pin extends above the compression fitting with a steel ruler, STD-750 or a vernier caliper (0 - 6 inch, readable to 1/1000 inch), STD-1097 that has a depth gage.

(c) Compare the measurement with the requirement of 0.7167-0.7367 inch (18.2042-18.7122 millimeters).

NOTE: With the turnbuckles adjusted to the correct length of exposed thread and the gap between the bottom of the No.2 latch bolt fitting and the top of the bracket assembly at 0.4573-0.4773 inch (11.6154-12.1234 millimeters), the interlock pin will extend above the top of the compression fitting to engage the serrated fitting.

SUBTASK 78-31-21-820-001-H01

(5) If necessary, adjust the turnbuckles equally on the rod assembly.

(a) Remove the turnbuckle clips.

1) Refer to the Turnbuckle Locking Clips Removal, TASK 20-10-05-000-801.

(b) Turn the turnbuckles to adjust the length of exposed thread above and below the turnbuckle.

(c) Repeat the measurement above until the pin extends above the compression fitting at the correct length.

(d) Install the turnbuckle clips; install the clips on the same side of the turnbuckle to ease the installation.

1) Refer to the Turnbuckle Locking Clips Installation, TASK 20-10-05-400-801.

SUBTASK 78-31-21-090-001-H01

(6) Discard the reprorubber spacer.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-21-410-006-H01



WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

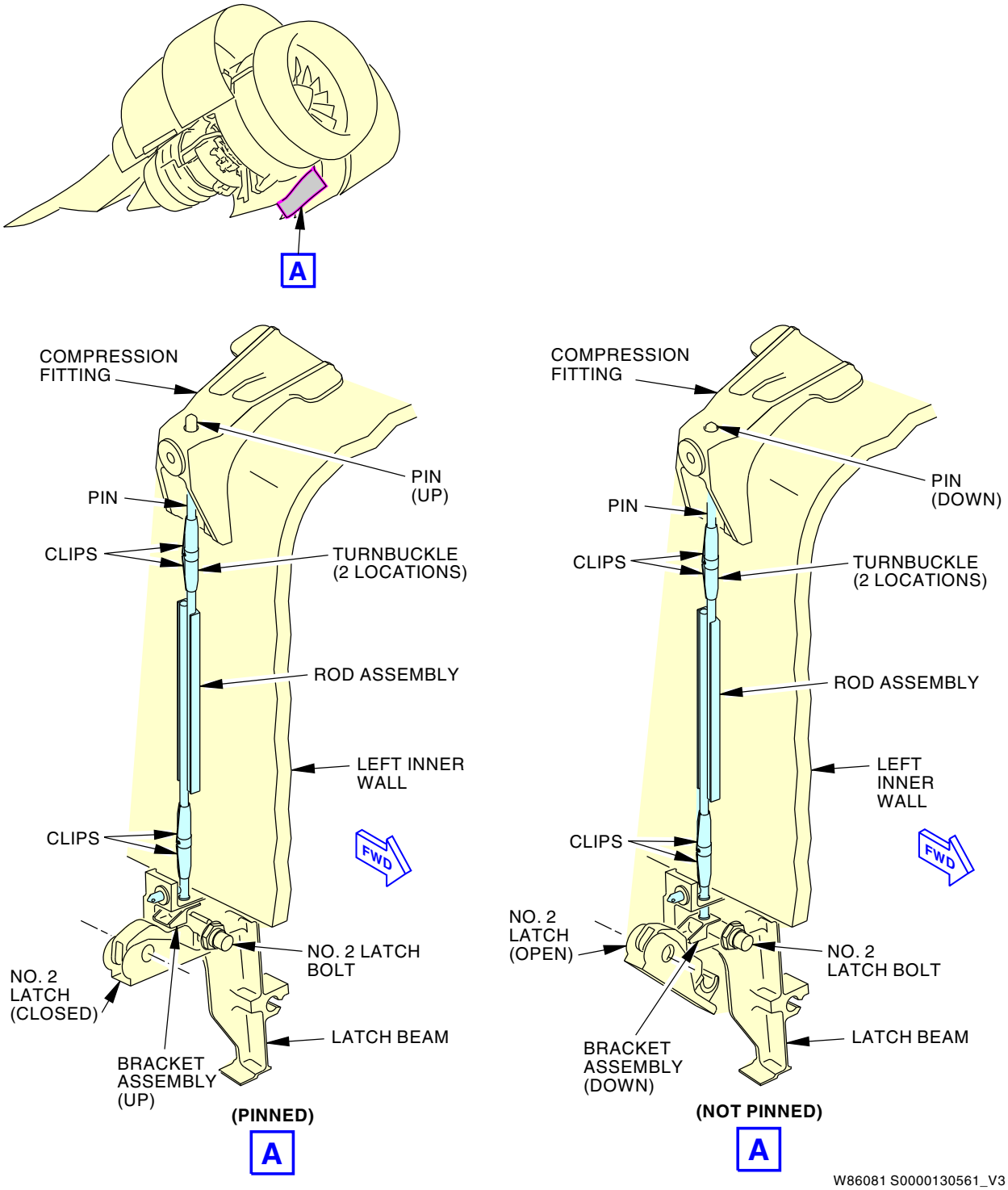
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

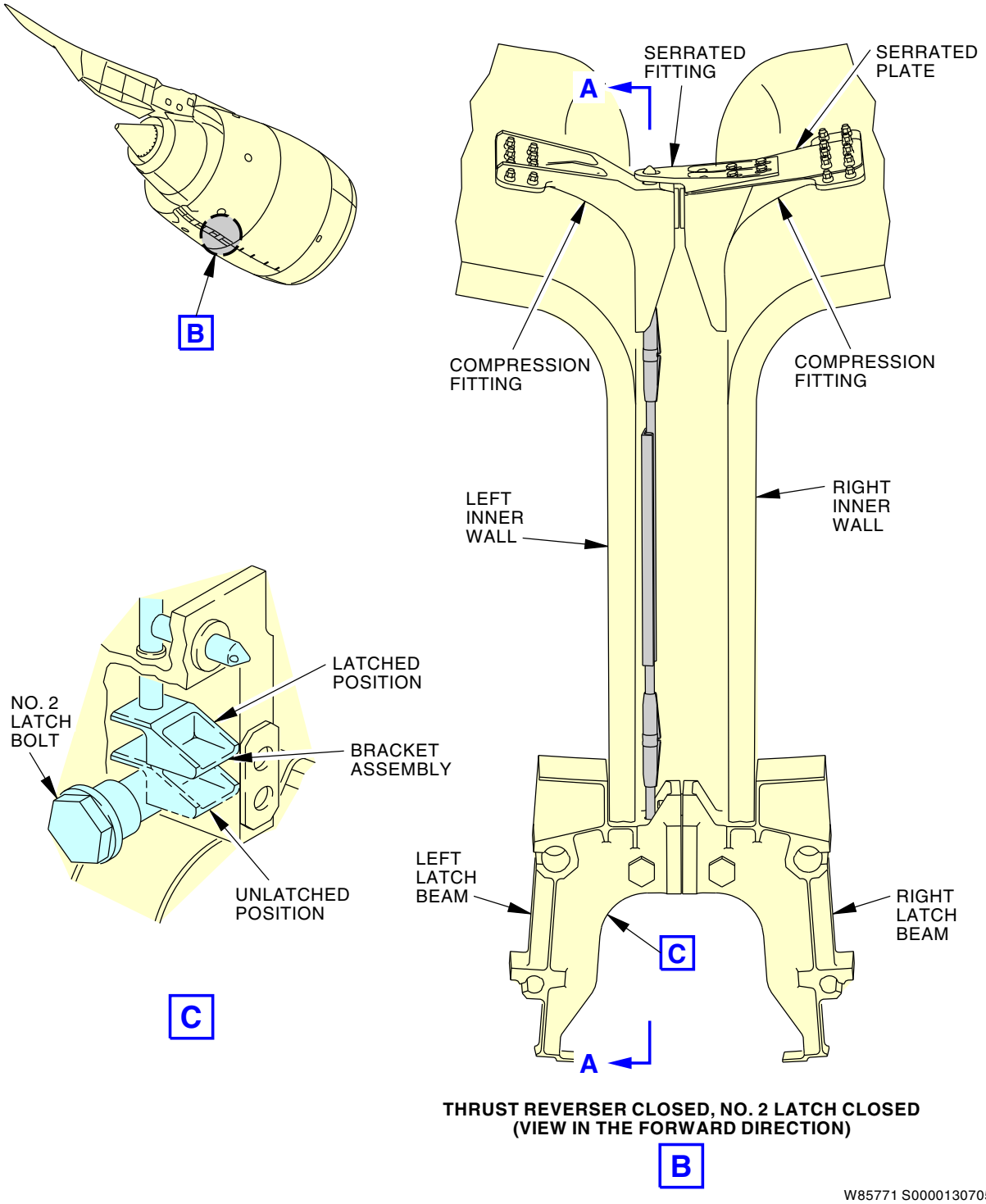
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



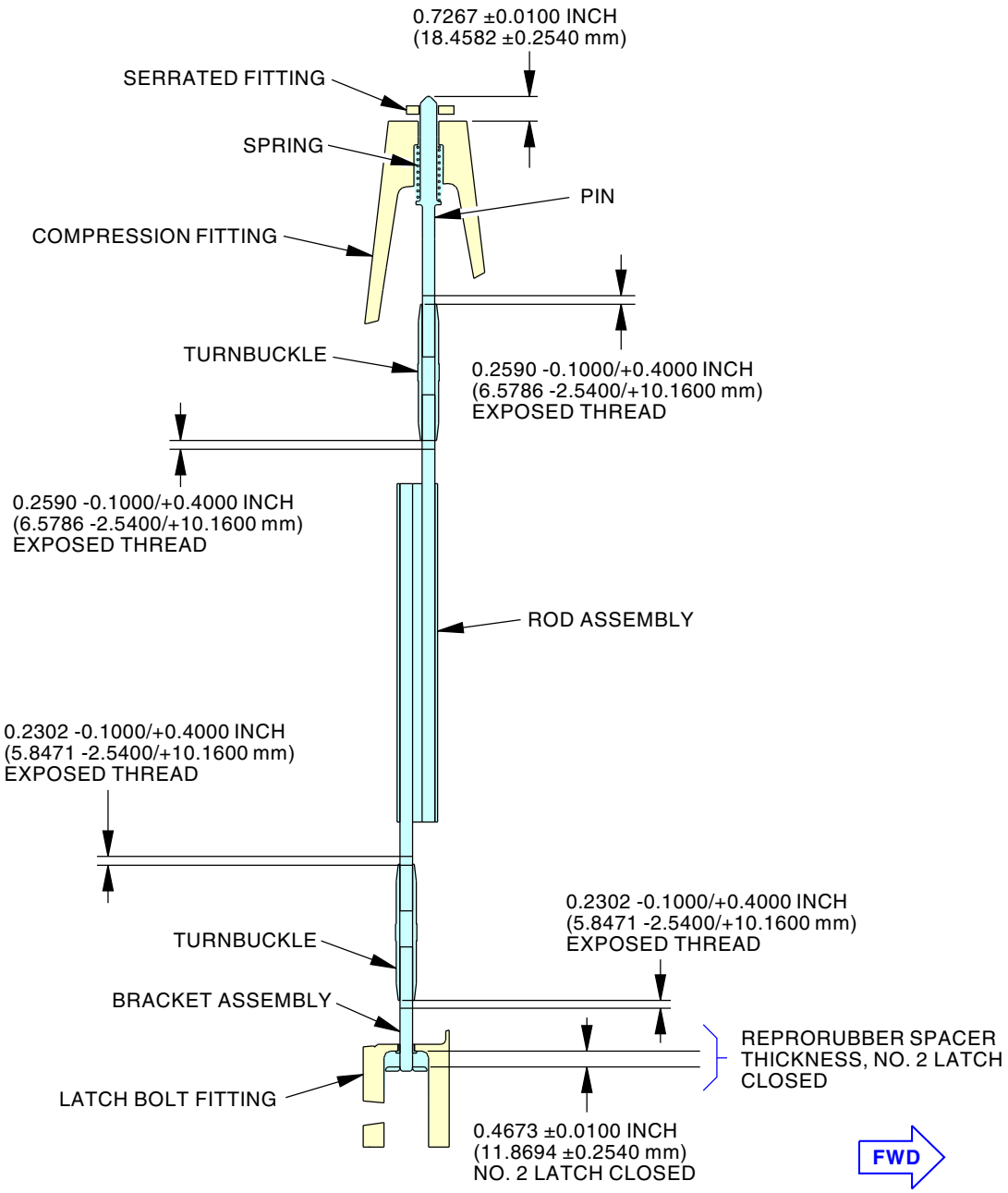
Interlock Pin Assembly Adjustment
Figure 501/78-31-21-990-803-H01 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Interlock Pin Assembly Adjustment
Figure 501/78-31-21-990-803-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



340052 S0000131913_V2

Interlock Pin Assembly Adjustment
Figure 501/78-31-21-990-803-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-21-820-802-H01

3. Thrust Reverser Lower Bifurcation Interlock Pin Fitting Adjustment

(Figure 502)

A. General

(1) This task gives the procedure to find the overhang dimension to adjust the serrated fitting for the interlock pin.

(2) The serrated fitting for the interlock pin is mounted on the No.1 compression pad on the lower bifurcation of the right side thrust reverser.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-06-000-801-H01	Thrust Reverser Thermal Insulation Blanket Removal (P/B 401)
78-31-06-400-802-H01	Thrust Reverser Thermal Insulation Blanket Installation (P/B 401)
78-31-21-000-802-H01	Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal (P/B 401)
78-31-21-400-802-H01	Thrust Reverser Lower Bifurcation Interlock Pin Fitting Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-146	Calipers - Vernier, 0 to 6 in (0 to 152 mm), Readable to 1/1000 in (.025 mm)
STD-596	Micrometer - Depth, 0.0 to 1.07 in (0.0 to 25.0 mm)

D. Consumable Materials

Reference	Description	Specification
B00083	Solvent - VM&P Naphthas	TT-N-95 Type II, ASTM D-3735 Type III
D00504	Grease - Petrolatum	VV-P-236
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02020	Clay, Modeling	
G02145	Tape - Aluminum Foil	BMS8-289

E. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Adjustment

SUBTASK 78-31-21-010-007-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left and right thrust reversers on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(d) For the left and right fan cowl panels, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(e) For the left and right thrust reversers, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

SUBTASK 78-31-21-020-006-H01

(2) Remove the thermal insulation blanket at the forward compression pad fitting (No.1) on the lower bifurcation of the right side thrust reverser.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: Thrust Reverser Thermal Insulation Blanket Removal, TASK 78-31-06-000-801-H01.

H. Adjust the Interlock Pin Serrated Fitting

SUBTASK 78-31-21-820-003-H01

(1) Before the serrated fitting is removed, put a length of aluminum foil tape, G02145 at the back edge of the serrated fitting to give a reference of the installed position of the fitting at the start of the adjustment.

NOTE: The aluminum foil tape gives a sharp and straight edge. Because the position of the serrated fitting is adjusted by the position of the fitting on the serrations on the serrated plate, the foil tape gives a reference to find the change in the amount and direction during the fitting adjustment.

SUBTASK 78-31-21-020-003-H01

(2) Remove the serrated fitting from the forward compression pads (No.1) on the left and right side thrust reversers.

(a) Do this task: Thrust Reverser Lower Bifurcation Interlock Pin Fitting Removal, TASK 78-31-21-000-802-H01.

SUBTASK 78-31-21-020-007-H01

(3) Remove the two wear plates and spacers from the forward compression pads (No.1) on the left and right side thrust reversers.

NOTE: The measurement of the gap between the forward compression fittings on the lower bifurcation of the left and right side thrust reversers is done with the wear plates and spacers removed from the compression fittings.

SUBTASK 78-31-21-220-002-H01

(4) Measure the gap between the forward compression pads (No.1) on the lower bifurcation of the left and right side thrust reversers:

NOTE: You must use a parting agent with clay. You must clean the parts with solvent and a cloth after the measurements.

(a) Apply a piece of clay, G02020 which is 1.00 inch (25.40 millimeters) thick to the forward compression pad (No.1) on the lower bifurcation of the left side thrust reverser (Figure 502).

(b) Apply petrolatum grease, D00504 as a parting agent on the clay.

(c) Apply petrolatum grease, D00504 as a parting agent to the forward compression pad (No.1) on the right side thrust reverser.

SUBTASK 78-31-21-860-003-H01

(5) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

(a) Close the v-band latch, the 5 thrust reverser centerline latches, the 3 aft cowl centerline latches, and the 4 deflection limiter latches.

(b) Do not close the latch access doors at this time.

(c) Press both the left and right PDOS down buttons for 60 seconds to depressurize the PDOS system.

NOTE: The PDOS actuators can have some oil in the actuators that will become pressurized when the thrust reverser is closed and latched. Depressurize the PDOS system to get an accurate gap value.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-21-860-004-H01

CAUTION

OPEN THE DEFLECTION LIMITER LATCHES ON THE AFT COWL BEFORE YOU OPEN THE THRUST REVERSER. IF THE LATCHES ARE NOT OPEN, DAMAGE TO THE STRUT, CROSS-TIE RODS, AND THE THRUST REVERSER WILL OCCUR.

CAUTION

MAKE SURE THAT ALL FOUR LATCH HOOKS FOR THE DEFLECTION LIMITER LATCHES ON THE LEFT AND RIGHT AFT COWL MOVED AWAY FROM THE DEFLECTION LIMITER STRAPS BEFORE YOU OPERATE THE PDOS SYSTEM. DAMAGE TO THE STRUCTURE OF THE THRUST REVERSER, AND THE BRACKETS THAT HOLD THE CROSS TIE RODS CAN OCCUR.

(6) Do this task: Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00.

(a) Make sure that the left and right deflection limiter latches are open and the latch hooks are not engaged on the deflection limiter straps before you open the thrust reverser.

(b) Open the 4 deflection limiter latches, the 3 aft cowl centerline latches, the 5 thrust reverser centerline latches, and the v-band latch.

SUBTASK 78-31-21-220-003-H01

(7) Measure the thickness of the clay, G02020 to find the gap between the forward compression pads (No.1) on the left and right side thrust reversers:

(a) Use 0.0 to 1.07 in (0.0 to 25.0 mm) depth micrometer, STD-596 or vernier calipers, STD-146 to measure the compressed thickness of the clay.

(b) Be careful you do not deform the clay as you measure it to prevent a false value.

(c) Make a record of the thickness value.

SUBTASK 78-31-21-160-001-H01

WARNING

DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(8) Remove all the residual clay and parting agent from the area of the compression pads with solvent, B00083 and a clean cotton wiper, G00034.

SUBTASK 78-31-21-970-001-H01

(9) Calculate the position of the serrated fitting; refer to the table: Interlock Pin Serrated Fitting Position Calculation Example/Table 501.

NOTE: The wear plate and spacers for the forward compression pad on the left and right side thrust reversers were removed in a previous step. The 0.440 inch value is based on the wear plate thickness, any spacer thickness required, the 0.06-0.10 inch (1.52-2.54 millimeters) gap between the wear plates after the latches are closed and the position of the hole in the tongue of the serrated fitting in relation to the fitting.

NOTE: The thickness of the spacer is 0.020 inch (0.508 millimeter). The thickness of the wear plate is 0.160 ± 0.005 inch (4.064 ± 0.1270 millimeter)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

Table 501/78-31-21-993-801-H01 Interlock Pin Serrated Fitting Position Calculation Example

Calculate the Serrated Fitting Overhang Dimension	
No.1 Compression Pad Gap	0.480 inch (12.192 mm)
Minus 0.440 inch (11.176 mm)	- 0.440 inch (11.176 mm)
Equals Minimum Fitting Overhang Dimension	= 0.040 inch (1.016 mm)

SUBTASK 78-31-21-420-003-H01

(10) Install the serrated fitting at the overhang dimension.

(a) Do this task: Thrust Reverser Lower Bifurcation Interlock Pin Fitting Installation, TASK 78-31-21-400-802-H01.

SUBTASK 78-31-21-420-007-H01

(11) Install the wear plates and spacers at the forward compression fittings (No.1) on the lower bifurcation of the left and right side thrust reversers.

(a) Do this task: Thrust Reverser Lower Bifurcation Interlock Pin Fitting Installation, TASK 78-31-21-400-802-H01.

SUBTASK 78-31-21-860-005-H01

(12) Remove and discard the aluminum foil tape.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-21-420-006-H01

(1) Install the thermal insulation blanket.

(a) Refer to the Thrust Reverser Thermal Insulation Blanket Installation, TASK 78-31-06-400-802-H01.

SUBTASK 78-31-21-410-007-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Do these tasks in sequence to safely close the left and right thrust reversers on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
416AR	Right Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

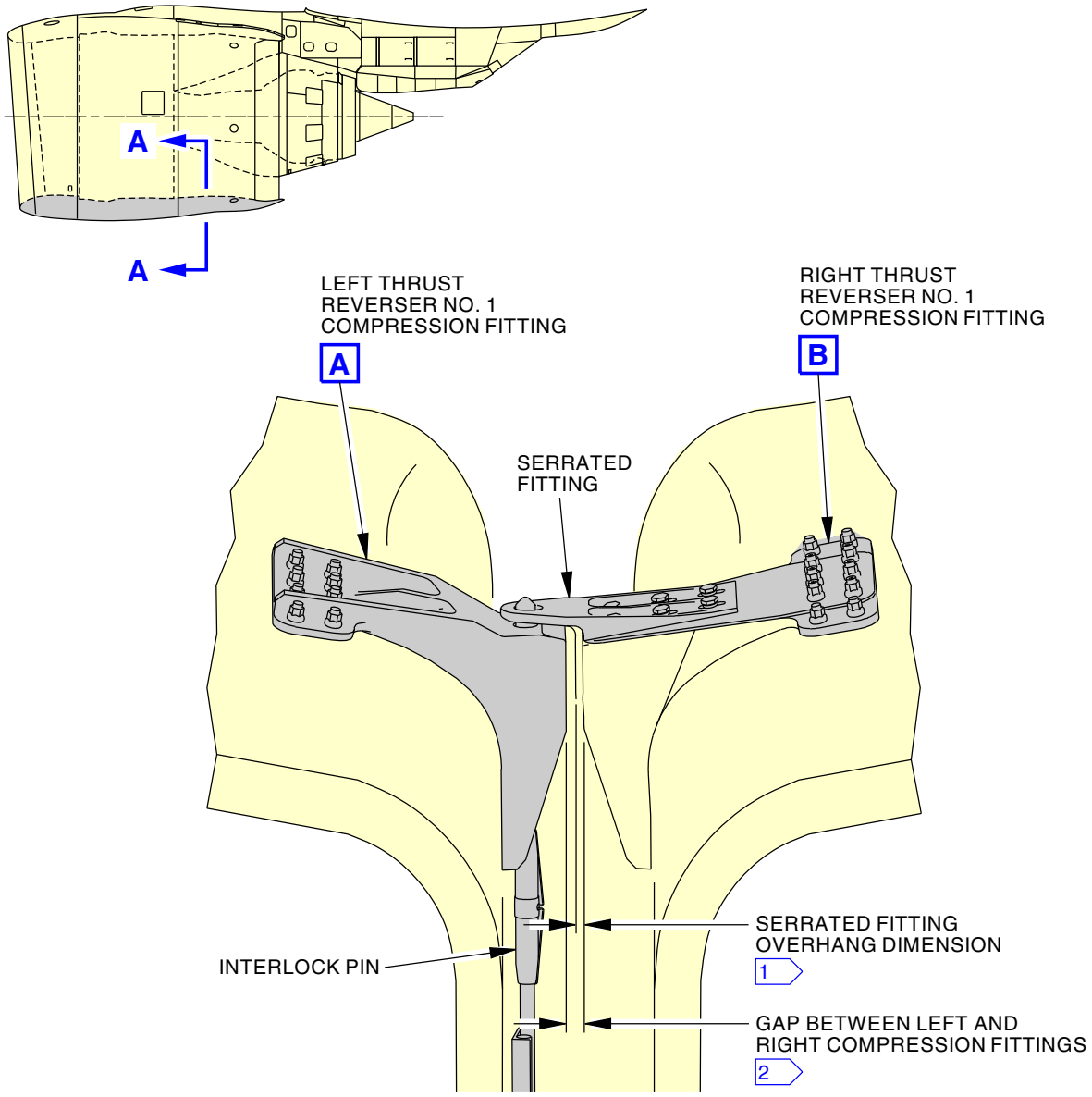
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



THRUST REVERSER CLOSED AND LATCHES CLOSED
(VIEW IN THE FORWARD DIRECTION)

A-A

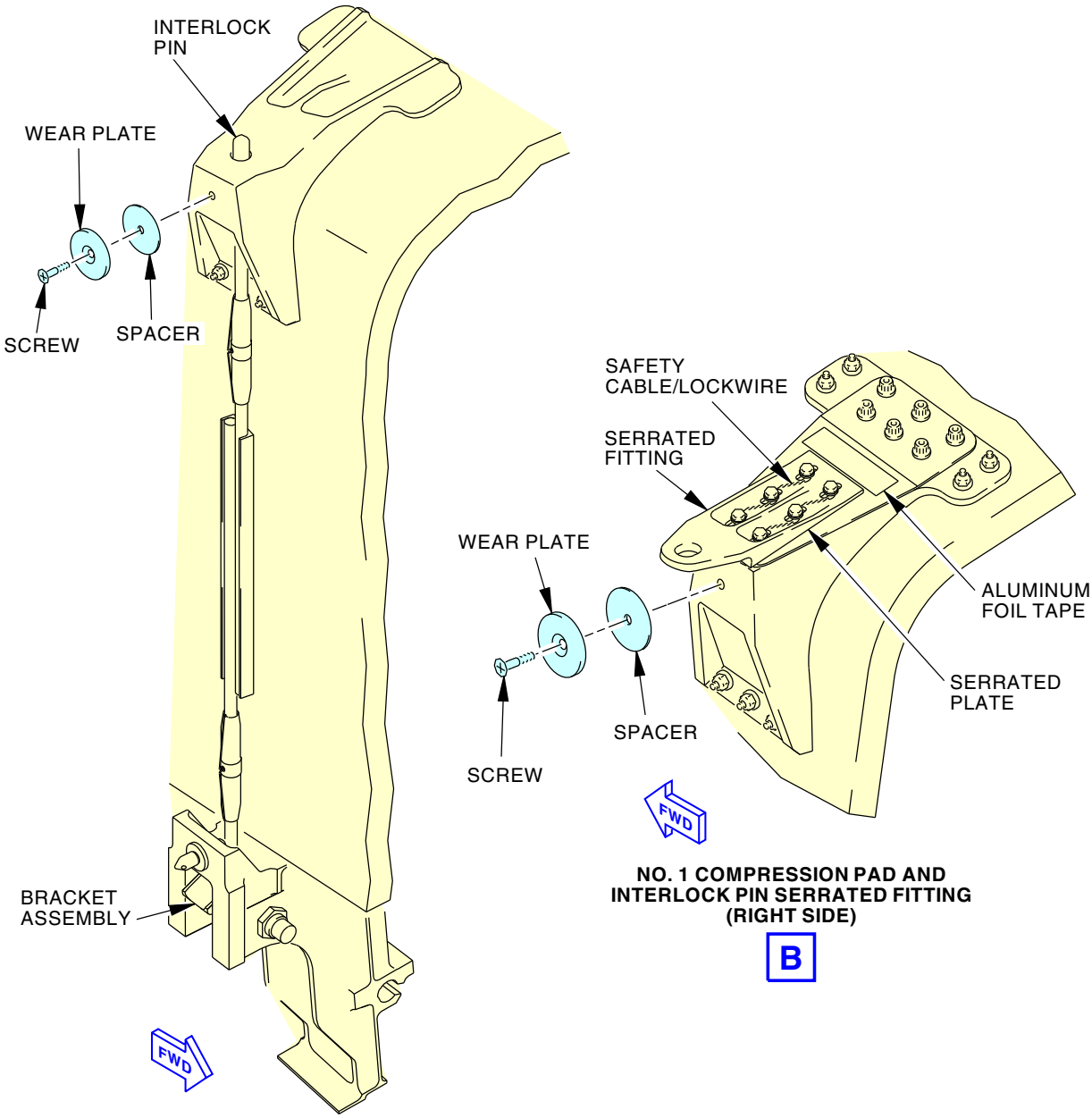
1 SEE TEXT FOR CALCULATION

2 APPLY CLAY TO COMPRESSION FITTINGS WITHOUT WEAR PLATES OR SPACERS INSTALLED.

352958 S0000132741_V3

Interlock Pin Serrated Fitting Overhang Dimension
Figure 502/78-31-21-990-804-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



382868 S0000133896_V2

Interlock Pin Serrated Fitting Overhang Dimension
Figure 502/78-31-21-990-804-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

HINGE BEAM ACCESS DOOR - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the hinge beam access door and crimping hinges.

(2) An installation of the hinge beam access door.

TASK 78-31-22-000-801-H00

2. Hinge Beam Access Door Removal

(Figure 401)

A. General

(1) This task is the removal procedure for the hinge beam access door and crimping hinges.

B. References

Reference	Title
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-000-801-001	Forward Fairings Removal (P/B 401)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
G00624	Bag - Plastic, General Purpose	

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
432	Forward Torque Box - Left Nacelle Strut
442	Forward Torque Box - Right Nacelle Strut

E. Access Panels

Number	Name/Location
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
415FL	Center Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
416FR	Center Thrust Reverser Hinge Cover, Left Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Prepare for the Removal

SUBTASK 78-31-22-040-001-H00

WARNING DO THE THRUST REVERSER DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. ACCIDENTAL OPERATION OF THE THRUST REVERSE CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(1) For the applicable engine, do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-31-22-910-001-H00

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(2) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-31-22-000-001-H00

(3) Remove the strut side fairing [4] if required (TASK 54-52-01-000-801-001).

(a) Remove the applicable access panels:

Number	Name/Location
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

G. Hinge Beam Access Door Removal

SUBTASK 78-31-22-000-002-H00

(1) Remove the forward fairing [2] from the applicable thrust reverser [3].

(a) Remove the bolts [5] from the forward fairing [2].

1) Remove the applicable access panels:

Number	Name/Location
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine

(b) Store the bolts [5] in a plastic bag, G00624.

(c) On the forward fairing [2], remove the rivets [6] from the hinge [7].

(d) On the forward fairing [2], remove the rivets [8] from the hinge [9].

SUBTASK 78-31-22-000-003-H00

(2) Remove the track fairing [1] from the applicable thrust reverser [3].

(a) Remove the bolts [5] from the track fairing [1].

1) Remove the applicable access panels:

Number	Name/Location
415FL	Center Thrust Reverser Hinge Cover, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
416FR	Center Thrust Reverser Hinge Cover, Left Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine

(b) Store the bolts [5] in a plastic bag, G00624.

(c) On the track fairing [1], remove the rivets [10] from the hinge [11].

(d) On the track fairing [1], remove the rivets [12] from the hinge [13].

SUBTASK 78-31-22-210-002-H00

(3) Inspect the hinge ends on hinge [7], hinge [9], hinge [11], and hinge [13] for damages.

(a) If the hinge ends are damaged, contact Boeing.

SUBTASK 78-31-22-210-003-H00

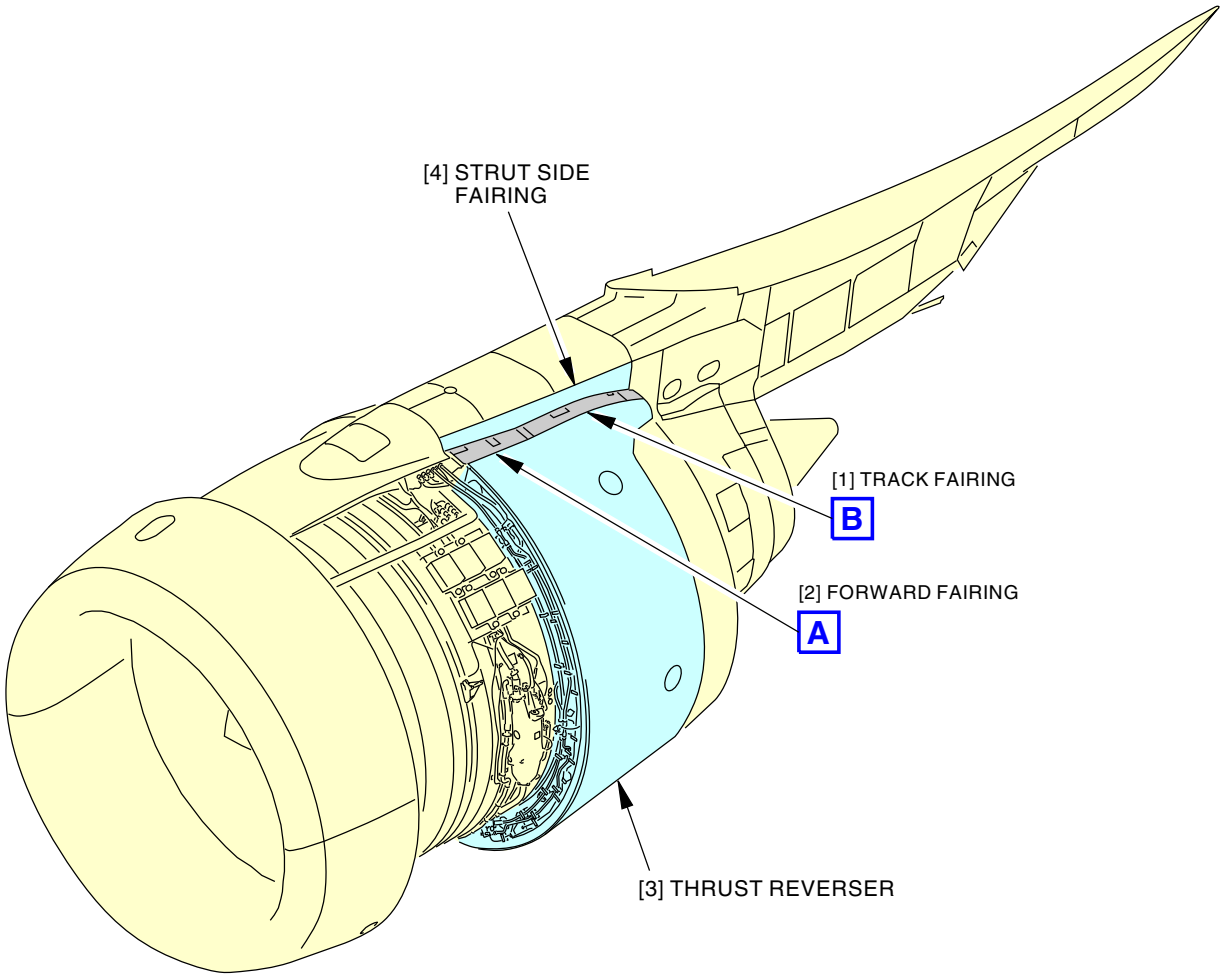
(4) Verify the hinge end on the applicable hinge is secured (Figure 402).

(a) If the hinge end is not secured, crimp the hinge end.

1) Do not cause the hinge to bind when crimping.

——— END OF TASK ———

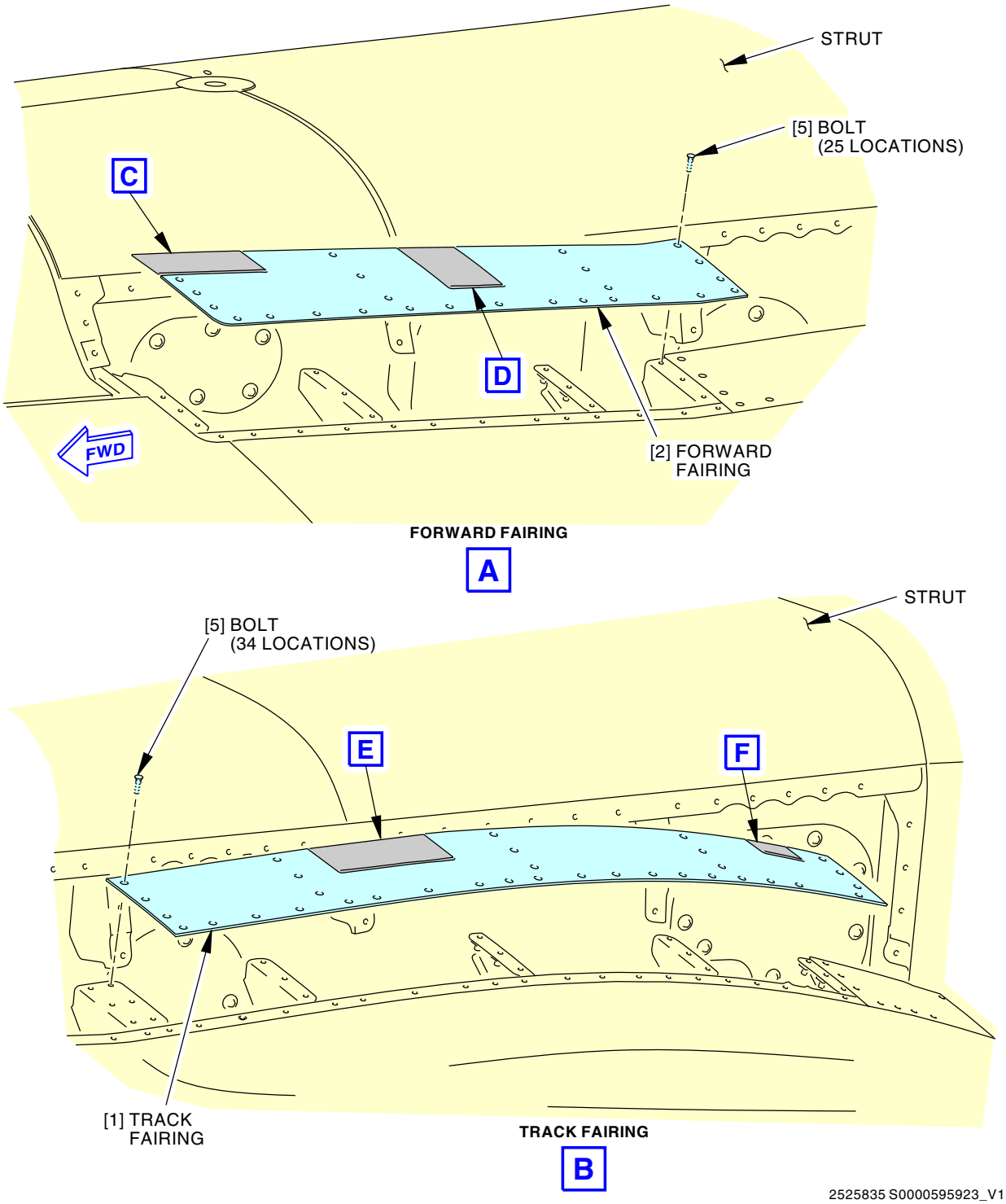
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2525814 S0000595922_V1

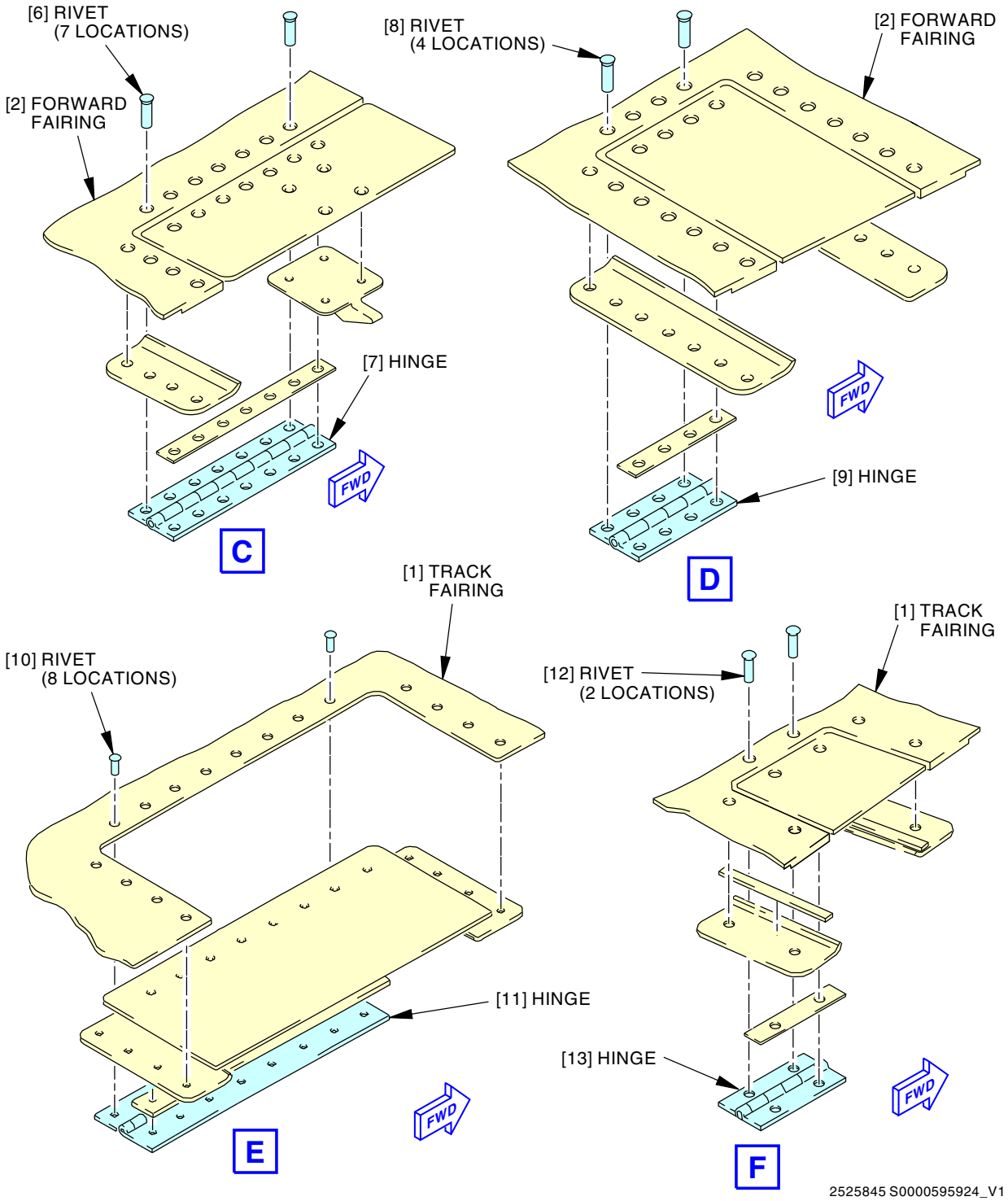
Hinge Beam Access Door Installation
Figure 401/78-31-22-990-804-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



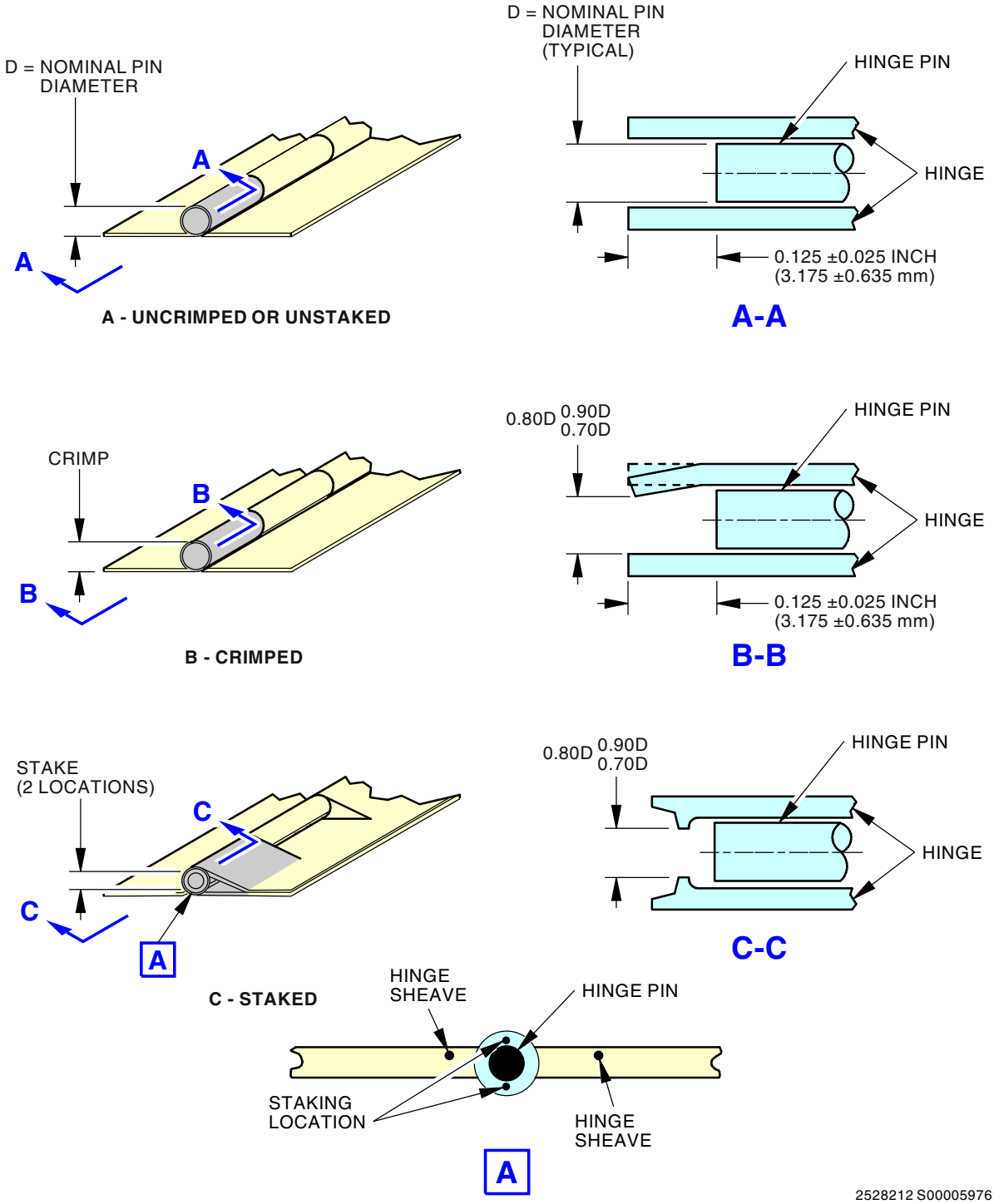
Hinge Beam Access Door Installation
Figure 401/78-31-22-990-804-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Hinge Beam Access Door Installation
Figure 401/78-31-22-990-804-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Crimping and Staking Hinge Ends
Figure 402/78-31-22-990-803-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-22-400-801-H00

3. Hinge Beam Access Door Installation

(Figure 401)

A. General

(1) This task is the installation of the hinge beam access door.

B. References

Reference	Title
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-400-801-001	Forward Fairings Installation (P/B 401)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00633	Grease - Aircraft General Purpose	BMS3-33

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine
432	Forward Torque Box - Left Nacelle Strut
442	Forward Torque Box - Right Nacelle Strut

E. Access Panels

Number	Name/Location
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
415FL	Center Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
416FR	Center Thrust Reverser Hinge Cover, Left Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

F. Hinge Beam Panel Installation

SUBTASK 78-31-22-910-002-H00

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(1) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-31-22-400-001-H00

(2) Install the track fairing [1] on the thrust reverser [3]:

(a) Install the hinge [11] on the track fairing [1] with rivets [10].

(b) Install the hinge [13] on the track fairing [1] with rivets [12].

(c) Apply grease, D00633 to the bolts [5].

(d) Install the track fairing [1] with bolts [5].

1) Close the applicable access panels:

Number	Name/Location
415FL	Center Thrust Reverser Hinge Cover, Left Engine
416FR	Center Thrust Reverser Hinge Cover, Left Engine
425FL	Center Thrust Reverser Hinge Cover, Right Engine
426FR	Center Thrust Reverser Hinge Cover, Right Engine

SUBTASK 78-31-22-400-002-H00

(3) Install the forward fairing [2] on the thrust reverser [3].

(a) Install the hinge [7] on the forward fairing [2] using rivets [6].

(b) Install the hinge [9] on the forward fairing [2] using rivets [8].

(c) Apply grease, D00633 to the bolts [5].

(d) Install the forward fairing [2] with bolts [5].

1) Close the applicable access panels:

Number	Name/Location
415EL	Forward Thrust Reverser Hinge Cover, Left Engine
416ER	Forward Thrust Reverser Hinge Cover, Left Engine
425EL	Forward Thrust Reverser Hinge Cover, Right Engine
426ER	Forward Thrust Reverser Hinge Cover, Right Engine

SUBTASK 78-31-22-400-003-H00

(4) If the strut side fairing [4] was removed, do this task: Forward Fairings Installation, TASK 54-52-01-400-801-001.

(a) Install the applicable access panels:

Number	Name/Location
432AL	Left Forward Side Fairing, Left Strut
432AR	Right Forward Side Fairing, Left Strut
442AL	Left Forward Side Fairing, Right Strut
442AR	Right Forward Side Fairing, Right Strut

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-22-440-001-H00

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-31-22-080-001-H00

(2) Remove the fall arrest equipment from the strut (TASK 54-52-00-910-804-001).

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER PRECOOLER KISS SEAL - REMOVAL/INSTALLATION

1. General

A. This procedure includes these tasks:

(1) The removal of the thrust reverser precooler kiss seal.

(2) The installation of the thrust reverser precooler kiss seal.

B. The thrust reverser precooler kiss seal is referred to in this procedure as the kiss seal.

TASK 78-31-99-000-801-H01

2. Thrust Reverser Precooler Kiss Seal Removal

A. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

B. Tools/Equipment

Reference	Description
STD-653	Platform - Engine and Strut Access

C. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

E. Prepare for the Removal

SUBTASK 78-31-99-010-003-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left thrust reverser on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) For the left fan cowl panel, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

(e) For the left thrust reverser, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

SUBTASK 78-31-99-490-001-H01

(2) Put the engine and strut access platform, STD-653 in position.

F. Kiss Seal Removal

SUBTASK 78-31-99-020-001-H01

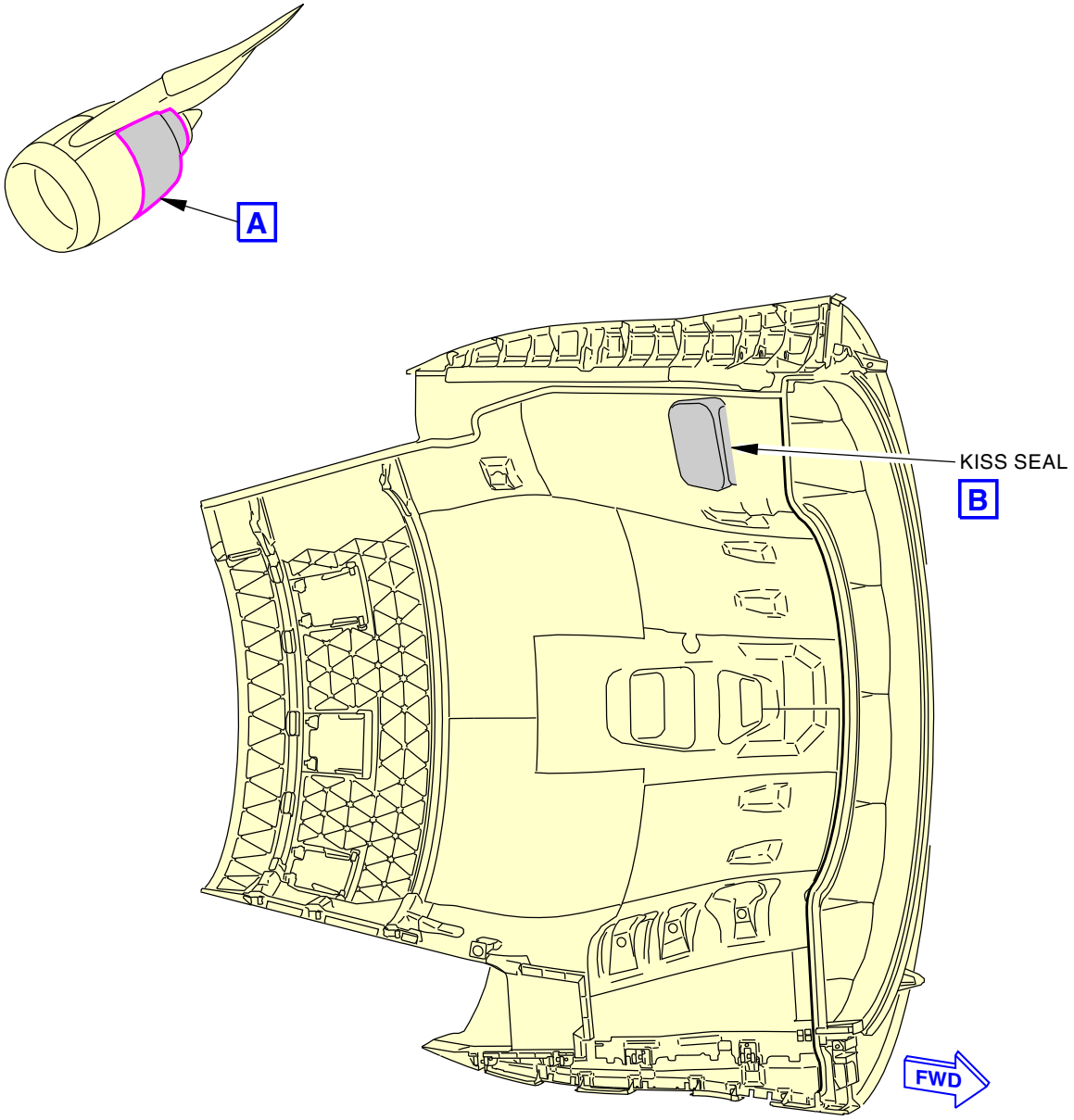
(1) Remove the kiss seal [1] (Figure 401):

NOTE: The kiss seal is on the inner bifurcation at the top of the left thrust reverser.

(a) Remove the 18 bolts [2] which attach the kiss seal to the inlet duct flange.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



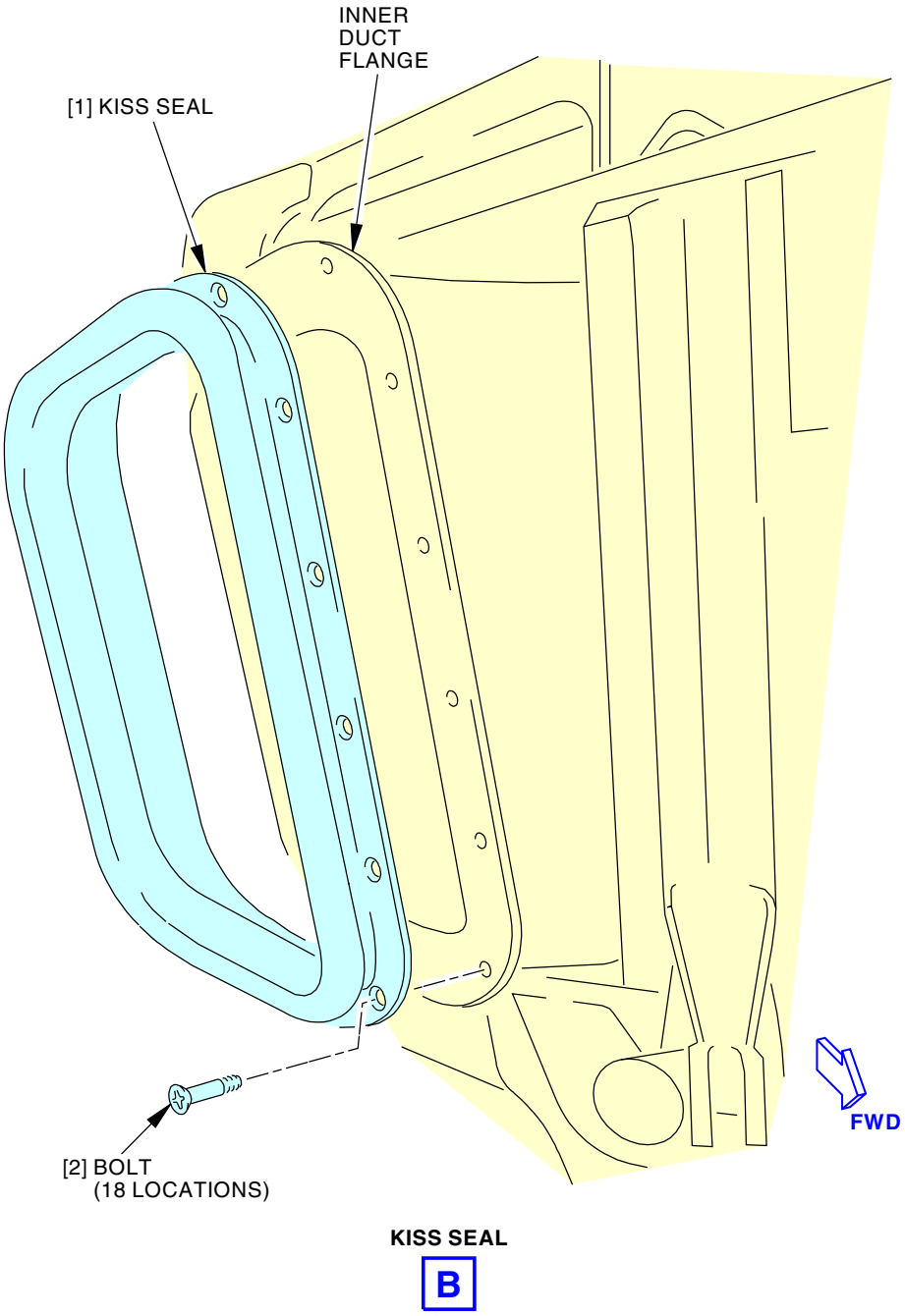
LEFT THRUST REVERSER
(INTERNAL SIDE)

A

M07512 S0004286467_V2

Thrust Reverser Precooler Kiss Seal Installation
Figure 401/78-31-99-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07513 S0004286468_V2

Thrust Reverser Precooler Kiss Seal Installation
Figure 401/78-31-99-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-31-99-400-801-H01

3. Thrust Reverser Precooler Kiss Seal Installation

A. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

B. Tools/Equipment

Reference	Description
STD-653	Platform - Engine and Strut Access

C. Consumable Materials

Reference	Description	Specification
D00633	Grease - Aircraft General Purpose	BMS3-33

D. Location Zones

Zone	Area
415	Left Thrust Reverser - Left Engine
425	Left Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

F. Kiss Seal Installation

SUBTASK 78-31-99-420-001-H01

(1) Install the new kiss seal [1] (Figure 401):

(a) Put the new kiss seal into position on the inlet duct flange.

(b) Install 18 bolts [2] to attach the kiss seal.

1) Apply grease, D00633 to the bolt shank and threads of the bolt.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-31-99-860-001-H01

(1) Make sure that the work area is clean and remove all tools and other items.

SUBTASK 78-31-99-090-001-H01

(2) Remove the engine and strut access platform, STD-653.

SUBTASK 78-31-99-410-003-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left thrust reverser on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER PRECOOLER KISS SEAL - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure includes the steps to do an inspection of the thrust reverser precooler kiss seal.

C. The thrust reverser precooler kiss seal will be referred to as the kiss seal in this procedure.

TASK 78-31-99-200-801-H01

2. Thrust Reverser Precooler Kiss Seal - Inspection

A. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-010-816-H00	Open the Thrust Reverser (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-99-000-801-H01	Thrust Reverser Precooler Kiss Seal Removal (P/B 401)
78-31-99-400-801-H01	Thrust Reverser Precooler Kiss Seal Installation (P/B 401)

B. Tools/Equipment

Reference	Description
STD-653	Platform - Engine and Strut Access

C. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
415AL	Left Thrust Reverser, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
425AL	Left Thrust Reverser, Right Engine

D. Prepare for the Inspection Procedure

SUBTASK 78-31-99-010-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO OPEN THE THRUST REVERSER(S). IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR

(1) Do these tasks in sequence to safely open the left thrust reverser on the applicable engine:

(a) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

(b) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

(c) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) For the left fan cowl panel, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

(e) For the left thrust reverser, do this task:

Open the Thrust Reverser (Selection), TASK 78-31-00-010-816-H00

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

SUBTASK 78-31-99-490-002-H01

(2) Put the engine and strut access platform, STD-653 in position.

E. Inspection Procedure

SUBTASK 78-31-99-211-001-H01

(1) Examine the kiss seal for these conditions:

(a) Missing material

(b) Cracks

(c) Tears

SUBTASK 78-31-99-900-001-H01

(2) If the kiss seal has any of these conditions, replace the kiss seal.

(a) Do this task: Thrust Reverser Precooler Kiss Seal Removal, TASK 78-31-99-000-801-H01.

(b) Do this task: Thrust Reverser Precooler Kiss Seal Installation, TASK 78-31-99-400-801-H01.

F. Put the Airplane Back to Its Usual Condition.

SUBTASK 78-31-99-942-001-H01

(1) Make sure that the work area is clean and remove all tools and other items.

SUBTASK 78-31-99-090-002-H01

(2) Remove the engine and strut access platform, STD-653.

SUBTASK 78-31-99-410-004-H01

WARNING DO ALL OF THE SPECIFIED TASKS IN THE CORRECT SEQUENCE TO CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THIS INSTRUCTION, INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Do these tasks in sequence to safely close the left thrust reverser on the applicable engine:

(a) Do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

1) Close these access panels:

Number	Name/Location
415AL	Left Thrust Reverser, Left Engine
425AL	Left Thrust Reverser, Right Engine

(b) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(d) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER DIRECTIONAL CONTROL VALVE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser directional control valve.

(2) An installation of the thrust reverser directional control valve.

B. Refer to the vendors component repair instructions from Smiths Aerospace Products (formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Directional Control Valve assembly, P/N 1U1503-2 (Boeing P/N S315W360-19).

C. Strut mounted tubes, fittings without o-rings, and hoses forward of the wing are tightened to leakproof torque values. Unions, fittings with o-rings and bosses are tightened to standard torque values.

TASK 78-34-01-000-801-H01

2. Thrust Reverser Directional Control Valve Removal

A. General

(1) This task is the removal procedure for the thrust reverser directional control valve.

(2) For this procedure the thrust reverser direction control valve is referred to as the directional control valve.

(3) The directional control valve is installed in the strut behind the No. 2 forward fairing.

(4) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-000-801-001	Forward Fairings Removal (P/B 401)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
431	Forward Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
431CR	Forward Access Fairing, Left Strut

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
431DT	No. 2 Forward Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut
441DT	No. 2 Forward Fairing, Right Strut

G. Prepare for the Removal

SUBTASK 78-34-01-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Deactivate the thrust reverser for ground maintenance.

(a) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-01-490-001-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(2) If you do not use other safety equipment, do the (strut-mounted) Fall Arrest Lifeline Procedure.

(a) Do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001

SUBTASK 78-34-01-864-001-H01

(3) Release the pressure in the main hydraulic system and reservoir for the applicable strut.

(a) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-01-010-001-H01

(4) Remove the forward fairings from the applicable strut; do this task: Forward Fairings Removal, TASK 54-52-01-000-801-001.

(a) Remove the applicable access panels:

Number	Name/Location
431CR	Forward Access Fairing, Left Strut
431DT	No. 2 Forward Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut
441DT	No. 2 Forward Fairing, Right Strut

H. Directional Control Valve Removal

SUBTASK 78-34-01-030-001-H01

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

(1) Disconnect the electrical connector [5] from the directional control valve [1] (Figure 401).

(a) Install the protection caps on the electrical connector and the receptacle on the directional control valve.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-01-030-002-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(2) Disconnect the hydraulic lines and elbows at the directional control valve [1]:

(a) Get a 1 quart (1 l) oil/fuel resistant container, STD-195 to catch the hydraulic fluid.

(b) Get a cotton wiper, G00034 to clean the hydraulic fluid.

(c) Follow this general practice when the hydraulic tubes are removed.

1) Do this task: Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

(d) Remove the two screws [35] for the two clamp blocks [31] which hold the hydraulic return line [2], pressure line [3], and control line [4].

(e) Disconnect the pressure line [3] from the directional control valve [1].

(f) Disconnect the return line [2] from the directional control valve [1].

(g) Disconnect the control line [4] from the directional control valve [1].

(h) Remove the four screws [43], spacers [44], washers [45] and nuts [46] for the clamp block [41] and channels [42] for the hydraulic extend line [9].

(i) Disconnect the extend line [9] from the extend elbow [11] and the extend flow control tee [13].

(j) Remove the four screws [43], spacers [44], washers [45] and nuts [46] for the clamp block [48] and channels [47] for the hydraulic retract line [8].

(k) Disconnect the retract line [8] from the retract elbow [10] and the retract flow control tee [12].

SUBTASK 78-34-01-020-001-H01

(3) Remove the directional control valve [1] from the strut.

(a) Remove the three bolts [6] and washers [7] that attach the directional control valve [1] to the strut bracket.

(b) Turn the directional control valve [1] in a clockwise direction to remove it from the strut.

SUBTASK 78-34-01-020-002-H01

(4) Remove the elbows from the directional control valve [1]:

(a) Remove the extend elbow [11] from the directional control valve [1] port.

(b) Remove the retract elbow [10] from the directional control valve [1] port.

