CHAPTER

72

ENGINE

(GE90-100 SERIES ENGINES)

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 72
ENGINE

Subject/Page	Date	COC
72-EFFECTIVE PAGES		
1 thru 10	SEP 05/2018	
72-CONTENTS		
1	May 05/2018	
2	Jul 25/2018	
3	Jul 25/2018	
4	Sep 05/2017	
O 5	Sep 05/2018	
O 6	Sep 05/2018	
7	Sep 05/2017	
8	Sep 05/2017	
9	May 05/2018	
10	BLANK	
72-00-00		
201	Jan 05/2016	
202	Sep 05/2017	
203	Sep 05/2017	
204	Sep 05/2017	
205	Sep 05/2017	
206	Jan 05/2017	
207	Sep 05/2017	
208	Sep 05/2017	
209	Sep 05/2017	
210	Sep 05/2017	
211	Sep 05/2017	
212	Jan 05/2017	
213	Sep 05/2017	
214	May 05/2018	
215	May 05/2018	
216	May 05/2018	
217	May 05/2018	
218	May 05/2018	
72-00-00		
601	Jan 05/2015	
602	Jan 05/2016	
603	Sep 05/2017	
604	Jan 05/2018	
72-00-00 (cont)		
605	Jan 05/2018	
606	May 05/2018	
607	May 05/2018	
608	Jul 25/2018	
609	May 05/2018	
610	May 05/2018	
611	Jul 25/2018	
612	Jul 25/2018	
613	Jul 25/2018	
614	Jul 25/2018	
615	Sep 05/2017	
616	Sep 05/2016	
617	Sep 05/2017	
618	Sep 05/2017	
619	Sep 05/2017	
620	Sep 05/2017	
621	Sep 05/2017	
622	Sep 05/2017	
623	Sep 05/2017	
624	Sep 05/2017	
625	Sep 05/2017	
626	May 05/2017	
627	Sep 05/2017	
628	Sep 05/2017	
629	Sep 05/2017	
630	Sep 05/2017	
631	Sep 05/2017	
632	Sep 05/2017	
633	May 05/2017	
634	May 05/2017	
635	Sep 05/2017	
636	Sep 05/2017	
637	Sep 05/2017	
638	May 05/2017	
639	May 05/2017	
640	Jul 25/2018	
72-00-00 (cont)		
641	May 05/2017	
642	Jul 25/2018	
643	Jul 25/2018	
644	Jul 25/2018	
645	Jul 25/2018	
646	Jul 25/2018	
647	Jul 25/2018	
648	Jul 25/2018	
649	Jul 25/2018	
650	Jul 25/2018	
651	Sep 05/2017	
652	Sep 05/2017	
653	Sep 05/2017	
654	Sep 05/2017	
655	Sep 05/2017	
656	Sep 05/2017	
657	Sep 05/2017	
658	Sep 05/2017	
659	Sep 05/2017	
660	Sep 05/2017	
661	Sep 05/2017	
662	Sep 05/2017	
663	Sep 05/2017	
664	Sep 05/2017	
665	Sep 05/2017	
666	Sep 05/2017	
667	Sep 05/2017	
668	Sep 05/2017	
669	Sep 05/2017	
670	May 05/2018	
671	May 05/2018	
672	May 05/2018	
673	May 05/2018	
674	May 05/2018	
675	May 05/2018	
676	May 05/2018	

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

72-EFFECTIVE PAGES

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CHAPTER 72
ENGINE

Subject/Page	Date	COC
72-00-00 (cont)		
677	May 05/2018	
678	May 05/2018	
679	May 05/2018	
680	May 05/2018	
681	May 05/2018	
682	May 05/2018	
683	May 05/2018	
684	May 05/2018	
685	May 05/2018	
686	May 05/2018	
687	May 05/2018	
688	May 05/2018	
689	May 05/2018	
690	May 05/2018	
691	May 05/2018	
692	May 05/2018	
693	May 05/2018	
694	May 05/2018	
695	May 05/2018	
696	May 05/2018	
697	May 05/2018	
698	May 05/2018	
698.1	May 05/2018	
698.2	May 05/2018	
698.3	May 05/2018	
698.4	May 05/2018	
698.5	May 05/2018	
698.6	Sep 05/2017	
698.7	Sep 05/2017	
698.8	Sep 05/2017	
698.9	Sep 05/2017	
698.10	Sep 05/2017	
698.11	Sep 05/2017	
698.12	Sep 05/2017	
698.13	May 05/2018	
698.14	May 05/2018	
698.15	May 05/2018	
698.16	May 05/2018	
698.17	May 05/2018	
698.18	May 05/2018	
698.19	May 05/2018	
698.20	May 05/2018	
698.21	May 05/2018	
698.22	May 05/2018	
698.23	May 05/2018	
698.24	May 05/2018	
698.25	May 05/2018	
698.26	May 05/2018	
698.27	May 05/2018	
698.28	May 05/2018	
698.29	May 05/2018	
698.30	May 05/2018	
698.31	May 05/2018	
698.32	May 05/2018	
698.33	Sep 05/2017	
698.34	Sep 05/2017	
698.35	Sep 05/2017	
698.36	BLANK	
72-00-00		
701	Jan 05/2018	
702	Jan 05/2018	
R 703	Sep 05/2018	
704	Sep 05/2017	
705	Sep 05/2017	
706	Sep 05/2017	
707	Sep 05/2017	
708	Sep 05/2017	
709	Sep 05/2017	
710	Sep 05/2017	
711	Sep 05/2017	
712	Sep 05/2017	
713	Sep 05/2017	
72-00-00 (cont)		
714	Sep 05/2017	
715	Sep 05/2017	
716	Sep 05/2017	
717	Jan 05/2017	
718	Jan 05/2017	
719	May 05/2017	
720	BLANK	
72-21-00		
601	Sep 05/2017	
602	Sep 05/2017	
603	Sep 05/2017	
604	Sep 05/2017	
605	Sep 05/2017	
606	Jul 25/2018	
607	Jul 25/2018	
608	Jan 05/2015	
609	Jan 05/2015	
610	Jan 05/2015	
611	Jul 25/2018	
612	Jan 05/2015	
613	Jul 25/2018	
614	Jul 25/2018	
615	Jul 25/2018	
616	Jul 25/2018	
617	Jul 25/2018	
618	Jul 25/2018	
619	Jul 25/2018	
620	Jul 25/2018	
621	Jul 25/2018	
622	Jul 25/2018	
623	Jul 25/2018	
624	Jul 25/2018	
625	Jul 25/2018	
626	Jul 25/2018	
627	Jul 25/2018	
628	Jul 25/2018	

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

72-EFFECTIVE PAGES

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

CHAPTER 72
ENGINE

Subject/Page	Date	COC
72-21-00 (cont)		
629	Jul 25/2018	
630	Jul 25/2018	
631	Jul 25/2018	
632	Jul 25/2018	
633	Jul 25/2018	
634	Jul 25/2018	
635	Jul 25/2018	
636	Jul 25/2018	
637	Jul 25/2018	
638	Jul 25/2018	
639	Jul 25/2018	
640	Jul 25/2018	
641	Jul 25/2018	
642	Jul 25/2018	
643	Jul 25/2018	
644	Jul 25/2018	
645	Jul 25/2018	
646	Jul 25/2018	
647	Jul 25/2018	
648	Jul 25/2018	
649	Jul 25/2018	
650	Jul 25/2018	
651	Jul 25/2018	
652	Jul 25/2018	
653	Jul 25/2018	
654	Jul 25/2018	
655	Jul 25/2018	
656	Jul 25/2018	
657	Jul 25/2018	
658	Jul 25/2018	
659	Jul 25/2018	
660	BLANK	
72-21-00		
801	Sep 05/2017	
802	Sep 05/2017	
803	Sep 05/2017	
804	Sep 05/2017	
72-21-00 Config 1		
801	Sep 05/2017	
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	BLANK	
72-21-01		
401	Jan 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	May 05/2017	
405	Jan 05/2015	
406	Sep 05/2017	
407	Sep 05/2017	
408	Sep 05/2017	
72-21-01		
601	Sep 05/2017	
602	Sep 05/2017	
603	May 05/2017	
604	BLANK	
72-21-02		
401	Jan 05/2015	
402	Jan 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	May 05/2017	
406	May 05/2017	
407	May 05/2017	
408	May 05/2017	
409	May 05/2017	
410	May 05/2017	
411	May 05/2017	
72-21-02 (cont)		
412	May 05/2018	
413	May 05/2018	
414	May 05/2018	
415	May 05/2018	
416	Sep 05/2017	
417	May 05/2018	
418	May 05/2018	
419	May 05/2018	
420	May 05/2018	
421	May 05/2018	
422	May 05/2018	
423	May 05/2017	
424	May 05/2017	
425	May 05/2017	
426	May 05/2017	
427	May 05/2017	
428	May 05/2017	
429	May 05/2018	
430	May 05/2018	
431	May 05/2018	
432	May 05/2018	
433	May 05/2018	
434	May 05/2018	
72-21-02		
601	Jul 25/2018	
602	Jul 25/2018	
603	Sep 05/2017	
604	Sep 05/2017	
605	Sep 05/2017	
606	Jul 25/2018	
607	Jul 25/2018	
608	Jul 25/2018	
609	Jul 25/2018	
610	Jul 25/2018	
611	May 05/2018	
612	May 05/2018	

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

72-EFFECTIVE PAGES

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

Subject/Page	Date	COC
72-21-02 (cont)		
613	May 05/2018	
614	May 05/2018	
615	May 05/2018	
616	May 05/2018	
617	May 05/2018	
618	May 05/2018	
619	May 05/2018	
620	Jul 25/2018	
621	Jul 25/2018	
622	May 05/2018	
623	May 05/2018	
624	May 05/2018	
625	May 05/2018	
626	May 05/2018	
627	May 05/2018	
628	May 05/2018	
629	May 05/2018	
630	May 05/2018	
631	May 05/2018	
632	May 05/2018	
633	May 05/2018	
634	May 05/2018	
635	May 05/2018	
636	May 05/2018	
637	May 05/2018	
638	May 05/2018	
639	May 05/2018	
640	May 05/2018	
641	May 05/2018	
642	BLANK	
72-21-02		
701	Sep 05/2017	
702	Sep 05/2017	
703	Sep 05/2017	
704	BLANK	
72-21-02		
801	Jan 05/2017	
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	Sep 05/2017	
810	Sep 05/2017	
811	Sep 05/2017	
812	Sep 05/2017	
813	Sep 05/2017	
814	Sep 05/2017	
815	Sep 05/2017	
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	Jul 25/2018	
827	Jul 25/2018	
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	Jul 25/2018	
836	Jul 25/2018	
72-21-02 (cont)		
837	Jul 25/2018	
838	Jul 25/2018	
839	Jul 25/2018	
840	Jul 25/2018	
841	Jul 25/2018	
842	Jul 25/2018	
843	Jul 25/2018	
844	Jul 25/2018	
845	Jul 25/2018	
846	Jul 25/2018	
847	Jul 25/2018	
848	Jul 25/2018	
849	Jul 25/2018	
850	Jul 25/2018	
851	Jul 25/2018	
852	Jul 25/2018	
853	Jul 25/2018	
854	Jul 25/2018	
855	Jul 25/2018	
856	Jul 25/2018	
72-21-03		
401	Sep 05/2017	
402	Sep 05/2017	
403	May 05/2017	
404	May 05/2017	
405	May 05/2017	
406	May 05/2017	
407	May 05/2017	
408	Jan 05/2017	
409	May 05/2016	
410	Sep 05/2017	
72-21-03		
601	May 05/2017	
602	Sep 05/2017	
603	May 05/2017	
604	May 05/2017	

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

72-EFFECTIVE PAGES

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

CHAPTER 72
ENGINE

Subject/Page	Date	COC
72-21-03 (cont)		
605	May 05/2017	
606	Jan 05/2018	
607	Jan 05/2018	
608	May 05/2017	
609	May 05/2017	
610	Sep 05/2017	
611	May 05/2017	
612	May 05/2017	
613	May 05/2017	
614	May 05/2016	
615	May 05/2016	
616	May 05/2017	
72-21-03		
801	Jan 05/2017	
802	Sep 05/2017	
803	Sep 05/2017	
804	Sep 05/2017	
805	Sep 05/2017	
806	Sep 05/2017	
807	May 05/2017	
808	Jan 05/2016	
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	Sep 05/2017	
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	May 05/2017	

Subject/Page	Date	COC
72-21-04		
401	Sep 05/2017	
402	Sep 05/2017	
403	May 05/2017	
404	Sep 05/2017	
405	Sep 05/2017	
406	BLANK	
72-21-04		
601	Sep 05/2017	
602	Sep 05/2017	
603	Sep 05/2017	
604	May 05/2018	
605	Sep 05/2017	
606	Sep 05/2017	
607	Sep 05/2017	
608	May 05/2017	
72-21-05		
401	Jan 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2016	
405	Sep 05/2016	
406	Sep 05/2016	
407	Sep 05/2016	
408	Sep 05/2016	
409	Sep 05/2017	
410	Sep 05/2017	
411	Sep 05/2017	
412	BLANK	
72-21-05		
801	Jan 05/2017	
802	Sep 05/2017	
803	Sep 05/2017	
804	Sep 05/2017	
805	Sep 05/2017	
806	Sep 05/2017	
807	Sep 05/2017	

Subject/Page	Date	COC
72-21-05 (cont)		
808	Sep 05/2017	
809	Sep 05/2017	
810	Jan 05/2017	
811	Jan 05/2017	
812	Jan 05/2017	
813	Jan 05/2017	
814	Jan 05/2017	
815	Jan 05/2017	
816	BLANK	
72-23-00		
601	Jul 25/2018	
602	Sep 05/2017	
603	Jul 25/2018	
604	Jul 25/2018	
605	Jul 25/2018	
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	
72-23-00		
801	Jan 05/2016	
802	Sep 05/2017	
803	Sep 05/2017	
804	BLANK	
72-24-00		
601	Jan 05/2017	
602	Sep 05/2017	
603	Sep 05/2017	
604	Sep 05/2017	
605	Sep 05/2017	
606	Sep 05/2017	

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

72-EFFECTIVE PAGES

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

CHAPTER 72
ENGINE

Subject/Page	Date	COC
72-24-00 (cont)		
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	Sep 05/2017	
615	Sep 05/2017	
616	May 05/2016	
617	May 05/2016	
R 618	Sep 05/2018	
R 619	Sep 05/2018	
R 620	Sep 05/2018	
R 621	Sep 05/2018	
R 622	Sep 05/2018	
R 623	Sep 05/2018	
R 624	Sep 05/2018	
O 625	Sep 05/2018	
R 626	Sep 05/2018	
R 627	Sep 05/2018	
O 628	Sep 05/2018	
R 629	Sep 05/2018	
R 630	Sep 05/2018	
O 631	Sep 05/2018	
O 632	Sep 05/2018	
R 633	Sep 05/2018	
O 634	Sep 05/2018	
R 635	Sep 05/2018	
O 636	Sep 05/2018	
O 637	Sep 05/2018	
O 638	Sep 05/2018	
O 639	Sep 05/2018	
O 640	Sep 05/2018	
A 641	Sep 05/2018	
A 642	Sep 05/2018	
A 643	Sep 05/2018	
A 644	BLANK	
72-24-00		
801	Jul 25/2018	
802	Jan 05/2018	
803	Jan 05/2018	
804	Jul 25/2018	
805	Sep 05/2017	
806	Sep 05/2017	
807	Jan 05/2018	
808	Jul 25/2018	
809	Sep 05/2017	
810	Sep 05/2017	
811	Sep 05/2017	
812	Sep 05/2017	
813	Sep 05/2017	
814	Jul 25/2018	
815	Jan 05/2018	
816	Jan 05/2018	
817	Jul 25/2018	
818	Jan 05/2018	
819	Jan 05/2018	
820	Sep 05/2017	
821	Sep 05/2017	
822	Sep 05/2017	
823	Jan 05/2016	
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	Jan 05/2016	
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	BLANK	
72-24-01		
401	Sep 05/2017	
402	Sep 05/2017	
403	Sep 05/2017	
404	May 05/2018	
405	May 05/2018	
406	May 05/2018	
407	May 05/2018	
408	May 05/2018	
409	May 05/2018	
410	May 05/2018	
411	May 05/2018	
412	May 05/2018	
413	May 05/2018	
414	BLANK	
72-24-01		
601	May 05/2018	
602	May 05/2018	
603	May 05/2018	
604	May 05/2018	
605	May 05/2018	
606	May 05/2018	
607	Sep 05/2017	
608	Sep 05/2017	
609	Sep 05/2017	
610	Sep 05/2017	
611	Sep 05/2017	

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

72-EFFECTIVE PAGES

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

CHAPTER 72
ENGINE

Subject/Page	Date	COC
72-24-01 (cont)		
612	Sep 05/2017	
613	May 05/2018	
614	May 05/2018	
615	May 05/2018	
616	May 05/2018	
617	May 05/2018	
618	May 05/2018	
619	May 05/2018	
620	May 05/2018	
621	May 05/2018	
622	May 05/2018	
72-24-03		
401	Jan 05/2016	
402	Sep 05/2017	
403	Sep 05/2017	
404	Sep 05/2017	
405	Jan 05/2018	
406	May 05/2018	
407	May 05/2018	
408	May 05/2018	
409	May 05/2018	
410	May 05/2018	
411	May 05/2018	
412	May 05/2018	
72-30-00		
601	Sep 05/2016	
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	Sep 05/2017	
609	Sep 05/2016	
610	Sep 05/2016	
611	Sep 05/2016	

Subject/Page	Date	COC
72-30-00 (cont)		
612	Sep 05/2016	
613	May 05/2017	
614	May 05/2017	
615	May 05/2017	
616	May 05/2017	
72-30-00		
801	Sep 05/2016	
R 802	Sep 05/2018	
R 803	Sep 05/2018	
O 804	Sep 05/2018	
O 805	Sep 05/2018	
O 806	Sep 05/2018	
R 807	Sep 05/2018	
O 808	Sep 05/2018	
O 809	Sep 05/2018	
O 810	Sep 05/2018	
O 811	Sep 05/2018	
R 812	Sep 05/2018	
813	May 05/2017	
814	May 05/2017	
815	May 05/2017	
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	May 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	

Subject/Page	Date	COC
72-30-00 (cont)		
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	May 05/2017	
839	Sep 05/2017	
840	May 05/2017	
841	Sep 05/2017	
842	May 05/2017	
843	May 05/2017	
844	May 05/2017	
845	Sep 05/2017	
846	Sep 05/2017	
847	May 05/2017	
848	May 05/2017	
849	May 05/2017	
850	May 05/2017	
851	May 05/2017	
852	May 05/2017	
853	May 05/2017	
854	May 05/2017	
855	May 05/2017	
856	May 05/2017	
857	May 05/2017	
858	Sep 05/2017	
859	May 05/2017	
860	Sep 05/2017	
861	Sep 05/2017	
862	Sep 05/2017	
863	May 05/2017	
864	May 05/2017	
865	May 05/2017	
866	May 05/2017	

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

72-EFFECTIVE PAGES

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

Subject/Page	Date	COC
72-30-00 (cont)		
867	May 05/2017	
868	May 05/2017	
869	May 05/2017	
870	BLANK	
72-40-00		
601	Jan 05/2016	
602	Sep 05/2017	
603	Sep 05/2017	
604	Sep 05/2017	
605	Sep 05/2017	
606	BLANK	
72-40-01		
601	May 05/2017	
602	May 05/2017	
603	May 05/2017	
604	May 05/2017	
605	Jan 05/2018	
606	May 05/2017	
607	May 05/2017	
608	Sep 05/2017	
609	Sep 05/2017	
610	Sep 05/2017	
611	Sep 05/2017	
612	Sep 05/2017	
613	Sep 05/2016	
614	BLANK	
72-41-01		
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	Jan 05/2015	
408	Sep 05/2017	
409	Sep 05/2017	

Subject/Page	Date	COC
72-41-01 (cont)		
410	Sep 05/2017	
411	Sep 05/2017	
412	Sep 05/2017	
413	Sep 05/2017	
414	Sep 05/2017	
415	Jan 05/2015	
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	Jan 05/2015	
424	Sep 05/2017	
72-50-00		
601	Jan 05/2016	
602	Sep 05/2017	
603	Jan 05/2015	
604	May 05/2016	
605	May 05/2016	
606	Sep 05/2017	
607	Jan 05/2018	
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	Sep 05/2017	
615	May 05/2016	
616	BLANK	
72-50-01		
801	Jan 05/2016	
802	Sep 05/2017	
803	Sep 05/2017	

Subject/Page	Date	COC
72-50-01 (cont)		
804	BLANK	
72-60-00		
601	Jan 05/2016	
602	Sep 05/2017	
603	Jan 05/2015	
604	Jan 05/2015	
605	May 05/2015	
606	May 05/2015	
607	May 05/2015	
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	Sep 05/2017	
615	Sep 05/2017	
616	Sep 05/2017	
617	Sep 05/2017	
618	BLANK	
72-62-01		
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	
415	Sep 05/2017	

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

72-EFFECTIVE PAGES

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

Subject/Page	Date	COC
72-62-01	(cont)	
416	Sep 05/2017	
417	Jan 05/2018	
418	Sep 05/2016	
419	Sep 05/2016	
420	Jan 05/2018	
421	Sep 05/2017	
422	Sep 05/2017	
423	Sep 05/2017	
424	Sep 05/2017	
425	Sep 05/2017	
426	BLANK	
72-64-01		
401	May 05/2018	
402	May 05/2018	
403	May 05/2018	
404	May 05/2018	
405	May 05/2018	
406	May 05/2018	
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	Jan 05/2017	
414	Jan 05/2017	
415	May 05/2018	
416	May 05/2018	
417	May 05/2018	
418	May 05/2018	
419	May 05/2018	
420	May 05/2018	
421	May 05/2018	
422	May 05/2018	
423	May 05/2018	
424	BLANK	
72-64-02		
401	May 05/2018	
402	May 05/2018	
403	May 05/2018	
404	May 05/2018	
405	May 05/2018	
406	May 05/2018	
407	May 05/2018	
408	May 05/2018	
409	May 05/2018	
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	
417	May 05/2018	
418	May 05/2018	
419	May 05/2018	
420	May 05/2018	
421	May 05/2018	
422	May 05/2018	
423	May 05/2018	
424	May 05/2018	
425	May 05/2018	
426	May 05/2018	
427	May 05/2018	
428	May 05/2018	
429	May 05/2018	
430	May 05/2018	
431	May 05/2018	
432	May 05/2018	
433	May 05/2018	
434	May 05/2018	
435	May 05/2018	
436	May 05/2018	
72-64-02	(cont)	
437	May 05/2018	
438	May 05/2018	
439	May 05/2018	
440	May 05/2018	
441	May 05/2018	
442	May 05/2018	
443	May 05/2018	
444	May 05/2018	
445	May 05/2018	
446	May 05/2018	
447	May 05/2018	
448	May 05/2018	
449	May 05/2018	
450	May 05/2018	
451	May 05/2018	
452	May 05/2018	
453	May 05/2018	
454	May 05/2018	
455	May 05/2018	
456	May 05/2018	
457	May 05/2018	
458	May 05/2018	
459	May 05/2018	
460	May 05/2018	
461	May 05/2018	
462	May 05/2018	
463	May 05/2018	
464	May 05/2018	
465	May 05/2018	
466	May 05/2018	
467	May 05/2018	
468	May 05/2018	
469	May 05/2018	
470	May 05/2018	

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

72-EFFECTIVE PAGES

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

Subject/Page	Date	COC	Subject/Page	Date	COC	Subject/Page	Date	COC
72-99-99								
401	May 05/2015							
402	May 05/2015							

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

72-EFFECTIVE PAGES

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

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
ENGINE - MAINTENANCE PRACTICES	72-00-00		201	ARO ALL
Manual Motoring of the HPC Rotor TASK 72-00-00-980-801-H01			201	ARO ALL
Electrical Motoring of the HPC Rotor TASK 72-00-00-980-802-H01			207	ARO ALL
Zero-Index of the HPC Rotor TASK 72-00-00-820-801-H01			212	ARO ALL
ENGINE - INSPECTION/CHECK	72-00-00		601	ARO ALL
Continue-In-Service Limit(s) (CIS) - General TASK 72-00-00-800-801-H01			601	ARO ALL
Borescope Inspection Preparation TASK 72-00-00-290-801-H01			602	ARO ALL
High Pressure Compressor Section Rotor Inspection TASK 72-00-00-290-803-H01			604	ARO ALL
Combustion Section and High Pressure Turbine Section Stage One Nozzle Leading Edge Inspection TASK 72-00-00-290-804-H01			638	ARO ALL
High Pressure Turbine Section Stage One Nozzle (Except the Leading Edge) and Stage 1 Shroud Inspection TASK 72-00-00-290-805-H01			667	ARO ALL
High Pressure Turbine Section Rotor (Stage 1 and 2 blades), Stage 2 Nozzle and Stage 2 Shroud Inspection TASK 72-00-00-290-806-H01			675	ARO ALL
Low Pressure Turbine Section Rotor Inspection TASK 72-00-00-290-807-H01			698.22	ARO ALL
ENGINE - CLEANING/PAINTING	72-00-00		701	ARO ALL
Engine Gas Path Cleaning (Juniper Wash Cart Method) TASK 72-00-00-100-801-H01			701	ARO ALL

72-CONTENTS

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

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
FAN BOOSTER ASSEMBLY - INSPECTION/CHECK	72-21-00		601	ARO ALL
Fan Rotor Spinner and Support Ring (Scheduled Maintenance Requirement) Inspection TASK 72-21-00-200-801-H01			601	ARO ALL
Fan Blade (Scheduled Maintenance Requirement) Inspection TASK 72-21-00-200-803-H01			606	ARO ALL
Fan Blade Platforms (Scheduled Maintenance Requirement) Inspection TASK 72-21-00-220-803-H01			628	ARO ALL
Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection TASK 72-21-00-220-801-H01			639	ARO ALL
Fan Booster Stage 1 Vane Outer Shroud Inspection TASK 72-21-00-200-802-H01			646	ARO ALL
Fan Blade Retainer Inspection TASK 72-21-00-200-804-H00			651	ARO ALL
Dovetail Key Inspection TASK 72-21-00-200-805-H00			656	ARO ALL
FAN BLADE RETAINER - REPAIR - MOLYDAG COATING REPLACEMENT	72-21-00		801	ARO ALL
Fan Blade Retainer Repair (Molydag Coating Replacement) TASK 72-21-00-300-801-H00			801	ARO ALL
FAN BLADE RETAINER - REPAIR – SWAGE NUT REPLACEMENT	72-21-00	1	801	ARO ALL
Fan Blade Retainer Repair (Swage Nut Replacement) TASK 72-21-00-300-802-H01		1	801	ARO ALL
FAN ROTOR SPINNER - REMOVAL/INSTALLATION	72-21-01		401	ARO ALL
Fan Rotor Spinner Removal TASK 72-21-01-000-801-H01			401	ARO ALL
Fan Rotor Spinner Installation TASK 72-21-01-400-801-H01			406	ARO ALL

72-CONTENTS

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

777-200/300
AIRCRAFT MAINTENANCE MANUAL

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
FAN ROTOR SPINNER - INSPECTION/CHECK	72-21-01		601	ARO ALL
Fan Rotor Spinner Inspection TASK 72-21-01-200-801-H01			601	ARO ALL
FAN BLADE - REMOVAL/INSTALLATION	72-21-02		401	ARO ALL
Fan Blades Removal (Selection) TASK 72-21-02-020-801-H01			401	ARO ALL
Fan Blades Installation (Selection) TASK 72-21-02-400-801-H01			401	ARO ALL
Fan Blade Set Removal TASK 72-21-02-020-802-H01			402	ARO ALL
Fan Blade Set Installation TASK 72-21-02-400-802-H01			412	ARO ALL
One Fan Blade Removal TASK 72-21-02-020-803-H01			420	ARO ALL
One Fan Blade Installation TASK 72-21-02-400-803-H01			429	ARO ALL
FAN BLADE - INSPECTION/CHECK	72-21-02		601	ARO ALL
Fan Blade Inspection TASK 72-21-02-200-801-H01			601	ARO ALL
Fan Blade Tip Clearance Inspection TASK 72-21-02-200-802-H01			622	ARO ALL
FAN BLADE - CLEANING/PAINTING	72-21-02		701	ARO ALL
Fan Blade Cleaning TASK 72-21-02-100-801-H01			701	ARO ALL
FAN BLADE - REPAIRS	72-21-02		801	ARO ALL
Fan Blade Metal Leading Edge (Blend) Repair TASK 72-21-02-300-801-H01			801	ARO ALL
Fan Blade (Local Area Paint Touch-up) Repair TASK 72-21-02-300-802-H01			815	ARO ALL
Fan Blade Platform Wear Strip Repair TASK 72-21-02-300-803-H00			826	ARO ALL
Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film TASK 72-21-02-300-804-H00			835	ARO ALL

72-CONTENTS

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

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
FAN BLADE PLATFORM - REMOVAL/INSTALLATION	72-21-03		401	ARO ALL
Fan Blade Platform Removal TASK 72-21-03-000-801-H01			401	ARO ALL
Fan Blade Platform Installation TASK 72-21-03-400-801-H01			408	ARO ALL
FAN BLADE PLATFORM - INSPECTION/CHECK	72-21-03		601	ARO ALL
Fan Blade Platform Inspection TASK 72-21-03-220-801-H01			601	ARO ALL
FAN BLADE PLATFORM - REPAIRS	72-21-03		801	ARO ALL
Fan Blade Platform (Local Area Paint Touch-up) Repair TASK 72-21-03-300-801-H01			801	ARO ALL
Fan Blade Platform Top Skin Repair TASK 72-21-03-300-802-H00			808	ARO ALL
Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair TASK 72-21-03-300-803-H00			811	ARO ALL
FAN BOOSTER ACOUSTIC PANEL - REMOVAL/INSTALLATION	72-21-04		401	ARO ALL
Fan Booster Acoustic Panel Removal TASK 72-21-04-000-801-H01			401	ARO ALL
Fan Booster Acoustic Panel Installation TASK 72-21-04-400-801-H01			404	ARO ALL
FAN BOOSTER ACOUSTIC PANEL - INSPECTION/CHECK	72-21-04		601	ARO ALL
Visually Examine the Fan Booster Acoustic Panels TASK 72-21-04-200-802-H01			601	ARO ALL
Fan Booster Acoustic Panel Inspection TASK 72-21-04-200-801-H01			603	ARO ALL
COMPOSITE FLOWPATH SPACER - REMOVAL/INSTALLATION	72-21-05		401	ARO ALL
Composite Flowpath Spacer Removal TASK 72-21-05-000-801-H00			401	ARO ALL

72-CONTENTS

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

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Composite Flowpath Spacer Installation TASK 72-21-05-400-801-H00			409	ARO ALL
FLOWPATH SPACER - REPAIR	72-21-05		801	ARO ALL
Flowpath Spacer - Repair of Carbon Fiber Erosion TASK 72-21-05-300-801-H00			801	ARO ALL
FAN HUB FRAME ASSEMBLY - INSPECTION/CHECK	72-23-00		601	ARO ALL
Fan Hub Frame Forward Inner Cowl Support V-groove Inspection TASK 72-23-00-220-801-H01			601	ARO ALL
Fan Hub Frame Forward Outer Support V-Groove Inspection TASK 72-23-00-200-801-H01			603	ARO ALL
Fan Hub Frame IGV Guide Pads Inspection TASK 72-23-00-200-802-H00			606	ARO ALL
FAN HUB FRAME ASSEMBLY - REPAIRS	72-23-00		801	ARO ALL
Fan Hub Frame (Forward Inner Cowl Support V-groove) Repair TASK 72-23-00-370-801-H01			801	ARO ALL
FAN STATOR ASSEMBLY - INSPECTION/CHECK	72-24-00		601	ARO ALL
Fan Abradable Shroud Inspection TASK 72-24-00-200-802-H01			601	ARO ALL
Fan Stator Abradable Erosion Measurement Inspection TASK 72-24-00-200-809-H00			607	ARO ALL
Fan Case Inspection TASK 72-24-00-200-803-H01			618	ARO ALL
Fan Trench Filler Inspection TASK 72-24-00-200-808-H00			625	ARO ALL
Fan Outlet Guide Vane (OGV) Inspection TASK 72-24-00-200-804-H01			631	ARO ALL
Fan Stator Pneumatic Seal Inspection TASK 72-24-00-200-806-H01			636	ARO ALL

72-CONTENTS

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

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Fan Stator Case Outlet Guide Vane (OGV) Fairing Inspection TASK 72-24-00-200-807-H01			639	ARO ALL
FAN STATOR ASSEMBLY - REPAIRS	72-24-00		801	ARO ALL
Fan Case Outer Acoustic Liner Captive Nut of a Captive Nut Assembly Replacement TASK 72-24-00-400-801-H01			801	ARO ALL
Fan Case Outer Acoustic Liner Captive Nut Assembly Replacement TASK 72-24-00-400-802-H01			807	ARO ALL
Fan Stator Pneumatic Seal Repair (24 hour cure repair) TASK 72-24-00-300-801-H01			823	ARO ALL
Fan Stator Pneumatic Seal Repair (fast cure repair) TASK 72-24-00-300-802-H01			833	ARO ALL
FAN STATOR CASE OUTER ACOUSTIC LINERS - REMOVAL/INSTALLATION	72-24-01		401	ARO ALL
Fan Stator Case Forward Outer Acoustic Liners Removal TASK 72-24-01-000-801-H01			401	ARO ALL
Fan Stator Case Forward Outer Acoustic Liners Installation TASK 72-24-01-400-801-H01			404	ARO ALL
Fan Stator Case Aft Outer Acoustic Liners Removal TASK 72-24-01-000-802-H01			408	ARO ALL
Fan Stator Case Aft Outer Acoustic Liners Installation TASK 72-24-01-400-802-H01			411	ARO ALL
FAN STATOR CASE OUTER ACOUSTIC LINERS - INSPECTIONS/CHECK	72-24-01		601	ARO ALL
Fan Stator Case Forward Outer Acoustic Liner Inspection TASK 72-24-01-200-801-H01			601	ARO ALL
Fan Stator Case Aft Outer Acoustic Liner Inspection TASK 72-24-01-200-802-H01			615	ARO ALL

72-CONTENTS

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

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
FAN CASE OUTLET GUIDE VANES (OGV) FAIRING - REMOVAL/INSTALLATION	72-24-03		401	ARO ALL
Fan Case Outlet Guide Vanes (OGV) Fairing Removal TASK 72-24-03-000-801-H01			401	ARO ALL
Fan Case Outlet Guide Vanes (OGV) Fairing Installation TASK 72-24-03-400-801-H01			406	ARO ALL
HIGH PRESSURE COMPRESSOR SECTION (HPC) - INSPECTION/CHECK	72-30-00		601	ARO ALL
High Pressure Compressor Section (HPC) Inspection TASK 72-30-00-200-801-H01			601	ARO ALL
HIGH PRESSURE COMPRESSOR SECTION (HPC) - REPAIRS	72-30-00		801	ARO ALL
Stage 2-8 HPC Rotor Blades Repair (with the Borescope Blending Tool) TASK 72-30-00-300-802-H00			801	ARO ALL
Stages 1-3 VSV Actuating Ring and Rudders Lever Arm Pin Bushing(s) Repair (Replacement) TASK 72-30-00-960-801-H00			824	ARO ALL
VSV Torsion Bar Repair (Replacement) TASK 72-30-00-960-802-H00			840	ARO ALL
VSV Turnbuckles Repair (Replacement) TASK 72-30-00-300-803-H00			857	ARO ALL
COMBUSTION SECTION - INSPECTION/CHECK	72-40-00		601	ARO ALL
Combustion Diffuser Inspection TASK 72-40-00-200-801-H01			601	ARO ALL
COMBUSTOR DIFFUSER NOZZLE - INSPECTION/CHECK	72-40-01		601	ARO ALL
Combustor Diffuser Nozzle Inspection TASK 72-40-01-200-801-H00			601	ARO ALL
COMBUSTION SKIRT PANELS - REMOVAL/INSTALLATION	72-41-01		401	ARO ALL
Left Combustion Skirt Panel Removal TASK 72-41-01-000-801-H01			401	ARO ALL

72-CONTENTS

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

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
Left Combustion Skirt Panel Installation TASK 72-41-01-400-801-H01			407	ARO ALL
Center Combustion Skirt Panel Removal TASK 72-41-01-000-802-H01			409	ARO ALL
Center Combustion Skirt Panel Installation TASK 72-41-01-400-802-H01			415	ARO ALL
Right Combustion Skirt Panel Removal TASK 72-41-01-000-803-H01			417	ARO ALL
Right Combustion Skirt Panel Installation TASK 72-41-01-400-803-H01			423	ARO ALL
TURBINE SECTION - INSPECTION/CHECK	72-50-00		601	ARO ALL
Turbine Section Inspection TASK 72-50-00-200-801-H01			601	ARO ALL
Turbine Rear Frame (TRF) Aft Engine Mount Lugs (Scheduled Maintenance Requirements) Inspection TASK 72-50-00-220-801-H01			607	ARO ALL
Aft TRF Cavity Inspection TASK 72-50-00-200-802-H00			612	ARO ALL
TURBINE REAR FRAME - REPAIRS	72-50-01		801	ARO ALL
Turbine Rear Frame Repair TASK 72-50-01-300-801-H01			801	ARO ALL
ACCESSORY DRIVES - INSPECTION/CHECK	72-60-00		601	ARO ALL
Accessory Gearbox and Transfer Gearbox Inspection TASK 72-60-00-200-801-H01			601	ARO ALL
Accessory Gearbox Mount Features and Links (Scheduled Maintenance Requirement) Inspection TASK 72-60-00-200-802-H01			612	ARO ALL
TRANSFER GEARBOX - REMOVAL/INSTALLATION	72-62-01		401	ARO ALL
Transfer Gearbox Removal TASK 72-62-01-000-801-H00			401	ARO ALL
Transfer Gearbox Installation TASK 72-62-01-400-801-H00			417	ARO ALL

72-CONTENTS

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

CHAPTER 72
ENGINE

SUBJECT	CHAPTER SECTION SUBJECT	CONF	PAGE	EFFECT
ACCESSORY GEARBOX SEAL - REMOVAL/INSTALLATION	72-64-01		401	ARO ALL
Accessory Gearbox Sealol Face Seal Removal TASK 72-64-01-020-801-H01			401	ARO ALL
Accessory Gearbox Sealol Face Seal Installation TASK 72-64-01-420-801-H01			415	ARO ALL
ACCESSORY GEARBOX - REMOVAL/INSTALLATION	72-64-02		401	ARO ALL
Accessory Gearbox Removal TASK 72-64-02-000-801-H00			401	ARO ALL
Accessory Gearbox Installation TASK 72-64-02-400-801-H00			453	ARO ALL
ENGINE MODULES - REMOVAL/INSTALLATION	72-99-99		401	ARO ALL
Discard the Fan Disk and the Booster Spool TASK 72-99-99-000-801-H01			401	ARO ALL
Discard the Fan Shaft TASK 72-99-99-000-802-H01			401	ARO ALL
Discard the HPC Stage Disks, Shaft, Spools, and Seal TASK 72-99-99-000-803-H01			401	ARO ALL
Discard the HPT Stage Disks and the Seals TASK 72-99-99-000-804-H01			401	ARO ALL
Discard the LPT Shafts and the Stage Disks TASK 72-99-99-000-805-H01			402	ARO ALL

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

ENGINE - MAINTENANCE PRACTICES

1. General

A. This procedure contains three tasks:

(1) A manual motor of the high pressure compressor (HPC) rotor.

(2) An electrical motor of the HPC rotor.

(3) An identification of the zero-index point for the HPC rotor.

B. The core motoring pad is installed on the forward side of the accessory gearbox, outboard of the control alternator.

C. The zero-index procedure is the method to identify a specific blade in a stage of the HPC to make an analysis of damage or deterioration.

TASK 72-00-00-980-801-H01

2. Manual Motoring of the HPC Rotor

(Figure 201)

A. General

(1) To manually motor the HPC rotor, you must do these steps:

(a) Do the deactivation of the thrust reverser and LE slats.

(b) Open the fan cowl panels and thrust reversers.

(c) Remove the accessory gearbox motoring pad cover.

(d) Manually motor the HPC rotor.

(e) Install the accessory gearbox motoring pad cover.

(f) Close the fan cowl panels and thrust reversers.

(g) Do the activation of the thrust reverser and LE slats.

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. Consumable Materials

Reference	Description	Specification
D00552 [C02-019]	Oil - Engine Lubricating	GE Spec. D50TF1

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Manual Motor of the HPC Rotor

SUBTASK 72-00-00-010-018-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. Manual Motor Procedure for the HPC Rotor

SUBTASK 72-00-00-020-003-H01

(1) Remove the four nuts [1] and bushings [2] which attach the motoring pad cover [5] to the accessory gearbox.

SUBTASK 72-00-00-020-004-H01

(2) Remove the motoring pad cover [5].

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

SUBTASK 72-00-00-020-005-H01

(3) Remove and discard the preformed packing [4] from the motoring pad cover [5].

SUBTASK 72-00-00-480-004-H01

CAUTION

YOU MUST MAKE SURE THERE IS CLEARANCE BETWEEN THE ACCESSORY GEARBOX MOTOR PAD STUDS AND THE TOOL HANDLE OR STUD DAMAGE IS POSSIBLE.

(4) Insert a 1/2-inch square-drive tool into the accessory gearbox core motoring pad drive.

SUBTASK 72-00-00-980-007-H01

(5) Turn the accessory gearbox motoring drive in a counterclockwise direction to turn the HPC rotor.

SUBTASK 72-00-00-080-008-H01

(6) Remove the drive tool from the accessory gearbox core motoring pad drive.

SUBTASK 72-00-00-420-003-H01

WARNING

DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(7) Apply clean oil, D00552 [C02-019] to the new preformed packing [4] of the motoring pad cover [5].

SUBTASK 72-00-00-420-004-H01

(8) Put the preformed packing [4] on the motoring pad cover [5].

SUBTASK 72-00-00-420-005-H01

(9) Put the motoring pad cover [5] on the core motoring pad.

SUBTASK 72-00-00-420-006-H01

(10) Put the four nuts [1] and bushings [2] on the studs to attach the motoring pad cover [5] to the core motoring pad of the accessory gearbox.

SUBTASK 72-00-00-420-007-H01

(11) Tighten the nuts [1] to 55 in-lb (6.2 N·m) - 70 in-lb (7.9 N·m).

SUBTASK 72-00-00-212-001-H00

CAUTION

MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

(12) Make sure that you do not leave the drive tools and other components inside the accessory gearbox after you tighten the nuts.

SUBTASK 72-00-00-212-002-H00

(13) Make sure that no gap remains between the motoring pad cover and the gearbox mating face.

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

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-410-019-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:

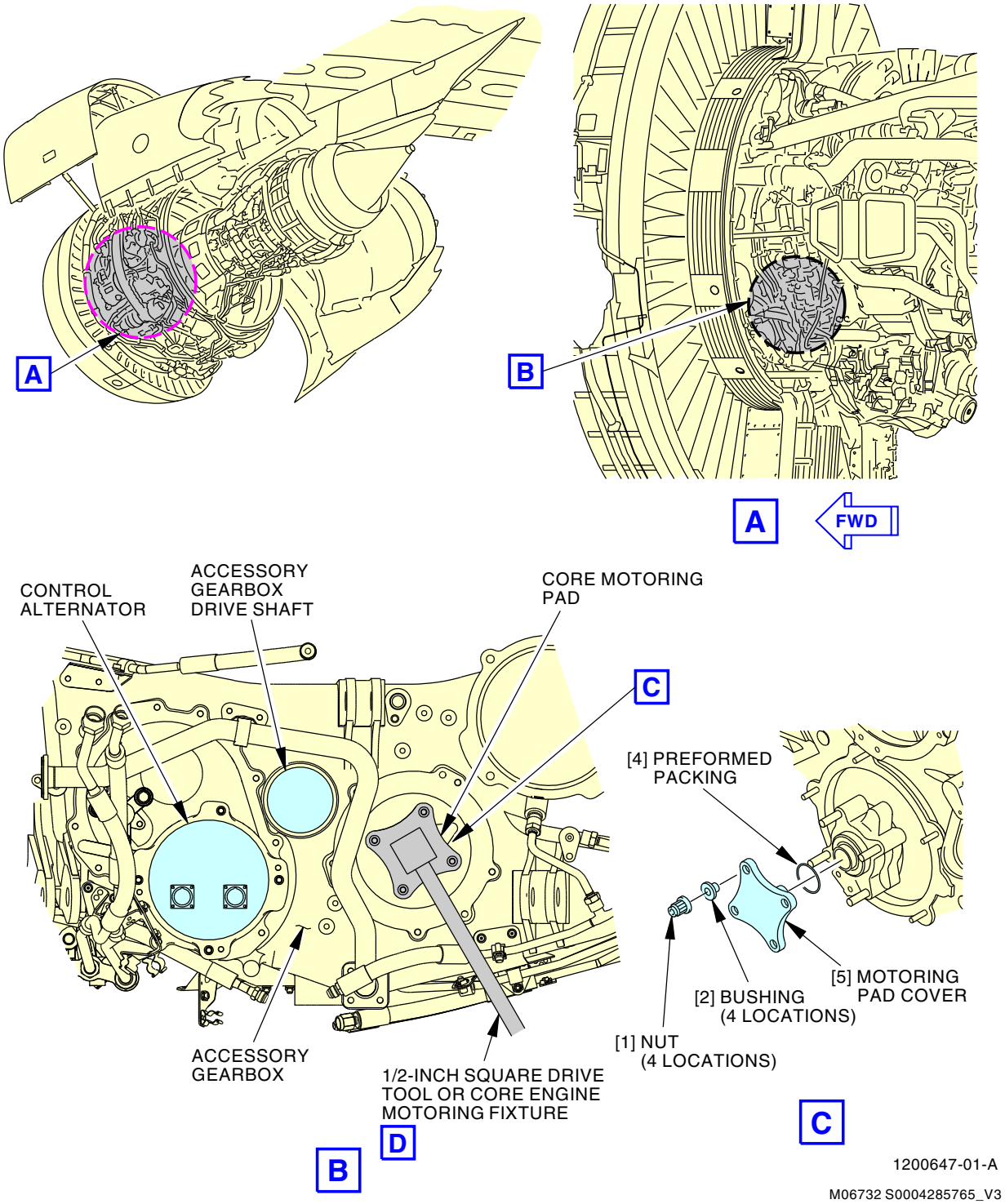
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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.

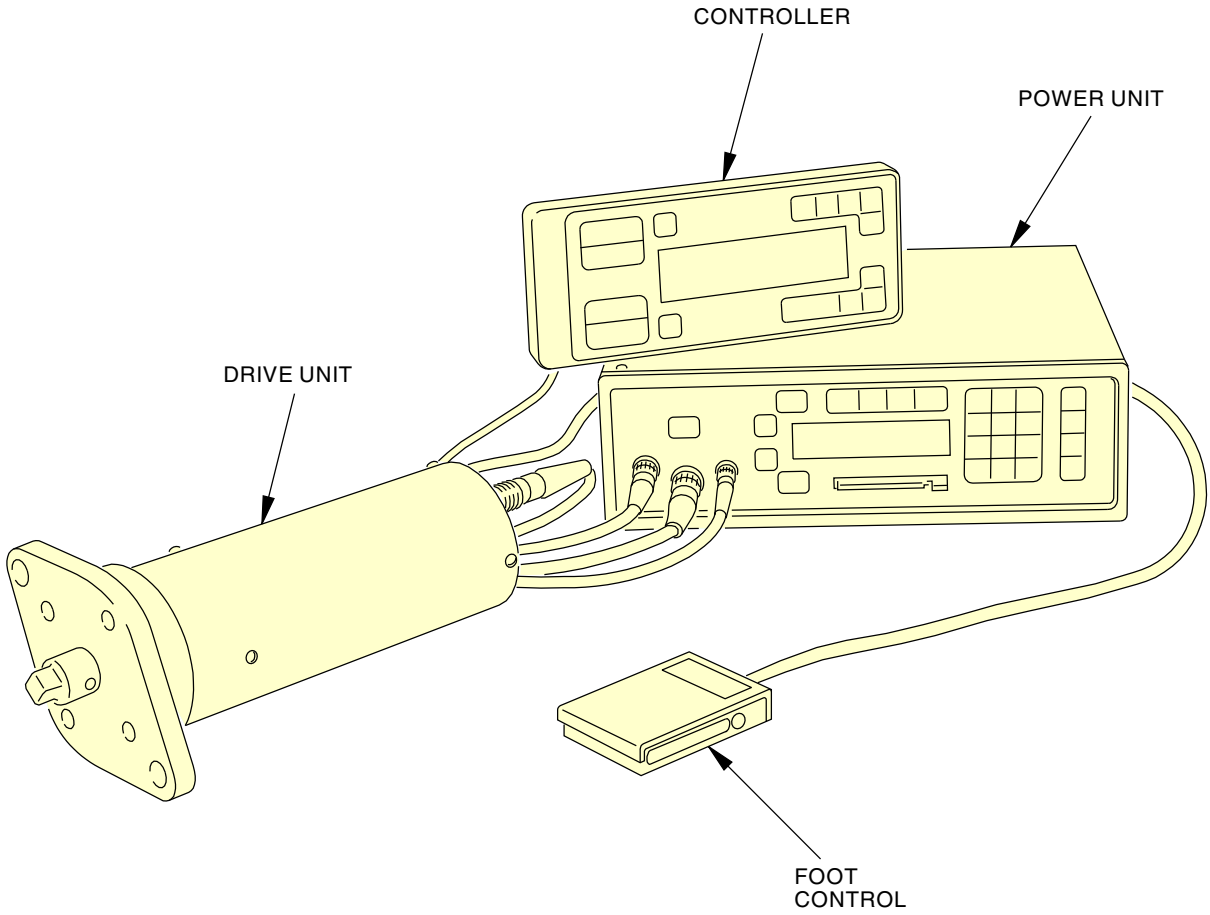
——— END OF TASK ———

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



Core Motoring Tool Installation
Figure 201/72-00-00-990-822-H01 (Sheet 1 of 2)

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



D

2535253 S0000599176_V1

Core Motoring Tool Installation
Figure 201/72-00-00-990-822-H01 (Sheet 2 of 2)

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

TASK 72-00-00-980-802-H01

3. Electrical Motoring of the HPC Rotor

(Figure 202)

A. General

(1) To electrically motor the HPC rotor, you must do these steps:

(a) Do the deactivation of the thrust reversers and LE slats.

(b) Open the fan cowl panels and thrust reversers.

(c) Remove the accessory gearbox motoring pad cover.

(d) Electrically motor the high pressure compressor rotor.

(e) Install the accessory gearbox motor pad cover.

(f) Close the fan cowl panels and thrust reversers.

(g) Do the activation of the thrust reversers and LE slats.

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-7418	Kit - Electronic Turning Tool, GE90 and GE90-115B Part #: SWE18946DTT Supplier: 87641 Opt Part #: SWE18946ETT Supplier: 87641

D. Consumable Materials

Reference	Description	Specification
D00552 [C02-019]	Oil - Engine Lubricating	GE Spec. D50TF1

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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
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 Electrical Motoring of the HPC Rotor

SUBTASK 72-00-00-010-019-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. Electrical Motoring Procedure for the HPC Rotor

SUBTASK 72-00-00-020-006-H01

(1) Remove the four nuts [1] and bushings [2] which attach the motoring pad cover [5] to the accessory gearbox.

SUBTASK 72-00-00-020-007-H01

(2) Remove the motoring pad cover [5].

SUBTASK 72-00-00-020-008-H01

(3) Remove and discard the preformed packing [4] from the motoring pad cover [5].

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

SUBTASK 72-00-00-480-005-H01

CAUTION

YOU MUST INSTALL THE HPC ROTOR MOTORING FIXTURE CORRECTLY. INCORRECT INSTALLATION OF THE HIGH COMPRESSOR ROTOR MOTORING FIXTURE COULD DAMAGE THE ACCESSORY GEARBOX MOTORING PAD STUDS.

(4) Put the motoring fixture adapter into the accessory gearbox core motoring pad drive.

NOTE: The motoring fixture adapter is parted of the electronic turning tool kit, COM-7418.

SUBTASK 72-00-00-480-006-H01

(5) Put the four nuts [1] and bushings [2] on the core motoring pad studs to attach the motoring fixture adapter to the accessory gearbox.

SUBTASK 72-00-00-980-008-H01

(6) Turn the accessory gearbox motoring drive in a counterclockwise direction to turn the HPC rotor.

SUBTASK 72-00-00-020-009-H01

(7) Remove the four nuts [1] and bushings [2] from the HPC rotor motoring fixture studs.

SUBTASK 72-00-00-020-010-H01

(8) Remove the motoring fixture adapter from the accessory gearbox motoring drive.

SUBTASK 72-00-00-420-008-H01

WARNING

DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(9) Apply clean oil, D00552 [C02-019] to the new preformed packing [4] of the motoring pad cover [5].

SUBTASK 72-00-00-420-009-H01

(10) Put the preformed packing [4] on the motoring pad cover [5].

SUBTASK 72-00-00-420-010-H01

(11) Put the motoring pad cover [5] on core motoring pad.

SUBTASK 72-00-00-420-011-H01

(12) Put the four nuts [1] and bushings [2] on the studs to attach the motoring pad cover [5] to the core motoring pad of the accessory gearbox.

SUBTASK 72-00-00-420-012-H01

(13) Tighten the nuts [1] to 55 in-lb (6.2 N·m) - 70 in-lb (7.9 N·m).

SUBTASK 72-00-00-212-003-H00

CAUTION

MAKE SURE THAT YOU REMOVE ALL TOOLS, LOOSE PARTS AND UNWANTED MATERIAL FROM THE AREA WHEN YOU COMPLETE MAINTENANCE. DAMAGE TO EQUIPMENT COULD OCCUR.

(14) Make sure that you do not leave the drive tools and other components inside the accessory gearbox after you tighten the nuts.

SUBTASK 72-00-00-212-004-H00

(15) Make sure that no gap remains between the motoring pad cover and the gearbox mating face.

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

I. Put the Airplane Back to its Usual Condition.

SUBTASK 72-00-00-410-020-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:

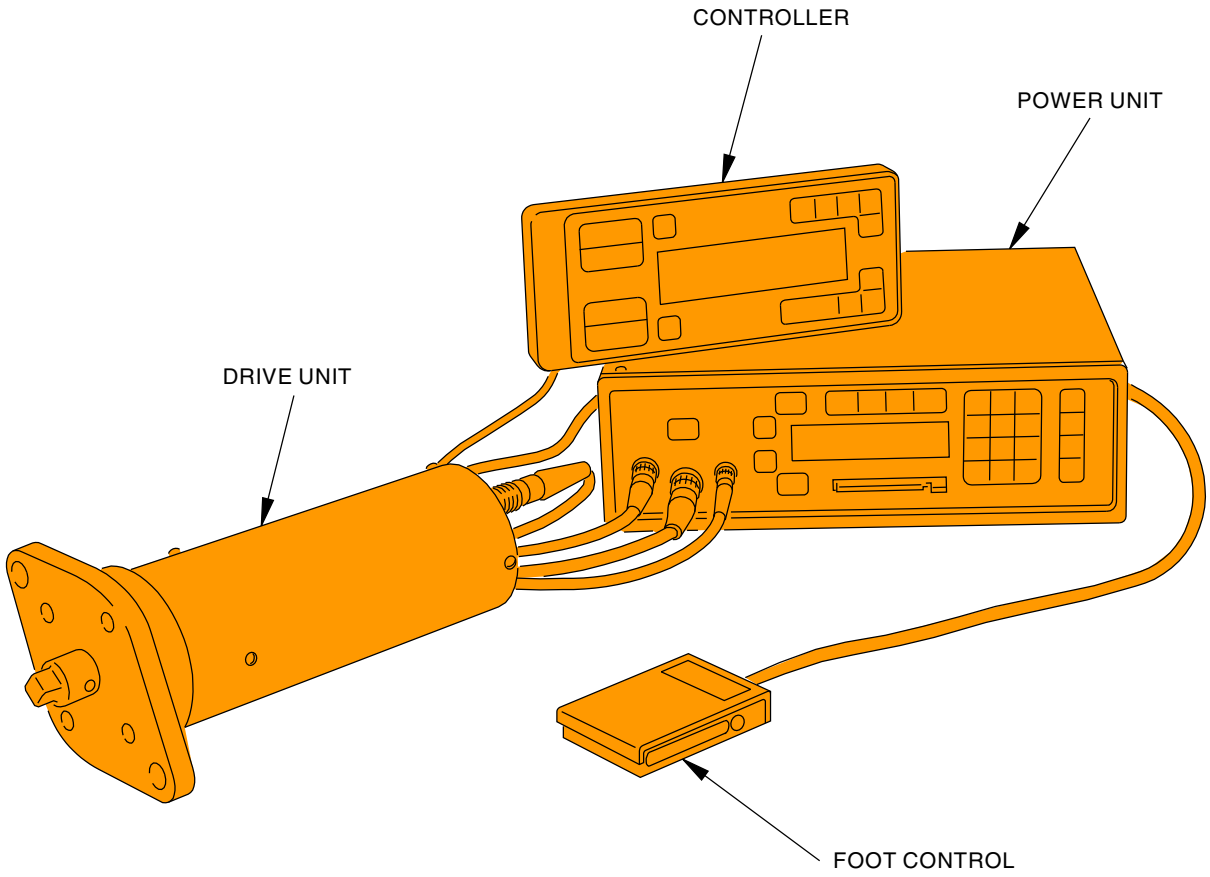
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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



M06733 S0004285766_V2

Core Engine Motoring Fixture
Figure 202/72-00-00-990-848-H01

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

TASK 72-00-00-820-801-H01

4. Zero-Index of the HPC Rotor

(Figure 203)

A. General

(1) Inspection of each stage of the HPC rotor and high pressure turbine (HPT) rotor must start with the HPC rotor at the zero-index position.

(2) To zero-index the HPC, you must do these steps:

(a) Do the deactivation of the thrust reversers and LE slats.

(b) Open the fan cowl panels and thrust reversers.

(c) Remove the accessory gearbox motoring pad cover.

(d) Manually or electrically motor the HPC rotor.

(e) Identify the zero-index point.

(f) Install the accessory gearbox motor pad cover.

(g) Close the fan cowl panels and thrust reversers.

(h) Do the activation of the thrust reversers and LE slats.

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-571	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083 Part #: 9C1303P02 Supplier: 06083
SPL-116	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D50003 [C02-061]	Compound - Antiseize - Milk of Magnesia (unflavored)	
D50017 [C02-071]	Compound - Antiseize And Lubricating - Pure Nickel Special Grade	GE Spec D6Y28C1 or A50TF198

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

(Continued)

Reference	Description	Specification
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
D60004	Compound - Antiseize, Acheson GP460	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Zero-Index of the HPC Rotor

SUBTASK 72-00-00-010-020-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

H. HPC Zero-Index Procedure

SUBTASK 72-00-00-480-007-H01

(1) Remove the motoring pad cover and install the manual motoring tool (TASK 72-00-00-980-801-H01) or the electrical motoring tool (TASK 72-00-00-980-802-H01).

SUBTASK 72-00-00-010-021-H01

(2) Remove the borescope plug from port J.

SUBTASK 72-00-00-020-014-H00

(3) If the plug is seized, do as follows:

CAUTION MAKE SURE PROTECTIVE COVERS ARE INSTALLED CORRECTLY. IF NOT, FRAGMENTS FROM THE BORESCOPE PORT DRILLING CAN ENTER THE ENGINE. DAMAGE TO THE ENGINE CAN OCCUR WHICH MAY RESULT IN THE LOSS OF THE ENGINE.

(a) Install protective covers below the borescope plug in port J into the extension case cavity and through the stage 7 bleed port.

(b) Remove all the fragments of the borescope plug.

(c) Drill out the remaining borescope plug to remove it with a DIA 10mm twist drill to drill to a depth of 1.69 in. (43 mm) from the top surface of the borescope plug.

(d) Install a replacement borescope plug.

SUBTASK 72-00-00-480-008-H01

(4) Turn the borescope light source, COM-571 on and insert the rigid borescope, SPL-116 into borescope port J for the zero-index identification.

SUBTASK 72-00-00-820-001-H01

(5) Identify the zero-index point for the HPC rotor:

(a) Turn the rigid borescope, SPL-116 aft to look at the rotor blade platform for the eighth stage HPC rotor.

(b) Turn the motoring drive unit in a counterclockwise direction to turn the HPC rotor.

(c) Look through the rigid borescope, SPL-116 until you see the first locking lug come into view.

(d) Continue to turn the HPC rotor with the motoring drive until you see the second locking lug.

NOTE: The second locking lug is found two blades from the first locking lug.

(e) Align the leading edge of the blade that follows the second blade lock lug with the leading edge of the eighth stage compressor stator vane.

(f) When the manual motoring procedure is used to identify the zero-index point.

1) Count the number of blades (84) to know when a full turn of eighth stage HPC rotor is complete.

(g) When the electrical motoring procedure is used to identify the zero-index point.

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

1) Set the ETT controller display to zero degrees using the manufacturer supplied instructions.

SUBTASK 72-00-00-820-002-H01

(6) All stages of the HPC rotor and the HPT rotor are now zero-indexed in relation to each other.

(a) Remove the rigid borescope, SPL-116 from borescope port J.

SUBTASK 72-00-00-080-009-H01

(7) When the zero-index identification is complete, turn the borescope light source, COM-571 off.

(a) Let the blower to stay on for a while to cool the lamp and case.

SUBTASK 72-00-00-420-013-H01

(8) Put Acheson GP460 compound, D50043 [C02-058], or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the borescope plug threads and install the plug into port J.

SUBTASK 72-00-00-420-014-H01

(9) Tighten the plug to 85.0 - 93.0 pound-inches (9.6 - 10.5 Newton-meters) until seated. Loosen the borescope plug and then tighten to 24.4 - 28.7 pound-inches (2.8 - 3.2 Newton-meters).

SUBTASK 72-00-00-420-015-H01

(10) Put antiseize compound, D60004, or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on borescope plug port J cap.

SUBTASK 72-00-00-420-016-H01

(11) Install the cap on the borescope port J.

(a) Compress to spring in the cap to engage the cap threads with the extension case.

(b) Tighten the cap to 85.0 - 95.0 pound-inches (9.6 - 10.5 Newton-meters).

SUBTASK 72-00-00-080-010-H01

(12) Remove the manual motoring tool (TASK 72-00-00-980-801-H01) or electrical motoring tool (TASK 72-00-00-980-802-H01) and install the motoring pad cover.

I. Put the Airplane Back to its Usual Condition.

SUBTASK 72-00-00-410-021-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.

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

1) Close these access panels:

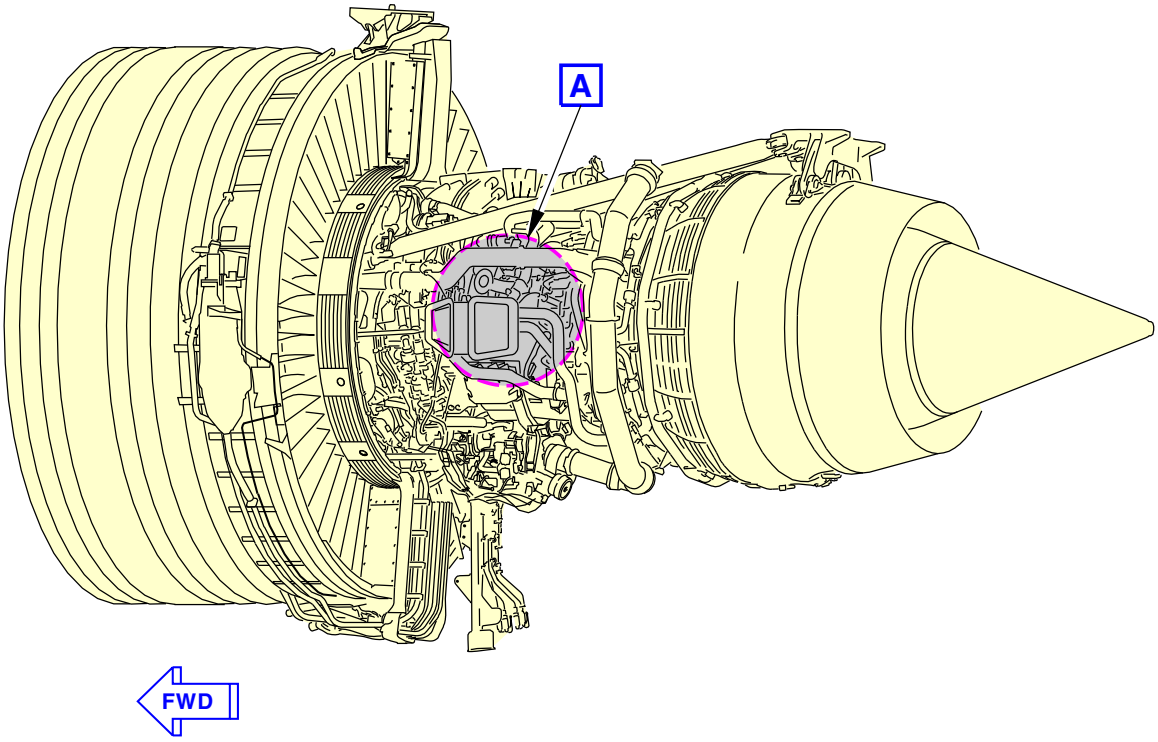
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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 ———

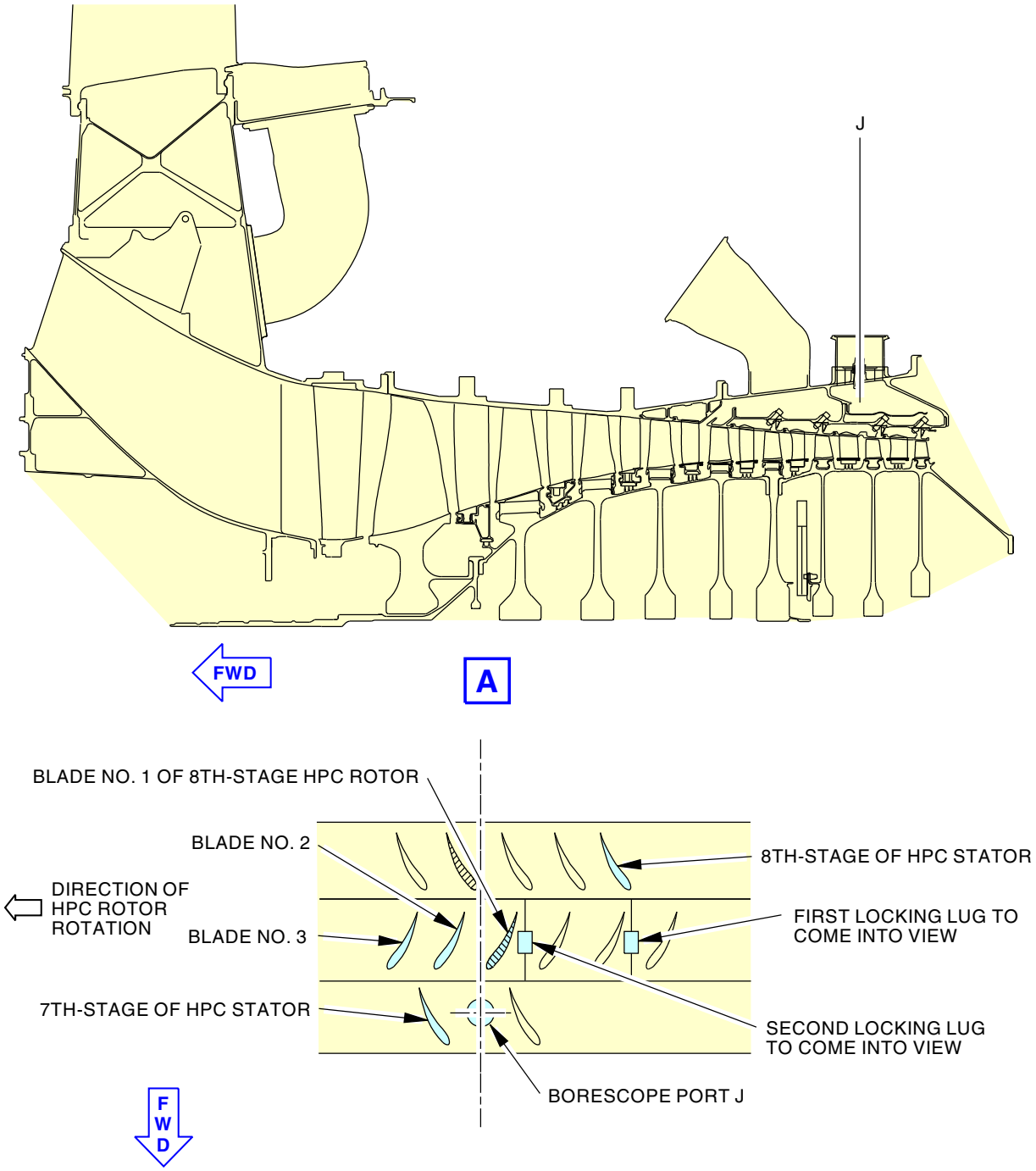
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1201506-00-A
M06735 S0004285767_V2

High Pressure Compressor Zero-Index Point
Figure 203/72-00-00-990-847-H01 (Sheet 1 of 2)

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



High Pressure Compressor Zero-Index Point
Figure 203/72-00-00-990-847-H01 (Sheet 2 of 2)

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

ENGINE - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has 7 tasks:

(1) Continue-In-Service Limit extensions (CIS) - general

(2) A preparation for the borescope inspection

(3) An inspection of the high pressure compressor rotor

(4) An inspection of the combustion section and the high pressure turbine section stage one nozzle leading edge

(5) An inspection of the high pressure turbine section stage one nozzle (all except the leading edge)

(6) An inspection of the high pressure turbine rotor section

(7) An inspection of the low pressure turbine section.

C. The borescope procedure is the gas path examination of the primary airstream. This includes the booster section, high pressure compressor, combustion section, high pressure turbine, and low pressure turbine.

D. The engine borescope ports give access for scheduled or unscheduled maintenance examination of the internal engine areas without disassembly of the engine.

E. Borescope examination of the engine is done with the use of the rigid borescope set and lightsource set. Use the fiberscope set and lightsource set as necessary to examine the HPT stage 2 nozzle assembly.

F. These inspection procedures show maximum serviceable limits. A corrective action is necessary for a condition beyond these limits. If there are Continue-In-Service Limit extensions, they are included with the maximum serviceable limits.

TASK 72-00-00-800-801-H01

2. Continue-In-Service Limit(s) (CIS) - General

A. General

(1) When a defect is found during an inspection, which can not be corrected at the present location, use the Continue-In-Service (CIS) limits.

B. Procedure

SUBTASK 72-00-00-800-001-H01

(1) The CIS limit permits the airplane to be flown to a facility where the defect can be corrected.

(a) Necessary maintenance must be scheduled during the CIS period.

(b) The CIS limit can only be used one time, unless otherwise stated in the inspection procedures.

1) When the limit reached, the defect must be corrected.

SUBTASK 72-00-00-800-002-H01

(2) When CIS flight cycles and flight hours are given in the same limit, the condition that occurs first is the maximum limit.

SUBTASK 72-00-00-800-003-H01

(3) The CIS limits are given in their related Chapter-Section inspection procedures.

END OF TASK

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

TASK 72-00-00-290-801-H01

3. Borescope Inspection Preparation

A. General

(1) To prepare for a borescope examination, you must do these steps:

(a) Do the deactivation of the thrust reverser and the LE slats.

(b) Open the fan cowl panels and 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)
78-31-00-010-816-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-571	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083 Part #: 9C1303P02 Supplier: 06083
SPL-114	Borescope - Fiberscope Part #: 9C1301P01 Supplier: 06083 Part #: 9C1301P03 Supplier: 06083

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 inspection

SUBTASK 72-00-00-860-015-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-00-00-010-001-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

(2) 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 72-00-00-800-004-H01

CAUTION MAKE SURE THE TEMPERATURE OF THE ENGINE AND THE ADJACENT AREAS NEAR THE BORESCOPE INSPECTION PORTS ARE LESS THAN 150°F (65.6°C). DO NOT DO A BORESCOPE INSPECTION IF THE ADJACENT AREAS ARE TOO HOT TO TOUCH. DO THE BORESCOPE INSPECTION WHEN THE ENGINE TEMPERATURE IS LESS THAN 150°F (65.6°C). THIS WILL PREVENT DAMAGE TO THE BORESCOPE EQUIPMENT.

(3) Assemble the fiberscope borescope, SPL-114 and the borescope light source, COM-571.

END OF TASK

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

TASK 72-00-00-290-803-H01

4. High Pressure Compressor Section Rotor Inspection

(Figure 601, Figure 602, Figure 603, Figure 604, Figure 605, Figure 606, Figure 607, Figure 608, and Figure 609)

A. General

(1) This task is an examination of the high pressure compressor (HPC) section with a rigid borescope, SPL-116 for damage.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-00-00-700-818-H01	Test No. 19 - Variable Stator Vane Operational Test (MAT Initiated test) (P/B 501)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
72-00-00-820-801-H01	Zero-Index of the HPC Rotor (P/B 201)
72-00-00-980-801-H01	Manual Motoring of the HPC Rotor (P/B 201)
72-00-00-980-802-H01	Electrical Motoring of the HPC Rotor (P/B 201)
72-30-00-300-802-H00	Stage 2-8 HPC Rotor Blades Repair (with the Borescope Blending Tool) (P/B 801)
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-116	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083
SPL-570	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D50003 [C02-061]	Compound - Antiseize - Milk of Magnesia (unflavored)	
D50017 [C02-071]	Compound - Antiseize And Lubricating - Pure Nickel Special Grade	GE Spec D6Y28C1 or A50TF198
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

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Prepare for the Inspection

SUBTASK 72-00-00-010-003-H01

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-290-801-H01.

SUBTASK 72-00-00-480-001-H01

(2) Install the manual or electrical motoring tool (TASK 72-00-00-980-801-H01 or TASK 72-00-00-980-802-H01).

H. High Pressure Compressor Section Rotor Inspection

SUBTASK 72-00-00-010-004-H01

CAUTION

DO NOT REMOVE THE CAPTIVE SCREWS FROM THE BLANKOFF PANEL. DAMAGE CAN OCCUR TO THE PANELS OR THE CAPTIVE SCREWS.

(1) Remove the blankoff panel that is marked POS 2 & 6, from the 8:00 o'clock position on the OGV extension case (Figure 607).

(a) Loosen the captive screws that attach the blankoff panel to the deflector panels at the 8:00 and 9:00 o'clock positions.

NOTE: The deflector panels at the 8:00 and 9:00 o'clock positions are marked as follows: The 8:00 o'clock deflector panel is marked as POS 2 & 7 and the 9:00 o'clock deflector panel is marked as POS 3 & 8.

(b) Remove the blankoff panel.

SUBTASK 72-00-00-010-005-H01

(2) Remove the borescope cover plate that attaches to the OGV extension case at the 8:00 o'clock position (Figure 607).

(a) Remove the two bolts that attach the cover plate.

(b) Remove the cover plate.

SUBTASK 72-00-00-010-006-H01

(3) Remove the borescope plugs from ports B through J to do the examination of the HPC stage one through eight rotor blades (Figure 601 and Figure 606).

NOTE: The S1, S2, S3 and S4 BSI ports are blocked by the VSVs. You can use the VSV special function or hydraulic pumping to move the VSVs (Test No. 19 - Variable Stator Vane Operational Test (MAT Initiated test), TASK 71-00-00-700-818-H01).

(a) At the port C, release the Velcro on the heat blanket above the port.

(b) Move the heat blanket out of the way.

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

SUBTASK 72-00-00-020-015-H00

(4) If one of the borescope plugs C, D, E, F or J is seized do as follows:

CAUTION

MAKE SURE PROTECTIVE COVERS ARE INSTALLED CORRECTLY. IF NOT, FRAGMENTS FROM THE BORESCOPE PORT DRILLING CAN ENTER THE ENGINE. DAMAGE TO THE ENGINE CAN OCCUR WHICH MAY RESULT IN THE LOSS OF THE ENGINE.

(a) Install protective covers below the borescope plug into the extension case cavity and through the stage bleed port.

(b) Remove all fragments of the borescope plug.

(c) Drill out the remaining borescope plug to remove it with a DIA 10mm twist drill.

(d) Install a replacement borescope plug.

SUBTASK 72-00-00-800-005-H01

(5) Tag each borescope plug to identify the stage from which it was removed (Figure 606).

SUBTASK 72-00-00-980-002-H01

(6) Do this task: Zero-Index of the HPC Rotor, TASK 72-00-00-820-801-H01.

SUBTASK 72-00-00-290-004-H01

(7) Turn the borescope light source, SPL-570 on.

SUBTASK 72-00-00-480-009-H00

(8) Insert the rigid borescope, SPL-116 in its position for the examination (Figure 602, Figure 603, Figure 604, and Figure 605).

SUBTASK 72-00-00-980-003-H01

(9) Manually or electrically motor the HPC rotor (TASK 72-00-00-980-801-H01 or TASK 72-00-00-980-802-H01).

NOTE: One turn of the motoring tool equals one turn of the rotor.

SUBTASK 72-00-00-220-031-H01

(10) Examine the stage 1 blisk airfoils (Figure 608):

(a) Cracks and tears

1) None permitted.

(b) Scratches in all areas of the airfoil or platform of the blades

1) There is no limit to the number of scratches that are less than 0.003 inch (0.080 mm) in depth.

(c) Nicks and dents on the center of airfoil

NOTE: A concave pattern can occur at the concave side of an airfoil blisk. This condition is fully serviceable and must not be considered to be a blend repair.