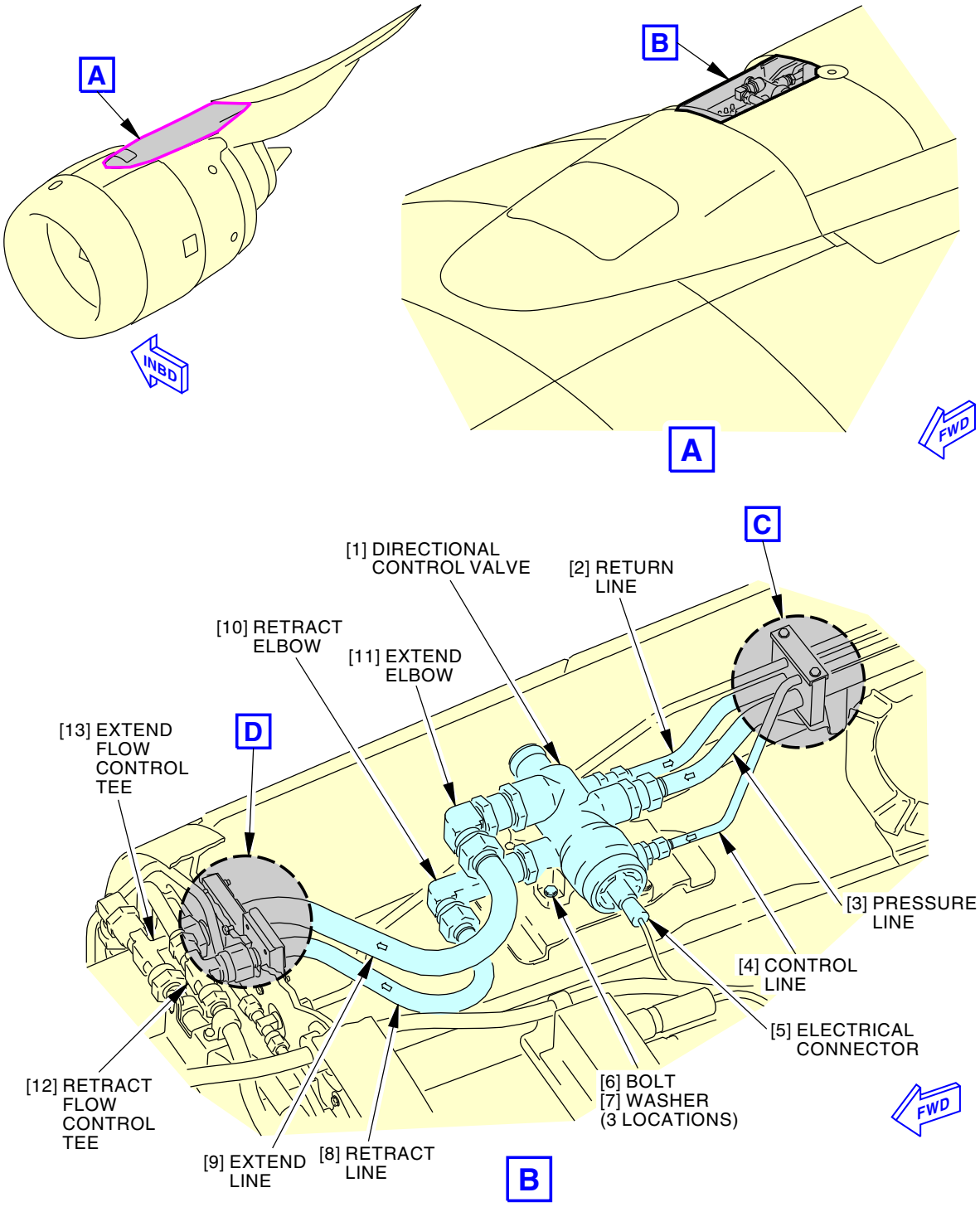
(c) Keep the extend elbow [11] and the retract elbow [10] for installation on the new directional control valve [1].

SUBTASK 78-34-01-913-001-H01

(5) Install the protection caps on the hydraulic return line [2], pressure line [3], control line [4], retract line [8] and extend line [9], and on the hydraulic ports on the directional control valve [1].

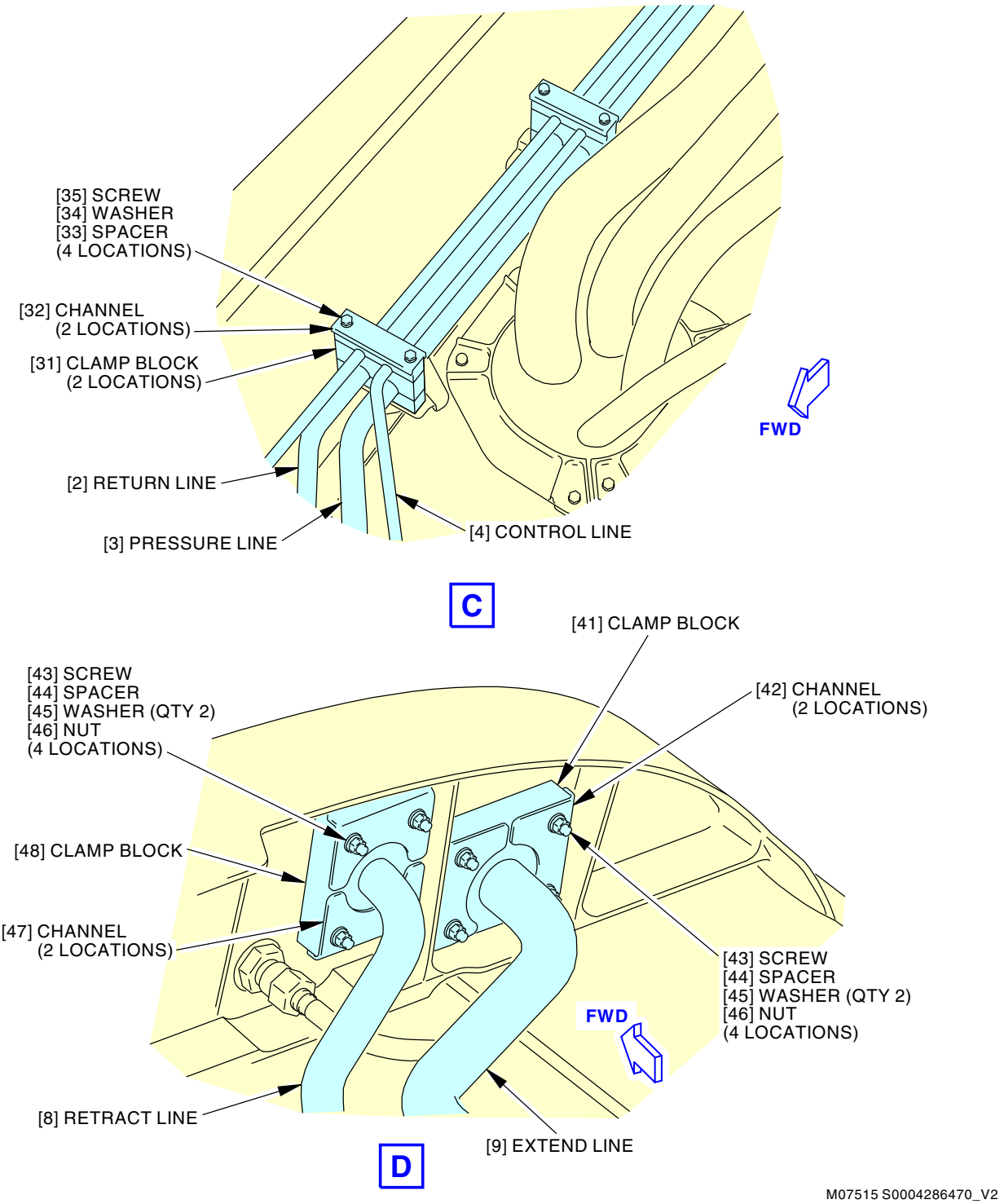
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Directional Control Valve Installation
Figure 401/78-34-01-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Directional Control Valve Installation
Figure 401/78-34-01-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-01-400-801-H01

3. Thrust Reverser Directional Control Valve Installation

A. General

(1) This task is the installation procedure for the thrust reverser directional control valve.

(2) You must use the fall arrest lifeline procedure or other safety equipment to do this task.

(3) After the installation of the directional control valve, you must do the operational test of the thrust reverser system.

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-11-400-801	Block Clamps Installation (P/B 401)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-400-801-001	Forward Fairings Installation (P/B 401)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Location Zones

Zone	Area
431	Forward Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut

D. Access Panels

Number	Name/Location
431CR	Forward Access Fairing, Left Strut
431DT	No. 2 Forward Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut
441DT	No. 2 Forward Fairing, Right Strut

E. Directional Control Valve Installation

SUBTASK 78-34-01-490-002-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(1) If you do not use other safety equipment, do the (strut-mounted) Fall Arrest Lifeline Procedure.

(a) Do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-34-01-913-002-H01

(2) Remove the protection caps from the all of the hydraulic ports on the valve and the hydraulic lines and components.

SUBTASK 78-34-01-430-001-H01

(3) Install and manually tighten the retract elbow [10]and the extend elbow [11] on the directional control valve [1] (Figure 401).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do not tighten the nut on the elbows at this time to allow the elbows to be aligned with the tubing.

SUBTASK 78-34-01-420-001-H01

(4) Install the directional control valve [1] on the strut bracket.

(a) Turn the directional control valve in a counter-clockwise direction to put it in position on the strut.

(b) Align the hydraulic return line [2], pressure line [3] and control line [4] to the directional control valve [1] ports.

(c) Install the three bolts [6] and washers [7].

(d) Tighten the bolts to 90-110 pound-inches (10.2-12.4 newton-meters).

SUBTASK 78-34-01-430-002-H01

(5) Install the retract line [8] between the retract flow control tee [12] and the retract elbow [10] on the directional control valve [1] as follows:

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(a) Follow these general practices when you install the hydraulic lines to the directional control valve to minimize leakage and tube preload.

1) Do this task: Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do this task: Block Clamps Installation, TASK 20-10-11-400-801.

(b) Align the tube with the port on the elbow.

(c) Manually engage the tube nuts on the fittings.

(d) Install channels [47] on the clamp block [48].

(e) Install and tighten the four screws [43], spacers [44], washers [45] and nuts [46] through the clamp block [48].

NOTE: The bolt head is on the forward side of the strut structure.

(f) Tighten the nut on the retract line [8] to 855-945 pound-inches (97-107 newton-meters).

NOTE: The leakproof torque method requires you to tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

(g) Tighten the nut on the retract elbow [10] to 855-945 pound-inches (97-107 newton-meters).

SUBTASK 78-34-01-430-003-H01

(6) Install the extend line [9] between the extend flow control tee [13] and the extend elbow [11] on the directional control valve as follows:

(a) Align the tube with the port on the elbow.

(b) Manually engage the tube nuts on the fittings.

(c) Install channels [42] on the clamp block [41].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Install and tighten the four screws [43], spacers [44], washers [45] and nuts [46] through the clamp block [41].

NOTE: The bolt head is on the forward side of the strut structure.

(e) Tighten the nut on the extend line [9] to 1140-1260 pound-inches (129-142 newton-meters).

NOTE: The leakproof torque method requires you to tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

(f) Tighten the nut on the extend elbow [11] to 1140-1260 pound-inches (129-142 newton-meters).

SUBTASK 78-34-01-430-004-H01

(7) Connect the hydraulic return line [2] to the directional control valve [1] ports with the leakproof torque method as follows:

(a) Align the tubes with the ports on the valve.

(b) Manually engage the tube nuts on the fittings.

(c) Install channel [32] on clamp block [31].

(d) Install and tighten the two screws [35], washers [34], spacers [33] through clamp block [31] that is closest to the valve.

(e) Connect the return line [2] and tighten the nut on the return line [2] to 342-378 pound-inches (39-43 newton-meters).

NOTE: The leakproof torque method requires you to tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

(f) Connect the control line [4] and tighten the nut on the control line [4] to 256-284 pound-inches (29-32 newton-meters).

(g) Connect the pressure line [3] and tighten the nut on the pressure line [3] to 855-945 pound-inches (97-107 newton-meters).

(h) Install channel [32] on the remaining clamp block [31].

(i) Install and tighten the two screws [35], washers [34], spacers [33] through the remaining clamp block [31].

SUBTASK 78-34-01-913-003-H01

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(8) Connect the electrical connector [5] to the proximity sensor on the directional control valve [1].

F. Directional Control Valve Installation Test

SUBTASK 78-34-01-651-001-H01

(1) Do this task: Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-01-440-001-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-01-981-001-H01

(3) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of six full cycles to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-01-040-002-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-01-210-001-H01

(5) Examine the directional control valve [1] and the hydraulic return line [2], pressure line [3] and control line [4], retract line [8], and extend line [9] for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-01-410-001-H01

(1) Install the forward fairings for the applicable strut; do this task: Forward Fairings Installation, TASK 54-52-01-400-801-001.

(a) Install the applicable access panels:

Number	Name/Location
431CR	Forward Access Fairing, Left Strut
431DT	No. 2 Forward Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut
441DT	No. 2 Forward Fairing, Right Strut

SUBTASK 78-34-01-090-001-H01

(2) Remove the fall arrest equipment.

(a) Do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-34-01-440-002-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER FLOW CONTROL TEES - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser flow control tees.

(2) An installation of the thrust reverser flow control tees.

B. The thrust reverser flow control tees are made by Smiths Aerospace Products (formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)), P/N 1U1504-3 (Boeing P/N S315W360-15) and P/N 1U1505 (Boeing P/N S315W360-5).

C. Strut mounted tubes, fittings without o-rings, and hoses forward of the wing are tightened to leakproof torque values. Unions, fittings with o-rings and bosses are tightened to standard torque values.

TASK 78-34-02-000-801-H01

2. Thrust Reverser Flow Control Tees Removal

A. General

(1) This task is the removal procedure for the thrust reverser flow control tees.

(2) For this procedure the thrust reverser flow control tees will be referred to as the flow control tees.

(3) The two flow control tees are installed in the strut under the No. 1 forward fairing.

(4) You need to use the fall arrest lifeline procedure or other safety equipment to do this task.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-000-801-001	Forward Fairings Removal (P/B 401)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
431	Forward Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
431BT	PDOS Pump Access Door

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
441BT	PDOS Pump Access Door

G. Prepare for the Removal

SUBTASK 78-34-02-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-02-860-001-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(2) If you do not use other safety equipment, do the (strut-mounted) Fall Arrest Lifeline Procedure.

(a) Do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-34-02-864-001-H01

(3) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-02-010-001-H01

(4) Remove the forward fairing on the applicable strut; do this task: Forward Fairings Removal, TASK 54-52-01-000-801-001:

(a) Remove the applicable access panels:

Number	Name/Location
431BT	PDOS Pump Access Door
441BT	PDOS Pump Access Door

H. Flow Control Tees Removal

SUBTASK 78-34-02-020-001-H01

(1) Remove the retract flow control tee [1] (Figure 401).

NOTE: To get access to the extend flow control tee [9], remove the retract flow control tee [1] first.

(a) Remove the screws [3], washers [4] and nuts [5] to disconnect the tube clamps [2]on retract tube [6] from the bracket.

(b) Remove the screw [3], washer [4] and nut [5] to disconnect the tube clamp [2] for the retract tube [11] from the bracket.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(c) Remove the hydraulic retract tube [6] and retract tube [11].

1) Follow this general practice when the hydraulic tubes are removed.

a) Do this task: Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

2) Get a 1 quart (1 l) oil/fuel resistant container, STD-195 to catch the hydraulic fluid.

3) Get a cotton wiper, G00034 to clean airplane or engine of the hydraulic fluid.

4) Let the hydraulic fluid drain into the applicable container or on some cloth.

5) Disconnect hydraulic retract tube [6] and retract tube [11] from the elbows [12].

(d) Disconnect the retract flow control tee [1] from the tube nut of retract tube [16].

(e) Remove the retract flow control tee [1] from the strut.

SUBTASK 78-34-02-030-001-H01

(2) Remove the extend flow control tee [9].

(a) Remove the screws [3], washers [4] and nut [5] to disconnect the tube clamps [7] on extend tube [8] from the brackets.

(b) Remove the screw [3], washer [4] and nut [5] to disconnect the tube clamp [7] on extend tube [14] from the bracket.

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(c) Remove the hydraulic extend tube [8] and extend tube [14].

1) Follow this general practice when the hydraulic tubes are removed.

a) Do this task: Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

2) Get a 1 quart (1 l) oil/fuel resistant container, STD-195 to catch the hydraulic fluid.

3) Get a cotton wiper, G00034 to clean airplane or engine of the hydraulic fluid.

4) Let the hydraulic fluid drain into the applicable container or on some cloth.

5) Disconnect the extend tube [8] and extend tube [14] from the elbows [13].

(d) Disconnect the extend flow control tee [9] from the tube nut of extend tube [15] from the directional control valve [17].

(e) Remove the extend flow control tee [9] from the strut.

SUBTASK 78-34-02-030-002-H01

(3) Remove the elbow [10] from the extend flow control tee [9].

(a) Keep elbow [10] for the installation on the new extend flow control tee [9].

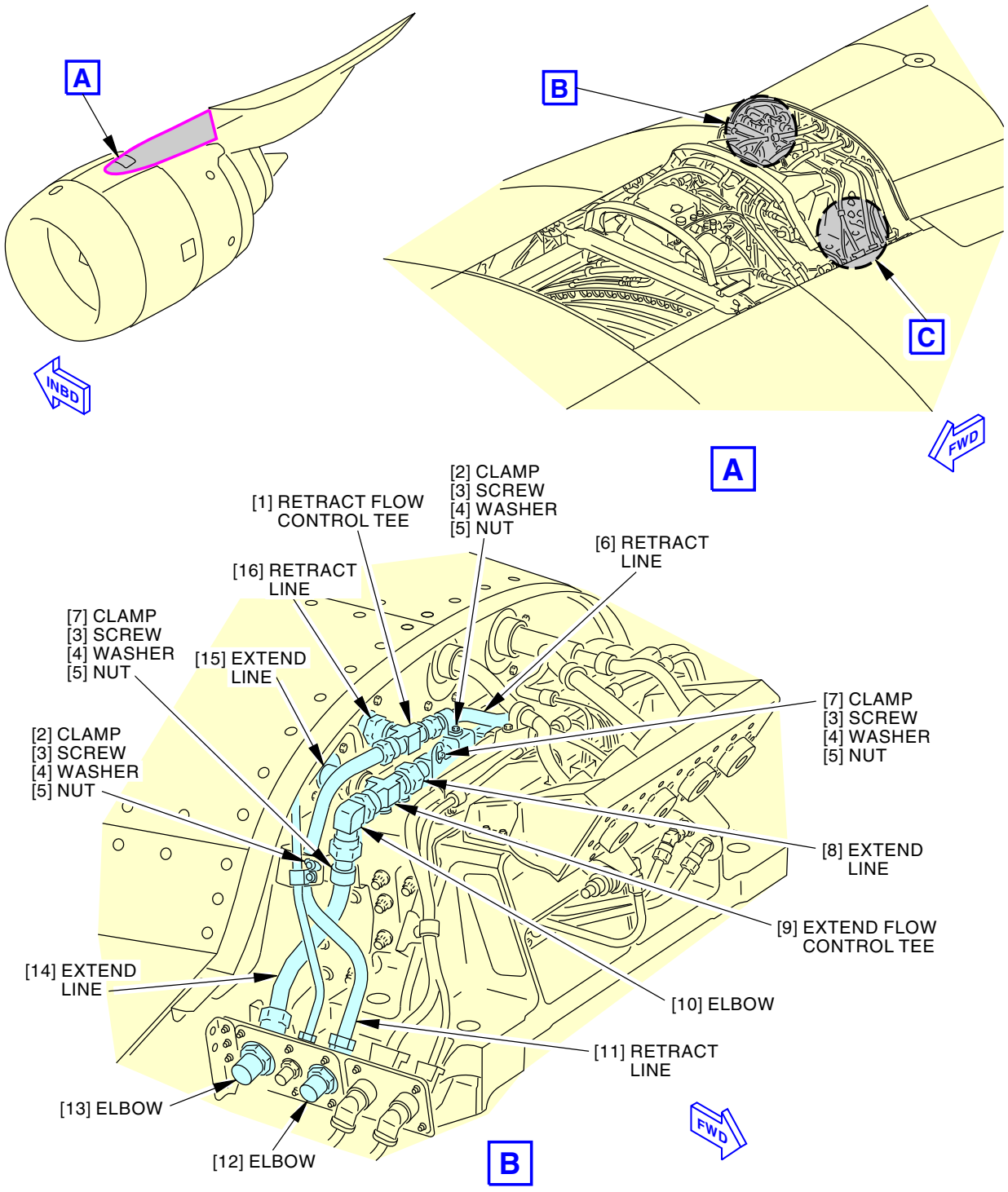
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-02-860-002-H01

(4) Install the protection caps on the hydraulic lines and the ports on the retract flow control tee [1] or extend flow control tee [9].

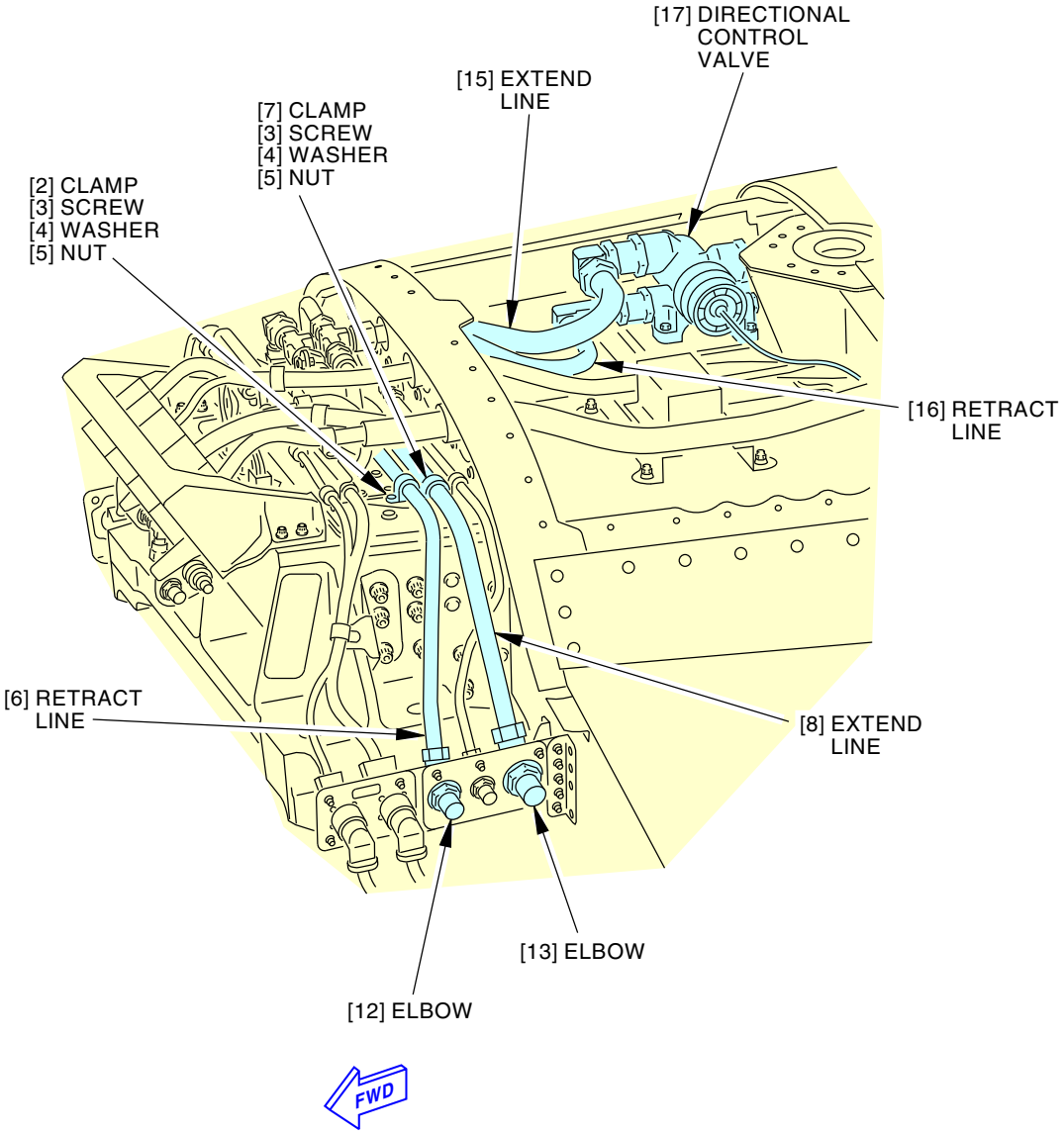
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Flow Control Tees Installation
Figure 401/78-34-02-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



N33448 S0004286472_V2

Thrust Reverser Flow Control Tees Installation
Figure 401/78-34-02-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-02-400-801-H01

3. Thrust Reverser Flow Control Tees Installation

A. General

(1) This task is the installation procedure for the thrust reverser flow control tees.

(2) You need to use the fall arrest lifeline procedure or other safety equipment to do this task.

(3) After the installation of the flow control tees, you must do the operational test of the thrust reverser system.

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-11-400-801	Block Clamps Installation (P/B 401)
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-400-801-001	Forward Fairings Installation (P/B 401)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Location Zones

Zone	Area
431	Forward Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut

D. Access Panels

Number	Name/Location
431BT	PDOS Pump Access Door
441BT	PDOS Pump Access Door

E. Flow Control Tees Installation

SUBTASK 78-34-02-860-003-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(1) If you do not use other safety equipment, do the (strut-mounted) Fall Arrest Lifeline Procedure.

(a) Do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-34-02-860-004-H01

(2) Remove the protection caps from the hydraulic lines.

SUBTASK 78-34-02-430-001-H01

(3) Install the elbow [10] on the extend flow control tee [9] (Figure 401).

(a) Do not tighten the tube nut on the elbow [10] to allow the alignment of the elbow with the extend tube [14].

SUBTASK 78-34-02-420-001-H01

(4) Install the extend flow control tee [9].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(a) Follow these general practices when you install the hydraulic lines to the tees to minimize leakage and tube preload.

1) Do this task: Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do this task: Block Clamps Installation, TASK 20-10-11-400-801.

(b) Install the extend flow control tee [9] on the extend tube [15] from the directional control valve [17].

1) Align the tee with the tube nut of the extend tube [15].

2) Manually engage the tube nut on the fittings.

3) Tighten the tube nut on the extend tube [15] to a torque value of 1140-1260 pound-inches (129-142 newton-meters).

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

(c) Install the extend tube [8] and extend tube [14] to the extend flow control tee [9].

1) Align the tubes with the extend flow control tee [9] and the elbows [13].

2) Manually engage the tube nuts on the fittings.

3) Install the tube clamp [7] that is closest to the tee with screws [3], washers [4] and nut [5].

4) Tighten the tube nuts on the hydraulic extend tube [8] or extend tube [14] to a torque value of 855-945 pound-inches (97-107 newton-meters).

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

(d) Tighten the tube nut on the elbow [10] to a torque value of 855-945 pound-inches (97-107 newton-meters).

NOTE: The leakproof torque method requires you to tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

SUBTASK 78-34-02-420-002-H01

(5) Install the retract flow control tee [1].

CAUTION

REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(a) Follow these general practices when you install the hydraulic lines to the tees to minimize leakage and tube preload.

1) Do this task: Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do this task: Block Clamps Installation, TASK 20-10-11-400-801.

(b) Connect the retract flow control tee [1] to the retract tube [16] from the directional control valve [17].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Tighten the tube nut on the retract tube [16] to a torque value of 855-945 pound-inches (97-107 newton-meters).

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

(c) Install the retract tube [6] and retract tube [11] on the retract flow control tee [1].

1) Align the tubes with the retract flow control tee [1] and the elbows [12].

2) Manually engage the tube nuts on the fittings.

3) Install the tube clamps [2] that are closest to the retract flow control tee [1] with screws [3], washers [4] and nut [5].

4) Tighten the tube nuts on the hydraulic retract tube [6] or retract tube [11] to a torque value of 665-735 pound-inches (75-83 newton-meters).

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

SUBTASK 78-34-02-430-002-H01

(6) Install the remaining tube clamp [2]and tube clamp [7] with screws [3], washers [4] and nut [5].

F. Flow Control Tees Installation Test

SUBTASK 78-34-02-651-001-H01

(1) For the applicable reservoir, do this task: Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-02-440-001-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-02-710-001-H01

(3) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of six full cycles to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-02-040-002-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-02-790-001-H01

(5) Examine the retract flow control tee [1] and extend flow control tee [9] and the adjacent hydraulic retract tube [6], extend tube [8], retract tube [11], extend tube [14], extend tube [15] and retract tube [16] for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-02-410-001-H01

(1) Install the No. 1 forward fairing; do this task: Forward Fairings Installation, TASK 54-52-01-400-801-001:

(a) Install the applicable access panels:

Number	Name/Location
431BT	PDOS Pump Access Door
441BT	PDOS Pump Access Door

SUBTASK 78-34-02-860-005-H01

(2) Remove the fall arrest equipment.

(a) Do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-34-02-440-002-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER ISOLATION VALVE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser isolation valve

(2) An installation of the thrust reverser isolation valve.

B. The thrust reverser isolation valve will be referred to as the isolation valve in this procedure.

C. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Isolation Valve assembly 1U1501-3 (Boeing P/N S315W360-17).

TASK 78-34-05-000-804-H00

2. Thrust Reverser Isolation Valve Removal

A. General

(1) This task is the removal procedure for the thrust reverser isolation valve.

(2) The isolation valve is located behind the aft strut fairing door.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
20-10-11-960-801	Block Clamps Removal (P/B 401)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
434CL	Left Forward Access Door, Left Strut Aft Fairing
434CR	Right Forward Access Door, Left Strut Aft Fairing
434DL	Left Aft Access Door, Left Strut Aft Fairing
434DR	Right Aft Access Door, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
444CL	Left Forward Access Door, Right Strut Aft Fairing
444CR	Right Forward Access Door, Right Strut Aft Fairing
444DL	Left Aft Access Door, Right Strut Aft Fairing
444DR	Right Aft Access Door, Right Strut Aft Fairing

G. Prepare for the Removal

SUBTASK 78-34-05-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-05-864-001-H01

(2) Release the pressure in the main hydraulic system and reservoir for the applicable strut; do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-05-010-001-H01

(3) Remove the applicable panel that is forward of the strut fairing access door:

(a) Open the applicable access panels:

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing

SUBTASK 78-34-05-010-002-H01

(4) Open the applicable strut aft fairing access door; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
434CR	Right Forward Access Door, Left Strut Aft Fairing
434DL	Left Aft Access Door, Left Strut Aft Fairing
434DR	Right Aft Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing
444CR	Right Forward Access Door, Right Strut Aft Fairing
444DL	Left Aft Access Door, Right Strut Aft Fairing
444DR	Right Aft Access Door, Right Strut Aft Fairing

H. Isolation Valve Removal

SUBTASK 78-34-05-030-001-H01

(1) Loosen or remove the clamp block [47], clamp block [48] and clamp block [49] for these hydraulic lines; the TRAS return line [7], the TRAS pressure line [8], the DCV control line [9], and the sync lock valve control line [34] (Figure 401).

(a) Follow this general procedure to remove clamp blocks; Block Clamps Removal, TASK 20-10-11-960-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Remove the screws [45] and screws [53], washers [52] under the screw head, upper channel [46], clamp block [47], clamp block [48] and clamp block [49], lower channel [50], and spacers [51] to disassemble the two clamp blocks which attach the hydraulic lines to the bracket.

NOTE: Disassemble a sufficient number of clamp blocks to disconnect the hydraulic lines from the isolation valve without too much force.

SUBTASK 78-34-05-030-002-H01

(2) Remove the clamp [36] for the module line [22].

(a) Remove the two screws [37], washers [38] and nuts [39].

SUBTASK 78-34-05-030-003-H01

(3) Loosen or remove clamp [44] and clamp block [55] and clamp block [56] for the system return line [3].

(a) Remove the two screws [41], washers [42] and nuts [43] to remove clamp [44].

(b) Remove the two screws [60], washers [59] under the screw head, upper channel [54], clamp block [55], clamp block [56] and clamp block [57], and spacers [58] to disassemble the clamp block which attaches the hydraulic line to the bracket.

SUBTASK 78-34-05-030-004-H01

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS.

(4) Disconnect the three electrical connectors from the isolation valve [1]:

(a) Disconnect the electrical connector [4] for the hydraulic pressure switch.

(b) Disconnect the electrical connector [5] for the isolation valve solenoid valve.

(c) Disconnect the electrical connector [6] for the directional control valve (DCV) solenoid valve.

(d) Install the protection caps on the three electrical connectors and the three electrical receptacles on the isolation valve.

SUBTASK 78-34-05-030-005-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(5) Disconnect or remove the five hydraulic pressure lines as follows from the isolation valve [1].

(a) Follow this general practice when the hydraulic tubes are removed; Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

(b) Use a cotton wiper, G00034 or rag around the hydraulic line and the wrench to catch the hydraulic fluid.

(c) Catch the hydraulic fluid that drains from the valve and the hydraulic lines in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203 or smaller container.

(d) Remove the sync lock valve pressure line [23] between the cross fitting [25] and the sync lock valve [35].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Disconnect the DCV control line [9] for the directional control valve from the elbow [27].

(f) Remove the elbow [27] from the isolation valve [1] control port.

(g) Remove the system pressure line [2] between the tee [62] on the system supply line [40] and the cross fitting [25].

(h) Remove the elbow [24] from the cross fitting [25].

(i) Disconnect the module line [22] from the cross fitting [25].

(j) Remove the cross fitting [25] from the isolation valve [1] system pressure port.

(k) Disconnect the TRAS pressure line [8] from the elbow [28].

(l) Remove the elbow [28] from the isolation valve [1] TRAS pressure port.

(m) Disconnect the TRAS return line [7] from the tee [31].

(n) Remove the sync lock valve return line [21] between the elbow [32] on the sync lock valve [35] and the tee [31].

(o) Remove the tee [31] from the isolation valve [1] TRAS return port.

(p) Disconnect the system return line [3] from the elbow [26].

(q) Remove the elbow [26] from the isolation valve [1] system return port.

(r) Install the protection caps on the isolation valve [1] ports and the hydraulic lines.

SUBTASK 78-34-05-020-001-H01

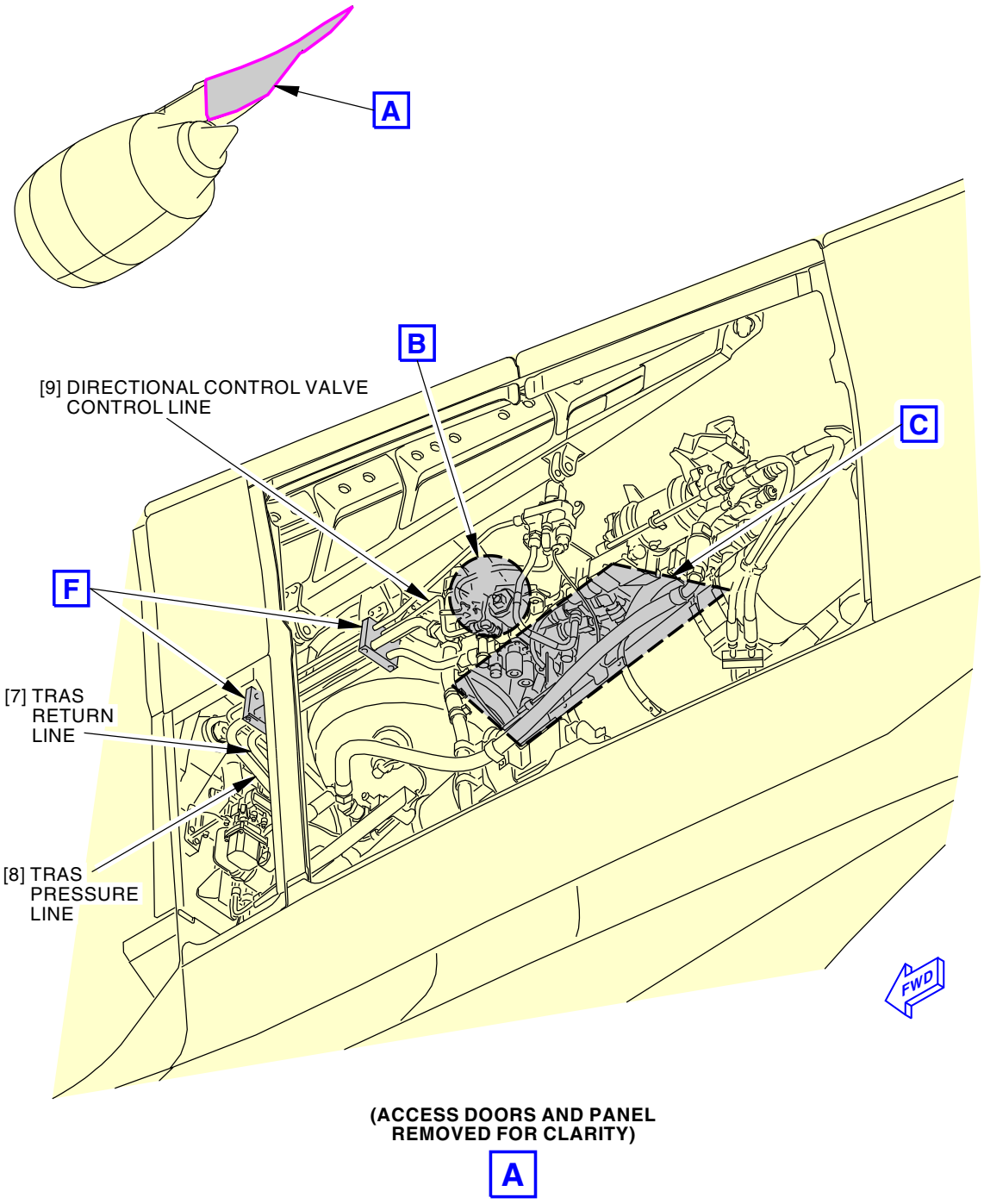
(6) Remove the isolation valve [1]:

(a) Remove the three bolts [10], washers [11], washers [12], and nuts [13] that attach the isolation valve to the bracket.

(b) Remove the isolation valve from the strut.

——— END OF TASK ———

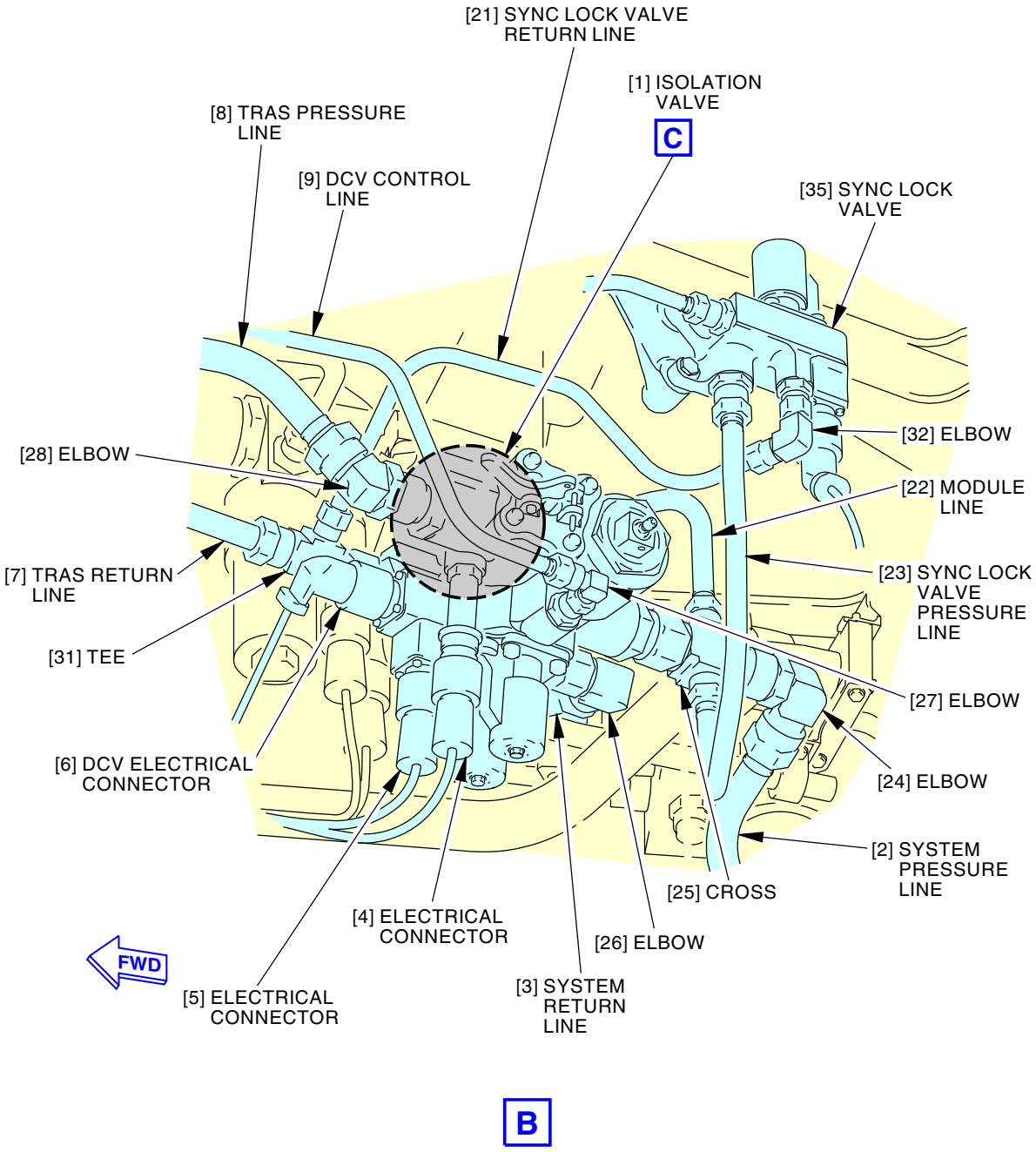
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07519 S0004286474_V2

Isolation Valve Installation
Figure 401/78-34-05-990-801-H01 (Sheet 1 of 4)

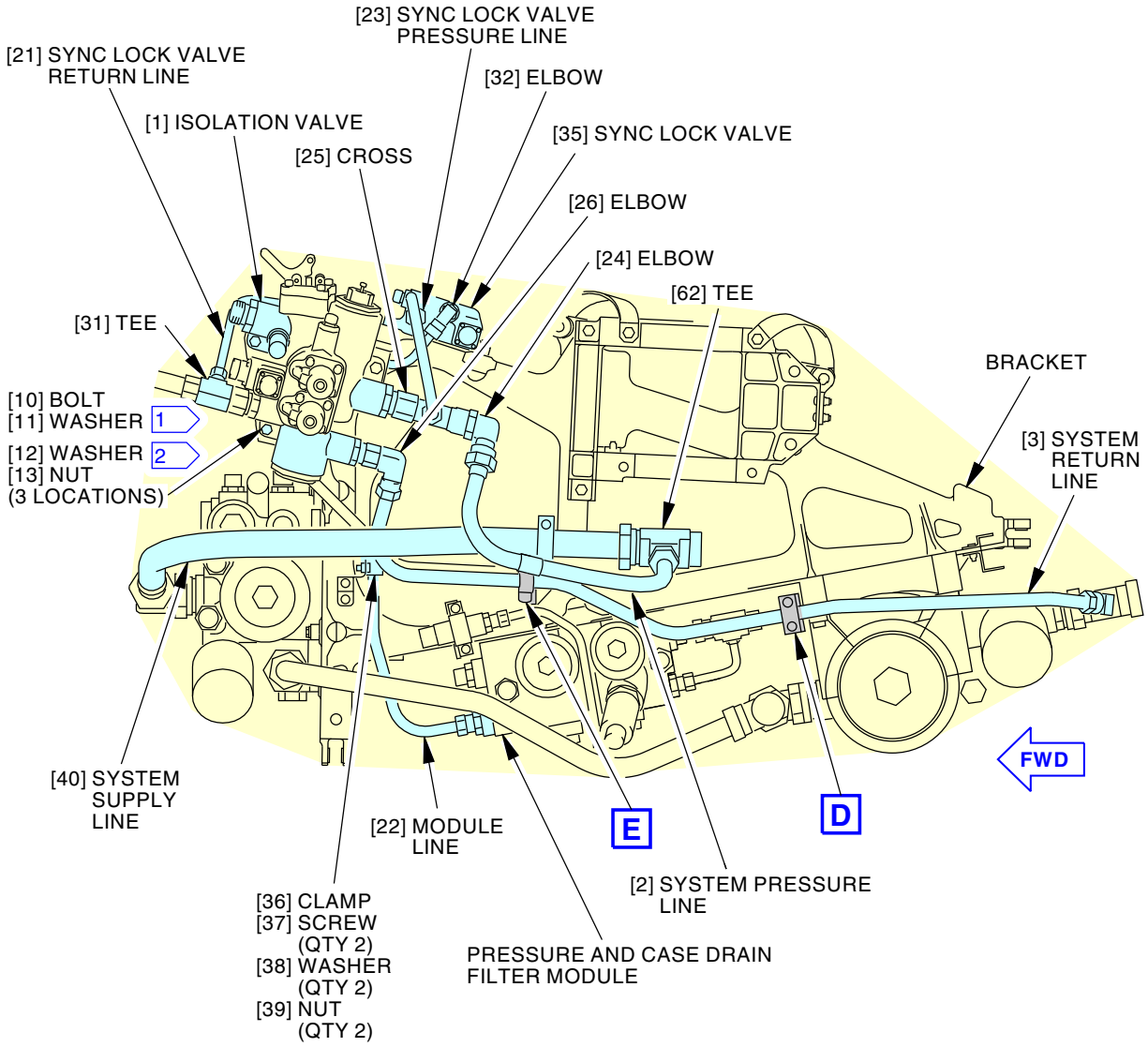
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07520 S0004286475_V2

Isolation Valve Installation
Figure 401/78-34-05-990-801-H01 (Sheet 2 of 4)

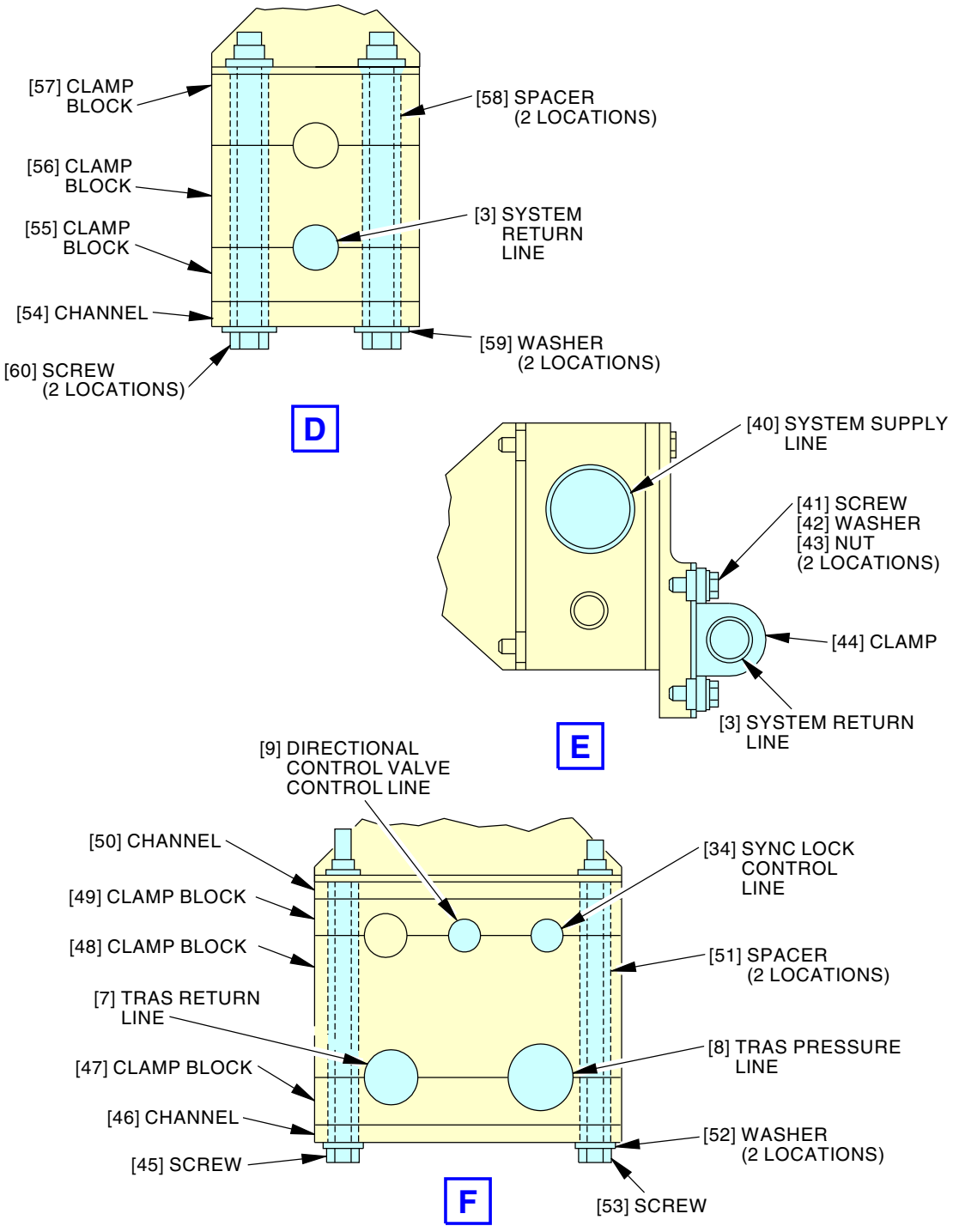
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07521 S0004286476_V2

Isolation Valve Installation
Figure 401/78-34-05-990-801-H01 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Isolation Valve Installation
Figure 401/78-34-05-990-801-H01 (Sheet 4 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-05-400-801-H01

3. Thrust Reverser Isolation Valve Installation

A. General

(1) This task is the installation procedure for the thrust reverser isolation valve.

(2) After you install the isolation valve, you must do the thrust reverser operational test.

B. References

Reference	Title
12-12-01-610-802	Hydraulic Reservoir Filling (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-11-400-801	Block Clamps Installation (P/B 401)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1550	Bonding Meters - Approved, Intrinsically Safe (Approved for use in Class I, Divisions I & II hazardous (classified) locations. Outside these hazardous locations, COM-614 can be used in lieu of COM-1550). Part #: 620LK Supplier: 1CRL2 Part #: M1 Supplier: 3AD17 Part #: T477W Supplier: 01014 Opt Part #: M1B Supplier: 3AD17
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant

D. Consumable Materials

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00074	Solvent - Degreasing	MIL-PRF-680 (Supersedes P-D-680)
C00064	Coating - Aluminum Chemical Conversion	BAC5719 Type II Class A (MIL-DTL-5541 Class 1A)
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description	Specification
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054
G01061	Water - Distilled	
G01659	Swab - Cotton Or Rayon, (Disposable)	

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
434CL	Left Forward Access Door, Left Strut Aft Fairing
434CR	Right Forward Access Door, Left Strut Aft Fairing
434DL	Left Aft Access Door, Left Strut Aft Fairing
434DR	Right Aft Access Door, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing
444CR	Right Forward Access Door, Right Strut Aft Fairing
444DL	Left Aft Access Door, Right Strut Aft Fairing
444DR	Right Aft Access Door, Right Strut Aft Fairing

G. Prepare the Isolation Valve For the Installation

SUBTASK 78-34-05-160-001-H01

(1) Clean the top of the feet of the isolation valve [1] (Figure 401).

NOTE: You must clean these surfaces to get a good electrical bond. The electrical bond is through the fastener.

(a) Wipe or scrub the mount feet of the isolation valve with a dry, clean cotton wiper, G00034 to remove all oil, grease, hydraulic fluid and dirt.

WARNING

DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(b) Clean the top of the feet with a clean cotton wiper, G00034 wet with solvent, B00074 or solvent, B00062.

1) Remove the solvent, B00074 or solvent, B00062 with clean cloth before it becomes dry.

(c) If the three isolation valve feet have a damaged alodine coating, C00064, do these steps:

1) Abrasive clean the top of the feet with abrasive mat, G00251 pads to get a bright aluminum finish.

2) Remove all residue with a clean, dry cotton wiper, G00034.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

3) Clean the top of the feet with a clean cotton wiper, G00034 wet with solvent, B00074 or solvent, B00062.

   a) Remove the solvent, B00074 or solvent, B00062 with clean, dry cloth before it becomes dry.

WARNING DO NOT GET ALODINE IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ALODINE. PUT ON GOGGLES AND GLOVES WHEN YOU USE ALODINE. KEEP ALODINE AWAY FROM SPARKS, FLAME, AND HEAT. ALODINE IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

4) Manually apply the Alodine 600 coating, C00064 to the cleaned area with a clean swab, G01659 or cotton wiper, G00034.

5) After the color change, rinse the area several times with a clean cotton wiper, G00034 and distilled water, G01061 to remove the excess Alodine.

6) Air dry at room temperature.

7) If a powdery coating develops, clean the surface and apply the Alodine coating, C00064 again.

SUBTASK 78-34-05-160-002-H01

(2) Prepare the area around the holes of the mount bracket.

NOTE: You must clean these surfaces to get a good electrical bond. The electrical bond is through the fastener.

(a) Wipe or scrub the areas around the holes on the bottom of the bracket with a dry, clean cotton wiper, G00034 to remove all oil, grease, hydraulic fluid and dirt.

(b) Clean a 0.50 in. (12.7 mm) diameter area around each mount hole on the bracket.

NOTE: Clean the area on the bottom of the bracket under the washer and nut.

1) Clean the surface with abrasive mat, G00251 pads to get a bright aluminum finish.

2) Remove all residue with a clean, dry cotton wiper, G00034.

WARNING DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

3) Clean the area with a swab, G01659 or cotton wiper, G00034 wet with solvent, B00074 or solvent, B00062.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Remove all solvent, B00074 or solvent, B00062 with a clean, dry cotton wiper, G00034 before the solvent, B00074 or solvent, B00062 becomes dry.

WARNING

DO NOT GET ALODINE IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ALODINE. PUT ON GOGGLES AND GLOVES WHEN YOU USE ALODINE. KEEP ALODINE AWAY FROM SPARKS, FLAME, AND HEAT. ALODINE IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(c) Manually apply the Alodine 600 coating, C00064 to the cleaned area with a clean swab, G01659 or cotton wiper, G00034.

(d) After the color change, rinse the area with a clean cotton wiper, G00034 and distilled water, G01061 to remove the excess Alodine coating, C00064.

(e) Air dry at room temperature.

(f) If a powdery coating develops, clean the surface and apply the Alodine coating, C00064 again.

H. Isolation Valve Installation

SUBTASK 78-34-05-420-001-H01

(1) Install the isolation valve [1].

(a) Install the isolation valve [1] on the bracket with three bolts [10], washers [11], washers [12] and nuts [13].

1) Tighten the nuts [13] to 65 in-lb (7.3 N·m) to 100 in-lb (11.3 N·m).

SUBTASK 78-34-05-760-002-H00

(2) Do a check of the bonding resistance through the bracket that the isolation valve [1] is attached.

(a) With the intrinsically safe approved bonding meter, COM-1550, do a check of the bonding resistance between the isolation valve [1] and the strut structure where the bracket attaches.

1) Make sure that the bonding resistance is less than 0.0005 ohms.

SUBTASK 78-34-05-390-001-H00

(3) Apply primer, C00259 to cover all exposed bare areas on the bracket around the nut [13].

SUBTASK 78-34-05-430-001-H01

CAUTION

REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(4) Install the five hydraulic lines as follows to the isolation valve [1]:

(a) Get a 1 quart (1 l) oil/fuel resistant container, STD-195 to catch the hydraulic fluid.

(b) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane or engine.

(c) Remove the protection caps from the ports of the five hydraulic lines on the isolation valve [1]; the system pressure line [2], the system return line [3], the TRAS return line [7], the TRAS pressure line [8] and DCV control line [9].

(d) Remove the protection caps from the five hydraulic lines.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Follow these general practices when you install the five hydraulic lines to the isolation valve to minimize leakage and tube preload.

1) Do this task: Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do this task: Block Clamps Installation, TASK 20-10-11-400-801.

3) Visually examine all tube assemblies for damaged end fittings, seal areas, and threads immediately before installation.

a) No dents are allowed in hydraulic tubing.

4) Install the tube and tighten the hydraulic fittings in a sequence as follows:

a) Manually align the tubing with the end points and the tube clamp blocks.

CAUTION

DO NOT USE THE WRENCH ON THE NUT TO PULL THE TUBE INTO ALIGNMENT. DAMAGE TO THE TUBING CAN OCCUR.

b) Align and seat the tube sleeves in the hydraulic fitting.

c) Apply hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

d) Manually tighten the tube nuts first.

NOTE: The tube nuts must turn smoothly until the tube assembly is snug on the fitting.

e) If the clamp blocks were removed, install the clamp blocks with the mount screws installed but not tightened.

f) Back off the tube nuts and do a check for tube alignment at the hydraulic fittings and with the clamp block.

g) Tighten the screws for the clamp block closest to the end of the tube to minimize the tube twist.

h) Tighten the tube nuts to the correct torque value.

i) Loosen the tube clamp block and do a check for tube alignment.

j) Tighten the tube clamp block to complete the installation.

(f) Install the system return line [3] on the isolation valve system return port.

1) Do not apply hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153 to the elbow swivel nut; a solid film lubricant is on the swivel nut threads.

2) Manually tighten the elbow nut at this time to allow the elbow [26] to be aligned with the system return line [3].

(g) Connect the system return line [3] on the elbow [26].

1) Tighten the tube nut to 342 in-lb (38.6 N·m) to 378 in-lb (42.7 N·m).

(h) After the system return line [3] is installed, tighten the nut on elbow [26] to 342 in-lb (38.6 N·m) to 378 in-lb (42.7 N·m).

(i) Install the tee [31] on the isolation valve Thrust Reverser Actuation System (TRAS) return port.

1) Do not apply hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153 to the tee [31] swivel nut; a solid film lubricant is on the swivel nut threads.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Manually tighten the tee [31] nut at this time to allow the tee [31] to be aligned with the sync lock valve return line [21].

(j) Install the sync lock valve return line [21] between the elbow [32] on the sync lock valve [35] and the tee [31].

1) Align the tee [31] with the sync lock valve return line [21].

2) Tighten the tube nuts to 162 in-lb (18.3 N·m) to 178 in-lb (20.1 N·m).

(k) After the sync lock valve return line [21] is installed, tighten the nut on tee [31] to 342 in-lb (38.6 N·m) to 378 in-lb (42.7 N·m).

(l) Connect the TRAS return line [7] to the tee [31].

1) Tighten the tube nut to 342 in-lb (38.6 N·m) to 378 in-lb (42.7 N·m).

(m) Connect the elbow [28] on the isolation valve [1] TRAS pressure port.

1) Do not apply hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153 to the elbow [28] swivel nut; a solid film lubricant is on the swivel nut threads.

2) Manually tighten the nut on the elbow [28] at this time to allow the elbow [28] to be aligned with the TRAS pressure line [8].

(n) Connect the TRAS pressure line [8] on the elbow [28].

1) Tighten the tube nut to 855 in-lb (96.6 N·m) to 945 in-lb (106.8 N·m).

(o) After the TRAS pressure line [8] is installed, tighten the nut on the elbow [28] to 855 in-lb (96.6 N·m) to 945 in-lb (106.8 N·m).

(p) Install the cross fitting [25] on the isolation valve system pressure port.

1) Do not apply hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153 to the cross swivel nut; a solid film lubricant is on the swivel nut threads.

2) Manually tighten the nut on the cross fitting [25] at this time to allow the cross to be aligned with the sync lock valve pressure line [23] for the sync lock valve, and module line [22].

(q) Connect the module line [22] on the cross fitting [25].

1) Tighten the tube nut to 475 in-lb (53.7 N·m) to 525 in-lb (59.3 N·m).

(r) Install the sync lock valve pressure line [23] between the cross fitting [25] and the sync lock valve [35].

1) Tighten the tube nuts to 475 in-lb (53.7 N·m) to 525 in-lb (59.3 N·m).

(s) After the module line [22] and sync lock valve pressure line [23] are installed, tighten the nut on the cross fitting [25] to 855 in-lb (96.6 N·m) to 945 in-lb (106.8 N·m).

(t) Install the elbow [24] on the cross fitting [25].

1) Do not apply hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153 to the elbow [24] swivel nut; a solid film lubricant is on the swivel nut threads.

2) Manually tighten the nut on the elbow [24] at this time to allow the elbow [24] to be aligned with the system pressure line [2].

(u) Install the system pressure line [2] between the tee [62] on the system supply line [40] and the elbow [24].

1) Align the elbow [24] with the system pressure line [2].

2) Tighten the tube nuts to 855 in-lb (96.6 N·m) to 945 in-lb (106.8 N·m).

(v) After the system pressure line [2] is installed, tighten the nut on the elbow [24] to 855 in-lb (96.6 N·m) to 945 in-lb (106.8 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(w) Install the elbow [27] on the isolation valve control port.

1) Do not apply hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153 to the elbow swivel nut; a solid film lubricant is on the swivel nut threads.

2) Manually tighten the nut on the elbow [27] at this time to allow the elbow [27] to be aligned with the DCV control line [9].

(x) Connect the DCV control line [9] for the directional control valve on the elbow [27].

1) Tighten the tube nut to 256 in-lb (28.9 N·m) to 284 in-lb (32.1 N·m).

(y) After the DCV control line [9] is installed, tighten the nut on the elbow [27] to 256 in-lb (28.9 N·m) to 284 in-lb (32.1 N·m).

SUBTASK 78-34-05-430-002-H01

(5) Install the clamp block [47], clamp block [48] and clamp block [49] for these hydraulic lines; the TRAS return line [7], the TRAS pressure line [8], the DCV control line [9] and the sync lock valve control line [34].

(a) Follow this general procedure to install the clamp blocks: Block Clamps Installation, TASK 20-10-11-400-801.

(b) Install the screw [45] and screw [53], washer [52] under the screw head, upper channel [46], clamp block [47], clamp block [48] and clamp block [49], lower channel [50], and spacers [51] to assemble the two clamp blocks which attaches the hydraulic lines to the bracket.

SUBTASK 78-34-05-430-003-H01

(6) Install the clamp [36] for the module line [22].

(a) Install the two screws [37], washers [38] and nuts [39].

SUBTASK 78-34-05-430-004-H01

(7) Install the clamp [44] and clamp block [55] and clamp block [56] for the system return line [3].

(a) Install the two screws [41], washers [42] and nuts [43] to remove clamp [44].

(b) Install the two screws [60], washers [59] under the screw head, upper channel [54], clamp block [55] and clamp block [56] and clamp block [57], and spacers [58] to assemble the clamp block which attaches the hydraulic line to the bracket.

SUBTASK 78-34-05-430-005-H01

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(8) Install the three electrical connectors as follows to the isolation valve [1]:

(a) Remove the protection caps from the three electrical connectors.

(b) Install the electrical connector [4] for the hydraulic pressure switch.

(c) Install the electrical connector [5] for the isolation valve solenoid valve.

(d) Install the electrical connector [6] for the directional control valve (DCV) solenoid valve.

I. Isolation Valve Installation Test

SUBTASK 78-34-05-610-001-H01

(1) Do the servicing procedure for the applicable hydraulic system reservoir, refer to this task: Hydraulic Reservoir Filling, TASK 12-12-01-610-802.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-05-440-001-H01

(2) Do the activation procedure for the thrust reverser, refer to this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-05-710-001-H01

(3) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of six full cycles to remove all the air from the thrust reverser actuation system.

SUBTASK 78-34-05-212-001-H01

(4) Examine the isolation valve and the adjacent hydraulic tubing and fittings for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

J. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-05-410-001-H01

(1) Close the aft strut fairing door for the applicable strut, refer to this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
434CR	Right Forward Access Door, Left Strut Aft Fairing
434DL	Left Aft Access Door, Left Strut Aft Fairing
434DR	Right Aft Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing
444CR	Right Forward Access Door, Right Strut Aft Fairing
444DL	Left Aft Access Door, Right Strut Aft Fairing
444DR	Right Aft Access Door, Right Strut Aft Fairing

SUBTASK 78-34-05-410-002-H01

(2) Install the applicable panel that is forward of the strut fairing access door:

(a) Close the applicable access panels:

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYNC LOCK SWITCH - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser sync lock switch.

(2) An installation of the thrust reverser sync lock switch.

TASK 78-34-06-000-801-H01

2. Thrust Reverser Sync Lock Switch Removal

(Figure 401)

A. General

(1) The task is the removal procedure of the thrust reverser sync lock switch.

(2) For this procedure the thrust reverser sync lock switch is referred to as the sync lock switch.

(3) The sync lock switch is in the thrust lever assembly.

B. References

Reference	Title
27-61-00-040-801	Spoiler Deactivation (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-505	Iron - Soldering, 100 Watt

D. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right

E. Prepare for the Removal

SUBTASK 78-34-06-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS, OR MOVE ALL PERSONNEL AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Spoiler Deactivation, TASK 27-61-00-040-801.

SUBTASK 78-34-06-040-002-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(2) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(a) Do all the steps in the deactivation procedure to open the circuit breakers and install deactivation pins in the isolation valve except do not install the DO-NOT-OPERATE tags on the forward and reverse thrust levers.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Sync Lock Switch Removal

SUBTASK 78-34-06-010-004-H01

(1) Move the two reverse thrust levers to the full down position.

SUBTASK 78-34-06-010-001-H01

(2) Move one of the forward thrust levers to the fully forward position to get access to the side of the other thrust lever.

SUBTASK 78-34-06-010-002-H01

(3) Remove the cover [3] from the thrust lever (Figure 401).

(a) Remove the two screws [2] from the side of the cover.

(b) Remove the screw [1] from the front of the cover.

SUBTASK 78-34-06-020-001-H01

(4) Remove the sync lock switch [7].

(a) Remove the three wires [6] from the sync lock switch.

1) Put identification tags on the wires for easier installation.

2) Remove the heat shrink insulation sleeve from the soldered joints.

3) With a 100 watt soldering iron, STD-505 or local equivalent tool, remove the wires from the sync lock switch.