1) There is no limit to the amount of damage with these conditions.

a) The damage is more than 0.10 inch (2.54 mm) from the leading edge, trailing edge, or tip.

b) The damage does not make a hole in the blade.

c) The damage is less than 0.10 inch (2.54 mm) in diameter.

d) The damage is less than 0.020 inch (0.51 mm) in depth.

(d) Nicks and dents in the airfoil root radius area.

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

1) There is no limit to the number of nicks and dents that are less than 0.003 inch (0.080 mm) in depth.

(e) Airfoil tip corners that are missing

1) There is no limit to the amount of damage permitted if the downstream damages are serviceable.

NOTE: A few airfoil tip corners may be chamfered at both leading and trailing edges. The chamfers are from new productions and are used to identify blades with tip notches. This condition is fully serviceable and must not be considered to have missing corners.

NOTE: One airfoil may have blended squealer tip corner missing at the trailing edge, with the dimension of 0.59 inch (15.0 mm) along chord and 0.13 inch (3.3 mm) in depth.

(f) Tip curl in the blisk airfoil

NOTE: Use borescope port B for the best view of the stage 1 airfoil.

1) There is no limit to the number of curled blade tips with these conditions.

a) The tip curl is less than 0.40 inch (10.16 mm) maximum along the airfoil tip chord.

b) There is no tears or cracks as a result of the tip curl.

2) If you find a tip curl in excess of these limits, do these steps:

a) Replace the engine within 10 days

b) Examine the opposite engine for stage 1 blade tip curls within 5 flight cycles.

c) If the opposite engine has tip curl in excess of these limits, replace that engine.

(g) Nicks, dents, distortion and metal that is missing (not broken off tip corner) in the leading and trailing edges or the stage 1 blisk airfoils

1) There is no limit to the amount of damage permitted in the lower 25 percent of area L with these conditions.

a) The maximum depth is not more than 0.03 inch (0.76 mm).

b) There is no damage in the airfoil root radius area.

2) There is no limit to the amount of damage permitted in the upper 75 percent of area L with these conditions.

a) The maximum depth is not more than 0.04 inch (1.02 mm).

(h) Distorted or bulged leading edges of the stage 1 blisk airfoil

1) It is permitted to have distortion or bulges in the leading edges with these conditions.

NOTE: Use borescope port B for the best view of the stage 1 airfoil.

a) The distortion or bulge is in the top 50 percent of the blade.

b) Not more than 30 percent of the blade chord is affected.

c) The length D damage must be more than 3 times the depth T damage (View C).

d) There are no tears, cracks or creases caused by the distortion or bulge.

e) It is permitted to have a total of 8 or less blades with distortion or bulges with these conditions.

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

<1> There is no more than one distorted or bulged area in each blade.

<2> There are not more than five blades with Depth T damage to 0.060 inch (1.52 mm) on each blade.

NOTE: Compare the damaged area with the adjacent unaffected area to find the amount of Depth T damage of the distortion or bulge.

<3> There are not more than three blades with Depth T damage to 0.120 inch (3.05 mm) on each blade.

<4> Each blade with Depth T damage that is more than 0.060 inch (1.52 mm) is separated by at least two blades with 0.060 inch (1.52 mm) or less damage.

SUBTASK 72-00-00-220-002-H01

(11) Examine the HPC blades (Figure 608).

(a) Cracks and tears in stage 2 through 4 HPC blades

1) Not permitted except as follows:

a) If there are tears or cracks as a result of the tip curl, and the tears and cracks are in the tip corner area.

(b) Radial tip cracks in stage 6 thru 8 blades

1) There is no limit to the number of cracks permitted if they are no more than 0.10 inch (2.54 mm) in length.

(c) Scratches in all areas of the airfoil or platform of the blade

1) There is no limit to the number of scratches that are less than 0.003 inch (0.080 mm) in depth.

(d) Nicks, dents and pits on the platform top surface of stage 5 through stage 8 HPC blades

1) There is no limit to amount of damage permitted with this condition:

a) The damage is less than 0.005 in. (0.13 mm) in depth.

(e) Nicks, dents and wear on the leading edge or trailing edge of the platform of stage 5 and stage 6 HPC blades

1) There is no limit to the amount of damage with this condition:

a) Damage does not extend into the airfoil root radius area.

(f) Nicks, dents and pits on the platform edges of stages 7 and stage 8 HPC blades

1) There is no limit to amount of damage permitted with this condition:

a) The damage is less than 0.005 in. (0.13 mm) in depth.

(g) Nicks and dents on the center of the airfoil

1) There is no limit to the amount of damage with these conditions.

a) The damage is more than 0.10 inch (2.54 mm) from the leading edge, trailing edge, or tip.

b) The damage does not make a hole in the blade.

c) Damage that pushes metal through to the opposite side is permitted.

d) The damage is less than 0.10 inch (2.54 mm) in diameter.

e) The distance between damaged locations must not be less than 0.40 inch (10.2 mm).

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

(h) Nicks and dents in the airfoil root radius area of stages 2, 3, 4 and 6 HPC blades

1) There is no limit to amount of damage permitted with this condition.

a) The damage is less than or equal to 0.003 inch (0.080 mm) deep.

(i) Nicks and dents in the airfoil root radius area of stage 5 HPC blades

1) There is no limit to amount of damage permitted with this condition.

a) The damage is less than 0.005 inch (0.130 mm) deep.

(j) Nicks and dents in the airfoil root radius area of stage 7 HPC blades

1) There is no limit to amount of damage permitted with this condition.

a) The damage is less than 0.006 inch (0.150 mm) deep with a 7 to 1 length to depth ratio.

(k) Nicks and dents in the airfoil leading edge root radius area of stage 8 HPC blades

1) There is no limit to the amount of damage permitted with this condition.

a) The damage is less than or equal to 0.03 inch (0.76 mm) in depth.

(l) Nicks and dents in the airfoil root radius area of stage 8 HPC blades (except leading edge)

1) There is no limit to the amount of damage permitted with this condition.

a) The damage is less than or equal to 0.003 inch (0.080 mm) in depth.

(m) Tip corners that are missing

1) There is no limit to the amount of stages 1-2 and stages 6-8 blade damage permitted in the tip corner area if the downstream damage is serviceable.

NOTE: A few HPC blades on each stage may have chamfered tip corners at both leading and trailing edges. The chamfers are from new production and are used to identify blades with tip notches. This condition is fully serviceable and must not be considered to have missing corners.

2) There is no limit to the amount of stages 3 and 4 HPC blade damage permitted in the tip corner area if the downstream damage is serviceable and with this condition:

a) The rough edges found on stage 3 and 4 HPC blade in the tip corner area is blended smooth (TASK 72-30-00-300-802-H00).

<1> It is permitted to defer the removal of damage for up to 15 cycles.

3) Multiple stage 5 blades with corners missing are permitted within the areas specified (view F) as follows:

a) A blade cannot have both a leading edge (LE) and trailing edge (TE) tip corner missing.

b) A stage 5 blade can only have one blend per blade and as follows:

<1> Up to four blades can have a LE or TE missing tip corner within the blend limits (view F) (TASK 72-30-00-300-802-H00).

<2> Up to 16 blades can have the TE tip corner missing if it is within serviceable limits (view F).

4) There is no limit to the amount of stage 5 blade damage in the LE or TE tip corner area within a 0.25 x 0.25 inch (6.4 x 6.4 mm) area.

(n) Tip curl in stage 2 through 4 blades

1) There is no limit to the number of curled blade tips with these conditions.

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

a) The tip curl is less than 0.40 inch (10.16 mm) maximum along the blade tip cord.

b) If there are tears or cracks as a result of the tip curl, and the tears or cracks are in the tip corner area.

(o) Tip curl in stage 5 through 8 blades

1) There is no limit to the number of curled blade tips with these conditions.

a) The tip curl is less than 25 percent of the blade tip cord.

b) If there are tears or cracks as a result of the tip curl, and the tears and cracks are in the tip corner area.

(p) Tip cracks (stage 2 through 4)

1) There is no limit to the amount of tip cracks permitted in the stage 2 through 4 HPC blade tip with this condition:

a) The damage is contained in the tip cracks area.

(q) Cracks, tears, nicks, dents, distortion and metal that is missing (not broken off tip corner) in the tip corner area of stage 2 through 8 HPC blades.

1) There is no limit to the amount of damage permitted in the tip corner area with these conditions:

a) The damage does not extend axially or radially out of the tip corner area.

b) The damage found on stage 3 and 4 HPC blade in the tip corner area is fully removed (TASK 72-30-00-300-802-H00).

<1> It is permitted to defer the removal of damage for up to 15 cycles.

2) Any amount of blending is permitted to remove damage in the tip corner region (TASK 72-30-00-300-802-H00).

(r) Nicks, dents, and metal that is missing (not broken-off from the tip corners) in the leading and trailing edges of stages 2 thru 5 HPC blades

1) There is no limit to the amount of damage permitted in the lower 25 percent of area L with these conditions.

a) The maximum depth is not more than 0.03 inch (0.76 mm).

b) There is no damage in the airfoil root radius area.

2) There is no limit to the amount of damage permitted in the upper 75 percent of area L with these conditions.

a) The maximum depth is not more than 0.05 inch (1.27 mm).

3) See the Continue-In-Service Limits (TASK 72-00-00-800-801-H01).

4) See the approved repairs (TASK 72-30-00-300-802-H00).

(s) Nicks, dents, and metal that is missing (not broken off from tip corners) in the leading and trailing edges of the stage 6 HPC blades

1) There is no limit to the amount of damage permitted in the lower 25 percent of area L with these conditions.

a) The maximum depth is not more than 0.03 inch (0.76 mm).

b) There is no damage in the airfoil root radius area.

2) There is no limit to the amount of damage permitted in the upper 75 percent of area L with this condition.

a) The maximum depth is not more than 0.04 inch (1.01 mm).

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

3) See the Continue-In-Service limits (TASK 72-00-00-800-801-H01).

4) See the approved repair (TASK 72-30-00-300-802-H00).

(t) Tears in the leading and trailing edges of the stage 5 and 6 HPC blades:

1) None permitted.

2) Blend repair to 0.030 inch (0.9 mm) in depth more than the measured tear to make sure that the damage is completely removed.

3) See the approved repair (TASK 72-30-00-300-802-H00).

(u) Nicks, dents, and metal that is missing (not broken off from tip corners) in the leading and trailing edges of stage 7 HPC blades:

1) There is no limit to the amount of damage permitted in the lower 25 percent of area L with these conditions:

a) The maximum depth is not more than 0.040 inch (1.01 mm).

b) There is no damage in the airfoil root radius area.

2) There is no limit to the amount of damage permitted in the upper 75 percent of area L with this condition

a) The maximum depth is not more than 0.047 inch (1.19 mm).

3) See the Continue-In-Service limits (TASK 72-00-00-800-801-H01).

4) See the approved repair (TASK 72-30-00-300-802-H00).

(v) Tears in the leading and trailing edges of stage 7 HPC blades:

1) None permitted in the lower 25 percent of area L.

2) There is no limit to the amount of damage permitted in the upper 75 percent of area L with this condition

a) The maximum depth is not more than 0.030 inch (0.76 mm).

3) Blend repair to 0.030 inch (0.9 mm) in depth more than the measured tear to make sure that the damage is completely removed.

4) See the approved repair (TASK 72-30-00-300-802-H00).

(w) Nicks, dents, and metal that is missing (not broken off from tip corners) in the leading edges and trailing edges of stage 8 HPC blades:

1) There is no limit to the amount of damage permitted in the lower 25 percent of area L with these conditions:

a) The maximum depth is not more than 0.040 inch (1.01 mm).

b) There is no damage in the airfoil root radius area.

2) There is no limit to the amount of damage permitted in the upper 75 percent of area L with this condition

a) The maximum depth is not more than 0.047 inch (1.19 mm).

3) See the Continue-In-Service limits (TASK 72-00-00-800-801-H01).

4) See the approved repair (TASK 72-30-00-300-802-H00).

(x) Bends on the stage 8 blades

1) Permitted bends on one blade.

2) The maximum tangential displacement (either direction), dimension ZZ must not be more than 0.020 inch (0.50 mm).

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

3) The dimension ZZ divided by dimension YY must be less than or equal to 0.07 (absolute value).

(y) Cracks and tears in the leading and trailing edges of the stage 8 HPC blades

1) None permitted.

2) Blend repair to 0.030 inch (0.9 mm) in depth more than the measured tear to make sure that the damage is completely removed.

3) See the approved repair (TASK 72-30-00-300-802-H00).

(z) Particles on the blade surface

1) There is no limit to the amount of particles permitted.

(aa) Burrs and high metal on the blade tips due to rub

1) There is no limit to the amount permitted.

(ab) Erosion of the tip, airfoil, and tip corner

1) There is no limit to the amount permitted.

(ac) HPC blades Continue-In-Service Limits

1) Nicks, dents, and metal that is missing (not broken-off tip corners) in the leading and trailing edges

a) The Continue-In-Service Limit is 10 cycles or 50 hours with these conditions:

<1> The maximum depth in the lower 25 percent of area L is not more than 0.06 inch (1.50 mm).

<2> There is no damage in the airfoil root radius area.

2) Nicks, dents, and metal that is missing (not broken-off tip corners) in the leading and trailing edges

a) The Continue-In-Service Limit is 10 cycles or 50 hours with this condition:

<1> The maximum depth in the upper 75 percent of area L is not more than 0.08 inch (2.00 mm).

(ad) Examine the HPC stages 7 and 8 blade platforms for gaps.

1) Any amount is permitted.

SUBTASK 72-00-00-800-006-H01

(12) When the examination is complete turn the borescope light source, SPL-570 off.

(a) Let the lightsource blower to stay on for a while to cool the lamp and case.

SUBTASK 72-00-00-410-002-H01

(13) Install the borescope plug B (Figure 606).

(a) Remove the tag from borescope plug B.

(b) Put Acheson GP460 compound, D50043 [C02-058], or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the borescope plug threads.

(c) Install the plug in the borescope port.

(d) Tighten the plug to 110-140 pound-inches (12.4-15.8 Newton-meters).

SUBTASK 72-00-00-410-003-H01

(14) Install the borescope plugs C through F and J (Figure 606).

(a) Remove the tag from borescope plugs C through F and J.

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

1) At the port C, move the heat blanket into its position.
2) Attach the Velcro straps.

(b) Put Acheson GP460 compound, D50043 [C02-058], or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the borescope plug threads.

(c) Install the plug in the correct borescope port.

(d) Tighten the plugs to 85-93 pound-inches (9.6-10.5 Newton-meters).

SUBTASK 72-00-00-410-004-H01

(15) Install the borescope plug G and H (Figure 606).

(a) Remove the tag from borescope plug G and H.

(b) Put Acheson GP460 compound, D50043 [C02-058], or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the borescope plug threads.

(c) Install the plug in the correct borescope port.

(d) Tighten the plugs to 85-93 pound-inches (9.6-10.5 Newton-meters) until seated.

(e) Loosen the plugs.

(f) Tighten the plugs to 27.7-28.4 pound-inches (2.9-3.2 Newton-meters).

(g) Put Acheson GP460 compound, D50043 [C02-058], or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the borescope cap G.

(h) Install the caps on borescope plug G and H as follows:

1) Compress the spring in the cap to engage the cap threads with the extension case.
2) Tighten the caps to 85-93 pound-inches (9.6-10.5 Newton-meters).

SUBTASK 72-00-00-410-005-H01

(16) Install the borescope cover plate (Figure 607).

(a) Put Acheson GP460 compound, D50043 [C02-058], or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the threads of the 2 bolts for the cover plate.

(b) Attach the cover plate to the OGV extension case with the 2 bolts.

(c) Tighten the bolts to 110-120 pound-inches (12.4-13.6 Newton-meters).

SUBTASK 72-00-00-410-006-H01

CAUTION DO NOT REMOVE THE CAPTIVE SCREWS FROM THE BLEED-AIR DEFLECTOR PANEL. DAMAGE CAN OCCUR TO THE PANEL OR THE CAPTIVE SCREWS.

(17) Install the blankoff panel, that is marked POS 2 & 6, to the 8:00 o'clock position on the OGV extension case (Figure 607).

(a) Put Acheson GP460 compound, D50043 [C02-058], or pure nickel special compound, D50017 [C02-071], or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the threads of the captive screws in the panel.

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

(b) Install the blankoff panel to the deflector panels at the 8:00 and 9:00 o'clock positions with the captive screws.

NOTE: The deflector panels at the 8:00 and 9:00 o'clock positions are marked as follows: The 8:00 o'clock deflector panel is marked POS 2 & 7 and the 9:00 o'clock deflector panel is marked as POS 3 & 8.

(c) Tighten the captive screws to 40-60 pound-inches (4.5-6.8 Newton-meters).

I. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-080-002-H01

(1) Remove the manual motoring tool or the electrical motoring tool and install the motoring pad cover (TASK 72-00-00-980-802-H01 or TASK 72-00-00-980-801-H01).

SUBTASK 72-00-00-860-017-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-00-00-410-007-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:

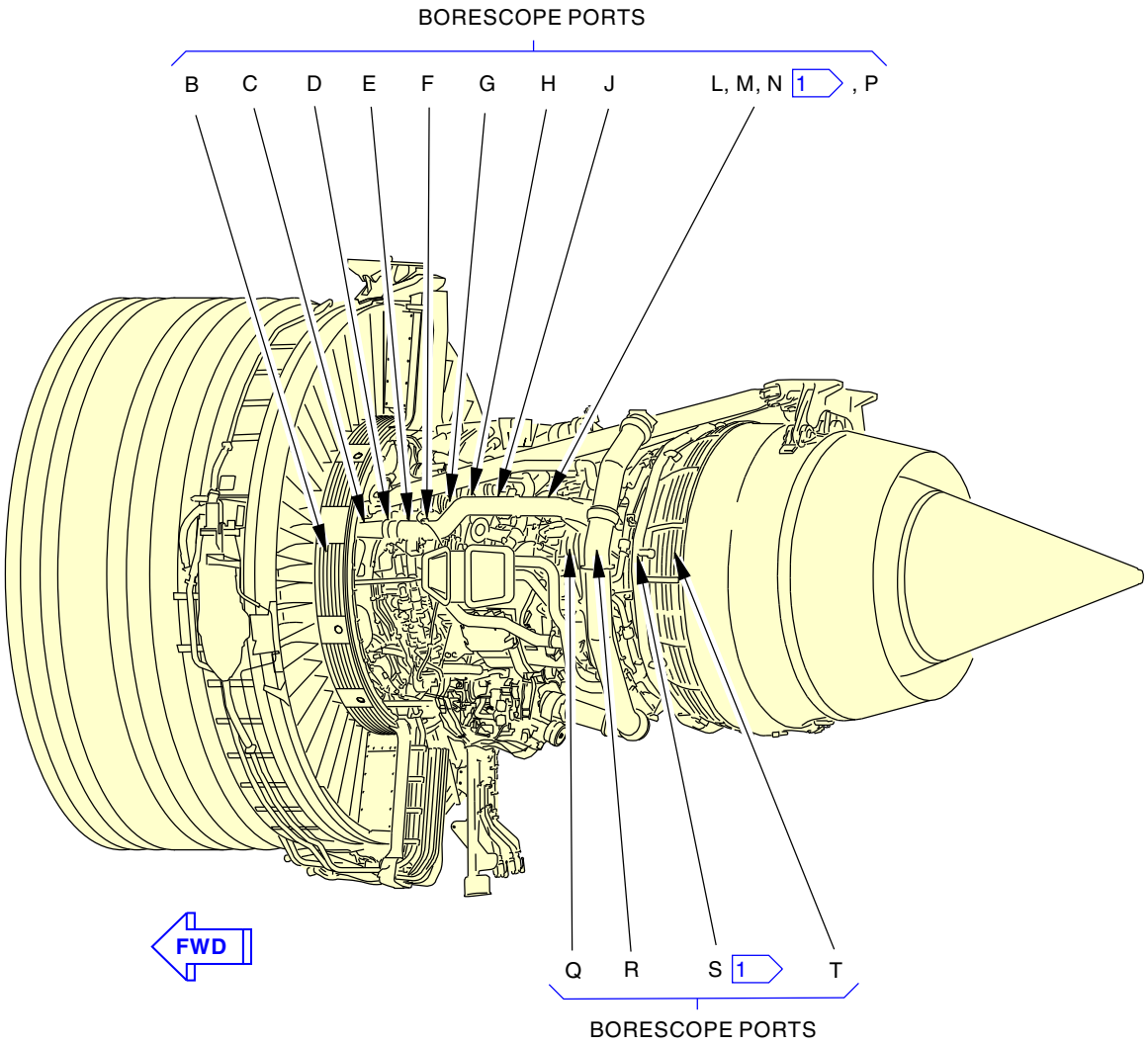
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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



1 IF ENGINE PORT IS INSTALLED

1247048-00
M92169 S0004285769_V6

Engine Borescope Port Locations
Figure 601/72-00-00-990-834-H01 (Sheet 1 of 2)

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

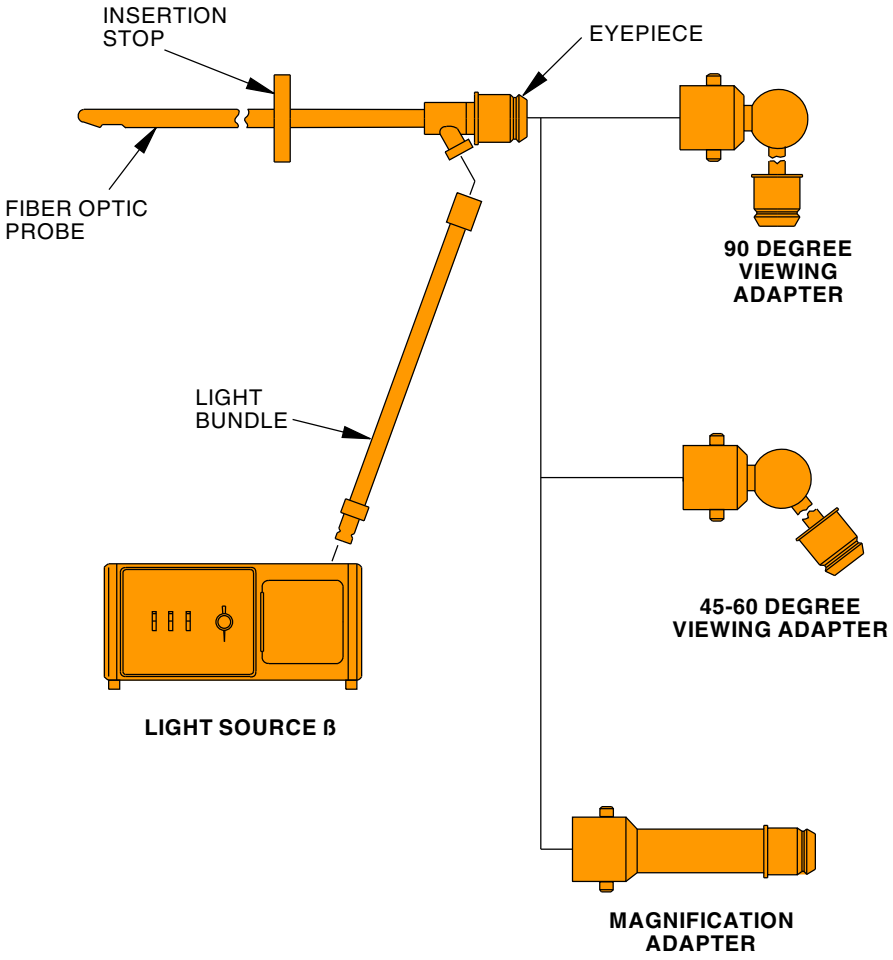
ENGINE LOCATION	STAGE AND VIEW	ANGLE	STATION	BORESCOPE PORT
FAN HUB FRAME	HPC IGV/ S1LE	253.125	197.995	B
FORWARD HPC CASE	HPC S1TE/S2LE	304.616	208.091	C
	HPC S2TE/S3LE	301.765	213.27	D
	HPC S3TE/S4LE	305.122	217.799	E
	HPC S4TE/S5LE	304.00	220.702	F
AFT HPC CASE	HPC S5TE/S6LE	299° 77' 00"	224.324	G
	HPC S6TE/S7LE	296° 11' 57"	227.638	H
	HPC S7TE/S8LE	299° 47' 24"	230.742	J
COMBUSTION CASE	COMBUSTOR DOME, LINERS, AND HPT S1 NOZZLE LE	36.00	249.074	L
		108.00	249.074	M
		192.00	249.074	N 1
		300.00	249.074	P
	HPT S1LE	306.00	253.815	Q
HPT CASE	HPT S1TE/S2LE	326.00	259.994	R
LPT CASE	LPT S1TE/S2LE	290.77	280.310	S 1
	LPT S3TE/S4LE	288.05	289.386	T

1 IF ENGINE PORT IS INSTALLED

1247049-00
M06738 S0004285770_V6

Engine Borescope Port Locations
Figure 601/72-00-00-990-834-H01 (Sheet 2 of 2)

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

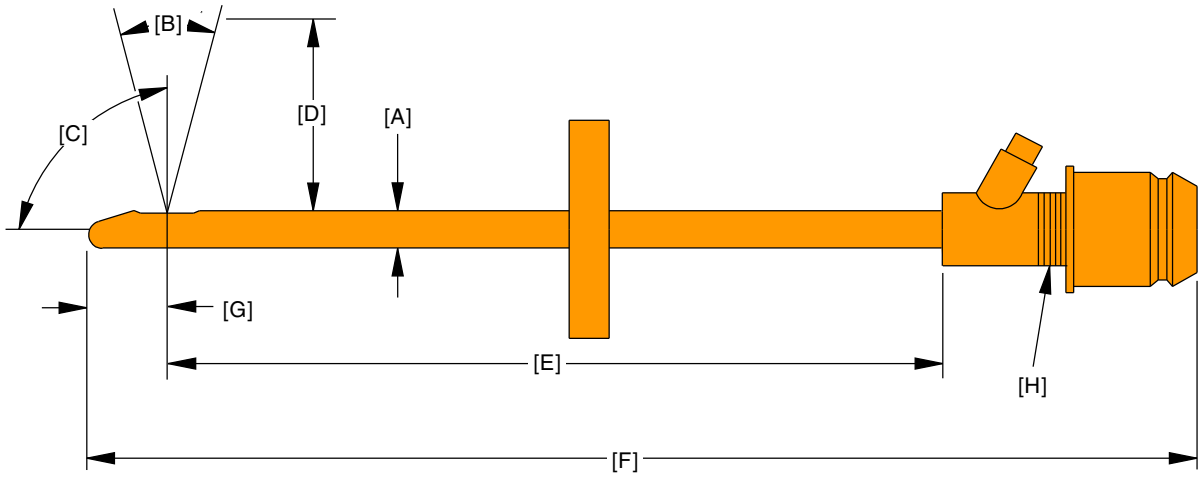


1117551-00-A

M06739 S0004285771_V2

Rigid Borescope Set and Light Source
Figure 602/72-00-00-990-835-H01

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



VIEW SHOWING FIBER OPTIC TYPE PROBE

PROBE	1	2	3	4
EXAMINATION AREA	FAN BOOSTER	COMBUSTOR	COMPRESSOR/ TURBINE	COMPRESSOR/ TURBINE
[A] PROBE DIAMETER	0.40 MAX (10.2)	0.40 MAX (10.2)	0.32 MAX (8.1)	0.32 MAX (8.1)
[B] VISION FIELD	30 TO 55	30 TO 55	30 TO 55	30 TO 55
[C] VIEW ANGLE (DEGREES)	90	90	50 TO 70	110 TO 120
[D] MAGNIFICATION	1:1 AT 2 (51)	1:1 AT 7 (178)	1:1 AT (51)	1:1 AT (51)
[E] PROBE LENGTH	26.5 MIN (673)	16.3 MIN (412)	16.5 MIN (419)	16.5 MIN (419)
[F] OVERALL LENGTH	30.0 MAX (762)	20.0 MAX (508)	20.0 MAX (508)	20.0 MAX (508)
[G] TIP LENGTH	0.50 MAX (13)	0.75 MAX (19.1)	0.50 MAX (13)	0.50 MAX (13)
[H] COLOR BAND	YELLOW	BLACK	GREEN	BLUE
RESOLUTION (MIN) LINE PAIRS AT 1 (25.4)	15	45	15	15

NOTE:

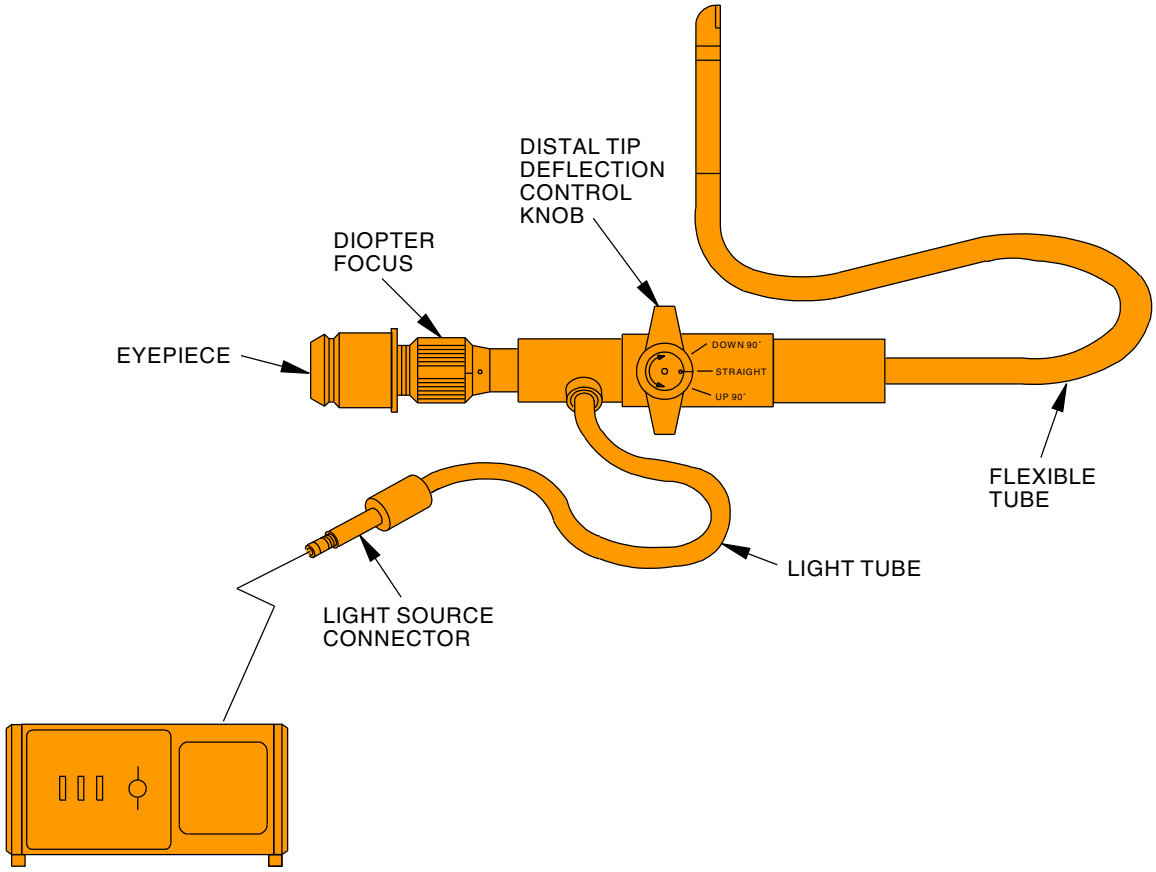
ALL DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1117552-01-A

M06740 S0004285772_V2

Rigid Borescope Probe Specification
Figure 603/72-00-00-990-836-H01

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



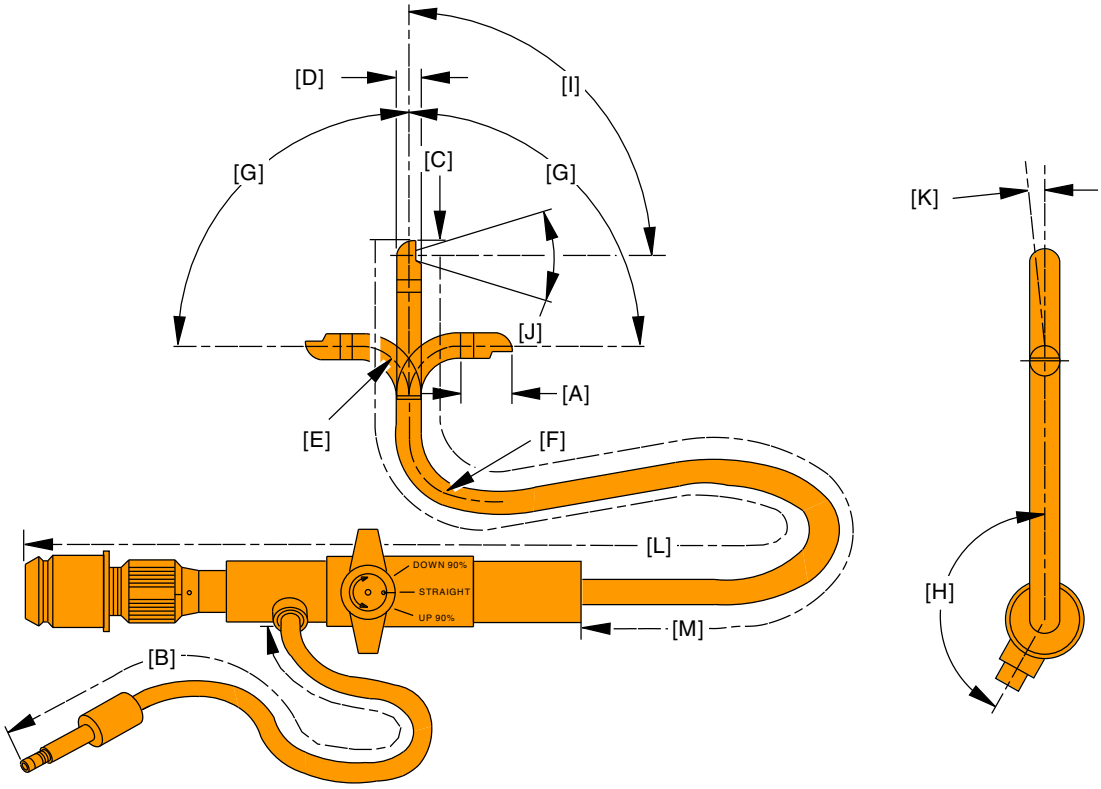
LIGHT SOURCE ß

1129463-00-A

M06779 S0004285773_V2

Fiberscope Set and Light Source
Figure 604/72-00-00-990-837-H01

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



SPECIFICATIONS		VALUE
[A]	ARTICULATION SECTION LENGTH	0.8 MAX (20)
[B]	INTEGRAL LIGHT GUIDE LENGTH	120 MIN (3048)
[C]	TIP LENGTH	0.3 (8)
[D]	WORKING DIAMETER	0.32 MAX (8.1)
[E]	ARTICULATION BEND RADIUS	1.0 MAX (25)
[F]	WORKING SECTION BEND RADIUS	2.0 MAX (51)
[G]	AXIAL ANGLE OF ARTICULATION	±90˚ MIN
[H]	CIRCUMFERENTIAL ANGLE OF ARTICULATION	OPTIONAL
[I]	AXIAL ANGLE OF VIEW	90˚ ±5˚
[J]	ANGLE OF FIELD	50˚ MIN

SPECIFICATIONS		VALUE
[K]	CIRCUMFERENTIAL ANGLE OF VIEW	0
[L]	OVERALL LENGTH	142 (3607)
[M]	WORKING LENGTH	108 (2743)
	DEPTH OF FIELD	0.25-4 (6-102)
	RESOLUTION (MIN) LINE PAIRS/mm AT 1 (25.4)	3.0
	MAGNIFICATION ±10˚	1:1 AT 1.0 (25.4)
	DIOPTER FOCUS ADJUSTMENT	-6 TO +4D
	FOCUSING	ADJUSTABLE

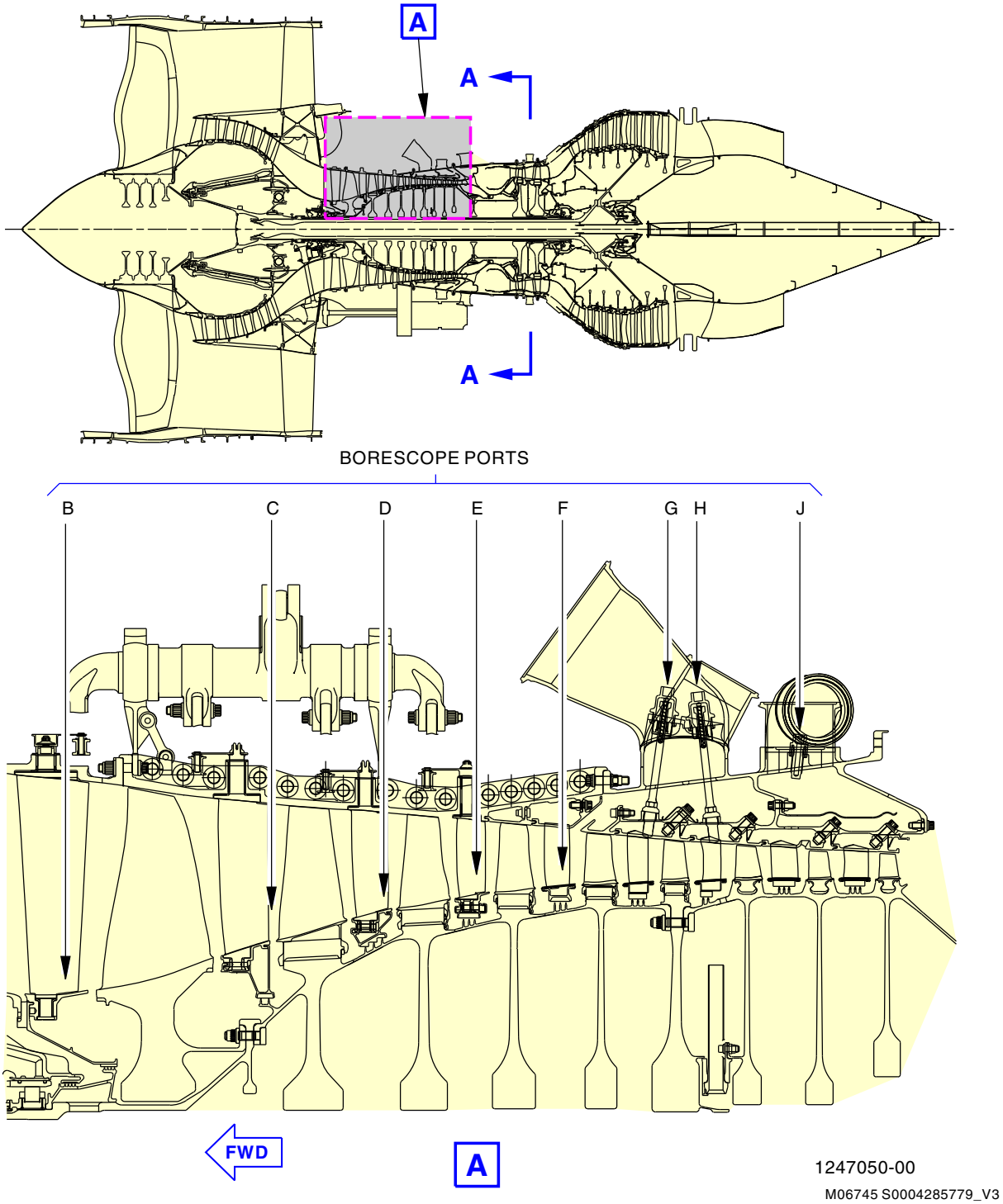
NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.

1129464-01-A
M06780 S0004285774_V3

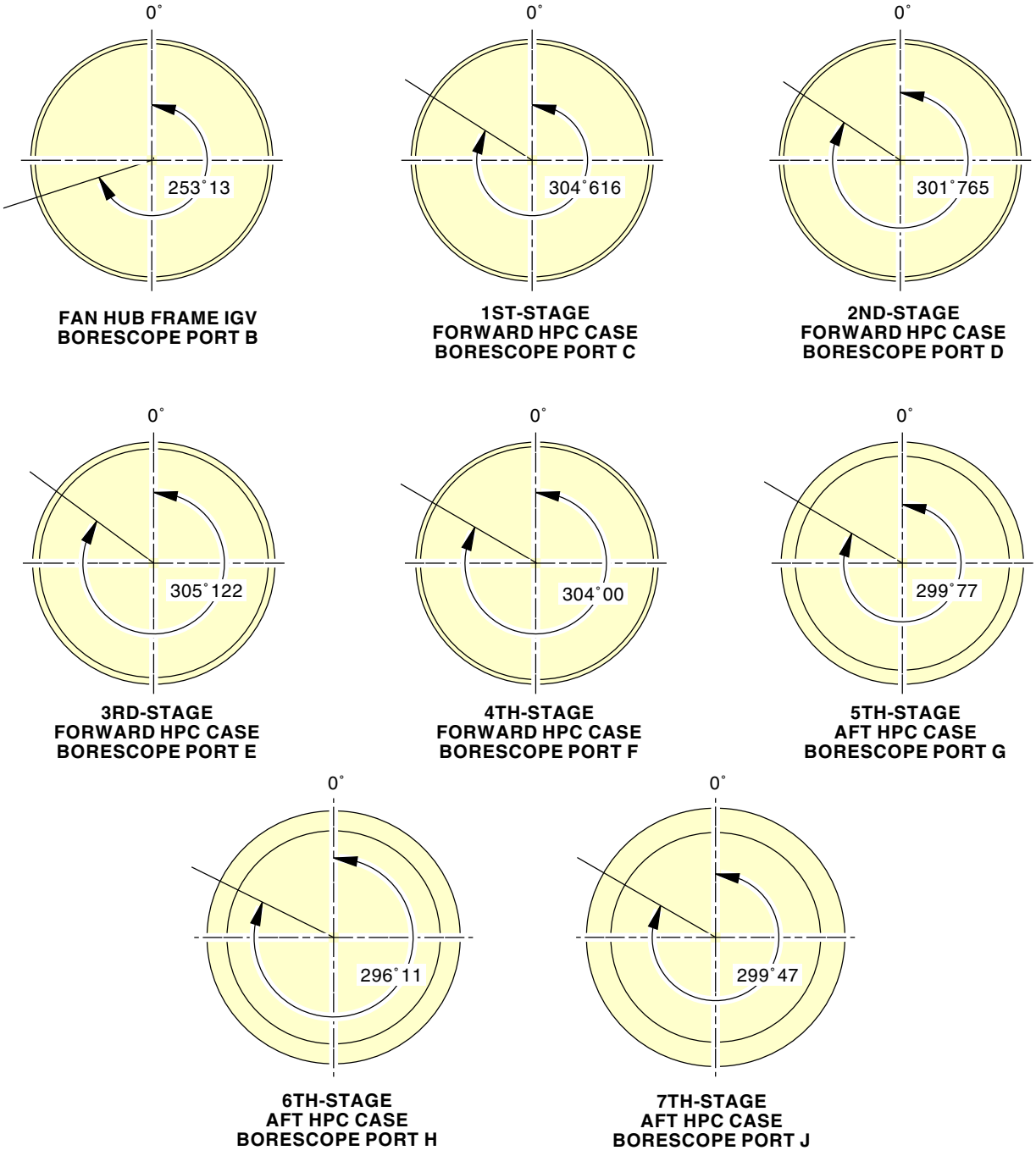
Fiberscope Set Specifications
Figure 605/72-00-00-990-838-H01

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



HPC Section Borescope Port Locations
Figure 606/72-00-00-990-808-H01 (Sheet 1 of 3)

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



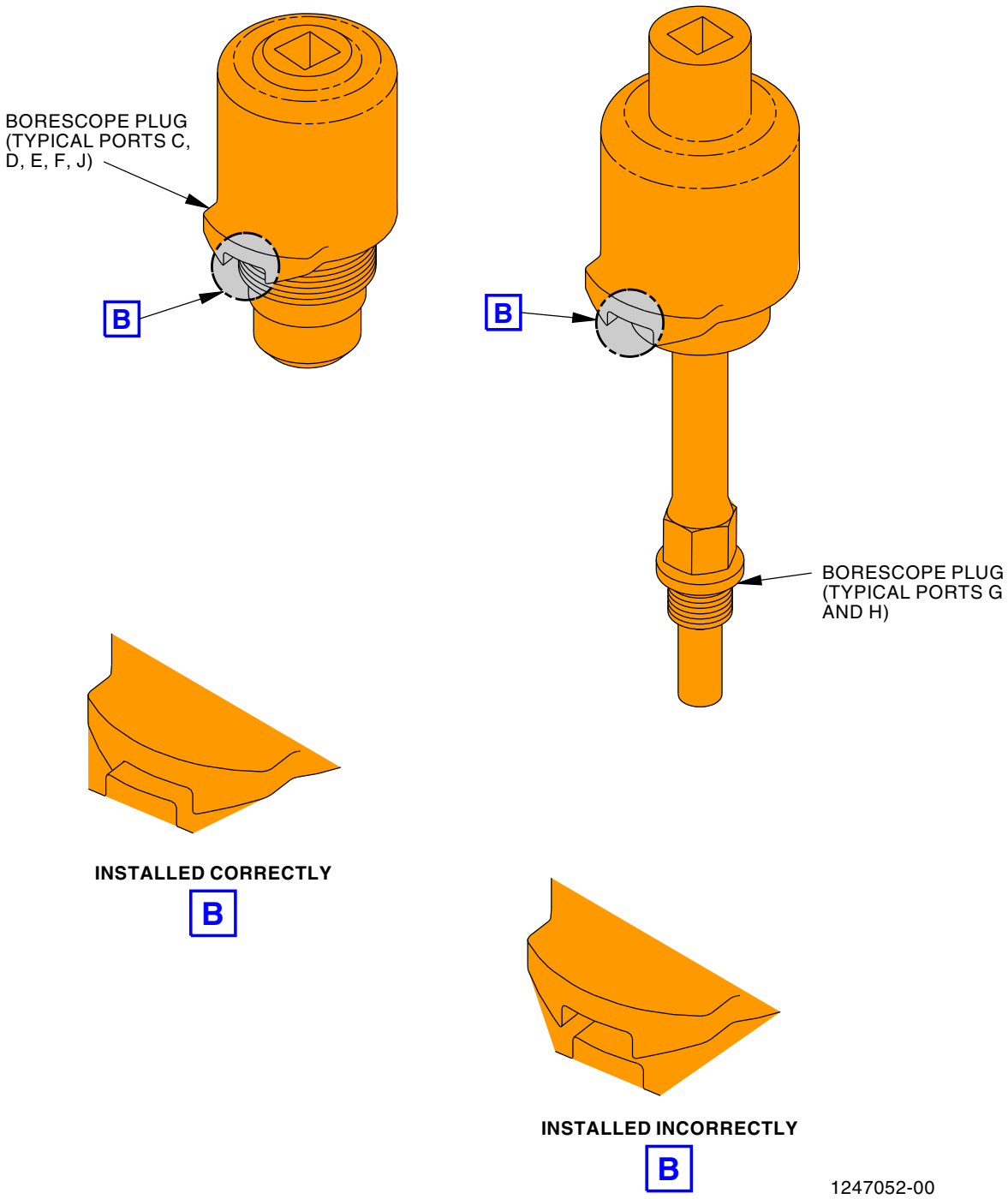
(VIEW IN THE FORWARD DIRECTION)

A-A

1247051-00
M06746 S0004285780_V4

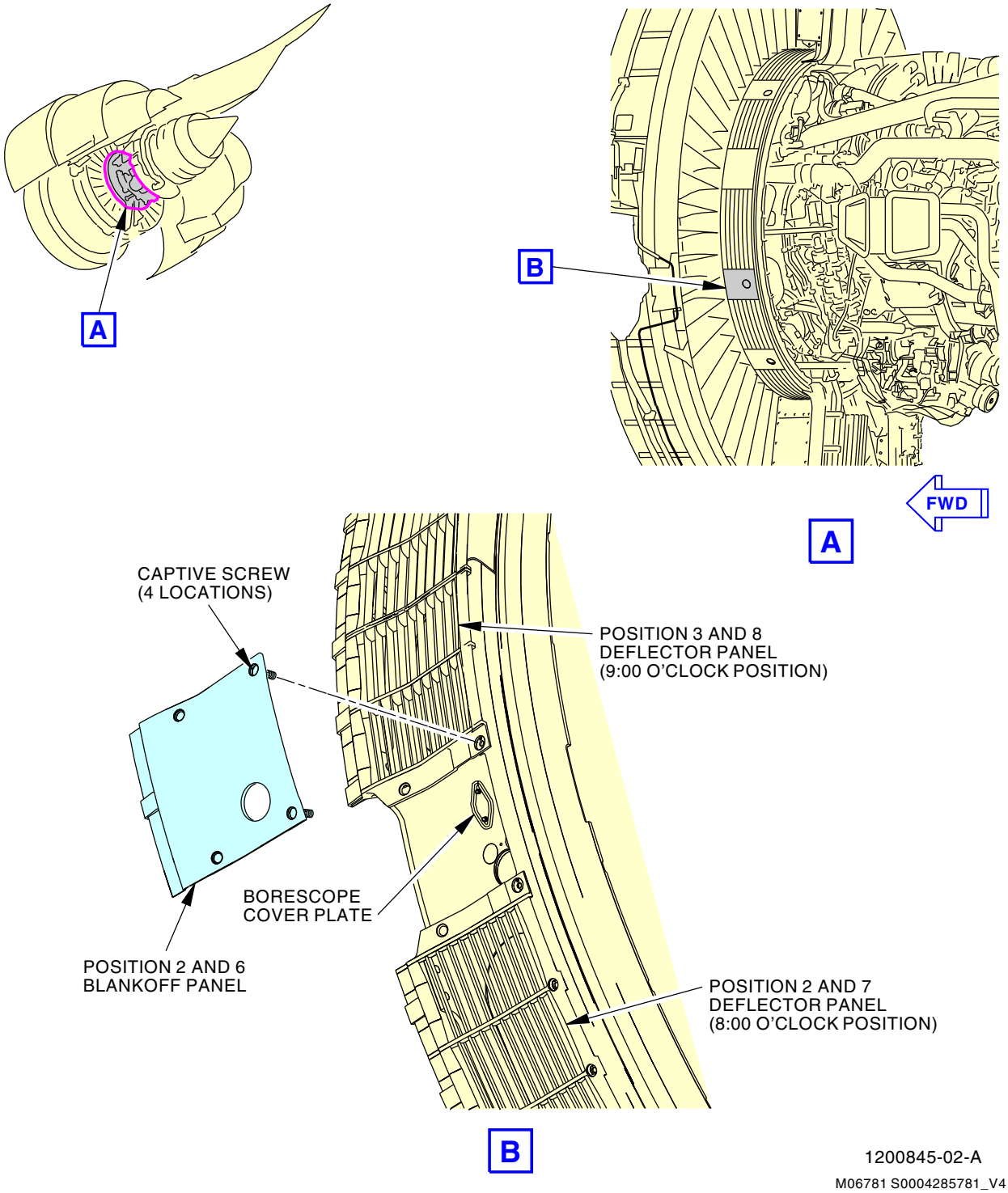
HPC Section Borescope Port Locations
Figure 606/72-00-00-990-808-H01 (Sheet 2 of 3)

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



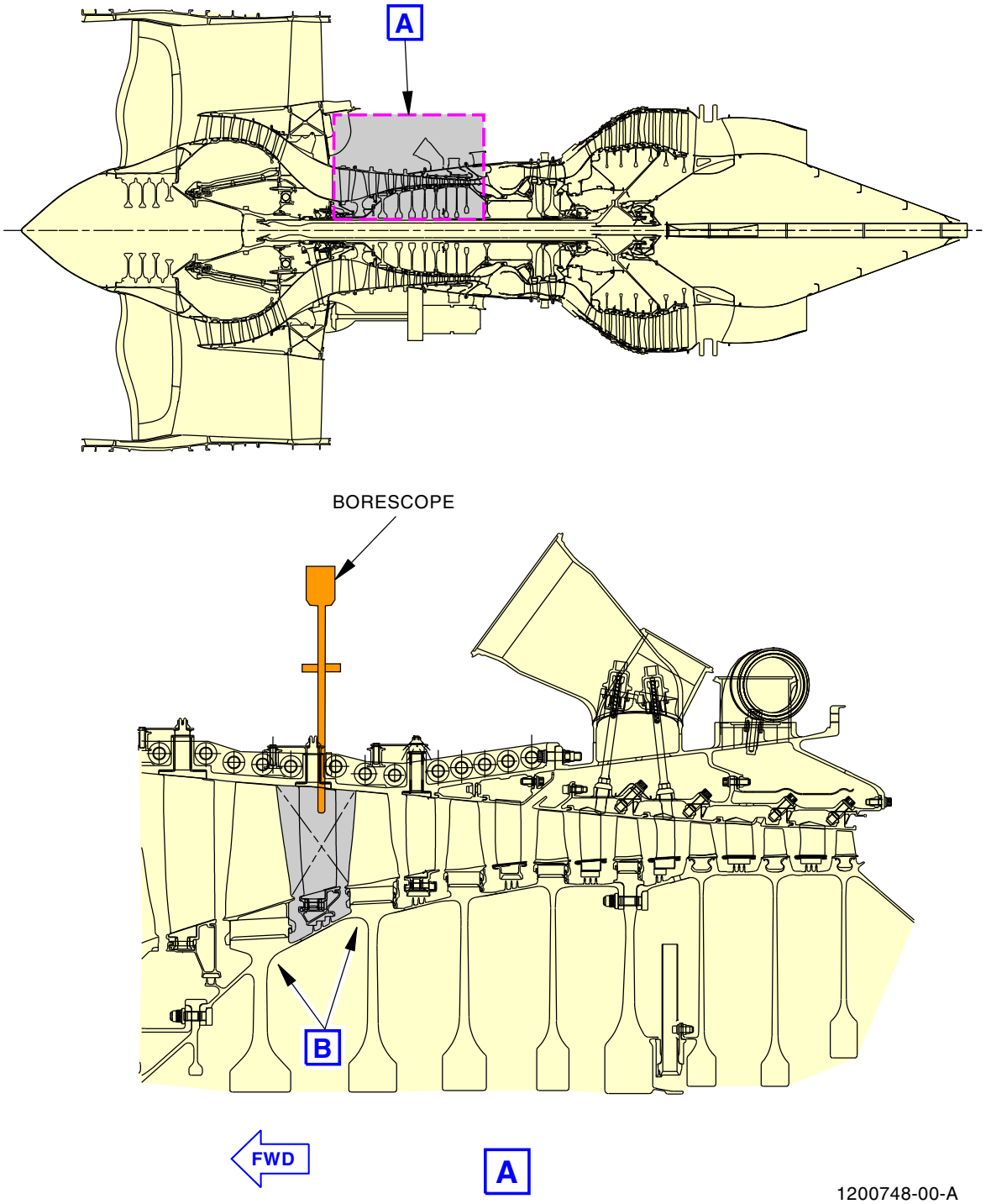
HPC Section Borescope Port Locations
Figure 606/72-00-00-990-808-H01 (Sheet 3 of 3)

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



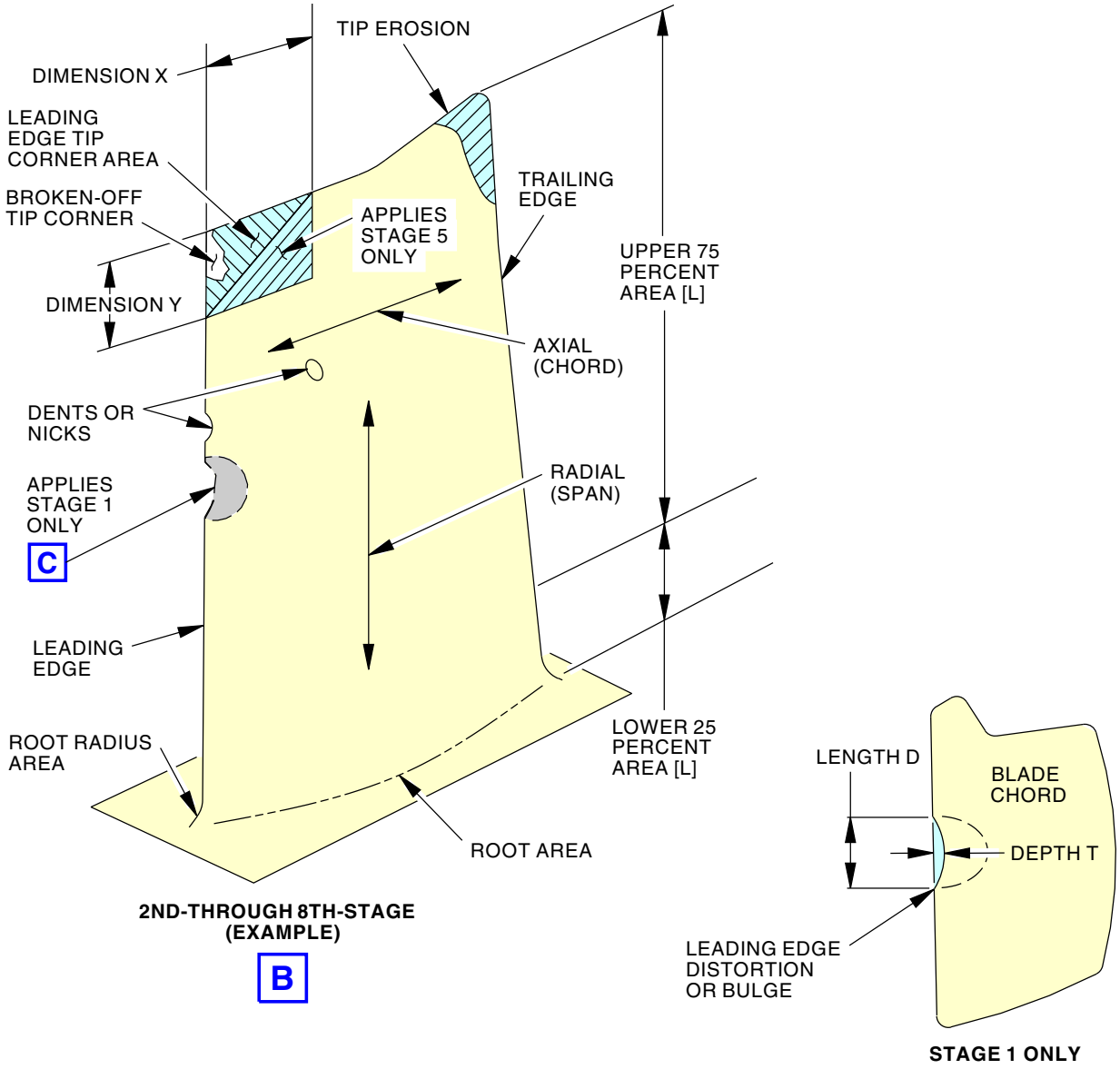
HPC Borescope Plug Access
Figure 607/72-00-00-990-809-H01

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



HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 1 of 10)

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

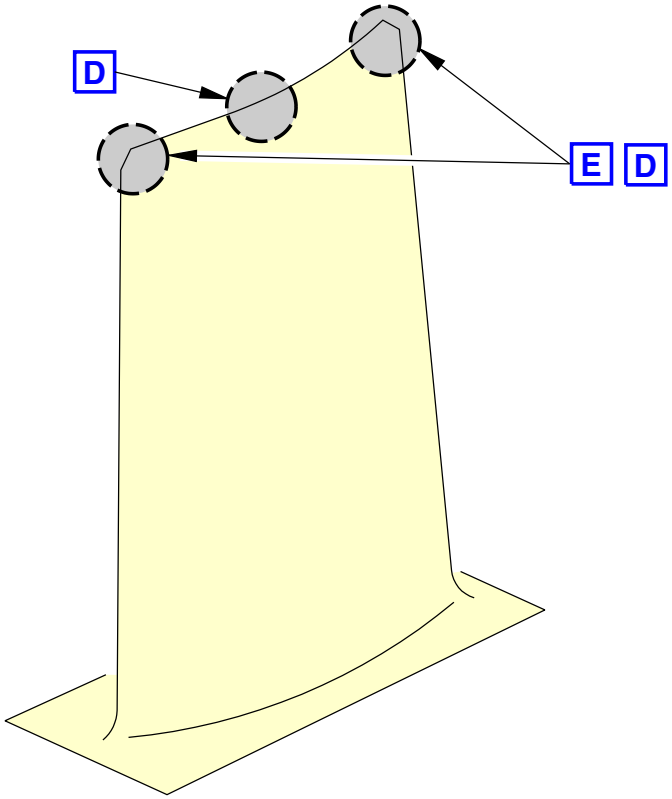


LEADING EDGE TIP CORNER AREA DEFINITION		
STAGE NO.	DIMENSION X	DIMENSION Y
6	0.25 INCH (6.35 mm)	0.25 INCH (6.35 mm)
7	0.25 INCH (6.35 mm)	0.25 INCH (6.35 mm)
8	0.178 INCH (4.52 mm)	0.178 INCH (4.52 mm)

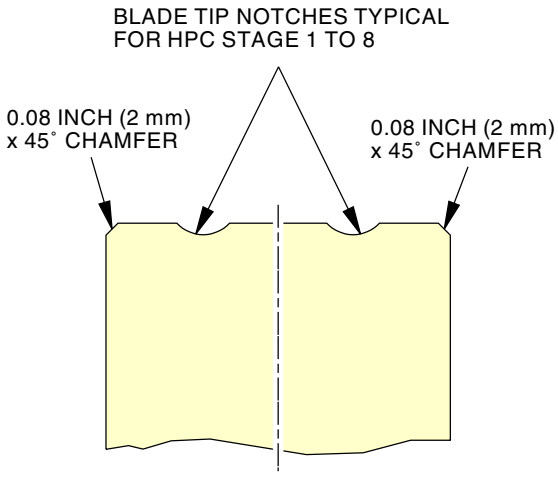
M06748 S0004285783_V6

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 2 of 10)

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

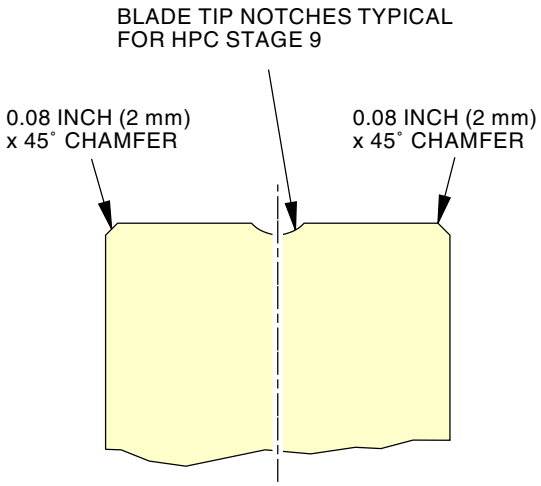


1ST- THROUGH 9TH-STAGE
(EXAMPLE)



BLADE TIP NOTCHES AND CHAMFERS

D



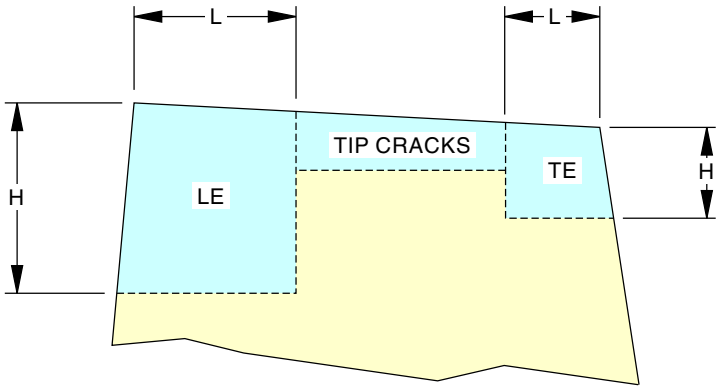
BLADE TIP NOTCHES AND CHAMFERS

D

1214410-02-A
M06749 S0004285784_V6

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 3 of 10)

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



LEADING AND TRAILING TIP CORNER AREA DEFINITION		
STAGE 2	L	H
LE	0.60 INCH (15.2 mm)	1.20 INCH (30.5 mm)
TE	0.60 INCH (15.2 mm)	1.20 INCH (30.5 mm)
STAGE 3	L	H
LE	0.60 INCH (15.2 mm)	0.75 INCH (19.1 mm)
TE	0.60 INCH (15.2 mm)	0.75 INCH (19.1 mm)
STAGE 4	L	H
LE	0.75 INCH (19.1 mm)	0.75 INCH (19.1 mm)
TE	0.75 INCH (19.1 mm)	0.75 INCH (19.1 mm)

TIP CRACKS	
STAGE 2	H
TIP CRACK	0.15 INCH (3.8 mm)
STAGE 3	
TIP CRACK	0.15 INCH (3.8 mm)
STAGE 4	
TIP CRACK	0.25 INCH (6.4 mm)

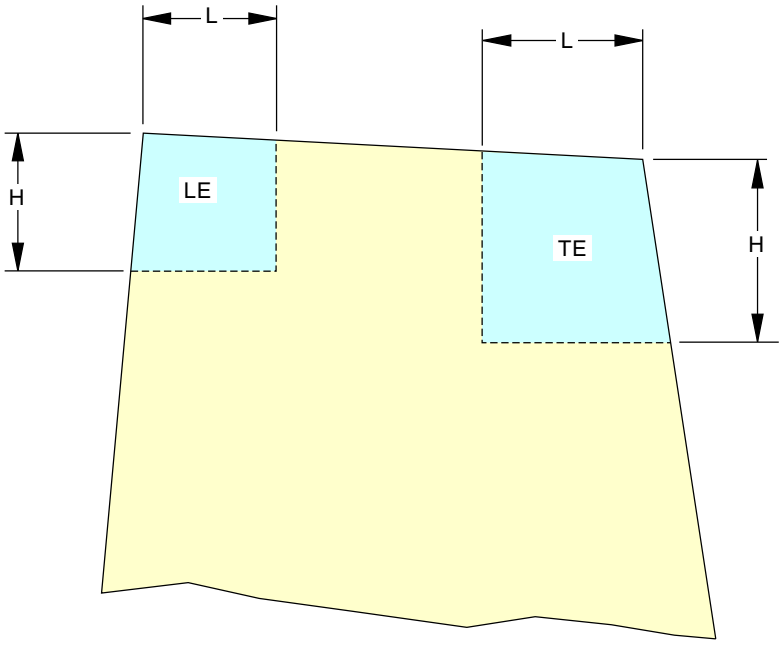
E

1228320-00-A

492768 S0000146901_V3

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 4 of 10)

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



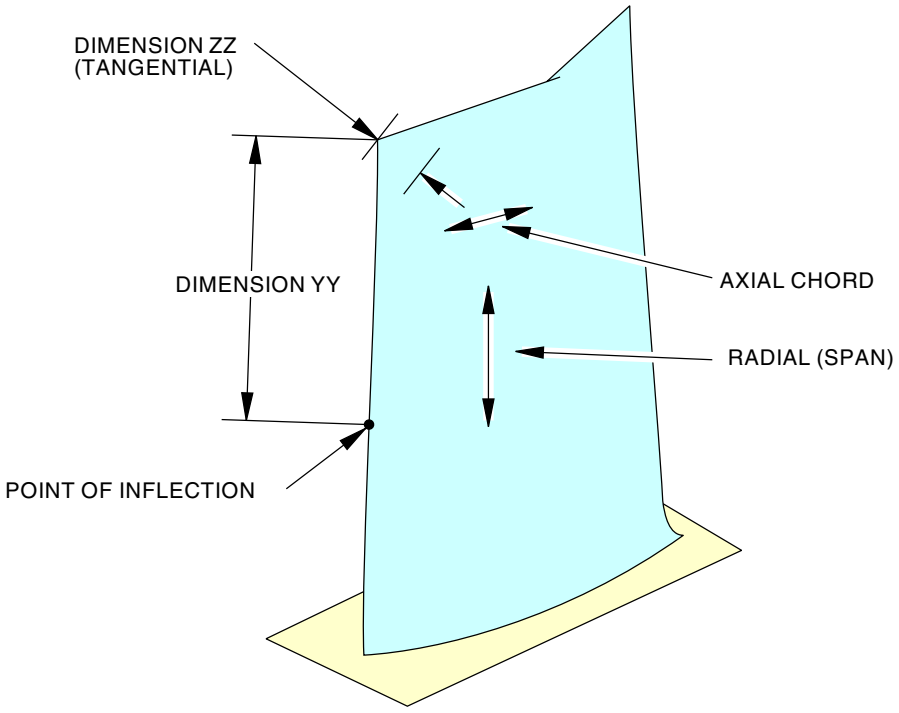
LEADING AND TRAILING TIP CORNER AREA DEFINITION		
STAGE 5	L	H
LE BLEND LIMIT	0.50 INCH (12.7 mm)	0.50 INCH (12.7 mm)
TE BLEND LIMIT	0.61 INCH (15.5 mm)	0.70 INCH (17.8 mm)
LE AND TE SERVICEABLE LIMIT	0.25 INCH (6.4 mm)	0.25 INCH (6.4 mm)

F

1225215-01-A
419150 S0000137201_V5

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 5 of 10)

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



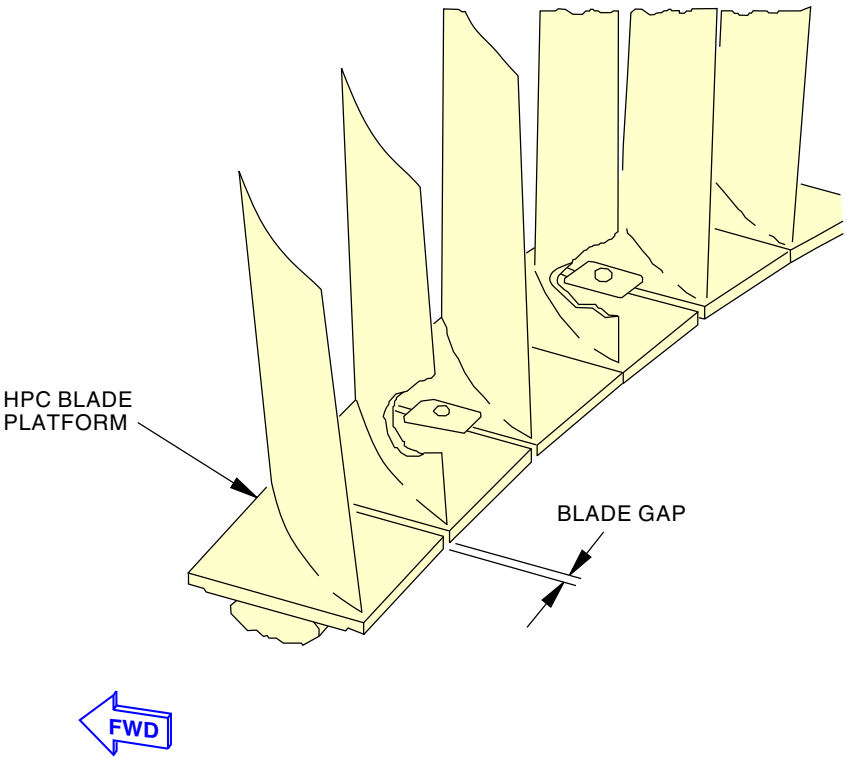
$$\frac{\text{DIMENSION ZZ}}{\text{DIMENSION YY}} = 0.07 \text{ (NON DIMENSION)}$$

8TH-STAGE BLADE

1246051-00
U47411 S0000197755_V2

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 6 of 10)

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



STAGES 7, 8, AND 9

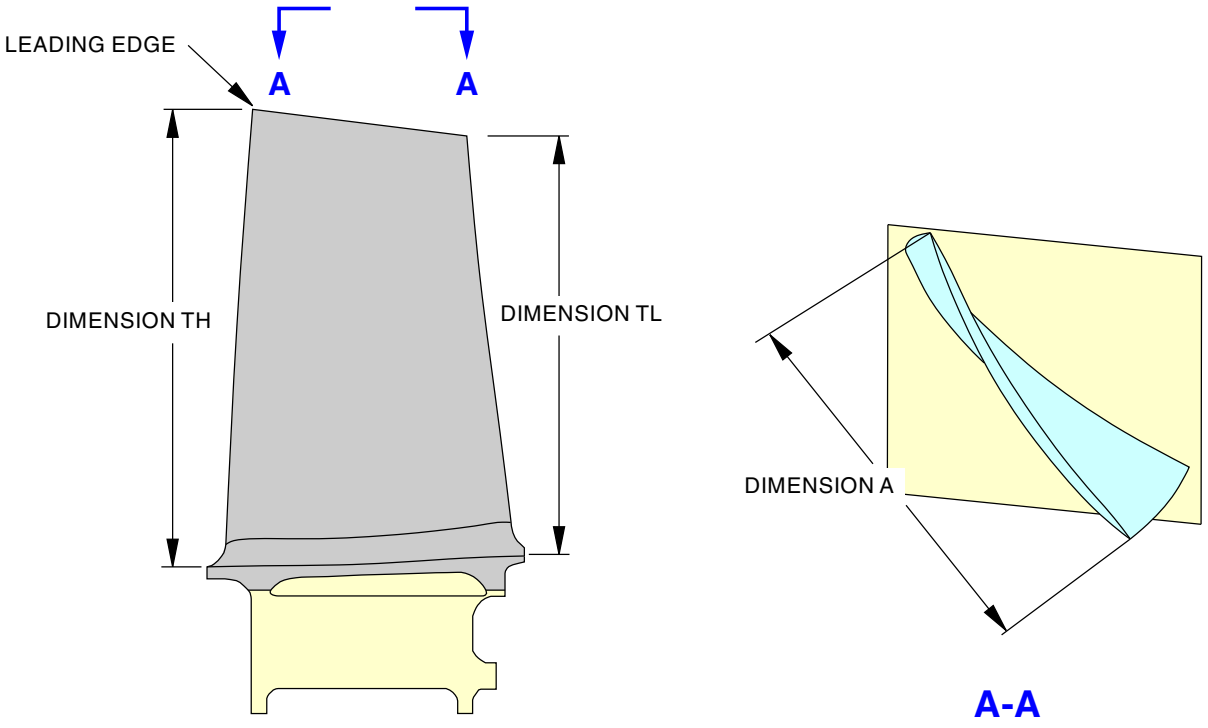
E

1227226-00-A

1548555 S0000283857_V2

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 7 of 10)

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



STAGE	NUMBER OF BLADES	DIMENSION TH	DIMENSION TL	DIMENSION A
BLISK	28	9.055 (230)	7.047 (179)	5.236 (133)
2	38	6.063 (154)	5.039 (128)	3.661 (93)
3	50	4.252 (108)	3.701 (94)	2.638 (67)
4	60	3.150 (80)	2.874 (73)	2.126 (54)
5	70	2.362 (60)	2.205 (56)	1.772 (45)
6	80	1.929 (49)	1.772 (45)	1.535 (39)
7	82	1.614 (41)	1.535 (39)	1.457 (37)
8	84	1.378 (35)	1.299 (33)	1.378 (35)
9	86	1.220 (31)	1.142 (29)	1.299 (33)

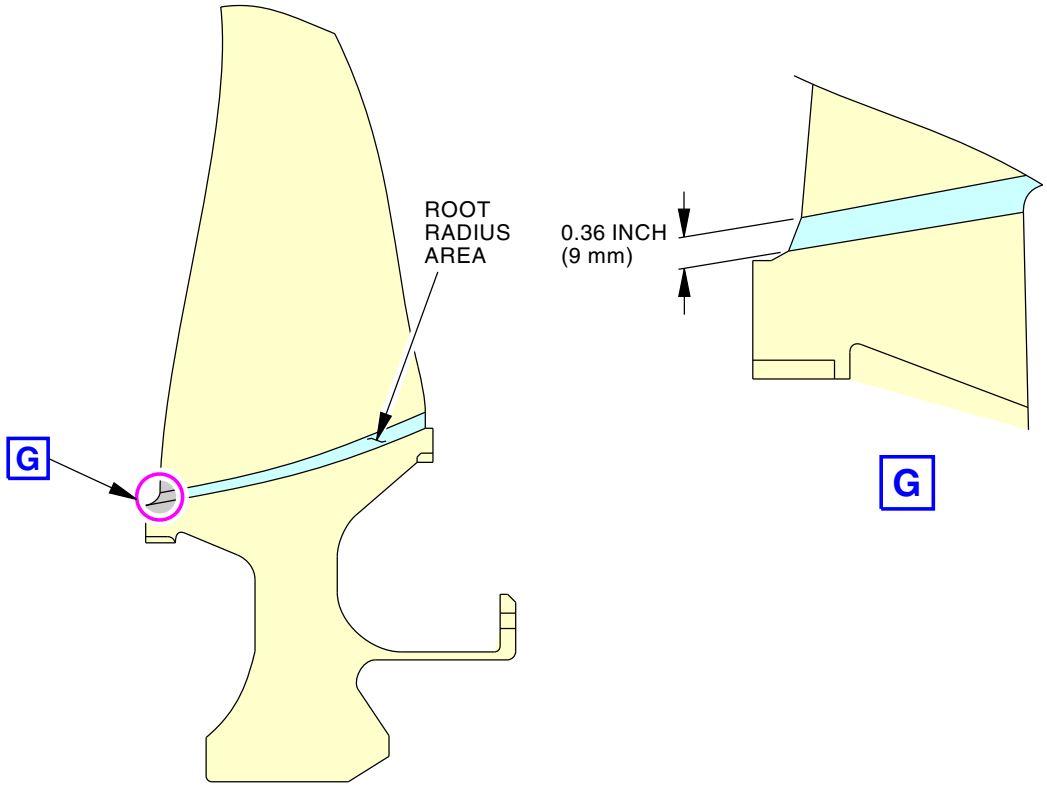
NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