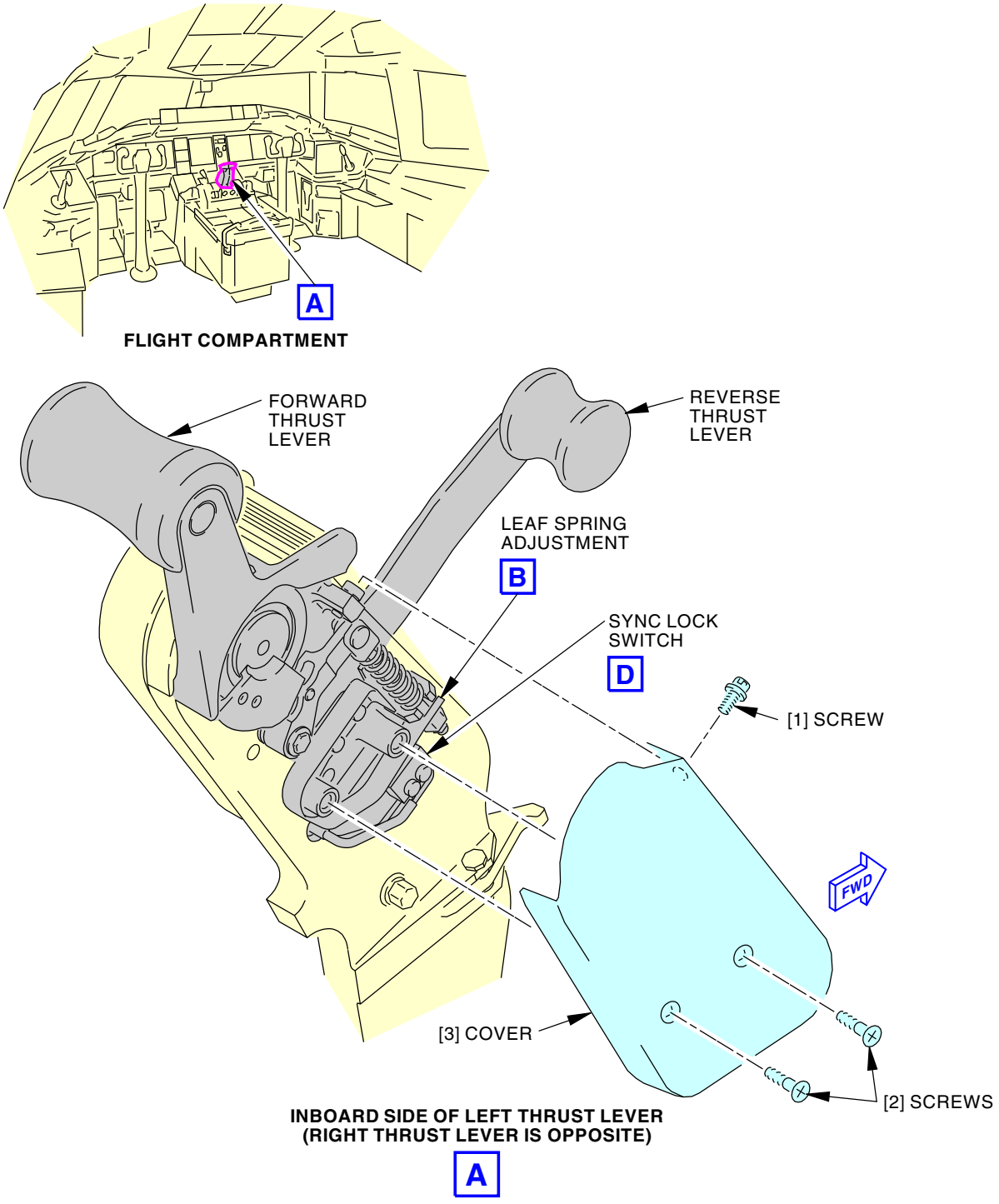
(b) Remove the two dovetail recess screws [5].

NOTE: The pan head, machine screws have a dovetail recess slot; a straight blade screwdriver will damage the screw heads. The screw part number is BACS12BE02-6.

(c) Remove the sync lock switch [7].

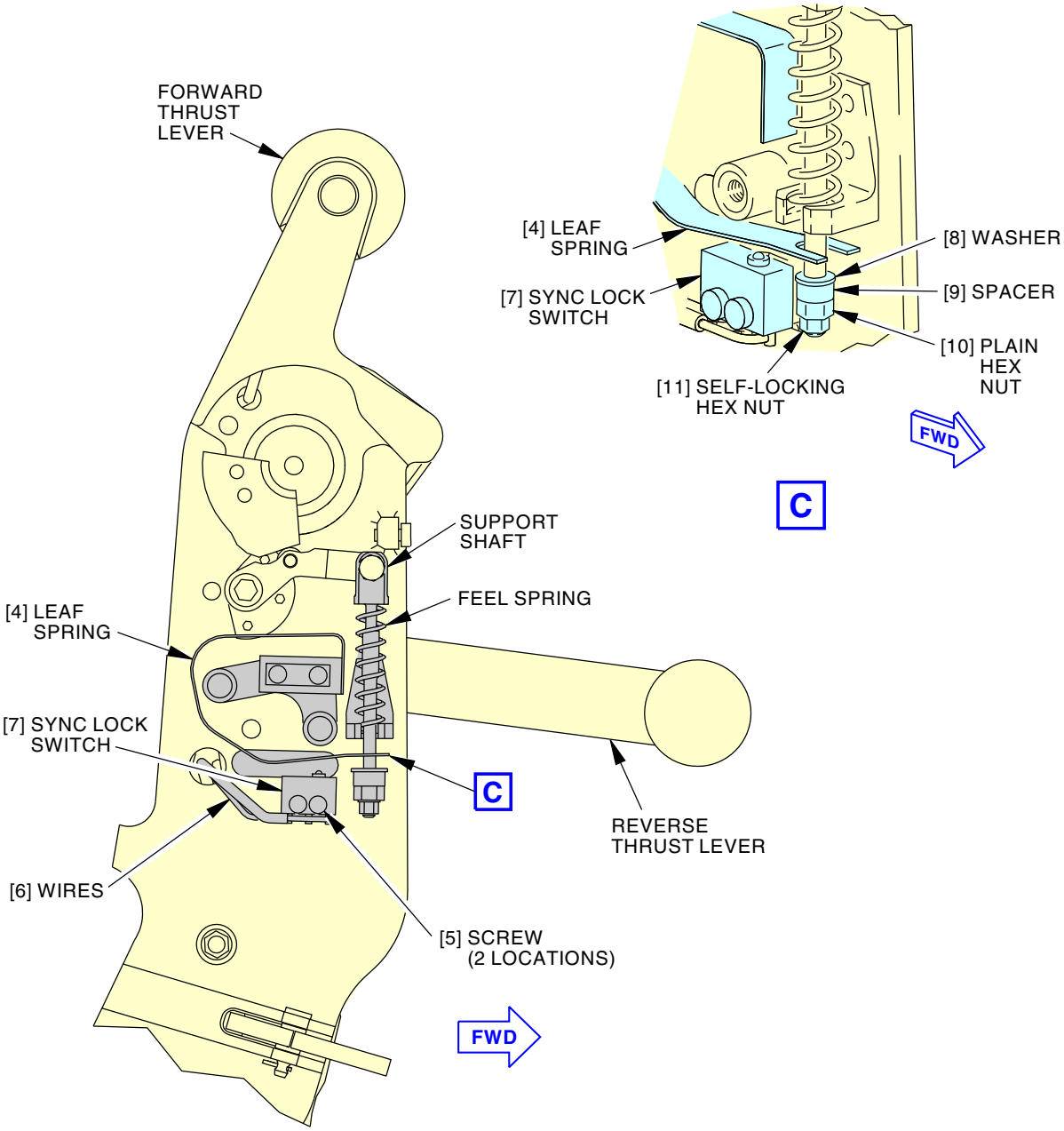
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sync Lock Switch Installation
Figure 401/78-34-06-990-801-H01 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



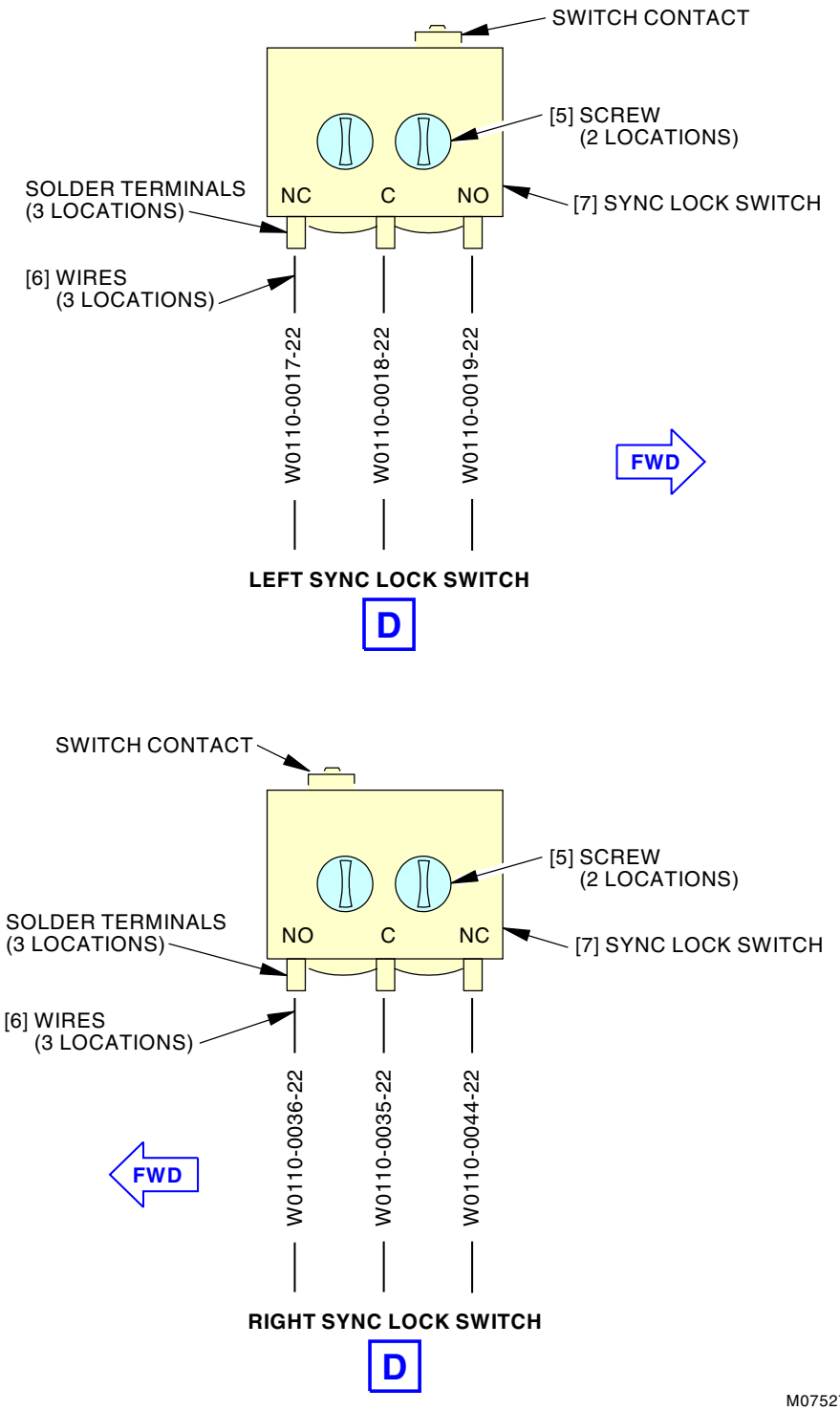
LEFT THRUST LEVER LEAF SPRING ADJUSTMENT
(RIGHT THRUST LEVER IS OPPOSITE)

B

M07526 S0004286481_V2

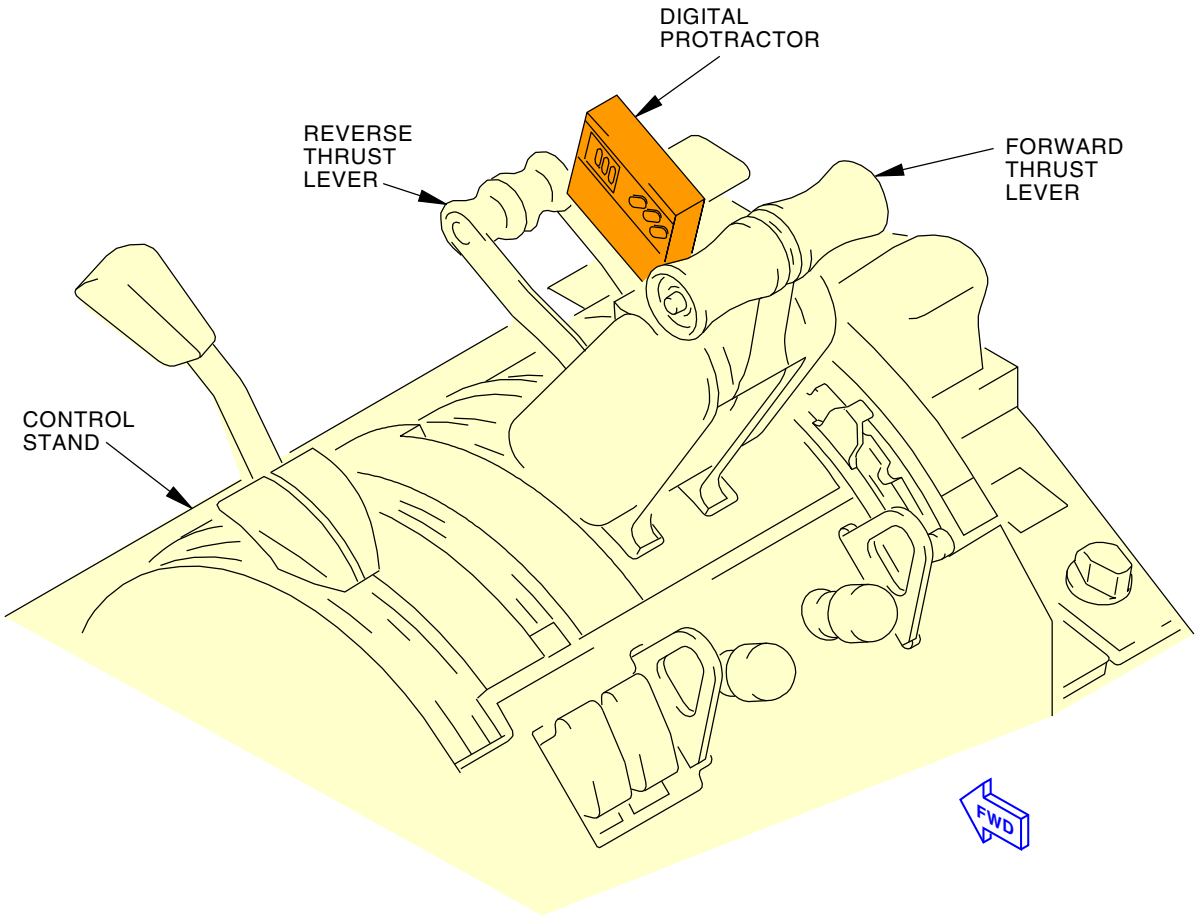
Thrust Reverser Sync Lock Switch Installation
Figure 401/78-34-06-990-801-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sync Lock Switch Installation
Figure 401/78-34-06-990-801-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

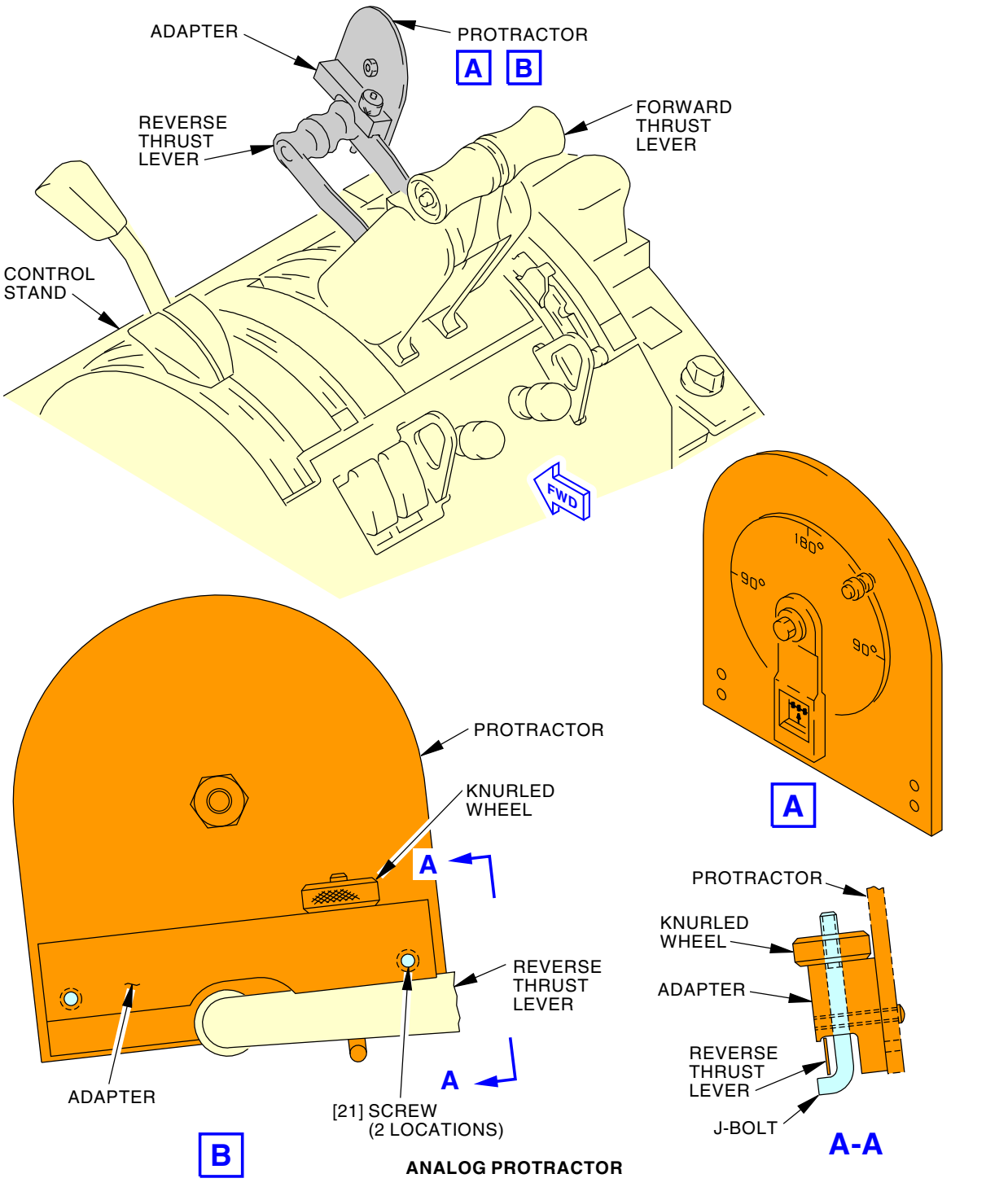


DIGITAL PROTRACTOR

M07528 S0004286483_V2

Reverse Thrust Lever Protractor
Figure 402/78-34-06-990-802-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Reverse Thrust Lever Protractor
Figure 402/78-34-06-990-802-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-06-400-801-H01

3. Thrust Reverser Sync Lock Switch Installation

(Figure 401, Figure 402)

A. General

(1) The task is the installation procedure of the thrust reverser sync lock switch.

(2) After you install the sync lock switch, you must make sure that the sync lock will release correctly when the sync lock switch is energized.

B. References

Reference	Title
24-22-00-860-805	Supply Electrical Power (P/B 201)
27-61-00-440-801	Spoiler Activation (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-706	Protractor - Thrust Reverser Levers, Digital Readout Part #: G76002-19 Supplier: 81205
STD-505	Iron - Soldering, 100 Watt

D. Consumable Materials

Reference	Description	Specification
G01148	Sleeve - Insulation, Electrical, Heat Shrinkable - RT-876	
G51210	Tubing - Highly Flame-Retardant, Low-Shrink Temperature, Polyolefin	AMS-DTL-23053/5 Class 1

E. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Thrust Reverser Sync Lock Switch Installation

SUBTASK 78-34-06-860-003-H01

(1) Move the two reverse thrust levers to the full down position.

SUBTASK 78-34-06-860-004-H01

(2) Move one of the forward thrust levers to the fully forward position to get access to the applicable sync lock switch [7].

SUBTASK 78-34-06-420-001-H01

(3) Install the sync lock switch [7] (Figure 401):

(a) Use the identification tags on the wires to make sure the correct wire will be soldered to the correct terminal on the switch.

(b) Slide a short length of heat shrink insulation RT-876 sleeve, G01148 or Versafit heat shrink tubing, G51210 around each wire and slide the sleeve away from area to be soldered.

(c) Solder the three wires [6] to the terminals on the sync lock switch with a 100 watt soldering iron, STD-505 or local equivalent tool.

(d) Slide the sleeve over the soldered joint and heat shrink the sleeve so that the joint is completely insulated.

(e) Install the switch with two dovetail recess screws [5].

NOTE: The pan head, machine screws have a dovetail recess slot; a straight blade screwdriver will damage the screw heads. The screw part number is BACS12BE02-6.

H. Adjust the Sync Lock Switch

SUBTASK 78-34-06-490-001-H01

(1) Install the protractor to the reverse thrust lever (Figure 402):

(a) For the digital protractor, put the thrust reverser lever protractor, SPL-706 on the reverse thrust lever.

1) Set the digital protractor to zero degrees.

(b) For the analog protractor, do these steps:

1) Attach the protractor to the adapter with the two screws [21].

2) Loosen the knurled wheel on the J-bolt.

3) Put the adapter on the reverse thrust lever.

4) Adjust the position of the adapter to prevent the interference of the J-bolt with the angled part of the lever.

5) Tighten the knurled wheel to hold the adapter to the reverse thrust lever.

6) Set the protractor to zero degrees.

SUBTASK 78-34-06-820-001-H01

(2) Adjust the leaf spring [4]:

(a) Make sure the reverse thrust lever is in the fully forward and down position.

(b) Slowly move the reverse thrust lever aft while you look at the leaf spring and the sync lock switch.

1) Make sure that the leaf spring operates the sync lock switch when the reverse thrust lever is lifted to 9.5-12.5 degrees.

a) Listen for the click sound from the switch when the switch is actuated.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) If it is necessary to adjust the leaf spring, adjust the plain nut [10] and self-locking nut [11] to adjust the position washer [8] and spacer [9].

I. Sync Lock Switch Installation Test

SUBTASK 78-34-06-861-001-H01

(1) Make sure there is electrical power, do this task: Supply Electrical Power, TASK 24-22-00-860-805.

SUBTASK 78-34-06-010-003-H01

(2) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-06-440-001-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-06-863-001-H01

(4) Make sure there is hydraulic power, do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-34-06-212-001-H01

(5) Slowly move the reverse thrust lever and have someone look at the lock release lever on one of the sync locks on the thrust reverser.

(a) Slowly move the reverse thrust lever through 9.5-12.5 degrees.

(b) Listen for the click sound from the switch when the switch is actuated.

(c) Make sure that the lock release lever on the sync lock moves to the "not locked" position when the reverse thrust lever is moved 9.5-12.5 degrees.

SUBTASK 78-34-06-820-002-H01

(6) If the lock release lever did not move in the limit, adjust the leaf spring with the plain nut and self-locking nut.

J. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-06-865-002-H01

(1) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

SUBTASK 78-34-06-090-001-H01

(2) Remove the protractor from the reverse thrust lever.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-06-410-002-H01

(3) Install the cover [3]:

(a) Install the two screws [2] in the side of the cover.

(b) Install the screw [1] in the front of the cover.

SUBTASK 78-34-06-860-001-H01

(4) Move the reverse thrust levers to the fully forward and down position.

SUBTASK 78-34-06-860-002-H01

(5) Move the forward thrust levers to the idle position.

SUBTASK 78-34-06-410-003-H01

(6) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-06-864-001-H01

(7) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-06-440-002-H01

(8) Do this task: Spoiler Activation, TASK 27-61-00-440-801.

SUBTASK 78-34-06-865-003-H01

(9) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYNC LOCK/MANUAL DRIVE UNIT - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser sync lock/manual drive unit

(2) An installation of the thrust reverser sync lock/manual drive unit.

B. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Sync-Lock/ Manual Drive Assembly P/N 1U1509-5 (Boeing P/N S315W360-14).

C. Thrust reverser mounted tubes, fittings without o-rings, and hoses are tightened to the leakproof torque values. Unions, fittings with o-rings, and bosses are tightened to standard torque values.

TASK 78-34-10-000-801-H01

2. Thrust Reverser Sync Lock/Manual Drive Unit Removal

(Figure 401)

A. General

(1) The thrust reverser sync lock/manual drive unit is referred to as the sync lock in this procedure.

(2) There are two sync locks on each engine.

(a) One sync lock is installed on each lower locking actuator.

(3) The sync locks are interchangeable between the left and right lower locking actuators.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-981-802-H01	Thrust Reverser Operation - Retract (Power Method) (P/B 201)
78-34-12-000-801-H01	Thrust Reverser Lower Actuator Removal (P/B 401)
78-34-12-400-801-H01	Thrust Reverser Lower Actuator Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)
STD-1110	Container - Hydraulic Fluid Resistant, 5 Gallon (19 Liter)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G50219	Marking Pen	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-34-10-040-001-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-34-10-040-003-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-34-10-010-001-H01

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-10-860-001-H01

(4) Make sure the thrust reverser sleeves are in the fully retracted (stowed) position.

NOTE: The thrust reverser sleeves do not have to be fully retracted if the sync lock removal is being done for the lower actuator removal. Do this step if it is only necessary to remove the sync lock.

(a) If it is necessary, do this task: Thrust Reverser Operation - Retract (Power Method), TASK 78-31-00-981-802-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-10-040-002-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(5) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

(a) Make sure the bypass valve in the isolation valve is closed.

NOTE: The bypass valve in the isolation valve must be closed if you remove thrust reverser hydraulic components or hydraulic tubing. If the bypass valve is not closed, hydraulic fluid from the hydraulic system reservoir will drain through the return line when you remove the components or tubing.

SUBTASK 78-34-10-864-001-H01

(6) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

H. Sync Lock Removal

SUBTASK 78-34-10-616-001-H01

CAUTION BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(1) Drain the retract hydraulic line and sync shaft tube (extend hydraulic line) before you remove the sync lock/manual drive unit.

(a) Disconnect the retract and extend hydraulic hoses at the strut hydraulic fittings.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic tubes on the thrust reverser.

1) Install the protection caps on the actuator port and the hydraulic line.

(b) At the lower locking actuator, remove the large plug in the actuator extend port C or D and the small plug in the actuator retract port A or B.

1) The location of these plugs on the locking actuator is shown in this task: Thrust Reverser Lower Actuator Removal, TASK 78-34-12-000-801-H01.

2) Remove the plugs that are near the ground.

3) Use a cotton wiper, G00034 or rag around the plug and the wrench to catch the hydraulic fluid spray.

(c) Catch the hydraulic fluid that drains from the actuator and the retract and extend hydraulic lines in a 5 gallon (19 liter) hydraulic fluid resistant container, STD-1110.

(d) Replace the packing and install the plugs in the actuator ports.

1) The instructions for the replacement of the packing and the installation of the plugs are in this task: Thrust Reverser Lower Actuator Installation, TASK 78-34-12-400-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-10-030-001-H01

(2) On the right thrust reverser half, remove the screw [12], spacer [11] and nut [13] to disconnect the tube clamp [10] from wire bundle clamp [9] ().

SUBTASK 78-34-10-030-002-H01

(3) Loosen or remove the closest clamp blocks around the hydraulic line [4] for the sync lock.

(a) Remove the bolts [18], washers [19], retainer [14] and retainer [17], clamp block [15] and clamp block [16], spacers [20], shim [21] to disassemble the clamp blocks which attach the hydraulic line [4].

NOTE: Disassemble a sufficient number of clamp blocks to disconnect the hydraulic line from the sync lock without too much force.

SUBTASK 78-34-10-860-002-H01

(4) Put the sync lock/manual drive unit [3] to the locked position, if required:

(a) Move the manual unlock handle [1] to the fully unlocked position to release the lock pin.

(b) Make sure the lock pin [2] moves out to the usual position.

(c) Make sure the manual unlock handle [1] moves back to the usual locked position.

SUBTASK 78-34-10-020-001-H01

(5) Remove the sync lock/manual drive unit [3]:

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

(a) Disconnect the electrical connector [7] from the proximity sensor [8].

(b) Install the protection caps on the electrical connector [7] and the proximity sensor [8].

CAUTION BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(c) Disconnect the hydraulic line [4] from the sync lock/manual drive unit [3] at the elbow [6].

1) Follow this general practice when you remove the hydraulic lines; Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

2) Use a cotton wiper, G00034 or a rag around the hydraulic line [4] and the wrench to catch the hydraulic fluid.

3) Catch the hydraulic fluid that drains from the actuator with the 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

4) Install protective caps on the hydraulic line [4].

(d) Remove the sync lock/manual drive unit [3] from the lower actuator.

1) Be careful to prevent rotation of the square shaft relative to the sync lock as the sync lock is removed.

2) Catch the hydraulic fluid that drains from the actuator with the 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Remove the five bolts [22] and washers [23].

   NOTE: Use a 1/4-inch drive universal socket, 3/8-inch size, to remove the bolts.

4) If the sync lock is to be rigged and installed again because of continuous occurrence of Maintenance Messages, use a marking pen, G50219 to place a temporary mark on the sync lock flange which is aligned with the slot in the end of the square shaft.

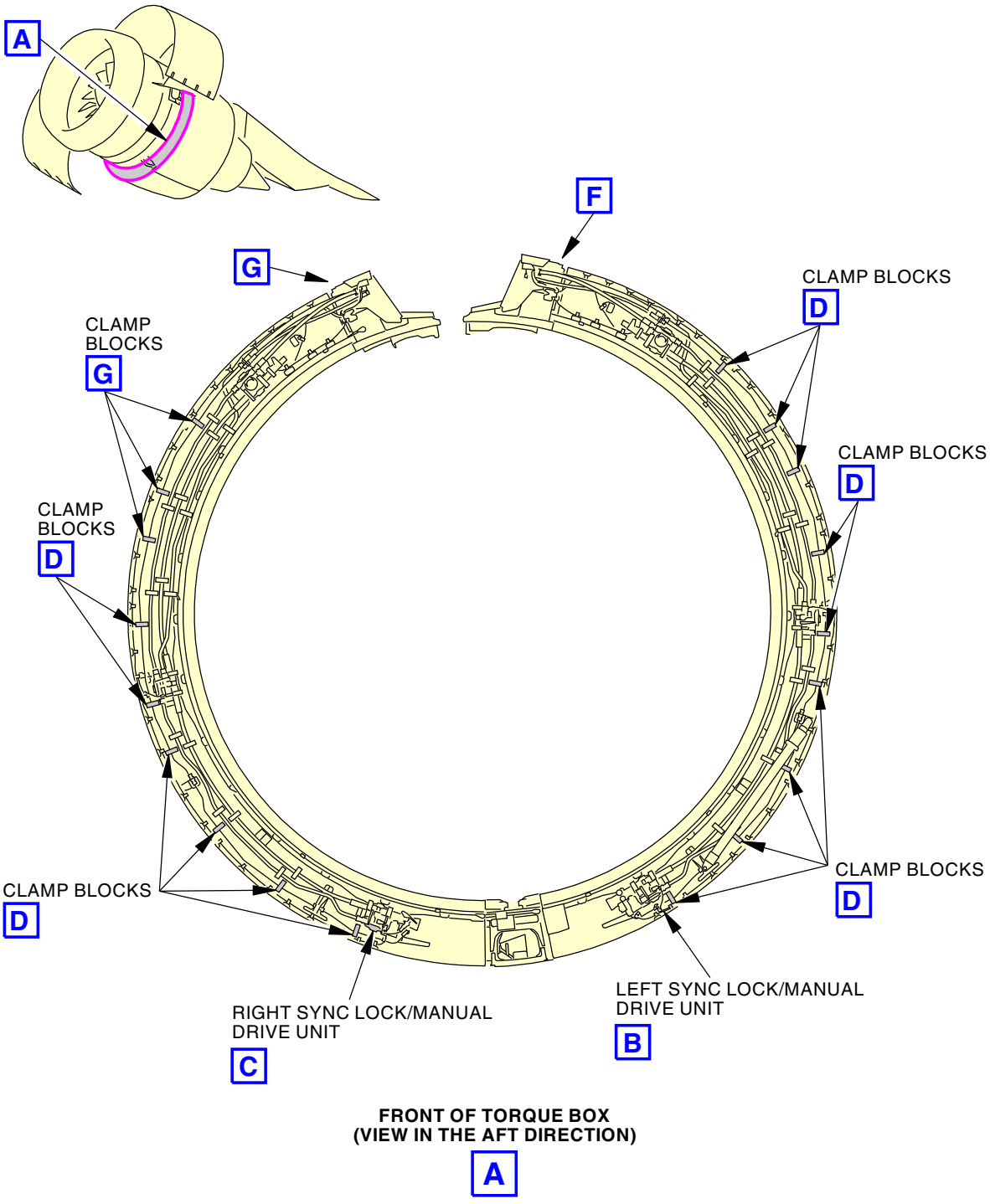
5) Remove and discard the o-ring [25].

6) Remove the elbow [6] from the union on the sync lock/manual drive unit [3].

7) Install the protection caps on the sync lock/manual drive unit [3] and the lower actuator.

——— END OF TASK ———

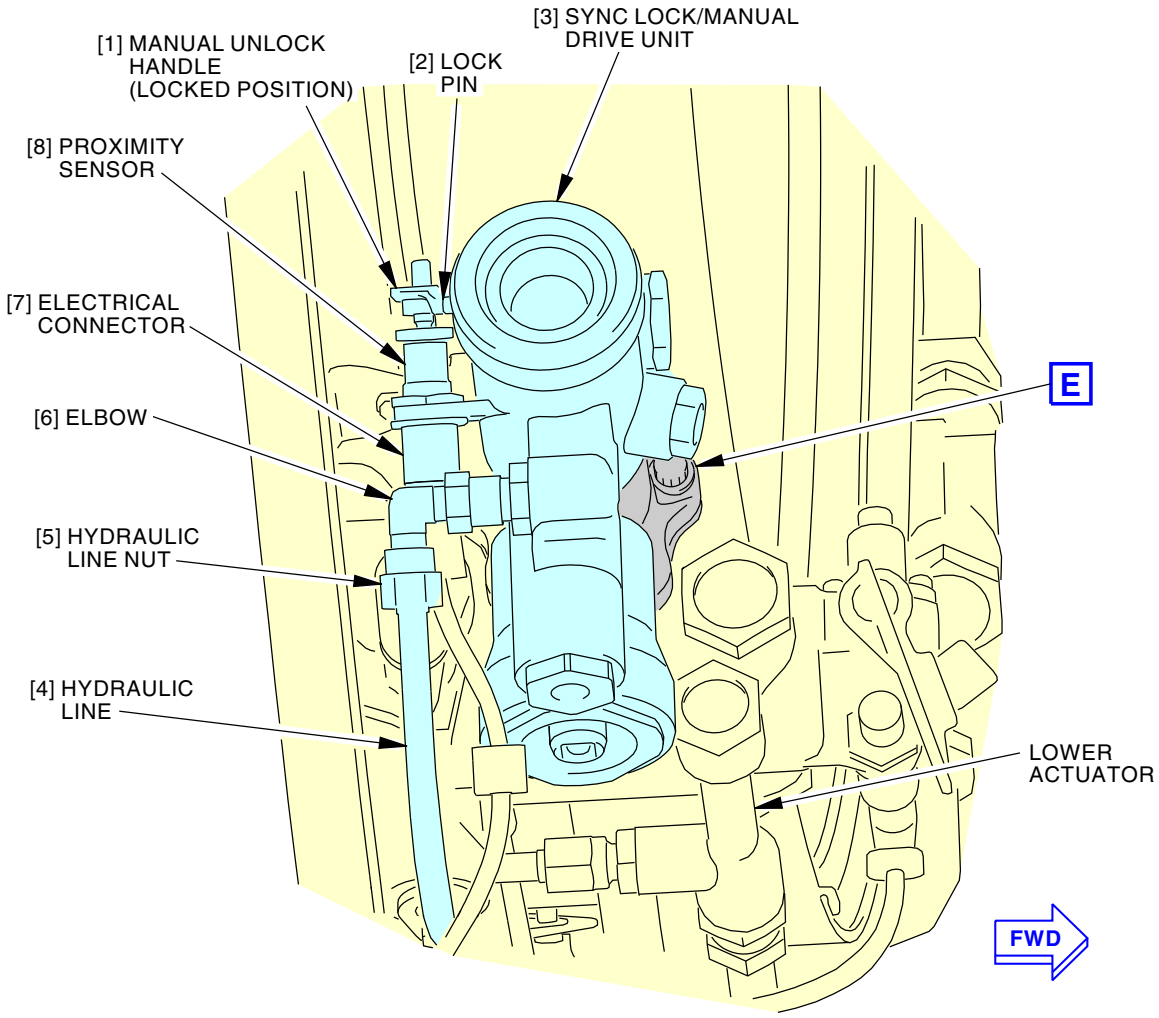
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07534 S0004286489_V2

Thrust Reverser Sync Lock/Manual Drive Unit Installation
Figure 401/78-34-10-990-801-H01 (Sheet 1 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



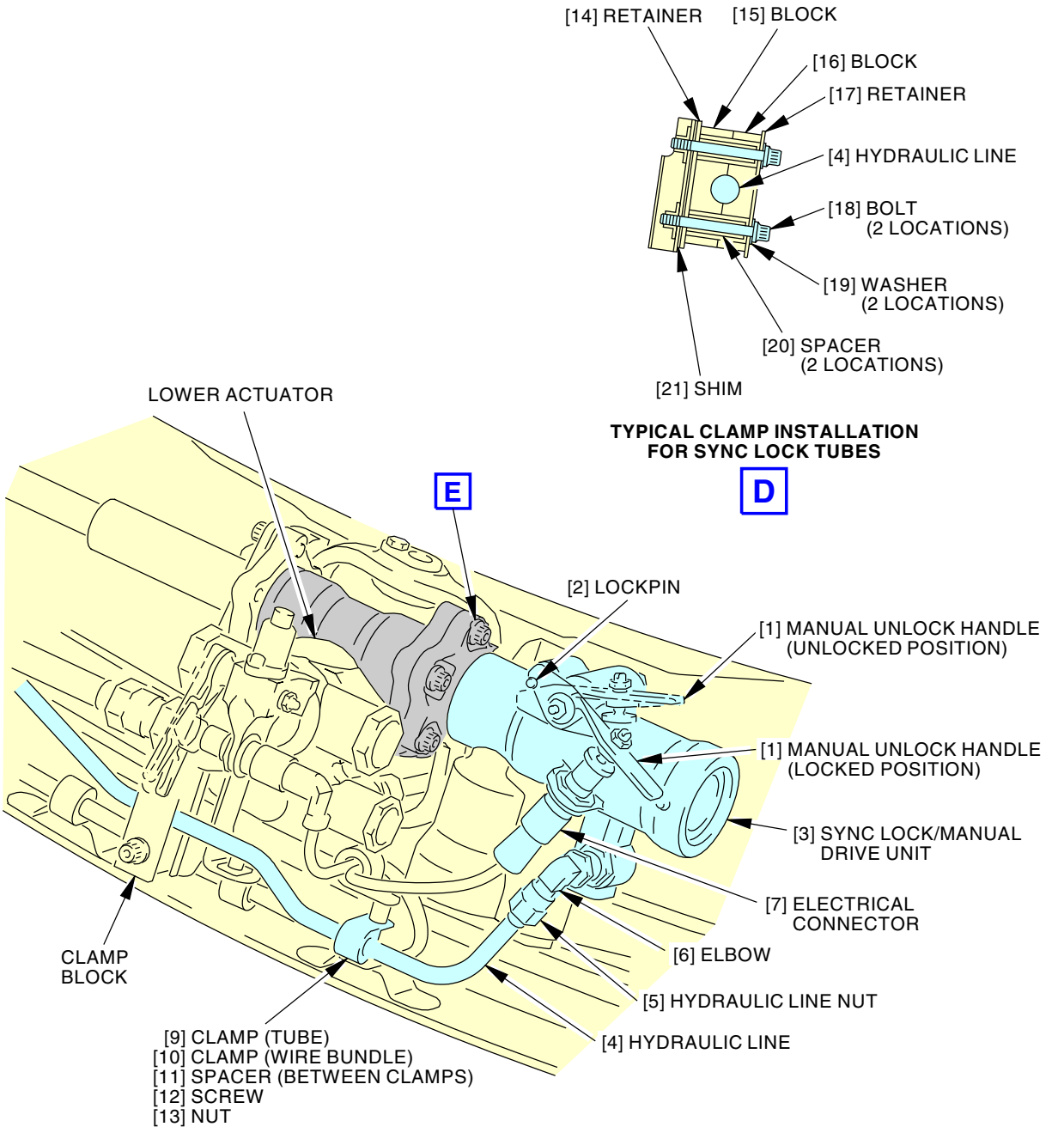
LEFT SYNC LOCK/MANUAL DRIVE UNIT

B

M07531 S0004286486_V2

Thrust Reverser Sync Lock/Manual Drive Unit Installation
Figure 401/78-34-10-990-801-H01 (Sheet 2 of 6)

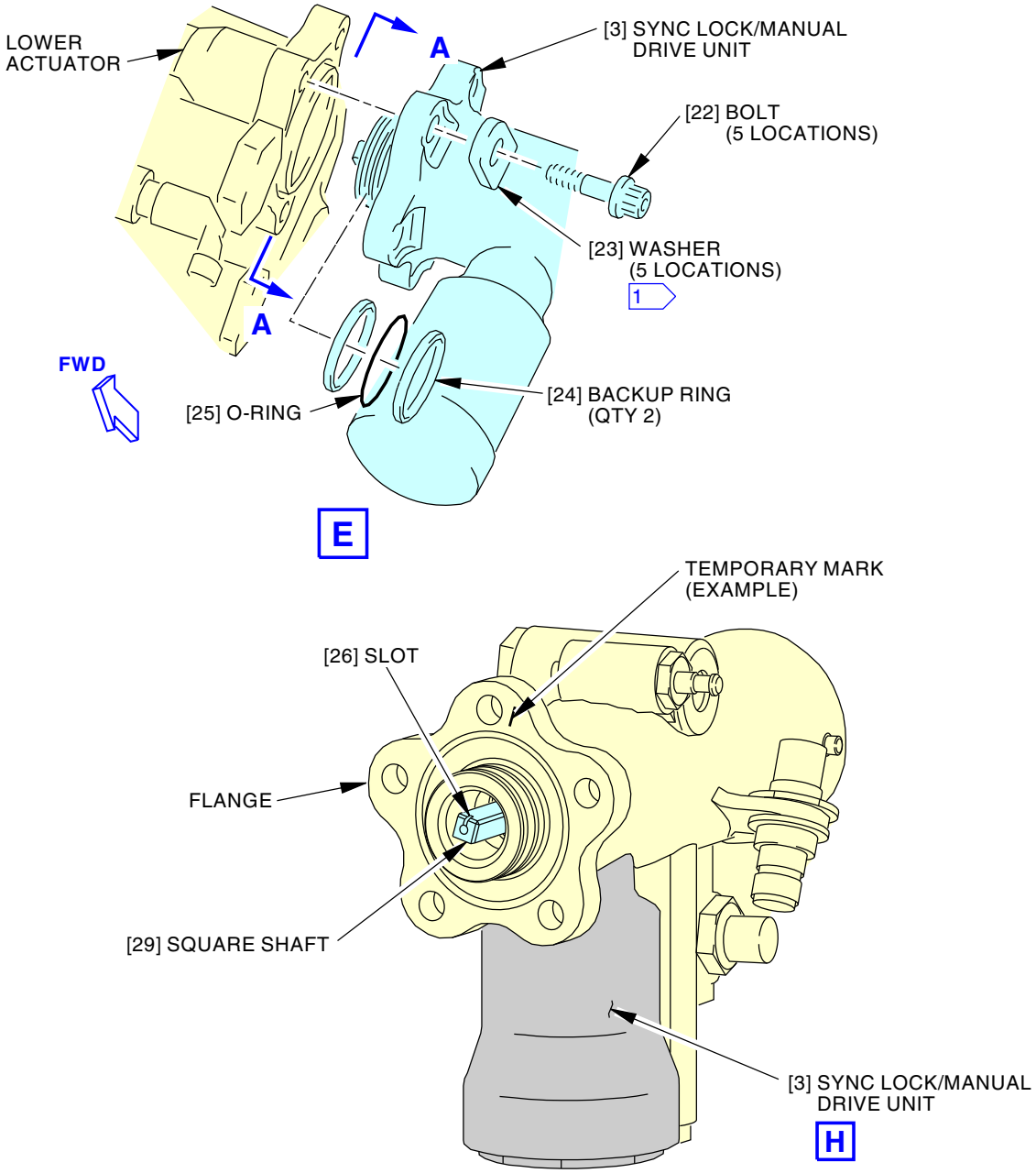
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07530 S0004286485_V2

Thrust Reverser Sync Lock/Manual Drive Unit Installation
Figure 401/78-34-10-990-801-H01 (Sheet 3 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



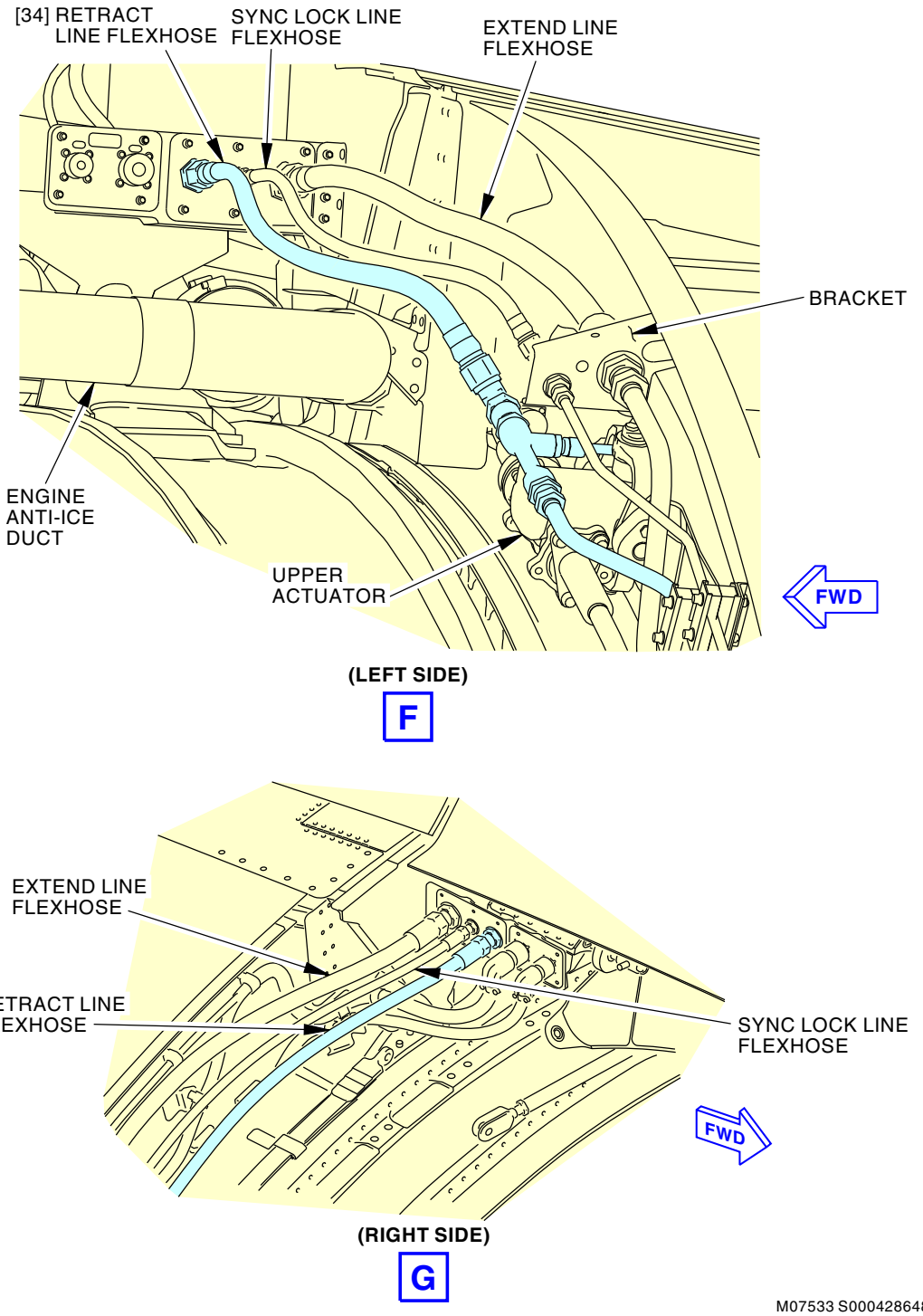
A-A

1 PUT THE WASHER IN A POSITION SO THAT THE ROUNDED SIDE POINTS RADIALLY OUT AND THE COUNTERSINK IS ADJACENT TO THE HEAD OF THE BOLT.

M07532 S0004286487_V4

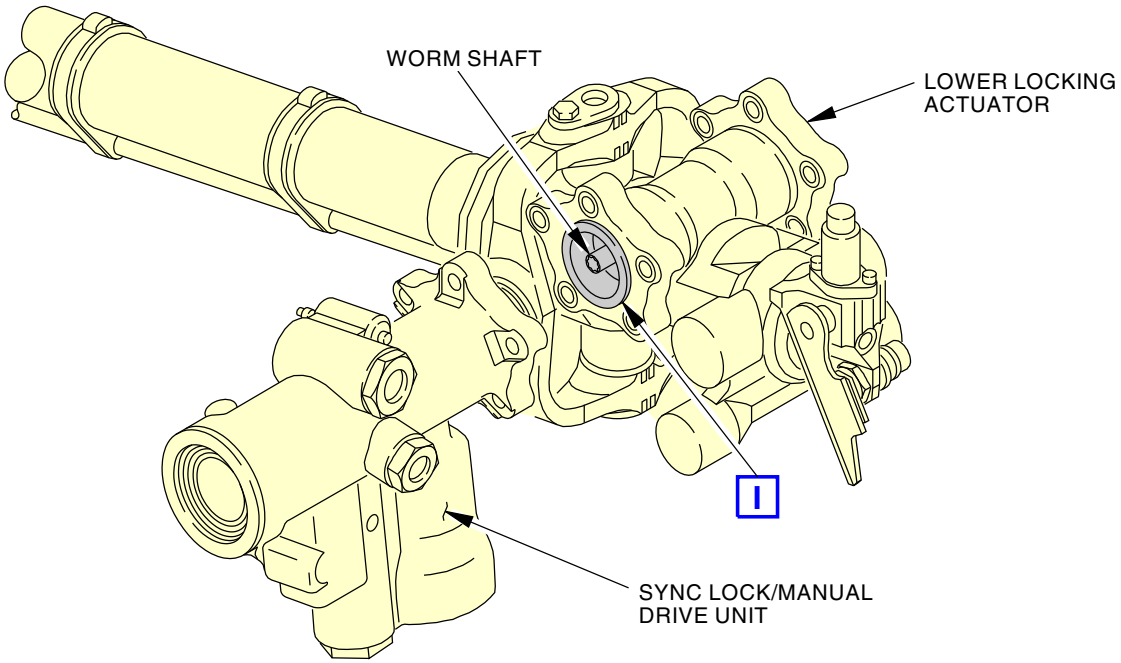
Thrust Reverser Sync Lock/Manual Drive Unit Installation
Figure 401/78-34-10-990-801-H01 (Sheet 4 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



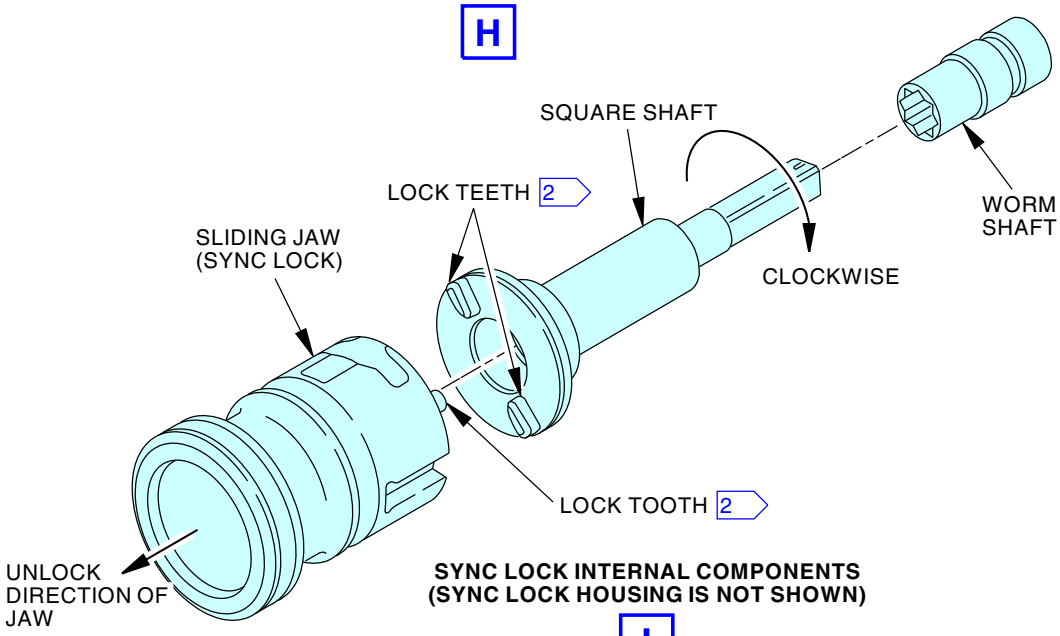
Thrust Reverser Sync Lock/Manual Drive Unit Installation
Figure 401/78-34-10-990-801-H01 (Sheet 5 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



SYNC LOCK/MANUAL DRIVE UNIT (SYNC LOCK HOUSING IS SHOWN)

H



SYNC LOCK INTERNAL COMPONENTS (SYNC LOCK HOUSING IS NOT SHOWN)

I

2 TWO LOCK TEETH ON SQUARE SHAFT, TWO LOCK TEETH ON SLIDING JAW. LOCK TEETH SHOWN 90˚ APART, NO TOOTH TO TOOTH ENGAGEMENT.

J96185 S0000189347_V2

Thrust Reverser Sync Lock/Manual Drive Unit Installation
Figure 401/78-34-10-990-801-H01 (Sheet 6 of 6)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-10-400-801-H01

3. Thrust Reverser Sync Lock/Manual Drive Unit Installation

(Figure 401)

A. General

(1) The sync lock/manual drive unit is referred to as the sync lock in this procedure.

(2) After you install the sync lock, you must do the operational test of the thrust reverser.

(3) To correctly adjust the sync lock, hydraulic pressure must be applied to the retract side of the thrust reverser actuators when the sync lock is installed.

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-10-000-801	Flexible Hose Removal (P/B 401)
20-10-10-400-801	Flexible Hose Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-34-13-400-801-H01	Thrust Reverser Sync Shaft and Tubing Installation (P/B 401)
78-36-04-400-801-H01	Thrust Reverser Sync Lock Proximity Sensor Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)
STD-896	Test Stand - Hydraulic, 0 to 3000 psi (0 to 20,684 kPa) Range

D. Consumable Materials

Reference	Description	Specification
B00316	Solvent - Aliphatic Naphtha (For Organic Coatings)	TT-N-95 Type I, ASTM D-3735 Type I
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description	Specification
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995
G50134	Cable, Safety with Ferrule, 0.032 in dia., Corrosion & Heat Resistant	AS3510-20( )K

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Sync Lock Installation

SUBTASK 78-34-10-430-001-H01

(1) Prepare the sync lock/manual drive unit [3] for installation (Figure 401).

(a) Remove the protection cap from the sync lock.

(b) Examine the two back up backup rings [24] for damage.

1) If it is necessary, replace the back up rings that have damage.

(c) Install the new o-ring [25] between the two backup backup rings [24] on the sync lock.

1) Make sure the sync lock packing grooves and adjacent surfaces are free of cuts, scratches, dents, and all deposits of unwanted material.

2) Clean the seal surfaces and grooves on the sync lock with a clean cotton wiper, G00034 moistened with solvent, B00316.

a) Wipe the all solvent from the surfaces with a clean, dry cloth before it dries.

NOTE: Do not let the solvent dry on the surfaces.

3) Make sure the new packing is free of nicks, cuts, grooves, excess flash or other defects.

4) Dry wipe the packing with a clean, dry cotton wiper, G00034 to remove all unwanted material.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

5) Lubricate the new packing with MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153.

6) Do not stretch the packing so that the inner diameter is expanded more than 50 percent when you install it.

7) Make sure the packing is not twisted in the groove.

8) Make sure the packing is not pinched.

(d) Rig the sync lock/manual drive unit [3] in the locked position before the installation:

1) To rig a new, replacement sync-lock, do these steps:

a) Turn the manual unlock handle in the unlock direction approximately 10 degrees; this is the partially unlocked position.

NOTE: A partial unlock of the sync lock moves the sliding jaw away from the square shaft but keeps the lock teeth on the sliding jaw engaged with the lock teeth on the square shaft. This is done to find the two extreme positions of the lock teeth on the sliding jaw.

<1> Hold the sync lock in the partial unlock position when you turn the square shaft.

b) Turn the square shaft from one extreme position to the other extreme position.

NOTE: Total rotation should be approximately 128 degrees.

c) Turn the square shaft half way between the extreme positions from the previous step; this is the middle point of rotational travel.

NOTE: When the sync lock is correctly rigged, the square shaft should be at the approximate middle point of rotational travel. When the sync lock moves to the lock position after the thrust reverser is stowed, there must be clearance on each side of the lock teeth on the sliding jaw to prevent "tooth on tooth" engagement with the lock teeth on the square shaft. If "tooth on tooth" engagement occurs, a Maintenance Message will occur.

d) Align the square shaft with the worm shaft on the lower locking actuator.

<1> Do not engage the square shaft in the worm shaft at this time.

<2> Position the sync lock flange close to the flange on the lower actuator in the approximate installed position to align the bolt holes.

<3> Turn the square shaft clockwise the minimum amount necessary, while you maintain the bolt hole alignment.

e) Move the manual unlock handle to lock the sync lock again.

2) To rig the old sync-lock because of the continuous occurrence of Maintenance Messages, do these steps:

a) Turn the manual unlock handle in the unlock direction approximately 10 degrees; this is the partially unlocked position.

NOTE: A partial unlock of the sync lock moves the sliding jaw away from the square shaft but keeps the lock teeth on the sliding jaw engaged with the lock teeth on the square shaft. This is done to find the two extreme positions of the lock teeth on the sliding jaw.

<1> Hold the sync lock in the partial unlock position when you turn the square shaft.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) Turn the square shaft from one extreme position to the other extreme position.

NOTE: Total rotation should be approximately 128 degrees.

c) Turn the square shaft half way between the extreme positions from the previous step; this is the middle point of rotational travel.

NOTE: When the sync lock is correctly rigged, the square shaft should be at the approximate middle point of rotational travel. When the sync lock moves to the lock position after the thrust reverser is stowed, there must be clearance on each side of the lock teeth on the sliding jaw to prevent "tooth on tooth" engagement with the lock teeth on the square shaft. If "tooth on tooth" engagement occurs, a Maintenance Message will occur.

d) Align the square shaft with the worm shaft on the lower locking actuator.

<1> Do not engage the square shaft in the worm shaft at this time.

<2> Position the sync lock flange close to the flange on the lower actuator in the approximate installed position to align the bolt holes.

<3> Turn the square shaft clockwise the minimum amount necessary, while you maintain the bolt hole alignment.

e) Move the manual unlock handle to lock the sync lock again.

f) Examine the location of the slot in the end of the square shaft relative to the temporary mark on the sync lock flange.

NOTE: Sometimes the correctly rigged position does not prevent the "tooth on tooth" engagement. If a sync lock that was correctly rigged continues to cause Maintenance Messages, then rotation of the square shaft an additional 45 degrees clockwise to reposition the lock teeth may prevent the "tooth on tooth" condition when the sync lock is installed again.

g) If the slot is aligned with the temporary mark, do these steps:

<1> Partially move the manual unlock handle to partially unlock the sync lock, and hold.

<2> Turn the square shaft 45 degrees clockwise to the next position that matches the worm shaft.

<3> Move the manual unlock handle to lock the sync lock again.

h) Remove the temporary mark from the sync lock flange surface with a clean cotton wiper, G00034 moistened with solvent, B00316.

<1> Wipe the all solvent off the surface with a clean, dry cloth.

NOTE: Do not let the solvent dry on the surface.

3) Make sure the sync lock is locked.

SUBTASK 78-34-10-860-003-H01

WARNING

MAKE SURE THAT THE TWO SYNC SHAFT TUBES ARE INSTALLED BETWEEN THE ACTUATORS. IF THE TUBES ARE NOT INSTALLED WHEN YOU SUPPLY RETRACT PRESSURE, PRESSURIZED HYDRAULIC FLUID CAN HIT PERSONNEL. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Make sure that the two sync shaft tubes are installed.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: Thrust Reverser Sync Shaft and Tubing Installation, TASK 78-34-13-400-801-H01.

SUBTASK 78-34-10-430-003-H01

(3) Connect the hydraulic flexhoses that were disconnected to drain the actuation system.

(a) Refer to this general practice: Flexible Hose Installation, TASK 20-10-10-400-801.

CAUTION

DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(b) Connect the extend flexhose to the strut hydraulic fitting.

1) Tighten the hose nut to 855-945 pound-inches (97-107 newton-meters).

(c) If necessary, connect the retract flexhose to the strut hydraulic fitting.

NOTE: If an external hydraulic service cart is to be used to provide retract hydraulic pressure for the installation, it is not necessary to connect the retract flexhose at this time.

1) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

(d) Do not adjust the position of the flexhose clamp block on the left thrust reverser hoses at this time.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and to do a check of the clearance between the retract flexhose and the engine anti-ice duct.

SUBTASK 78-34-10-863-001-H01

CAUTION

SUPPLY HYDRAULIC POWER TO THE RETRACT SIDE OF THE HYDRAULIC ACTUATORS WHILE YOU INSTALL THE SYNC LOCK. IF YOU DO NOT OBEY THIS INSTRUCTION, THE THRUST REVERSER WILL NOT OPERATE CORRECTLY.

(4) Apply hydraulic power to the retract side of the hydraulic actuators:

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the hydraulic actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the sync shaft tube flanges from the retract side of the actuator internal piston.

(a) If you use the airplane hydraulic power, do these steps:

1) Put the applicable EEC MAINT L(R) ENG POWER switch on the overhead maintenance panel, P61, to the TEST position.

2) Make sure that the reverse thrust lever is in the fully forward and down position and the DO-NOT-OPERATE tag is attached to it.

3) Remove the thrust reverser isolation valve lock, SPL-2591 from the shutoff valve spool on the isolation valve.

a) Refer to this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

4) Do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING KEEP ALL PERSONNEL AWAY FROM THE THRUST REVERSER SLEEVE. THE THRUST REVERSER SLEEVE WILL RETRACT WHEN YOU MOVE THE TEST ENABLE SWITCH. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

5) Move and hold the test enable switch to supply hydraulic pressure to the retract side of the actuators.

NOTE: The test enable switch is adjacent to the PDOS switch for the thrust reverser at the 4 o'clock position on the aft inlet bulkhead. Hold the test enable switch until the sync lock is installed and the bolts are tightened. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

WARNING MAKE SURE THAT THE PRESSURE LINE OF THE HYDRAULIC CART IS CONNECTED TO THE RETRACT LINE ON THE THRUST REVERSER. IF THE PRESSURE LINE IS CONNECTED TO THE EXTEND LINE, INJURIES TO PERSONNEL AND DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(b) If you use a hydraulic ground service cart, do these steps:

1) Make sure that the hydraulic power system to the airplane is depressurized.

a) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

CAUTION BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

2) If necessary, disconnect the retract line flexhose [34] at the hydraulic connection on the strut.

a) Refer to general practice: Flexible Hose Removal, TASK 20-10-10-000-801.

b) Use a cotton wiper, G00034 or a rag around the retract line and the wrench to catch the hydraulic fluid spray.

c) Catch the hydraulic fluid that drains from the retract line in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

3) Connect the hydraulic service cart or 0 to 3000 psi (0 to 20,684 kpa) range hydraulic test stand, STD-896 to the retract line flexhose [34] for the applicable thrust reverser.

WARNING KEEP ALL PERSONNEL AWAY FROM THE THRUST REVERSER SLEEVE. THE THRUST REVERSER SLEEVE WILL RETRACT WHEN YOU SUPPLY HYDRAULIC PRESSURE. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

4) Supply hydraulic pressure of 3000 psi (20684 kPa) to the retract side of the actuators.

NOTE: Do not decrease the hydraulic pressure.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Sync Lock Installation

SUBTASK 78-34-10-420-001-H01

(1) Install the sync lock/manual drive unit [3].

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston.

(a) Keep hydraulic pressure on the retract side while you install the sync lock/manual drive unit [3].

CAUTION

REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(b) Remove the protection caps from the sync lock/manual drive unit [3] and the lower locking actuator.

(c) Install the sync lock/manual drive unit [3] on the lower actuator.

1) Make sure the manual unlock handle [1] is at the locked position.

2) Align the holes in the sync lock flange with the holes in the lower locking actuator.

3) Engage the square shaft [29] in the lower actuator; keep hole misalignment to a minimum.

4) Do not turn the sync lock/manual drive unit [3] more than approximately ±22.5 degrees (clockwise or counterclockwise) to mate the square shaft [29] with the lower actuator and align the holes.

(d) Install the five bolts [22] and special washers [23] to attach the sync lock/manual drive unit [3] to the actuator.

NOTE: Use a 1/4-inch drive universal socket, 3/8-inch size, to install the bolts. The special washers, 1509-061, are given by the supplier as a loose part with the replacement sync lock/manual drive unit.

1) Install the washers so that the curved portion of the washer aligns with the curved outer edge of the sync lock flange and the countersunk side is adjacent to the bolt head.

2) Tighten the bolts to 145-155 inch-pounds (16.4-17.5 newton-meters).