1627638 S0000299497_V2

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 8 of 10)

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

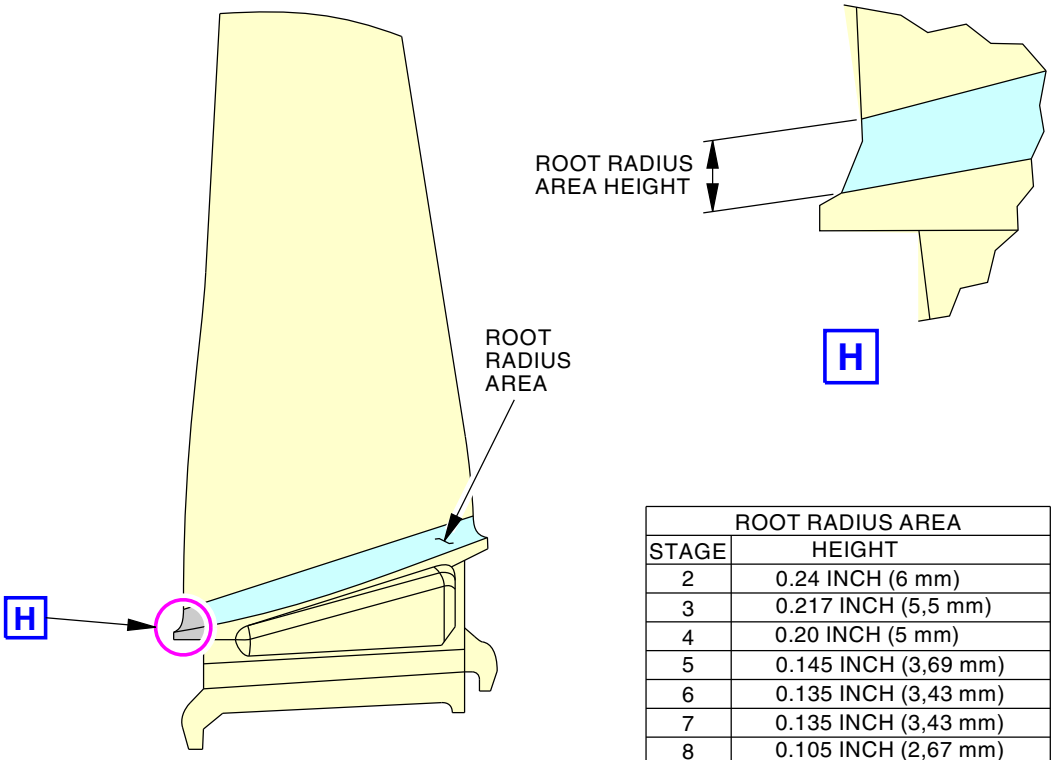


HPC STAGE 1 BLISK

5035974-00
2567433 S0000614423_V1

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 9 of 10)

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



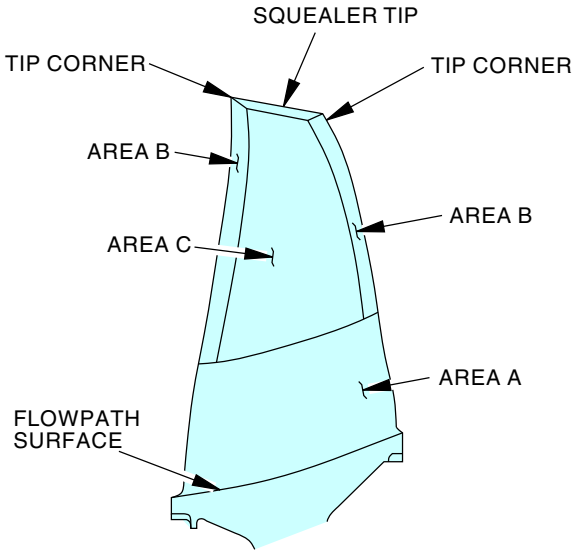
STAGE 2 BLADE SHOWN

ROOT RADIUS AREA	
STAGE	HEIGHT
2	0.24 INCH (6 mm)
3	0.217 INCH (5,5 mm)
4	0.20 INCH (5 mm)
5	0.145 INCH (3,69 mm)
6	0.135 INCH (3,43 mm)
7	0.135 INCH (3,43 mm)
8	0.105 INCH (2,67 mm)
9	0.105 INCH (2,67 mm)

5035975-00
2567438 S0000614425_V1

HPC Section Inspection
Figure 608/72-00-00-990-810-H01 (Sheet 10 of 10)

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



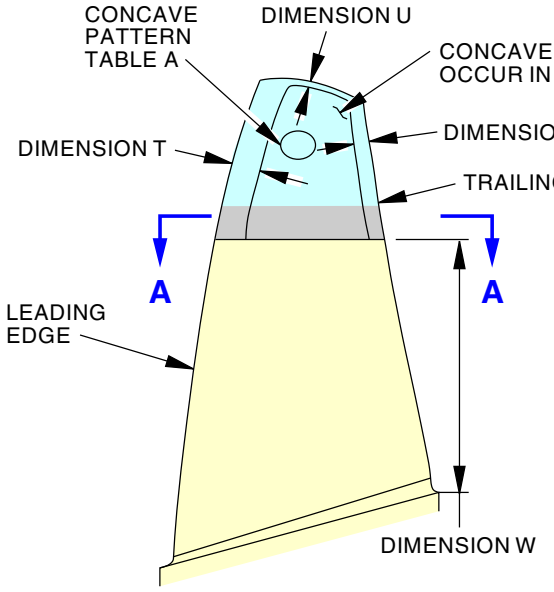
STAGE	DIMENSION A BLEND REPAIR PERMITTED	DIMENSION TBO BLEND REPAIR NOT PERMITTED
1	0.063 INCH (1.60 mm) UP TO 40% SPAN 0.063 INCH (1.60 mm) FROM 40% SPAN TO TIP	0.43 INCH (11.0 mm)

1200752-00-A

1545121 S0000279883_V2

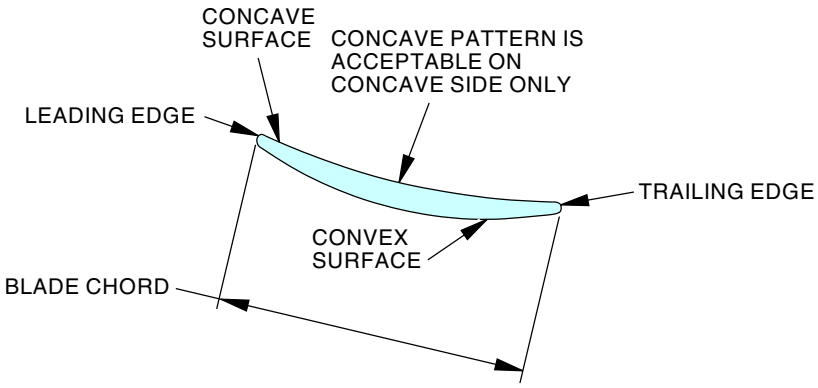
HPC Stage 1 Blisk Airfoil Inspection
Figure 609/72-00-00-990-850-H01 (Sheet 1 of 3)

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

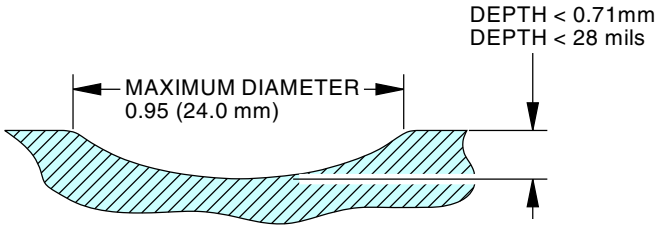


HPC STAGE 1 BRISK DIMENSIONS WHERE CONCAVE PATTERN IS POSSIBLE	
DIMENSION T	1.57 INCH (40.0 mm)
DIMENSION U	0.20 INCH (5.0 mm)
DIMENSION V	0.79 INCH (20.0 mm)
DIMENSION W	5.28 INCH (134.0 mm)

TABLE A



A-A

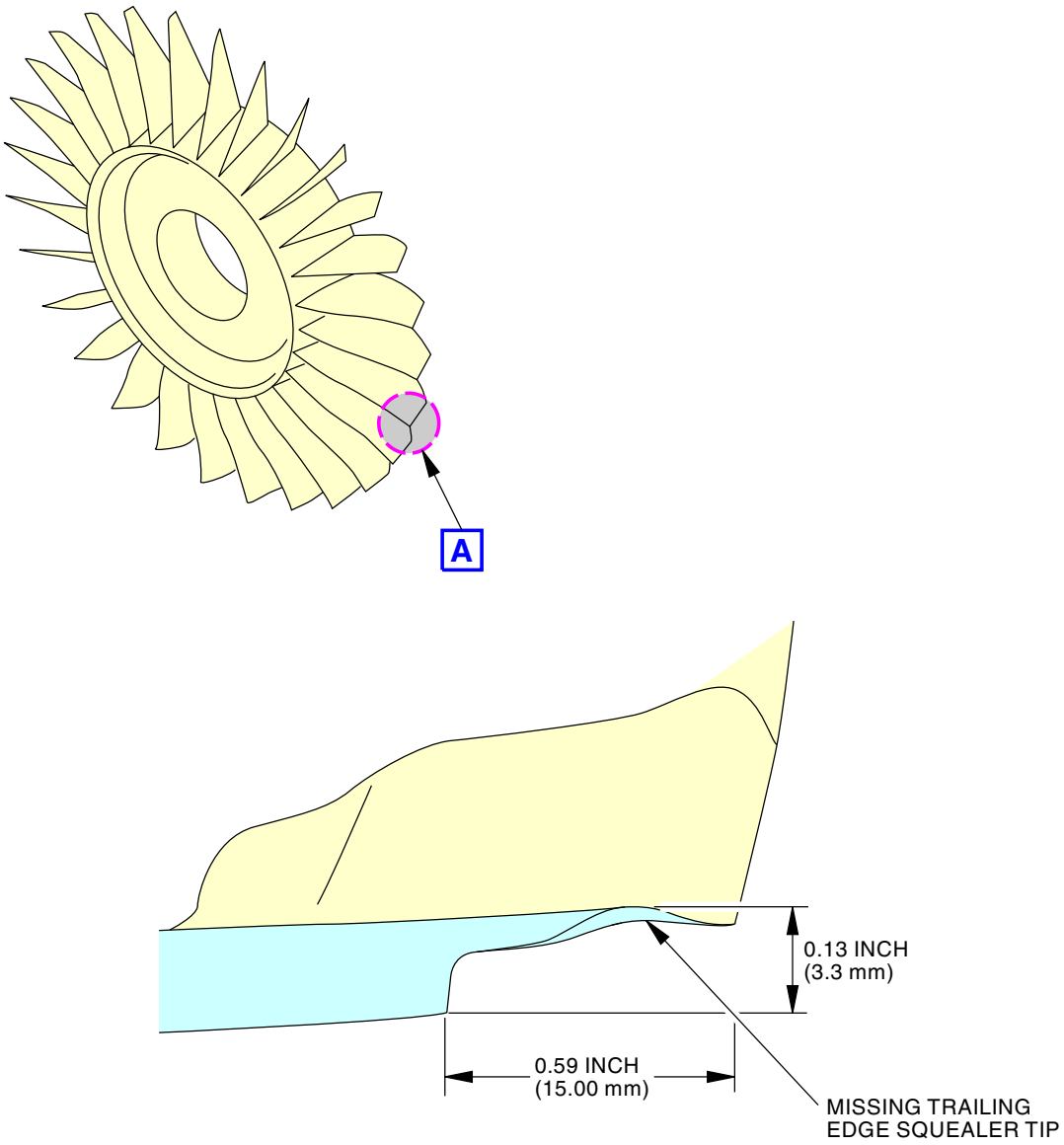


CONCAVE PATTERN OF THE HPC STAGE 1 BLISK CONCAVE AIRFOIL

1545118 S0000279884_V2

HPC Stage 1 Blisk Airfoil Inspection
Figure 609/72-00-00-990-850-H01 (Sheet 2 of 3)

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



1295840-00
1984282 S0000384277_V2

HPC Stage 1 Blisk Airfoil Inspection
Figure 609/72-00-00-990-850-H01 (Sheet 3 of 3)

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

TASK 72-00-00-290-804-H01

5. Combustion Section and High Pressure Turbine Section Stage One Nozzle Leading Edge Inspection

(Figure 610, Figure 611 and Figure 612)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to examine the combustion section and high pressure turbine section stage one nozzle leading edge with a rigid borescope, SPL-116.

NOTE: Use right angle flexscope borescope, SPL-115 or rigid borescope, SPL-2235 or fiberscope borescope to examine the combustion section and HPT section stage 1 nozzle leading edge, as necessary.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-11-13-960-801-H00	Engine Case Borescope Bosses Locking Insert Replacement (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
72-40-01-200-801-H00	Combustor Diffuser Nozzle Inspection (P/B 601)
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-115	Borescope - Right Angle Flexscope Part #: 9C1301P01 Supplier: 06083 Part #: 9C1301P03 Supplier: 06083
SPL-116	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083
SPL-570	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083
SPL-2235	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D50003 [C02-061]	Compound - Antiseize - Milk of Magnesia (unflavored)	
D50017 [C02-071]	Compound - Antiseize And Lubricating - Pure Nickel Special Grade	GE Spec D6Y28C1 or A50TF198

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Prepare for the Inspection

SUBTASK 72-00-00-010-007-H01

(1) Do this task: Borescope Inspection Preparation, TASK 72-00-00-290-801-H01.

H. Combustion Section and HPT Section Stage One Nozzle Leading Edge Inspection

SUBTASK 72-00-00-010-008-H01

(1) Remove the borescope covers on the aft skirt.

NOTE: The aft skirt panels are given position numbers in a counterclockwise (CCW) sequence when you look at them from the front of the engine. The right aft skirt panel is at the 8:00 o'clock position and the left aft skirt panel is at the 5:00-6:00 o'clock position. The borescope N cover is located below the engine heatshield. To get access, remove the bolt that holds the port N heatshield cover (at 5:00-6:00 o'clock) in place and open the hinged cover.

SUBTASK 72-00-00-010-009-H01

(2) Remove borescope plugs L, M, N (if the engine port is installed) and P.

SUBTASK 72-00-00-290-005-H01

(3) Turn the borescope light source, SPL-570 on.

SUBTASK 72-00-00-480-010-H00

(4) Insert the borescope light source, SPL-570 in position to do the inspection.

NOTE: Use a rigid borescope, SPL-116, right angle flexscope borescope, SPL-115 or rigid borescope, SPL-2235 or fiberscope borescope to examine the combustion section and HPT section stage 1 nozzle leading edge, as necessary.

SUBTASK 72-00-00-210-001-H01

(5) Examine all surfaces for the signs that follow:

(a) Discoloration

1) Permitted.

(b) Carbon accumulation

1) Permitted.

(c) Loose (W-seal, leaf-seal, honeycomb) material

1) Do the procedure to estimate serviceability and find when and how to remove the loose material (TASK 72-40-01-200-801-H00).

SUBTASK 72-00-00-220-003-H01

(6) Examine the inner and outer deflectors and the spectacle plate:

NOTE: Examine the spectacle plate if visible.

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

(a) Distortion and lift-off of the deflector

1) Permitted.

(b) Circumferential or radial cracks in the deflector

1) Permitted.

(c) Missing deflector TBC

1) Permitted.

(d) Missing deflector material

NOTE: Missing metal limits for the outer and inner annulus deflectors are based on the number of exposed cooling holes. As deflector material erodes away, the cooling holes in the spectacle plate are exposed (View E).

ARO ALL PRE SB 777-GE100-72-0689

1) Missing material is permitted on an outer or inner annulus deflector with these conditions:

a) There is a maximum of 25 percent missing material per deflector.

b) The maximum number of exposed spectacle plate cooling holes permitted is 42 per deflector.

NOTE: There are a total of 60 deflectors.

2) Continue-In-Service Limits:

a) The initial inspection interval is 500 cycles.

b) The inspection interval is reduced to 250 cycles on the conditions that follow:

<1> There is between 25 and 50 percent missing material per deflector.

<2> There are between 42 and 84 exposed spectacle plate cooling holes per deflector.

c) The inspection interval is decreased to 150 cycles for the conditions that follow:

<1> There is between 50 and 75 percent missing material for up to 2 outer annulus deflectors (except cups 22 and 24).

<2> There is between 84 and 126 exposed spectacle plate cooling holes for up to 2 outer annulus deflectors (except cups 22 and 24).

<3> Missing material more than 50 percent or 84 exposed spectacle plate cooling holes for deflectors at cups 22 and 24 is permitted for 25 cycles.

<4> Missing material more than 75 percent or 126 exposed spectacle plate cooling holes at any outer annulus deflector except at cups 22 and 24 is permitted for 25 cycles.

<5> Missing material more than 50 percent or 84 exposed spectacle plate cooling holes per inner annulus deflector are permitted for 25 cycles.

ARO ALL POST SB 777-GE100-72-0689

3) Missing material is permitted on an outer or inner annulus deflector with these conditions:

a) There is a maximum of 25 percent missing material for each deflector.

b) The maximum number of exposed spectacle plate cooling holes permitted is 23 for each deflector on an outer annulus.

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

ARO ALL POST SB 777-GE100-72-0689 (Continued)

c) The maximum number of exposed spectacle plate cooling holes permitted is 42 for each deflector on an inner annulus.

NOTE: There are a total of 30 outer and 30 inner deflectors.

4) Continue-In-Service Limits:

a) The initial inspection interval is 500 cycles.

b) The inspection interval is reduced to 250 cycles on the conditions that follow:

<1> There is between 25 and 50 percent missing material for each deflector.

<2> There are between 23 and 54 exposed spectacle plate cooling holes for each deflector on an outer annulus.

<3> There are between 42 and 84 exposed spectacle plate cooling holes for each deflector on an inner annulus.

c) The inspection interval is decreased to 150 cycles for the conditions that follow:

<1> There is between 50 and 75 percent missing material for up to 2 outer annulus deflectors (except cups 22 and 24).

<2> There is between 54 and 82 exposed spectacle plate cooling holes for up to 2 outer annulus deflectors (except cups 22 and 24).

<3> Missing material more than 50 percent or 54 exposed spectacle plate cooling holes for deflectors at cups 22 and 24 is permitted for 25 cycles.

<4> Missing material more than 75 percent or 82 exposed spectacle plate cooling holes at any outer annulus deflector except at cups 22 and 24 is permitted for 25 cycles.

<5> Missing material more than 50 percent or 54 exposed spectacle plate cooling holes per inner annulus deflector are permitted for 25 cycles.

ARO ALL

(e) Spectacle Plate Cracks (View F)

1) There is no limit to the amount permitted with these conditions:

a) Radial cracks are a maximum of 1/2 the height of the deflector in length.

b) Circumferential cracks connect a maximum of 5 spectacle plate cooling holes.

2) Continue-In-Service Limits:

a) Spectacle plate cracks more than the limits are permitted for a period of 25 cycles.

(f) Spectacle Plate Missing Material (View F)

1) A maximum of 1 area per spectacle plate is permitted with this condition:

a) Maximum area does not connect more than 2 spectacle plate cooling holes by 2 spectacle plate cooling holes.

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

(g) Flare cone missing material because of burning or erosion (Views G, H and J)

NOTE: Take BSI photographs of the flare cone directly over the cup assembly (fuel nozzle opening). This will help make sure of the accuracy of the cone burning or erosion measurement.

NOTE: Compare the flare cone with an image of sample flare cone with removed material (Figure 611) to estimate the amount of burning/erosion. Based on that and on the burning/erosion limits that follow, find out if you need to do a measurement.

NOTE: The missing material limits that follows are permitted for the full circumferential length of the flare cones (i.e. 360 degrees).

1) Fuel nozzle positions 22 and 24 at outer annulus cups (immediately adjacent to the igniters)

a) Missing material is permitted to a depth of up to 0.11 inch (2.8 mm) from worst case burning/erosion to outer edge of nearest flare cone cooling hole.

<1> If either of the cups 22 or 24 at the outer annulus are more than the permitted limits, remove in 25 cycles.

<2> If both igniter cups 22 and 24 are more that the limits, remove them immediately.

2) All other fuel nozzle positions

a) Missing material is permitted to a depth of up to 0.17 inch (4.3 mm) from worst case burning/erosion to outer edge of nearest flare cone cooling hole.

3) Continue-In-Service limits

a) A maximum of 6 flush flares not at fuel nozzle positions 22 or 24. Each of these 6 flush flares must have at least four adjacent flares which are not flush flares.

NOTE: A flush flare cone is one that has more than 0.17 inch (4.3 mm) material missing.

NOTE: Adjacent flares for outer flare in position X are outer flares in both adjacent positions and inner flares in the same position and both adjacent positions.

b) No more than two flush flares in adjacent positions are permitted.

<1> Do an inspection at the 250 cycle inspection interval of two flush flares are in an adjacent position.

<2> Remove immediately if they are more than the permitted limits.

c) Any flush flare or group of two flush flares has to be separated by two inner/ or two outer not flush flare cups. (See view G)

<1> Do an inspection at the 250 cycle inspection interval.

<2> Remove immediately if more than the permitted limits.

d) One out of three outer flares in position 21, 23 and 25 is permitted to be flush.

<1> Do an inspection at the 250 cycle inspection interval.

<2> Remove immediately if more than the permitted limits.

e) Flush flares are not permitted for inner and outer cups in the same fuel nozzle position.

<1> Remove immediately if more than the permitted limits.

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

f) Reduce inspection intervals as follows:

<1> No reduction in inspection interval if 1 flush flare cone present

<2> Inspect at 250 cycle inspection interval if 2 flush flare cones present

<3> Inspect at 200 cycle inspection interval if 3 flush flare cones present

<4> Inspect at 150 cycle inspection interval if 4 flush flare cones present

<5> Inspect at 75 cycle inspection interval if 5 flush flare cones present

<6> Remove in 25 cycles if there are 6 or more flush flare cones.

SUBTASK 72-00-00-220-004-H01

(7) Examine the inner combustion liners as follow:

(a) Circumferential cracks between dilution holes

1) Cracks that connect adjacent dilution holes are permitted as follows:

a) All set of dilution hole patterns can have cracks that connect 2 dilution holes.

2) Continue-In-Service Limits:

a) Cracks that connect 3 consecutive dilution holes, reduce the inspection interval to 150 cycles if the next circumferential crack is farther away than 12 dilution holes.

b) Circumferential cracks that connect 3 consecutive dilution holes that are closer than 12 dilution holes from the next circumferential crack are permitted for 150 cycles.

c) Remove in 50 cycles for circumferential cracks that connect 4 consecutive dilution holes, if the next circumferential crack is farther away than 12 dilution holes.

(b) Circumferential cracks in other areas of liner:

1) Permitted to a maximum of 2.0 inches (50.8 mm) in length.

2) Continue-In-Service Limits:

a) Remove in 25 cycles for circumferential cracks in other areas of the liner greater than 2.0 inches (50.8 mm) in length.

(c) Cracks other than circumferential in other areas of liner (excluding the aft lip area)

1) Permitted to a maximum of 1.0 inch (25.4 mm) in length.

2) Continue-In-Service Limits.

a) Remove in 25 cycle for cracks other than circumferential if more than 1.0 inch (25.4 mm) in length.

(d) Axial cracks in the aft lip area

1) Axial cracks cannot extend more than half the distance [1.0 inch (25 mm) long] between the aft lip and the secondary dilution holes.

2) Continue-In-Service limits:

NOTE: You will do the inspections on the steps that follow with a fiberscope borescope.

a) The initial inspection interval is 500 cycles.

b) If cracks extend more than half the distance between the aft lip and the secondary dilution holes, the inspection interval is reduced to 150 cycles.

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

c) If cracks extend from the aft lip to the secondary dilution holes, the inspection interval is reduced to 50 cycles if the conditions that follow are not exceeded:

NOTE: If one or more conditions are exceeded, the inner liner can remain in service for not more than 25 cycles.

<1> No connected circumferential cracks that start or increase at the secondary dilution holes.

<2> No connected circumferential cracks that extend to within 16 dilution holes of all other axial cracks.

<3> No missing parent material along the cracks.

<4> No lifting away of the aft lip.

d) If cracks from the aft lip extend forward of the secondary dilution holes, but not into the primary dilution hole area, the inspection interval is reduced to 25 cycles if the conditions that follows are not exceeded:

NOTE: If one or more conditions are exceeded, the inner liner can remain in service for not more than 25 cycles.

<1> No connected circumferential cracks that start or increase at the secondary dilution holes.

<2> No connected circumferential cracks that extend to within 16 dilution holes of all other axial cracks.

<3> No missing parent material along the cracks.

<4> No lifting away of the aft lip.

e) Cracks from the aft lip that extend all the way forward into the primary dilution hole area are permitted for 25 cycles.

f) Remove in 25 cycles if two cracks that are within 16 secondary dilution holes of each other extend more than half way between the aft lip and secondary dilution holes.

(e) Burn through or metal that is missing

1) A maximum of six burn through areas are permitted if the maximum area of any individual area is not more than the equivalent square-inch area of 0.40 in. (10.16 mm) by 0.40 in. (10.16 mm).

2) If any individual burn through area is more than 0.40 in. (10.16 mm) by 0.40 in. (10.16 mm) and less than 0.98 in. (24.9 mm) by 0.98 in. (24.9 mm), then the interval is decreased to 100 cycles.

3) Any individual burn through area more than 0.98 in. (24.9 mm) by 0.98 in. (24.9 mm) is not permitted.

4) Continue-In-Service Limits: Remove in 25 cycles if burn through or metal is missing beyond the serviceable limits.

NOTE: A burn through is defined as a hole caused by burning. Erosion of a portion of the metal thickness is not burned through.

NOTE: There must be at least one primary/secondary dilution hole with no burn through on either side between two connected primary/secondary dilution holes by burn through.

NOTE: The sum of individual burned through areas more than 0.96 in^2 (619.4 mm^2) (0.98 in. (24.9 mm) X 0.98 in. (24.9 mm)) is not permitted.

(f) Distortion

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

1) Permitted within 0.50 inch (12.7 mm) from initial contour.
2) Continue-In-Service Limits:
   a) Remove in 25 cycles if distortion is not more than 20 percent beyond the serviceable limits.

(g) Dilution holes that are blocked
1) Multiple dilution holes that are blocked are not permitted.
2) Continue-In-Service Limits:
   a) Multiple blocked dilution holes are permitted for 25 cycles.

(h) Missing TBC
1) Permitted.

(i) Burning or missing material of forward nugget lips:
1) Permitted.

SUBTASK 72-00-00-220-032-H01

(8) Examine the outer combustion liners as follow:

(a) Cracks that connect adjacent dilution holes
1) All sets of dilution holes patterns with cracks that connect 2 dilution holes are permitted.
2) Circumferential cracks
   a) Circumferential cracks that connect 3 consecutive dilution holes are permitted for 25 cycles.

(b) Circumferential cracks in other areas of the liner
1) Permitted to a maximum of 2.0 inches (50.8 mm) in length.
2) Continue-In-Service Limits:
   a) Circumferential cracks in other areas of the liner greater than 2.0 inches (50.8 mm) in length are permitted for 25 cycles.

(c) Cracks other than circumferential in other areas of liner
1) Permitted to a maximum of 1.0 inch (25.4 mm) in length.
2) Continue-In-Service Limits:
   a) Cracks other than circumferential greater than 1.0 inch (25.4 mm) in length are permitted for 25 cycles.

(d) Burn through or metal that is missing
1) Burned through areas are permitted with these conditions:
   a) Amounts less than 0.10 inch (2.54 mm) by 0.10 inch (2.54 mm) in size are permitted.
   b) A maximum of 6 burned through areas permitted between 0.10 inch (2.54 mm) by 0.10 inch (2.54 mm) and 0.40 inch (10.16 mm) by 0.40 inch (10.16 mm) in size.
   c) Burned through areas greater than 0.40 inch (10.16 mm) by 0.40 inch (10.16 mm) in size are not permitted.
2) Continue-In-Service Limits:
   a) Burned through or metal that is missing beyond the serviceable limits is permitted for 25 cycles.

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

(e) Distortion

1) Permitted within 0.5 inch (12.7 mm) from initial contour.

2) Continue-In-Service Limits:

a) Distortion is permitted for 25 cycles if the damage is not more than 20 percent beyond the serviceable limits.

(f) Dilution holes that are blocked

1) Multiple holes that are blocked are not permitted.

2) Continue-In-Service Limits

a) Multiple blocked dilution holes are permitted for 25 cycles.

(g) Missing TBC

1) Permitted.

SUBTASK 72-00-00-220-033-H01

(9) Examine the outer liner igniter ports, Area X for signs that follow.

(a) Missing TBC

1) Permitted.

(b) Circumferential cracks

1) Cracks that extend from the dilution holes are permitted up to 0.75 inch (19.0 mm) in length.

2) See the Continue-In-Service Limits (TASK 72-00-00-800-801-H01).

(c) Axial cracks

1) There is no limit to the number of axial cracks which are 0.5 inch (12.7 mm) long.

2) See the Continue-In-Service Limits (TASK 72-00-00-800-801-H01).

(d) Cracks that connect dilution holes

1) Cracks which connect adjacent dilution holes are permitted to a maximum of 4 locations if they are not more than 1.2 inches (30.5 mm) long.

(e) Connected cracks

1) Cracks which create 2 legs of a triangle between holes are permitted if they are in the limits given above.

2) Cracks that start to form 3 legs of a triangle are permitted if you do the check again at 125 cycle intervals.

(f) Burn through or metal that is missing

1) Burn through or metal that is missing forward of igniter port centerline is permitted as follows:

a) A maximum of one area per igniter port area is permitted if the maximum area is not more than 0.04 square inch (25.8 square mm).

2) Burn through or metal that is missing aft of igniter port centerline

a) A maximum of 1 area per igniter port area is permitted with these conditions:

<1> The maximum area is not more than 0.16 square inch (1.03 square cm).

<2> Burn through or missing metal up to a maximum area of 0.3 square inch (1.94 square cm) is permitted with these conditions:

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

<a> You examine the damage again at 125 cycles.

<b> You do the HPT rotor inspection and the LPT section rotor inspection when you first identify the metal loss (TASK 72-00-00-290-806-H01 and TASK 72-00-00-290-807-H01).

(g) Outer liner igniter port Continue-In-Service Limits

1) Circumferential cracks from dilution holes can extend up to 1.5 inches (38.0 mm) if there is no other crack in the Area X for a period of 125 cycles.

2) Axial cracks from dilution holes can extend up to 1.0 inch (25.4 mm) if there is no other crack in the Area X for a period of 125 cycles.

SUBTASK 72-00-00-220-007-H01

(10) Examine the centershield as follows:

(a) Circumferential cracks between dilution holes

1) Cracks which connect adjacent dilution holes are permitted at a maximum of 4 locations with these conditions:

a) They are separated by a minimum of 24 degrees, or 2 swirler cups.

b) They are not more than 1.0 inch (25.4 mm) long.

2) See the Continue-In-Service Limits (TASK 72-00-00-800-801-H01).

(b) Circumferential cracks in other areas of centershield

1) Permitted with these conditions:

a) They are a maximum of 2.0 inches (50.8 mm) in length.

b) They are separated by 6.0 inches (152.4 mm) circumferentially.

c) They are separated by 1.5 inches (38.1 mm) axially.

(c) Axial cracks

1) Axial cracks 0.5 inch (12.7 mm) long are permitted.

2) A maximum of ten 0.5-1.0 inch (12.7-25.4 mm) long cracks per liner are permitted.

(d) Connected cracks

1) A maximum of 4 damaged areas are permitted with these conditions:

a) The adjacent areas are separated by a minimum of 24 degrees, or 2 swirler cups.

b) The cracks may extend between 3 adjacent dilution holes to make 2 legs of a triangle.

c) Cracks which begin to form across the third leg of a triangle are not permitted.

2) See the Continue-In-Service Limits (TASK 72-00-00-800-801-H01).

(e) Burn through or metal that is missing

1) A maximum of 6 burned through areas per centershield are permitted with these conditions.

a) They are not more than 0.4 inch (10.2 mm) by 0.4 inch (10.2 mm) in size.

b) They are separated by a minimum of 6.0 inches (152.4 mm).

2) See the Continue-In-Service Limits (TASK 72-00-00-800-801-H01).

(f) Distortion

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

1) Permitted within 0.5 inch (12.7 mm) from initial contour.

(g) Multiple dilution holes that are blocked

1) Not permitted.

(h) Combustion centershield Continue-In-Service limits

1) Circumferential cracks between dilution holes are permitted for a maximum of 25 cycles.

2) Connected cracks are permitted for a maximum of 5 cycles.

3) Burn through or missing metal is permitted for 25 cycles if the damage is not more than 20 percent beyond the serviceable limits.

4) Distortion is permitted for 25 cycles if the damage is not more than 20 percent beyond the serviceable limits.

SUBTASK 72-00-00-210-002-H01

(11) Examine the fuel nozzles for signs that follow.

(a) Carbon on the fuel nozzle

1) Permitted.

SUBTASK 72-00-00-220-008-H01

(12) Examine the leading edge of the High Pressure Turbine (HPT) stage one nozzle airfoil as follows:

(a) Missing TBC coating

1) Permitted.

(b) Cracks that connect nose holes

1) Permitted if they are not more than 0.5 in. (12.7 mm) long, are separated by 0.25 in. (6.35 mm) and no metal is missing.

2) Continue-In-Service (C-I-S) limits for the HPT stage one nozzle with cracks that connect nose holes:

a) Do an inspection again in 250 cycles if crack length is between 0.5 in. (12.7 mm) and 1.5 in. (38.1 mm) and no metal is missing.

b) Do the inspection again in 100 cycles if crack length is more than 1.5 in. (38.1 mm) and no metal is missing.

(c) Cracks that extend from a nose hole(s) but do not connect with another nose hole(s).

1) There is no limit to the number permitted if no metal is missing.

(d) Cracks can extend from a nose holes and can connect with the concave gill holes if no metal is missing.

(e) Oxidation or erosion (the surface is oxidized, and no holes through the parent metal) is permitted with these conditions:

1) Any amount is permitted.

(f) Metal that is missing from the leading edge

1) Continue-In-Service (C-I-S) limits for the HPT stage one nozzle with missing metal on the leading edge:

a) Missing metal is up to 0.25 in^2 (1.61 cm^2) for each airfoil with maximum of 4 vanes within a 90 degree arc. Do an inspection again in 250 cycles

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

b) Missing metal between 0.25 in^2 (1.61 cm^2) and 0.4 in^2 (2.58 cm^2) for each airfoil with a maximum of 4 vanes within a 90 degree arc. Do an inspection again in 100 cycles.

c) Missing metal between 0.4 in^2 (2.58 cm^2) and 0.55 in^2 (3.55 cm^2) for each airfoil with a maximum of 4 vanes within a 90 degree arc. Do an inspection again in 25 cycles.

d) Missing metal more than 0.55 in^2 (3.55 cm^2) for each airfoil with a maximum of 4 vanes within a 90 degree arc. Remove engine before next flight.

(g) If you see distress on the concave airfoil surface, refer to the C-I-S limits in the HPT stage one nozzle concave surface (TASK 72-00-00-290-805-H01, Subtask 72-00-00-220-009-H01).

(h) If you see distress on the HPT stage 1 nozzle inner and outer platform surfaces, refer to the C-I-S limits in the HPT stage one nozzle inner and outer platform (TASK 72-00-00-290-805-H01, Subtask 72-00-00-220-013-H01).

SUBTASK 72-00-00-800-007-H01

(13) When the examination is complete turn the borescope light source, SPL-570 off.

(a) Let the light source blower to stay on for a while to cool the lamp and case.

SUBTASK 72-00-00-410-008-H01

(14) Install the borescope plugs as follow:

(a) Do a visual inspection of the locking insert (lock ring) on the borescope ports for inserts that are loose or missing.

1) Replace locking inserts (lock rings) that are loose or missing with new ones (TASK 70-11-13-960-801-H00).

(b) Do a visual inspection of the borescope plugs for broken, bent or deformed spring fingers.

1) If you find more than one broken or bent spring finger or deformation, replace the borescope plug.

(c) Put pure nickel special compound, D50017 [C02-071] or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the combustor borescope plug threads.

(d) Install the borescope plugs in combustor ports L, M, N and P.

NOTE: Borescope plugs L, M, N (if the engine port is installed) and P are interchangeable.

(e) Tighten the plugs to 190.0-210.0 pound-inches (21.5-23.7 Newton-meters).

SUBTASK 72-00-00-410-009-H01

(15) Attach the borescope covers to the aft skirt with the bolts.

NOTE: The aft skirt panels are given position numbers in a counterclockwise (CCW) sequence when you look at them from the front of the engine. The right skirt panel is at the 8:00 o'clock position and the left skirt panel is between 5:00-6:00 o'clock positions. The borescope N cover is located below the engine heatshield. To get access, remove the bolt that holds the port N heatshield cover (at 5:00-6:00 o'clock) in place and open the hinged cover.

(a) Tighten the bolts to 110.0-120.0 pound-inches (12.4-13.6 Newton-meters).