NOTE: Do not install the lockwire on the bolts at this time.

SUBTASK 78-34-10-864-002-H01

(2) Remove the hydraulic power.

(a) If you used airplane hydraulic power, release the test enable switch.

(b) If you used hydraulic power from a hydraulic test stand, remove the hydraulic power as follows:

1) Decrease the pressure from the hydraulic test stand to zero.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

2) Disconnect the hydraulic test stand from the retract line flexhose [34].
   a) Put a cotton wiper, G00034 or a rag around the retract line flexhose and the wrench to catch hydraulic fluid that will spray from the retract line.
   b) Catch the hydraulic fluid that drains from the retract line in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

CAUTION

DO NOT LET THE HOSE TWIST WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWIST IN THE HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE FAILURES, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

3) Connect the retract line flexhose [34] to the hydraulic connection at the strut.
   a) Refer to general practice: Flexible Hose Installation, TASK 20-10-10-400-801.
   b) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

SUBTASK 78-34-10-020-002-H01

(3) Complete the installation of the sync lock/manual drive unit [3].
   (a) Install MS20995C32 lockwire, G01048 or safety cable, G50134 on the bolts [22].
   (b) Put the sync lock/manual drive unit [3] in the locked position:
      1) Move the manual unlock handle [1] to the fully ununlocked position to release the lock pin [2].
      2) Make sure the lock pin moves out to the usual position.
      3) Make sure the manual unlock handle moves back to the usual locked position.
   (c) Remove the protection caps from the hydraulic line [4] and the union on the sync lock/manual drive unit [3].
   (d) Install the elbow [6] on the union on the sync lock.
      1) Align and seat the elbow on the union.
      2) Manually tighten the nut on the elbow at this time to allow the alignment of the elbow with the hydraulic line [4].
   (e) Install the hydraulic line [4] on the sync lock/manual drive unit [3].
      1) Refer to this general practice: Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.
      2) Do these steps to adjust the clamp blocks and prevent hydraulic tubing preload.

         NOTE: The clamp blocks and the retainers are different thicknesses and can be reversed to increase or decrease the offset from the brackets. All or any combination of these steps can be used to get the correct alignment for all the sync lock tubing between the sync lock and the bracket near the upper non-locking actuator.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Exchange the location of the clamp blocks.

b) Exchange the location of the white and grey retainers.

c) Remove the shim laminations or remove the shim under the clamp blocks.

d) Apply primer, C00259 to the shim [21] and install wet or dry.

CAUTION

DO NOT USE THE WRENCH ON THE NUT TO PULL THE TUBE INTO ALIGNMENT. DAMAGE TO THE TUBING CAN OCCUR.

3) Install the hydraulic line [4] at the elbow [6] on the sync lock and the union on the hold open rod bracket near the lower actuator.

a) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to the fitting external threads and the shoulders of the sleeve where the nut touches.

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

b) Manually align the hydraulic line tubing with the end points and the clamp blocks.

c) Align and seat the tubing sleeve in the fitting.

d) Manually tighten the tube nuts, then do a check for tube alignment.

e) Tighten the tube nut [5] to 257-283 inch-pounds (29-32 newton-meters).

f) Tighten the nut on the elbow [6] to 257-283 inch-pounds (29-32 newton-meters).

4) Install the clamp block.

a) Install the shim [21], lower retainer [14], clamp block [15] and clamp block [16], two spacer [20], and upper retainer [17] with bolts [18] and washers [19] under the bolt head.

b) Tighten the bolts to 65-75 inch-pounds (7.3-8.5 newton-meters).

(f) Remove the protection caps from the electrical connector [7] and the proximity sensor [8].

SUBTASK 78-34-10-430-004-H00

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(4) Connect the electrical connector [7] to the proximity sensor [8].

SUBTASK 78-34-10-430-002-H01

(5) On the right thrust reverser half, install the screw [12], spacer [11] and nut [13]] to connect the wire bundle clamp [10] to the tube clamp [9].

I. Sync Lock Installation Test

SUBTASK 78-34-10-220-002-H00

(1) Measure the gap between the sync lock proximity sensor and the target. The gap should be 0.045 in. (1.14 mm) to 0.055 in. (1.40 mm).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) If the gap is outside these limits, adjust the gap. (Thrust Reverser Sync Lock Proximity Sensor Installation, TASK 78-36-04-400-801-H01)

SUBTASK 78-34-10-651-001-H01

(2) For the applicable hydraulic system reservoir, Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-10-440-001-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-10-710-001-H01

(4) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of 6 cycles to remove all the air from the thrust reverser actuation system.

(b) Make sure the thrust reverser operates smoothly.

SUBTASK 78-34-10-212-001-H01

(5) Do a check for hydraulic fluid leakage from the thrust reverser actuation system.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

SUBTASK 78-34-10-220-001-H01

(6) Make sure the minimum clearance between the engine anti-ice duct and the retract line flexhose [34] on the left thrust reverser half is 1.0 inch (25.4 millimeters).

NOTE: This step is repeated in the installation procedure for the sync shaft and tubing, the upper, center and lower hydraulic actuators and the sync lock/manual drive unit and can be combined with those procedures.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and to do a check of the clearance between the retract flexhose and the engine anti-ice duct.

(a) Remove the flexhose clamp block [30] with two screws [31], washers [32], and nuts [33].

(b) Adjust the location of flexhose clamp block [30] to a position 15.2-15.6 inches (386.1-396.2 millimeters) from the upper thrust reverser bracket to prevent the interference between the retract line flexhose [34] and the engine anti-ice duct.

(c) Install the flexhose clamp block [30] with two screws [31], washers [32], and nuts [33].

J. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-10-410-001-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-10-440-002-H01

(2) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-10-741-001-H01

(3) Clear the ENG REVERSER status messages.

(a) Do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYNC LOCK VALVE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser sync lock valve.

(2) An installation of the thrust reverser sync lock valve.

B. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles) for the repair instructions for the Sync Lock Control Valve assembly, P/N 1U1508 (Boeing P/N S315W360-8).

TASK 78-34-11-000-801-H01

2. Thrust Reverser Sync Lock Valve Removal

(Figure 401)

A. General

(1) For this procedure, the thrust reverser sync lock valve will be referred to as the sync lock valve.

(2) The sync lock valve is found behind the left aft strut fairing doors.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
20-10-11-960-801	Block Clamps Removal (P/B 401)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
434CL	Left Forward Access Door, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Removal

SUBTASK 78-34-11-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do the deactivation procedure for the thrust reverser for ground maintenance; do thsis task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-11-864-001-H01

(2) Release the pressure in the main hydraulic system and reservoir for the applicable strut; do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-11-010-001-H01

(3) Remove this panel that is forward of the strut fairing access door:

(a) Remove the applicable access panels:

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing

SUBTASK 78-34-11-010-002-H01

(4) Open the left strut aft fairing door for the applicable strut, do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

H. Sync Lock Valve Removal

SUBTASK 78-34-11-030-001-H01

(1) Loosen or remove the clamp blocks for the control line [7]on the sync lock valve [1].

(a) Follow this general procedure: Block Clamps Removal, TASK 20-10-11-960-801.

(b) Remove the screw [23] and screw [24], washers [22] under the screw head, channel [25], block [26], block [27] and block [28], channel [25], and spacers [21] to disassemble the two clamp blocks which attach the control line [7] to the bracket.

NOTE: Only disassemble a sufficient number of clamp blocks to disconnect the control line from the sync lock valve without too much force.

SUBTASK 78-34-11-020-001-H01

(2) Remove the sync lock valve [1] (Figure 401):

CAUTION MAKE SURE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU DISCONNECT THEM. CONTAMINATION OF ELECTRICAL CONNECTORS CAN CAUSE DAMAGE TO EQUIPMENT.

(a) Disconnect the electrical connector [2] from the sync lock valve [1].

(b) Install the protection caps on the electrical connector [2] and the electrical receptacle on the sync lock valve [1].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(c) Install a 1 U.S.-gal (3.81 l) oil resistant container, STD-203 to catch the hydraulic fluid from the hydraulic lines.

(d) Put a cotton wiper, G00034 around the tube nut and use a wrench to disconnect these hydraulic lines from the sync lock valve [1]:

1) Follow this general procedure: Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

2) Remove the return line [10] between the sync lock valve [1] and the TRAS return line and tee.

3) Remove the elbow [9] from the sync lock valve [1].

4) Remove the pressure line [4] between the sync lock valve [1] and the system pressure line and cross.

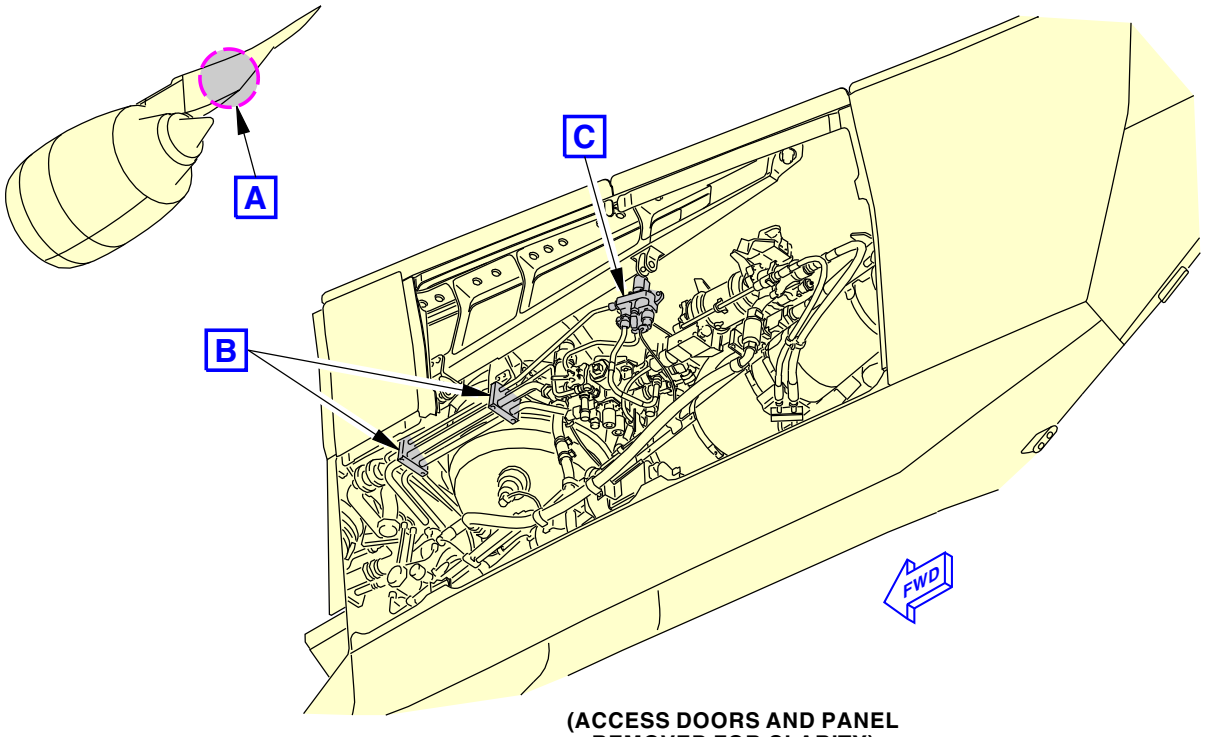
5) Disconnect the control line [7] from the sync lock valve [1].

(e) Install the protection caps on the hydraulic control line [7] and the hydraulic fittings on the sync lock valve [1].

(f) Remove the three bolts [5] and three washers [6] from the sync lock valve [1] and remove the sync lock valve.

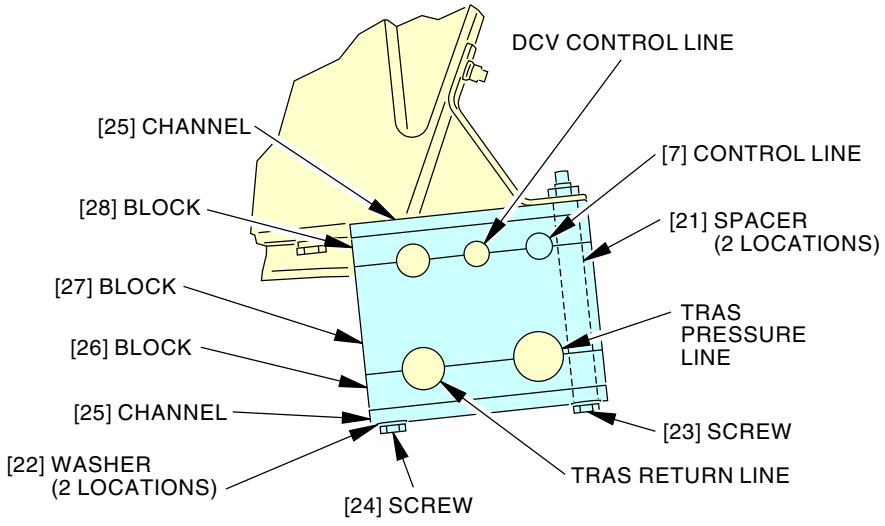
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(ACCESS DOORS AND PANEL REMOVED FOR CLARITY)

A



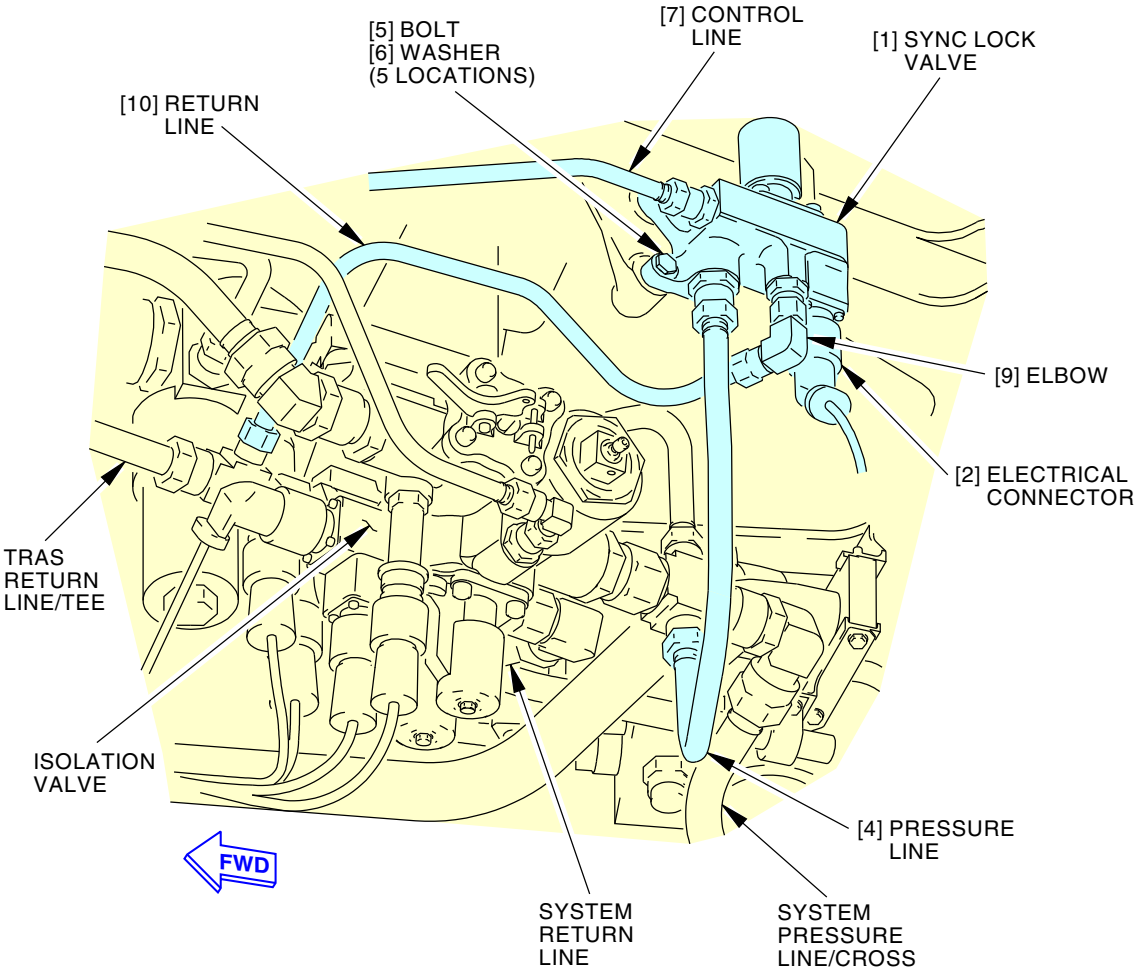
CLAMP BLOCK

B

M07539 S0004286494_V2

Sync Lock Valve Installation
Figure 401/78-34-11-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07541 S0004286495_V2

Sync Lock Valve Installation
Figure 401/78-34-11-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-11-400-801-H01

3. Thrust Reverser Sync Lock Valve Installation

(Figure 401)

A. General

(1) After you install the sync lock valve, you must do the operational test for the thrust reverser.

B. References

Reference	Title
12-12-01-610-802	Hydraulic Reservoir Filling (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-11-400-801	Block Clamps Installation (P/B 401)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1550	Bonding Meters - Approved, Intrinsically Safe (Approved for use in Class I, Divisions I & II hazardous (classified) locations. Outside these hazardous locations, COM-614 can be used in lieu of COM-1550). Part #: 620LK Supplier: 1CRL2 Part #: M1 Supplier: 3AD17 Part #: T477W Supplier: 01014 Opt Part #: M1B Supplier: 3AD17

D. Consumable Materials

Reference	Description	Specification
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00074	Solvent - Degreasing	MIL-PRF-680 (Supersedes P-D-680)
C00064	Coating - Aluminum Chemical Conversion	BAC5719 Type II Class A (MIL-DTL-5541 Class 1A)
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G00251	Abrasive - Mat, Non-Woven, Non-Metallic	A-A-58054
G01061	Water - Distilled	
G01659	Swab - Cotton Or Rayon, (Disposable)	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
434CL	Left Forward Access Door, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

G. Prepare the Sync Lock Valve for Installation

SUBTASK 78-34-11-160-001-H01

(1) Make sure the top of the valve mount feet are clean and the anodized surfaces are not damaged.

NOTE: You must clean these surfaces to supply a good electrical bond. The electrical bond is through the fasteners.

SUBTASK 78-34-11-765-001-H01

(2) If it is necessary, clean the top of the mount feet of the sync lock valve [1] and repair the anodized finish.

(a) Wipe or scrub the top of the mount feet of the sync lock valve [1] with a dry, clean cotton wiper, G00034 to remove all oil, grease, hydraulic fluid and dirt.

(b) Clean the top of the mount feet with abrasive mat, G00251 pads to get a bright aluminum finish.

(c) Remove all residue with a clean, dry cotton wiper, G00034.

WARNING

DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(d) Clean the top of the mount feet with a clean cotton wiper, G00034 wet with solvent, B00074 or solvent, B00062.

1) Remove the solvent with a clean dry cloth before it becomes dry.

WARNING

DO NOT GET ALODINE IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ALODINE. PUT ON GOGGLES AND GLOVES WHEN YOU USE ALODINE. KEEP ALODINE AWAY FROM SPARKS, FLAME, AND HEAT. ALODINE IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(e) Manually apply the Alodine 600 coating, C00064 to the cleaned area with a clean swab, G01659 or cotton wiper, G00034.

(f) After the color change, rinse the area several times with a clean cotton wiper, G00034 and distilled water, G01061 to remove the excess Alodine.

(g) Air dry at room temperature.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(h) If a powdery coating develops, clean the surface and apply the Alodine coating again.

H. Sync Lock Valve Installation

SUBTASK 78-34-11-420-001-H01

(1) Install the sync lock valve [1] (Figure 401):

(a) Make sure the mating surfaces on the sync lock valve [1] and the strut structure are clean and have no corrosion.

(b) Put the sync lock valve [1] in its position and install the three bolts [5] and three washers [6].

1) Tighten the bolts to 90-110 pound-inches (10.2-12.4 newton-meters).

(c) Do a check of the bonding resistance between the sync lock valve [1] and the strut structure with a intrinsically safe approved bonding meter, COM-1550.

1) Make sure the bonding resistance is less than 0.002 ohms.

SUBTASK 78-34-11-212-001-H01

(2) Visually examine all tube assemblies for damaged end fittings, seal areas, and threads immediately before installation.

(a) No dents are allowed in hydraulic tubing

SUBTASK 78-34-11-430-001-H01

(3) Install the three hydraulic lines to the sync lock valve [1].

(a) Follow these general practices when you install the three hydraulic lines to the sync lock valve [1] to minimize leakage and tube preload.

1) Do this task: Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do this task: Block Clamps Installation, TASK 20-10-11-400-801.

(b) Manually align the tubing with the end points and the tube clamp blocks.

(c) Remove the protection caps from the hydraulic control line [7] and the fittings on the sync lock valve [1].

(d) Install the elbow [9] on the valve return port.

1) Do not apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to the elbow swivel nut; a solid film lubricant is on the swivel nut threads.

2) Manually tighten the elbow nut at this time to allow the elbow to be aligned with the return line [10].

(e) Install the return line [10] between the elbow [9] and the TRAS return line and tee.

1) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

2) Align the elbow with the return line and align the return line with the tee.

3) Tighten the tube nuts to 162-178 pound-inches (18.3-20.2 newton-meters).

(f) After the return line [10] is installed, tighten the elbow nut to 162-178 pound-inches (18.3-20.2 newton-meters).

(g) Install the pressure line [4] between the sync lock valve [1] and the cross on the system pressure line.

1) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Tighten the tube nuts to 475-525 pound-inches (53.7-59.3 newton-meters).

(h) Install the control line [7] on the sync lock valve [1].

1) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

2) Align the hydraulic line in the closest clamp block to the actuator.

3) Install the channel [25], block [28], block [27], block [26], two spacers [21], and channel [25] with screw [23] and screw [24], two washers [22] under the screw head.

a) Tighten the screws to 25-35 pound-inches (2.8-4.0 newton-meters).

4) Tighten the tube nut to 256-284 pound-inches (28.9-32.1 newton-meters).

SUBTASK 78-34-11-410-001-H01

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(4) Connect the electrical connector [2] to the sync lock valve [1].

(a) Remove the protection caps from the electrical connector and the electrical receptacle on the sync lock valve.

I. Sync Lock Valve Installation Test

SUBTASK 78-34-11-611-001-H01

(1) Do the servicing procedure for the applicable hydraulic system reservoir, refer to this task: Hydraulic Reservoir Filling, TASK 12-12-01-610-802.

SUBTASK 78-34-11-440-001-H01

(2) Do the activation procedure for the thrust reverser, refer to this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-11-710-001-H01

(3) Do the operational test of the thrust reverser system, refer to this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of six full cycles to remove all the air from the thrust reverser actuation system.

SUBTASK 78-34-11-210-001-H01

(4) Examine the sync lock valve [1] and the pressure line [4], elbow [9], return line [10], and control line [7] for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace all parts as necessary and assemble the fitting/tube connection with the steps above.

J. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-11-410-002-H01

(1) Close the strut aft fairing door, refer to this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

SUBTASK 78-34-11-410-003-H01

(2) Install this panel that is forward of the strut fairing access door:

(a) Install the applicable access panels:

Number	Name/Location
434BL	Left Access Panel, Left Strut Aft Fairing
444BL	Left Access Panel, Right Strut Aft Fairing

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER HYDRAULIC ACTUATORS - SERVICING

1. General

A. This procedure has one task:

(1) The lubrication of the manual unlock handle on the thrust reverser locking actuator.

B. The upper actuator on each thrust reverser half is a nonlocking actuator and the center and lower actuators are locking actuators.

TASK 78-34-12-600-801-H01

2. Thrust Reverser Locking Actuator Servicing

A. General

(1) The thrust reverser locking actuators are found on the thrust reverser torque box in the center and lower actuator positions.

(2) An operator reported an increase of uncorrelated thrust reverser locking actuator maintenance messages. The thrust reversers operated normally and there were no flight deck effects. Fault isolation of the problem revealed that a false indication occurs because the manual unlock handle remains in the locked (target near) position as the thrust reverser extends.

(3) The hydraulic actuators on the thrust reversers for GE90-115 series engines have a non-symmetrical forged gimbal. Hydraulic actuators on the thrust reversers for GE90-70/-80/-90 series engines have a symmetrical gimbal.

B. References

Reference	Title
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-981-801-H01	Thrust Reverser Operation - Extend (Power Method) (P/B 201)
78-31-00-981-802-H01	Thrust Reverser Operation - Retract (Power Method) (P/B 201)

C. Consumable Materials

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Prepare for Servicing

SUBTASK 78-34-12-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-12-010-008-H01

(2) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Service the Manual Unlock Handle on the Locking Actuator

SUBTASK 78-34-12-160-001-H01

(1) Remove any dirt and old lubricant from the spring [2] under the manual unlock handle [1].

(a) Wipe the spring [2] under the manual unlock handle [1] with a clean, dry cotton wiper, G00034.

SUBTASK 78-34-12-640-001-H01

(2) Lubricate the manual unlock handle [1].

(a) Turn the nut [4] 80-90 degrees counterclockwise from the installed position to loosen the nut [4].

(b) Tighten the nut [4] against the shim [5] to 18-23 pound-inches (2.03-2.59 newton-meters).

(c) Apply 2-3 drops of hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to the areas where the ends of the torsional spring [2] touches the bushing [3] and the handle [1].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Do a Check of the Manual Unlock Handle Operation

SUBTASK 78-34-12-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-12-981-001-H01

(2) Do this task: Thrust Reverser Operation - Extend (Power Method), TASK 78-31-00-981-801-H01.

SUBTASK 78-34-12-210-001-H01

(3) Do a check of the snap operation of the manual unlock handle [1] (Figure 301).

(a) Move the handle [1] to the TARGET NEAR position and hold for 2 seconds.

(b) Release the handle [1]; the handle [1] must move to the TARGET FAR position immediately.

1) Do these steps again, three times.

SUBTASK 78-34-12-981-002-H01

(4) Do this task: Thrust Reverser Operation - Retract (Power Method), TASK 78-31-00-981-802-H01.

SUBTASK 78-34-12-212-002-H00

(5) Do a check for hydraulic fluid leakage from the thrust reverser hydraulic actuators and flexshafts.

Table 301/78-34-12-993-804-H00 Hydraulic Actuator Leakage Limit

Normal Operation Limits	Dispatch Limits To Avoid Delay
8 drops per minute (stopped or in operation)	30 drops per minute (stopped or in operation)

NOTE: If these limits are met, additional inspection of the thrust reverser hydraulic actuators is not required.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-12-410-008-H01

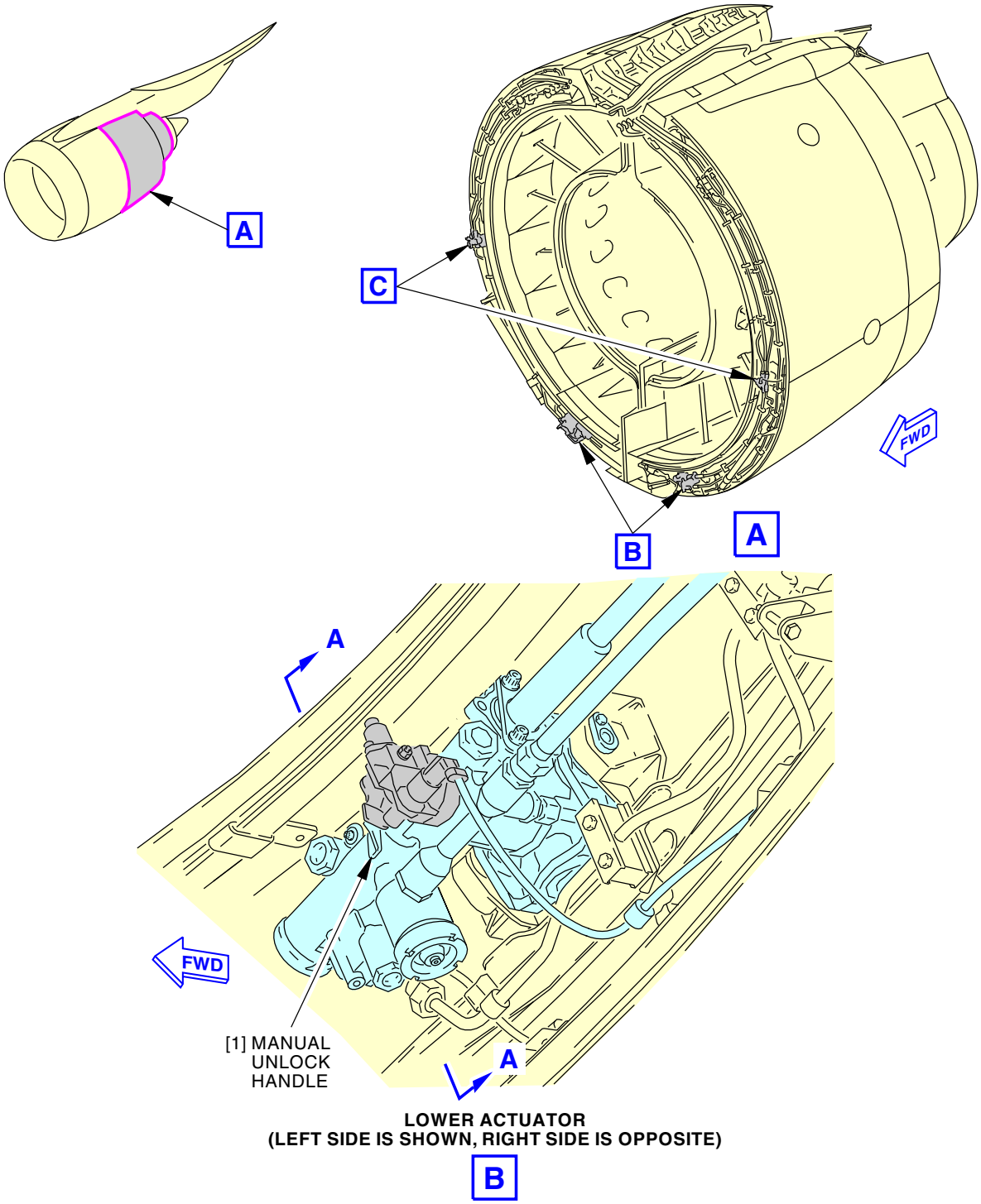
(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

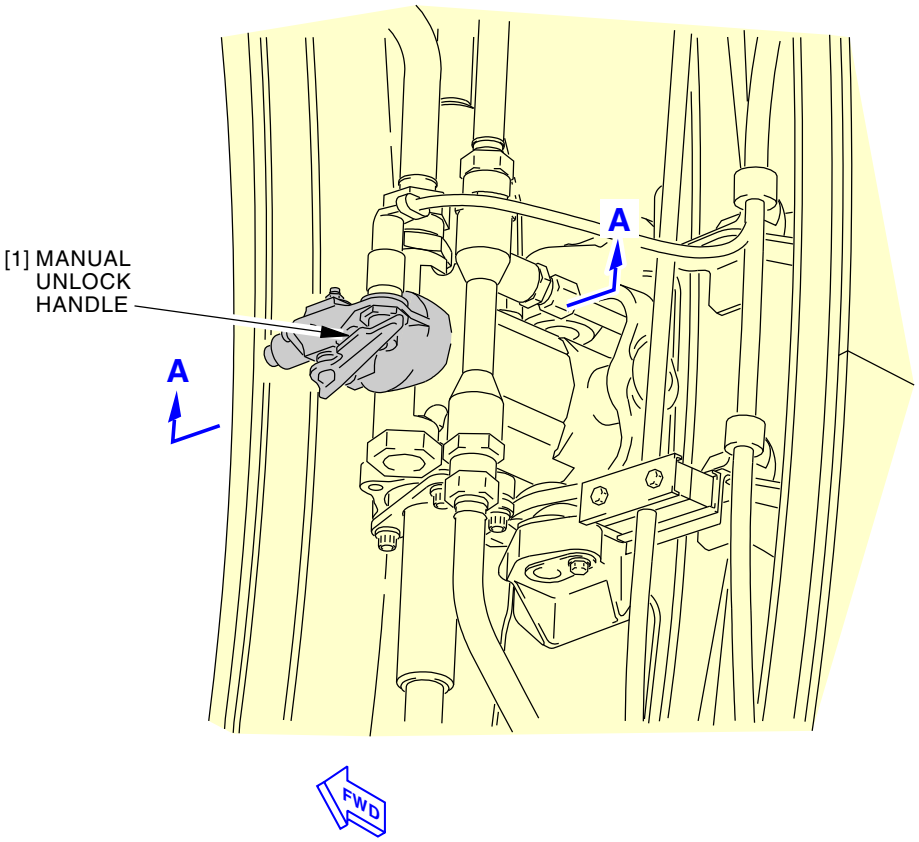


LOWER ACTUATOR
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

M07543 S0004286496_V3

Thrust Reverser Locking Hydraulic Actuators Servicing
Figure 301/78-34-12-990-801-H01 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



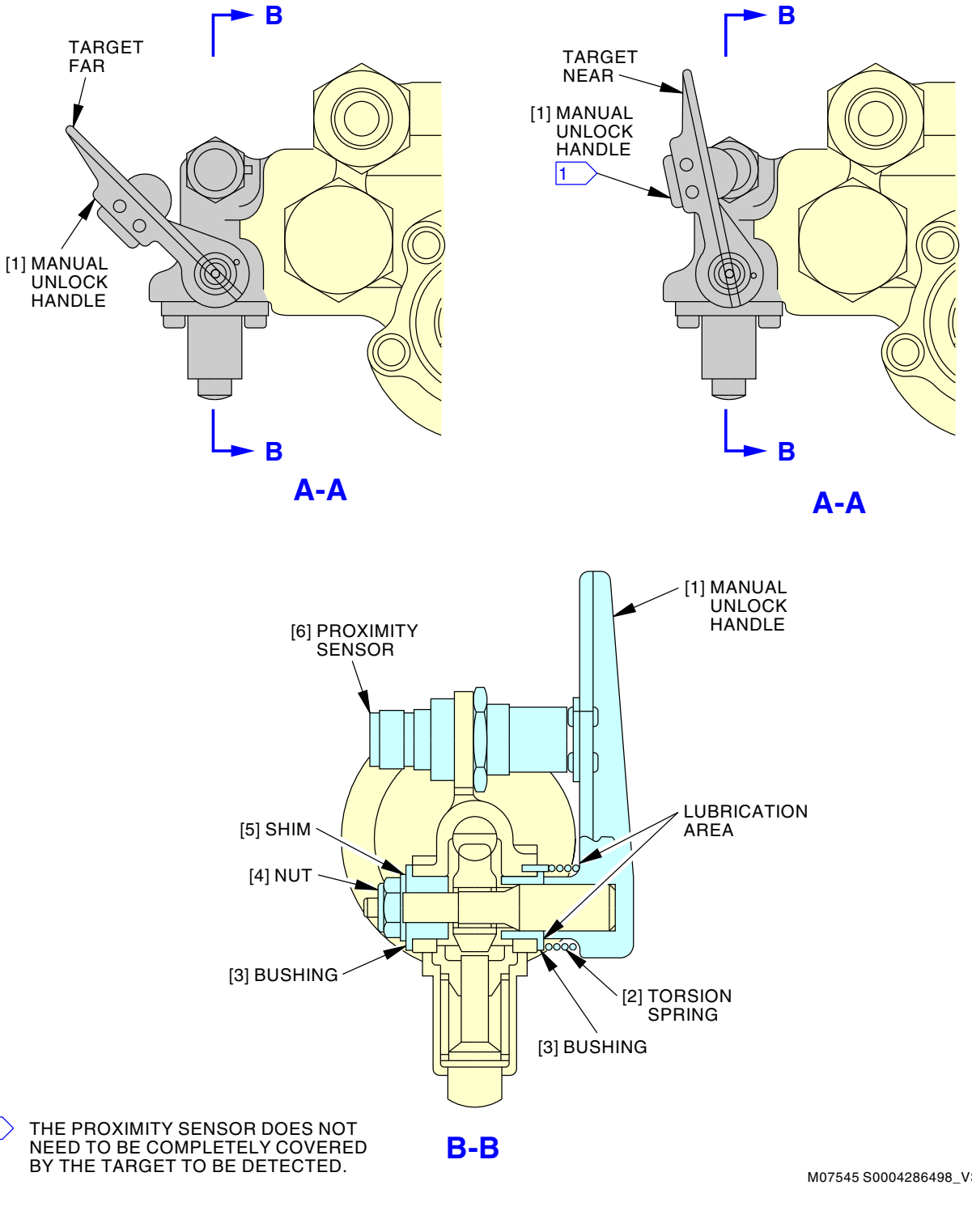
CENTER ACTUATOR
(LEFT SIDE IS SHOWN, RIGHT SIDE IS OPPOSITE)

C

M07544 S0004286497_V3

Thrust Reverser Locking Hydraulic Actuators Servicing
Figure 301/78-34-12-990-801-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 THE PROXIMITY SENSOR DOES NOT NEED TO BE COMPLETELY COVERED BY THE TARGET TO BE DETECTED.

M07545 S0004286498_V3

Thrust Reverser Locking Hydraulic Actuators Servicing
Figure 301/78-34-12-990-801-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER HYDRAULIC ACTUATORS - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

(1) The removal of a thrust reverser lower actuator

(2) The installation of a thrust reverser lower actuator

(3) The removal of a thrust reverser center actuator

(4) The installation of a thrust reverser center actuator

(5) The removal of a thrust reverser upper actuator

(6) The installation of a thrust reverser upper actuator.

(7) The removal of the thrust reverser actuator flexhoses (extend, retract and sync lock).

(8) The installation of the thrust reverser actuator flexhoses (extend, retract and sync lock).

B. The upper actuator on each thrust reverser half is a non-locking actuator and the center and lower actuators are locking actuators.

C. The correct rigging of the thrust reverser actuation system is done with the correct installation of the hydraulic actuators. There are no adjustments that can be made after the actuators are installed. All adjustments to the actuators are made when the actuators are assembled on the bench at the fully retracted position. Any adjustments to the actuators that are made during the installation, such as turning the rod end, can affect the operation of the thrust reverser actuation system. This can cause the translating sleeve to bind or jam, or operate slowly, and cause damage to the actuator or the thrust reverser structure.

D. Inside the actuator piston, there is a leadscrew. The linear movement of the piston turns the leadscrew through a leadscrew nut. The leadscrew turns a worm wheel that drives the worm gear shaft that engages the sync shaft. The sync shaft synchronizes the operation of the other hydraulic actuators. As the piston moves in and out, the leadscrew turns relative to the piston linear movement. When you pull the piston out (without turning the rod end) to attach the rod end to the sleeve clevis, the lead screw will turn a certain number of turns from the fully retracted position.

E. If the rod end is turned, the piston is moved in or out on the leadscrew. The actuator length is changed and the position of the piston relative to the lead screw has been lost. The actuators are no longer synchronized to move to the same position.

F. Thrust reverser mounted tubes, fittings without o-rings, and hoses are tightened to leakproof torque values. Unions, fittings with o-rings and bosses are tightened to standard torque values.

TASK 78-34-12-000-801-H01

2. Thrust Reverser Lower Actuator Removal

(Figure 401, Figure 402, and Figure 403)

A. General

(1) The thrust reverser lower actuator is a locking actuator.

(2) The hydraulic actuators on the thrust reversers for GE90-115 series engines have a non-symmetrical forged gimbal. Hydraulic actuators on the thrust reversers for GE90-70/-80/-90 series engines have a symmetrical gimbal.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-34-10-000-801-H01	Thrust Reverser Sync Lock/Manual Drive Unit Removal (P/B 401)
78-34-13-000-801-H01	Thrust Reverser Sync Shaft and Tubing Removal (P/B 401)
78-36-03-000-801-H01	Thrust Reverser Position Transducer (RVDT) Removal (P/B 401)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)
STD-1110	Container - Hydraulic Fluid Resistant, 5 Gallon (19 Liter)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Removal

SUBTASK 78-34-12-040-002-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-34-12-040-010-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-34-12-040-003-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-12-864-001-H01

(4) For the applicable engine, do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-12-010-002-H01

(5) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-12-020-004-H01

(6) If the upper hydraulic actuator is to be removed, remove the thrust reverser position transmitter (RVDT) from the upper hydraulic actuator before you continue.

NOTE: When other (multiple) actuators are to be removed, removal of the position transmitter (RVDT) will keep the RVDT at the zero, stowed position so that re-rig to zero position will not be necessary.

(a) Do this task: Thrust Reverser Position Transducer (RVDT) Removal, TASK 78-36-03-000-801-H01.

SUBTASK 78-34-12-980-001-H01

(7) Manually extend the applicable thrust reverser sleeve approximately 1.00 inch (2.54 cm).

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) After the thrust reverser sleeve is extended, remove the deactivation pin from the bypass valve handle on the isolation valve.

NOTE: The bypass valve must be closed if thrust reverser hydraulic components or hydraulic tubing are removed. If the bypass valve is not closed, hydraulic fluid from the hydraulic system reservoir will drain through the return line when the components or tubing are removed.

SUBTASK 78-34-12-010-003-H01

(8) Remove the access panel [6] for the lower actuator rod end.

(a) Remove the six bolts [8] to remove these access panels:

1) Remove the applicable access panels:

Number	Name/Location
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

H. Lower Actuator Removal

SUBTASK 78-34-12-616-001-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(1) Drain the retract hydraulic line and sync shaft tube (extend hydraulic line) before you remove the actuator, the retract tubes or the sync shaft tubes.

(a) Disconnect the retract and extend hydraulic flexhoses at the strut hydraulic fittings.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic tubes on the thrust reverser.

1) Install the protection caps on the actuator port and the hydraulic line.

(b) At the lower actuator, remove the plug [95] in the actuator extend port C or D and the plug [92] in the actuator retract port A or B (Figure 402).

1) Remove the plugs that are near the ground.

2) Use a cotton wiper, G00034 or rag around the plug and the wrench to catch the hydraulic fluid spray.

(c) Catch the hydraulic fluid that drains from the actuator and the retract and extend hydraulic lines in a 5 gallon (19 liter) hydraulic fluid resistant container, STD-1110.

(d) Install the plug [95] and the plug [92] in the actuator ports.

1) If the actuator is to be sent for component repair, you should attach a note that states the plugs are not tightened and the packing was not replaced.

2) If the same actuator will be installed again, replace the packing and install the plugs.

a) The instructions for the replacement of the packing and the installation of the plugs are in this task: Thrust Reverser Lower Actuator Installation, TASK 78-34-12-400-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-030-001-H01

(2) Remove the sync shaft and tubing [9] between the center actuator [24] and the lower actuator [14].

(a) Do this task: Thrust Reverser Sync Shaft and Tubing Removal, TASK 78-34-13-000-801-H01.

SUBTASK 78-34-12-030-002-H01

(3) Remove the sync lock/manual drive unit [18] from the lower actuator.

(a) Do this task: Thrust Reverser Sync Lock/Manual Drive Unit Removal, TASK 78-34-10-000-801-H01.

SUBTASK 78-34-12-020-001-H01

(4) Remove the lower actuator [14] (Figure 401):

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

(a) Disconnect the electrical connector [19] from the proximity sensor on the lower actuator [14].

1) Install the protection caps on the electrical connector and the proximity sensor.

(b) Loosen or remove the clamp blocks for the hydraulic retract line [22] on the actuator (Figure 403).

1) Remove the two bolts [45], washers [46], upper retainer [44], clamp block [42] and clamp block [43], spacers [47], lower retainer [41] and shim [48] to disassemble the clamp blocks which attach the retract line [22].

NOTE: Disassemble a sufficient number of clamp blocks to disconnect the retract line from the lower actuator without too much force.

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(c) Disconnect the retract line [22] from the lower actuator [14].

1) Follow this general practice when you remove the hydraulic lines; Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

2) Use a cotton wiper, G00034 or rag around the retract line and the wrench to catch the hydraulic fluid.

3) Catch the hydraulic fluid that drains from the actuator in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

4) Install the protection caps on the actuator port and the hydraulic line.

(d) Disconnect the actuator rodend from the thrust reverser sleeve.

NOTE: Do not drop the parts into the thrust reverser sleeve.

1) Remove the nut [7], two washers [4], bushing [5], and bolt [3] that attaches the actuator rod end [1] to the clevis [2].

(e) Remove the bolts [10] and washers [11] which hold the gimbal pins [12].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Remove the two gimbal pins [12].

CAUTION

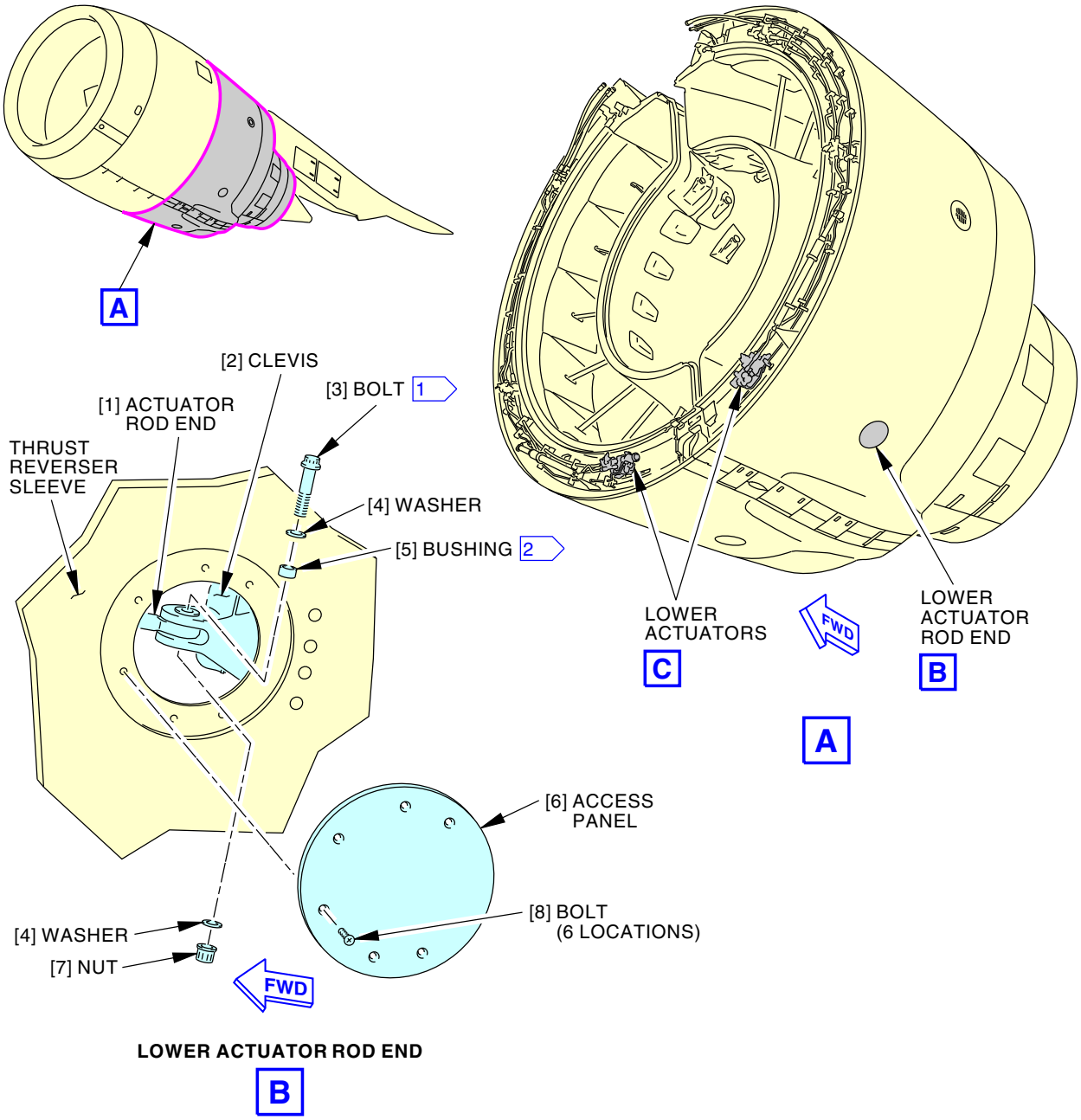
DO NOT HIT, OR LET THE ACTUATOR FALL ON THE UNLOCK HANDLE WHEN IT IS IN THE UNLOCKED POSITION. DAMAGE TO THE ACTUATOR SHAFT CAN OCCUR.

(g) Remove the lower actuator [14] from the thrust reverser.

NOTE: Keep the actuator to use the hydraulic fittings for the replacement actuator in the installation task.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



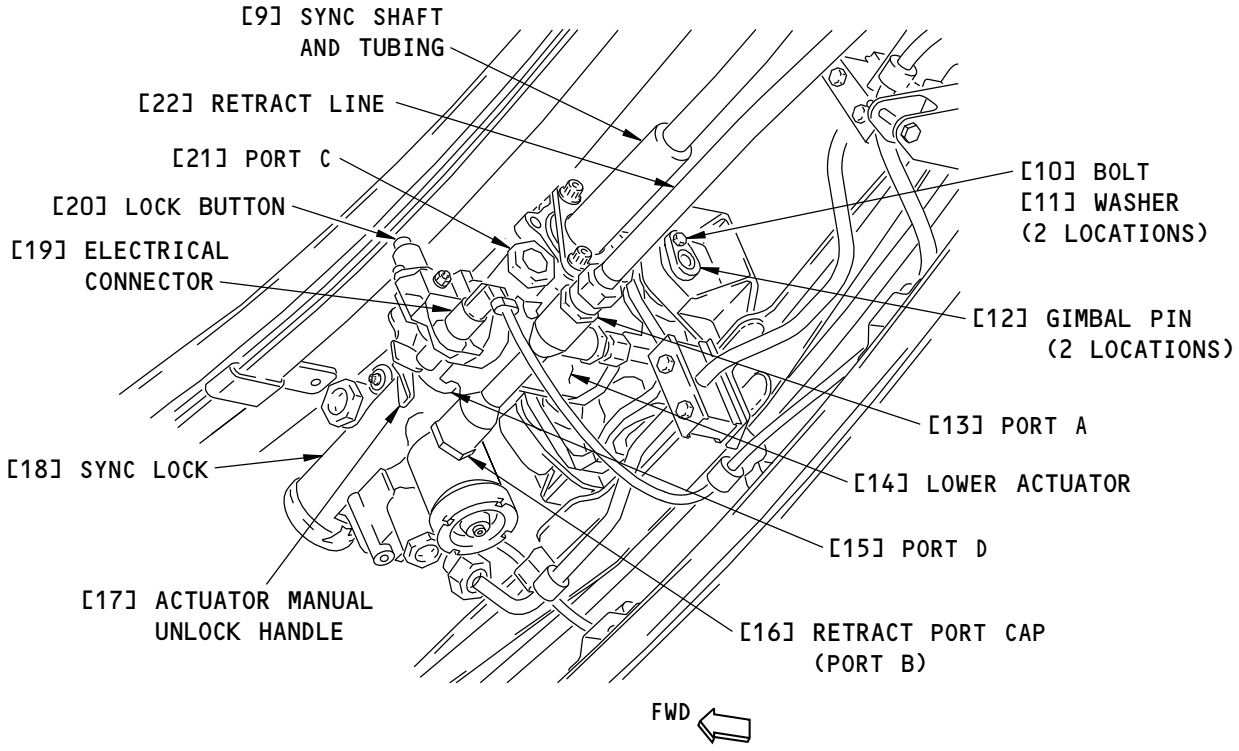
1 INSTALL THE BOLT ON THE TOP SIDE OF THE FITTING.

2 LEFT THRUST REVERSER IS SHOWN.
ON THE RIGHT THRUST REVERSER, INSTALL THE BUSHING FROM THE BOTTOM SIDE.

M94996 S0000102905_V4

Thrust Reverser Lower Actuator Installation
Figure 401/78-34-12-990-802-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



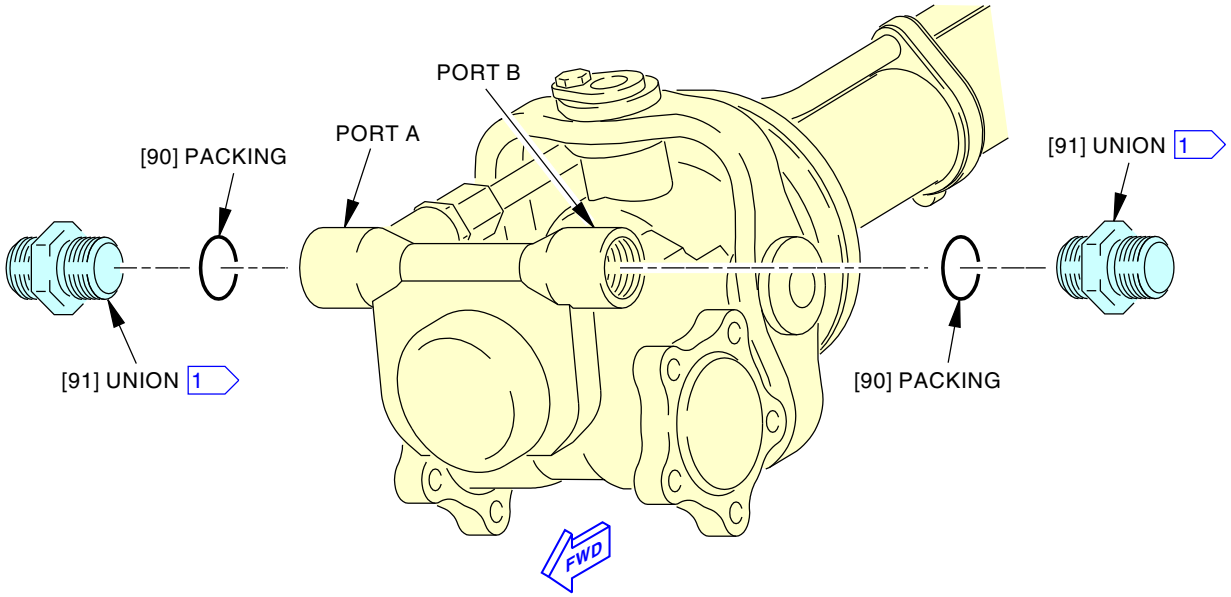
LEFT LOWER ACTUATOR
(RIGHT LOWER ACTUATOR IS OPPOSITE)

B

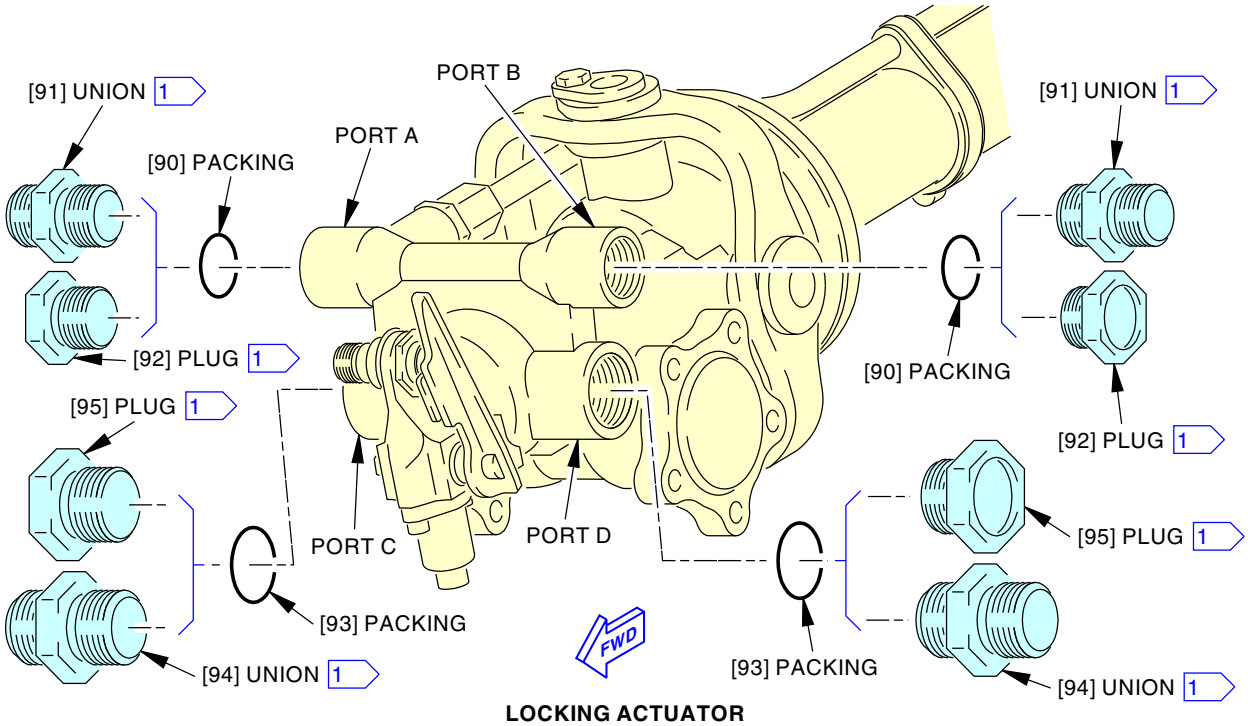
M07546 S0004286499_V1

Thrust Reverser Lower Actuator Installation
Figure 401/78-34-12-990-802-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NON-LOCKING ACTUATOR



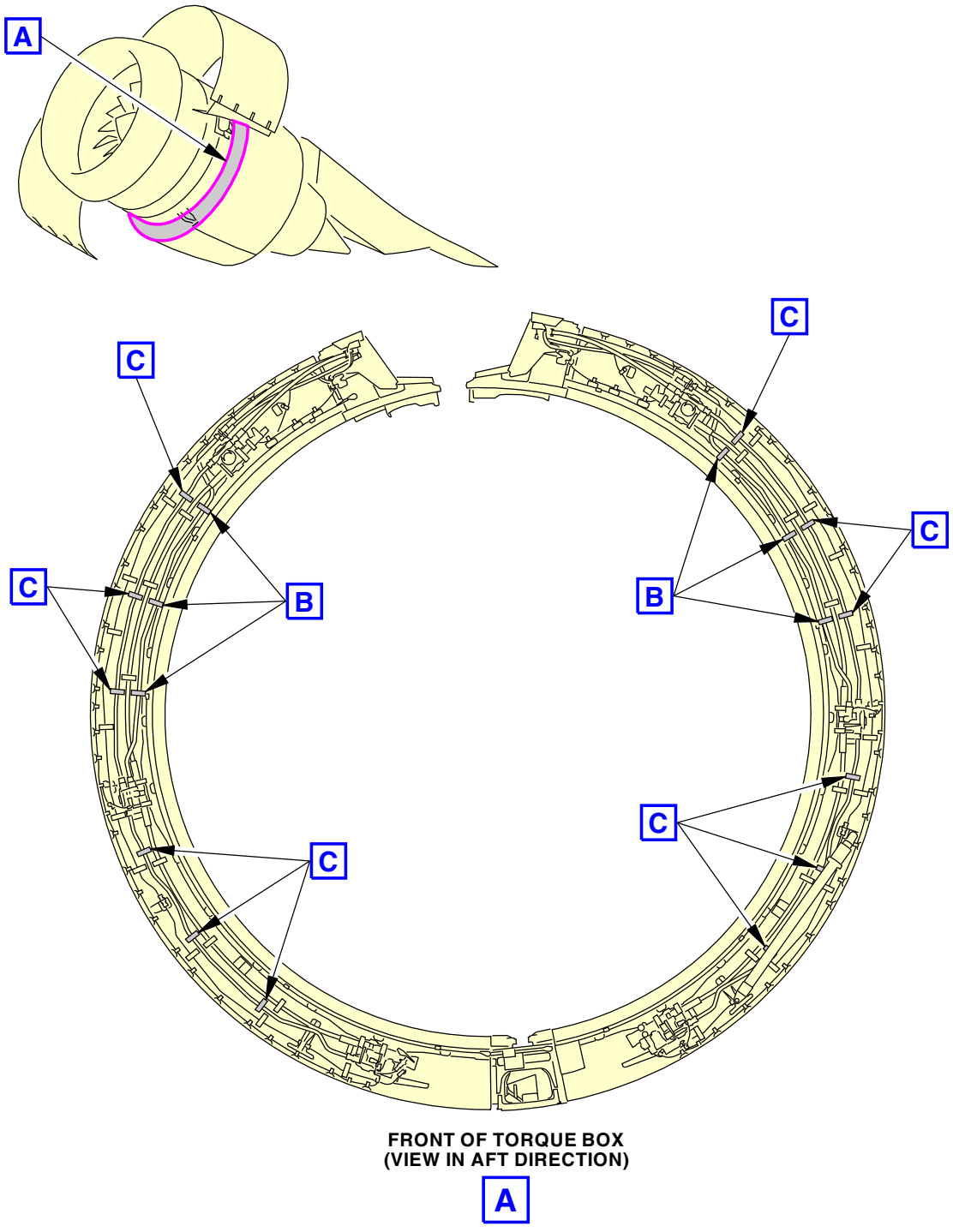
LOCKING ACTUATOR

1 SEE TABLE IN PROCEDURE FOR ACTUATOR FITTING CONFIGURATION

M07556 S0004286509_V3

Actuator Hydraulic Port Preparation
Figure 402/78-34-12-990-811-H01

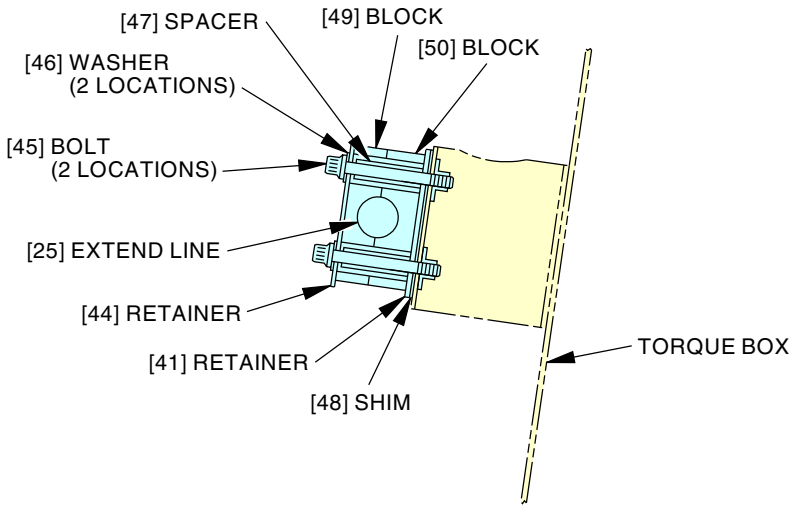
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07554 S0004286507_V2

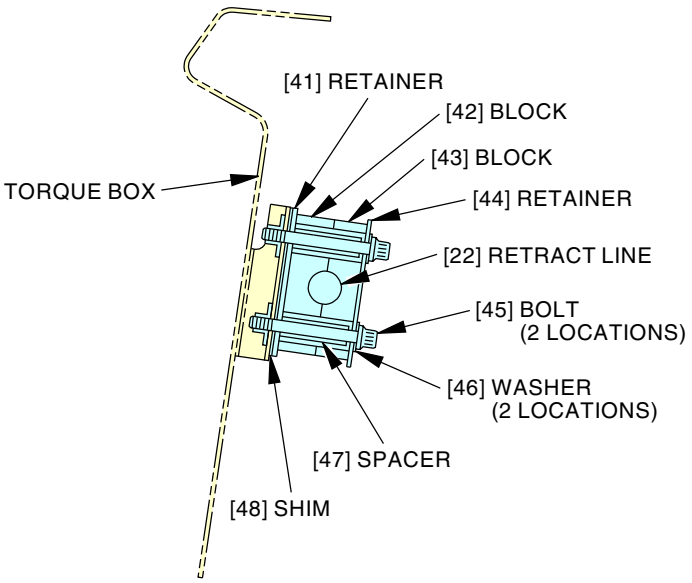
Hydraulic Actuator Tubing Clamp Block Installation
Figure 403/78-34-12-990-812-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



TYPICAL CLAMP INSTALLATION FOR EXTEND LINE TUBES

B



TYPICAL CLAMP INSTALLATION FOR RETRACT LINE TUBES

C

M07555 S0004286508_V2

Hydraulic Actuator Tubing Clamp Block Installation
Figure 403/78-34-12-990-812-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-12-400-801-H01

3. Thrust Reverser Lower Actuator Installation

(Figure 401, Figure 402, Figure 403)

A. General

(1) After you install the lower actuator, you must do the operational test for the thrust reverser.

(2) A standard locking actuator can be used at all four locking actuator positions if the correct fittings are installed.

(3) The hydraulic actuators on the thrust reversers for GE90-115 series engines have a non-symmetrical forged gimbal. Hydraulic actuators on the thrust reversers for GE90-70/-80/-90 series engines have a symmetrical gimbal.

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-10-400-801	Flexible Hose Installation (P/B 401)
20-10-19-000-801	O-Rings Removal (P/B 401)
20-10-19-400-801	O-Rings Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-34-10-400-801-H01	Thrust Reverser Sync Lock/Manual Drive Unit Installation (P/B 401)
78-34-13-400-801-H01	Thrust Reverser Sync Shaft and Tubing Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00316	Solvent - Aliphatic Naphtha (For Organic Coatings)	TT-N-95 Type I, ASTM D-3735 Type I
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02061	Marker - Permanent, Felt Tip Pen	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

F. Lower Actuator Installation

SUBTASK 78-34-12-860-001-H01

WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Make sure that the deactivation of the thrust reverser was done.

(a) Refer to Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00

SUBTASK 78-34-12-980-002-H01

(2) Make sure that the applicable thrust reverser sleeve is extended approximately 1.0 inch (2.54 cm).

(a) Refer to this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-34-12-430-009-H01

(3) If necessary, connect the hydraulic flexhoses that were disconnected to drain the actuation system.

NOTE: This step is repeated in the installation of the sync shaft and tubing, the upper, center and lower hydraulic actuators, and the sync lock/manual drive unit and can be combined with those installation procedures.

(a) Follow this general practice when you connect the hydraulic flexhose, do this task: Flexible Hose Installation, TASK 20-10-10-400-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(b) Connect the extend flexhose to the strut hydraulic fitting.

1) Tighten the hose nut to 855-945 pound-inches (97-107 newton-meters).

(c) If necessary, connect the retract flexhose to the strut hydraulic fitting.

NOTE: If an external hydraulic service cart is to be used to provide retract hydraulic pressure for the installation, it is not necessary to connect the retract flexhose at this time.

1) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

(d) Do not adjust the position of the flexhose clamp block on the left thrust reverser hoses at this time.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and do a check of the clearance between the retract flexhose and the engine anti-ice duct.

SUBTASK 78-34-12-430-001-H01

(4) Prepare the lower actuator [14] for the installation position (Figure 402):

NOTE: A standard locking actuator can be used at all four locking actuator positions if the correct hydraulic fittings are installed. Refer to the table below for the correct fittings in the four hydraulic ports.

(a) Install the correct hydraulic fitting in the applicable actuator port A [13], port B [16], port C [21] and port D [15] (Table 401).

NOTE: If some of the fittings need to be replaced with different fittings, you can remove the fittings from the actuator that was removed.

1) Remove and discard the old packing.

a) Refer to this general procedure: O-Rings Removal, TASK 20-10-19-000-801.

2) Install the new packing [90] on the union [91] or plug [92] and new packing [93] on the union [94] or plug [95].

a) Refer to this general procedure: O-Rings Installation, TASK 20-10-19-400-801.

b) Make sure the packing grooves and adjacent surfaces are free of cuts, scratches, dents, and all deposits of unwanted material.

c) Clean the seal surfaces and grooves with a clean cotton wiper, G00034 moistened with solvent, B00316.

d) Wipe the all solvent off the surfaces with a clean, dry cloth before the solvent becomes dry.

e) Make sure the new packing is free of nicks, cuts, grooves, excess flash or other defects.

f) Dry wipe the packing with a clean, dry cotton wiper, G00034 to remove all unwanted material.

g) Lubricate the new packing with MCS 352B fluid, D00054 or hydraulic fluid, D00153.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

h) Do not stretch the packing so that the inner diameter is expanded more than 50 percent when you install it.

i) Make sure the packings are not twisted in their grooves.

j) Make sure the packings are not pinched.

3) Install the applicable fittings to the actuator port A [13], port B [16], port C [21] and port D [15].

a) For port A and port B, tighten the fitting to 996-1110 inch-pounds (83-93 pound-feet) (113-126 newton-meters).

b) For port C and port D, tighten the fitting to 1270-1410 inch-pounds (106-118 pound-feet) (144-160 newton-meters).

Table 401/78-34-12-993-801-H01 Lower Actuator Hydraulic Fittings and Packing

ACTUATOR LOCATION AND PART NUMBER	PORT A	PORT B	PORT C	PORT D
Left, Lower 315W1660-11	Union	Plug	Plug	Plug
	MS21902J10	AS5169J10	AS5169J12	AS5169J12
	Packing	Packing	Packing	Packing
	NAS1612-10A	NAS1612-10A	NAS1612-12A	NAS1612-12A
Right, Lower 315W1660-12	Plug	Union	Plug	Plug
	AN5169J10	MS21902J10	AN5169J12	AN5169J12
	Packing	Packing	Packing	Packing
	NAS1612-10A	NAS1612-10A	NAS1612-12A	NAS1612-12A
NOTE: Actuator fittings are changed from the standard actuator S315W360-53. Packing NAS1612-10A/-12A is preferred to NAS1602-910/-912.				

4) Mark the part number for the actuator next to the vendor placard with a marker, G02061; do not cover or change the vendor placard.

NOTE: Use a pen or stamp that uses permanent ink with a contrast color.

SUBTASK 78-34-12-420-001-H01

(5) Install the lower actuator [14] (Figure 401).

(a) Insert the lower actuator through the torque box on the thrust reverser.

(b) Install the two gimbal pins [12], bolts [10] and washers [11] to the fitting on the thrust reverser.

1) Tighten the bolts to 72-88 inch-pounds (8.1-9.9 newton-meters).

(c) Unlock the lower actuator [14]:

1) Move and hold the actuator manual unlock handle [17] to the unlocked position.

2) Push and hold the lock button [20].

3) Release the manual unlock handle.

4) Release the lock button.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT TURN THE ACTUATOR ROD END. THE ACTUATOR LENGTH IS SET. IF YOU TURN THE ACTUATOR ROD END, DAMAGE TO THE ACTUATOR OR THE STRUCTURE CAN OCCUR.

(d) Pull the lower actuator rod end [1] straight out 8-12 inches (203-305 millimeters) by hand to the align the rod end with the clevis [2].

(e) Connect the actuator rod end to the thrust reverser sleeve.

NOTE: Do not drop the fasteners into the thrust reverser sleeve.

NOTE: The position of the bushing [5] changes because the clevis fitting, used in the left and right thrust reverser sleeve, is the same. The clevis fitting is installed upside down in the opposite sleeve.

1) Install the bolt [3], washer [4], bushing [5], washer [4] and nut [7] through the clevis and the rod end of the lower actuator.

NOTE: The nut is a self-locking nut.

a) For the left thrust reverser, install the bushing [5] under the bolt head of bolt [3].

b) For the right thrust reverser, install the bushing [5] under the nut [7].

c) Install the bolt [3] with the bolt head on the top side of the clevis [2].

NOTE: The bolt head will prevent the disconnection of the rod end from the clevis if the nut was missing.

d) Tighten the nut [7] to a value between 1400 in-lb (158 N·m) and 1900 in-lb (215 N·m).

ARO ALL; THRUST REVERSERS 315W1298-23 AND ON

2) Install the bolt [3], washer [4], bushing [5], washer [4] and nut [7] through the clevis and the rod end of the lower actuator.

NOTE: The nut is a self-locking nut.

a) For the left thrust reverser, install the bushing [5] under the bolt head of bolt [3].

b) For the right thrust reverser, install the bushing [5] under the nut [7].

c) Install the bolt [3] with the bolt head on the top side of the clevis [2].

NOTE: The bolt head will prevent the disconnection of the rod end from the clevis if the nut was missing.

d) Tighten the nut [7] to a value between 650 in-lb (73 N·m) and 750 in-lb (85 N·m).

ARO ALL

(f) Install the retract line [22] to the lower actuator [14] (Figure 403):

1) Follow this general practice when you install the hydraulic lines; Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do these steps to adjust the clamp blocks and prevent hydraulic tubing preload.

NOTE: The clamp blocks and the retainers are different thicknesses and can be reversed to increase or decrease the offset from the brackets. All or any combination of these steps can be used to get the correct alignment for the sync shaft tubing between the actuators.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Exchange the location of the clamp blocks.

b) Exchange the location of the white and grey retainers.

c) Remove the shim laminations or remove the shim under the clamp blocks.

d) Apply one coat primer, C00259 to the shim and install wet or dry.

CAUTION

DO NOT USE THE WRENCH ON THE NUT TO PULL THE TUBE INTO ALIGNMENT. DAMAGE TO THE TUBING CAN OCCUR.

3) Install the retract line [22] between the center actuator [24] and lower actuator [14].

a) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

b) Manually align the retract line tubing with the end points and the clamp blocks.

c) Align and seat the tubing sleeve in the fitting.

d) Manually tighten the tube nuts, then do a check for tube alignment.

e) Tighten the retract line [22] tube nut to 665-735 inch-pounds (75-83 newton-meters).

4) Install the clamp blocks.

a) Install the shim [48], lower retainer [41], clamp block [42] and clamp block [43], two spacers [47]], and upper retainer [41] with two bolts [45]] and washers [46] under the bolt head.

b) Tighten the bolts to 65-75 inch-pounds (7.3-8.5 newton-meters).

(g) Remove the protection caps from the electrical connector [19] and the proximity sensor.

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(h) Connect the electrical connector [19] to the proximity sensor on the lower actuator [14].

SUBTASK 78-34-12-430-002-H01

(6) Install the sync lock/manual drive unit [18] on the lower actuator [14].

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

NOTE: This procedure can be combined with the installation of the sync shafts and tubing.

(a) Refer to this task: Thrust Reverser Sync Lock/Manual Drive Unit Installation, TASK 78-34-10-400-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-430-003-H01

(7) Install the sync shaft and tubing [9] on the lower actuator [14].

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

NOTE: This procedure can be combined with the installation of the sync lock/manual drive unit.

(a) Refer to this task: Thrust Reverser Sync Shaft and Tubing Installation, TASK 78-34-13-400-801-H01.

SUBTASK 78-34-12-980-003-H01

(8) Manually extend and retract the thrust reverser.

NOTE: It is necessary to make sure the thrust reverser moves smoothly and does not bind or jam before hydraulic power is used to check the operation of the thrust reverser.

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

(b) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

G. Lower Actuator Installation Test

NOTE: The steps that follow can be combined with the installation tests for the sync lock/manual drive unit, the sync shaft and tubing, and the thrust reverser position transducer (RVDT).

SUBTASK 78-34-12-651-001-H01

(1) Do this task: Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-12-440-002-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-12-710-001-H01

(3) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser six times to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-12-210-002-H01

(4) Examine the thrust reverser actuation system for hydraulic fluid leakage.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-220-002-H01

(5) Make sure the minimum clearance between the engine anti-ice duct and the retract line flexhose on the left thrust reverser half is 1.0 inch (25.4 millimeters).

NOTE: This step is repeated in the installation procedure for the sync shaft and tubing, the upper, center and lower hydraulic actuators and the sync lock/manual drive unit and can be combined with those procedures.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and to do a check of the clearance between the retract flexhose and the engine anti-ice duct.

(a) Remove the flexhose clamp block with two screws, washers, and nuts.

(b) Adjust the location of flexhose clamp block to a position 15.2-15.6 inches (386.1-396.2 millimeters) from the upper thrust reverser bracket to prevent the interference between the retract flexhose and the engine anti-ice duct.

(c) Install the flexhose clamp block with two screws, washers, and nuts.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-12-410-002-H01

(1) Install the access access panel [6] with six bolts [8].

NOTE: The bolts can be one grip length longer or shorter but the door must be installed with bolts that are all the same grip length.

(a) Apply grease, D00633 to the bolt shank and bolt threads before installation.

(b) Tighten the bolts to 65-100 inch-pounds (7.3-11.3 newton-meters) to install these panels:

1) Install the applicable access panels:

Number	Name/Location
415DL	Left Thrust Reverser Lower Actuator Panel, Left Engine
416DR	Right Thrust Reverser Lower Actuator Panel, Left Engine
425DL	Left Thrust Reverser Lower Actuator Panel, Right Engine
426DR	Right Thrust Reverser Lower Actuator Panel, Right Engine

SUBTASK 78-34-12-410-003-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-12-440-008-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801

SUBTASK 78-34-12-741-003-H01

(4) Clear the ENG REVERSER status messages.

(a) Do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-12-000-802-H01

4. Thrust Reverser Center Actuator Removal

(Figure 404, Figure 405, and Figure 406)

A. General

(1) The thrust reverser center actuator is a locking actuator.

(2) The hydraulic actuators on the thrust reversers for GE90-115 series engines have a non-symmetrical forged gimbal. Hydraulic actuators on the thrust reversers for GE90-70/-80/-90 series engines have a symmetrical gimbal.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-34-13-000-801-H01	Thrust Reverser Sync Shaft and Tubing Removal (P/B 401)
78-36-03-000-801-H01	Thrust Reverser Position Transducer (RVDT) Removal (P/B 401)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)
STD-1110	Container - Hydraulic Fluid Resistant, 5 Gallon (19 Liter)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-34-12-040-004-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-34-12-040-011-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-34-12-040-005-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-12-864-002-H01

(4) For the applicable engine, do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-12-010-004-H01

(5) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-12-020-005-H01

(6) If the upper hydraulic actuator is to be removed, remove the thrust reverser position transmitter (RVDT) from the upper hydraulic actuator before you continue.

NOTE: When other (multiple) actuators are to be removed, removal of the position transmitter (RVDT) will keep the RVDT at the zero, stowed position so that re-rig to zero position will not be necessary.

(a) Do this task: Thrust Reverser Position Transducer (RVDT) Removal, TASK 78-36-03-000-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-980-004-H01

(7) Manually extend the applicable thrust reverser sleeve approximately 1.0 inch (2.54 cm).

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

(b) After the thrust reverser sleeve is extended, remove the deactivation pin from the bypass valve handle on the isolation valve.

NOTE: The bypass valve in the isolation valve must be closed if thrust reverser hydraulic components or hydraulic tubing are removed. If the bypass valve is not closed, hydraulic fluid from the hydraulic system reservoir will drain through the return line when the components or tubing are removed.

SUBTASK 78-34-12-010-005-H01

(8) Remove the applicable access panel [23] for the center actuator rod end [1].

(a) Remove the seven bolts [8] to remove these access panels:

1) Open the applicable access panels:

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

H. Center Actuator Removal

SUBTASK 78-34-12-616-002-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(1) Drain the retract hydraulic line and sync shaft tube (extend hydraulic line) before you remove the actuator, the retract tubes or the sync shaft tubes.

(a) Disconnect the retract and extend hydraulic hoses at the strut hydraulic fittings.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic tubes on the thrust reverser.

1) Install the protection caps on the actuator port and the hydraulic line.

(b) At the lower actuator, remove the plug [95] in the actuator extend port C or D and the plug [92] in the actuator retract port A or B (Figure 405).

1) Remove the plugs that are near the ground.

2) Use a cotton wiper, G00034 or rag around the plug and the wrench to catch the hydraulic fluid spray.

(c) Catch the hydraulic fluid that drains from the actuator and the retract and extend hydraulic lines in a 5 gallon (19 liter) hydraulic fluid resistant container, STD-1110.

(d) Install the plug [95] and the plug [92] in the actuator ports.

1) If the actuator is to be sent for component repair, you should attach a note that states the plugs are not tightened and the packing was not replaced.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) If the same actuator will be installed again, replace the packing and install the plugs.

a) The instructions for the replacement of the packing and the installation of the plugs are in this task: Thrust Reverser Lower Actuator Installation, TASK 78-34-12-400-801-H01.

SUBTASK 78-34-12-030-003-H01

(2) Remove the sync shaft and tubing [9] between the center actuator [24] and the lower actuator [14].

(a) Do this task: Thrust Reverser Sync Shaft and Tubing Removal, TASK 78-34-13-000-801-H01.

SUBTASK 78-34-12-030-004-H01

(3) Remove the sync shaft and tubing [9] between the upper actuator [31] and the center actuator [24].

(a) Do this task: Thrust Reverser Sync Shaft and Tubing Removal, TASK 78-34-13-000-801-H01.

SUBTASK 78-34-12-020-002-H01

(4) Remove the center actuator [24] (Figure 404):

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

(a) Disconnect the electrical connector [19] from the proximity sensor on the center actuator [24].

1) Install the protection caps on the electrical connector and the proximity sensor.

(b) Loosen or remove the clamp blocks for the hydraulic retract line [22] on the both sides of the center actuator (Figure 406).

1) Remove the two bolts [45], washers [46] upper retainer [44], clamp block [42] and clamp block [43], spacers [47], lower retainer [41] and shim [48] to disassemble the clamp blocks which attach the retract line [22].

NOTE: Disassemble a sufficient number of clamp blocks to disconnect the retract line from the center actuator without too much force.

(c) Loosen or remove the clamp blocks for the hydraulic extend line [25] on the upper side of the center actuator.

1) Remove the two bolts [45], washers [46] upper retainer [44], clamp block [49] and clamp block [50], spacers [47], lower retainer [41], and shim [48] to disassemble the clamp blocks which attach the hydraulic extend line [25].

NOTE: Disassemble a sufficient number of clamp blocks to disconnect the extend line from the center actuator without too much force.

CAUTION BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(d) Disconnect the retract line [22] from the upper and the lower end of the center actuator [24].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Follow this general practice when you remove the hydraulic lines; Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

2) Use a cotton wiper, G00034 or rag around the retract line and the wrench to catch the hydraulic fluid spray.

3) Catch the hydraulic fluid that drains from the actuator in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

(e) Disconnect the extend line [25] from the center actuator [24].

1) Use a cotton wiper, G00034 or rag around the extend line and the wrench to catch the hydraulic fluid spray.

2) Catch the hydraulic fluid that drains from the actuator in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

(f) Install the protection caps on the actuator ports and the hydraulic lines.

(g) Disconnect the actuator rod end [1] from the thrust reverser sleeve.

NOTE: Be careful to not drop the fasteners into the thrust reverser sleeve.

1) Remove the nut [7], washers [4], bushing [5] and bolt [3] that attach the actuator rod end [1] to the clevis [2].

(h) Remove the bolts [10] and washers [11] which hold the gimbal pin [12].

(i) Remove the two gimbal pins [12].

CAUTION

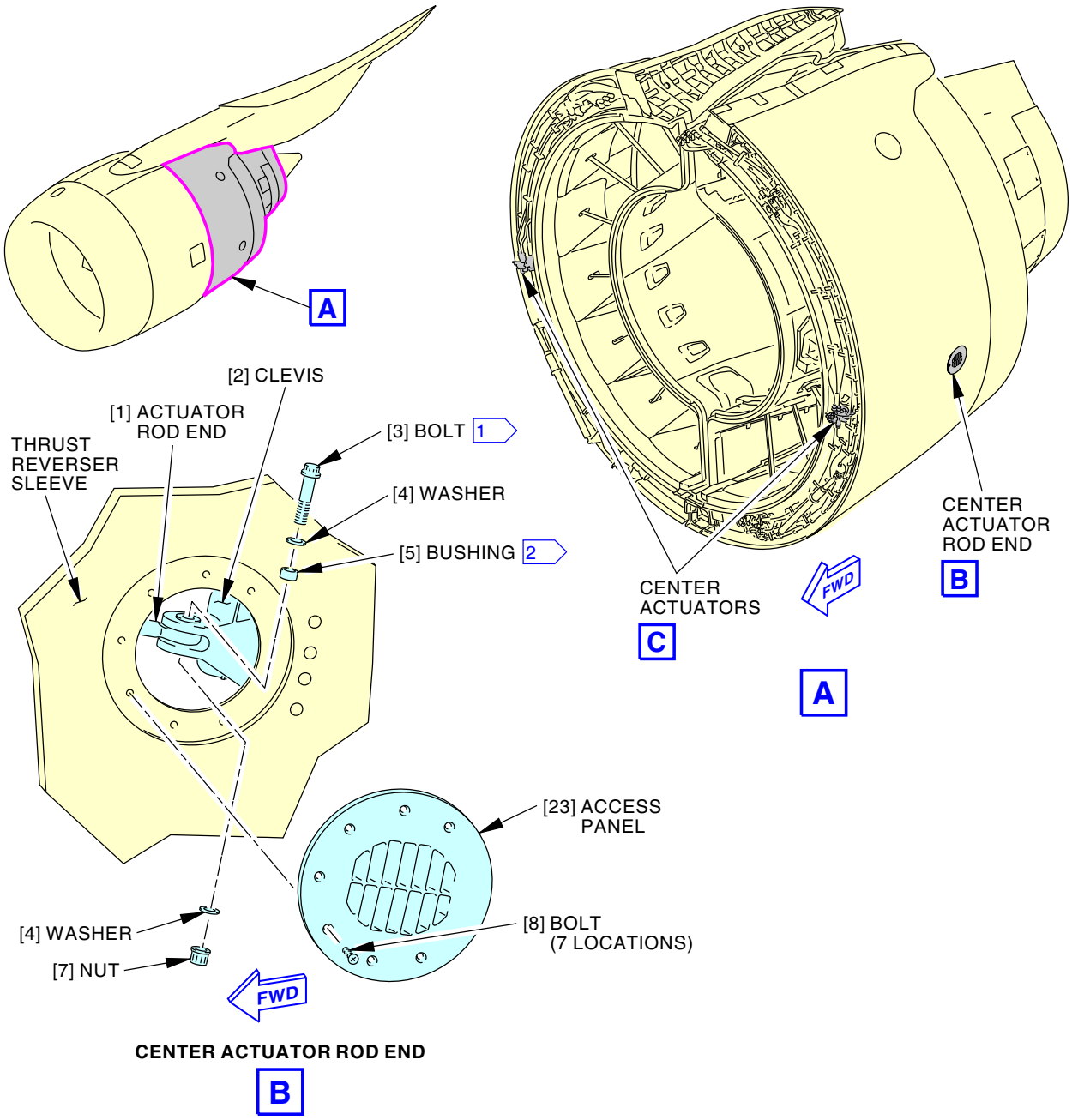
DO NOT HIT, OR LET THE ACTUATOR FALL ON THE UNLOCK HANDLE WHEN IT IS IN THE UNLOCKED POSITION. DAMAGE TO THE ACTUATOR SHAFT CAN OCCUR.

(j) Remove the center actuator [24] from the thrust reverser.

NOTE: Keep the actuator to use the hydraulic fittings for the replacement actuator in the installation task.

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



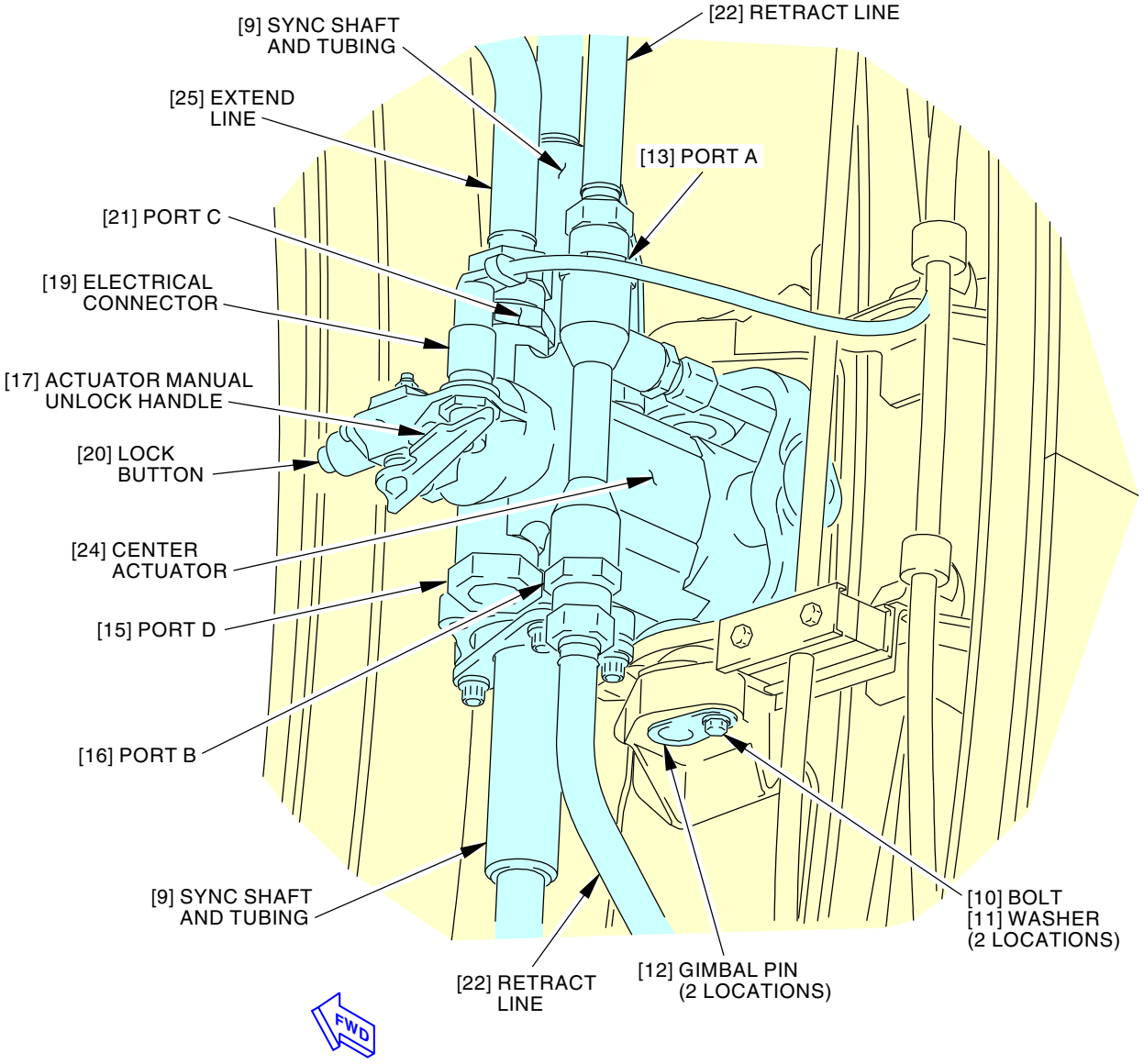
1 INSTALL THE BOLT ON THE TOP SIDE OF THE FITTING.

2 LEFT THRUST REVERSER IS SHOWN.
ON THE RIGHT THRUST REVERSER, INSTALL THE BUSHING FROM THE BOTTOM SIDE.

M95194 S0000100146_V4

Thrust Reverser Center Actuator Installation
Figure 404/78-34-12-990-805-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



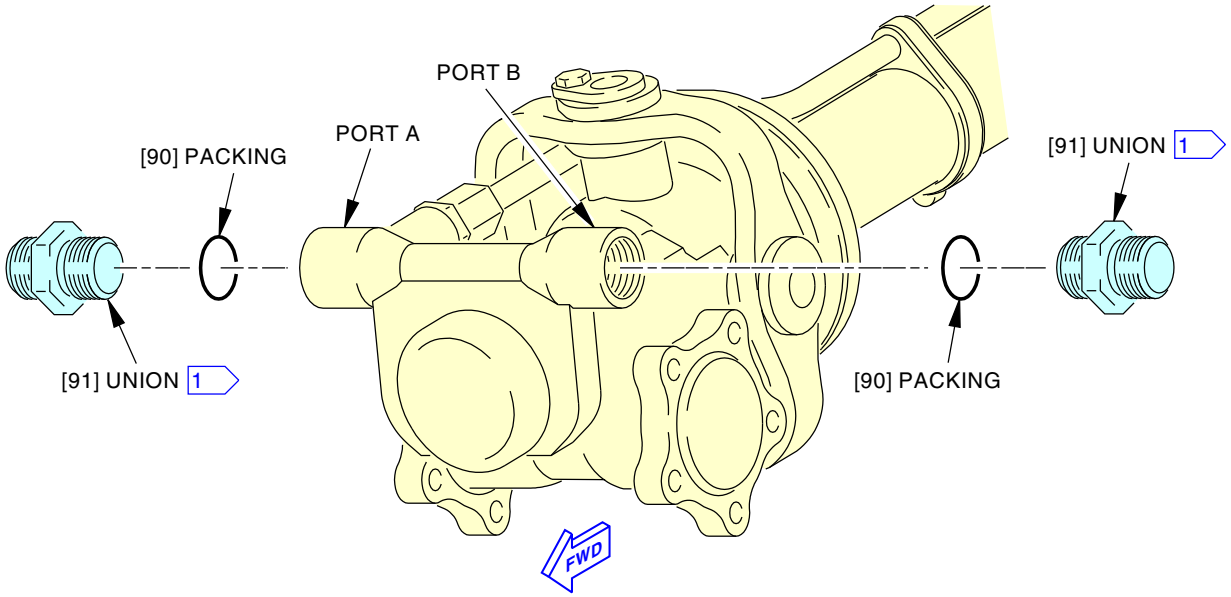
LEFT CENTER ACTUATOR
(RIGHT CENTER ACTUATOR IS OPPOSITE)

C

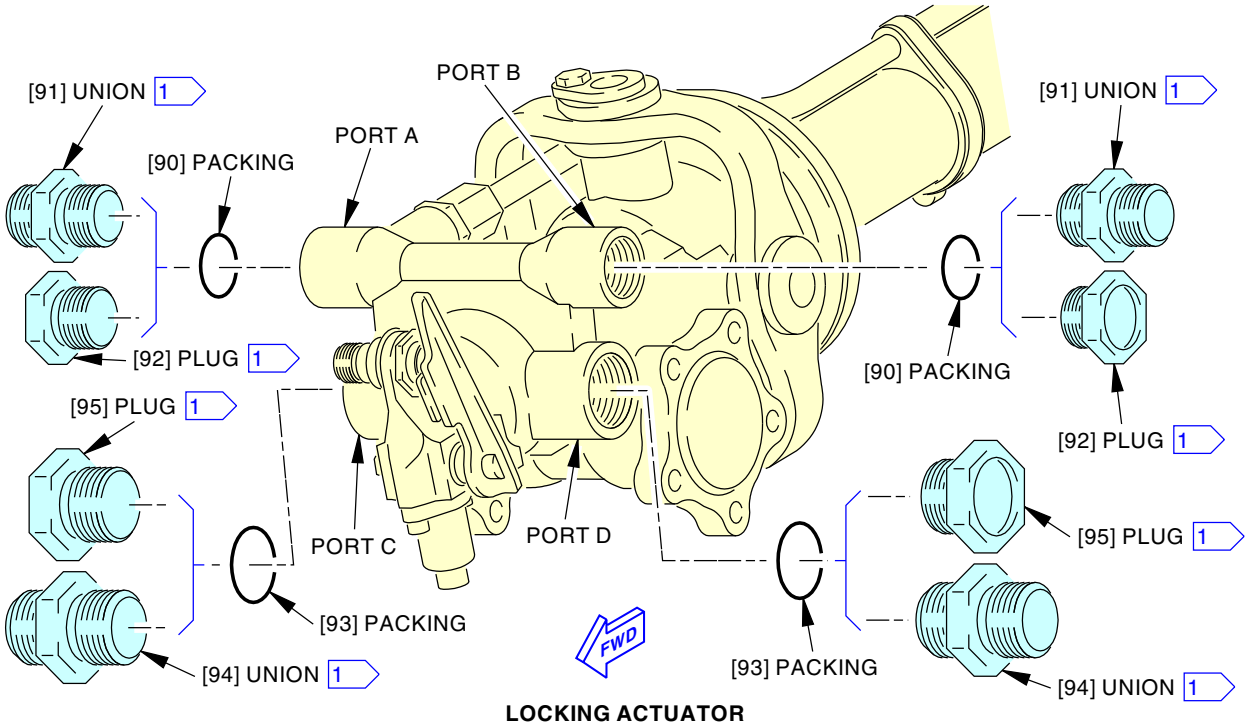
M07547 S0004286500_V2

Thrust Reverser Center Actuator Installation
Figure 404/78-34-12-990-805-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NON-LOCKING ACTUATOR



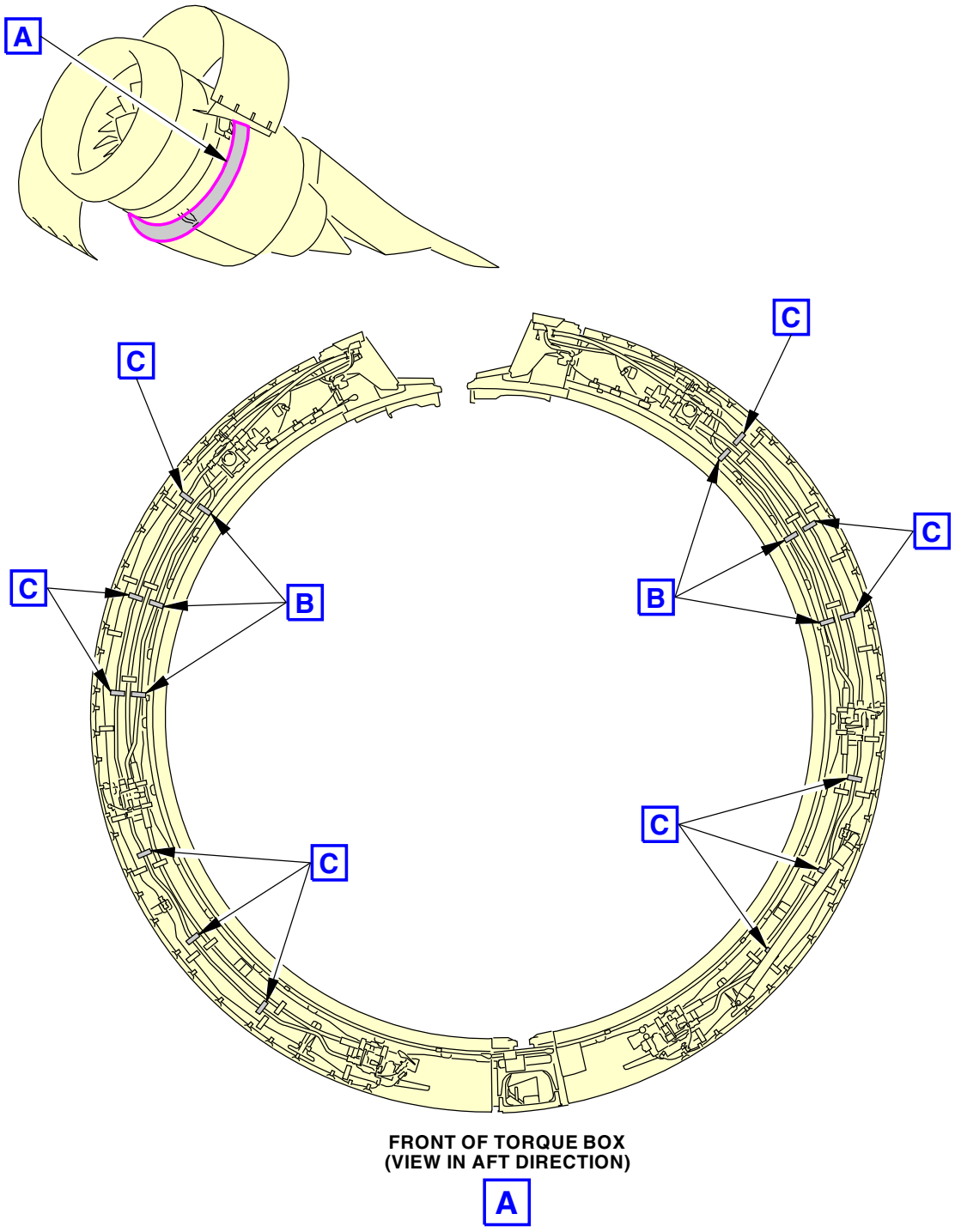
LOCKING ACTUATOR

1 SEE TABLE IN PROCEDURE FOR ACTUATOR FITTING CONFIGURATION

M07556 S0004286509_V3

Actuator Hydraulic Port Preparation
Figure 405/78-34-12-990-806-H01

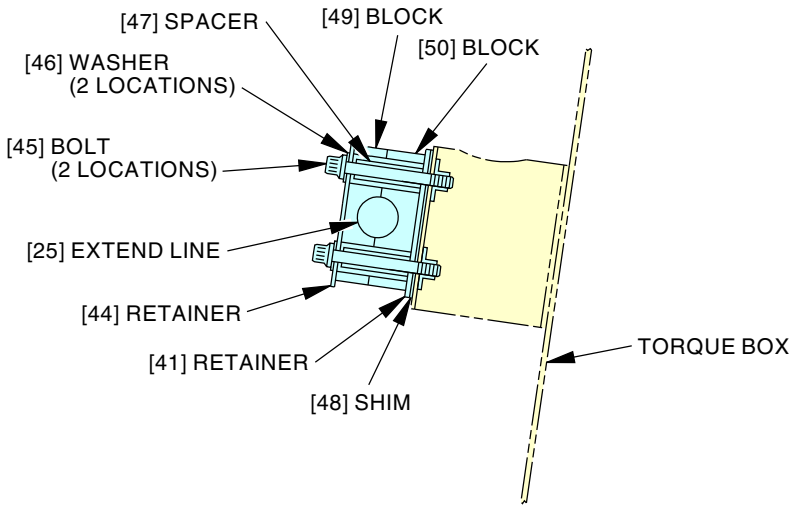
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07554 S0004286507_V2

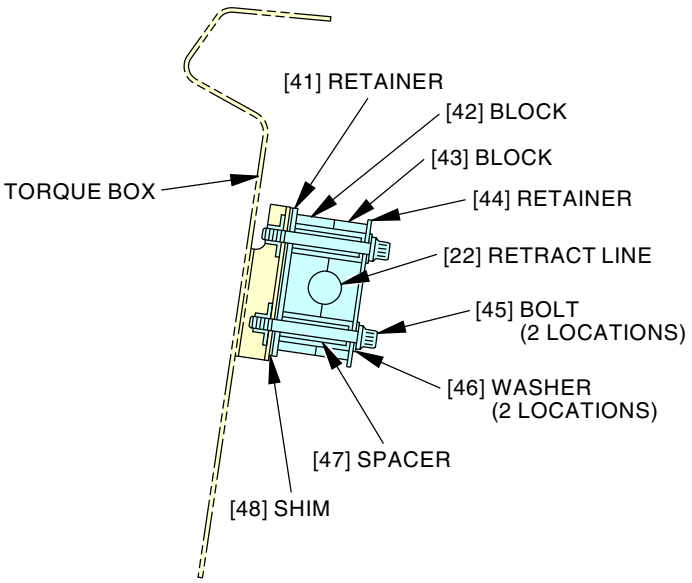
Hydraulic Actuator Tubing Clamp Block Installation
Figure 406/78-34-12-990-807-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



TYPICAL CLAMP INSTALLATION FOR EXTEND LINE TUBES

B



TYPICAL CLAMP INSTALLATION FOR RETRACT LINE TUBES

C

M07555 S0004286508_V2

Hydraulic Actuator Tubing Clamp Block Installation
Figure 406/78-34-12-990-807-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-12-400-802-H01

5. Thrust Reverser Center Actuator Installation

(Figure 404, Figure 405, Figure 406)

A. General

(1) After you install the center actuator, you must do the operational test for the thrust reverser.

(2) A standard locking actuator can be used at all four locking actuator positions if the correct fittings are installed.

(3) The hydraulic actuators on the thrust reversers for GE90-115 series engines have a non-symmetrical forged gimbal. Hydraulic actuators on the thrust reversers for GE90-70/-80/-90 series engines have a symmetrical gimbal.

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-10-400-801	Flexible Hose Installation (P/B 401)
20-10-19-000-801	O-Rings Removal (P/B 401)
20-10-19-400-801	O-Rings Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-34-13-400-801-H01	Thrust Reverser Sync Shaft and Tubing Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00316	Solvent - Aliphatic Naphtha (For Organic Coatings)	TT-N-95 Type I, ASTM D-3735 Type I
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02061	Marker - Permanent, Felt Tip Pen	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

F. Center Actuator Installation

SUBTASK 78-34-12-040-006-H01

WARNING: DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Make sure that the deactivation of the thrust reverser was done.

(a) Refer to this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-12-980-005-H01

(2) Make sure that the applicable thrust reverser sleeve is extended approximately 1.0 inch (2.54 cm).

(a) Refer to this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-34-12-430-010-H01

(3) If necessary, connect the hydraulic flexhoses that were disconnected to drain the actuation system.

NOTE: This step is repeated in the installation of the sync shaft and tubing, the upper, center and lower hydraulic actuators, and the sync lock/manual drive unit and can be combined with those installation procedures.

(a) Follow this general practice when you connect the hydraulic flexhose, do this task: Flexible Hose Installation, TASK 20-10-10-400-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(b) Connect the extend flexhose to the strut hydraulic fitting.

1) Tighten the hose nut to 855-945 pound-inches (97-107 newton-meters).

(c) If necessary, connect the retract flexhose to the strut hydraulic fitting.

NOTE: If an external hydraulic service cart is to be used to provide retract hydraulic pressure for the installation, it is not necessary to connect the retract flexhose at this time.

1) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

(d) Do not adjust the position of the flexhose clamp block on the left thrust reverser hoses at this time.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and do a check of the clearance between the retract flexhose and the engine anti-ice duct.

SUBTASK 78-34-12-430-004-H01

(4) Prepare the center actuator [24] for the installation position (Figure 405).

NOTE: A standard locking actuator can be used at all four locking actuator positions if the correct hydraulic fittings are installed. Refer to the table below for the correct fittings in the four hydraulic ports.

(a) Install the correct fitting in the applicable actuator port A [13], port B [16], port C [21] and port D [15] (Table 402).

NOTE: If it is necessary to replace some of the fittings with different fittings, you can remove the fittings from the actuator that was removed.

1) Remove and discard the old packing.

a) Refer to this general procedure: O-Rings Removal, TASK 20-10-19-000-801.

2) Install the new packing [90] on the union [91] or plug [92] and packing [93] on the union [94] or plug [95].

a) Refer to this general procedure:O-Rings Installation, TASK 20-10-19-400-801.

b) Make sure the packing grooves and adjacent surfaces are free of cuts, scratches, dents, and all deposits of unwanted material.

c) Clean the seal surfaces and grooves with a clean cotton wiper, G00034 moistened with solvent, B00316.

d) Wipe the all solvent off the surfaces with a clean, dry cloth before the solvent becomes dry.

e) Make sure the new packing is free of nicks, cuts, grooves, excess flash or other defects.

f) Dry wipe the packing with a clean, dry cotton wiper, G00034 to remove all unwanted material.

g) Lubricate the new packing with MCS 352B fluid, D00054 or hydraulic fluid, D00153.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

h) Do not stretch the packing so that the inner diameter is expanded more than 50 percent when you install it.

i) Make sure the packing are not twisted in their grooves.

j) Make sure the packing are not pinched.

3) Install the applicable fittings to the actuator port A [13], port B [16], port C [21] and port D [15].

a) For port A and port B, tighten the fitting to 996-1110 inch-pounds (83-93 pound-feet) (113-126 newton-meters).

b) For port C and port D, tighten the fitting to 1270-1410 inch-pounds (106-118 pound-feet) (144-160 newton-meters).

Table 402/78-34-12-993-802-H01 Center Actuator Hydraulic Fittings and Packing

ACTUATOR LOCATION AND PART NUMBER	PORT A	PORT B	PORT C	PORT D
Left, Center 315W1660-9	Union	Union	Union	Plug
	MS21902J10	MS21902J10	MS21902J12	AS5169J12
	Packing	Packing	Packing	Packing
	NAS1612-10A	NAS1612-10A	NAS1612-12A	NAS1612-12A
Right, Center 315W1660-10	Union	Union	Plug	Union
	MS21902J10	MS21902J10	AN5169J12	MS21902J12
	Packing	Packing	Packing	Packing
	NAS1612-10A	NAS1612-10A	NAS1612-12A	NAS1612-12A
NOTE: Actuator fittings are changed from the standard actuator S315W360-53. Packing NAS1612-10/-12 is preferred to NAS1602-910/-912				

4) Mark the part number for the actuator next to the vendor placard with a marker, G02061; do not cover or change the vendor placard.

NOTE: Use a pen or stamp that uses permanent ink with a contrast color.

SUBTASK 78-34-12-420-002-H01

(5) Install the center actuator [24] (Figure 404).

(a) Insert the center actuator through the torque box on the thrust reverser.

(b) Install the two gimbal pins [12], bolts [10] and washers [11] to the fitting on the thrust reverser.

1) Tighten the bolts to 72-88 inch-pounds (8.1-9.9 newton-meters).

(c) Unlock the center actuator [24]:

1) Move and hold the actuator manual unlock handle [17] to the unlocked position.

2) Push and hold the lock button [20].

3) Release the manual unlock handle.

4) Release the lock button.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT TURN THE ACTUATOR ROD END. THE ACTUATOR LENGTH IS SET. IF YOU TURN THE ACTUATOR ROD END, DAMAGE TO THE ACTUATOR OR THE STRUCTURE CAN OCCUR.

(d) Pull the center actuator rod end [1] straight out 8-12 inches (203-305 millimeters) by hand to the align the rod end with the clevis [2].

(e) Connect the actuator rodend to the thrust reverser sleeve.

NOTE: Do not drop the fasteners into the thrust reverser sleeve.

NOTE: The position of the bushing [5] changes because the clevis fitting used in the left and right thrust reverser sleeve is the same. The clevis fitting is upside down in the opposite sleeve.

1) Install the bolt [3], washer [4], bushing [5], washer [4] and nut [7] through the clevis and the rod end of the center actuator.

NOTE: The nut is a self-locking nut.

a) For the left thrust reverser, install the bushing [5] under the bolt head of bolt [3].

b) For the right thrust reverser, install the bushing [5] under the nut [7].

c) Install the bolt [3] with the bolt head on the top side of the clevis [2].

NOTE: The bolt head will prevent the disconnection of the rodend from the clevis if the nut was missing.

d) Tighten the nut [7] to a value between 1400 in-lb (158 N·m) and 1900 in-lb (215 N·m).

ARO ALL; THRUST REVERSERS 315W1298-23 AND ON

2) Install the bolt [3], washer [4], bushing [5], washer [4] and nut [7] through the clevis and the rod end of the center actuator.

NOTE: The nut is a self-locking nut.

a) For the left thrust reverser, install the bushing [5] under the bolt head of bolt [3].

b) For the right thrust reverser, install the bushing [5] under the nut [7].

c) Install the bolt [3] with the bolt head on the top side of the clevis [2].

NOTE: The bolt head will prevent the disconnection of the rodend from the clevis if the nut was missing.

d) Tighten the nut [7] to a value between 650 in-lb (73 N·m) and 750 in-lb (85 N·m).

ARO ALL

(f) Install the extend line [25] to the center actuator [24] (Figure 406).

1) Follow this general practice when you install the hydraulic lines; Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do these steps to adjust the clamp blocks and prevent hydraulic tubing preload.

NOTE: The clamp blocks and the retainers are different thicknesses and can be reversed to increase or decrease the offset from the brackets. All or any combination of these steps can be used to get the correct alignment for the extend tubing between the actuators.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Exchange the location of the clamp blocks.

b) Exchange the location of the white and grey retainers.

c) Remove the shim laminations or remove the shim under the clamp blocks.

d) Apply one coat primer, C00259 to the shim and install wet or dry.

CAUTION

DO NOT USE THE WRENCH ON THE NUT TO PULL THE TUBE INTO ALIGNMENT. DAMAGE TO THE TUBING CAN OCCUR.

3) Install the extend line [25] between the center actuator [24] and upper actuator [31].

a) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

b) Manually align the extend line tubing with the end points and the clamp blocks.

c) Align and seat the tubing sleeve in the fitting.

d) Manually tighten the tube nuts, then do a check for tube alignment.

e) Tighten the extend line [25] tube nut to 855-945 inch-pounds (97-107 newton-meters).

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

4) Install the clamp blocks on the extend line [25].

a) Install the shim [48], lower retainer [41], clamp block [49] and clamp block [50], two spacers [47], and upper retainer [44] with bolts [45] and washers [46] under the bolt head.

b) Tighten the bolts to 65-75 inch-pounds (7.3-8.5 newton-meters).

(g) Connect the two retract lines [22] to the center actuator [24].

1) Follow this general practice when you install the hydraulic lines; Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do these steps to adjust the clamp blocks and prevent hydraulic tubing preload.

NOTE: The clamp blocks and the retainers are different thicknesses and can be reversed to increase or decrease the offset from the brackets. All or any combination of these steps can be used to get the correct alignment for the retract tubing between the actuators.

a) Exchange the location of the clamp blocks.

b) Exchange the location of the white and grey retainers.

c) Remove the shim laminations or remove the shim under the clamp blocks.

d) Apply one coat primer, C00259 to the shim and install wet or dry.

CAUTION

DO NOT USE THE WRENCH ON THE NUT TO PULL THE TUBE INTO ALIGNMENT. DAMAGE TO THE TUBING CAN OCCUR.

3) Install the two retract lines [22] to the center actuator [24].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

b) Manually align the retract line tubing with the end points and the clamp blocks.

c) Align and seat the tubing sleeve in the fitting.

d) Manually tighten the tube nuts, then do a check for tube alignment.

e) Tighten the retract line [22] tube nut to 665-735 pound-inches (75-83 newton-meters).

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

4) Install the clamp blocks on the two retract lines [22].

a) Install the shim [48], lower retainer [41], clamp block [42] and clamp block [43], two spacers [47], and upper retainer [44] with two bolts [45] and washers [46] under the bolt head.

b) Tighten the bolts to 65-75 inch-pounds (7.3-8.5 newton-meters).

(h) Remove the protection caps from the electrical connector [19] and the proximity sensor.

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(i) Connect the electrical connector [19] to the proximity sensor on the center actuator [24].

SUBTASK 78-34-12-430-005-H01

(6) Install the sync shaft and tubing [9] on the center actuator [24].

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

(a) Refer to this task: Thrust Reverser Sync Shaft and Tubing Installation, TASK 78-34-13-400-801-H01.

(b) Install the sync shaft and tubing [9] between the upper actuator [31] and the center actuator [24].

(c) Install the sync shaft and tubing [9] between the lower actuator [14] and the center actuator [24].

SUBTASK 78-34-12-980-006-H01

(7) Manually extend and retract the thrust reverser.

NOTE: It is necessary to make sure the thrust reverser moves smoothly and does not bind or jam before hydraulic power is used to check the operation of the thrust reverser.

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

G. Center Actuator Installation Test

NOTE: The steps that follow can be combined with the installation tests for the sync lock/manual drive unit, the sync shaft and tubing, and the thrust reverser position transducer (RVDT).

SUBTASK 78-34-12-651-002-H01

(1) Do this task: Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-12-440-004-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-12-710-002-H01

(3) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser six times to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-12-210-003-H01

(4) Examine the thrust reverser actuation system for hydraulic fluid leakage.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

SUBTASK 78-34-12-220-003-H01

(5) Make sure the minimum clearance between the engine anti-ice duct and the retract line flexhose on the left thrust reverser half is 1.0 inch (25.4 millimeters).

NOTE: This step is repeated in the installation procedure for the sync shaft and tubing, the upper, center and lower hydraulic actuators and the sync lock/manual drive unit and can be combined with those procedures.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and to do a check of the clearance between the retract flexhose and the engine anti-ice duct.

(a) Remove the flexhose clamp block with two screws, washers, and nuts.

(b) Adjust the location of flexhose clamp block to a position 15.2-15.6 inches (386.1-396.2 millimeters) from the upper thrust reverser bracket to prevent the interference between the retract flexhose and the engine anti-ice duct.

(c) Install the flexhose clamp block with two screws, washers, and nuts.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-12-410-004-H01

(1) Install the access access panel [23] with the seven bolts [8].

NOTE: The bolts can be one grip length longer or shorter but the door must be installed with bolts that are all the same grip length.

(a) Apply grease, D00633 to the bolt shank and bolt threads before installation.

(b) Tighten the bolts to 65-100 pound-inches (7.3-11.3 newton-meters) to install these panels:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Install the applicable access panels:

Number	Name/Location
415CL	Left Thrust Reverser Middle Actuator Panel, Left Engine
416CR	Right Thrust Reverser Middle Actuator Panel, Left Engine
425CL	Left Thrust Reverser Middle Actuator Panel, Right Engine
426CR	Right Thrust Reverser Middle Actuator Panel, Right Engine

SUBTASK 78-34-12-410-005-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-12-440-009-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801

SUBTASK 78-34-12-741-002-H01

(4) Clear the ENG REVERSER status messages.

(a) Do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

——— END OF TASK ———

TASK 78-34-12-000-803-H01

6. Thrust Reverser Upper Actuator Removal

(Figure 407, Figure 408, and Figure 409)

A. General

(1) The upper actuator on each thrust reverser half is the only non-locking actuator.

(2) The hydraulic actuators on the thrust reversers for GE90-115 series engines have a non-symmetrical forged gimbal. Hydraulic actuators on the thrust reversers for GE90-70/-80/-90 series engines have a symmetrical gimbal.

B. References

Reference	Title
20-10-09-000-801	Flareless Tubing Assembly Removal (P/B 401)
20-10-10-000-801	Flexible Hose Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-34-13-000-801-H01	Thrust Reverser Sync Shaft and Tubing Removal (P/B 401)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Title
78-36-03-000-801-H01	Thrust Reverser Position Transducer (RVDT) Removal (P/B 401)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)
STD-1110	Container - Hydraulic Fluid Resistant, 5 Gallon (19 Liter)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-34-12-040-007-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-34-12-040-012-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-040-008-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-12-864-003-H01

(4) For the applicable engine, do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-12-010-006-H01

(5) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-12-030-005-H01

CAUTION MAKE SURE THAT YOU DO NOT TURN THE SHAFT ON THE GEARHEAD OF THE RVDT. THIS WILL CAUSE THE INCORRECT INDICATION OF THE THRUST REVERSER POSITION.

(6) Remove the thrust reverser position transducer (RVDT) [32] from the upper actuator [31].

(a) Do this task: Thrust Reverser Position Transducer (RVDT) Removal, TASK 78-36-03-000-801-H01.

NOTE: It is not necessary to remove the electrical wiring from the clamps or to disconnect the electrical connectors from the fan disconnect panel.

SUBTASK 78-34-12-980-007-H01

CAUTION MAKE SURE THAT YOU REMOVE THE RVDT BEFORE YOU EXTEND THE THRUST REVERSER SLEEVE. IF YOU REMOVE THE RVDT WHILE THE THRUST REVERSER SLEEVE IS NOT FULLY RETRACTED, AN INCORRECT THRUST REVERSER INDICATION WILL OCCUR.

(7) Manually extend the applicable thrust reverser sleeve approximately 1.0 inch (2.54 cm).

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

(b) After the thrust reverser sleeve is extended, remove the deactivation pin from the bypass valve handle on the isolation valve.

NOTE: The bypass valve must be closed if thrust reverser hydraulic components or hydraulic tubing are removed. If the bypass valve is not closed, hydraulic fluid from the hydraulic system reservoir will drain through the return line when the components or tubing are removed.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-010-007-H01

(8) Remove the access panel [6] for the upper actuator rod end [1].

(a) Remove the six bolts [8] to remove these access panels:

1) Remove the applicable access panels:

Number	Name/Location
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine

H. Upper Actuator Removal

SUBTASK 78-34-12-616-003-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(1) Drain the retract hydraulic line and sync shaft tube (extend hydraulic line) before you remove the actuator, the retract tubes or the sync shaft tubes.

(a) Disconnect the retract and extend hydraulic flexhoses at the strut hydraulic fittings.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic tubes on the thrust reverser.

1) Install the protection caps on the actuator port and the hydraulic line.

(b) At the lower actuator, remove the plug [95] in the actuator extend port C or D and the plug [92] in the actuator retract port A or B (Figure 408).

1) Remove the plugs that are near the ground.

2) Use a cotton wiper, G00034 or rag around the plug and the wrench to catch the hydraulic fluid spray.

(c) Catch the hydraulic fluid that drains from the actuator and the retract and extend hydraulic lines in a 5 gallon (19 liter) hydraulic fluid resistant container, STD-1110.

(d) Install the plug [95] and the plug [92] in the actuator ports.

1) If the actuator is to be sent for component repair, you should attach a note that states the plugs are not tightened and the packing was not replaced.

2) If the same actuator will be installed again, replace the packing and install the plugs.

a) The instructions for the replacement of the packing and the installation of the plugs are in this task: Thrust Reverser Lower Actuator Installation, TASK 78-34-12-400-801-H01.

SUBTASK 78-34-12-030-006-H01

(2) Remove the sync shaft and tubing [9] from the upper actuator [31]; refer to this task: Thrust Reverser Sync Shaft and Tubing Removal, TASK 78-34-13-000-801-H01.

SUBTASK 78-34-12-020-003-H01

(3) Remove the upper actuator [31] (Figure 407):

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Loosen or remove the clamp blocks for the hydraulic retract line [22] for the actuator (Figure 409).

1) Remove the two bolts [45], washers [46], upper retainer [44], clamp block [42] and clamp block [43], two spacers [47], lower retainer [41], and shim [48] to disassemble the clamp blocks which attach the retract line [22].

NOTE: Disassemble a sufficient number of clamp blocks to disconnect the retract line from the upper actuator without too much force.

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(b) Disconnect the retract line [22] from the upper actuator [31].

1) Follow this general practice when you remove the hydraulic lines; Flareless Tubing Assembly Removal, TASK 20-10-09-000-801.

2) Use a cotton wiper, G00034 or rag around the retract line and the wrench to catch the hydraulic fluid spray.

3) Catch the hydraulic fluid that drains from the actuator in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

4) Install the protection caps on the actuator port and the retract line [22].

(c) Disconnect the retract line flexhose [33] from the elbow [36] on the upper actuator [31].

1) Follow this general practice when you remove the hydraulic flexhoses; Flexible Hose Removal, TASK 20-10-10-000-801.

2) Catch the hydraulic fluid that drains from the flexhose in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

3) Install the protection caps on the actuator port and the retract line flexhose [33].

(d) Disconnect the actuator rodend from the thrust reverser sleeve.

NOTE: Do not drop the fasteners into the thrust reverser sleeve.

1) Remove the nut [7], washer [4], bushing [5], washer [4] and bolt [3] that attaches the rod end of the actuator to the clevis [2].

(e) Remove the two bolts [10] and washers [11] which hold the gimbal pins [12].

(f) Remove the two gimbal pins [12].

(g) Remove the upper actuator [31] from the thrust reverser.

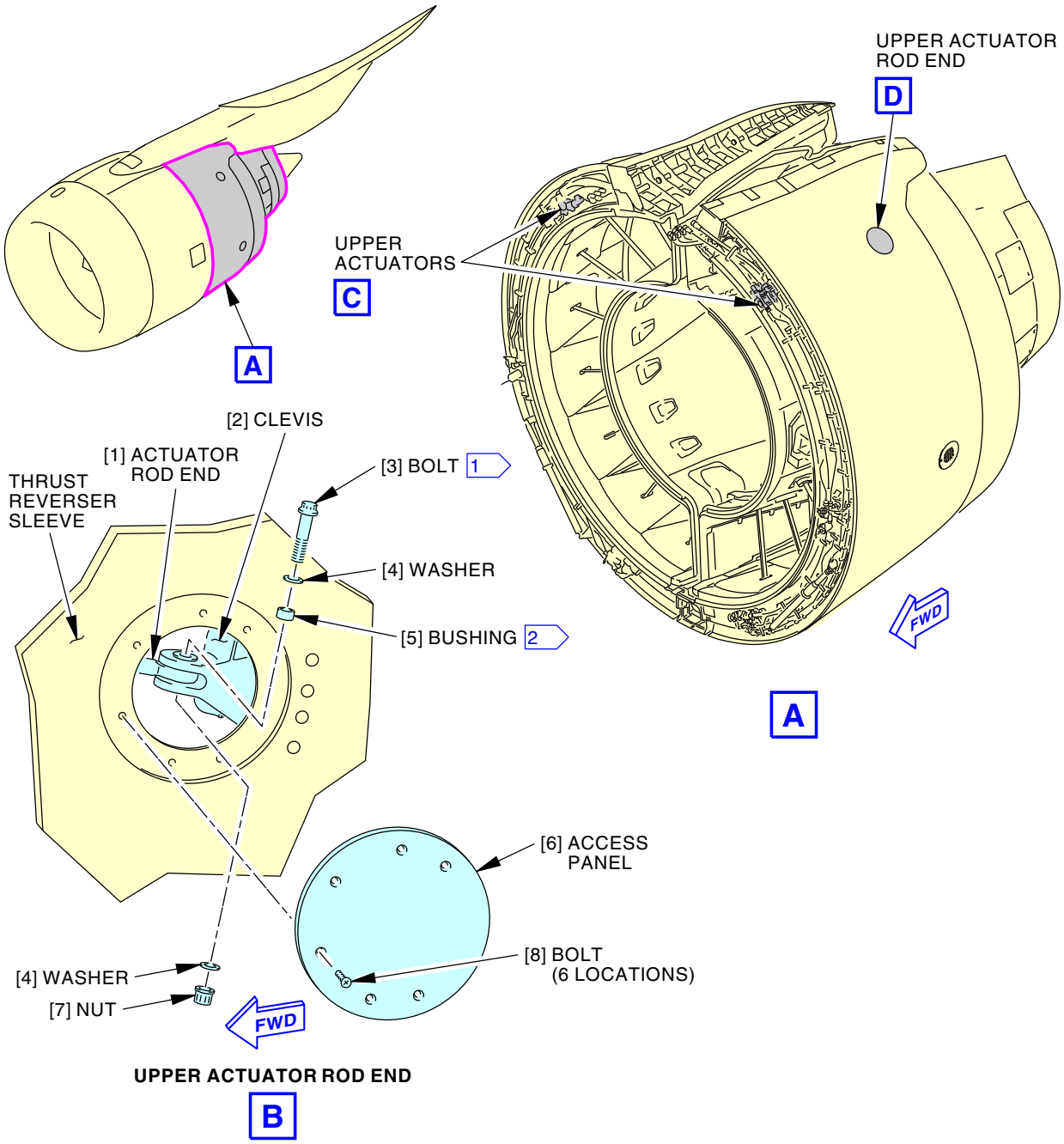
NOTE: Keep the actuator to use the hydraulic fittings for the replacement actuator in the installation task.

SUBTASK 78-34-12-020-006-H01

(4) Remove the elbow [36] from the union [91] on the upper actuator [31].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



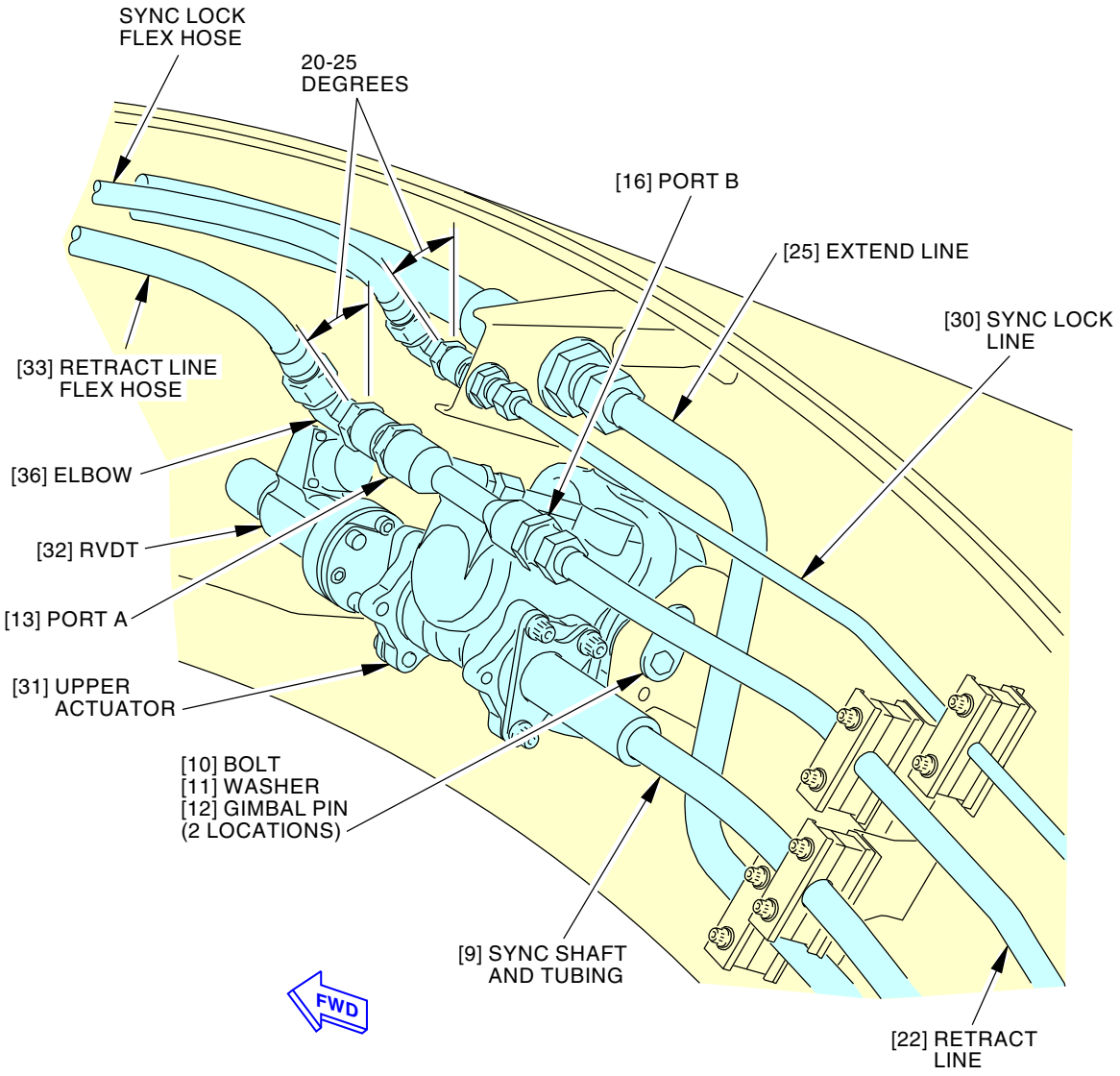
1 INSTALL THE BOLT ON THE TOP SIDE OF THE FITTING.