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

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-860-018-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-00-00-410-010-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:

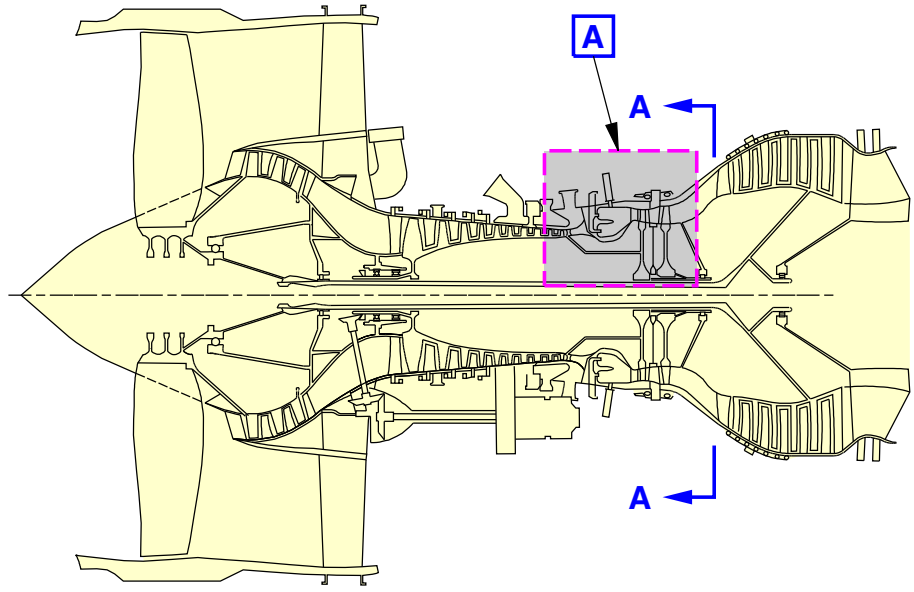
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

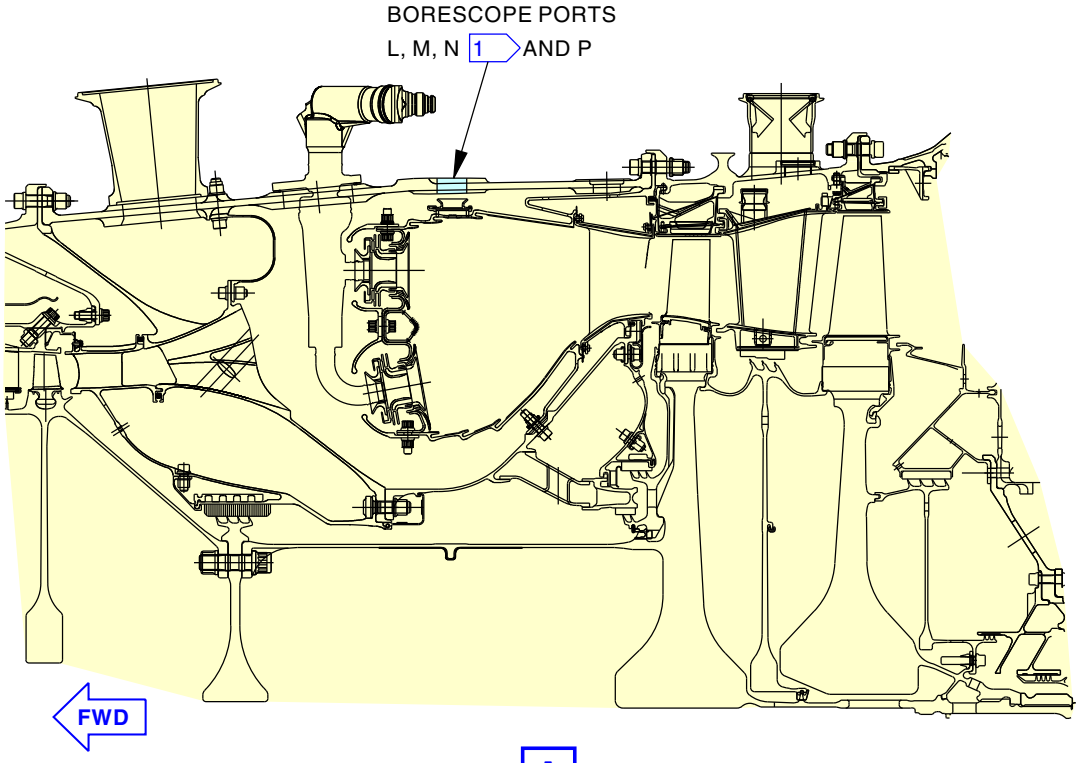
(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

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

END OF TASK

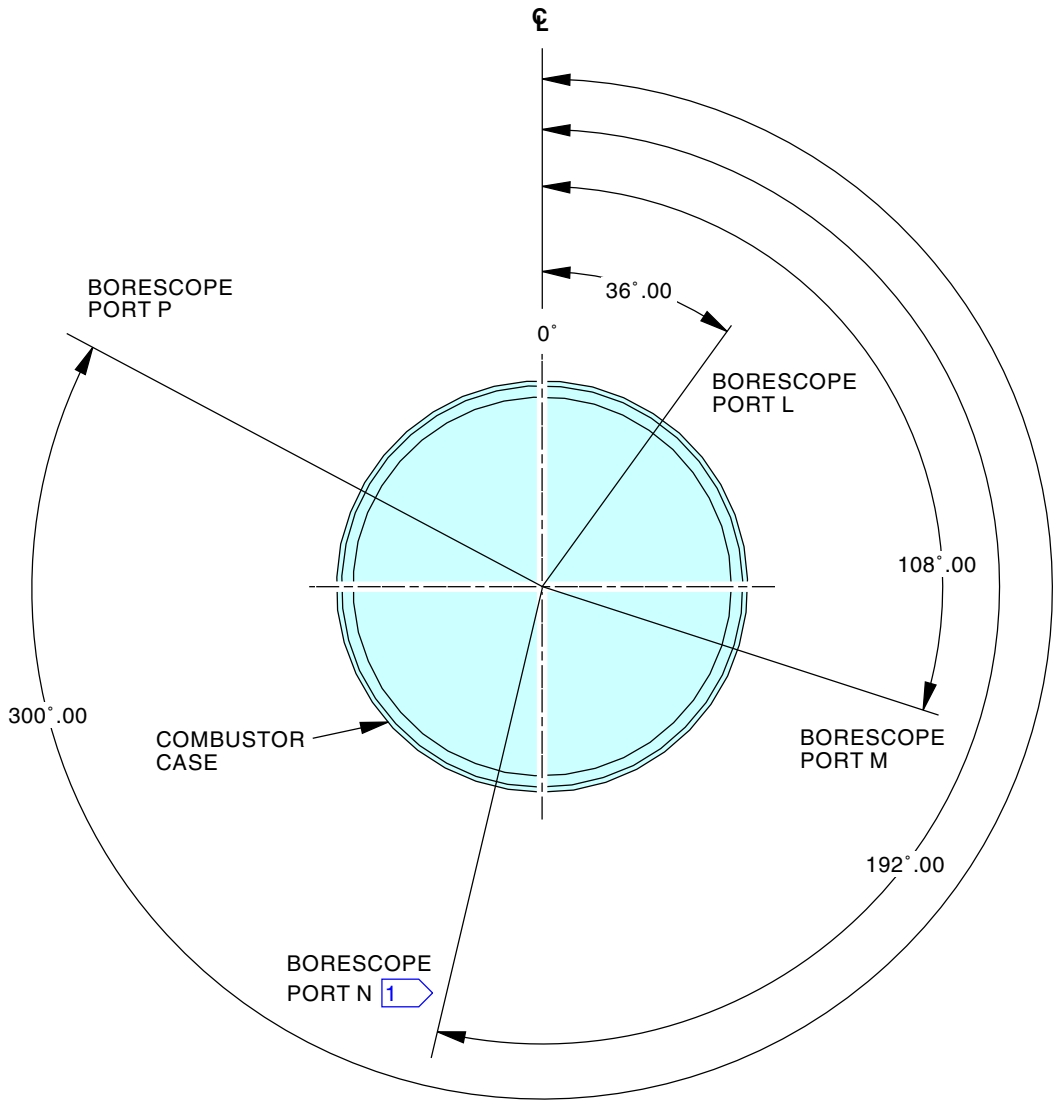
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





Combustion Section Borescope Port Locations
Figure 610/72-00-00-990-811-H01 (Sheet 1 of 2)

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



BORESCOPE PORTS L, M, N 1 AND P
(VIEW IN THE FORWARD DIRECTION)

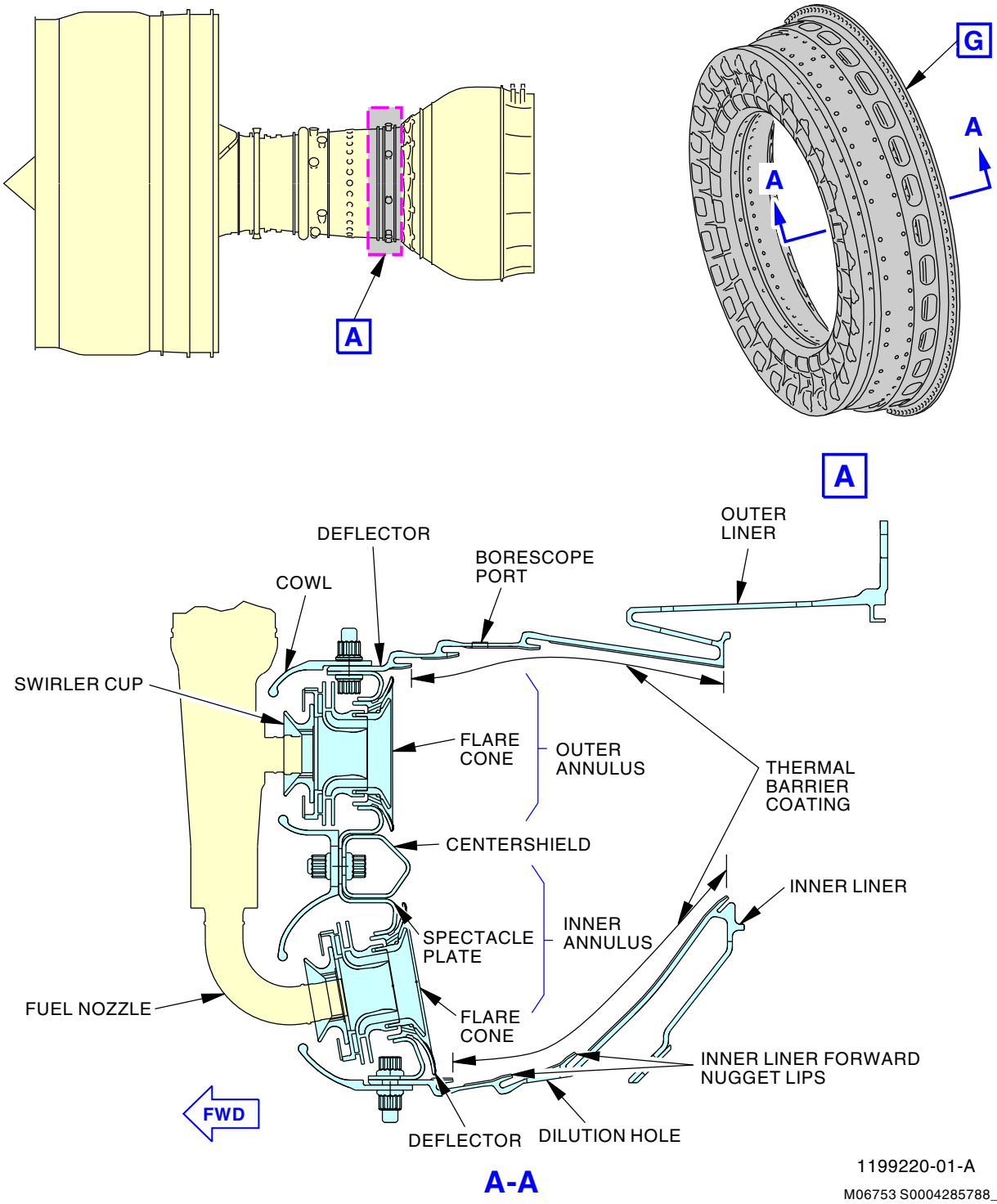
A-A

1 IF ENGINE PORT IS INSTALLED

1247054-00
M06752 S0004285787_V6

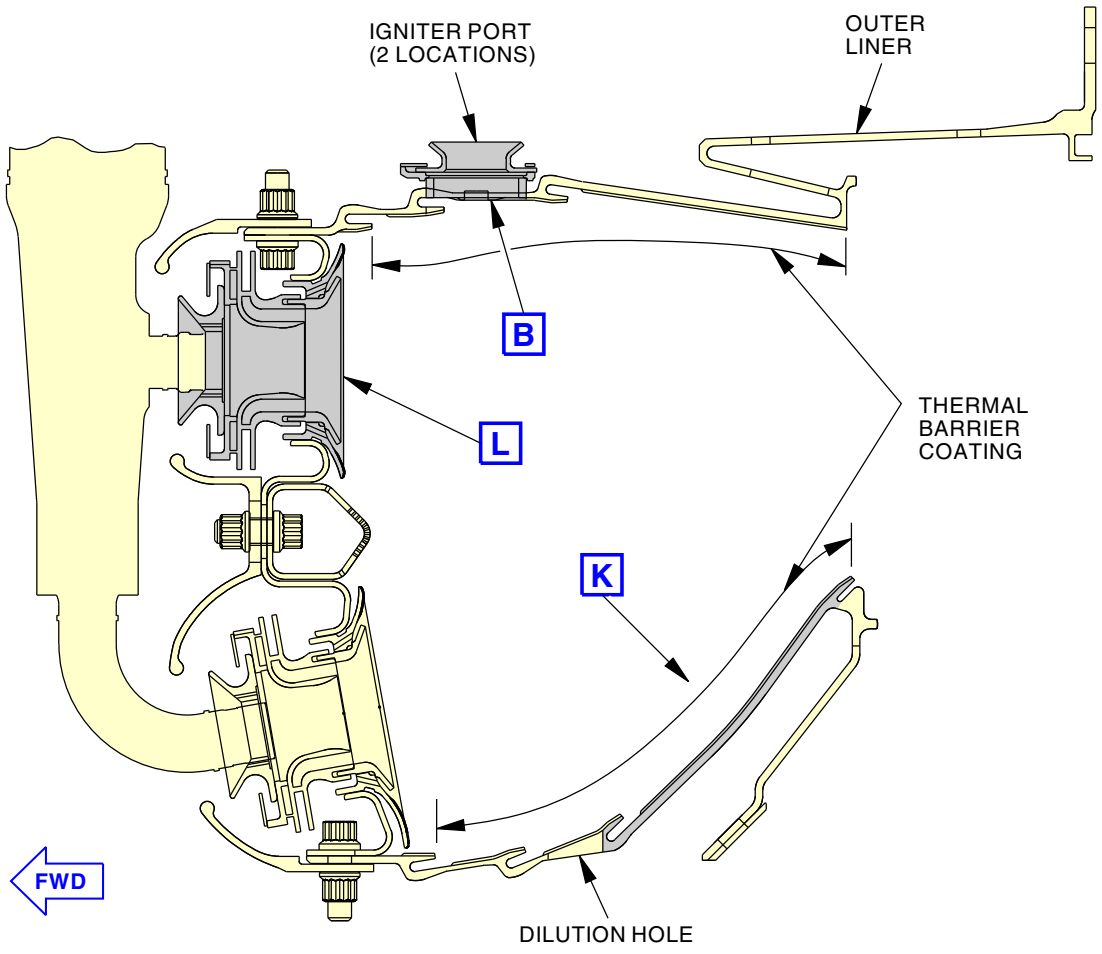
Combustion Section Borescope Port Locations
Figure 610/72-00-00-990-811-H01 (Sheet 2 of 2)

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



Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 1 of 12)

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

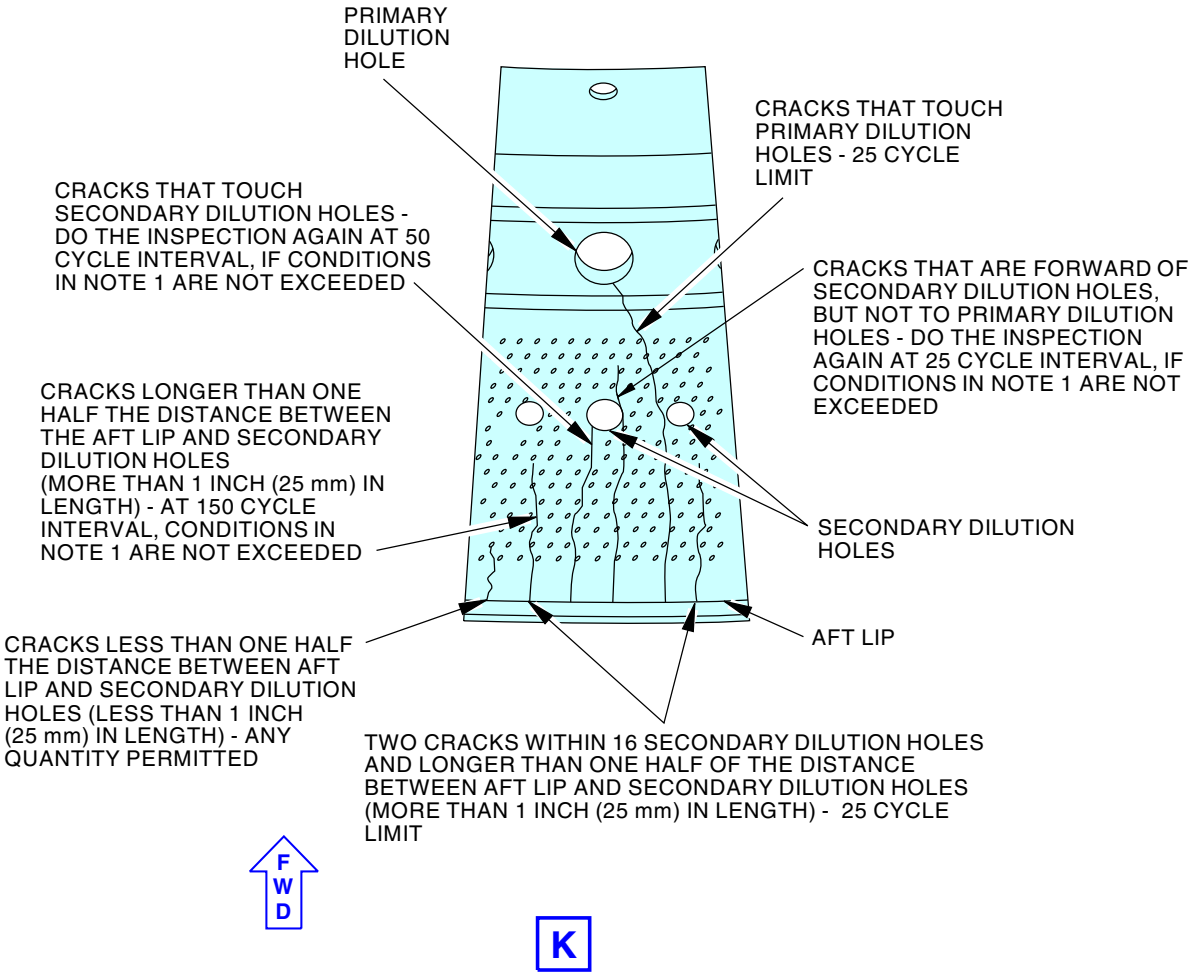


IGNITER PORT
A-A

1199221-01-A
M06757 S0004285792_V5

Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 2 of 12)

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



NOTE:

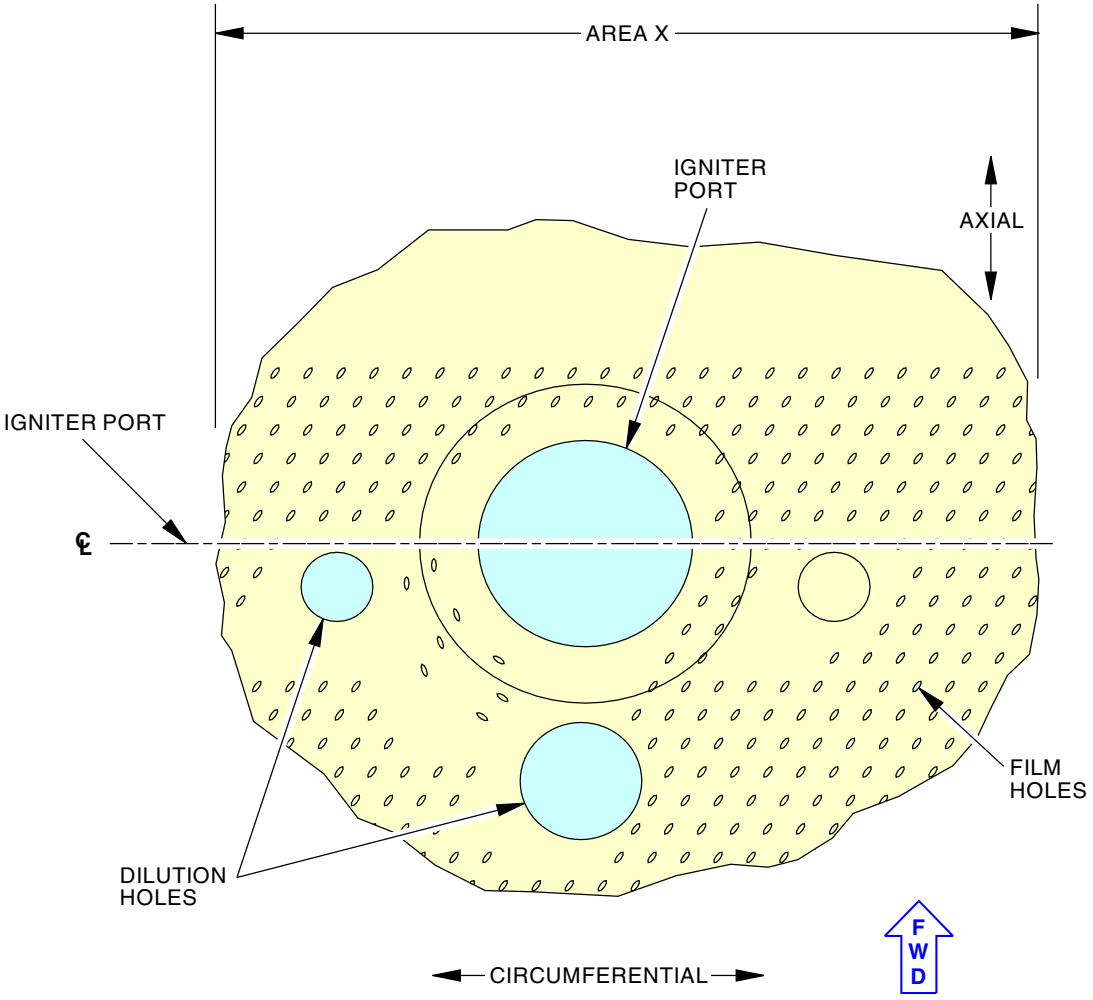
CRACK CONDITIONS MUST MEET THE CONDITIONS THAT FOLLOW
(IF NOT MET, THEN SERVICEABLE FOR ONLY 25 CYCLES):

- NO CONNECTED OF CIRCUMFERENTIAL CRACKS THAT START OR INCREASE AT THE SECONDARY DILUTION HOLE
- NO CIRCUMFERENTIAL CRACKS THAT EXTEND TO WITHIN 16 DILUTION HOLES OF ANY AXIAL CRACKS
- NO MISSING PARENT MATERIAL
- NO LIFTING AWAY OF THE AFT LIP

1363142-00
2168975 S0000477547_V2

Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 3 of 12)

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



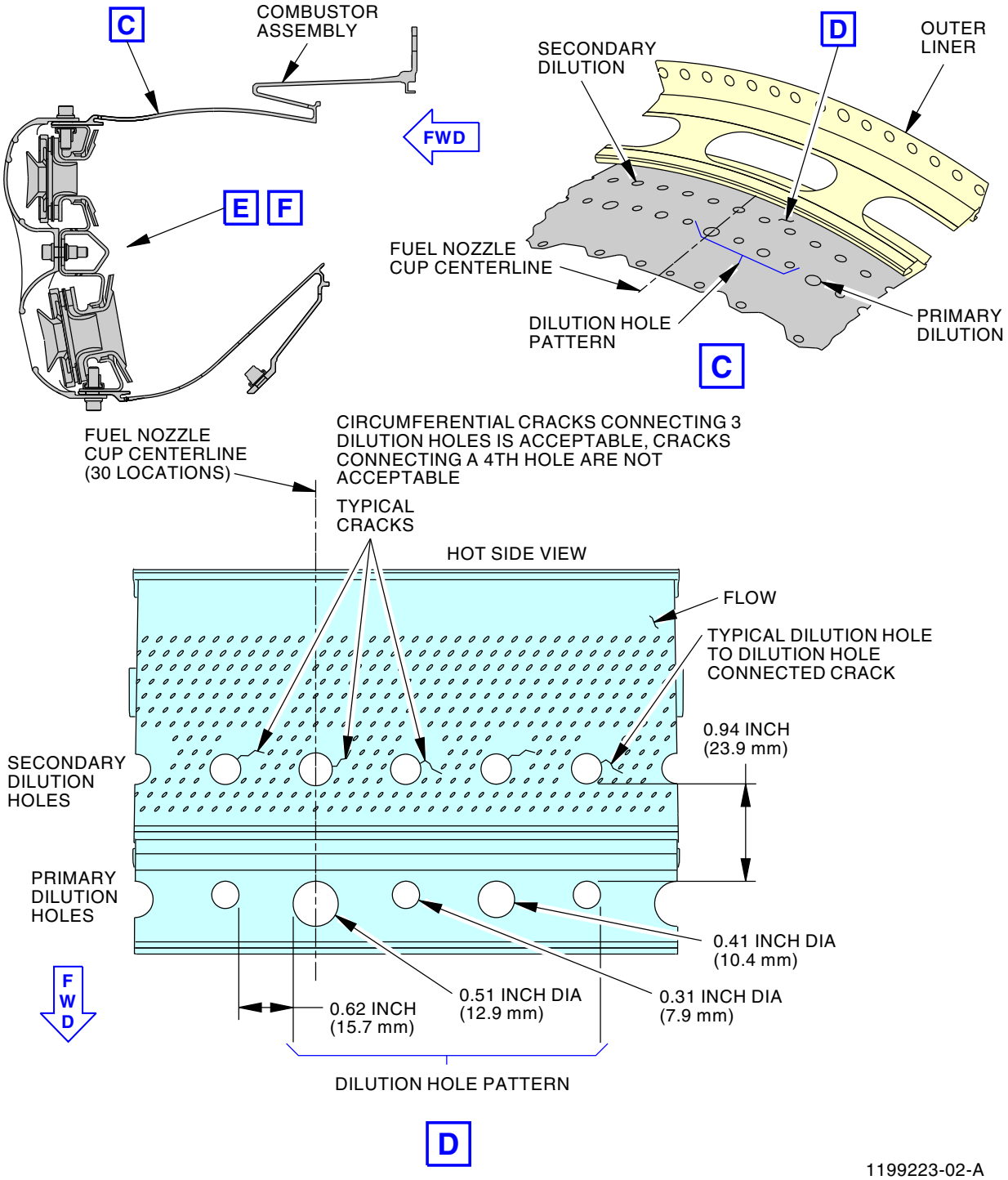
(2 LOCATIONS)

B

1199222-01-A
M06758 S0004285793_V3

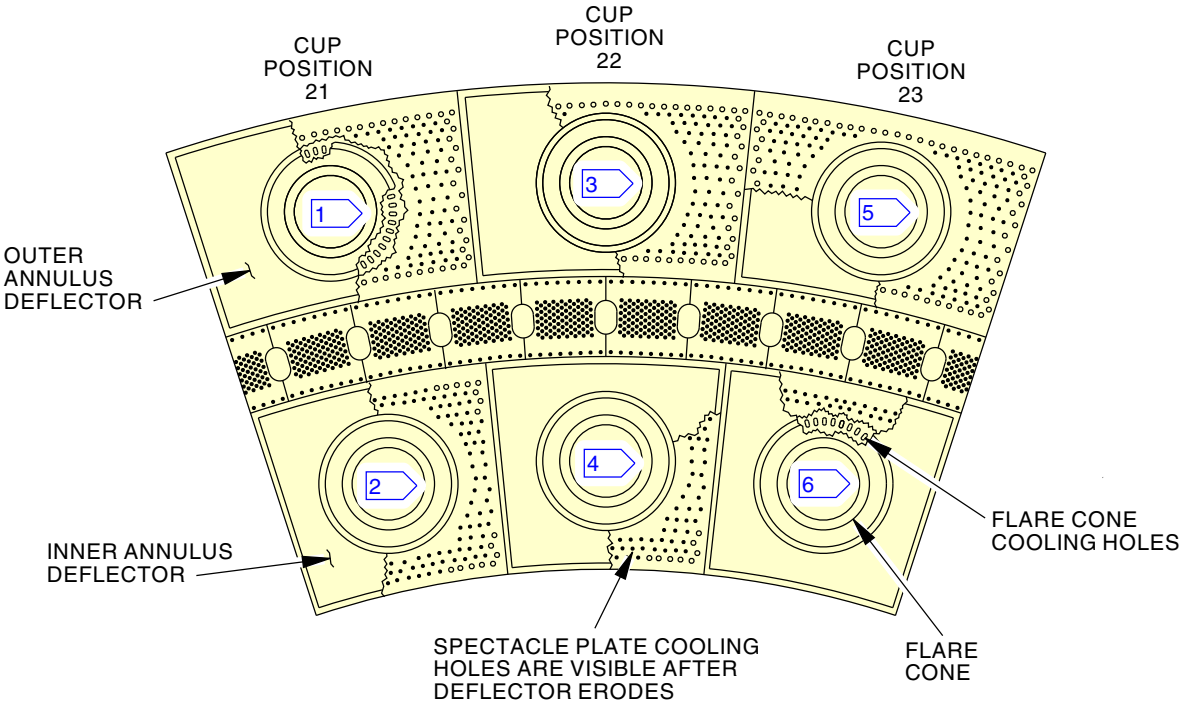
Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 4 of 12)

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



Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 5 of 12)

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



(VIEW IN THE FORWARD DIRECTION)

E

1 THIS OUTER ANNULUS DEFLECTOR HAS MORE THAN 50% MISSING MATERIAL AND MORE THAN 84 SPECTACLE PLATE COOLING HOLES EXPOSED. IF THERE ARE NO MORE THAN TWO OUTER DEFLECTORS WITH MORE THAN 50% MISSING MATERIAL OR MORE THAN 84 SPECTACLE PLATE COOLING HOLES EXPOSED AND IS NOT IN THE 22 OR 24 CUP POSITION, THEN THE INSPECTION INTERVAL IS REDUCED TO 150 CYCLES.

2 THIS INNER ANNULUS DEFLECTOR HAS MORE THAN 50% MISSING MATERIAL AND MORE THAN 84 SPECTACLE PLATE COOLING HOLES EXPOSED. THIS IS BEYOND THE MAXIMUM PERMITTED MISSING MATERIAL LIMIT. THE ENGINE CAN OPERATE 25 CYCLES.

3 THIS OUTER ANNULUS DEFLECTOR HAS MORE THAN 50% MISSING MATERIAL AND IS IN CUP POSITION 22. THE ENGINE CAN OPERATE 25 CYCLES.

4 THIS INNER ANNULUS DEFLECTOR HAS 30% MISSING MATERIAL AND HAS MORE THAN 42 SPECTACLE PLATE COOLING HOLES EXPOSED. THE INSPECTION INTERVAL IS REDUCED TO 250 CYCLES.

5 THIS OUTER ANNULUS DEFLECTOR HAS ABOUT 75% MISSING MATERIAL BUT HAS MORE THAN 126 SPECTACLE PLATE COOLING HOLES EXPOSED AND IS NOT AT CUPS 22 OR 24. THE ENGINE CAN OPERATE 25 CYCLES.

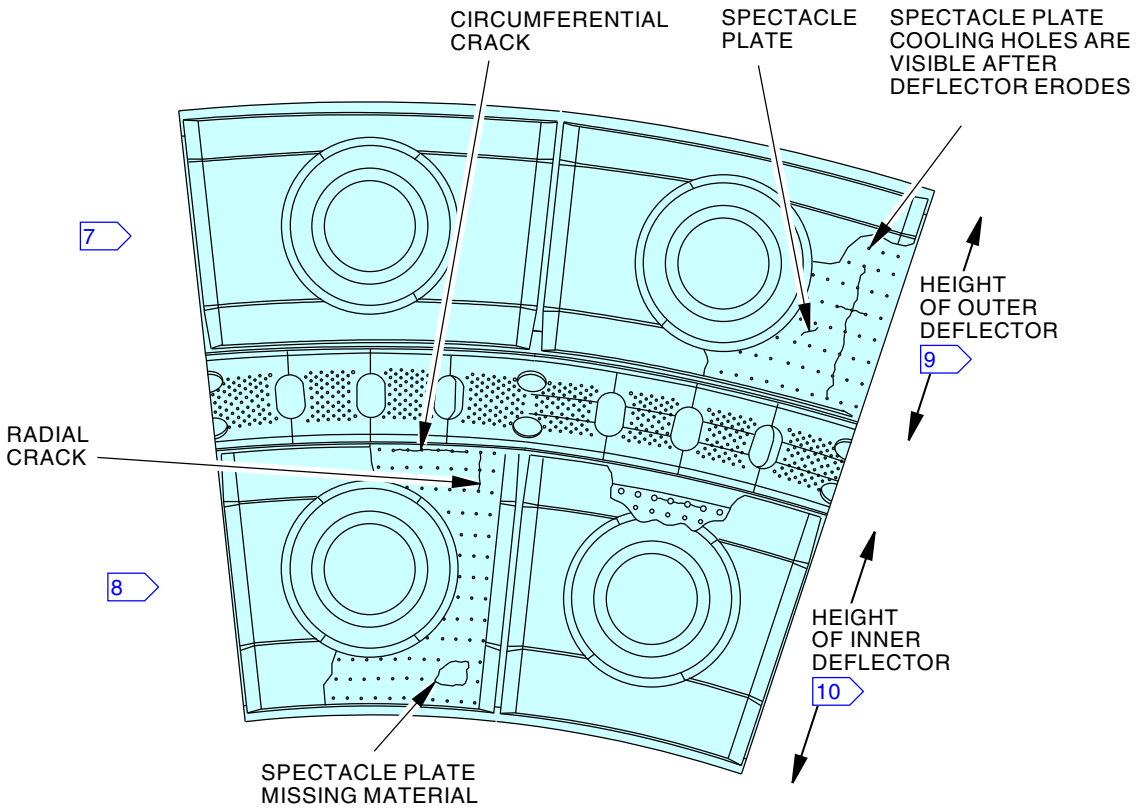
6 THIS INNER ANNULUS DEFLECTOR HAS LESS THAN 25% MISSING MATERIAL AND LESS THAN 42 SPECTACLE PLATE COOLING HOLES EXPOSED. THERE IS NO CHANGE TO THE INSPECTION INTERVAL.

5004560-00
5004561-00

M06760 S0004285795_V6

Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 6 of 12)

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



7 THE SPECTACLE PLATE IS NOT VISIBLE BECAUSE THERE IS NO DEFLECTOR MISSING MATERIAL. THIS CONDITION IS SERVICEABLE.

8 THE SPECTACLE PLATE IS VISIBLE BECAUSE THERE IS DEFLECTOR MISSING MATERIAL. A CIRCUMFERENTIAL CRACK CONNECTS 6 SPECTACLE PLATE COOLING HOLES; THIS CONDITION IS NOT SERVICEABLE AND THE ENGINE MUST BE REMOVED WITHIN 25 CYCLES. THE RADIAL CRACK IS LESS THAN HALF THE HEIGHT OF THE DEFLECTOR AND IS SERVICEABLE. THE SPECTACLE PLATE HAS MISSING MATERIAL GREATER THAN 2 SPECTACLE PLATE COOLING HOLES BY 2 SPECTACLE PLATE COOLING HOLES AND IS NOT SERVICEABLE.

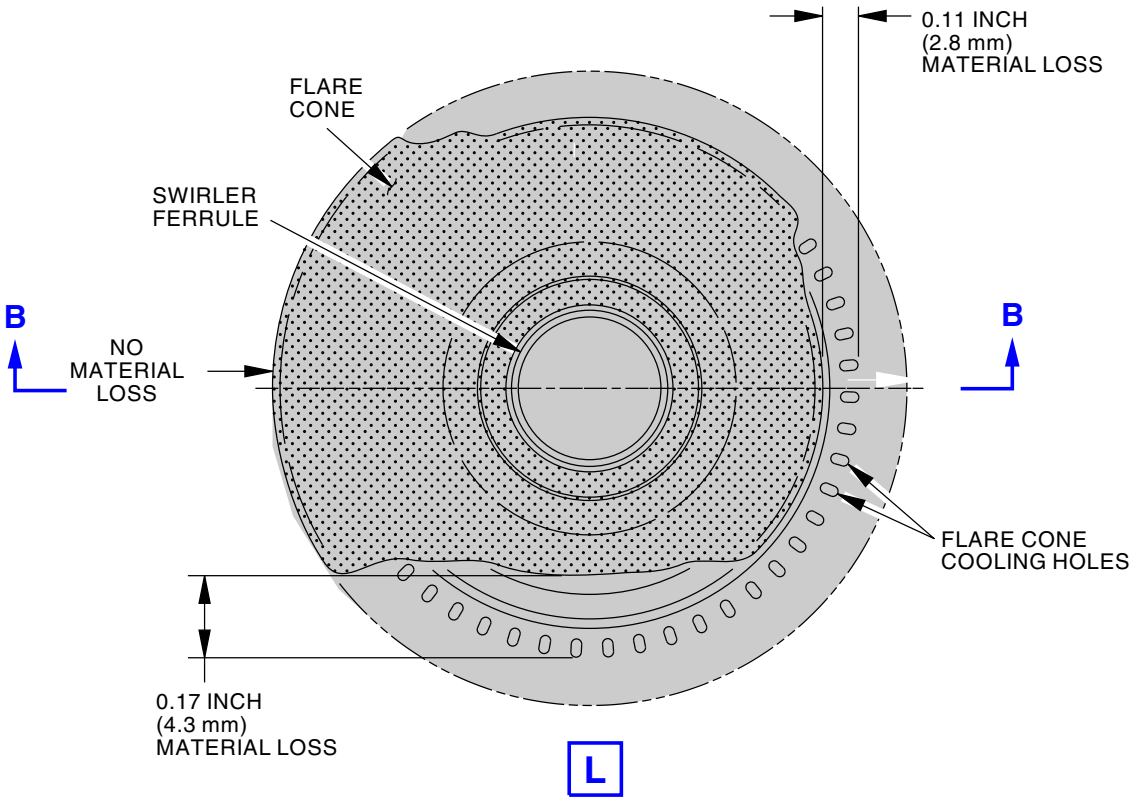
9 THIS DEFLECTOR HAS A RADIAL CRACK THAT IS GREATER THAN HALF THE HEIGHT OF THE DEFLECTOR; THIS CONDITION IS NOT SERVICEABLE AND THE ENGINE MUST BE REMOVED WITHIN 25 CYCLES. THE CIRCUMFERENTIAL CRACK CONNECTS ONLY 3 SPECTACLE PLATE COOLING HOLES AND IS SERVICEABLE.

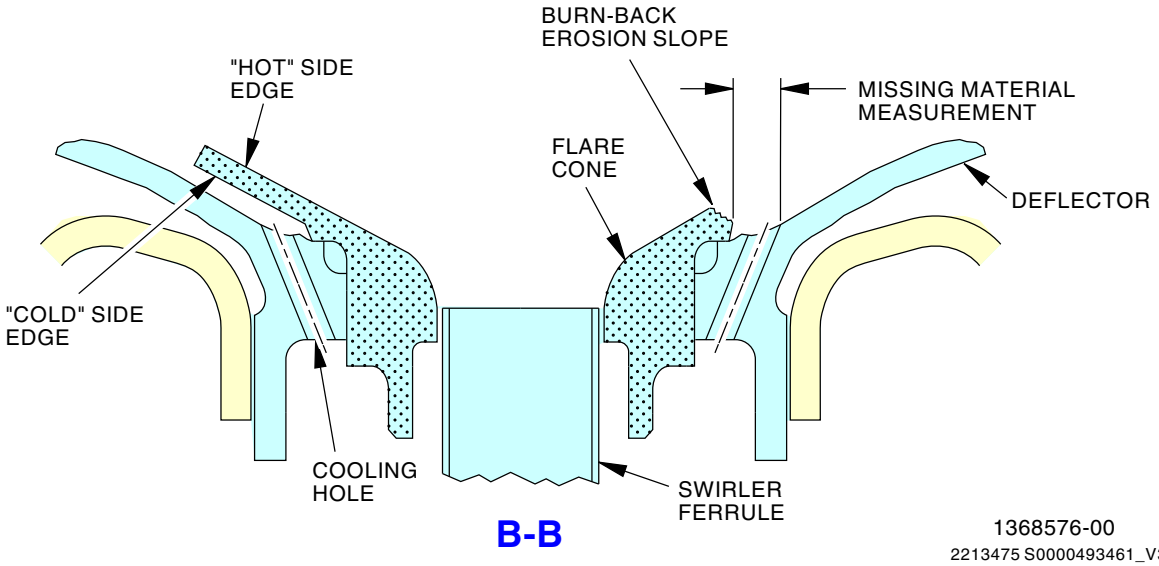
10 THIS DEFLECTOR HAS A CIRCUMFERENTIAL CRACK THAT CONNECTS 4 SPECTACLE PLATE COOLING HOLES AND IS SERVICEABLE.

1228108-00-A
M06759 S0000129095_V4

Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 7 of 12)

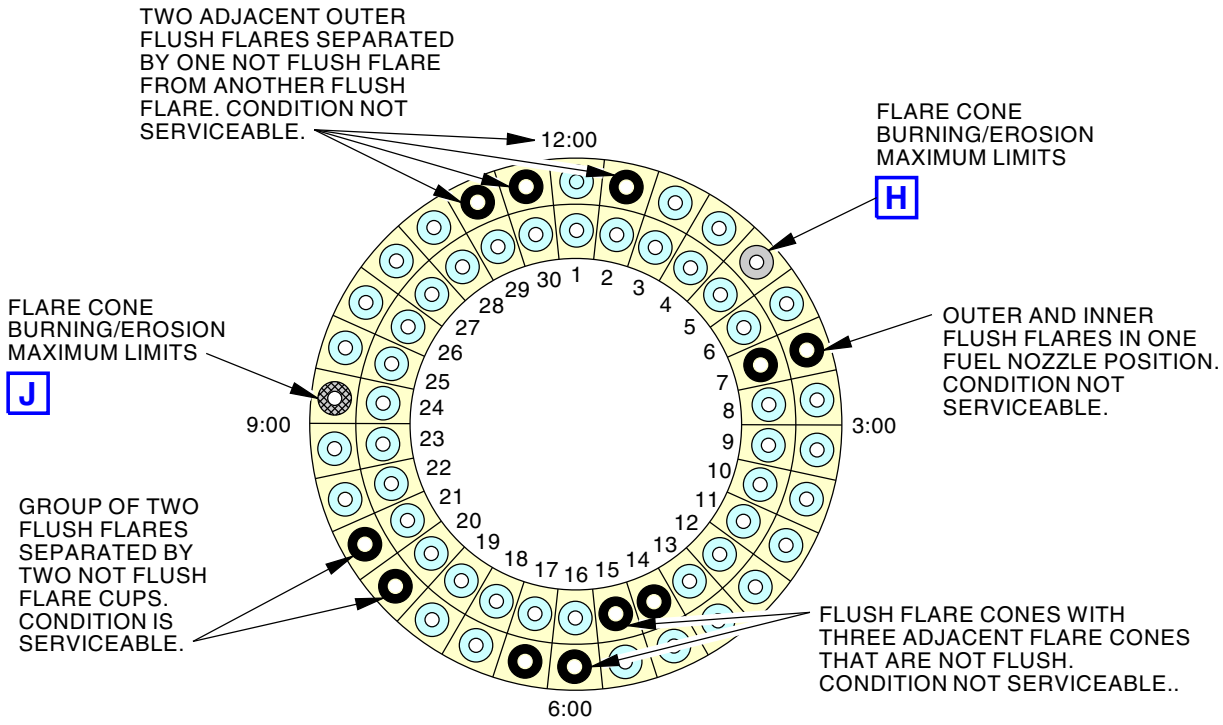
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 8 of 12)

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



(VIEW IN THE FORWARD DIRECTION)

G

LEGEND:

- ALL INNER ANNULUS AND OUTER ANNULUS CUP FLARE CONES AT FUEL NOZZLE LOCATIONS 25 THRU 30 AND 1 THRU 21 AND FLARE CONE AT FUEL NOZZLE LOCATION 23 HAVE MAXIMUM PERMITTED AMOUNT OF 0.17 INCH (4.3 MM) MISSING MATERIAL FROM OUTER EDGE OF NEAREST FLARE CONE COOLING HOLE FOR UP TO 360 DEGREES FOR EACH FLARE CONE.
- OUTER ANNULUS CUP FLARE CONES AT FUEL NOZZLE LOCATIONS 22 AND 24 (IMMEDIATELY ADJACENT TO THE IGNITERS) HAVE A MAXIMUM PERMITTED AMOUNT OF 0.11 INCH (28 mm) MISSING MATERIAL FROM OUTER EDGE OF NEAREST FLARE CONE COOLING HOLE FOR UP TO 360 DEGREES FOR EACH FLARE CONE.
- INNER/OUTER FLUSH FLARE CONES. MAXIMUM 6 FLUSH FLARE CONES.

NOTE:

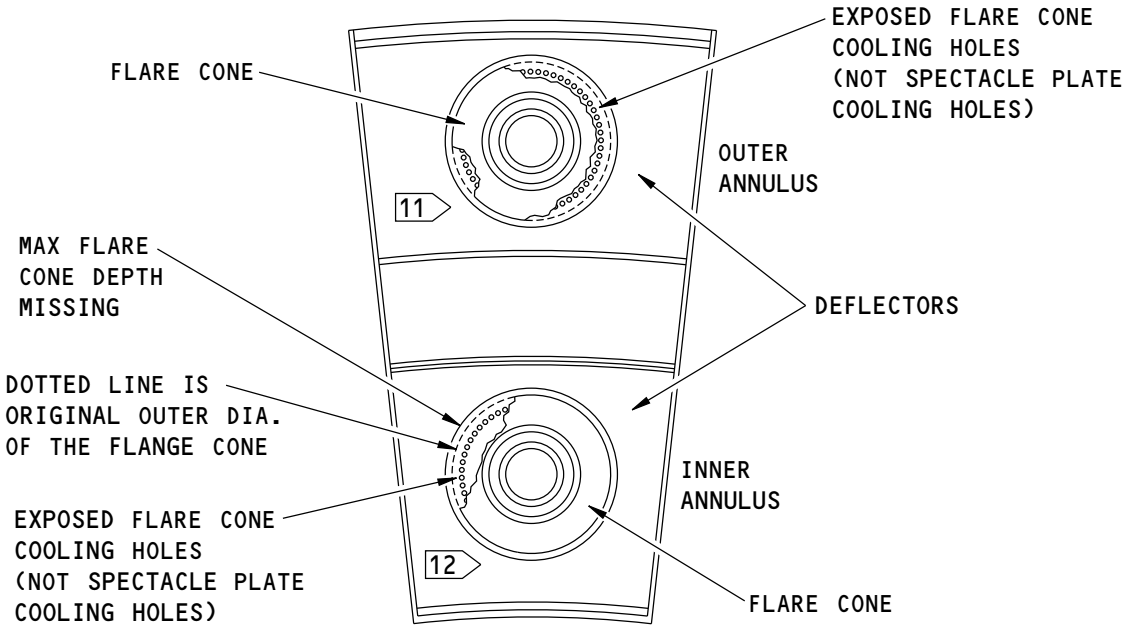
FLUSH FLARE CONE LOCATIONS IN THE FIGURE ARE SHOWN AS AN EXAMPLE.

5026099-00

2059767 S0000423873_V5

Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 9 of 12)

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



FLARE CONE BURNING/EROSION MAXIMUM LIMITS
(VIEW IN THE FORWARD DIRECTION)

H

NOTE: TO HELP MAKE SURE OF THE ACCURACY OF THE MEASUREMENT OF FLARE CONE BURNING/EROSION, THE BSI/PHOTOGRAPHING OF THE FLARE CONE SHOULD BE DONE SOMEWHERE OVER THE CUP ASSEMBLY, NOT FROM THE SIDE OR EDGE OF THE CUP.

NOTE: TYPICAL DEFLECTOR DISTRESS RELATED WITH FLARE CONE BURNING/EROSION IS NOT SHOWN HERE TO HELP MAKE SURE OF THE CLARITY OF THE MESSAGE.

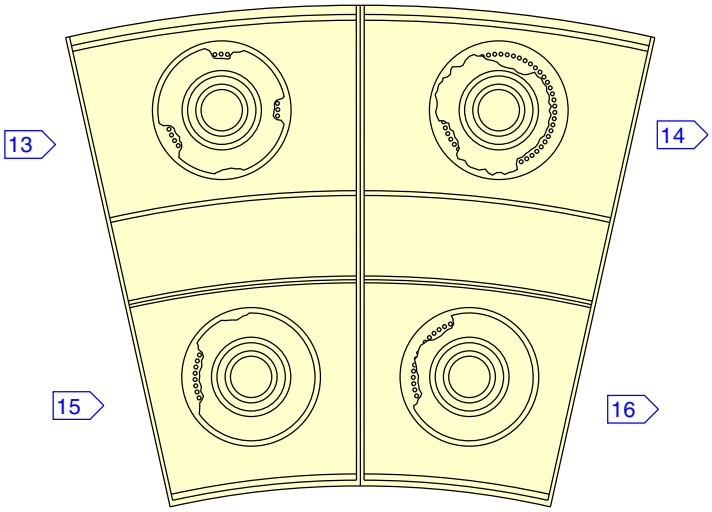
11 THIS FLARE CONE HAS MISSING MATERIAL FOR ABOUT 270 DEGREES TOTAL CIRCUMFERENTIALLY. THE MAXIMUM DEPTH FROM NEAREST FLARE CONE COOLING HOLE IS APPROXIMATELY 0.12 INCH (3.05 mm). THIS DISTRESS IS SERVICEABLE, AND HAS 500-CYCLE INSPECTION INTERVAL.

12 THIS FLARE CONE HAS MISSING MATERIAL FOR ABOUT 100 DEGREES TOTAL CIRCUMFERENTIALLY. THE MAXIMUM DEPTH FROM NEAREST FLARE CONE COOLING HOLE IS MORE THAN 0.17 INCH (4.3 mm). THIS DISTRESS IS UNSERVICEABLE.

1305274-00
2059821 S0000423874_V4

Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 10 of 12)

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



FLARE CONE BURNING/EROSION MAXIMUM LIMITS
(VIEW IN THE FORWARD DIRECTION)

J

NOTE:

TO HELP MAKE SURE OF THE ACCURACY OF THE MEASUREMENT OF FLARE CONE BURNING/EROSION, THE BSI/PHOTOGRAPHING OF THE FLARE CONE SHOULD BE DONE SOMEWHERE OVER THE CUP ASSEMBLY, NOT FROM THE SIDE OR EDGE OF THE CUP.

NOTE:

TYPICAL DEFLECTOR DISTRESS RELATED WITH FLARE CONE BURNING/EROSION IS NOT SHOWN HERE TO HELP MAKE SURE OF THE CLARITY OF THE MESSAGE.

13 FLARE CONE ON FUEL NOZZLE POSITION 24. THE MAXIMUM DEPTH PERMITTED IS 0.11 INCH (28 mm). THE MAXIMUM DEPTH OF MISSING MATERIAL HERE IS APPROXIMATELY 0.09 INCH (2.28 mm). THIS DISTRESS IS SERVICEABLE, AND HAS A 500-CYCLE INSPECTION INTERVAL.

14 THIS FLARE CONE HAS MISSING MATERIAL FOR 360 DEGREES. THE MAXIMUM DEPTH IS MORE THAN 0.17 INCH (4.3 mm). THIS DISTRESS IS SERVICEABLE ACCORDING TO CONTINUE-IN-SERVICE LIMITS, AND HAS A 500-CYCLE INSPECTION INTERVAL (AS LONG AS THERE IS NO OTHER OUTER ANNULUS CUP THAT IS MORE THAN THE 0.17 INCH (4.3 mm) LIMIT).

15 THE MAXIMUM DEPTH OF MISSING MATERIAL IS LESS THAN 0.17 INCH (4.3 mm). THIS FLARE CONE IS SERVICEABLE AND HAS A 500-CYCLE INSPECTION INTERVAL.

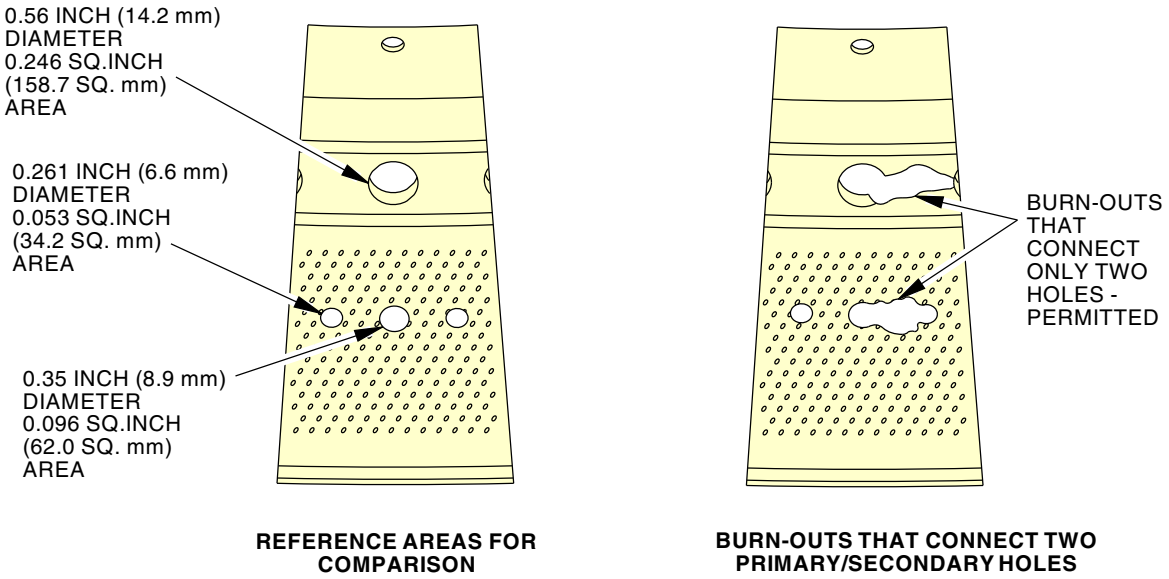
16 THIS FLARE CONE HAS MISSING MATERIAL FOR ABOUT 90 DEGREES CIRCUMFERENTIALLY. THE MAXIMUM DEPTH IS LESS THAN 0.17 INCH (4.3 mm). THIS DISTRESS IS SERVICEABLE, AND HAS A 500-CYCLE INSPECTION INTERVAL.

1305275-00

2059890 S0000423876_V7

Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 11 of 12)

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



REFERENCE AREAS FOR COMPARISON

BURN-OUTS THAT CONNECT TWO PRIMARY/SECONDARY HOLES

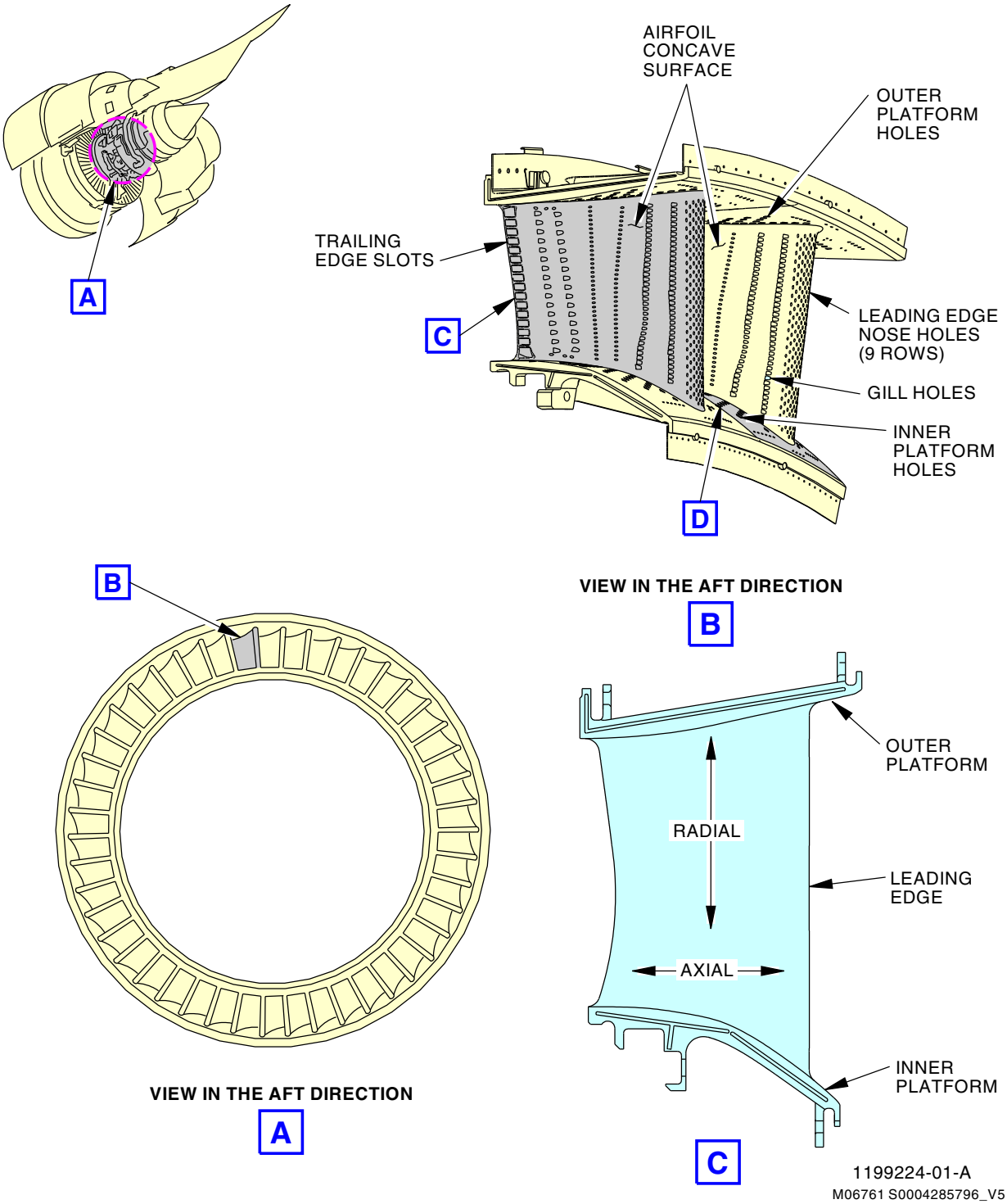
BURN-OUTS THAT CONNECT MORE THAN TWO PRIMARY/SECONDARY HOLES

MULTIPLE BURN-OUTS

2608322 S0000626613_V1

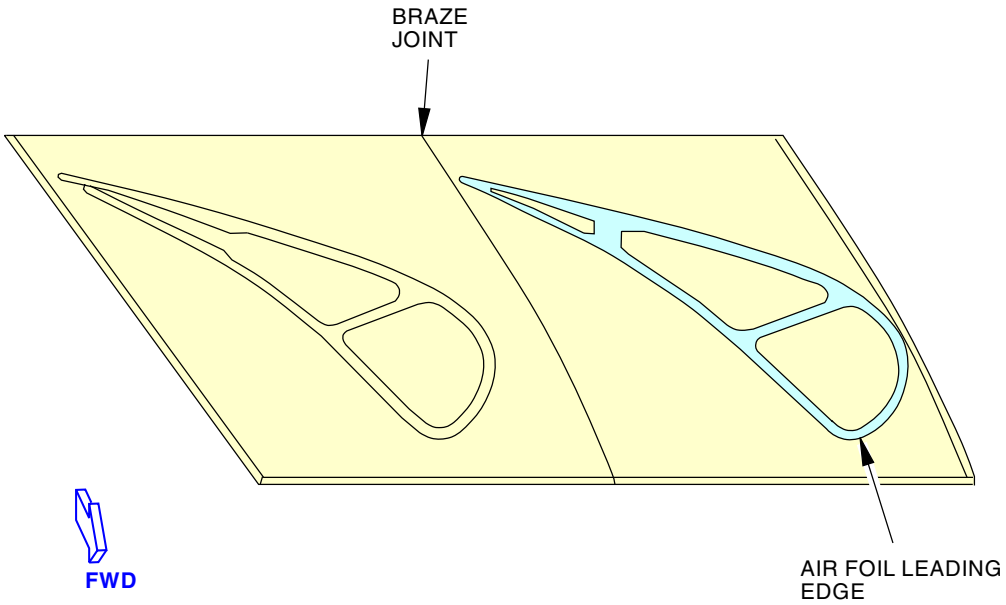
Combustion Section Inspection
Figure 611/72-00-00-990-812-H01 (Sheet 12 of 12)

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



HPT Section Stage One Nozzle Inspection
Figure 612/72-00-00-990-813-H01 (Sheet 1 of 2)

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



2132779 S0000462473_V3

HPT Section Stage One Nozzle Inspection
Figure 612/72-00-00-990-813-H01 (Sheet 2 of 2)

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

TASK 72-00-00-290-805-H01

6. High Pressure Turbine Section Stage One Nozzle (Except the Leading Edge) and Stage 1 Shroud Inspection

(Figure 610, Figure 611, Figure 612, Figure 613 and Figure 616)

A. General

(1) This task provides the instructions on how to examine the high pressure turbine section stage 1 nozzle and shroud except the leading edge.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-11-13-960-801-H00	Engine Case Borescope Bosses Locking Insert Replacement (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-115	Borescope - Right Angle Flexscope Part #: 9C1301P01 Supplier: 06083 Part #: 9C1301P03 Supplier: 06083
SPL-116	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083
SPL-570	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083
SPL-2235	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D50003 [C02-061]	Compound - Antiseize - Milk of Magnesia (unflavored)	
D50017 [C02-071]	Compound - Antiseize And Lubricating - Pure Nickel Special Grade	GE Spec D6Y28C1 or A50TF198

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

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

G. Prepare for the Inspection

SUBTASK 72-00-00-010-011-H01

(1) If it is necessary, do this task: Borescope Inspection Preparation, TASK 72-00-00-290-801-H01.

SUBTASK 72-00-00-010-025-H01

(2) Remove the borescope covers on the aft skirt.

NOTE: The aft skirt panels are given position numbers in a counterclockwise (CCW) sequence when you look at them from the front of the engine. The right aft skirt panel is at the 8:00 o'clock position and the left aft skirt panel is at the 5:00-6:00 o'clock position. Borescope L cover is at the top of the right aft skirt panel. Borescope M cover is at the top of the left aft skirt panel.

(a) Remove the bolts that attach borescope port L and M covers to the aft skirt panels.

SUBTASK 72-00-00-010-013-H01

(3) Remove borescope plugs P to do the examination of the High Pressure Turbine (HPT) stage one nozzle.

SUBTASK 72-00-00-290-006-H01

(4) Turn the borescope light source, SPL-570 on and insert the rigid borescope, SPL-116 in position for the examination.

NOTE: This examination is limited to what you can see with the rigid borescope, SPL-116 through port P. However, for EGT or other troubleshooting a more complete examination can be accomplished using the right angle flexscope borescope, SPL-115 through one of the combustor ports or the HPT section borescope ports L, M, N (if the engine is equipped with this port) and P or HPT borescope port Q.

H. High Pressure Turbine Section Stage One Nozzle (Except the Leading Edge) and Stage 1 Shroud Inspection

NOTE: Missing material is considered to be a through hole. Surface oxidation/corrosion in areas of missing coating is not missing material.

SUBTASK 72-00-00-220-038-H01

(1) Examine all surfaces of the HPT stage one nozzle.

(a) Missing TBC coating

1) Permitted.

SUBTASK 72-00-00-220-009-H01

(2) Examine the concave surface of the HPT stage one nozzle airfoil.

(a) Radial and axial cracks that extend from the gill holes

1) Any amount is permitted.

2) Any number of gill holes.

3) No missing material permitted.

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

(b) Radial and axial cracks, but not in the gill hole rows

1) Any amount of cracks are permitted.

2) No missing material.

(c) Burns or oxidation

1) Permitted if no metal is missing and the burns are not fully through.

(d) Cracks in the fillet area adjacent to the inner and outer platforms:

1) Any amount is permitted.

2) No missing material.

SUBTASK 72-00-00-220-047-H00

(3) Continue-In-Service for HPT stage one nozzle concave surface radial and axial cracks from gill holes.

(a) Borescope the area every 250 cycles.

(b) Up to 0.50 in^2 (3.23 cm^2) for each airfoil of concave surface metal that is missing for each airfoil because of cracks or burn through. Permitted for up to 25 cycles.

(c) Remove the engine immediately if missing material is more than 0.50 in^2 (3.23 cm^2) of concave surface metal for each airfoil is missing because of cracks or burn through.

SUBTASK 72-00-00-220-010-H01

(4) Examine the HPT stage one nozzle convex surface.

(a) Radial cracks

1) Permitted if no material is missing.

(b) Axial cracks

1) Permitted if no material is missing.

(c) Burns

1) Permitted if no material is missing and the burns do not go through the surface.

(d) Cracks in the fillet area that are adjacent to the inner and the outer platforms

1) Permitted with no maximum number if no material is missing.

SUBTASK 72-00-00-220-048-H00

(5) HPT stage one nozzle convex surface Continue-In-Service Limits for missing material.

(a) Borescope the area every 250 cycles.

(b) Up to 0.50 in^2 (3.23 cm^2) for each airfoil of convex surface metal that is missing for each airfoil because of cracks or burn through. Permitted for up to 25 cycles.

(c) Remove the engine immediately if missing material is more than 0.50 in^2 (3.23 cm^2) of convex surface metal for each airfoil is missing because of cracks or burn through.

SUBTASK 72-00-00-220-011-H01

(6) Examine the trailing edge of the HPT stage one nozzle airfoil.

(a) Axial cracks that start at the slots adjacent to the trailing edge

1) Permitted.

(b) Buckling or bowing

1) Permitted.

(c) Metal that is missing

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

1) Permitted if the missing material does not extend past (forward) of the trailing edge cooling slots.

(d) Continue-In-Service Limits for stage 1 HPT nozzle trailing edge missing material

1) Borescope every 100 cycles.

2) If the total area of the missing metal is within 0.90 in^2 (580.6 mm^2) - 1.1 in^2 (709.7 mm^2), remove the engine in 10 cycles.

3) If the missing metal is more than 1.1 in^2 (709.7 mm^2), remove the engine.

SUBTASK 72-00-00-220-012-H01

(7) Examine all areas of the HPT stage one nozzle airfoil.

(a) Craze cracks

1) Permitted.

(b) Nicks, scores, scratches, and dents

1) Permitted.

(c) Metal splatter

1) Permitted.

SUBTASK 72-00-00-220-013-H01

(8) Examine the HPT stage one nozzle inner and outer platforms.

(a) Cracks in the parent metal and on the braze joint between the airfoils

1) Any amount of cracks are permitted.

2) No missing material is permitted.

(b) Nicks, scores, scratches, and dents on the platform surface

1) Permitted.

(c) Burns/oxidation

1) Permitted if the burns/oxidation are not fully through the metal.

(d) Bulges or bows

1) HPT stage one nozzle inner and outer platforms Continue-In-Service limits permitted for not more than 25 cycles.

(e) HPT stage one nozzle inner and outer platform Continue-In-Service Limits for missing material

1) Borescope every 250 cycles

2) As much as 0.20 in^2 (1.29 cm^2) for each airfoil of inner and outer platform metal can be missing because of cracks or burn-through.

3) As much as 1.0 in^2 (6.45 cm^2) for each assembly of inner and outer platform metal can be missing because of cracks or burn-through.

4) Permitted for not more than 25 cycles if the above missing material is more than the limit.

5) Remove the engine immediately if the total area of missing material from both inner and outer platforms for each nozzle airfoil is more than 0.20 in^2 (1.29 cm^2).

(f) HPT stage one nozzle inner platform protruding or missing spline seal

1) Permitted.

(g) Only one HPT stage one nozzle outer platform protruding or missing spline seal

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

1) Permitted.

SUBTASK 72-00-00-290-007-H01

(9) Examine the HPT first stage shrouds for:

NOTE: This inspection is limited to what can be seen with the rigid borescope, SPL-2235.

(a) Axial cracks in the shroud flowpath surface:

1) Axial cracks in the flowpath surface that are not more than 0.15 in. (3.81 mm) in length are permitted.

2) Four cracks in the flowpath surface are permitted if they are not more than 1.0 in. (25.4 mm) in length.

3) One crack completely across the flowpath surface is permitted, if it is separated from other cracks by a minimum of 0.125 in. (3.18 mm).

a) Spacing limit does not apply to axial cracks up to 0.15 in. (3.81 mm) long that are connected to a cooling hole.

4) It is not permitted to have three connected axial and circumferential cracks.

5) Remove the engine if you make the decision that three cracks will connect in 25 cycles.

6) See the Continue-In-Service (C-I-S) limits.

(b) C-I-S limits for the HPT first stage shrouds with axial cracks in the shroud flowpath surface - 250 cycle inspection interval with these conditions

1) Axial cracks in the flowpath surface that are no more than 0.3 in. (7.6 mm) in length are permitted.

2) Four cracks in the flowpath surface are permitted if they are not more than 1.25 in. (31.8 mm) in length.

3) One crack completely across the flowpath surface is permitted as follows:

a) If it is separated from other cracks by a minimum of 0.125 in. (3.18 mm) and the width of the crack is not more than 0.010 in. (0.254 mm).

b) Spacing limit does not apply to axial cracks up to 0.15 in. (3.81 mm) long that are connected to a cooling hole.

4) Three connected axial and circumferential cracks are not permitted.

5) Remove the engine if you make the decision that three cracks will connect in 25 cycles.

6) See C-I-S limits.

(c) Continue-In-Service (C-I-S) limits for the HPT first stage shrouds with axial cracks in the shroud flowpath surface - 100 cycle inspection interval with these conditions

1) Axial cracks in the flowpath surface that are not more than 0.5 in. (12.7 mm) in length are permitted.

2) Four cracks in the flowpath surface are permitted if they are not more than 1.5 in. (38.1 mm) in length.

3) One crack completely across the flowpath surface is permitted as follows:

a) If it is separated from other cracks by a minimum of 0.125 in. (3.18 mm) and the width of the crack is not more than 0.010 in. (0.254 mm).

b) Spacing limit does not apply to axial cracks up to 0.15 in. (3.81 mm) long that are connected to a cooling hole.

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

4) Three connected axial cracks and circumferential cracks are not permitted.

5) Remove the engine if you make the decision that three cracks will connect in 25 cycles.

(d) Circumferential cracks in the shroud flowpath surface:

1) Circumferential cracks in the flowpath surface are permitted if they are not more than 0.375 in. (9.52 mm) in length and the cracks are separated by 0.125 in. (3.18 mm).

2) See the C-I-S limits.

(e) Continue-In-Service (C-I-S) limits for the HPT first stage shrouds with circumferential cracks in the shroud flowpath surface - 250 cycle inspection interval with this condition

1) Circumferential cracks in the flowpath surface are permitted if they are not more than 0.5 in. (12.7 mm) in length and the cracks are separated by 0.125 in. (3.18 mm).

2) See the C-I-S limits.

(f) Continue-In-Service (C-I-S) limits for the HPT first stage shrouds with circumferential cracks in the shroud flowpath surface - 100 cycle inspection interval with this condition

1) Circumferential cracks in the flowpath surface are permitted if they are not more than 0.625 in. (15.88 mm) in length; and the cracks are separated by 0.125 in. (3.180 mm).

(g) Split line, leading edge, trailing edge, cooling hole and flowpath surface oxidation and missing material

1) Permitted if there is no missing material.

2) At each shroud split line, an area of missing material that is less than 0.012 in^2 (7.74 mm^2) is permitted between adjacent shrouds and as follows:

a) The spline seal slot that is exposed is permitted.

b) Spline seal that is missing is permitted.

3) At each shroud leading edge, area of missing material must be less than 0.050 in^2 (32.26 mm^2) is permitted.

4) Local material loss at each cooling hole is permitted if the area is not more than 0.020 in^2 (12.90 mm^2) at each hole.

5) A hole through the shroud flowpath surface is not permitted.

(h) Continue-In-Service limits for the HPT first stage shrouds with surface oxidation and missing material at the split line - 250 cycle inspection interval with these conditions:

1) Local split line missing material is permitted, if not more than an area of 0.18 in^2 (116.13 mm^2).

2) A hole through the shroud flowpath surface is not permitted.

(i) Continue-In-Service limits for the HPT first stage shrouds with surface oxidation and missing material at the split line - 100 cycle inspection interval with these condition:

1) Local split line missing material permitted, if not more than an area of 0.25 in^2 (161.29 mm^2).

2) A hole through the shroud flowpath surface is not permitted.

(j) Continue-In-Service limits for the HPT first stage shrouds with surface oxidation and missing material at the leading or trailing edge - 250 cycle inspection interval with these conditions:

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

1) Local leading or trailing edge missing material is permitted, if not more than an area of 0.100 in^2 (64.52 mm^2) and the missing material is not more than 0.12 in. (3.05 mm) back from the edge.

2) Shroud hanger forward rail is permitted to be exposed if the area is not more than 0.060 in^2 (38.71 mm^2).

3) A hole through the shroud flowpath surface is not permitted.

(k) Continue-In-Service limits for the HPT first stage shrouds with oxidation and missing material at the leading or trailing edge - 100 cycle inspection interval with these conditions:

1) Local leading or trailing edge missing material is permitted, if not more than an area of 0.180 in^2 (116.13 mm^2).

2) Shroud hanger forward rail is permitted to be exposed if the area is not more than 0.120 in^2 (77.42 mm^2).

3) A hole through the shroud flowpath surface is not permitted.

(l) Continue-In-Service limits for the HPT first stage shrouds with oxidation and missing material at the cooling holes - 250 cycle inspection interval with these conditions:

1) Local cooling hole missing material is permitted if the cumulative area is not more than 0.200 in^2 (129.03 mm^2) and local material loss at individual cooling holes is not more than an area of 0.025 in^2 (16.13 mm^2).

2) A hole through the shroud flowpath surface is not permitted.

(m) Continue-In-Service limits for the HPT first stage shrouds with oxidation and missing material at the cooling holes - 100 cycle inspection interval with these conditions:

1) Local cooling hole missing material is permitted if the cumulative area is not more than 0.400 in^2 (258.1 mm^2) and local material loss at individual cooling holes is not more than an area of 0.030 in^2 (19.35 mm^2).

2) A hole through the shroud flowpath surface is not permitted.

(n) Continue-In-Service limits for HPT first stage shrouds with a hole through the flowpath surface:

1) Holes or missing material of any size in or less than 0.35 in. (8.9 mm) of the leading edge are serviceable on a decreased inspection interval of every 50 cycles.

2) Holes more than 0.35 in. (8.9 mm) of the leading edge less than 0.15 in. (3.8 mm) diameter (maximum area of 0.018 in^2 (11.61 mm^2)) are serviceable on a decreased inspection interval of every 25 cycles.

3) Holes more than 0.35 in. (8.9 mm) of the leading edge between 0.15 in. (3.8 mm) diameter (maximum area of 0.018 in^2 (11.61 mm^2)) and 0.25 in. (6.4 mm) diameter (maximum area of 0.049 in^2 (31.61 mm^2)) are serviceable on a decreased inspection interval of every 10 cycles.

4) Remove the engine before next flight if the hole is more than 0.35 in. (8.9 mm) of the leading edge and the hole is more than 0.25 in. (6.4 mm) diameter (more than an area of 0.049 in^2 (31.61 mm^2)).

SUBTASK 72-00-00-800-008-H01

(10) When the examination is complete, turn the borescope light source, SPL-570 off.

(a) Let the light source blower to stay on for a while to cool the lamp and case.

SUBTASK 72-00-00-410-011-H01

(11) Install the borescope plugs as follow:

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

(a) Do a visual inspection of the locking insert (lock ring) on the borescope ports for inserts that are loose or missing.

1) Replace locking inserts (lock rings) that are loose or missing with new ones (TASK 70-11-13-960-801-H00).

(b) Do a visual inspection of the borescope plugs for broken, bent or deformed spring fingers.

1) If you find more than one broken or bent spring finger or deformation, replace the borescope plug.

(c) Put pure nickel special compound, D50017 [C02-071] or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the combustor borescope plug threads.

(d) Install the borescope plugs in the combustor ports L, M, N and P.

NOTE: Not all engines are equipped with the N port.

NOTE: Borescope plugs L, M, N and P are interchangeable.

(e) Install the borescope plug in the HPT port P.

(f) Tighten the plugs for ports L, M, N and P to 190.0 in-lb (21.5 N·m) - 210.0 in-lb (23.7 N·m).

(g) If the HPT section borescope plug in port Q was removed, put pure nickel special compound, D50017 [C02-071] on the borescope plug thread.

(h) Install the HPT section borescope plug in port Q.

1) Tighten the plug for port Q to 190.0 in-lb (21.5 N·m) - 210.0 in-lb (23.7 N·m).

(i) Continue-In-Service (C-I-S) limits for loose/missing locking insert.

CAUTION

USE ANTISEIZE COMPOUND IN THE CASE BEFORE YOU INSTALL THE PLUG. IF NOT, THE PLUG CAN SEIZE IN THE CASE.

1) If you find that the locking insert is loose/missing and the running torque is less than 15 in-lb (1.7 N·m), then over tighten the plug to 350 in-lb (39.5 N·m).

2) Remove the plug in or less than 50 cycles and replace the locking insert (TASK 70-11-13-960-801-H00).

3) If there is no running torque during the installation of the plug after replacement of the locking insert, replace the borescope plug.

SUBTASK 72-00-00-410-012-H01

(12) Attach the borescope L and M covers to the aft skirt with the bolts.

NOTE: The aft skirt panels are given position numbers in a counterclockwise (CCW) sequence when you look at them from the front of the engine. The right aft skirt panel is at the 8:00 o'clock position, and the left aft skirt panel is at the 5:00-6:00 o'clock position. Borescope L cover is at the top of the right aft skirt panel. Borescope M cover is at the top of the left aft skirt panel.

(a) Tighten the bolts to 110.0 in-lb (12.4 N·m) - 120.0 in-lb (13.6 N·m).

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

I. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-860-019-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-00-00-410-013-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 ———

TASK 72-00-00-290-806-H01

7. High Pressure Turbine Section Rotor (Stage 1 and 2 blades), Stage 2 Nozzle and Stage 2 Shroud Inspection

(Figure 613, Figure 614, Figure 615, Figure 616 and Figure 617)

NOTE: This procedure is a scheduled maintenance task.

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

A. General

(1) This task provides the instructions on how to examine high pressure turbine section rotor.