2 LEFT THRUST REVERSER IS SHOWN.
ON THE RIGHT THRUST REVERSER, INSTALL THE BUSHING FROM THE BOTTOM SIDE.

M95231 S0000100221_V4

Thrust Reverser Upper Actuator Installation
Figure 407/78-34-12-990-808-H01 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



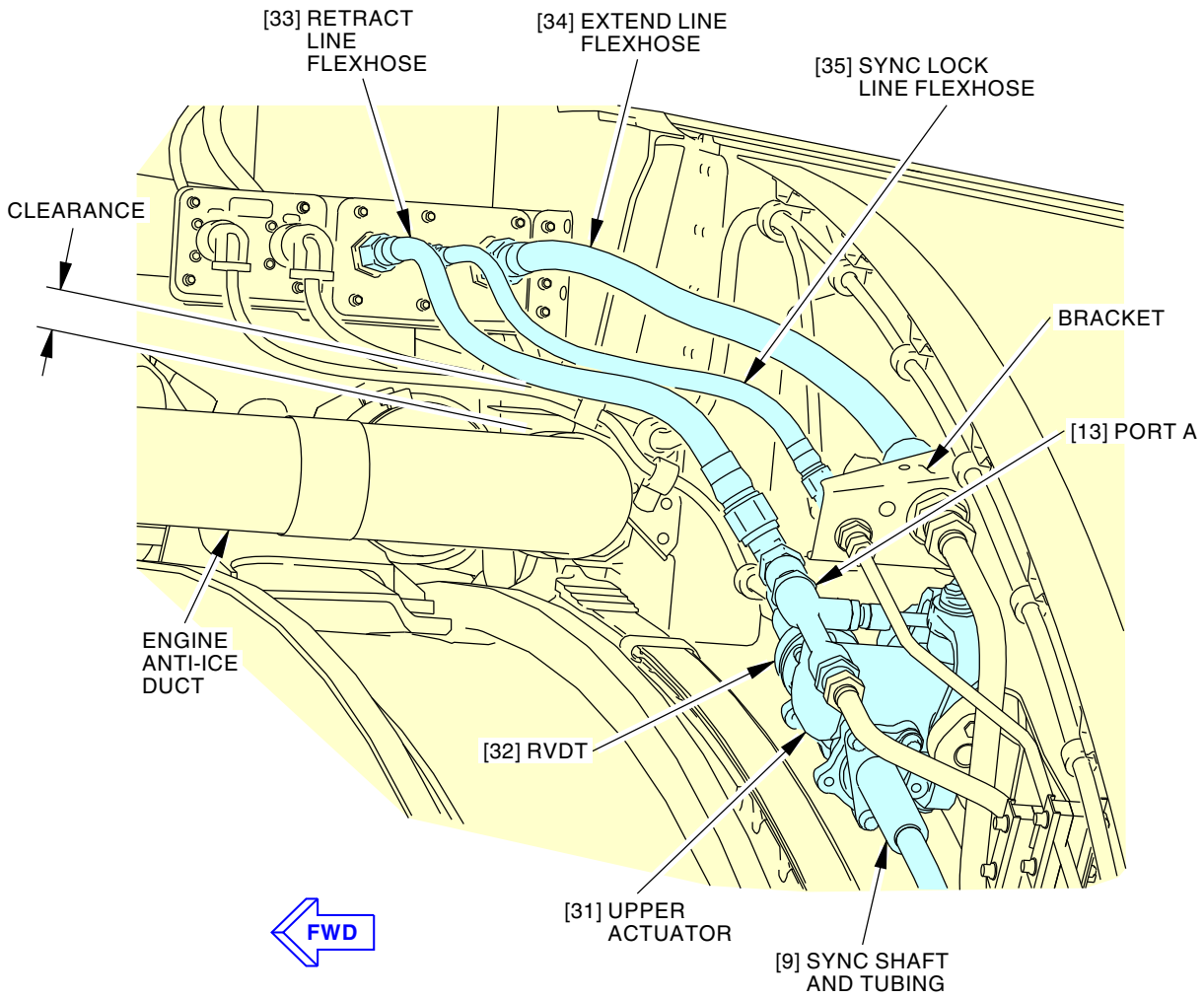
LEFT UPPER ACTUATOR
(RIGHT UPPER ACTUATOR IS OPPOSITE)

C

M07548 S0004286501_V3

Thrust Reverser Upper Actuator Installation
Figure 407/78-34-12-990-808-H01 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



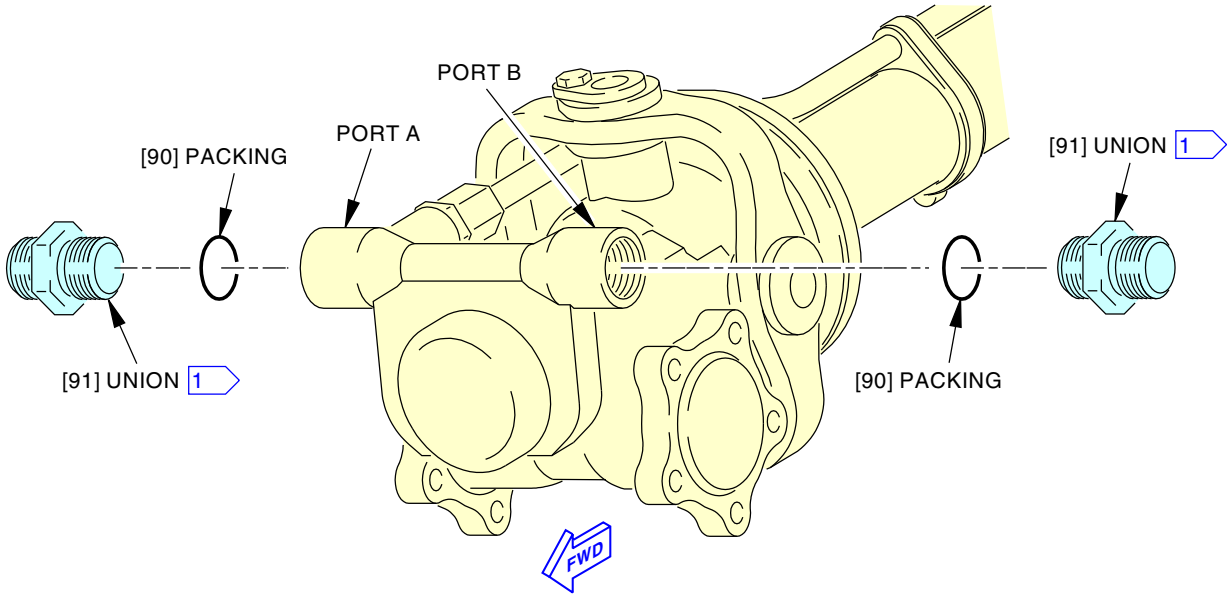
HYDRAULIC FLEXHOSES

D

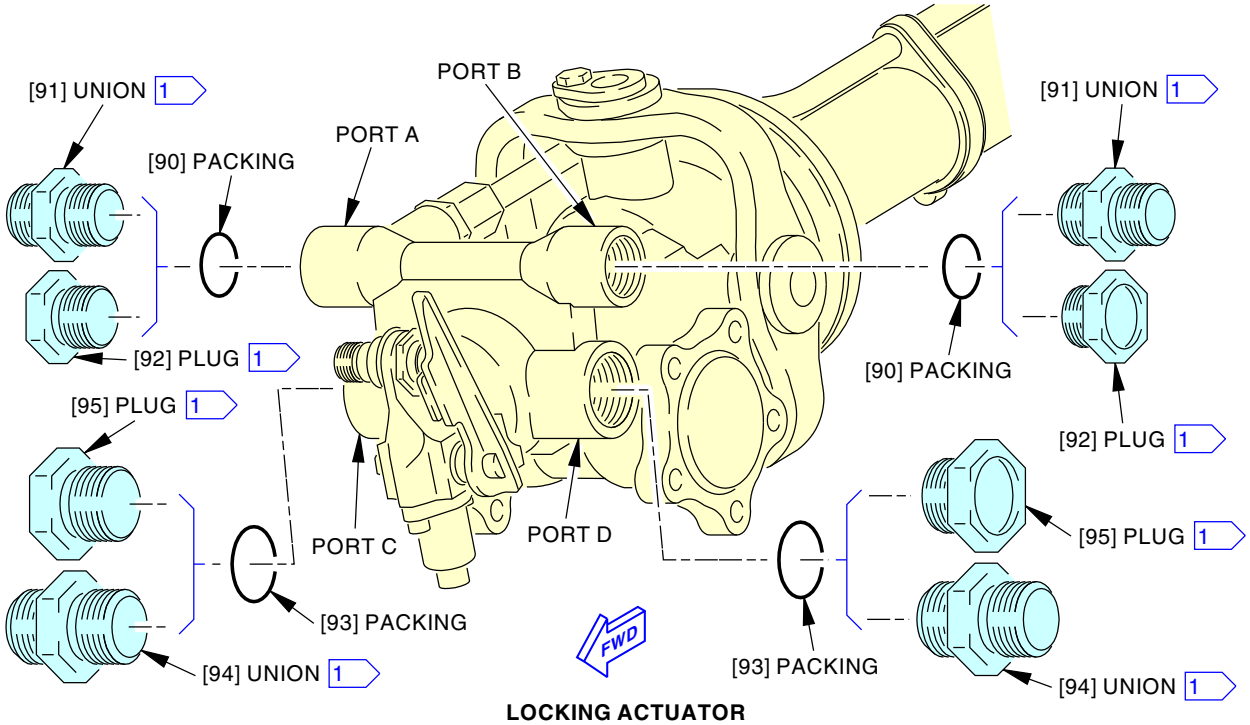
M07550 S0004286503_V3

Thrust Reverser Upper Actuator Installation
Figure 407/78-34-12-990-808-H01 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NON-LOCKING ACTUATOR



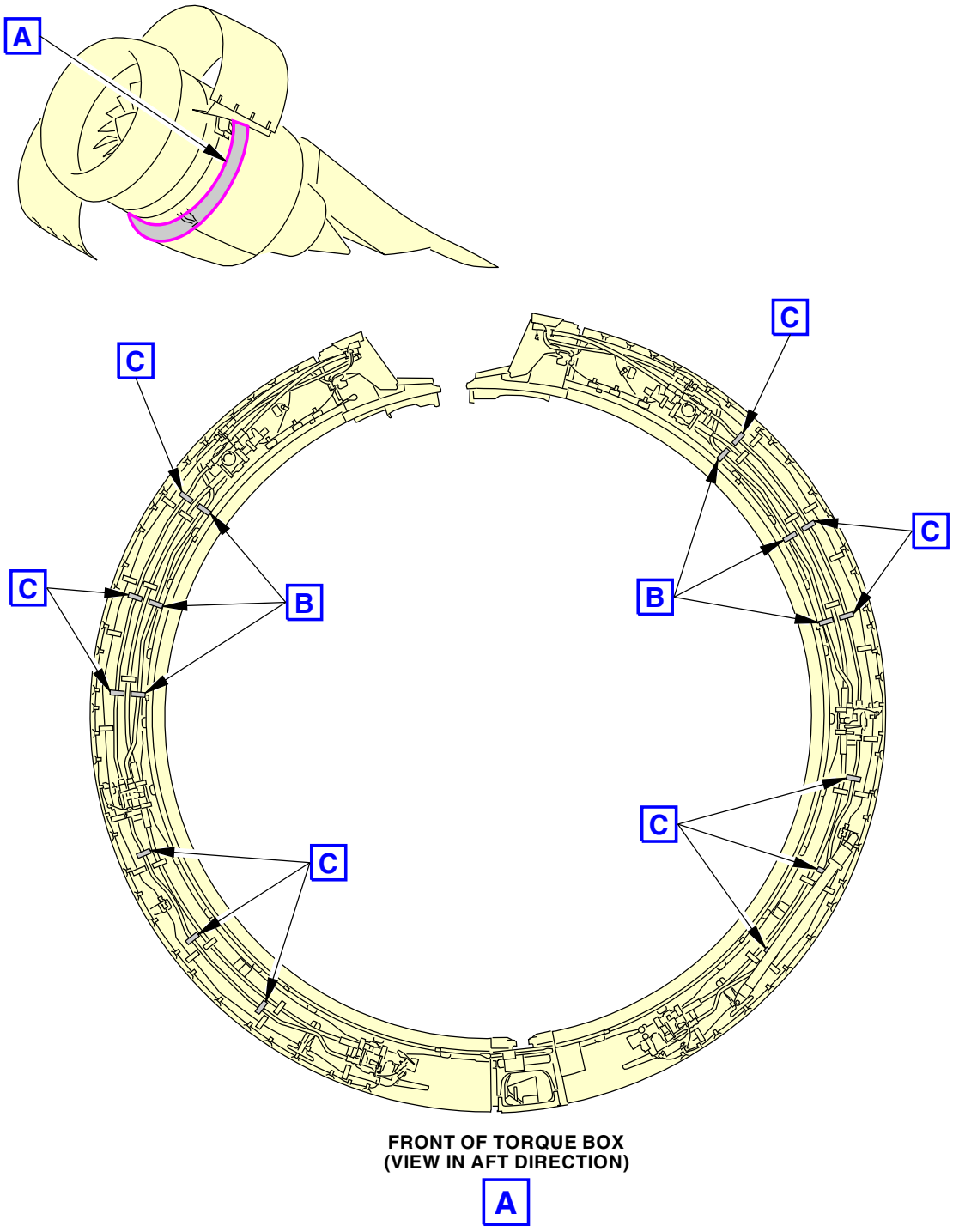
LOCKING ACTUATOR

1 SEE TABLE IN PROCEDURE FOR ACTUATOR FITTING CONFIGURATION

M07556 S0004286509_V3

Actuator Hydraulic Port Preparation
Figure 408/78-34-12-990-809-H01

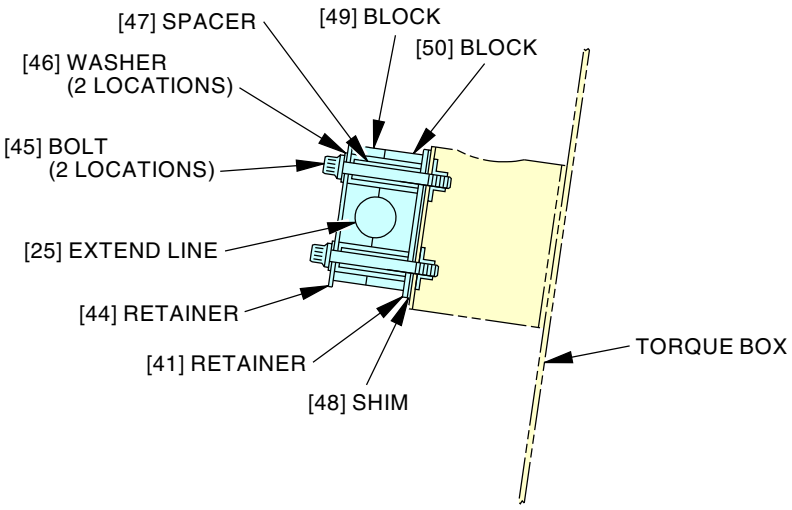
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07554 S0004286507_V2

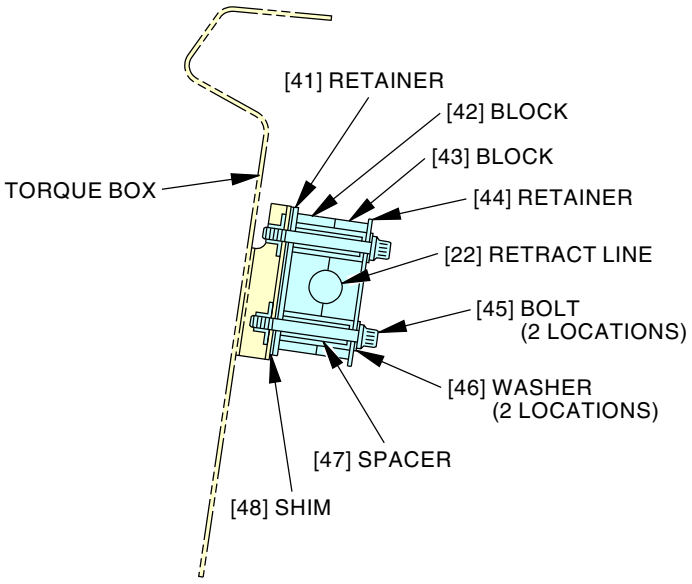
Hydraulic Actuator Tubing Clamp Block Installation
Figure 409/78-34-12-990-810-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



TYPICAL CLAMP INSTALLATION FOR EXTEND LINE TUBES

B



TYPICAL CLAMP INSTALLATION FOR RETRACT LINE TUBES

C

M07555 S0004286508_V2

Hydraulic Actuator Tubing Clamp Block Installation
Figure 409/78-34-12-990-810-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-12-400-803-H01

7. Thrust Reverser Upper Actuator Installation

(Figure 407, Figure 408, Figure 409)

A. General

(1) After you install the upper actuator, you must do the operational test for the thrust reverser.

(2) The hydraulic actuators on the thrust reversers for GE90-115 series engines have a non-symmetrical forged gimbal. Hydraulic actuators on the thrust reversers for GE90-70/-80/-90 series engines have a symmetrical gimbal.

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-09-400-801	Flareless Tubing Assembly Installation (P/B 401)
20-10-10-400-801	Flexible Hose Installation (P/B 401)
20-10-19-000-801	O-Rings Removal (P/B 401)
20-10-19-400-801	O-Rings Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-34-13-400-801-H01	Thrust Reverser Sync Shaft and Tubing Installation (P/B 401)
78-36-03-400-801-H01	Thrust Reverser Position Transducer (RVDT) Installation (P/B 401)

C. Consumable Materials

Reference	Description	Specification
B00316	Solvent - Aliphatic Naphtha (For Organic Coatings)	TT-N-95 Type I, ASTM D-3735 Type I
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
D00633	Grease - Aircraft General Purpose	BMS3-33
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine

F. Upper Actuator Installation

SUBTASK 78-34-12-040-009-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Make sure that the deactivation of the thrust reverser was done.

(a) Refer to this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-12-980-008-H01

(2) Make sure that the thrust reverser sleeve is extended approximately 1.0 inch (2.54 cm).

(a) Refer to this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

SUBTASK 78-34-12-430-011-H01

(3) If necessary, connect the hydraulic flexhoses that were disconnected to drain the actuation system.

NOTE: This step is repeated in the installation of the sync shaft and tubing, the upper, center and lower hydraulic actuators, and the sync lock/manual drive unit and can be combined with those installation procedures.

(a) Follow this general practice when you connect the hydraulic flexhose, do this task: Flexible Hose Installation, TASK 20-10-10-400-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(b) Connect the extend flexhose to the strut hydraulic fitting.

1) Tighten the hose nut to 855-945 pound-inches (97-107 newton-meters).

(c) If necessary, connect the retract flexhose to the strut hydraulic fitting.

NOTE: If an external hydraulic service cart is to be used to provide retract hydraulic pressure for the installation, it is not necessary to connect the retract flexhose at this time.

1) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

(d) Do not adjust the position of the flexhose clamp block on the left thrust reverser hoses at this time.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and do a check of the clearance between the retract flexhose and the engine anti-ice duct.

SUBTASK 78-34-12-430-006-H01

(4) Prepare the upper actuator [31] for the installation position (Figure 408).

NOTE: Refer to the table below for the correct fittings in the two hydraulic ports.

(a) Install the union [91] in actuator port A [13] and port B [16] (Table 403).

NOTE: If it is necessary to replace some of the fittings with different fittings, you can remove the fittings from the actuator that was removed.

1) Remove and discard the old packing.

a) Refer to this general procedure: O-Rings Removal, TASK 20-10-19-000-801.

2) Install the new packing [90] on the union [91].

a) Refer this general procedure:O-Rings Installation, TASK 20-10-19-400-801.

b) Make sure the packing grooves and adjacent surfaces are free of cuts, scratches, dents, and all deposits of unwanted material.

c) Clean the seal surfaces and grooves with a clean cotton wiper, G00034 moistened with solvent, B00316.

d) Wipe the all solvent off the surfaces with a clean, dry cloth before the solvent becomes dry.

e) Make sure the new packing is free of nicks, cuts, grooves, excess flash or other defects.

f) Dry wipe the packing with a clean, dry cotton wiper, G00034 to remove all unwanted material.

g) Lubricate the new packing with MCS 352B fluid, D00054 or hydraulic fluid, D00153.

h) Do not stretch the packing so that the inner diameter is expanded more than 50 percent when you install it.

i) Make sure the packing are not twisted in their grooves.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

j) Make sure the packing are not pinched.

3) Install the union [91] in the actuator port A [13] and port B [16].

a) Tighten the unions at port A and port B to 996-1110 inch-pounds (83-93 pound-feet) (113-126 newton-meters).

Table 403/78-34-12-993-803-H01 Upper Actuator Hydraulic Fittings and Packing

ACTUATOR LOCATION AND PART NUMBER	PORT A	PORT B
Left, Upper Right, Upper S315W360-54	Union	Union
	MS21902J10	MS21902J10
	Packing	Packing
	NAS1612-10A	NAS1612-10A

SUBTASK 78-34-12-420-004-H01

(5) Install the elbow [36] on the union [91] on the upper actuator [31] (Figure 407).

(a) Turn the elbow [36] on the union [91] 20-25 degrees forward from the vertical.

NOTE: The bend in the 45 degree elbow will be toward the front of the engine and away from the torque box of the thrust reverser.

SUBTASK 78-34-12-420-003-H01

(6) Install the upper actuator [31] (Figure 407):

(a) Install the upper actuator [31] through the torque box on the thrust reverser.

(b) Install the two gimbal pins [12], bolts [10] and washers [11] to the fitting on the thrust reverser.

1) Tighten the bolts to 72-88 inch-pounds (8.1-9.9 newton-meters).

CAUTION DO NOT TURN THE ACTUATOR ROD END. THE ACTUATOR LENGTH IS SET. IF YOU TURN THE ACTUATOR ROD END, DAMAGE TO THE ACTUATOR OR THE STRUCTURE CAN OCCUR.

(c) Pull the upper actuator rod end [1] straight out 8-12 inches (203-305 millimeters) by hand to the align the rod end with the clevis [2].

(d) Connect the actuator rodend to the thrust reverser sleeve.

NOTE: Do not drop the fasteners into the thrust reverser sleeve.

NOTE: The position of the bushing [5] changes because the clevis fitting used in the left and right thrust reverser sleeve is the same. The clevis fitting is inverted in the opposite sleeve.

1) Install the bolt [3], washer [4], bushing [5], washer [4] and nut [7] through the clevis and the rod end of the upper actuator.

NOTE: The nut is a self-locking nut.

a) For the left thrust reverser, install the bushing [5] under the bolt head of the bolt [3].

b) For the right thrust reverser, install the bushing [5] under the nut [7].

c) Install the bolt [3] with the bolt head on the top side of the clevis [2].

NOTE: The bolt head will prevent the disconnection of the rod end from the clevis if the nut was missing.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

d) Tighten the nut [7] to a value between 1400 in-lb (158 N·m) and 1900 in-lb (215 N·m).

ARO ALL; THRUST REVERSERS 315W1298-23 AND ON

2) Install the bolt [3], washer [4], bushing [5], washer [4] and nut [7] through the clevis and the rod end of the upper actuator.

NOTE: The nut is a self-locking nut.

a) For the left thrust reverser, install the bushing [5] under the bolt head of the bolt [3].

b) For the right thrust reverser, install the bushing [5] under the nut [7].

c) Install the bolt [3] with the bolt head on the top side of the clevis [2].

NOTE: The bolt head will prevent the disconnection of the rod end from the clevis if the nut was missing.

d) Tighten the nut [7] to a value between 650 in-lb (73 N·m) and 750 in-lb (85 N·m).

ARO ALL

CAUTION

DO NOT LET THE HOSE TWIST WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWIST IN THE HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE FAILURES, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(e) Connect the retract line flexhose [33] to the elbow [36] on the upper actuator [31].

1) Follow this general practice when you install the hydraulic flexhoses; Flexible Hose Installation, TASK 20-10-10-400-801.

2) Tighten the retract line flexhose [33] hose nut to 665-735 pound-inches (75-83 newton-meters).

a) The elbow on the upper actuator [31] must not turn as you tighten the hose nut.

b) Do not let the hose twist.

(f) Connect the retract line [22] to the upper actuator [31].

1) Follow this general practice when you install the hydraulic lines; Flareless Tubing Assembly Installation, TASK 20-10-09-400-801.

2) Do these steps to adjust the clamp blocks and prevent hydraulic tubing preload.

NOTE: The clamp blocks and the retainers are different thicknesses and can be reversed to increase or decrease the offset from the brackets. All or any combination of these steps can be used to get the correct alignment for the retract tubing between the actuators.

a) Exchange the location of the clamp blocks.

b) Exchange the location of the white and grey retainers.

c) Remove the shim laminations or remove the shim under the clamp blocks.

d) Apply one coat primer, C00259 to the shim and install wet or dry.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT USE THE WRENCH ON THE NUT TO PULL THE TUBE INTO ALIGNMENT. DAMAGE TO THE TUBING CAN OCCUR.

3) Install the retract line [22] to the upper actuator [31].

a) Apply MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

b) Manually align the retract line tubing with the end points and the clamp blocks.

c) Align and seat the tubing sleeve in the fitting.

d) Manually tighten the tube nuts, then do a check for tube alignment.

e) Tighten the retract line [22] tube nut to 665-735 pound-inches (75-83 newton-meters).

NOTE: The leakproof torque method requires that you tighten the nut to the torque value. Next back off the nut to relax the torque and allow rotation by hand. Then, tighten the nut again to the torque value.

4) Install the clamp blocks on the retract line [22] (Figure 409).

a) Install the shim [48], lower retainer [41], clamp block [42] and clamp block [43], two spacers [47], and upper retainer [44] with two bolts [45] and washers [46] under the bolt head.

b) Tighten the bolts to 65-75 inch-pounds (7.3-8.5 newton-meters).

SUBTASK 78-34-12-430-007-H01

(7) Install the sync shaft and tubing [9] on the upper actuator [31].

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

NOTE: This procedure can be combined with the installation of the thrust reverser position transducer (RVDT).

(a) Refer to this task: Thrust Reverser Sync Shaft and Tubing Installation, TASK 78-34-13-400-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-430-008-H01

CAUTION

MAKE SURE THAT THE THRUST REVERSER IS FULLY RETRACTED BEFORE YOU INSTALL THE RVDT. INCORRECT THRUST REVERSER INDICATION WILL OCCUR IF THE THRUST REVERSER IS NOT FULLY RETRACTED.

(8) Install the thrust reverser position transducer (RVDT) [32] on the upper actuator [31].

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

NOTE: This procedure can be combined with the installation of the sync shafts and tubing.

(a) Refer to this task: Thrust Reverser Position Transducer (RVDT) Installation, TASK 78-36-03-400-801-H01.

SUBTASK 78-34-12-980-009-H01

(9) Manually extend and retract the thrust reverser:

NOTE: It is necessary to make sure the thrust reverser moves smoothly and does not bind or jam before hydraulic power is used to check the operation of the thrust reverser.

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

(b) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

G. Upper Actuator Installation Test

NOTE: The steps that follow can be combined with the installation tests for the sync lock/manual drive unit, sync shaft and tubing, and the thrust reverser position transducer (RVDT).

SUBTASK 78-34-12-651-003-H01

(1) Do this task: Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-12-440-006-H01

(2) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-12-710-003-H01

(3) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser six times to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-12-210-004-H01

(4) Examine the thrust reverser actuation system for hydraulic fluid leakage.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-220-001-H01

CAUTION	DO NOT LET THE RETRACT FLEXHOSE TOUCH THE ENGINE ANTI-ICE DUCT. KEEP A 1.0 INCH (25.4 MILLIMETERS) CLEARANCE BETWEEN THE FLEXHOSE AND THE DUCT. CLOSE AND LATCH THE THRUST REVERSER BEFORE YOU DO THIS CHECK. DAMAGE TO THE RETRACT FLEXHOSE CAN OCCUR.

(5) Make sure there is a minimum clearance of 1.0 inch (25.4 millimeters) between the retract flexhose and the engine anti-ice duct with the thrust reversers closed and latched.

NOTE: This step is repeated in the installation procedure for the sync shaft and tubing, the upper, center and lower hydraulic actuators and the sync lock/manual drive unit and can be combined with those procedures.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and to do a check of the clearance between the retract flexhose and the engine anti-ice duct.

(a) Remove the flexhose clamp block with two screws, washers, and nuts.

(b) Adjust the location of flexhose clamp block to a position 15.2-15.6 inches (386.1-396.2 millimeters) from the upper thrust reverser bracket to prevent the interference between the retract flexhose and the engine anti-ice duct.

(c) Install the flexhose clamp block with two screws, washers, and nuts.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-12-410-006-H01

(1) Install the applicable access access panel [6] with six bolts [8].

NOTE: The bolts can be one grip length longer or shorter but the door must be installed with bolts that are all the same grip length.

(a) Apply grease, D00633 to the bolt shank and bolt threads before installation.

(b) Tighten the bolts to 65-100 pound-inches (7.3-11.3 newton-meters) to install these panels:

1) Install the applicable access panels:

Number	Name/Location
415BL	Left Thrust Reverser Upper Actuator Panel, Left Engine
416BR	Right Thrust Reverser Upper Actuator Panel, Left Engine
425BL	Left Thrust Reverser Upper Actuator Panel, Right Engine
426BR	Right Thrust Reverser Upper Actuator Panel, Right Engine

SUBTASK 78-34-12-410-007-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-12-440-010-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-741-001-H01

(4) Clear the ENG REVERSER status messages.

(a) Do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

——— END OF TASK ———

TASK 78-34-12-000-804-H01

8. Thrust Reverser Hydraulic Actuator Flexhoses (Extend, Retract and Sync Lock) Removal

(Figure 410)

A. General

(1) The extend, retract and sync lock control flexhoses are installed between the strut and the upper non-locking hydraulic actuator on each thrust reverser half.

(2) On the left thrust reverser, the retract and sync lock control flexhoses have 45 degree elbows installed on the union of the upper hydraulic actuator and the union on the torque box bracket. The 45 degree elbow shortens the installation length between the strut and the upper actuator and bracket. The flexhoses remain the same length so that when those flexhoses are installed, the shorter installation length causes the flexhoses to lift up from the EAI duct. The clamp block for the extend, retract and sync lock control flexhoses that are found on left side thrust reversers for the GE90-70/-80/-90 series engines is not used on this installation on the left side thrust reversers for the GE90-100 series engines.

(3) On the right thrust reverser, the retract and sync lock control flexhoses are installed on the union of the upper hydraulic actuator and the union on the torque box bracket.

B. References

Reference	Title
20-10-10-000-801	Flexible Hose Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant
STD-764	Scraper - Non-metallic

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-34-12-040-013-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-34-12-040-014-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-34-12-040-015-H01

WARNING

MAKE SURE YOU DO THE DEACTIVATION PROCEDURE ON THE THRUST REVERSER HALF. IF YOU DO NOT, THE THRUST REVERSER CAN ACCIDENTALLY OPERATE. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-12-864-004-H01

(4) For the applicable engine, do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-12-010-009-H01

(5) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Remove the Thrust Reverser Flexhoses

SUBTASK 78-34-12-020-007-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(1) Remove the extend line flexhose [34].

(a) Follow this general practice when you remove the hydraulic flexhoses; Flexible Hose Removal, TASK 20-10-10-000-801.

(b) Disconnect the extend line flexhose [34] at the strut hydraulic fitting.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic flexhoses on the thrust reverser.

1) Install a protection cap on the strut hydraulic fitting.

(c) Disconnect the extend line flexhose [34] from the bulkhead union [38] on the torque box bracket.

1) Catch the hydraulic fluid that drains from the flexhose in a 1 quart (1 l) oil/fuel resistant container, STD-195.

2) Install the protection cap on the union.

SUBTASK 78-34-12-020-008-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(2) Remove the retract line flexhose [33].

(a) Follow this general practice when you remove the hydraulic flexhoses; Flexible Hose Removal, TASK 20-10-10-000-801.

(b) Disconnect the retract line flexhose [33] at the strut hydraulic fitting.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic flexhoses on the thrust reverser.

1) Install the protection cap on the strut hydraulic fitting.

(c) For the left side thrust reverser, disconnect the retract line flexhose [33] from the 45 degree elbow [36] and union [91] on the upper hydraulic actuator.

NOTE: The upper hydraulic actuator on the left side thrust reverser has a 45 degree elbow for the retract flexhose.

1) Catch the hydraulic fluid that drains from the flexhose in a 1 quart (1 l) oil/fuel resistant container, STD-195.

2) Install the protection cap on the elbow.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) For the right side thrust reverser, disconnect the retract line flexhose [33] from the union [91] on the upper hydraulic actuator.

NOTE: The upper hydraulic actuator on the right side thrust reverser does not have a 45 degree elbow for the retract flexhose.

1) Catch the hydraulic fluid that drains from the flexhose in a 1 quart (1 l) oil/fuel resistant container, STD-195.

2) Install the protection cap on the union.

SUBTASK 78-34-12-020-009-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(3) Remove the sync lock line flexhose [35].

(a) Follow this general practice when you remove the hydraulic flexhoses; Flexible Hose Removal, TASK 20-10-10-000-801.

(b) Disconnect the sync lock line flexhose [35] at the strut hydraulic fittings.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic flexhoses on the thrust reverser.

1) Install the protection cap on the strut hydraulic fitting.

(c) For the left side thrust reverser, disconnect the sync lock line flexhose [35] from the 45 degree elbow [37] and bulkhead union [51] on the torque box bracket.

NOTE: The torque box bracket, behind the upper hydraulic actuator on the left side thrust reverser, has a 45 degree elbow for the sync lock flexhose.

1) Catch the hydraulic fluid that drains from the flexhoses in a 1 quart (1 l) oil/fuel resistant container, STD-195.

2) Install the protection cap on the elbow.

(d) For the right side thrust reverser, disconnect the sync lock line flexhose [35] from the bulkhead union [51] on the torque box bracket.

NOTE: The torque box bracket behind the upper hydraulic actuator on the right side thrust reverser does not have a 45 degree elbow for the sync lock flexhose.

1) Catch the hydraulic fluid that drains from the flexhoses in a 1 quart (1 l) oil/fuel resistant container, STD-195.

2) Install the protection cap on the union.

SUBTASK 78-34-12-020-010-H01

(4) If it is necessary, remove the bulkhead union [38], washer [39] and bulkhead nut [40] for extend hydraulic line on the thrust reverser torque box bracket.

(a) Cut the fillet seal to the fitting and the nut with a non-metallic scraper, STD-764.

SUBTASK 78-34-12-020-011-H01

(5) If it is necessary, remove the bulkhead union [51], washer [52] and bulkhead nut [53] for the sync lock hydraulic line on the thrust reverser torque box bracket.

(a) Cut the fillet seal around the fitting and the nut with a non-metallic scraper, STD-764.

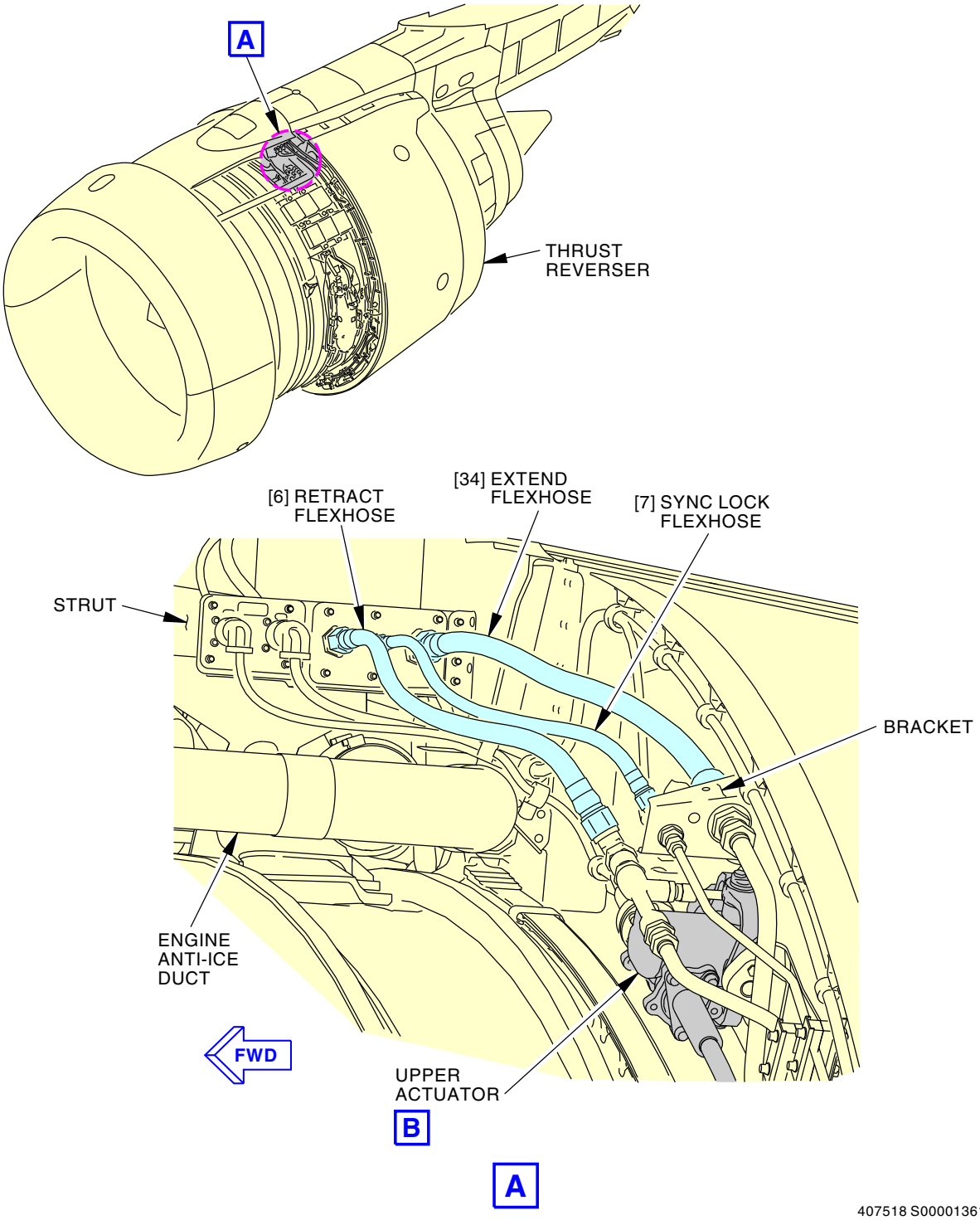
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-12-160-003-H01

(6) Clean all hydraulic fluid spills from the engine fan case and thrust reverser with alcohol, B00130 and a clean, dry, cotton wiper, G00034.

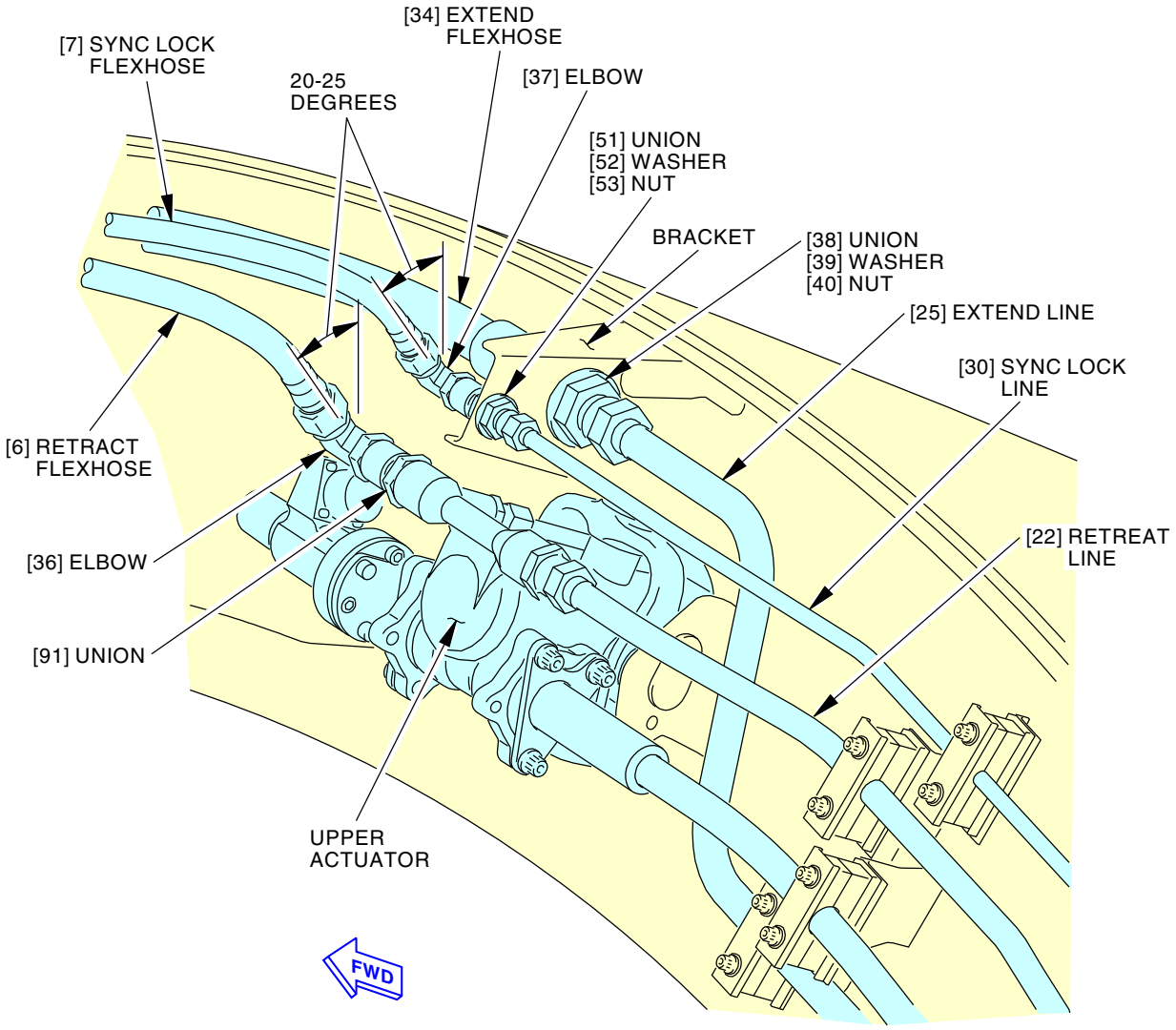
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Hydraulic Actuator Flexhose Installation
Figure 410/78-34-12-990-813-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEFT UPPER ACTUATOR

B

407656 S0000136174_V2

Thrust Reverser Hydraulic Actuator Flexhose Installation
Figure 410/78-34-12-990-813-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-12-400-804-H01

9. Thrust Reverser Hydraulic Actuator Flexhoses (Extend, Retract and Sync Lock) Installation

(Figure 410)

A. General

(1) The extend, retract and sync lock control flexhoses are installed between the strut and the upper non-locking hydraulic actuator on each thrust reverser half.

(2) The retract and sync lock control flexhoses on the left thrust reverser have 45 degree elbows installed on the union of the upper hydraulic actuator and the union on the torque box bracket. The 45 degree elbow shortens the installation length between the strut and the upper actuator and bracket. The flexhoses remain the same length so that when those flexhoses are installed, the shorter installation length causes the flexhoses to lift up from the EAI duct. The clamp block for the extend, retract and sync lock control flexhoses that is used on left side thrust reversers for the GE90-70/-80/-90 series engines is not used on this installation on the left side thrust reversers for the GE90-100 series engines.

(3) On the right thrust reverser, the retract and sync lock control flexhoses are installed on the union of the upper hydraulic actuator and the union on the torque box bracket.

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-10-400-801	Flexible Hose Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
A00160	Sealant - Firewall - Hydraulic Fluid Resistant	BMS5-63
B00130	Alcohol - Isopropyl	TT-I-735
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Install the Thrust Reverser Flexhoses

SUBTASK 78-34-12-420-005-H01

(1) Install the extend hydraulic line bulkhead union [38], with the washer [39] under the bulkhead nut [40] on the thrust reverser torque box bracket.

(a) Tighten the nut to 810-990 inch-pounds (91.5-111.8 newton-meters).

(b) Apply a fillet seal to the fitting and the nut with firewall sealant, A00160; do not apply sealant to the threads of the fitting.

SUBTASK 78-34-12-420-006-H01

(2) Install the bulkhead union [51], with the washer [52] under the bulkhead nut [53] for the sync lock hydraulic line on the thrust reverser torque box bracket.

(a) Tighten the nut to 243-297 inch-pounds (27.5-33.6 newton-meters).

(b) Apply a fillet seal to the fitting and the nut with firewall sealant, A00160; do not apply sealant to the threads of the fitting.

SUBTASK 78-34-12-420-007-H01

(3) For the left thrust reverser, install the 45 degree elbow [37] on the bulkhead union [51].

(a) Turn the elbow [37] on the bulkhead union [51] 20-25 degrees forward from the vertical.

NOTE: The bend in the 45 degree elbow will be toward the front of the engine and away from the torque box of the thrust reverser.

(b) Tighten the elbow swivel nut to 243-297 inch-pounds (27.5-33.6 newton-meters).

SUBTASK 78-34-12-420-008-H01

(4) For the left thrust reverser, install the 45 degree elbow [36] on the union [91] on the upper hydraulic actuator.

(a) Turn the elbow [36] on the union [91] 20-25 degrees forward from the vertical.

NOTE: The bend in the 45 degree elbow will be toward the front of the engine and away from the torque box of the thrust reverser.

(b) Tighten the elbow swivel nut to 630-770 inch-pounds (71.2-87.0 newton-meters).

SUBTASK 78-34-12-420-009-H01



CAUTION

DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(5) Install the extend line flexhose [34].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Follow this general practice when you connect the hydraulic flexhose, do this task: Flexible Hose Installation, TASK 20-10-10-400-801.

(b) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the hose nut touches.

(c) Connect the extend line flexhose [34] to the union on the torque box bracket.

1) Remove the protection cap from the union on the torque box bracket.

2) Tighten the hose nut to 855-945 pound-inches (97-107 newton-meters).

(d) Connect the extend line flexhose [34] to the strut hydraulic fitting.

1) Remove the protection cap from the strut hydraulic fitting.

2) Tighten the hose nut to 855-945 pound-inches (97-107 newton-meters).

SUBTASK 78-34-12-420-010-H01

CAUTION

DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(6) Install the retract flexhose [6].

(a) Follow this general practice when you connect the hydraulic flexhose, do this task: Flexible Hose Installation, TASK 20-10-10-400-801.

(b) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

(c) For the left side thrust reverser, connect the retract flexhose [6] to the 45 degree elbow [36] and union [91] on the upper hydraulic actuator.

1) Remove the protection cap from the 45 degree elbow.

2) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

(d) For the right side thrust reverser, connect the retract flexhose [6] to the union [91] on the upper hydraulic actuator.

1) Remove the protection cap from the union.

2) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

(e) Connect the retract flexhose [6] to the strut hydraulic fitting.

1) Remove the protection cap from the strut hydraulic fitting.

2) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

SUBTASK 78-34-12-420-011-H01

CAUTION

DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(7) Install the sync lock flexhose [7].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Follow this general practice when you connect the hydraulic flexhose, do this task: Flexible Hose Installation, TASK 20-10-10-400-801.

(b) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the hose nut touches.

(c) For the left side thrust reverser, connect the sync lock flexhose [7] to the 45 degree elbow [37] and bulkhead union [51] on the torque box bracket.

1) Remove the protection cap from the 45 degree elbow.

2) Tighten the hose nut to 257-283 pound-inches (29-32 newton-meters).

(d) For the right side thrust reverser, connect the sync lock flexhose [7] to the bulkhead union [51] on the torque box bracket.

1) Remove the protection cap from the union.

2) Tighten the hose nut to 257-283 pound-inches (29-32 newton-meters).

(e) Connect the sync lock flexhose [7] to the strut hydraulic fitting.

1) Remove the protection cap from the strut hydraulic fitting.

2) Tighten the hose nut to 257-283 pound-inches (29-32 newton-meters).

SUBTASK 78-34-12-212-001-H01

CAUTION DO NOT LET THE RETRACT FLEXHOSE TOUCH THE ENGINE ANTI-ICE DUCT. KEEP A 1.0 INCH (25.4 MILLIMETERS) CLEARANCE BETWEEN THE FLEXHOSE AND THE DUCT. CLOSE AND LATCH THE THRUST REVERSER BEFORE YOU DO THIS CHECK. DAMAGE TO THE RETRACT FLEXHOSE CAN OCCUR.

(8) Make sure there is a minimum clearance of 1.0 inch (25.4 millimeters) between the retract flexhose and the sync lock control flexhose and the engine anti-ice (EAI) duct with the thrust reversers closed and latched.

NOTE: The thrust reverser must be closed and latched to do this visual check.

SUBTASK 78-34-12-651-004-H01

(9) Do this task: Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-12-440-011-H01

(10) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-12-710-004-H01

(11) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser six times to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-12-790-001-H01

(12) Examine the flexhoses for hydraulic fluid leakage.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-12-160-002-H01

(1) Clean all hydraulic fluid spills from the engine fan case and thrust reverser with alcohol, B00130 and a clean, dry, cotton wiper, G00034.

SUBTASK 78-34-12-410-009-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-12-440-012-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYNC SHAFT AND TUBING - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser sync shaft and tubing.

(2) An installation of the thrust reverser sync shaft and tubing.

TASK 78-34-13-000-801-H01

2. Thrust Reverser Sync Shaft and Tubing Removal

(Figure 401, Figure 402)

A. General

(1) The thrust reverser sync shaft and tubing will be referred to as the sync shaft and tubing for this procedure.

(2) The sync shaft and tubing is found between the upper and middle actuators and between the middle and lower actuators on each thrust reverser torque box.

(3) The sync shaft 1U1542 (Boeing P/N S315W360-42) and tubing 1U1543 (Boeing P/N S315W360-43) is supplied by Smiths Industries Aerospace (formerly Dowty Aerospace).

B. References

Reference	Title
20-10-19-000-801	O-Rings Removal (P/B 401)
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-34-12-000-801-H01	Thrust Reverser Lower Actuator Removal (P/B 401)
78-34-12-400-801-H01	Thrust Reverser Lower Actuator Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)
STD-1110	Container - Hydraulic Fluid Resistant, 5 Gallon (19 Liter)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-34-13-010-001-H01



CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-34-13-040-001-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-34-13-040-002-H01



WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(3) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-13-864-001-H01

(4) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-13-010-002-H01

(5) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-13-860-001-H01

(6) Make sure that the thrust reverser sleeve is not extended more than one inch from the retracted (stowed) position; do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) After the thrust reverser sleeve is retracted, remove the deactivation pin from the bypass valve handle on the isolation valve.

NOTE: The bypass valve must be closed if thrust reverser hydraulic components or hydraulic tubing are removed. If the bypass valve is not closed, hydraulic fluid from the hydraulic system reservoir will drain through the return line when the components or tubing are removed.

SUBTASK 78-34-13-860-002-H01

(7) Put the center actuator [9] and lower actuator [10] to the unlocked position (Figure 402):

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push and hold the lock button.

(c) Release the manual unlock handle.

(d) Make sure that the manual unlock handle stays in the unlocked position.

SUBTASK 78-34-13-860-003-H01

(8) Put the sync lock [18] to the unlocked position:

(a) Move and hold the manual unlock handle to the unlocked position.

(b) Push-in the lock pin on the opposite side of the manual unlock handle on the sync lock.

(c) Release the manual unlock handle and make sure that the manual unlock handle stays in the unlocked position.

H. Sync Shaft and Tubing Removal

SUBTASK 78-34-13-616-001-H01

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(1) Drain the retract hydraulic line and sync shaft tube (extend hydraulic line) before you remove the retract tubes or the sync shaft tubes.

(a) Disconnect the retract and extend hydraulic flexhoses at the strut hydraulic fittings.

NOTE: This will allow the hydraulic fluid to drain from the hydraulic tubes on the thrust reverser.

1) Install the protection caps on the actuator port and the hydraulic line.

(b) At the lower locking actuator, remove the large plug in the actuator extend port C or D and the small plug in the actuator retract port A or B.

1) The location of these plugs on the locking actuator is shown in this task: Thrust Reverser Lower Actuator Removal, TASK 78-34-12-000-801-H01.

2) Remove the plugs that are near the ground.

3) Use a cotton wiper, G00034 or rag around the plug and the wrench to catch the hydraulic fluid spray.

(c) Catch the hydraulic fluid that drains from the actuator and the retract and extend hydraulic lines in a 5 gallon (19 liter) hydraulic fluid resistant container, STD-1110.

(d) Replace the packing and install the plugs in the lower actuator ports.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) The instructions for the replacement of the packing and the installation of the plugs are in this task: Thrust Reverser Lower Actuator Installation, TASK 78-34-12-400-801-H01.

SUBTASK 78-34-13-020-001-H01

(2) Remove three clamp blocks on the torque box for the sync shaft tube [5].

(a) Remove bolts [28],washers [27], retainer [26], clamp block [22], clamp block [21], spacers [24], retainer [25] and shim [23].

SUBTASK 78-34-13-020-002-H01

(3) Remove the sync shaft and tubing (Figure 401):

NOTE: The sync shaft and tubing is an assembly of one sync shaft, one tube, two sleeves and two collar components. There are a total of two sync shaft and tubes which are installed between the three hydraulic actuators on each thrust reverser half.

(a) Remove the lockwire between the bolts [16] at the upper collar [17] and lower collar [17].

WARNING

DO NOT GET HYDRAULIC FLUID ON YOUR SKIN, IN YOUR MOUTH OR IN YOUR EYES. HYDRAULIC FLUID IS POISONOUS AND CAN GO THROUGH YOUR SKIN AND INTO YOUR BODY. FLUSH HYDRAULIC FLUID FROM YOUR EYES, MOUTH OR SKIN WITH WATER. GET MEDICAL AID IF YOU GET HYDRAULIC FLUID IN YOUR EYES OR MOUTH.

CAUTION

BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(b) Remove the three bolts [16] from the lower collar [17].

1) Put some cloth around the connection of the tube [5] to prevent a spray of hydraulic fluid.

2) Drain the hydraulic fluid in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

(c) Remove the three bolts [16] from the upper collar [17].

(d) Move the upper collar [17] and sleeve [6] down the tube [5] to get access to the sync shaft [11].

(e) Move the lower collar [17] and sleeve [6] up the tube [5].

(f) Move the upper end of the tube [5] to one side of the actuator port and flex the sync shaft [11] to remove the sync shaft from the actuator.

CAUTION

DO NOT LET DIRT OR OTHER CONTAMINATION GET ON THE FLEX SHAFT. DAMAGE TO THE FLEX SHAFT CAN OCCUR

(g) Remove the sync shaft [11] and tube [5] together.

NOTE: Keep the sync shaft in the tube to prevent contamination to the sync shaft.

(h) Install a protection cap on each sync shaft port on the actuators.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

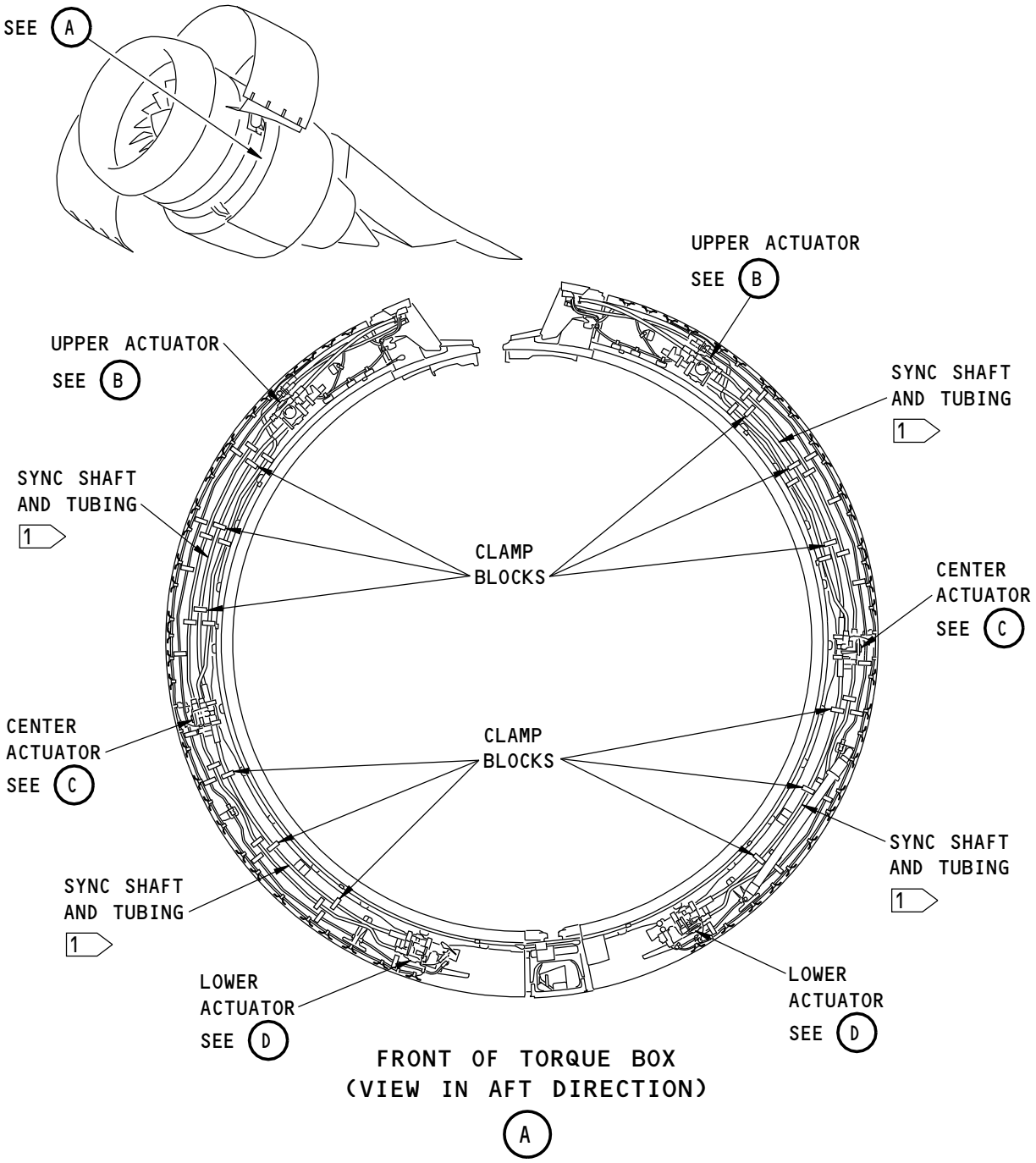
(i) Use this general practice to remove the packing on the sleeve or tube fittings; do this task O-Rings Removal, TASK 20-10-19-000-801.

(j) Remove and discard the packings [14] on the sleeve.

(k) Remove and discard the packings [13] on the tube.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

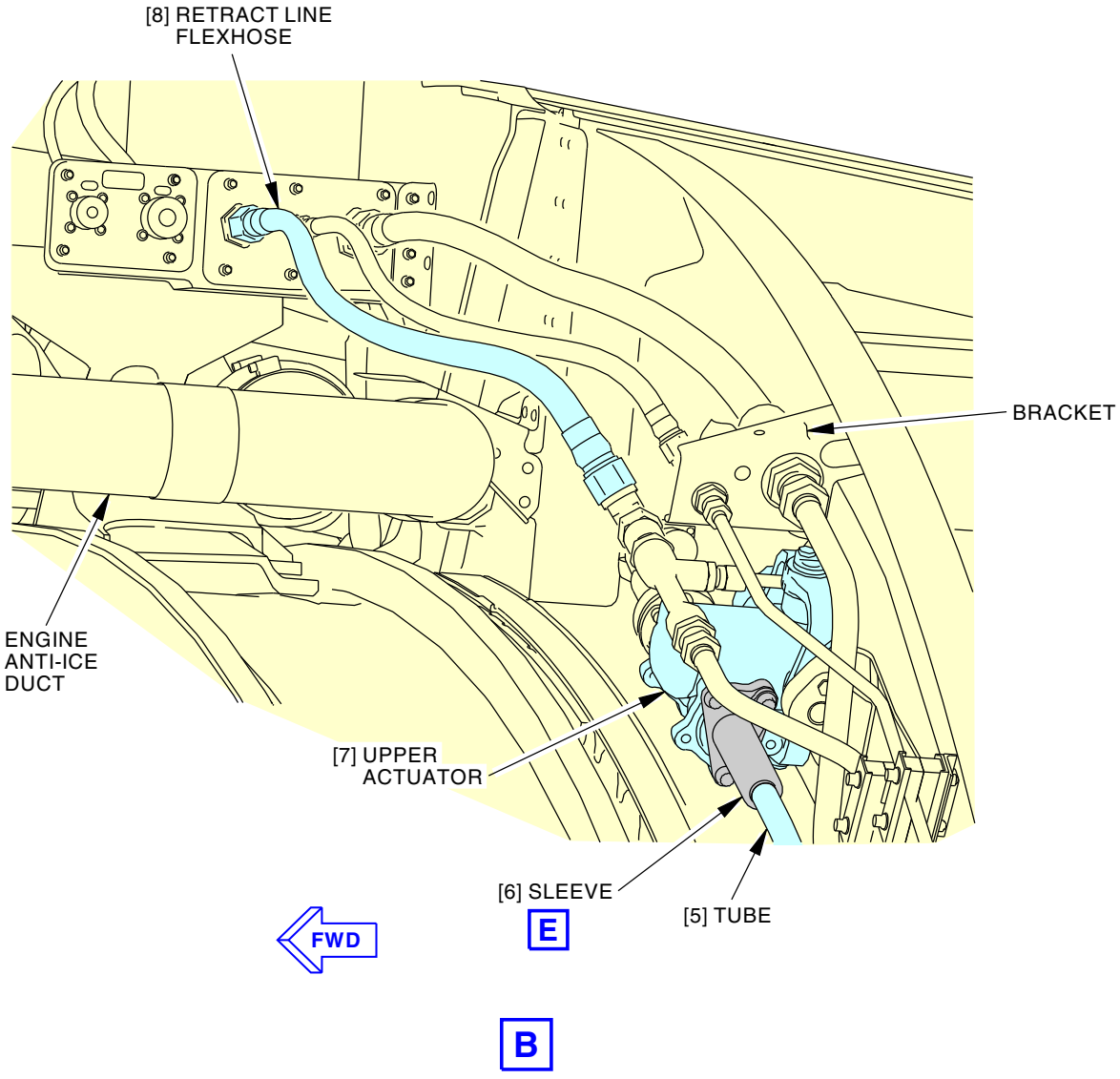


1 LIGHTLY PULL THE TUBE RADIALLY OUTWARD 5-10 POUNDS (22-44 NEWTONS) TO SEAT THE TUBE ENDS IN THE TUBE SLEEVES

M93327 S000099833_V1

Thrust Reverser Sync Shaft and Tubing Installation
Figure 401/78-34-13-990-801-H01 (Sheet 1 of 5)

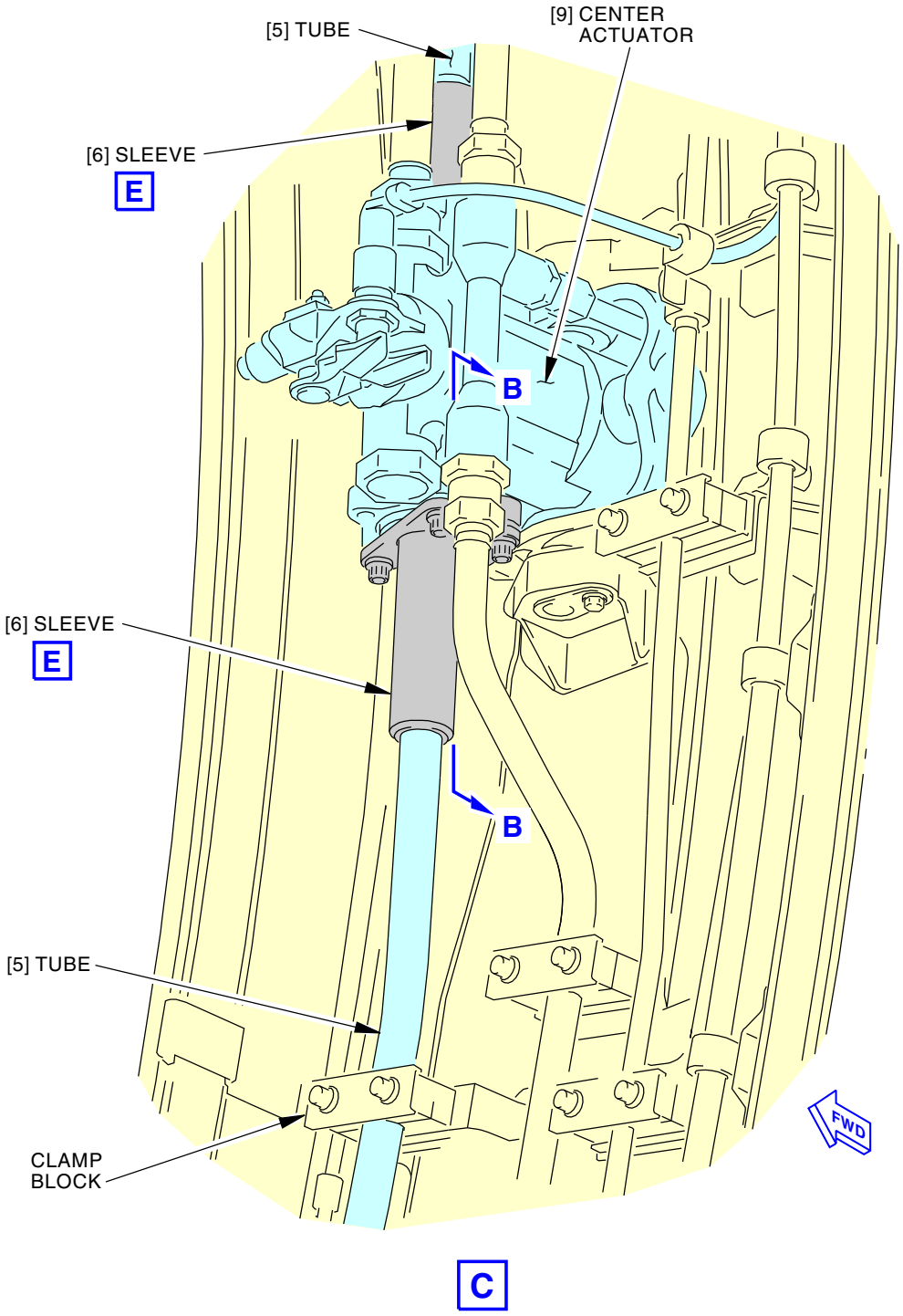
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07558 S0004286511_V3

Thrust Reverser Sync Shaft and Tubing Installation
Figure 401/78-34-13-990-801-H01 (Sheet 2 of 5)

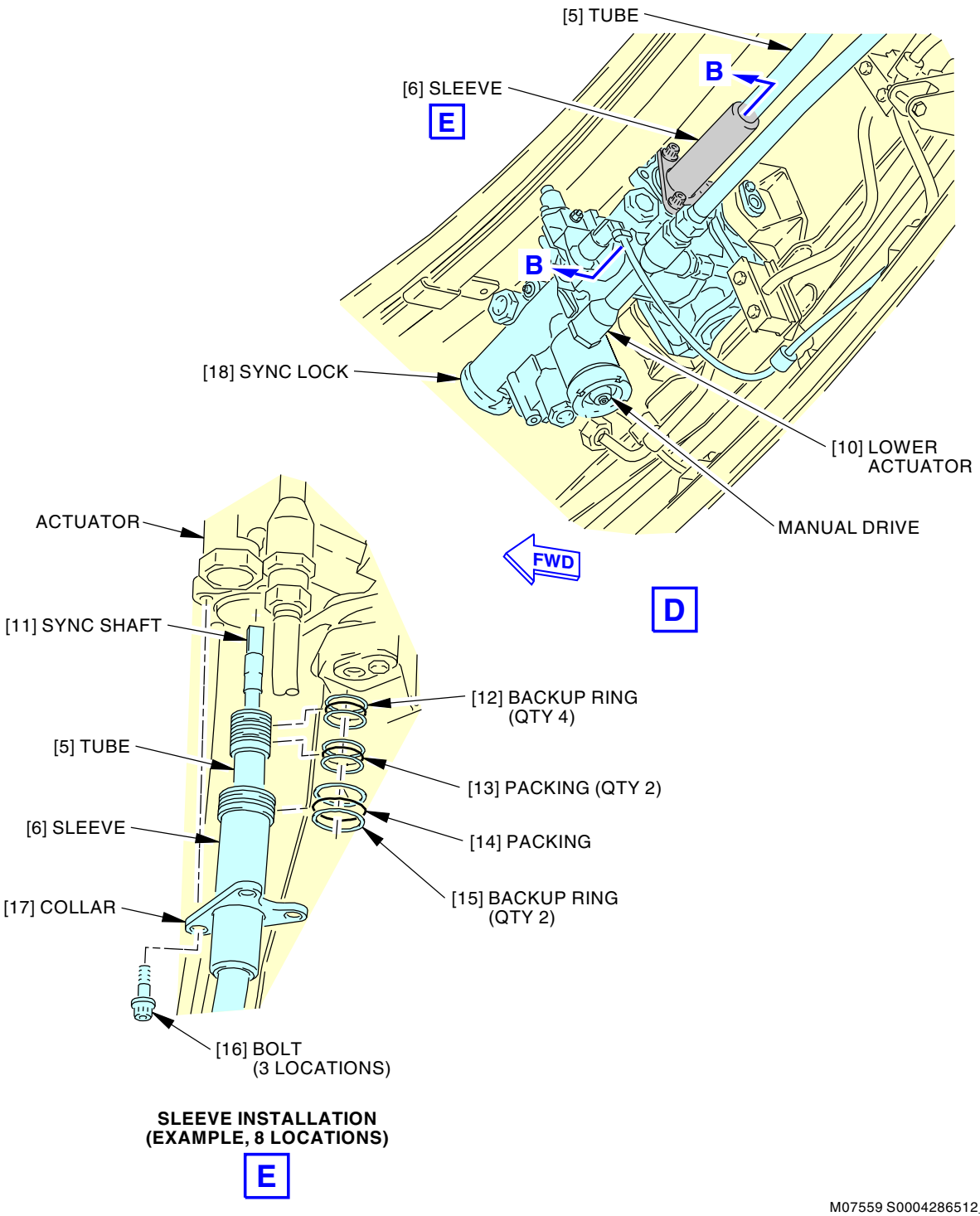
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



M07557 S0004286510_V2

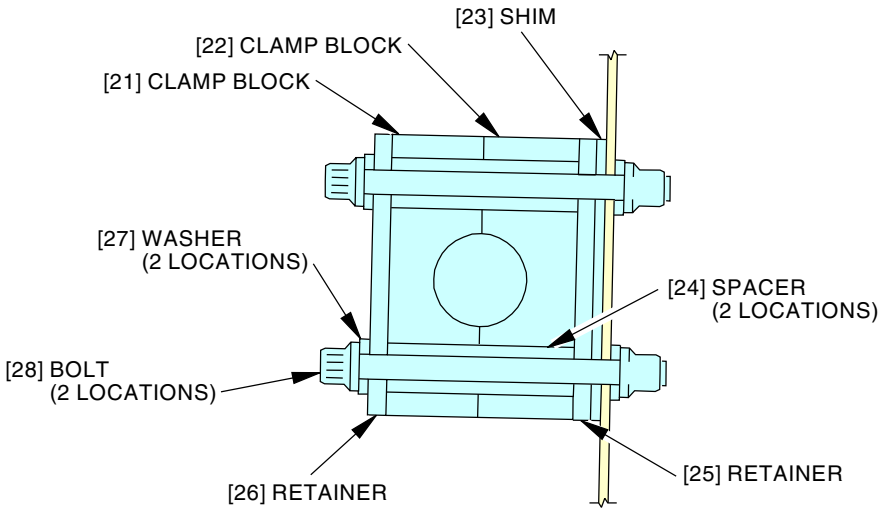
Thrust Reverser Sync Shaft and Tubing Installation
Figure 401/78-34-13-990-801-H01 (Sheet 3 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



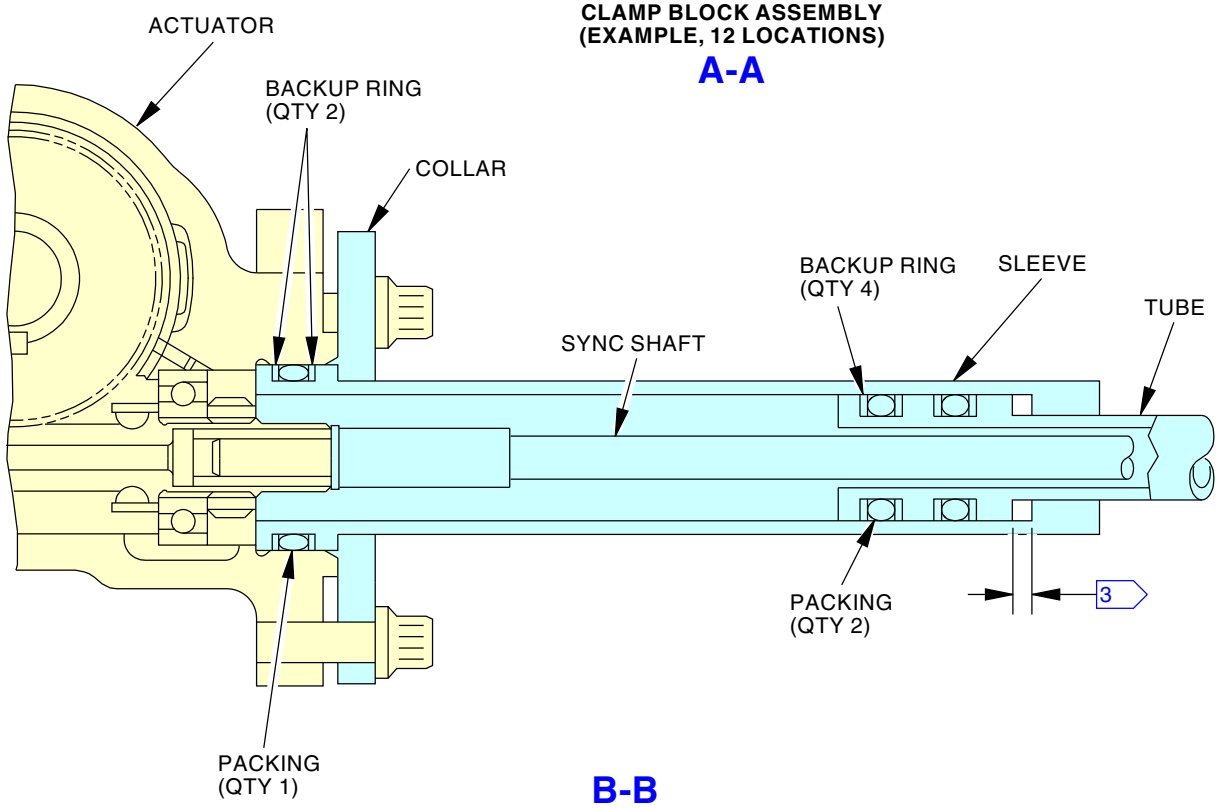
Thrust Reverser Sync Shaft and Tubing Installation
Figure 401/78-34-13-990-801-H01 (Sheet 4 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



CLAMP BLOCK ASSEMBLY
(EXAMPLE, 12 LOCATIONS)

A-A



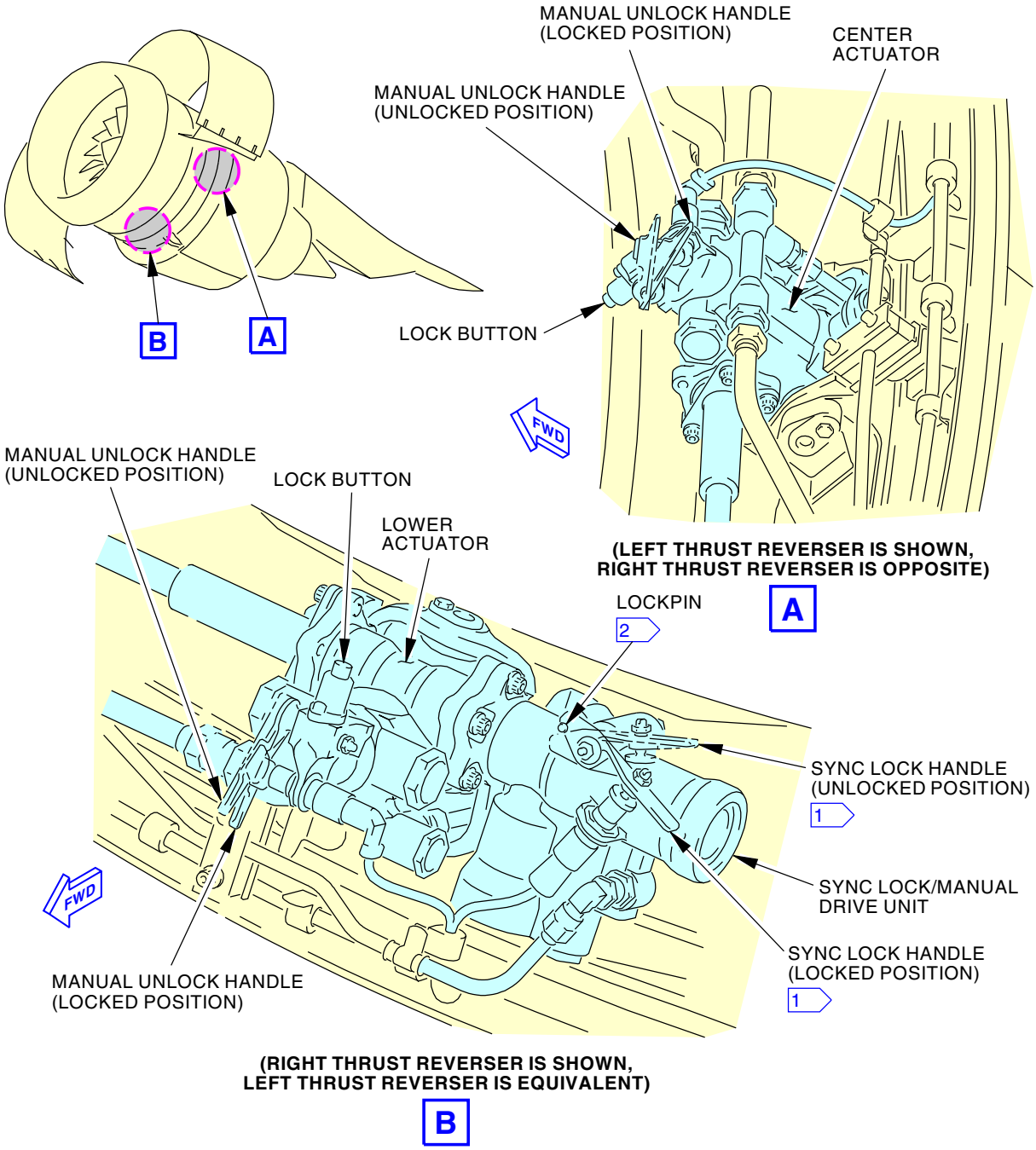
B-B

3 SEAT TUBE END IN SLEEVE TO MINIMIZE THE INTERNAL GAP

M07560 S0004286513_V2

Thrust Reverser Sync Shaft and Tubing Installation
Figure 401/78-34-13-990-801-H01 (Sheet 5 of 5)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1 THE MANUAL UNLOCK HANDLE ON THE LEFT THRUST REVERSER IS BETWEEN THE SYNC LOCK AND THE THRUST REVERSER TORQUE BOX.

2 PUSH-IN OPPOSITE END OF LOCKPIN TO HOLD HANDLE IN UNLOCKED POSITION.

M07561 S0004286514_V2

Thrust Reverser Locks
Figure 402/78-34-13-990-802-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-13-400-801-H01

3. Thrust Reverser Sync Shaft and Tubing Installation

(Figure 401)

A. General

(1) After you install the sync shaft and tubing, you must do the operational test for the thrust reverser.

(2) To correctly rig the sync shaft, hydraulic pressure must be applied to the retract side of the thrust reverser actuators when the sync shaft is installed. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser.

(3) The upper sync shaft and the lower sync shaft are interchangeable and can be reversed end for end.

(4) The sync shaft 1U1542 (Boeing P/N S315W360-42) and tubing 1U1543-1/-2 (Boeing P/N S315W360-43) is supplied by Smiths Aerospace Actuation Products (formerly Dowty Aerospace).

B. References

Reference	Title
12-12-01-610-801	Hydraulic Reservoir Fluid Level Check (P/B 301)
20-10-10-400-801	Flexible Hose Installation (P/B 401)
20-10-19-400-801	O-Rings Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-00-980-801-H01	Thrust Reverser Operation - Extend (Manual Method) (P/B 201)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-31-00-981-802-H01	Thrust Reverser Operation - Retract (Power Method) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-896	Test Stand - Hydraulic, 0 to 3000 psi (0 to 20,684 kPa) Range

D. Consumable Materials

Reference	Description	Specification
B00316	Solvent - Aliphatic Naphtha (For Organic Coatings)	TT-N-95 Type I, ASTM D-3735 Type I
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description	Specification
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Sync Shaft and Tubing Installation

SUBTASK 78-34-13-040-003-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Make sure that the deactivation procedure for the thrust reverser for ground maintenance was done; do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-13-020-003-H01

(2) Install the new packing on the sleeve [6] and the tube [5] (Figure 401).

(a) The general practice to install the new packing on the sleeve or tube fittings is given in O-Rings Installation, TASK 20-10-19-400-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING DO NOT GET THE SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. SOLVENT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(b) Clean the seal surfaces and grooves with a clean cotton wiper, G00034 moistened with solvent, B00316.

1) Wipe all the solvent off the surfaces with a clean, dry cloth.

NOTE: Do not let the solvent dry on the surfaces.

(c) Lubricate the new packing with hydraulic MCS 352B fluid, D00054 or hydraulic fluid, D00153.

(d) Install the two packings [13] between four backup rings [12] on the tube [5].

(e) Install the packing [14] between the two backup rings [15] on the sleeve [6].

(f) If there is contamination on the sync shaft [11], remove the contamination with a clean cotton wiper, G00034.

SUBTASK 78-34-13-020-004-H01

(3) Temporarily install the tube [5] without the sync shaft [11]:

(a) Put the tube [5] without the sync shaft [11] in its position between the actuators.

(b) Install the bolts [16] to the collar [17].

SUBTASK 78-34-13-860-004-H01

WARNING MAKE SURE THAT THE SYNC LOCK IS UNLOCKED BEFORE HYDRAULIC PRESSURE IS APPLIED TO THE THRUST REVERSER. STRUCTURAL DAMAGE WILL OCCUR IF THE THRUST REVERSER ACTUATORS TRY TO RETRACT WHILE THE THRUST REVERSER SLEEVE IS EXTENDED AND THE SYNC LOCK IS LOCKED.

(4) Make sure that the manual unlock handle on the sync lock is in the unlocked position.

SUBTASK 78-34-13-860-005-H01

(5) Make sure that the thrust reverser sleeve is not extended more than 1.0 in. (25.4 mm) from the retracted (stowed) position.

SUBTASK 78-34-13-430-001-H01

(6) Connect the hydraulic flexhoses that were disconnected to drain the actuation system.

(a) Follow this general practice when you connect the hydraulic flexhose, do this task: Flexible Hose Installation, TASK 20-10-10-400-801.

CAUTION DO NOT LET THE HOSE BECOME TWISTED WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWISTED HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE DAMAGE, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(b) Connect the extend flexhose to the strut hydraulic fitting.

1) Tighten the hose nut to 855 in-lb (97 N·m)-945 in-lb (107 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) If necessary, connect the retract flexhose to the strut hydraulic fitting.

NOTE: If an external hydraulic service cart is to be used to provide retract hydraulic pressure for the installation, it is not necessary to connect the retract flexhose at this time.

1) Tighten the hose nut to 665 in-lb (75 N·m)-735 in-lb (83 N·m).

(d) Do not adjust the position of the flexhose clamp block on the left thrust reverser hoses at this time.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and do a check of the clearance between the retract flexhose and the engine anti-ice duct.

SUBTASK 78-34-13-863-001-H01

(7) Supply hydraulic power to the retract side of the actuators:

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston.

(a) If you use the airplane hydraulic power, do these steps:

1) For the applicable engine, move the EEC MAINT POWER switch on the P61 panel to the TEST position.

2) Make sure that the reverse thrust lever is in the fully forward and down position and the DO-NOT-OPERATE tag is attached to it.

3) Remove the pin from the shutoff valve spool on the isolation valve.

a) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

4) Do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

WARNING KEEP ALL PERSONNEL AWAY FROM THE THRUST REVERSER SLEEVE. THE THRUST REVERSER SLEEVE WILL RETRACT WHEN YOU MOVE THE TEST ENABLE SWITCH. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

5) Move and hold the test enable switch to apply hydraulic pressure to the retract side of the actuators.

NOTE: The test enable switch is at the 5:00 o'clock position on the aft face of the inlet cowl near the PDOS switch. Hold the test enable switch until the sync shaft is installed and the bolts are tightened. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

a) Do this task: Thrust Reverser Operation - Retract (Power Method), TASK 78-31-00-981-802-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING MAKE SURE THAT THE PRESSURE LINE OF THE HYDRAULIC CART IS CONNECTED TO THE RETRACT LINE ON THE THRUST REVERSER. IF THE PRESSURE LINE IS CONNECTED TO THE EXTEND LINE, INJURIES TO PERSONNEL AND DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(b) If you use a hydraulic ground service cart, do these steps:

1) Make sure that the hydraulic power system to the airplane is depressurized.

a) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

2) If necessary, disconnect the retract line flexhose [8] at the hydraulic connection on the strut.

a) Use some cotton wiper, G00034 around the retract line flexhose and the wrench to catch the hydraulic fluid spray.

3) Connect the 0 to 3000 psi (0 to 20,684 kpa) range hydraulic test stand, STD-896 to the retract line flexhose [8].

4) Make sure that all the tube [5] are installed.

WARNING KEEP ALL PERSONNEL AWAY FROM THE THRUST REVERSER SLEEVE. THE THRUST REVERSER SLEEVE WILL RETRACT WHEN YOU SUPPLY HYDRAULIC PRESSURE. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

5) Supply hydraulic pressure of 3000 psi (20,684 kPa) and do not decrease the hydraulic pressure.

NOTE: Hydraulic pressure will only be on the retract side of the actuators.

SUBTASK 78-34-13-420-001-H01

(8) Keep the hydraulic pressure on the retract side while you do these steps to install the sync shaft [11] in the tube [5] (Figure 401).

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston.

(a) Loosen but do not remove the bolts [16] from the collar [17] at one end of the tube [5].

(b) Remove the bolts [16] from the collar [17] at the other end of the tube [5].

(c) Install the sync shaft [11] in the open end of the tube [5].

(d) Make sure the sync shaft [11] is engaged in the actuator splined shaft:

1) Try to turn the sync shaft and feel for engagement; there must not be any radial movement.

(e) Put the other end of the sync shaft [11] in the splined shaft of the one actuator:

1) Keep the tube [5] to the side of the actuator.

2) Flex the sync shaft [11] and put the sync shaft in the splined shaft of the other actuator.

(f) Install the three bolts [16] through the collars [17].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Tighten the bolts to 145 in-lb (16.4 N·m)-155 in-lb (17.5 N·m).

NOTE: Do not install the lockwire at this time.

SUBTASK 78-34-13-864-002-H01

(9) Remove the hydraulic power to the retract side of the actuators:

(a) If you used airplane hydraulic power, release the test enable switch.

(b) If you used hydraulic power from a hydraulic service cart, remove the hydraulic power:

1) Decrease the pressure in the hydraulic service cart to zero.

2) Disconnect the hydraulic service cart from the retract line flexhose [8].

a) Put a cotton wiper, G00034 around the retract line flexhose and the wrench to catch hydraulic fluid that will spray from the retract line.

CAUTION

DO NOT LET THE HOSE TWIST WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWIST IN THE HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE FAILURES, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

3) Connect the retract line flexhose [8] to the hydraulic connection at the strut.

a) The general practice for the connection of the flexible hose is Flexible Hose Installation, TASK 20-10-10-400-801.

b) Tighten the hose nut to 665 in-lb (75 N·m)-735 in-lb (83 N·m).

SUBTASK 78-34-13-420-002-H01

(10) Install MS20995C32 lockwire, G01048 on the bolts [16] at the lower collar [17] and upper collar [17].

SUBTASK 78-34-13-420-003-H01

(11) Install three clamp blocks to attach the sync shaft and tube to the thrust reverser torque box.

NOTE: The clamp blocks and retainers are of different thickness. The clamp blocks and retainers can be reversed to increase or decrease the offset from the brackets.

(a) Lightly pull the tube [5] radially outward with a force of 5 lbf (22 N)-10 lbf (44 N) to seat the tube end in the sleeve [6] during the installation and adjustment of the clamp blocks.

(b) Use any combination of these steps to prevent preload and correctly align the sync shaft tube:

1) Exchange the top and bottom location of the clamp blocks.

2) Exchange the top and bottom location of the white and grey retainers.

3) Remove the laminations from the shim or remove the shim under the retainer.

4) Install the clamp blocks to remove or reduce the internal gap between the sleeve and the tube.

(c) Measure the installed position of the tube relative to the sleeve to find the internal gaps.

NOTE: The maximum internal gap allowed per tube is 0.000-0.055 inch (0.000-1.397 millimeter); this is a total value for both ends of the tube.

(d) Install the three clamp blocks.

1) Apply primer, C00259 to the shim [23].

NOTE: The shim can be installed with wet primer.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Install the shim [23], retainer [25], clamp block [22], clamp block [21], spacers [24], retainer [26], washers [27] and bolts [28].

3) Tighten the bolts to 65 in-lb (7.3 N·m)-75 in-lb (8.5 N·m).

H. Sync Shaft and Tubing Installation Test

SUBTASK 78-34-13-040-004-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Make sure that the deactivation procedure for the thrust reverser for ground maintenance was done; do this task:Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00

SUBTASK 78-34-13-651-001-H01

(2) Do this task: Hydraulic Reservoir Fluid Level Check, TASK 12-12-01-610-801.

SUBTASK 78-34-13-980-001-H01

(3) Manually extend and retract the thrust reverser:

NOTE: It is necessary to make sure the thrust reverser moves smoothly and does not bind or jam before hydraulic power is used to check the operation of the thrust reverser.

(a) Do this task: Thrust Reverser Operation - Extend (Manual Method), TASK 78-31-00-980-801-H01.

(b) Do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-34-13-440-001-H01

(4) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-13-710-001-H01

(5) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of six cycles to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-13-210-001-H01

(6) Examine the thrust reverser sync shaft and tubing for hydraulic fluid leakage.

(a) If leakage occurs, depressurize the system, disassemble the fitting/tube connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/tube connection with the steps above.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-13-211-001-H01

CAUTION

DO NOT LET THE RETRACT FLEXHOSE TOUCH THE ENGINE ANTI-ICE DUCT. KEEP A 1.0 INCH (25.4 MILLIMETERS) CLEARANCE BETWEEN THE FLEXHOSE AND THE DUCT. CLOSE AND LATCH THE THRUST REVERSER BEFORE YOU DO THIS CHECK. DAMAGE TO THE RETRACT FLEXHOSE CAN OCCUR.

(7) Make sure the minimum clearance between the engine anti-ice duct and the retract flexhose [8] on the left thrust reverser half is 1.0 inch (25.4 millimeters) (Figure 401).

NOTE: This step is repeated in the installation procedure for the sync shaft and tubing, the upper, center and lower hydraulic actuators and the sync lock/manual drive unit and can be combined with those procedures.

NOTE: The thrust reverser must be closed and latched to adjust the clamp block and to do a check of the clearance between the retract flexhose and the engine anti-ice duct.

(a) Remove the flexhose clamp block [1] with two screws [2], washers [3], and nuts [4].

(b) Adjust the location of flexhose clamp block to a position 15.40 ±0.20 in. (391.2 ±5.1 mm) from the upper thrust reverser bracket to prevent the interference between the retract flexhose and the engine anti-ice duct.

(c) Install the flexhose clamp block [1] with two screws [2], washers [3], and nuts [4].

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-13-860-006-H01

(1) If you used hydraulic power from the airplane, move the EEC MAINT POWER switch on the P61 panel to the NORM position.

SUBTASK 78-34-13-410-001-H01

(2) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-13-440-002-H01

(3) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-34-13-860-007-H01

(4) Clear the ENG REVERSER status messages.

(a) Do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

REVERSE THRUST LEVER INTERLOCK ACTUATOR - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the reverse thrust lever interlock actuator.

(2) An installation of the reverse thrust lever interlock actuator.

B. Refer to the vendors component repair instructions from Eaton Aerospace Actuation and Controls (formerly Vickers (Electromechanical Division)) for repair instructions for the Automatic Ground Speed Brake Linear Actuator, P/N 684D100-11/-15 (Boeing P/N S253T402-4).

TASK 78-34-14-000-801-H01

2. Reverse Thrust Lever Interlock Actuator Removal

(Figure 401)

A. General

(1) The task is the removal procedure of the reverse thrust lever interlock actuator.

(2) The interlock actuator is in the control stand.

B. References

Reference	Title
27-61-00-040-801	Spoiler Deactivation (P/B 201)

C. Location Zones

Zone	Area
112	Area Forward of Nose Landing Gear Wheel Well
211	Flight Compartment, Left
212	Flight Compartment, Right

D. Access Panels

Number	Name/Location
112AL	Forward Access Door

E. Prepare for the Removal

SUBTASK 78-34-14-865-004-H01

(1) Open these circuit breakers and install safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL
P	24	C78609	L ENG T/R INTLK

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL
N	13	C78611	R ENG T/R INTLK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-14-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE FOR THE SPOILERS, OR MOVE ALL PERSONNEL AND EQUIPMENT AWAY FROM THE SPOILERS. THE SPOILERS CAN RETRACT QUICKLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(2) Do this task: Spoiler Deactivation, TASK 27-61-00-040-801.

SUBTASK 78-34-14-860-001-H01

(3) Make sure the two forward thrust levers are in the idle position.

(a) Attach DO-NOT-OPERATE tags to the two forward thrust levers.

SUBTASK 78-34-14-860-002-H01

(4) Make sure the two reverse thrust levers are fully forward and down.

(a) Attach DO-NOT-OPERATE tags to the two reverse thrust levers.

SUBTASK 78-34-14-010-001-H01

(5) Open the fuselage forward access door:

NOTE: The access door is forward of the wheel well for the nose landing gear.

(a) Open this access panel:

Number	Name/Location
112AL	Forward Access Door

F. Reverse Thrust Reverser Interlock Actuator Removal

SUBTASK 78-34-14-020-001-H01

(1) Remove the interlock actuator [1] (Figure 401):

(a) Remove the screw [3] and washer [4] to disconnect the clamp [5] from the separation bar [2].

NOTE: The separation bar prevents cross-connection of the electrical connectors for the interlock actuator. The separation bar is suspended from the wire bundles and is not fastened to any structure.

(b) Open the clamp [5] to remove the actuator wire bundle.

CAUTION MAKE SURE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU DISCONNECT THEM. CONTAMINATION OF ELECTRICAL CONNECTORS CAN CAUSE DAMAGE TO EQUIPMENT.

(c) Disconnect the electrical connector [12].

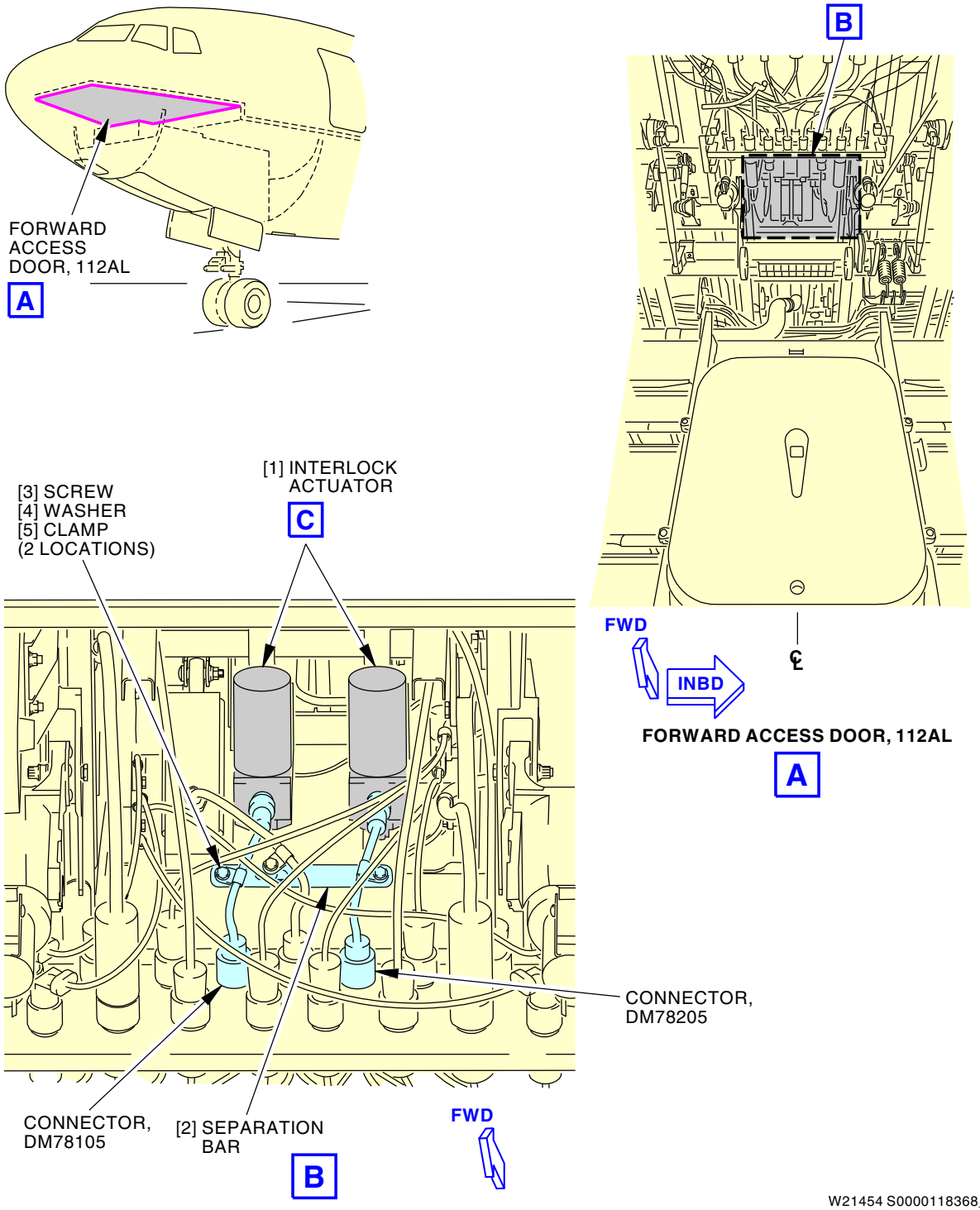
(d) Remove the nut [8], washer [7] and bolt [6].

(e) Remove the nut [11], washer [10] and bolt [9].

(f) Remove the interlock actuator [1].

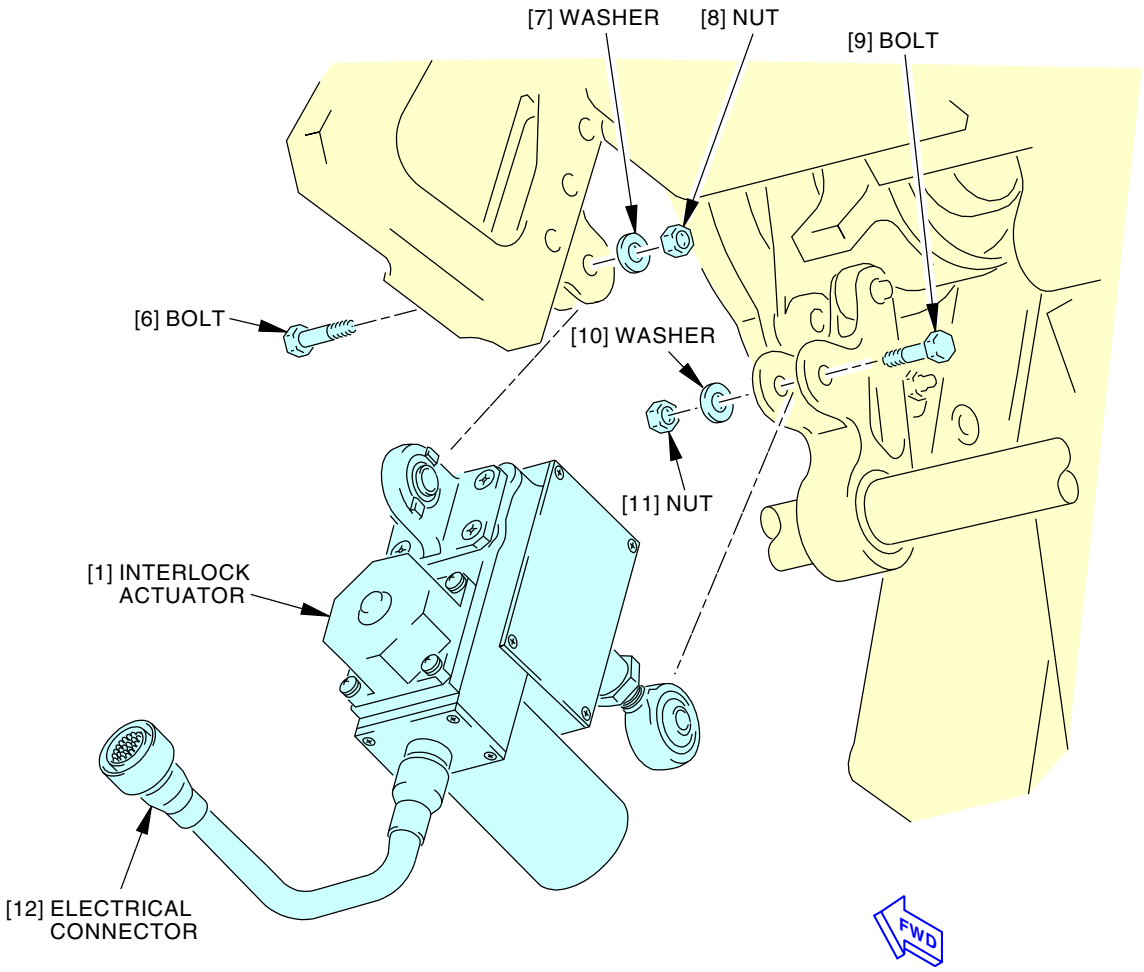
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Reverse Thrust Lever Interlock Actuator Installation
Figure 401/78-34-14-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



INTERLOCK ACTUATOR

C

M07562 S0004286515_V3

Reverse Thrust Lever Interlock Actuator Installation
Figure 401/78-34-14-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-14-400-801-H01

3. Reverse Thrust Lever Interlock Actuator Installation

(Figure 401)

A. General

(1) The task is the installation procedure of the reverse thrust lever interlock actuator.

(2) After the installation of the interlock actuator, you must do the operational test of the thrust reverser.

B. References

Reference	Title
27-61-00-440-801	Spoiler Activation (P/B 201)
71-00-00-700-812-H01	Test No. 13 - Engine Reverse Thrust Lever Interlock Test (MAT Initiated Test) (P/B 501)

C. Location Zones

Zone	Area
112	Area Forward of Nose Landing Gear Wheel Well
211	Flight Compartment, Left
212	Flight Compartment, Right

D. Access Panels

Number	Name/Location
112AL	Forward Access Door

E. Reverse Thrust Reverser Interlock Actuator Installation

SUBTASK 78-34-14-420-001-H01

(1) Install the interlock actuator [1] (Figure 401):

(a) Put the interlock actuator into position.

(b) Install the bolt [6], washer [7] and nut [8].

NOTE: The bolt head is installed outboard.

(c) Install the bolt [9], washer [10] and nut [11].

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(d) Connect the electrical connector [12].

(e) Install the clamp [5] on the actuator wire bundle.

(f) Attach the clamp [5] to the separation bar [2] with washer [4] and screw [3].

NOTE: The separation bar keeps the actuator wire bundles separated so that the actuator connector cannot be cross connected. The separation bar is suspended from the wire bundles and is not connected to any structure.

SUBTASK 78-34-14-410-001-H01

(2) Close the fuselage forward access door:

(a) Close this access panel:

Number	Name/Location
112AL	Forward Access Door

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-14-865-003-H01

(3) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
P	23	C78605	L ENG T/R CTRL
P	24	C78609	L ENG T/R INTLK

Right Power Management Panel, P210

Row	Col	Number	Name
N	12	C78604	R ENG T/R CTRL
N	13	C78611	R ENG T/R INTLK

SUBTASK 78-34-14-860-003-H01

(4) Remove the DO-NOT-OPERATE tags from the two forward thrust levers.

SUBTASK 78-34-14-860-004-H01

(5) Remove the DO-NOT-OPERATE tags from the two reverse thrust levers.

F. Reverse Thrust Reverser Interlock Actuator Installation Test

SUBTASK 78-34-14-710-001-H01

(1) Do this task: Test No. 13 - Engine Reverse Thrust Lever Interlock Test (MAT Initiated Test), TASK 71-00-00-700-812-H01.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-14-440-001-H01

(1) Do this task: Spoiler Activation, TASK 27-61-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER TEST ENABLE SWITCH ASSEMBLY- REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser test enable switch assembly.

(2) An installation of the thrust reverser test enable switch assembly.

TASK 78-34-15-000-801-H01

2. Thrust Reverser Test Enable Switch Assembly Removal

(Figure 401)

A. General

(1) The test enable switch assembly is below the right fan cowl panel on the aft face of the inlet cowl at the 5:00 o'clock position.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
414	Right Fan Cowl - Left Engine
424	Right Fan Cowl - Right Engine

D. Access Panels

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

E. Prepare for the Removal

SUBTASK 78-34-15-865-004-H01

(1) Open these circuit breakers and install safety tags:

Left Power Management Panel, P110

Row	Col	Number	Name
C	24	C73401	L ENG EEC ALTN PWR CHAN A
E	19	C73403	L ENG EEC ALTN PWR CHAN B

Right Power Management Panel, P210

Row	Col	Number	Name
E	1	C73400	R ENG EEC ALTN PWR CHAN A
E	11	C73402	R ENG EEC ALTN PWR CHAN B

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-34-15-860-001-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(2) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-34-15-040-001-H01

(3) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-34-15-040-002-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-15-010-002-H01

(5) For the right fan cowl panel on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Thrust Reverser Test Enable Switch Assembly Removal

SUBTASK 78-34-15-020-001-H01

(1) Do these steps to remove the test enable switch assembly [5]:

CAUTION

MAKE SURE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU DISCONNECT THEM. CONTAMINATION OF ELECTRICAL CONNECTORS CAN CAUSE DAMAGE TO EQUIPMENT.

(a) Disconnect the electrical connector [1] from the test enable switch assembly [5].

(b) Put a protective cover on the electrical connector.

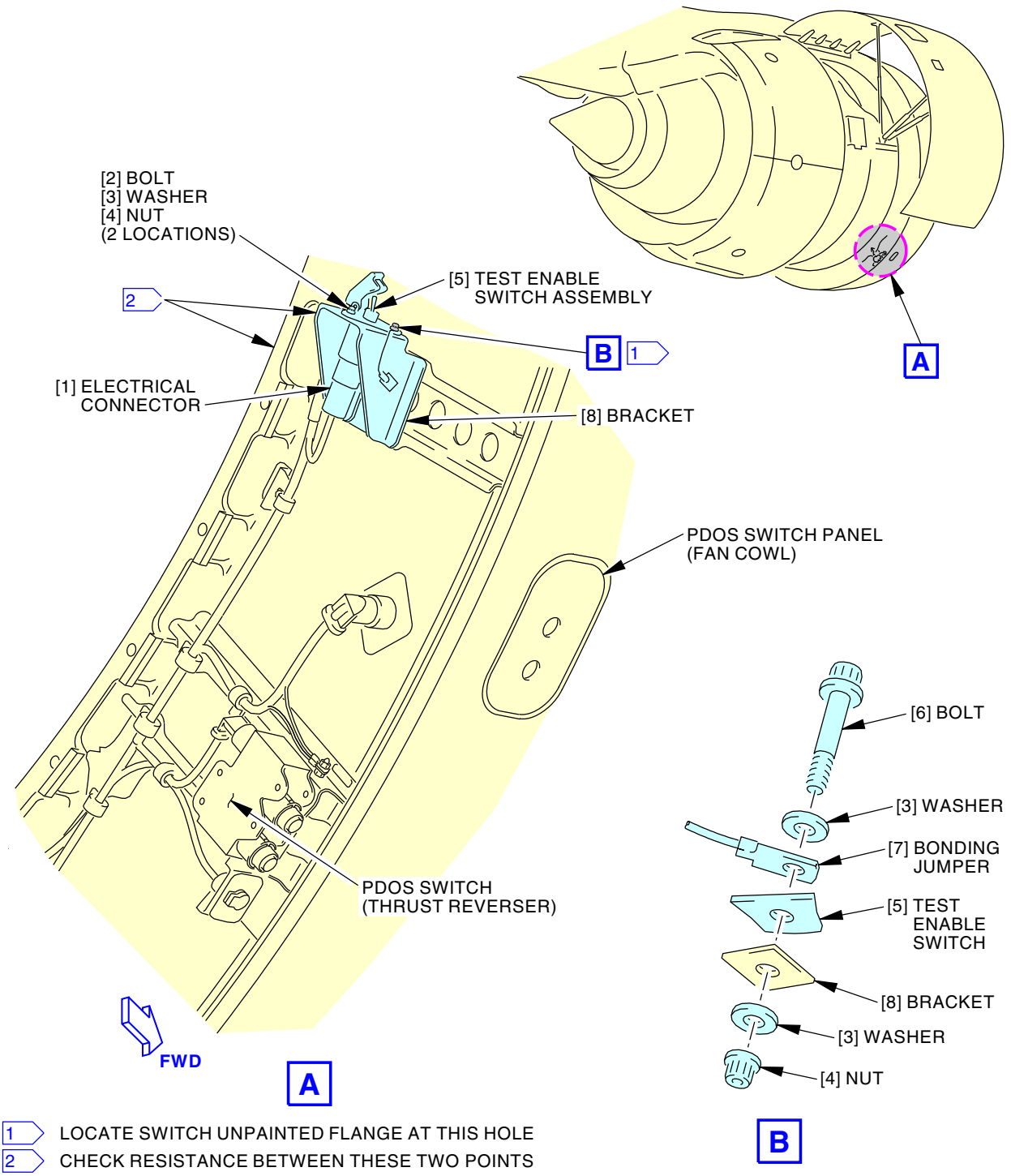
(c) Remove the two bolts [2], washers [3], and nuts [4].

(d) Remove the bolt [6], washers [3], and nut [4] from the bonding jumper [7].

(e) Remove the test enable switch assembly [5] from the bracket [8].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Test Enable Switch Assembly Installation
Figure 401/78-34-15-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-15-400-801-H01

3. Thrust Reverser Test Enable Switch Assembly Installation

(Figure 401)

A. General

(1) After the installation of the test enable switch assembly, you must extend and retract the thrust reverser sleeve by the power method.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-1550	Bonding Meters - Approved, Intrinsically Safe (Approved for use in Class I, Divisions I & II hazardous (classified) locations. Outside these hazardous locations, COM-614 can be used in lieu of COM-1550). Part #: 620LK Supplier: 1CRL2 Part #: M1 Supplier: 3AD17 Part #: T477W Supplier: 01014 Opt Part #: M1B Supplier: 3AD17

D. Consumable Materials

Reference	Description	Specification
A00436	Sealant - Fuel Tank	BMS5-45 (Supersedes BMS5-26)
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00130	Alcohol - Isopropyl	TT-I-735
B00148	Solvent - Methyl Ethyl Ketone (MEK)	ASTM D740
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
211	Flight Compartment, Left
212	Flight Compartment, Right
414	Right Fan Cowl - Left Engine
424	Right Fan Cowl - Right Engine

F. Access Panels

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
424AR	Right Fan Cowl Panel, Right Engine

G. Thrust Reverser Test Enable Switch Assembly Installation

SUBTASK 78-34-15-420-001-H01

(1) Install the test enable switch assembly [5]:

(a) Wipe or scrub the bracket [8] with a clean, dry cotton wiper, G00034 to remove all loose dirt, unwanted grease, oil, and hydraulic fluid.

WARNING DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(b) Clean the bracket [8] with a clean cotton wiper, G00034 wet with solvent, B00062 or alcohol, B00130 or solvent, B00148.

1) Remove the excess solvent with a clean, dry cotton wiper, G00034 before the solvent evaporates.

2) Continue to clean the surface until the cloth shows no dirt or unwanted material.

WARNING DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) Clean the underside of the test enable switch assembly [5] flange with a clean cotton wiper, G00034 wet with solvent, B00062 or alcohol, B00130 or solvent, B00148.

1) Remove the excess solvent with a clean, dry cotton wiper, G00034 before the solvent evaporates.

WARNING DO NOT GET SOLVENT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE LIQUID WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(d) Clean the unpainted test enable switch assembly [5] flange with a clean cotton wiper, G00034 wet with solvent, B00062 or alcohol, B00130 or solvent, B00148.

1) Remove the excess solvent with a clean, dry cotton wiper, G00034 before the solvent evaporates.

(e) Apply the sealant, A00436 to the bracket [8] where the test enable switch assembly [5] will attach.

1) Mix the two part sealant to the manufacturers instructions.

(f) Put the test enable switch assembly [5] in position on the bracket on the aft face of the inlet cowl.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Locate the unpainted flange of the test enable switch assembly [5] on the hole for the bonding jumper fastener.

(g) Apply the sealant, A00436 to the shank and threads of the bolts [2] and bolt [6].

1) Mix the two part sealant to the manufacturers instructions.

(h) Install the two bolts [2] with washers [3] under the nuts [4] with wet sealant.

(i) Install the bolt [6] with washer [3] under the bolt head, through the bonding jumper [7] and the test enable switch assembly [5] flange with washer [3] under the nut [4] with wet sealant.

(j) Remove the protective cover on the electrical connector.

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(k) Connect the electrical connector [1] to the test enable switch assembly [5].

SUBTASK 78-34-15-765-001-H01

(2) Do a check of the resistance between the flange of the test enable switch assembly [5] and the torque box structure with a intrinsically safe approved bonding meter, COM-1550.

(a) The maximum resistance must not be more than 0.0025 ohms.

H. Test Enable Switch Assembly Installation Test

SUBTASK 78-34-15-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-15-865-003-H01

(2) Remove the safety tags and close these circuit breakers:

Left Power Management Panel, P110

Row	Col	Number	Name
C	24	C73401	L ENG EEC ALTN PWR CHAN A
E	19	C73403	L ENG EEC ALTN PWR CHAN B

Right Power Management Panel, P210

Row	Col	Number	Name
E	1	C73400	R ENG EEC ALTN PWR CHAN A
E	11	C73402	R ENG EEC ALTN PWR CHAN B

SUBTASK 78-34-15-710-001-H01

(3) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Make sure that the thrust reverser sleeve extends and retracts when you use the test enable switch assembly [5].

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-15-410-002-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Close these access panels:

Number	Name/Location
414AR	Right Fan Cowl Panel, Left Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-34-15-440-002-H01

(2) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYNC LOCK SOLENOID VALVE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser sync lock solenoid valve.

(2) An installation of the thrust reverser sync lock solenoid valve.

B. The solenoid valve is a component of the thrust reverser sync lock valve. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles) for the repair instructions for the Sync Lock Control Valve assembly, P/N 1U1508 (Boeing P/N S315W360-8).

TASK 78-34-16-000-801-H01

2. Thrust Reverser Sync Lock Solenoid Valve Removal

A. General

(1) The task is the removal procedure of the thrust reverser sync lock solenoid valve.

(2) For this procedure, the thrust reverser sync lock solenoid valve is referred to as the solenoid valve.

(3) The solenoid valve is on the sync lock valve which is found behind the left aft strut fairing doors.

B. References

Reference	Title
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Removal

SUBTASK 78-34-16-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-16-864-001-H01

(2) Release the pressure in the main hydraulic system and reservoir for the applicable strut; do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-16-010-001-H01

(3) Open the applicable strut aft fairing access door; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801:

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

H. SLV Solenoid Valve Removal

SUBTASK 78-34-16-020-001-H01

CAUTION REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(1) Remove the solenoid valve [2] (Figure 401):

(a) Get a 1 quart (1 l) oil/fuel resistant container, STD-195 to catch the hydraulic fluid.

(b) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane.

(c) Remove the lockwire from the screws [1].

1) Make a record of the lockwire pattern and method.

(d) Remove the four screws [1] that attach the solenoid valve [2] to the sync lock valve [5].

(e) Remove the solenoid valve [2].

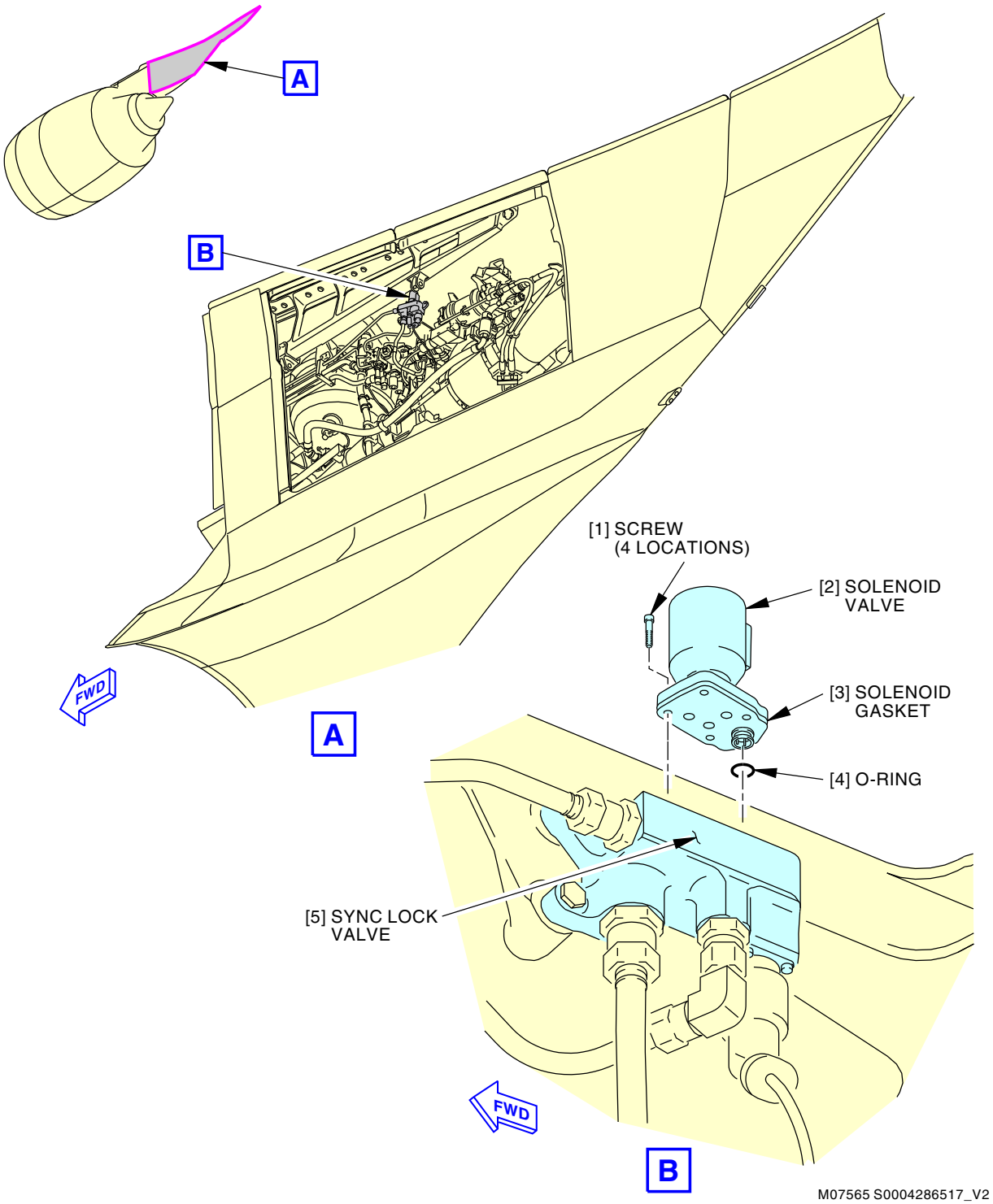
(f) Remove and discard the solenoid gasket plate [3].

(g) Remove and discard the packing [4].

(h) Install the protection caps on the base of the solenoid valve [2] and its receptacle on the sync lock valve [5].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Sync Lock Solenoid Valve Installation
Figure 401/78-34-16-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-16-400-801-H01

3. Thrust Reverser Sync Lock Solenoid Valve Installation

A. General

(1) The task is the installation procedure of the thrust reverser sync lock solenoid valve.

(2) After you install the sync lock solenoid valve, you must do the operational test for the thrust reverser.

B. References

Reference	Title
12-12-01-610-802	Hydraulic Reservoir Filling (P/B 301)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995

D. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Sync Lock Solenoid Valve Installation

SUBTASK 78-34-16-420-001-H01

(1) Install the solenoid valve [2] (Figure 401):

(a) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane.

(b) Remove the protection caps from the base of the solenoid valve [2] and its receptacle on the sync lock valve [5].

(c) Lubricate the new packing [4] with hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153.

(d) Install the new packing [4] on the solenoid valve [2].

(e) Apply a thin layer of hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 on the new solenoid gasket plate [3].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Put the new solenoid gasket plate [3] on the solenoid valve [2].

(g) Install the four screws [1] to attach the solenoid valve [2] to the sync lock valve [5].

1) Tighten the screws to 65-75 pound-inches (7-9 newton-meters).

2) Install MS20995C32 lockwire, G01048 on the screws.

NOTE: Use the lockwire pattern and method noted in the removal procedure.

G. SLV Solenoid Valve Installation Test

SUBTASK 78-34-16-611-001-H01

(1) Do the servicing procedure for the applicable hydraulic system reservoir; do this task: Hydraulic Reservoir Filling, TASK 12-12-01-610-802.

SUBTASK 78-34-16-863-001-H01

(2) For the applicable strut, do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-34-16-440-001-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-16-710-001-H01

(4) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser three times to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-16-210-001-H01

(5) Examine the solenoid valve [2] for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, remove the solenoid valve and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and install the solenoid valve with the steps above.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-16-410-001-H01

(1) Close the applicable strut aft fairing access door; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER DIRECTIONAL CONTROL SOLENOID VALVE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser directional control solenoid valve.

(2) An installation of the thrust reverser directional control solenoid valve.

B. The directional control solenoid valve is a component of the thrust reverser isolation valve. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Isolation Valve assembly 1U1501-3 (Boeing P/N S315W360-17).

TASK 78-34-17-000-801-H01

2. Thrust Reverser Directional Control Solenoid Valve Removal

A. General

(1) The task is the removal procedure of the thrust reverser directional control solenoid valve.

(2) For this procedure, the thrust reverser directional control solenoid valve is referred to as the DCV solenoid valve.

(3) The DCV solenoid valve is on the isolation valve behind the aft strut fairing door.

B. References

Reference	Title
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Removal

SUBTASK 78-34-17-040-001-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-17-864-001-H01

(2) Release the pressure in the main hydraulic system and reservoir for the applicable strut; do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-17-010-001-H01

(3) Open the applicable strut aft fairing access door; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801:

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

H. DCV Solenoid Valve Removal

SUBTASK 78-34-17-020-001-H01

CAUTION

REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(1) Remove the DCV solenoid valve [4] (Figure 401):

(a) Get a 1 quart (1 l) oil/fuel resistant container, STD-195 to catch the hydraulic fluid.

(b) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane or engine.

(c) Remove the lockwire from the screws [3].

(d) Remove the four screws [3].

(e) Remove the DCV solenoid valve [4].

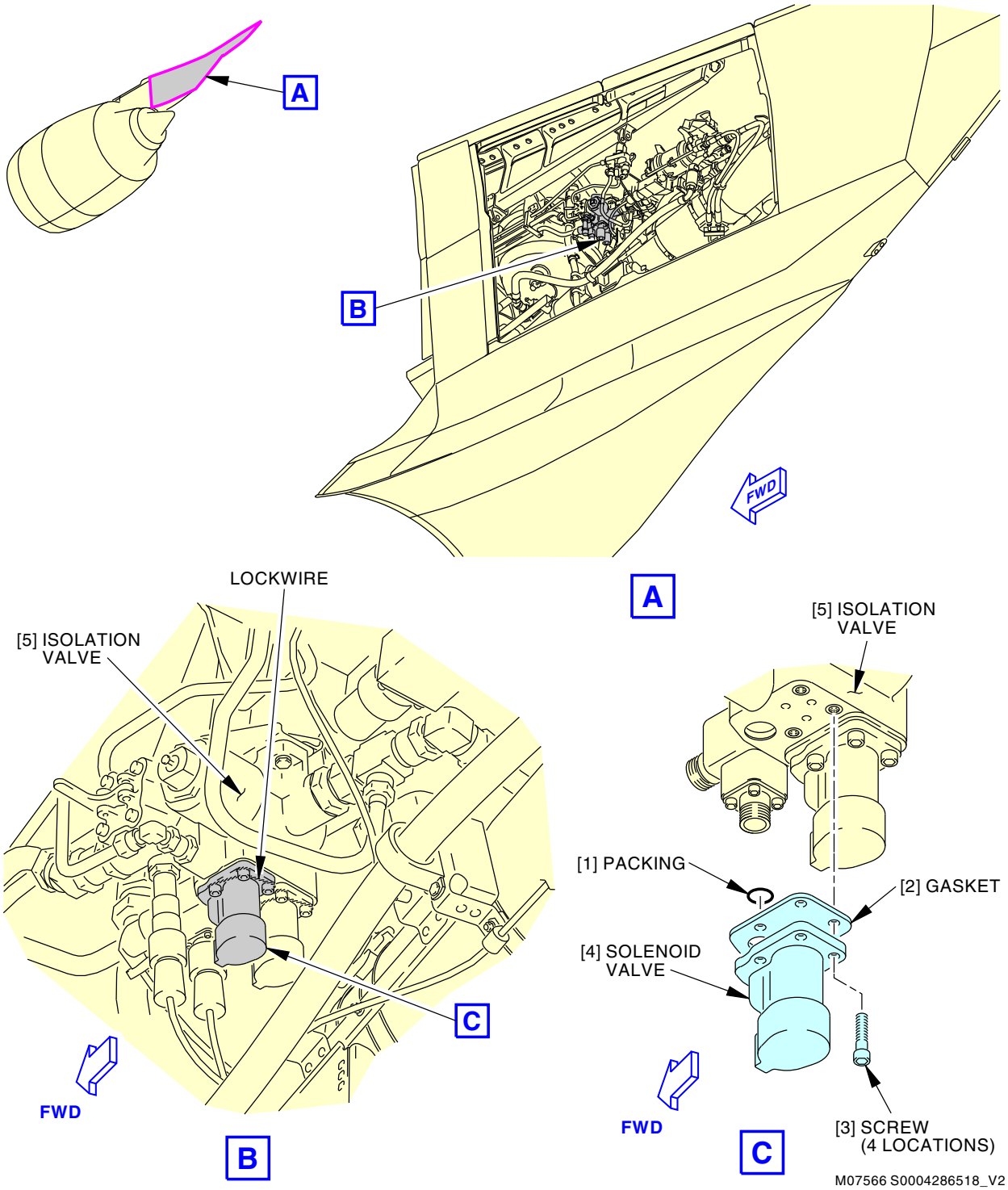
(f) Remove and discard the solenoid gasket [2].

(g) Remove and discard the packing [1].

(h) Install the protection cover on the base of the solenoid valve and its receptacle on the isolation valve [5].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Directional Control Valve (DCV) Solenoid Valve Installation
Figure 401/78-34-17-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-17-400-801-H01

3. Thrust Reverser Directional Control Solenoid Valve Installation

A. General

(1) The task is the installation procedure of the thrust reverser directional control solenoid valve.

B. References

Reference	Title
12-12-01-610-802	Hydraulic Reservoir Filling (P/B 301)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995

D. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. DCV Solenoid Valve Installation

SUBTASK 78-34-17-420-001-H01

(1) Install the DCV solenoid valve [4] (Figure 401):

(a) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane or engine.

(b) Remove the protection covers from the base of the DCV solenoid valve [4] and its receptacle on the isolation valve [5].

(c) Install a new packing [1] on the solenoid valve [4]:

1) Apply a thin layer of hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 on the packing [1].

2) Install the packing [1] on the solenoid valve [4].

(d) Apply a thin layer of hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 on the solenoid gasket [2].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Put the solenoid gasket [2] on the solenoid valve [4].

(f) Install the solenoid valve [4] with the four screws [3].

1) Tighten the screws to 32-35 foot-pounds (44-48 Newton-meters).

2) Install MS20995C32 lockwire, G01048 on the screws.

G. DCV Solenoid Valve Installation Test

SUBTASK 78-34-17-611-001-H01

(1) Do the servicing procedure for the applicable hydraulic system reservoir; do this task: Hydraulic Reservoir Filling, TASK 12-12-01-610-802.

SUBTASK 78-34-17-863-001-H01

(2) For the applicable strut, do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-34-17-440-001-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-17-710-001-H01

(4) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser three times to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-17-790-001-H01

(5) Examine the DCV solenoid valve [4] for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, remove the solenoid valve and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and install the solenoid valve with the steps above.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-17-410-001-H01

(1) Close the applicable strut aft fairing access door; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER ISOLATION SOLENOID VALVE - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser isolation solenoid valve.

(2) An installation of the thrust reverser isolation solenoid valve.

B. The isolation solenoid valve is a component of the thrust reverser isolation valve. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc) for the repair instructions for the Isolation Valve assembly 1U1501-3 (Boeing P/N S315W360-17).

TASK 78-34-18-000-801-H01

2. Thrust Reverser Isolation Solenoid Valve Removal

A. General

(1) The task is the removal procedure of the thrust reverser isolation solenoid valve.

(2) For this procedure the thrust reverser isolation solenoid valve is referred to as the isolation solenoid valve.

(3) The isolation solenoid valve is located on the isolation valve behind the aft strut fairing door.

B. References

Reference	Title
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Removal

SUBTASK 78-34-18-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-34-18-864-001-H01

(2) Release the pressure in the main hydraulic system and reservoir for the applicable strut.

(a) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-34-18-010-001-H01

(3) Open the applicable strut aft fairing access door; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801:

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

H. Isolation Solenoid Valve Removal

SUBTASK 78-34-18-020-001-H01

CAUTION REMOVE HYDRAULIC FLUID IMMEDIATELY. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

(1) Remove the isolation solenoid valve [4] (Figure 401):

(a) Get a 1 quart (1 l) oil/fuel resistant container, STD-195 to catch the hydraulic fluid.

(b) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane.

(c) Remove the lockwire from the screws [3].

(d) Remove the four screws [3].

(e) Remove the solenoid valve [4].

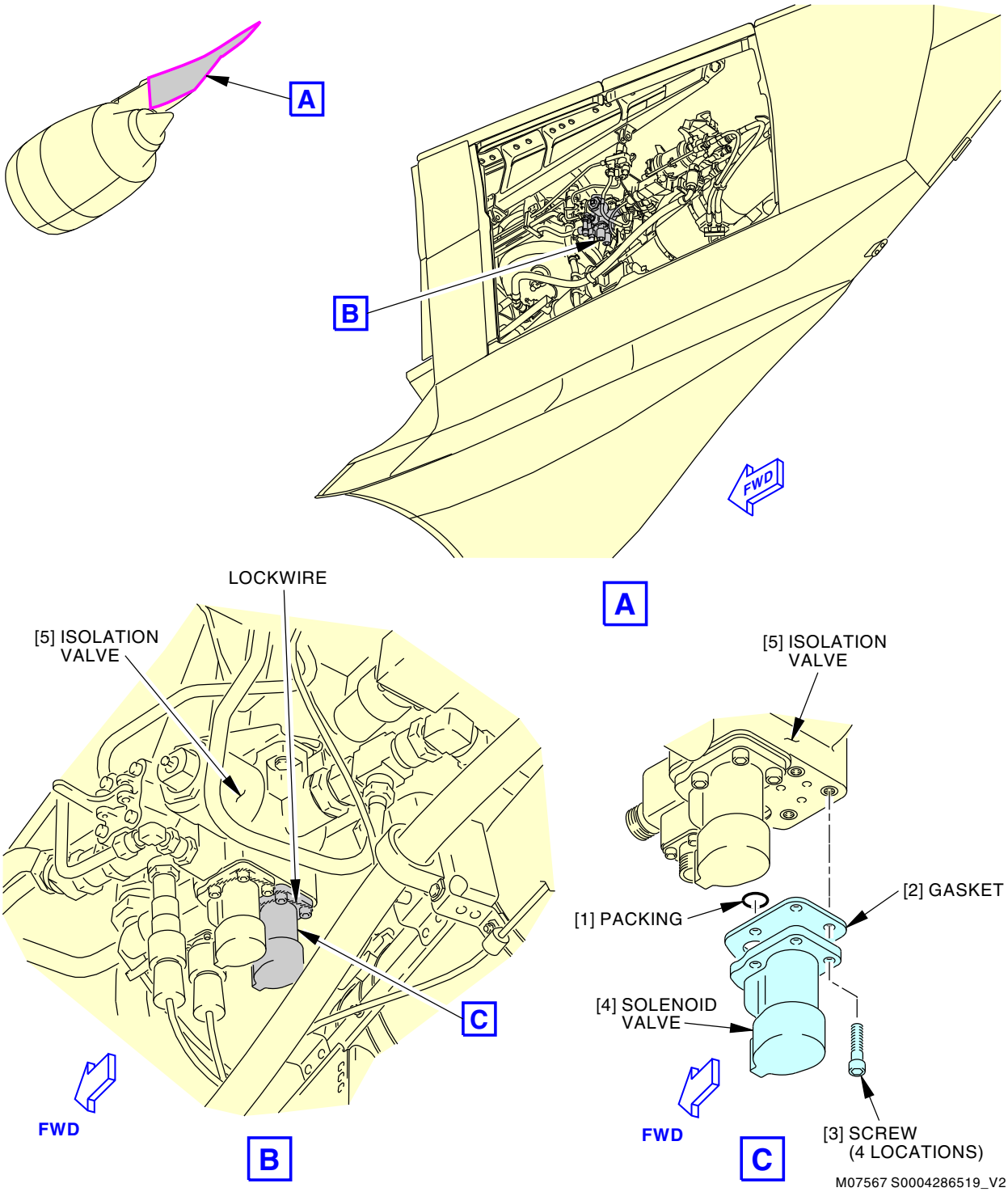
(f) Remove and discard the solenoid gasket [2].

(g) Remove and discard the packing [1].

(h) Install a protection cover on the base of the solenoid valve [4] and its receptacle on the isolation valve [5].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Isolation Solenoid Valve Installation
Figure 401/78-34-18-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-34-18-400-801-H01

3. Thrust Reverser Isolation Solenoid Valve Installation

A. General

(1) The task is the installation procedure of the thrust reverser isolation solenoid valve.

B. References

Reference	Title
12-12-01-610-802	Hydraulic Reservoir Filling (P/B 301)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
4	Solenoid valve	78-34-17-01-010	ARO ALL
		78-34-17-01-013	ARO ALL

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

G. Isolation Solenoid Valve Installation

SUBTASK 78-34-18-420-001-H01

(1) Install the isolation solenoid valve [4] (Figure 401):

(a) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane.

(b) Remove the protection cover from the base of the solenoid valve [4] and its receptacle on the isolation valve [5].

(c) Apply a thin layer of hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 on the packing [1].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Install the packing [1] on the solenoid valve [4].

(e) Apply a thin layer of hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 on the solenoid gasket [2].

(f) Put the solenoid gasket [2] on the isolation solenoid valve [4].

(g) Install the isolation solenoid valve [4] with the four screws [3].

1) Tighten the screws to 9 ft-lb (12 N·m) - 10 ft-lb (14 N·m).

2) Install MS20995C32 lockwire, G01048 between the screws.

H. Isolation Solenoid Valve Installation Test

SUBTASK 78-34-18-611-001-H01

(1) For the applicable hydraulic system reservoir, do this task: Hydraulic Reservoir Filling, TASK 12-12-01-610-802.

SUBTASK 78-34-18-863-001-H01

(2) For the applicable strut, do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

SUBTASK 78-34-18-440-001-H01

(3) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-34-18-710-001-H01

(4) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Extend and retract the thrust reverser three times to remove the air from the thrust reverser actuation system.

SUBTASK 78-34-18-790-001-H01

(5) Examine the isolation solenoid valve [4] for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, remove the solenoid valve and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and install the solenoid valve with the steps above.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 78-34-18-410-001-H01

(1) Close the applicable strut aft fairing access door; do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER ACTUATOR LOCK PROXIMITY SENSOR - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser actuator lock proximity sensor.

(2) An installation of the thrust reverser actuator lock proximity sensor.

B. The lock proximity sensor is a component on the thrust reverser locking hydraulic actuator. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Locking Actuator assembly 1U1545 (Boeing P/N S315W360-53).

TASK 78-36-01-000-801-H01

2. Thrust Reverser Actuator Lock Proximity Sensor Removal

(Figure 401)

A. General

(1) The task is the removal procedure of the thrust reverser actuator lock proximity sensor.

(2) For this procedure the actuator lock proximity sensor will be referred to as the proximity sensor.

(3) You must open the applicable fan cowl panel to get access to the proximity sensor on the locking hydraulic actuators.

(4) There is a proximity sensor on each locking hydraulic actuator. There are two locking actuators on each thrust reverser half for a total of four locking actuators for each engine.

B. References

Reference	Title
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Prepare for the Removal

SUBTASK 78-36-01-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-36-01-010-002-H01

(2) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Actuator Lock Proximity Sensor Removal

SUBTASK 78-36-01-020-001-H01

(1) Remove the proximity sensor [5] (Figure 401):

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

(a) Disconnect the electrical connector [2] from the proximity sensor.

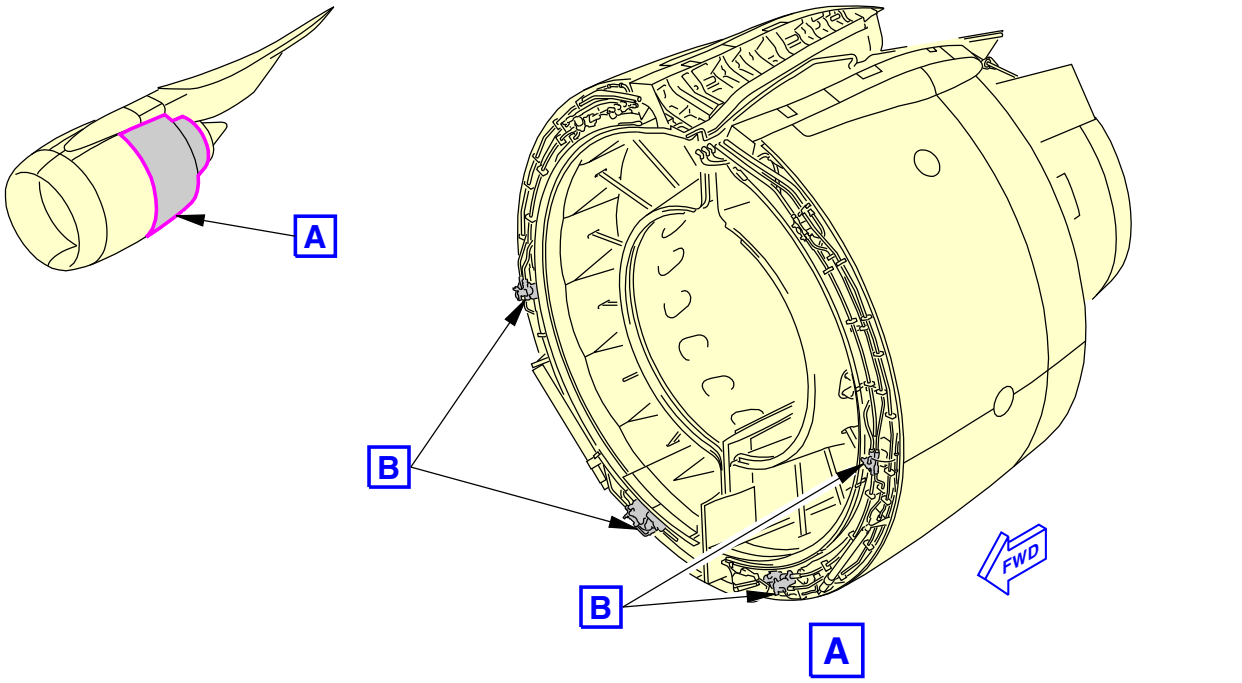
(b) Remove the lockwire from the nut [1] and the actuator [3].

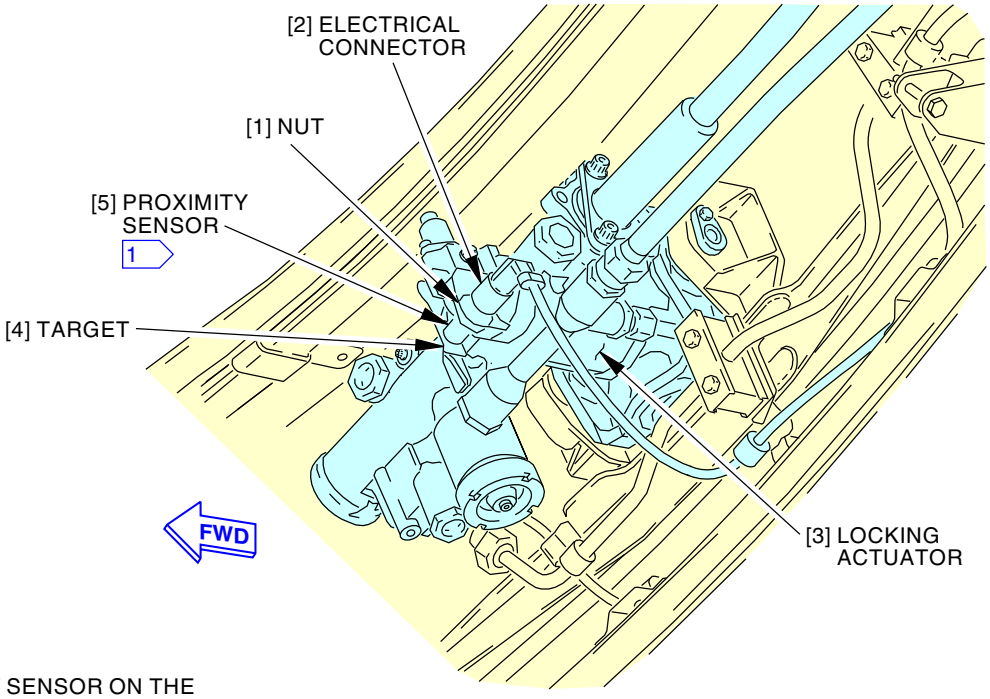
(c) Remove the nut [1] from the proximity sensor.

(d) Remove the proximity sensor from the locking actuator [3].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





1 THE PROXIMITY SENSOR ON THE LEFT LOWER LOCKING ACTUATOR IS SHOWN. THE OTHER THREE POSITIONS ARE EQUIVALENT

M07568 S0004286520_V2

Actuator Lock Proximity Sensor Installation
Figure 401/78-36-01-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-36-01-400-801-H01

3. Thrust Reverser Actuator Lock Proximity Sensor Installation

(Figure 401)

A. General

(1) The task is the installation procedure of the thrust reverser actuator lock proximity sensor.

(2) After the installation of the proximity sensor, you must do the operational test of the thrust reverser.

(3) There is a proximity sensor on each locking hydraulic actuator. There are two locking actuators on each thrust reverser half for a total of four locking actuators for each engine.

B. References

Reference	Title
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Actuator Lock Proximity Sensor Installation

SUBTASK 78-36-01-420-001-H01

(1) Install the proximity sensor [5] (Figure 401):

(a) Put the proximity sensor in position on the locking actuator [3].

(b) Install the nut [1] and hand tighten the nut.

(c) Measure the gap between the actuator lock proximity sensor and the target [4]; the correct gap is 0.030-0.035 inch (0.762-0.889 millimeter).

1) If the gap is not in the limits, do these steps to adjust the gap:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Make sure the actuator handle remains in the stowed and locked position during the adjustment procedure.

b) Loosen the nut on the proximity sensor.

c) Turn the proximity sensor to make the gap 0.030-0.035 inch (0.762-0.889 millimeter).

(d) If the gap is correct, tighten the proximity sensor nut to 13-15 pound-inches (18-20 newton-meters).

(e) Safety the proximity sensor nut [1] with MS20995C32 lockwire, G01048 to the locking actuator [3].

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(f) Connect the electrical connector [2] to the proximity sensor.

G. Actuator Lock Proximity Sensor Installation Test

SUBTASK 78-36-01-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-36-01-710-001-H01

(2) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of three full cycles.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-36-01-410-002-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER HYDRAULIC PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser hydraulic pressure switch.

(2) An installation of the thrust reverser hydraulic pressure switch.

B. The hydraulic pressure switch is a component on the thrust reverser isolation valve. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Isolation Valve assembly 1U1501-3 (Boeing P/N S315W360-17).

TASK 78-36-02-000-801-H01

2. Thrust Reverser Hydraulic Pressure Switch Removal

(Figure 401)

A. General

(1) The task is the removal procedure of the thrust reverser hydraulic pressure switch.

(2) For this procedure, the thrust reverser hydraulic pressure switch will be referred to as the hydraulic pressure switch.

B. References

Reference	Title
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Tools/Equipment

Reference	Description
STD-195	Container - 1 Quart (1 l), Oil/Fuel Resistant

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

F. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

G. Prepare for the Removal

SUBTASK 78-36-02-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-36-02-864-001-H01

(2) Release the pressure in the main hydraulic system and reservoir for the applicable strut, do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-36-02-010-001-H01

(3) Open the applicable strut aft fairing access door, do this task:Aft Fairing Access Doors Operation, TASK 54-52-05-800-801:

(a) Open the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

H. Hydraulic Pressure Switch Removal

SUBTASK 78-36-02-020-001-H01

CAUTION BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

(1) Remove the hydraulic pressure switch [2] (Figure 401):

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS.

(a) Disconnect the electrical connector [3] from the hydraulic pressure switch [2].

(b) Remove the lockwire [5] between the pressure switch and the valve housing.

(c) Remove the hydraulic pressure switch from the isolation valve [1].

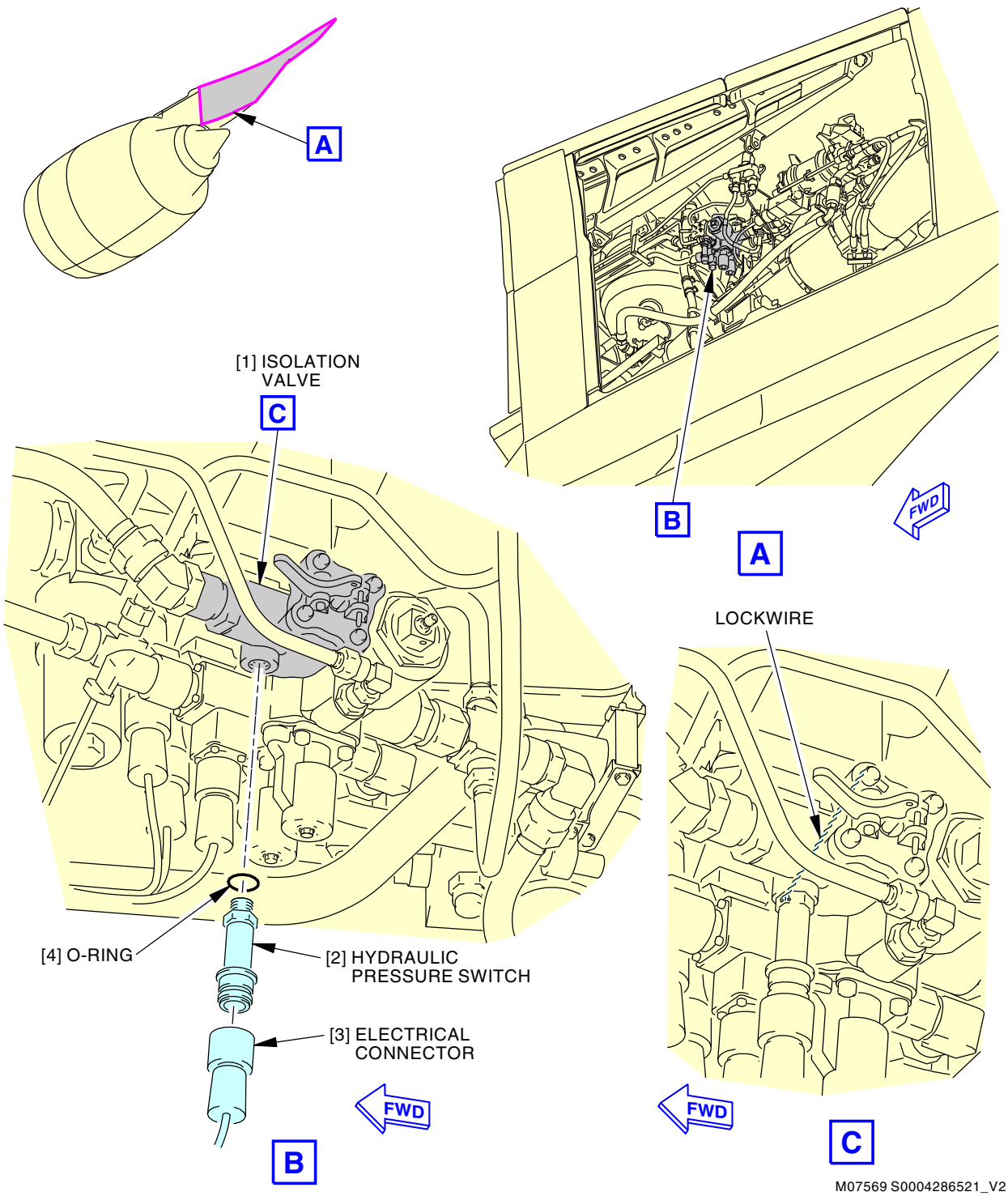
1) Use a cotton wiper, G00034 or rag around the pressure switch and the wrench to catch the hydraulic fluid.

2) Catch the hydraulic fluid that drains from the valve in a 1 quart (1 l) oil/fuel resistant container, STD-195 or smaller container.

(d) Remove and discard the packing [4].

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Hydraulic Pressure Switch Installation
Figure 401/78-36-02-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-36-02-400-801-H01

3. Thrust Reverser Hydraulic Pressure Switch Installation

A. General

(1) The task is the installation procedure of the thrust reverser hydraulic pressure switch.

(2) After you do the installation of the hydraulic pressure switch, you must do the operational test for the thrust reverser.

B. References

Reference	Title
54-52-05-800-801	Aft Fairing Access Doors Operation (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
D50222	Grease - Conductive, Brisal OX 50-855	
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995

D. Location Zones

Zone	Area
434	Aft Strut Fairing - Left Nacelle Strut
444	Aft Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

F. Hydraulic Pressure Switch Installation

SUBTASK 78-36-02-420-001-H01

(1) Install the hydraulic pressure switch [2] (Figure 401):

(a) Get a cotton wiper, G00034 to clean the hydraulic fluid from the airplane.

(b) Apply a thin layer of MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 on the new packing [4].

(c) Install the new packing [4] on the hydraulic pressure switch.

(d) Lightly coat the threads of the hydraulic pressure switch with conductive Brisal OX 50-855 conductive grease, D50222.

(e) Install and tighten the hydraulic pressure switch to 32-35 foot-pounds (44-48 newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Install a lockwire [5] between the pressure switch and the bolt for the bypass valve retainer on the isolation valve [1] housing.

NOTE: Use MS20995C32 lockwire, G01048. Attach the lockwire to the specific bolt shown on the bypass valve retainer.

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(g) Connect the electrical connector [3] to the hydraulic pressure switch [2].

G. Hydraulic Pressure Switch Installation Test

SUBTASK 78-36-02-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-36-02-710-001-H01

(2) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

SUBTASK 78-36-02-790-001-H01

(3) Examine the hydraulic pressure switch [2] and the isolation valve [1] for hydraulic fluid leaks.

(a) If leakage occurs, depressurize the system, remove the switch and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and install the switch with the steps above.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-36-02-410-001-H01

(1) Close the aft strut fairing door for the applicable strut, do this task: Aft Fairing Access Doors Operation, TASK 54-52-05-800-801.

(a) Close the applicable access panels:

Number	Name/Location
434CL	Left Forward Access Door, Left Strut Aft Fairing
444CL	Left Forward Access Door, Right Strut Aft Fairing

END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER POSITION TRANSDUCER (RVDT) - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser position transducer (RVDT).

(2) An installation of the thrust reverser position transducer (RVDT).

B. The thrust reverser position transducer is the rotary variable differential transducer (RVDT), found on the upper actuator of each thrust reverser half.

C. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (MPC Products Corp.)) for the repair instructions for the Rotary Variable Differential Transducer (RVDT) assembly; DALA P/N 1U1527-12 (Boeing P/N S315W360-51).

TASK 78-36-03-000-801-H01

2. Thrust Reverser Position Transducer (RVDT) Removal

(Figure 401)

A. General

(1) The position transducer is the rotary variable differential transducer (RVDT), found on the upper actuator of each thrust reverser half.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)
78-31-00-860-818-H00	Thrust Reverser Operation - Retract (Selection) (P/B 201)

C. Tools/Equipment

Reference	Description
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)

D. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Zone	Area
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the Removal

SUBTASK 78-36-03-040-001-H01

CAUTION RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task: Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-36-03-040-003-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-36-03-010-002-H01

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-36-03-981-001-H01

(4) Make sure the thrust reverser is fully retracted, do this task:Thrust Reverser Operation - Retract (Selection), TASK 78-31-00-860-818-H00.

SUBTASK 78-36-03-040-004-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(5) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

SUBTASK 78-36-03-864-004-H01

(6) Do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

H. RVDT Removal

SUBTASK 78-36-03-020-001-H01

(1) Remove the RVDT [1] (Figure 401):

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS.

(a) Disconnect the electrical connector [2] from the RVDT [1].

1) Install the protection caps on the electrical connector and the receptacle on the RVDT [1].

(b) Remove the bolts [5].

CAUTION DO NOT TURN THE FLEX SPLINE ON THE GEARHEAD. YOU MUST ADJUST THE RVDT IF THE SPLINE TURNS. DAMAGE TO THE EQUIPMENT CAN OCCUR.

(c) Remove the RVDT [1].

CAUTION CATCH THE HYDRAULIC FLUID IN A CONTAINER OR CLOTH WHEN YOU DISCONNECT THE RVDT. IMMEDIATELY CLEAN ALL SURFACES THAT HYDRAULIC FLUID FALLS ON. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

1) Catch the hydraulic fluid that drains from the upper actuator in a cotton wiper, G00034 or a rag.

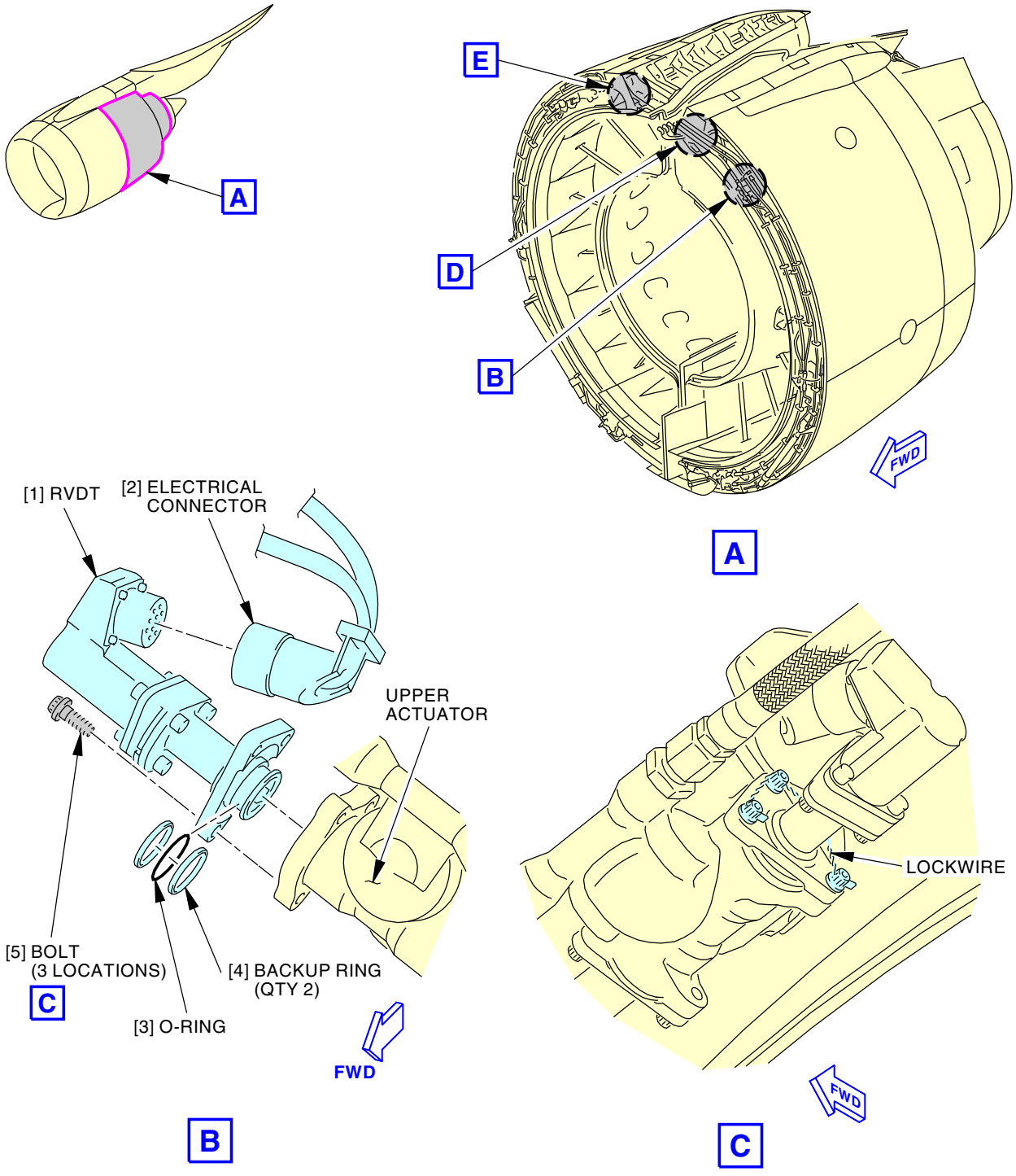
2) Catch the hydraulic fluid that drains in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

(d) Discard the packing [3].

(e) Install the protection caps on the RVDT [1] and the upper actuator.

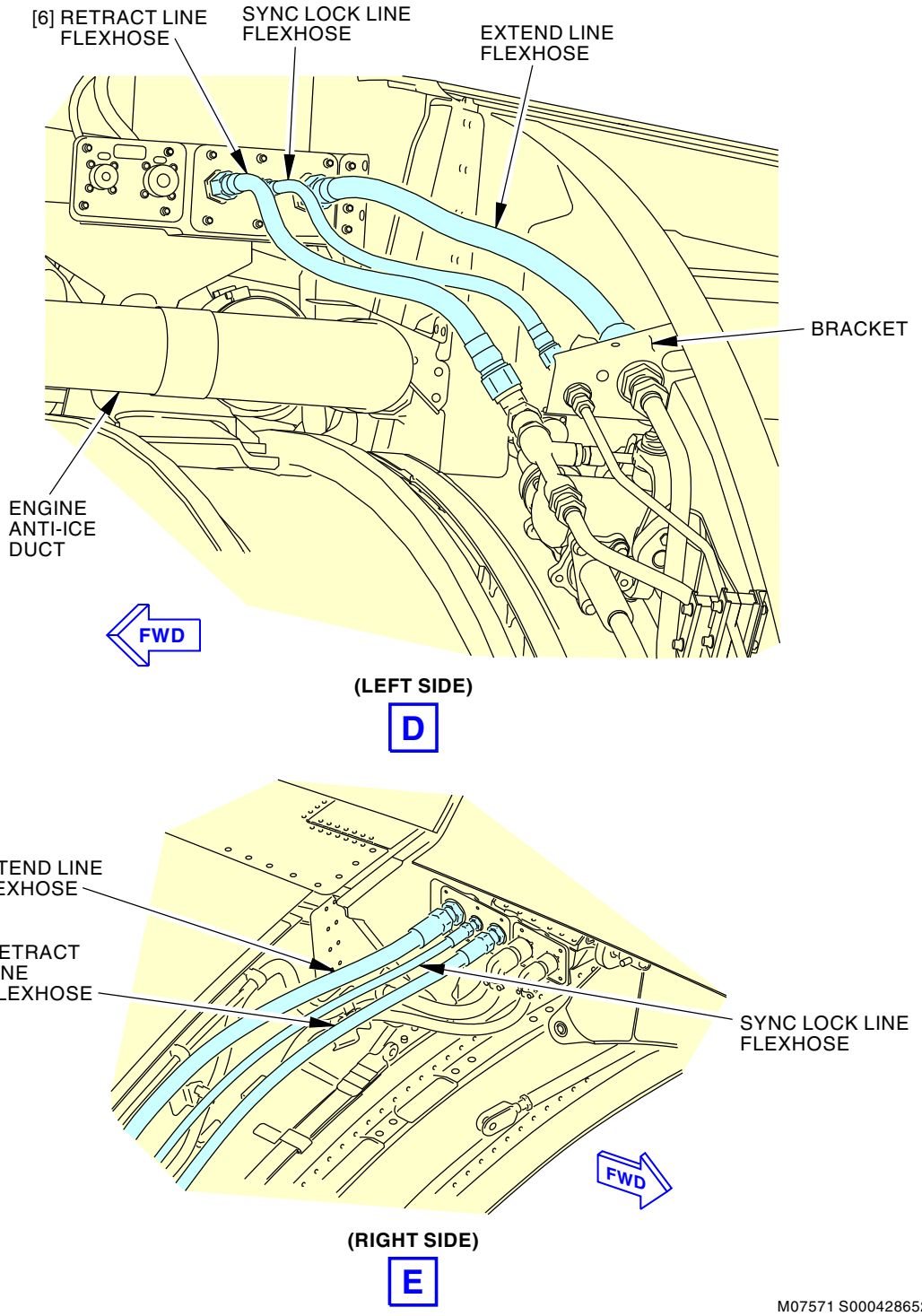
——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Position Transducer (RVDT) Installation
Figure 401/78-36-03-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Position Transducer (RVDT) Installation
Figure 401/78-36-03-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-36-03-400-801-H01

3. Thrust Reverser Position Transducer (RVDT) Installation

(Figure 401)

A. General

(1) After you install the RVDT, you must do the operational test for the thrust reverser.

(2) The RVDT is shipped in the NULL position from the supplier with protective caps. The RVDT is installed in the NULL position on the left or right thrust reverser half.

(3) The rotary variable differential transducer is known as the RVDT in this procedure.

B. References

Reference	Title
20-10-10-400-801	Flexible Hose Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
29-11-00-860-801	Main Hydraulic System Pressurization (P/B 201)
29-11-00-860-807	Main Hydraulic System and the Reservoir Depressurization (P/B 201)
31-61-00-800-802	Erasing a EICAS Status Message Latched by AIMS (P/B 201)
31-61-00-800-804	Showing a Maintenance Page (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-410-816-H00	Close the Thrust Reverser (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)
78-31-00-980-802-H01	Thrust Reverser Operation - Retract (Manual Method) (P/B 201)
78-34-13-400-801-H01	Thrust Reverser Sync Shaft and Tubing Installation (P/B 401)

C. Tools/Equipment

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-163	Portable Hydraulic Cart, Capable of 3000 PSI and a minimum flow of 30 GPM Part #: 57301FC3BBCILMNY Supplier: 59603 Part #: 57305KV3BBCI-A1 Supplier: 59603 Part #: 673A5FCBBCLMNY4 Supplier: 59603 Part #: 9780-0398 Supplier: 05172 Part #: HT2000-1-E/1-S Supplier: H6394 Part #: HT50-E-F-D Supplier: H6394 Part #: PH50E Supplier: 10000
SPL-2591	Lock - Thrust Reverser Isolation Valve (Ground, Flyaway & Dispatch) Part #: B78001-24 Supplier: 81205
STD-203	Container - Oil Resistant, 1 U.S.-Gal (3.8 l)

D. Consumable Materials

Reference	Description	Specification
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description	Specification
D00153	Fluid - Hydraulic Fluid, Fire Resistant (Interchangeable And Intermixable With BMS 3-11 Type V)	BMS3-11 Type IV
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01505	Lockwire - Safety And Lock	NASM20995

E. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

F. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

G. Prepare for the RVDT Installation

SUBTASK 78-36-03-860-002-H01

(1) Make sure the thrust reverser is closed and latched, do this task: Close the Thrust Reverser (Selection), TASK 78-31-00-410-816-H00.

SUBTASK 78-36-03-860-001-H01

(2) Make sure the thrust reverser is fully retracted, do this task: Thrust Reverser Operation - Retract (Manual Method), TASK 78-31-00-980-802-H01.

SUBTASK 78-36-03-430-001-H01

WARNING MAKE SURE THAT THE TWO SYNC SHAFT TUBES ARE INSTALLED BETWEEN THE ACTUATORS. IF THE TUBES ARE NOT INSTALLED WHEN YOU SUPPLY RETRACT PRESSURE, PRESSURIZED HYDRAULIC FLUID CAN HIT PERSONNEL. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Make sure that the two sync shaft tubes are installed, do this task: Thrust Reverser Sync Shaft and Tubing Installation, TASK 78-34-13-400-801-H01.

SUBTASK 78-36-03-864-002-H01

(4) Make sure that the hydraulic power system to the airplane is depressurized; do this task: Main Hydraulic System and the Reservoir Depressurization, TASK 29-11-00-860-807.

SUBTASK 78-36-03-420-001-H01

(5) Prepare the RVDT [1] for the installation (Figure 401).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION DO NOT TURN THE FLEX SPLINE ON THE GEARHEAD UNTIL IT HAS ENGAGED THE INTERNAL SPLINE OF THE ACTUATOR. YOU MUST ADJUST THE RVDT IF THE SPLINE TURNS.

(a) Remove the protection cap from the RVDT [1].

(b) Examine the two backup rings [4] for damage.

1) If you find damage, replace the backup rings [4].

(c) Lubricate the new packing [3] with hydraulic fluid, D00153.

(d) Install the new packing [3] on the RVDT [1] between the two backup rings [4].

CAUTION DO NOT TURN THE FLEX SPLINE ON THE GEARHEAD UNTIL IT HAS ENGAGED THE INTERNAL SPLINE OF THE ACTUATOR. YOU MUST ADJUST THE RVDT IF THE SPLINE TURNS.

(e) Install the protection cap on the RVDT [1].

SUBTASK 78-36-03-863-001-H01

CAUTION SUPPLY HYDRAULIC POWER TO THE RETRACT SIDE OF THE HYDRAULIC ACTUATORS WHILE YOU INSTALL THE RVDT AND GEARHEAD ASSEMBLY. IF YOU DO NOT OBEY THIS INSTRUCTION, THE THRUST REVERSER WILL NOT OPERATE CORRECTLY.

(6) Apply hydraulic power to the retract side of the actuators:

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston.

(a) If you use the airplane hydraulic power, do these steps:

1) Put the applicable EEC MAINT L(R) ENG POWER switch on the overhead maintenance panel, P61, to the TEST position.

2) Make sure that the reverse thrust lever is in the fully forward and down position and the DO-NOT-OPERATE tag is attached to it.

3) Remove the thrust reverser isolation valve lock, SPL-2591 from the shutoff valve spool on the isolation valve.

a) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

4) Do this task: Main Hydraulic System Pressurization, TASK 29-11-00-860-801.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING KEEP ALL PERSONNEL AWAY FROM THE THRUST REVERSER SLEEVE. THE THRUST REVERSER SLEEVE WILL RETRACT WHEN YOU MOVE THE TEST ENABLE SWITCH. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

5) Move and hold the test enable switch to supply hydraulic pressure to the retract side of the actuator.

NOTE: The test enable switch is adjacent to the PDOS switch for the right thrust reverser at the 4:00 o'clock position on the aft inlet bulkhead. Hold the test enable switch until the sync lock is installed and the bolts are tightened. ENG REVERSER status and advisory messages will occur when the test enable switch is held during the procedure. The status messages are cleared after the maintenance is completed.

WARNING MAKE SURE THAT THE PRESSURE LINE OF THE HYDRAULIC CART IS CONNECTED TO THE RETRACT LINE ON THE THRUST REVERSER. IF THE PRESSURE LINE IS CONNECTED TO THE EXTEND LINE, INJURIES TO PERSONNEL AND DAMAGE TO THE THRUST REVERSER CAN OCCUR.

(b) If you use a hydraulic cart, COM-163, do these steps:

1) Disconnect the retract line flexhose [6] at the hydraulic connection on the strut.

a) Use a cotton wiper, G00034 or rag around the retract line flexhose [6] and the wrench to catch the hydraulic fluid spray.

CAUTION BE PREPARED TO CATCH THE HYDRAULIC FLUID IN AN APPLICABLE CONTAINER OR SOME CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IF THE HYDRAULIC FLUID FALLS ON THE AIRPLANE OR THE ENGINE, QUICKLY CLEAN THE FLUID FROM THE AIRPLANE OR THE ENGINE. THE HYDRAULIC FLUID CAN CAUSE DAMAGE TO THE AIRPLANE OR ENGINE.

b) Catch the hydraulic fluid that drains from the hydraulic line and strut connection in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

2) Connect the hydraulic cart to the retract line flexhose [6] for the thrust reverser.

WARNING KEEP ALL PERSONNEL AWAY FROM THE THRUST REVERSER SLEEVE. THE THRUST REVERSER SLEEVE WILL RETRACT WHEN YOU SUPPLY HYDRAULIC PRESSURE. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

3) Supply hydraulic pressure of 3000 psi (20684 kPa).

NOTE: Hydraulic pressure will only be on the retract side of the actuators. Do not decrease the hydraulic pressure.

H. RVDT Installation

SUBTASK 78-36-03-420-002-H01

(1) Install the RVDT [1] (rotary variable differential transducer):

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Keep hydraulic pressure on the retract side while you install the RVDT.

NOTE: This procedure will apply hydraulic pressure to the retract side of the hydraulic actuators. This is done to make sure the actuators are completely retracted and the bullnose seal is compressed to correctly rig the thrust reverser. Some residual hydraulic fluid leakage may be seen at the flex tube flanges from the retract side of the actuator internal piston.

CAUTION DO NOT TURN THE FLEX SPLINE ON THE GEARHEAD UNTIL IT HAS ENGAGED THE INTERNAL SPLINE OF THE ACTUATOR. YOU MUST ADJUST THE RVDT IF THE SPLINE TURNS.

(b) Remove the protection caps from the RVDT [1] and the upper actuator.

1) Make sure you remove the protection cap that is around the flex spline in the end of the gearhead assembly.
2) Look in the ends of the gearhead assembly and the upper actuator to make sure all the protection caps are removed.

(c) Put the RVDT [1] in its position on the upper actuator so the flange seats firmly.

NOTE: When this is done, the spline on the RVDT engages the internal spline in the upper actuator.

(d) Turn the RVDT [1] to the nearest position which aligns the bolt holes.

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(e) Connect the electrical connector [2].

(f) Make sure that the RVDT [1] is adjusted correctly:

1) Show the 71 EPCS maintenance page 1; do this task:Showing a Maintenance Page, TASK 31-61-00-800-804.
2) The thrust reverser (T/R) sleeve values for channel A and B should be between -7.0 and 7.0 percent.
3) If the thrust reverser sleeve values are not in the limits, do these steps:
   a) Remove the RVDT [1] from the upper actuator.
      NOTE: Do not remove the electrical connector.
   b) Turn the shaft on the gearhead until the thrust reverser sleeve values are in the limits.
      NOTE: The shaft may be turned clockwise or counterclockwise as required.
   c) Put the RVDT [1] in its position on the upper actuator so the flange seats firmly.

(g) Install the three bolts [5].

1) Tighten the bolts to 145-155 inch-pounds (16.4-17.5 newton-meters).

SUBTASK 78-36-03-864-003-H01

(2) Remove the hydraulic power.

(a) If you used airplane hydraulic power, release the test enable switch.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) If you used hydraulic power from a hydraulic service cart, decrease the pressure in the hydraulic service cart to zero.

SUBTASK 78-36-03-420-003-H01

(3) Complete the installation of the RVDT [1].

(a) Disconnect the hydraulic service cart from the retract line flexhose [6].

1) Put a cotton wiper, G00034 or rag around the retract line flexhose and the wrench to catch hydraulic fluid that will spray from the retract line.

CAUTION

CATCH THE HYDRAULIC FLUID IN A CONTAINER OR CLOTH WHEN YOU DISCONNECT THE HYDRAULIC LINES. IMMEDIATELY CLEAN ALL SURFACES THAT HYDRAULIC FLUID FALLS ON. HYDRAULIC FLUID CAUSES DAMAGE TO EQUIPMENT.

2) Catch the hydraulic fluid that drains in a 1 U.S.-gal (3.81 l) oil resistant container, STD-203.

CAUTION

DO NOT LET THE HOSE TWIST WHEN YOU TIGHTEN THE HOSE B-NUTS. USE THE INDEX LINE ON THE SIDE OF THE HOSE TO MAKE SURE THAT THE HOSE DOES NOT TWIST. A TWIST IN THE HOSE CAN CAUSE THE HOSE TO RUB AGAINST OTHER ENGINE COMPONENTS. HOSE FAILURES, HOSE COUPLING LEAKS, AND DAMAGE TO OTHER EQUIPMENT CAN OCCUR.

(b) Connect the retract line flexhose [6] to the hydraulic connection at the strut.

1) Follow this general practice when you install the hydraulic flexhoses; Flexible Hose Installation, TASK 20-10-10-400-801.

2) Align and seat the sleeve in the fitting.

3) Apply hydraulic MCS 352B fluid, D00054 or hydraulic hydraulic fluid, D00153 to lubricate the fitting external threads and the shoulders of the sleeve where the tube nut touches.

4) Manually tighten the hose nut first.

5) Tighten the hose nut to 665-735 pound-inches (75-83 newton-meters).

a) The union at the strut connection must not turn as you tighten the hose nut.

b) Do not let the hose twist.

(c) Install lockwire, G01505 on the bolts [5].

I. RVDT Installation Test

SUBTASK 78-36-03-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-36-03-710-001-H01

(2) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

(a) Operate the thrust reverser a minimum of 6 cycles to remove all the air from the thrust reverser actuation system.

SUBTASK 78-36-03-790-001-H01

(3) Examine the thrust reverser actuation system for hydraulic fluid leakage.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) If leakage occurs, depressurize the system, disassemble the fitting/hose connections and examine the parts for damage or contamination.

(b) Replace or clean all parts as necessary and assemble the fitting/hose connections with the steps above.

SUBTASK 78-36-03-430-002-H01

CAUTION

DO NOT LET THE RETRACT FLEXHOSE TOUCH THE ENGINE ANTI-ICE DUCT. KEEP A 1.0 INCH (25.4 MILLIMETERS) CLEARANCE BETWEEN THE FLEXHOSE AND THE DUCT. CLOSE AND LATCH THE THRUST REVERSER BEFORE YOU DO THIS CHECK. DAMAGE TO THE RETRACT FLEXHOSE CAN OCCUR.

(4) Make sure the minimum clearance between the engine anti-ice duct and the retract flexhose [6] on the left thrust reverser half is 1.00 inch (25.40 millimeters).

(a) Remove the flexhose clamp block [7] with two screws [8], washers [9], and nuts [10].

(b) Adjust the location of flexhose clamp block [7] to a position 15.2-15.6 inches (386-396 millimeters) from the upper thrust reverser bracket to prevent the interference between the retract flexhose [6] and the engine anti-ice duct.

(c) Install the flexhose clamp block [7] with two screws [8], washers [9], and nuts [10].

J. Put the Airplane Back to Its Usual Condition

SUBTASK 78-36-03-410-002-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-36-03-440-002-H01

(2) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

SUBTASK 78-36-03-741-001-H01

(3) Clear the ENG REVERSER status messages.

(a) Do this task: Erasing a EICAS Status Message Latched by AIMS, TASK 31-61-00-800-802.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER SYNC LOCK PROXIMITY SENSOR - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the thrust reverser sync lock proximity sensor.

(2) An installation of the thrust reverser sync lock proximity sensor.

B. The proximity sensor is a component on the thrust reverser sync-lock/manual drive unit. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Sync-Lock/Manual Drive Assembly P/N 1U1509-4 (Boeing P/N S315W360-14).

TASK 78-36-04-000-801-H01

2. Thrust Reverser Sync Lock Proximity Sensor Removal

A. General

(1) The thrust reverser sync lock proximity sensor is referred to as the sync lock proximity sensor in this procedure.

(2) There are two sync lock proximity sensors on each engine. One sync lock proximity sensor is installed on each sync lock on the lower locking actuators.

(3) The sync lock proximity sensors are interchangeable between the left and right thrust reversers.

B. References

Reference	Title
27-81-00-040-801	Leading Edge Slat - Deactivation (P/B 201)
27-81-00-860-805	Retract the Leading Edge Slats (P/B 201)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

D. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

E. Prepare for the Removal

SUBTASK 78-36-04-860-001-H01

CAUTION

RETRACT THE LEADING EDGE SLATS AND DO THE DEACTIVATION PROCEDURE BEFORE YOU OPEN THE FAN COWL PANELS. IF THE LEADING EDGE SLATS ARE NOT RETRACTED, THE FAN COWL PANELS WILL HIT THEM AND CAUSE DAMAGE.

(1) Do this task:Retract the Leading Edge Slats, TASK 27-81-00-860-805.

SUBTASK 78-36-04-040-001-H01

(2) Do this task: Leading Edge Slat - Deactivation, TASK 27-81-00-040-801.

SUBTASK 78-36-04-010-002-H01

(3) For the left and right fan cowl panels on the applicable engine, do this task:

Open the Fan Cowl Panel (Selection), TASK 71-11-04-010-814-H00

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-36-04-040-002-H01

WARNING

DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(4) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

F. Sync Lock Proximity Sensor Removal

SUBTASK 78-36-04-020-001-H01

(1) Remove the sync lock proximity sensor [4] (Figure 401):

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

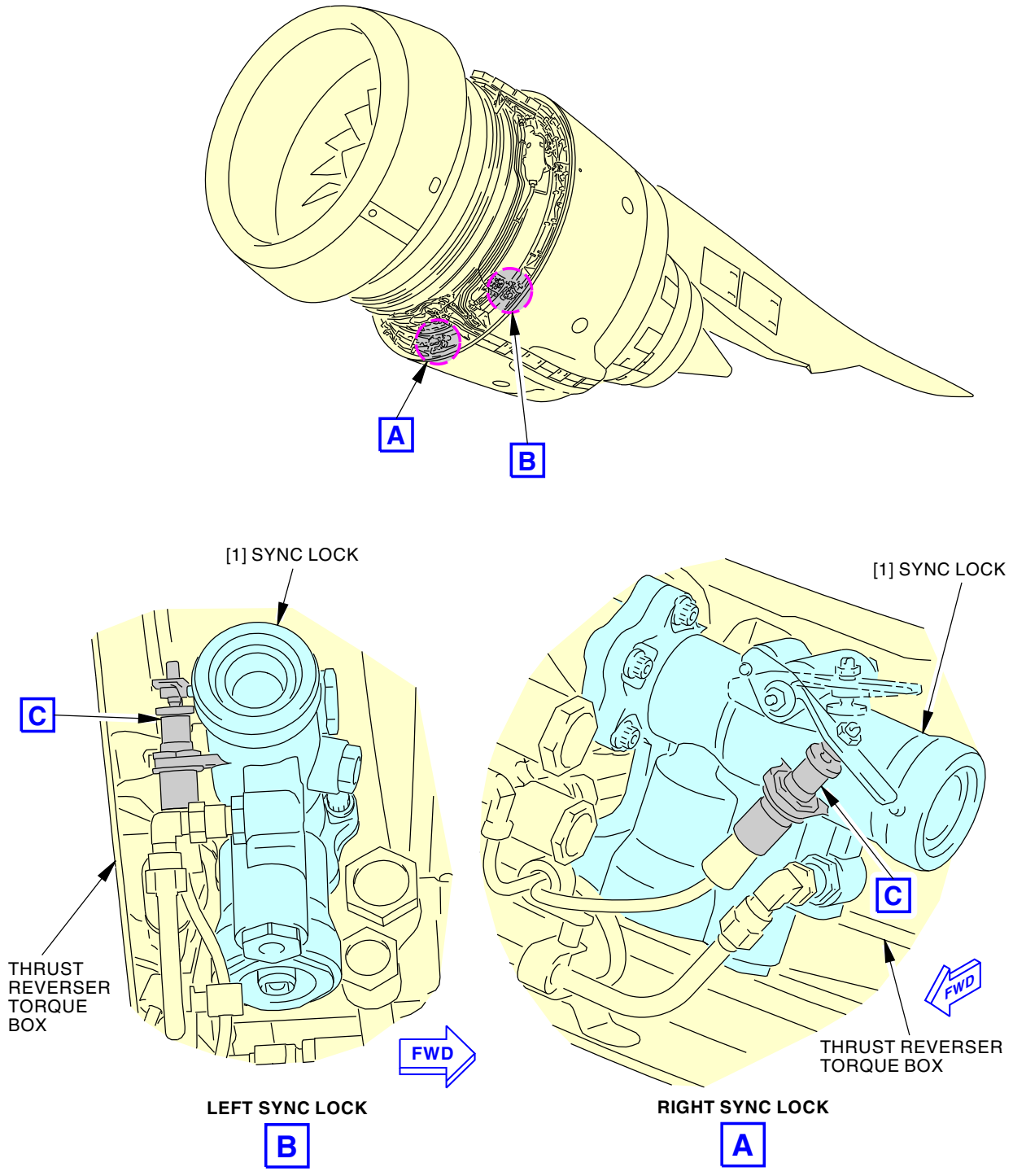
(a) Disconnect the electrical connector [6] from the sync lock proximity sensor [4].

(b) Remove the sensor nut [5] from the sync lock proximity sensor [4].

(c) Remove the sync lock proximity sensor [4].

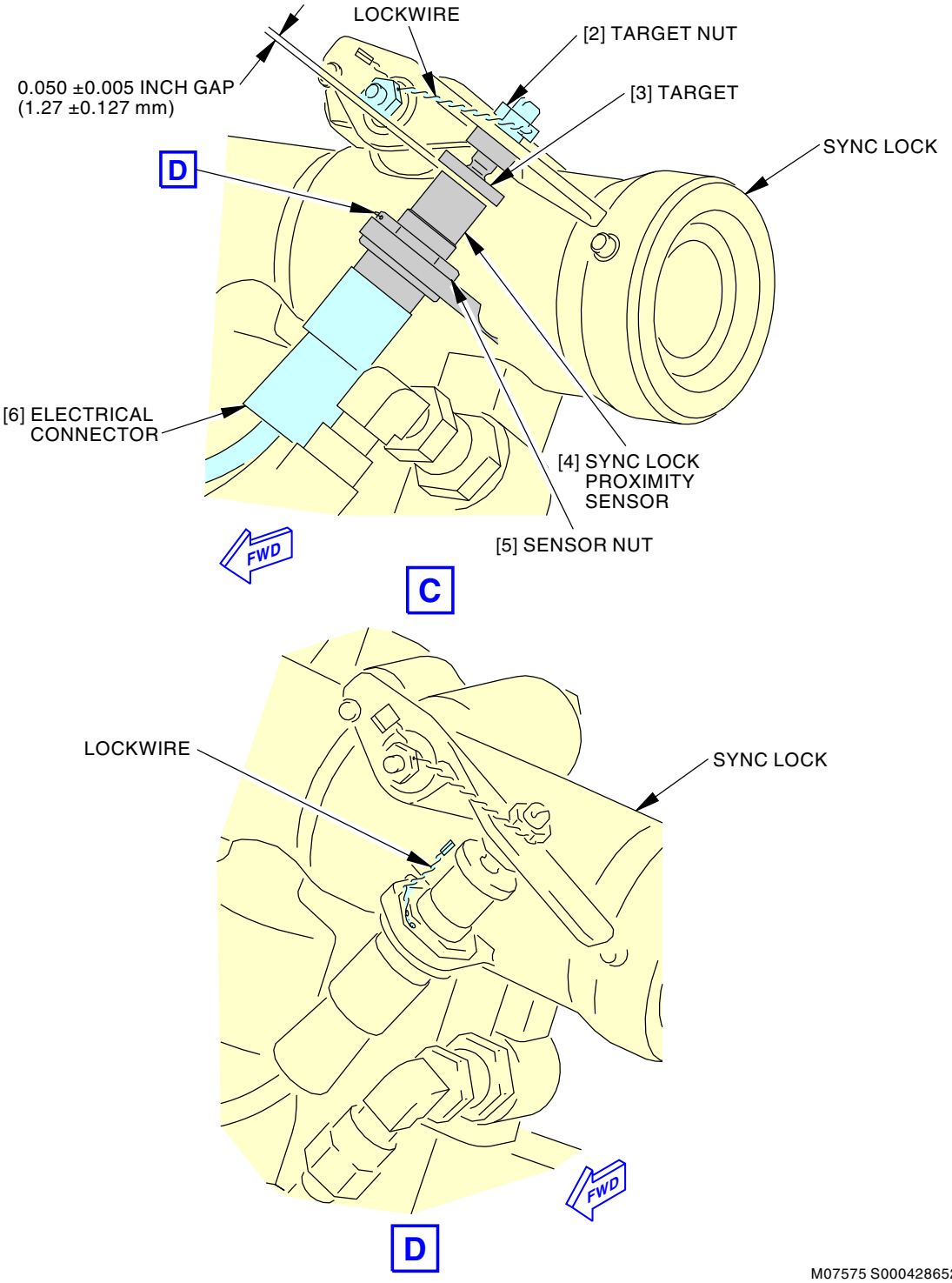
END OF TASK

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sync Lock Proximity Sensor Installation
Figure 401/78-36-04-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Thrust Reverser Sync Lock Proximity Sensor Installation
Figure 401/78-36-04-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-36-04-400-801-H01

3. Thrust Reverser Sync Lock Proximity Sensor Installation

A. General

(1) There are two sync lock proximity sensors on each engine. One sync lock proximity sensor is installed on each sync lock on the lower locking actuators.

(2) The sync lock proximity sensors are interchangeable between the left and right thrust reversers.

(3) After you install the sync lock proximity sensor, you must do the operational test for the thrust reverser.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
G01048	Lockwire - MS20995C32, Corrosion Resistant Steel - 0.032 Inch (0.8128 mm) Diameter	NASM20995

D. Location Zones

Zone	Area
413	Left Fan Cowl - Left Engine
414	Right Fan Cowl - Left Engine
415	Left Thrust Reverser - Left Engine
416	Right Thrust Reverser - Left Engine
423	Left Fan Cowl - Right Engine
424	Right Fan Cowl - Right Engine
425	Left Thrust Reverser - Right Engine
426	Right Thrust Reverser - Right Engine

E. Access Panels

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

F. Sync Lock Proximity Sensor Installation

SUBTASK 78-36-04-420-001-H01

(1) Install the sync lock proximity sensor [4] (Figure 401):

(a) Put the sync lock proximity sensor [4] in position on the sync lock [1].

1) Make sure the sensor is correctly located in the bracket with the location pin engaged.

(b) Install the sensor nut [5] on the sync lock proximity sensor [4].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Tighten the sensor nut to 170-190 pound-inches (19-21 Newton-meters).
2) Safety the sensor nut with MS20995C32 lockwire, G01048 to the sync lock housing next to the sensor.

(c) Measure the gap between the sync lock proximity sensor [4] and the target [3]; the correct gap is 0.045-0.055 inch (1.14-1.40 mm).

NOTE: Though the adjustment can be done manually without a tool, the supplier uses a target rig tool, 1509-511, which fits over the sensor. Tool dimensions and specifications for local fabrication can be found in the vendors component repair instructions.

1) If the gap is not in the limits, do these steps to adjust the gap:
   a) Make sure the sync lock handle remains in the locked position during the adjustment procedure.
   b) Loosen the target nut [2].
   c) Turn the target [3] to make the gap 0.045-0.055 inch (1.14-1.40 mm).

      NOTE: If the rig tool 1509-511 is used, turn the target until the target touches the center of the tool.

CAUTION DO NOT LET THE TARGET TURN WHEN YOU TIGHTEN THE NUT. THE CLEARANCE WILL NOT BE CORRECT IF THE TARGET TURNS.

   d) Tighten the target nut [2] to 70-90 pound-inches (7.9-10.2 Newton-meters).
   e) Safety the target nut [2] with MS20995C32 lockwire, G01048 to the nut on the unlock handle axis.

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTORS ARE CLEAN BEFORE YOU CONNECT THEM. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS

(d) Connect the electrical connector [6] to the sync lock proximity sensor [4].

G. Sync Lock Proximity Sensor Installation Test

SUBTASK 78-36-04-440-001-H01

(1) Do this task:Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-36-04-710-001-H01

(2) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-36-04-410-001-H01

(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(a) Close these access panels:

Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Number	Name/Location
424AR	Right Fan Cowl Panel, Right Engine

SUBTASK 78-36-04-440-002-H01

(2) Do this task: Leading Edge Slat Reactivation, TASK 27-81-00-440-801.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

THRUST REVERSER DIRECTIONAL CONTROL VALVE PROXIMITY SENSOR - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) The removal of the thrust reverser directional control valve proximity sensor.

(2) The installation of the thrust reverser directional control valve proximity sensor.

B. The proximity sensor is a component on the thrust reverser directional control valve. Refer to the vendors component repair instructions from Smiths Industries Aerospace (Formerly Dowty Aerospace Los Angeles (Hydraulic Units, Inc.)) for the repair instructions for the Directional Control Valve assembly, P/N 1U1503-2 (Boeing P/N S315W360-19).

TASK 78-36-05-000-801-H01

2. Thrust Reverser Directional Control Valve Proximity Sensor Removal

A. General

(1) The directional control valve proximity sensor is referred to as the DCV proximity sensor in this procedure.

(2) The DCV proximity sensor is located on the directional control valve under the right No. 2 fairing on the left or right strut.

(3) You need to use the fall arrest lifeline procedure or other safety equipment to do this task.

B. References

Reference	Title
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-000-801-001	Forward Fairings Removal (P/B 401)
78-31-00-040-806-H00	Thrust Reverser Deactivation For Ground Maintenance (P/B 201)

C. Location Zones

Zone	Area
431	Forward Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut

D. Access Panels

Number	Name/Location
431CR	Forward Access Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut

E. Prepare for the Removal

SUBTASK 78-36-05-040-001-H01

WARNING DO THE DEACTIVATION PROCEDURE TO PREVENT THE OPERATION OF THE THRUST REVERSER. THE ACCIDENTAL OPERATION OF THE THRUST REVERSER CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Do this task: Thrust Reverser Deactivation For Ground Maintenance, TASK 78-31-00-040-806-H00.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 78-36-05-860-001-H01

WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(2) If you do not use other safety equipment, do this task:Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-36-05-010-001-H01

(3) Remove the right No. 2 fairing, do this task: Forward Fairings Removal, TASK 54-52-01-000-801-001:

(a) Open the applicable access panels:

Number	Name/Location
431CR	Forward Access Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut

F. DCV Proximity Sensor Removal

SUBTASK 78-36-05-020-001-H01

(1) Remove the DCV proximity sensor [2] (Figure 401):

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS.

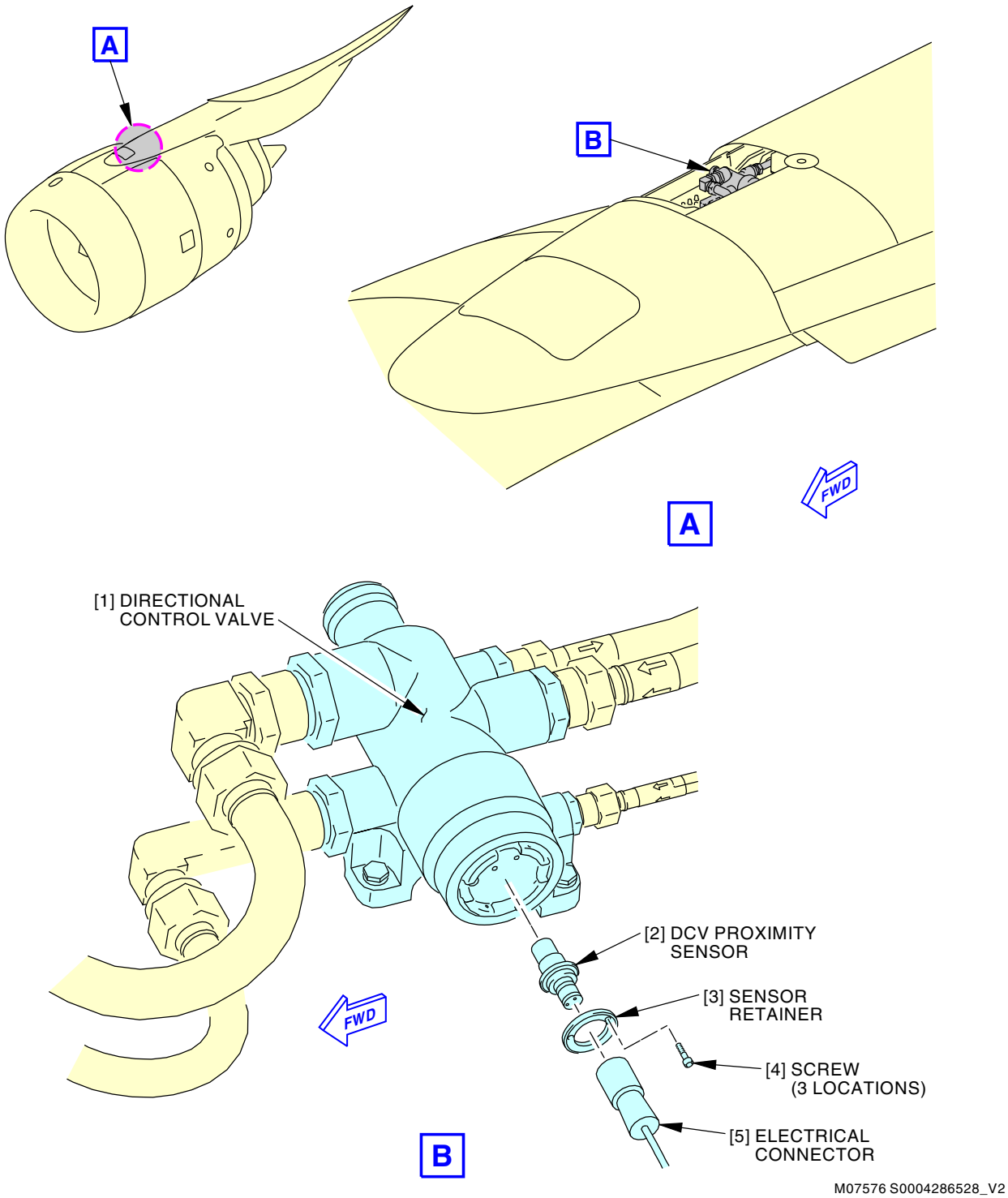
(a) Remove the electrical connector [5] from the DCV proximity sensor [2].

(b) Remove the lockwire and the three screws [4] from the directional control valve [1].

(c) Remove the sensor retainer [3] and the DCV proximity sensor [2].

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Directional Control Valve (DCV) Proximity Sensor Installation
Figure 401/78-36-05-990-801-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 78-36-05-400-801-H01

3. Thrust Reverser Directional Control Valve Proximity Sensor Installation

A. General

(1) You need to use the fall arrest lifeline procedure or other safety equipment to do this task.

(2) After you install the DCV proximity sensor, you must do the operational test for the thrust reverser.

B. References

Reference	Title
54-52-00-910-804-001	Fall Arrest Lifeline Procedure (P/B 201)
54-52-01-400-801-001	Forward Fairings Installation (P/B 401)
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
78-31-00-710-821-H00	Thrust Reverser - Operational Test (Engine Not In Operation) (P/B 501)

C. Consumable Materials

Reference	Description	Specification
G01505	Lockwire - Safety And Lock	NASM20995

D. Location Zones

Zone	Area
431	Forward Strut Fairing - Left Nacelle Strut
441	Forward Strut Fairing - Right Nacelle Strut

E. Access Panels

Number	Name/Location
431CR	Forward Access Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut

F. DCV Proximity Sensor Installation

SUBTASK 78-36-05-860-002-H01



WARNING USE THE FALL ARREST LIFELINE PROCEDURE IF YOU DO NOT USE OTHER SAFETY EQUIPMENT. IF YOU USE THE SAFETY EQUIPMENT OR PROCEDURES INCORRECTLY, IT CAN CAUSE INJURY OR KILL YOU.

(1) If you do not use other safety equipment, do this task: Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

SUBTASK 78-36-05-420-001-H01

(2) Install the DCV proximity sensor [2] (Figure 401):

(a) Put the DCV proximity sensor [2] through the sensor retainer [3].

(b) Put the DCV proximity sensor [2] and the sensor retainer [3] in the directional control valve [1].

(c) Install the three screws [4] through the sensor retainer [3].

1) Tighten the screws to 10-15 pound-inches (1.1-1.7 Newton-meters).

(d) Install a single lockwire, G01505, corrosion resistant steel, 0.020 inch (0.508 millimeter) diameter, to safety the screws [4].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE THRUST REVERSER CONTROL AND INDICATION PROBLEMS.

(e) Install the electrical connector [5] to the DCV proximity sensor [2].

G. Installation Test

SUBTASK 78-36-05-440-001-H01

(1) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

SUBTASK 78-36-05-710-001-H01

(2) Do this task: Thrust Reverser - Operational Test (Engine Not In Operation), TASK 78-31-00-710-821-H00.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 78-36-05-410-001-H01

(1) Install the right No. 2 fairing; do this task: Forward Fairings Installation, TASK 54-52-01-400-801-001:

(a) Close the applicable access panels:

Number	Name/Location
431CR	Forward Access Fairing, Left Strut
441CR	Forward Access Fairing, Right Strut

SUBTASK 78-36-05-860-003-H01

(2) Remove the fall arrest equipment, do this task:Fall Arrest Lifeline Procedure, TASK 54-52-00-910-804-001.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details