NOTE: Inspection of the stage 2 nozzle is limited to the borescope nozzle concave airfoil, convex airfoil and inner and outer platform during inspection of the stage 1 blade trailing edge and the stage 2 blade leading edge.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-11-13-960-801-H00	Engine Case Borescope Bosses Locking Insert Replacement (P/B 201)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
72-00-00-820-801-H01	Zero-Index of the HPC Rotor (P/B 201)
72-00-00-980-801-H01	Manual Motoring of the HPC Rotor (P/B 201)
72-00-00-980-802-H01	Electrical Motoring of the HPC Rotor (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-115	Borescope - Right Angle Flexscope Part #: 9C1301P01 Supplier: 06083 Part #: 9C1301P03 Supplier: 06083
SPL-116	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083
SPL-570	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D50003 [C02-061]	Compound - Antiseize - Milk of Magnesia (unflavored)	
D50017 [C02-071]	Compound - Antiseize And Lubricating - Pure Nickel Special Grade	GE Spec D6Y28C1 or A50TF198

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

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
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

G. Prepare for the Inspection

SUBTASK 72-00-00-010-015-H01

(1) If it is necessary, do this task: Borescope Inspection Preparation, TASK 72-00-00-290-801-H01.

SUBTASK 72-00-00-480-002-H01

(2) Install the manual or electrical motoring tool (TASK 72-00-00-980-801-H01 or TASK 72-00-00-980-802-H01).

H. High Pressure Turbine Section Rotor Inspection

SUBTASK 72-00-00-010-016-H01

(1) Remove borescope plugs Q and R.

SUBTASK 72-00-00-980-004-H01

(2) Do this task: Zero-Index of the HPC Rotor, TASK 72-00-00-820-801-H01.

SUBTASK 72-00-00-290-008-H01

(3) Turn the borescope light source, SPL-570 on and insert the rigid borescope, SPL-116 or right angle flexscope borescope, SPL-115 into position for the examination.

NOTE: Use the right angle flexscope borescope, SPL-115 if necessary to examine the High Pressure Turbine (HPT) stage 2 nozzle assembly.

SUBTASK 72-00-00-980-005-H01

(4) Manual or electrical motor the HPT rotor.

NOTE: One turn of the motoring tool equals one turn of the rotor.

SUBTASK 72-00-00-210-003-H01

(5) Examine the HPT rotor first stage blade surface coat (TBC).

(a) Surface coat (TBC) that is missing with metal oxidation:

NOTE: Metal oxidation shows as green or black discoloration of the metal.

1) Any amount is permitted.

NOTE: Missing surface coat (TBC) limits may change based on other inspection criteria.

(b) Metal Splatter

1) Permitted if the holes are not plugged.

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

SUBTASK 72-00-00-210-004-H01

(6) Examine the HPT rotor first stage blade leading edge:

NOTE: The HPT first stage blade leading edge conditions below (specifically cracks, tears, and missing material) are indications of impact damage. When these conditions are found and result in reduced inspections, upstream hardware must be inspected to find the source of the impact damage. It is recommended to do an inspection of upstream hardware within 10 cycles after you find the impact damage to make sure of the serviceability of upstream hardware.

NOTE: The upstream hardware to be inspected includes the HPT stage 1 shroud, stage 1 nozzle, and combustor.

NOTE: A flexible borescope minimum length of 3.5 meters is necessary to examine all of the HPT stage 1 shrouds.

NOTE: The leading edge of the airfoil is defined as the region from row 3 convex surface gill holes to the row 9 concave surface gill holes.

(a) Axial and radial cracks in area A:

1) Permitted with these conditions:

a) Cracks can connect a maximum of three holes.

b) Axial cracks do not go past the leading edge region.

2) Continue-In-Service (C-I-S) Limits for stage 1 blade leading edge axial and radial cracks in area A:

a) Borescope the area every 250 cycles.

b) Cracks can connect to any number of holes.

c) Axial cracks do not go past the leading edge region.

d) Remove the engine in 25 cycles if the axial crack goes past the leading edge region.

(b) Radial cracks that go out of the area B leading edge holes:

1) Permitted with these conditions:

a) Cracks can connect a maximum of two holes.

b) Cracks cannot go in an axial direction.

2) Continue-In-Service (C-I-S) Limits for stage 1 blade leading edge radial cracks in area B:

a) Borescope the area every 125 cycles.

b) Cracks can connect to any number of holes.

c) Remove the engine in 25 cycles if the radial cracks turn axial and go past the leading edge region.

(c) Axial cracks in area B:

1) Continue-In-Service (C-I-S) Limits for stage 1 blade leading edge axial and radial cracks in area B:

a) Borescope the area every 100 cycles.

b) Cracks can connect to all holes if there is no missing metal.

c) Axial cracks do not go past the leading edge region.

d) Remove the engine in 25 cycles if the axial crack goes past the leading edge region.

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

(d) Nicks and dents in area A:

1) Permitted in area A with these conditions:

a) The damage or cracks that result do not go past the leading edge region.

(e) Nicks and dents in area B:

1) Permitted in area B with these conditions:

a) The damage does not go past the leading edge region.

b) There is no related tears, metal that is missing, or cracks.

(f) Metal that is missing in area A:

1) Continue-In-Service (C-I-S) Limits for stage 1 blade leading edge metal that is missing in area A:

a) Borescope the area every 250 cycles.

b) All amounts are permitted if it does not go beyond the first internal rib.

NOTE: The first internal rib has cross over holes in it.

c) Axial cracks do not go past the nose holes.

d) Axial cracks do not go past the convex surface gill holes.

e) Remove engine in 25 cycles if the axial cracks go past the nose holes or convex surface gill holes.

2) Continue-In-Service (C-I-S) Limits for stage 1 blade leading edge metal that is missing in area A beyond the first internal rib:

a) Borescope the area every 50 cycles.

b) All amounts are permitted.

c) Axial cracks must not go past the convex surface gill holes.

d) Remove the engine in 25 cycles if axial cracks go past the concave or convex surface gill holes.

e) Remove the engine in 15 cycles if the metal that is missing is past the second internal rib.

(g) Metal that is missing in area B:

1) Continue-In-Service (C-I-S) Limits for stage 1 blade leading edge metal that is missing in area B:

a) Borescope the area every 125 cycles.

b) All amounts are permitted if it does not go beyond the first internal rib.

c) Axial cracks are not permitted.

d) Radial cracks are not permitted.

e) Remove the engine in 5 cycles if missing material goes beyond the first rib or if there are axial cracks.

f) Borescope the area every 25 cycles if there are radial cracks.

SUBTASK 72-00-00-220-014-H01

(7) Examine the HPT rotor first stage blade trailing edge (Figure 614).

NOTE: The trailing edge limits apply to a region from the aft edge of the trailing edge to 0.5 in. (12.7 mm) forward of the trailing edge.

(a) Axial cracks in the first stage blade trailing edge in area A:

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

1) Axial cracks that are not more than 0.3 in. (7.6 mm) from the trailing edge are permitted.
2) Continue-In-Service (C-I-S) Limits for the stage 1 blade trailing edge axial cracks in area A:
   a) Borescope the area every 250 cycles.
   b) Axial cracks can be longer than 0.3 in. (7.6 mm) but must be less than 0.4 in. (10.2 mm).
   c) Remove the engine in 25 cycles, if the axial cracks in the trailing edge are longer than 0.4 in. (10.2 mm).

(b) Axial crack in the first stage blade trailing edge in area B:
1) All axial cracks that are not more than 0.30 in. (7.6 mm) from the trailing edge are permitted if they are not in the trailing edge root radius.
2) Continue-In-Service (C-I-S) Limits for the stage 1 blade trailing edge axial cracks in area B if they are not in the trailing edge root radius:
   a) Borescope the area every 100 cycles.
   b) Axial cracks can be longer than 0.3 in. (7.6 mm) but must be less than 0.4 in. (10.2 mm).
   c) Remove the engine in 15 cycles if the axial cracks in the trailing edge are longer than 0.40 in. (10.2 mm).

(c) Axial cracks in the first stage blade trailing edge root radius:
1) All axial cracks that are not more than 0.2 in. (5.1 mm) in length and that do not turn radially are permitted.
2) Continue-In-Service (C-I-S) Limits for stage 1 blade trailing edge axial cracks in the root radius:
   a) Borescope the area every 50 cycles.
   b) Axial cracks can be longer than 0.2 in. (5.1 mm) but must be less than 0.4 in. (10.2 mm) and must not turn radially.
   c) Remove the engine in 15 cycles if the axial cracks in the trailing edge are longer than 0.4 in. (10.2 mm).

(d) Nicks in Area A trailing edge:
1) There is no limit to the number of nicks permitted in Area A with these conditions:
   a) There is no torn metal or cracks.
2) Continue-In-Service (C-I-S) Limits for stage 1 blade trailing edge nicks in area A:
   a) Borescope the area every 250 cycles for torn metal or cracks.
   b) Borescope the trailing edge every 50 cycles if internal cavities are visible.
   c) Remove in 25 cycles if the torn metal or cracks are more than 0.40 in. (10.2 mm).

(e) Nicks in area B trailing edge:
1) Permitted in area B with these conditions:
   a) There is no torn metal or cracks.
   b) There are no nicks in the root radius.
2) Continue-In-Service (C-I-S) Limits for stage 1 blade trailing edge nicks in the root radius:

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

a) Borescope the area every 250 cycles.

b) Nicks in the root radius that are more than 0.20 in. (5.1 mm) but less than 0.40 in. (10.2 mm) are permitted with this condition:

<1> There is no torn metal or cracks.

3) Continue-In-Service (C-I-S) Limits for stage 1 blade trailing edge nicks in area B if there is torn metal or cracks:

a) Borescope the area every 100 cycles.

b) Remove the engine in 25 cycles if there is torn metal or cracks that are more than 0.40 in. (10.2 mm).

4) Continue-In-Service (C-I-S) Limits for stage 1 blade trailing edge nicks in area B if the internal cavities are visible:

a) Borescope the area every 50 cycles.

b) Remove the engine in 25 cycles if there is torn metal or cracks that are more than 0.40 in. (10.2 mm).

(f) Dents in Area A trailing edge:

1) Permitted with these conditions:

a) The length or diameter of the dent is not more than the area of one trailing edge slot or 0.15 in. (3.81 mm).

b) The depth of the dent is not more than 0.04 in. (1.02 mm).

c) There is no metal extrusion from the dent into the trailing edge slot.

2) Continue-In-Service (C-I-S) Limits for the stage 1 blade with trailing edge dents with extrusion into the trailing edge slot:

a) Borescope the area every 250 cycles.

b) All amounts are permitted if there is no cracking.

(g) Dents in area B trailing edge:

1) All dents in area B are permitted with these conditions:

a) The length or diameter of the dent is not greater than the area of the one trailing edge slot or 0.15 in. (3.81 mm).

b) The depth of the dent is not greater than 0.04 in. (1.02 mm).

c) There is no metal extrusion from the dent into the trailing edge slot.

2) Continue-In-Service (C-I-S) Limits for stage 1 blade with trailing edge dents with extrusion into the trailing edge slot

a) Borescope the area every 100 cycles.

b) All amounts are permitted if there is no cracking.

(h) Tears in Area A trailing edge:

1) Continue-In-Service (C-I-S) Limits for stage 1 blade with tears in area A:

a) Borescope the area every 250 cycles.

b) All amounts that do not go past 0.40 in. (10.2 mm) from the trailing edge are permitted.

c) Axial crack from tears are permitted up to 0.10 in. (2.5 mm).

d) Radial cracks toward the tip from the tears are permitted.

(i) Tears in area B trailing edge:

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

1) Continue-In-Service (C-I-S) Limits for stage 1 blade with tears in area B:
   a) Borescope the area every 100 cycles.
   b) All amounts that do not go past 0.40 in. (10.2 mm) from the trailing edge are permitted.
   c) Axial crack from tears are permitted up to 0.10 in. (2.5 mm).
   d) Radial cracks from the tears toward the tip are permitted.

(j) Oxidation in the first stage blade trailing edge area A and B, but not in the root radius:
1) Permitted, if you do not see the internal cavities.
2) Continue-In-Service (C-I-S) Limits for oxidation of the stage 1 blade trailing edge area A and B when the internal cavities are visible:
   a) Borescope the area every 100 cycles.
   b) Axial cracking is permitted up to 0.10 in. (2.5 mm).
   c) Radial cracking is permitted up to 0.20 in. (5.1 mm).

(k) Oxidation in the first stage blade trailing edge root radius.
1) Oxidation in the root radius is not permitted.
2) Continue-In-Service (C-I-S) Limits for oxidation of the stage 1 blade trailing edge root radius:
   a) Borescope the area every 50 cycles if the internal cavities are not visible.
   b) Cracks are not allowed.
   c) Remove the engine in 10 cycles if internal cavities are visible.

(l) Metal that is missing from the first stage blade trailing edge in area A and B, but not from the root radius:
1) Permitted, if you do not see the internal cavities of the blade.
2) Continue-In-Service (C-I-S) Limits for metal that is missing from the stage 1 blade trailing edge in area A and B, but not from the root radius:
   a) Borescope the area every 100 cycles if the internal cavities are visible.
   b) Axial cracks are permitted up to 0.10 in. (2.54 mm).
   c) Radial cracks are permitted up to 0.20 in. (5.1 mm).

(m) Metal that is missing from the stage 1 blade trailing edge in the root radius:
1) Continue-In-Service (C-I-S) Limits for metal that is missing from the stage 1 blade trailing edge in the root radius with no cracks:
   a) Remove the engine in 10 cycles.
2) Continue-In-Service (C-I-S) Limits for metal that is missing from the first stage blade trailing edge in the root radius with axial or radial cracks:
   a) Axial and radial cracks are not permitted.
   b) Remove the engine before next flight.

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

SUBTASK 72-00-00-220-015-H01

(8) Examine the HPT rotor first stage blade concave surfaces:

NOTE: These limits apply only to areas of the blade that are not the leading edge, trailing edge or blade tip inspection regions.

NOTE: If cracks on the concave surface extend into the tip region, find the condition based on the limits below.

(a) Radial cracks at film (row 10 to row 14) and row 9 gill holes:

NOTE: For missing material between cooling holes, all crack limits apply for a maximum of 3 adjacent cooling holes, if the crack width is no more than twice the width of a cooling hole.

1) Permitted above the 4th gill hole from the tip of the blade with this condition:

a) Cracks can connect a maximum of two holes and must not turn in an axial direction.

2) No cracks are permitted below the eighth gill hole from the tip of the blade on the concave surface.

3) Continue-In-Service Limit for stage 1 blade concave surface radial cracks at film row 10 to row 14 or row 9 gill holes that connect any number of cooling holes and do not turn in an axial direction:

a) Borescope the area every 250 cycles.

b) No cracks are permitted below the 15th gill hole from the tip of the blade on the concave surface.

c) Remove the engine in 10 cycles if the cracking is below the 15th gill hole from the tip of the blade.

4) Continue-In-Service Limits for stage 1 blade concave surface radial cracks at row 11 holes that turn in an axial direction:

a) Borescope the area every 125 cycles.

b) No cracks are permitted below the 15th gill hole from the tip of the blade on the concave surface.

c) Cracks can turn in a axial direction up to row 10 cooling holes.

d) Cracks cannot go past the row 10 cooling holes.

e) Cracks cannot turn in a radial direction at row 10 cooling holes.

f) TBC must be present forward of row ten cooling holes in front of the crack TBC can be missing forward of row ten if not at crack front.

g) Two axial cracks going forward toward row 10 are not permitted.

<1> Remove the engine within 50 cycles.

h) Cracks can turn in axial direction and extend aft to the tip.

i) Remove the engine in 10 cycles if cracking is below the 15th gill hole from the tip of the blade.

5) Continue-In-Service Limits for stage 1 blade concave surface radial cracks at row 12 holes that turn in an axial direction:

a) Borescope the area every 125 cycles.

b) No cracks are permitted below the 15th gill hole from the tip of the blade on the concave surface.

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

c) Cracks can turn in a axial direction up to row 11 cooling holes.

d) Cracks cannot go past the row 11 cooling holes.

e) Cracks cannot turn in a radial direction at row 11 cooling holes.

f) Two axial cracks going forward toward row 11 are not permitted.

<1> Remove the engine within 50 cycles.

g) Two axial cracks from row 12 cooling holes, one going forward and one going aft are not permitted.

<1> Remove the engine in 50 cycles.

h) Remove the engine in 10 cycles if cracking goes forward of row 11 cooling holes, turns radially in row 11 cooling holes or below the 15th gill hole from the tip of the blade.

(b) Radial cracks in Area A other than at the film or gill holes:

1) One radial crack in area A other than at the film or gill holes is permitted with these conditions:

a) The crack on the concave surface is not longer than the space between four gill holes, or 0.40 in. (10.2 mm).

b) The crack does not turn in an axial direction.

c) The Internal cavity must not be visible.

2) Continue-In-Service Limits for the radial crack in area A that is on the concave surface and is longer than the space between four gill holes, or 0.40 in. (10.2 mm) but less than 0.80 in. (20.3 mm) space between 8 grill holes:

a) Borescope the area every 250 cycles.

b) A crack in an axial direction up to 0.10 in. (2.5 mm) is permitted.

c) The Internal cavity must not be visible.

3) Continue-In-Service Limits for a radial crack in area A that is on the concave surface and up to 1.0 in. (25.4 mm).

a) Borescope the area every 100 cycles.

b) A crack in an axial direction up to 0.20 in. (5.1 mm) is permitted.

c) The Internal cavity must not be visible.

d) For radial cracks more than 1.00 in. (25.4 mm), axial cracks more than 0.20 in. (5.1 mm), or cracks that connect to cracks in cooling hole rows, do an inspection of area every 25 cycles.

e) If internal cavity is visible, remove the engine within 10 cycles.

(c) Radial cracks in Area B other than at the film or gill holes:

1) One radial crack in Area B other than at the film or gill holes is permitted with these conditions:

a) One crack up to a maximum space between 4 grill holes of 0.40 in. (10.2 mm) long is permitted.

b) The crack is not in an axial direction.

c) The internal cavity is not visible.

2) Continue-In-Service Limits for one radial crack in area B that is longer than 0.40 in. (10.2 mm) space between 4 grill holes but less than 0.60 in. (15.2 mm) space between 6 grill holes:

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

a) Borescope the area every 100 cycles.
b) The crack cannot be in an axial direction.
c) The internal cavity must not be visible.
d) Remove engine in 25 cycles if the crack is longer than 0.6 in. (15.2 mm).
e) Remove engine in 10 cycles if the crack is in an axial direction or internal cavities are visible.

(d) Radial cracks that go out of the tips of the film holes.
1) Three cracks are permitted with these conditions:
a) They do not go into the next film hole.
b) They do not go in the direction of the blade platform from the bottom hole.
c) They do not go in an axial direction.
2) Continue-In-Service Limits for radial cracks that go out of the tip of the film holes and connects two film holes:
a) Borescope the area every 100 cycles.
b) The cracks must not go in the direction of the platform from the bottom hole.
c) The cracks must not turn in an axial direction.
d) Remove engine in 10 cycles if crack turns axial or if it goes in the direction of the platform from the bottom hole.
3) Continue-In-Service Limits for radial cracks that go out of the tip of the film holes and connects three film holds:
a) Borescope the area every 25 cycles.
b) The cracks must not go in the direction of the platform from the bottom hole.
c) The cracks must not turn in an axial direction.
d) Remove the engine in 10 cycles if the cracking is below the twelfth gill hole from the platform or turns in a radial direction.

(e) Nicks and dents in Area A concave surfaces:
1) Permitted in Area A if there are no tears, cracks, or holes that go through the surface metal.

(f) Nicks and dents in Area B concave surfaces:
1) Permitted in Area B concave surface if the diameter is no more than the space between two gill holes or 0.07 in. (1.78 mm).
2) Permitted in Area B convex surface if there are no tears, cracks, or holes through the surface metal.
3) No nicks and dents are permitted in the root radius.

(g) Twisted, bent, burnt/oxidized, or melted airfoil surfaces.
1) Not permitted.

(h) Axial cracks in area A and B:
1) Not permitted.
2) Continue-In-Service Limits for axial cracks that are less than 0.10 in. (2.5 mm) on areas A and B:
a) Borescope the area every 100 cycles.

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

b) One crack that is less than 0.10 in. (2.5 mm) is permitted.

c) The crack cannot be in a radial direction.

3) Continue-In-Service Limits for axial cracks that are more than 0.10 in. (2.5 mm) but less than 0.20 in. (5.1 mm) on areas A and B:

a) Borescope the area every 50 cycles.

b) One crack that is less than 0.20 in. (5.1 mm) is permitted.

c) Remove engine in 10 cycles if the crack is longer than 0.20 in. (5.1 mm) or if the crack turns is a radial direction.

SUBTASK 72-00-00-220-039-H00

(9) Examine the HPT rotor first stage blade convex surfaces (Figure 614).

(a) Radial cracks at film and gill holes:

1) Permitted above the fourth gill hole from the tip of the blade with this condition:

a) Cracks can connect a maximum of two holes and must not turn in an axial direction.

2) No cracks are permitted below the eighth gill hole from the tip of the blade on the convex surface.

3) Continue-In-Service Limit for stage 1 blade convex surface radial cracks at film or gill holes that connect a maximum of three holes and do not turn in an axial direction:

a) Borescope the area every 250 cycles.

b) No cracks are permitted below the twelfth gill hole from the tip of the blade on the convex surface.

c) Remove the engine in 10 cycles if the cracking is below the twelfth gill hole from the platform or turns in a radial direction.

4) Continue-In-Service Limits for stage 1 blade convex surface radial cracks at film or gill holes that connect more than three holes and do not turn in an axial direction:

a) Borescope the area every 50 cycles.

b) No cracks are permitted below the 12th gill hole tip of the blade on the convex surface.

c) Remove the engine in 10 cycles if cracking is below the twelfth gill hole from the tip of the blade or turns in a radial direction.

(b) Radial cracks in Area A and B other than at the film or gill holes:

1) One radial crack other than at the film or gill holes is permitted with these conditions:

a) One crack up to a maximum of 0.40 in. (10.2 mm) long is permitted.

b) The crack is not in an axial direction.

c) The internal cavity is not visible.

2) Continue-In-Service Limits for one radial crack that is longer than 0.40 in. (10.2 mm) but less than 0.60 in. (15.2 mm):

a) Borescope the area every 100 cycles.

b) The crack cannot be in an axial direction.

c) The internal cavity is not visible.

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

d) Remove engine in 25 cycles if the crack is longer than 0.6 in. (15.2 mm).

e) Remove engine in 10 cycles if the crack is in an axial direction.

(c) Radial cracks that go out of the tips of the film holes.

1) Three cracks are permitted with these conditions:

a) They do not go into the next film hole.

b) They do not go in the direction of the blade platform from the bottom hole.

c) They do not go in an axial direction.

2) Continue-In-Service Limits for radial cracks that go out of the tip of the film holes and connects two film holes:

a) Borescope the area every 100 cycles.

b) The cracks must not go in the direction of the platform from the bottom hole.

c) The cracks must not turn in an axial direction.

d) Remove engine in 10 cycles if crack turns axial or if it goes in the direction of the platform from the bottom hole.

3) Continue-In-Service Limits for radial cracks that go out of the tip of the film holes and connects three film holds:

a) Borescope the area every 25 cycles.

b) The cracks must not go in the direction of the platform from the bottom hole.

c) The cracks must not turn in an axial direction.

d) Remove the engine in 10 cycles if the cracking is below the twelfth gill hole from the platform or turns in a radial direction.

(d) Nicks and dents in Area A convex surfaces:

1) There is no limit to the number of nicks and dents in Area A with this condition.

a) There are no tears, cracks, or holes that go through the surface metal.

(e) Nicks and dents in Area B convex surfaces:

1) Permitted in Area [B] convex surface if there are no tears, cracks, or holes through the surface metal.

2) Nicks and dents are not permitted in the root radius.

(f) Twisted, bent, burnt/oxidised, or melted airfoil surfaces.

1) Not permitted.

(g) Axial cracks in area A and B:

1) Not permitted.

2) Continue-In-Service Limits for axial cracks that are less than 0.10 in. (2.5 mm) on areas A and B:

a) Borescope the area every 100 cycles.

b) One crack that is less than 0.10 in. (2.5 mm) is permitted.

c) The crack cannot turn in a radial direction.

3) Continue-In-Service Limits for axial cracks that are more than 0.10 in. (2.5 mm) but less than 0.20 in. (5.1 mm) on areas A and B:

a) Borescope the area every 50 cycles.

b) One crack that is less than 0.20 in. (5.1 mm) is permitted.

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

c) Remove engine in 10 cycles if the crack is longer than 0.20 in. (5.1 mm) or if the crack turns is a radial direction.

(h) Intersecting axial and radial cracks are not permitted on the convex surface:

1) Continue-In-Service Limits for intersecting cracks on the convex surface:

a) Boroscope the area every 10 cycles.

b) Internal cavities are not visible.

c) Each leg of the crack cannot be longer than 0.10 in. (2.54 mm).

d) If internal cavity is visible or crack leg is longer than 0.10 in. (2.54 mm) remove engine prior to next flight.

SUBTASK 72-00-00-220-017-H01

(10) Examine the HPT rotor first stage blade tip (the area in 0.35 inch (8.90 mm) of the blade tip).

(a) Radial cracks that start at the blade tip:

NOTE: The crack could open up at the tip and make a "V" notch

1) Concave side of the blade

a) Cracks are permitted if they do not go 0.35 inch (8.90 mm) below the blade tip.

b) A crack in a "V" notch is permitted if you do not see the internal cooling passages.

c) Cracks are permitted to intersect the top cooling holes in a concave film row.

2) Continue-In-Service Limits for radial cracks on the concave side of the blade:

a) Borescope the area every 250 cycles.

b) Radial tip cracks can be longer than 0.350 in. (8.9 mm) but must be less than 0.500 in. (12.7 mm).

c) The internal cavity must not be visible.

d) Remove the engine in 25 cycles if the radial cracks are longer than 0.500 in. (12.7 mm) or if the internal cavity is visible.

3) Convex side of the blade

a) Cracks are permitted if they do not go 0.35 inch (8.90 mm) below the blade tip.

b) A crack in a "V" notch is permitted if you do not see the internal cooling passages.

4) Continue-In-Service Limits for radial cracks on the concave side of the blade:

a) Borescope the area every 250 cycles.

b) Radial tip cracks can be longer than 0.35 in. (8.9 mm) but must be less than 0.50 in. (12.7 mm).

c) The internal cavity must not be visible.

d) Remove the engine in 25 cycles if the radial cracks are longer than 0.50 in. (12.7 mm) or if the internal cavity is visible.

(b) Axial cracks

1) Permitted.

(c) Bent or curled blade tip

1) Two areas that are four gill holes in length are permitted if they do not go below the tip cap.

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

(d) Tears

1) Permitted if they do not go below the tip cap.

(e) Metal that is missing from the tip on the concave and convex side:

1) Permitted with these conditions:

a) Missing material does not go below the tip cap.

b) The internal cavity is not visible.

2) Not permitted if you can see the internal air passages of the blade because of metal that is missing.

3) Continue-In-Service Limits for metal that is missing from the blade tip on the convex and concave side:

a) Remove engine in 10 cycles if the internal cavity is visible.

(f) Metal that is missing from the tip on the trailing edge:

NOTE: There may be a 45 degree chamfer on the trailing edge tip on stage 1 HPT blade to identify the blade with tip notches. This condition is serviceable and is not to be considered missing metal

1) Metal that is missing from the tip on the trailing edge is permitted with these conditions:

a) The damage does not go below the first trailing edge slot.

b) The internal cavity is not visible.

2) Continue-In-Service Limits for metal that is missing from the tip on the trailing edge:

a) Borescope every 100 cycles.

b) Damage goes below the first trailing edge slot.

c) The internal cavity can be visible with the damage above.

d) Axial cracks are permitted up to 0.10 in. (2.54 mm).

e) Radial cracks are permitted up to 0.20 in. (5.1 mm).

3) Metal that is missing from the tip on the leading edge is permitted with these conditions:

a) The damage is above the tip cap.

b) The internal cavity is not in view.

4) Continue-In-Service Limits for metal that is missing from the tip on the leading edge:

a) Borescope every 250 cycles.

b) Damage does not go beyond first internal rib.

c) Cracks and tears are permitted if they do not go beyond the nose holes or concave gill holes.

(g) Examine the HPT rotor first stage blade tips for buildup of first stage shroud material (Figure 614).

1) Shroud material buildup on the blade tips is permitted.

SUBTASK 72-00-00-210-011-H01

(11) Examine the HPT rotor first stage blade platform (Figure 614).

(a) Cracks on the pressure side (concave airfoil side) of the platform:

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

1) Any number of cracks from the platform edge are permitted if there is no oxidation, missing material, or platform bow.
2) Continue-In-Service (C-I-S) limits:
   a) Borescope the area every 250 cycles for cracks not connected to the edge of the platform.
   b) Borescope every 100 cycles if the platform is oxidized.
   c) Remove the engine in 5 cycles if there is a hole through the platform.

(b) Platform bow on the pressure side (concave airfoil side) of the platform.
1) Continue-In-Service (C-I-S) limits:
   a) Borescope the area every 50 cycles if the following conditions are met:
      <1> A maximum of 10 blade platforms are bowed.
      <2> The worst case bow is 0.1 in. (2.5 mm) maximum above the adjacent platform.
      <3> No two adjacent blades are bowed.
   b) Remove engine in 5 cycles if there is a hole through the platform.

(c) Cracks on the trailing edge of the platform.
1) Any number of cracks are permitted from the platform edge.
2) Cracks are permitted to extend from the platform trailing edge to the platform cooling holes.
3) Cracks are not permitted between the platform cooling holes.
4) Cracks are not permitted between the platform cooling holes and the airfoil root radius.
5) Missing coating and surface oxidation is permitted.
6) Missing material is permitted on up to 5 blades, with these conditions:
   a) Maximum width of missing material is not greater than 0.10 in. (2.5 mm) and the missing material does not go beyond the platform cooling holes.
7) Continue-In-Service Limits.
   a) Borescope the blade platform area every 250 cycles, if the blade platform cracks are between the platform cooling holes.
   b) Borescope the blade platform area every 100 cycles, if the blade platform cracks are between the cooling holes and the airfoil root radius.
   c) Remove the engine in 25 cycles, if the blade platform crack is at the airfoil root radius or if missing material limits are exceeded.

SUBTASK 72-00-00-210-007-H01

(12) Examine the HPT rotor second stage blade surface coat.

(a) Surface coat that is missing with metal oxidation is permitted if there are no holes or cracks in the metal.

NOTE: Metal oxidation shows as green or black discoloration of the metal.

(b) Thermal Barrier Coating (TBC) splatter.
1) Any amount is permitted.

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

SUBTASK 72-00-00-210-008-H01

(13) Examine the HPT rotor second stage blade leading edge.

NOTE: The HPT second stage blade leading edge conditions below (specifically cracks, tears, and missing material) are indications of impact damage. When these conditions are found, it is recommended to do an inspection of the upstream hardware within 10 cycles to make sure of the serviceability of upstream hardware.

NOTE: The recommended upstream hardware inspection includes the HPT stage 2 nozzle, stage 1 shroud, stage 1 nozzle, and combustor.

NOTE: A flexible borescope minimum length of 3.5 meters is necessary to examine all of the HPT stage 2 nozzle segments and stage 1 shrouds.

NOTE: The leading edge is defined as the region from the LE nose to 0.15 in. (3.81 mm) aft on the concave side, and from the LE nose to 0.20 in. (5.08 mm) aft on the convex side. In the radial direction, the LE region extends from platform to tip. The nose holes are within the LE region (Figure 615).

(a) Cracks or tears

1) All cracks or tears in Area A are permitted if they do not go past the LE region.

2) Cracks or tears are not permitted in Area B.

3) The full HPT stage 2 nozzle assembly must be inspected in or less than 10 cycles of the first time you find HPT second stage blade leading edge cracks.

NOTE: Engines post SB 72-0503 do not need to have the stage 2 nozzles inspected if impact damage is found to the stage 2 blades.

(b) Nicks and dents in Area A

1) Permitted in area A with these conditions:

a) Cracks or tears associated with nicks or dents are permitted if they do not go past the LE region.

<1> The full HPT stage 2 nozzle assembly must be inspected in or less than 10 cycles of the first time you find HPT second stage blade leading edge cracks or tears.

NOTE: Engines post SB 72-0503 do not need to have the stage 2 nozzles inspected if impact damage is found to the stage 2 blades.

b) Continue-In-Service limits for nicks and dents in area A.

<1> Remove the engine within 10 cycles for cracks and/or tears extending past the LE region.

(c) Nick and dents in Area B

1) Permitted if there are no cracks or tears.

(d) Metal that is missing in Area A

1) All amounts permitted if it does not go past the LE region.

a) The full HPT stage 2 nozzle assembly must be inspected in or less than 10 cycles of the first time you find HPT second stage blade leading edge missing material.

NOTE: Engines post SB 72-0503 do not need to have the stage 2 nozzles inspected if impact damage is found to the stage 2 blades.

2) Cracks and/or tears from missing metal must not go past the LE region.

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

3) Continue-In-Service Limits for stage 2 blade leading edge metal that is missing in Area A:

a) Remove the engine in 10 cycles if the cracks, tears, or missing metal go beyond the LE region.

(e) Metal that is missing, cracks, or tears in Area B

1) Not permitted.

2) Continue-In-Service Limits for stage 2 blade leading edge metal that is missing in Area B:

a) Remove the engine prior to the next flight if the missing metal goes beyond the LE region.

b) Remove the engine in 5 cycles if the missing metal does not go beyond the LE region.

c) Remove the engine prior to the next flight if cracks and/or tears go beyond the LE region.

(f) Metal splatter

1) Permitted with this condition:

a) If the metal splatter is seen on the convex side (suction side) of the blade in Area [C], do an inspection of all stage two nozzle segments for heat distress and burns in the inner platforms.

SUBTASK 72-00-00-220-018-H01

(14) Examine the HPT rotor second stage blade trailing edge (Figure 615).

(a) Cracks

1) Not permitted.

(b) Nicks and dents

1) Permitted if they are more than 0.5 in. (12.7 mm) from the blade platforms.

2) Not permitted within 0.5 in. (12.7 mm) of the blade platforms.

(c) Metal that is missing and tears in Area A and B

1) Metal that is missing and tears are not permitted.

2) Remove the engine within 5 cycles if missing material or tears are in area A.

3) Remove the engine before next flight if missing material or tears are in area B.

SUBTASK 72-00-00-220-019-H01

(15) Examine the HPT rotor second stage blade concave and convex surfaces.

NOTE: These limits apply only to the areas of the blade that are not the leading edge, trailing edge, or blade tip inspection regions.

(a) Cracks

1) Not permitted.

(b) Nicks and dents

1) Permitted if they are more than 0.5 in. (12.7 mm) from the blade platforms as follows:

a) The diameter is not more than 0.25 in. (6.35 mm).

b) There is no torn metal.

2) Not permitted within 0.5 in. (12.7 mm) of the blade platforms.

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

(c) Positive braze material

1) Permitted with these conditions.

a) The material is in Area D of the concave and convex surfaces.

b) The material extends not more than 0.003 inch (0.080 mm) above a concave or convex surface.

SUBTASK 72-00-00-220-020-H01

(16) Pitting

(a) Four pits are permitted on the concave or convex surface in these conditions.

1) Each pit is not more than 0.03 in. (0.76 mm) in length.

2) Each pit is not more than 0.005 inch (0.130 mm) in depth.

3) Each pit is more than 0.125 inch (3.170 mm) from an adjacent pit.

(b) All pits are permitted on the concave or convex surface in these conditions.

1) Each pit is not more than 0.015 inch (0.380 mm) in length.

2) Each pit is not more than 0.005 inch (0.130 mm) in depth.

3) There is a clear separation between each pit and an adjacent pit.

SUBTASK 72-00-00-220-021-H01

(17) Examine the HPT rotor second stage blade tip area.

NOTE: The blade tip area is defined as the region from the blade tip to 0.30 in. (7.62 mm) from the blade tip. For the leading edge tip, refer to the leading edge limits.

(a) Radial cracks from the concave or convex tip

1) Two radial cracks for each side are permitted with these conditions.

a) They are not more than 0.125 in. (3.2 mm) below the tip or tip weld.

b) You do not see the internal air passages of the blade.

2) Any number of radial cracks are permitted in the tip or tip weld area with these conditions:

a) No more than four cracks go beyond the tip weld.

b) Missing material is permitted above the tip cap.

(b) Axial cracks

1) Permitted if they are not more than 0.5 in. (12.7 mm).

(c) Continue-In-Service Limits for the stage 2 blade tip area.

1) For 5 or more cracks that are more than 0.125 in. (3.175 mm) below the tip or tip weld, do the inspection again every 250 cycles.

2) Remove the engine in or less than 10 cycles if the cracks are more than 0.30 in. (7.62 mm) past the blade tip or if you see the internal air passages.

(d) Bent or curled blade tip

1) Permitted.

(e) Metal that is missing and tears

1) Permitted with these conditions.

a) You do not see the tip cavity shelf because either part of or all of the tip cap is missing.

b) The opposite cavity wall is not missing.

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

c) There is only one area on each cavity wall that has damage 0.30 in. (7.62 mm) in length.

SUBTASK 72-00-00-220-040-H00

(18) Examine the HPT stage 2 nozzle assembly that is adjacent to the borescope port.

NOTE: The inspection is limited to the HPT stage 2 nozzle assembly that is adjacent to the borescope port. Use a flexible borescope to examine multiple segments as it is necessary.

NOTE: Do the inspection of the HPT stage 2 nozzle during the inspection of the stage 1 blade trailing edge and the stage 2 blade leading edge.

NOTE: The limits that follow are for the stage 2 nozzle borescope segment and are to be used to find out if additional inspections are necessary. If the limits are more than specified, it does not indicate that the engine is unserviceable. Serviceable limits are contained in the steps that follow to find engine serviceability.

(a) Coating that is missing from the airfoil or inner or outer platform

1) There is no limit to the amount of missing coating for the inner and outer platform surfaces if there are no holes through the surface material.

2) There is no limit to the amount of missing coating for the airfoil surfaces if there are no holes through the surface material.

(b) Leading edge

1) It is not permitted to have any cracking.

(c) Trailing edge

1) Any number of cracks are permitted up to 0.30 in. (7.6 mm) in length.

2) No missing material is permitted.

(d) Concave airfoil surfaces

1) It is permitted to have any number of cracks if they are not more than 0.75 inch (19.1 mm) in length and not in the row of cooling holes.

2) It is not permitted to have cracking at the row of cooling holes.

3) It is not permitted to have outer platform fillet radius cracking.

4) It is not permitted to have inner platform fillet radius cracking.

(e) Convex airfoil surfaces

1) It is not permitted to have any cracking.

2) It is not permitted to have cracking in the row of cooling holes.

3) It is not permitted to have outer fillet radius cracking.

4) It is not permitted to have inner fillet radius cracking.

(f) Outer platform

1) It is permitted to have any number of cracks in the borescope port the full length of the inner diameter of the hole and in any direction up to 0.20 in. (5.1 mm) in length.

2) It is permitted to have any number of cracks in the braze joint with these conditions:

a) They are not more than 2.0 in. (50.8 mm) in length.

b) There are no gaps in the cracks.

3) Any number of cracks not in the braze are permitted up to 0.30 in. (7.6 mm) in length.

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

(g) Inner platform

1) It is permitted to have any number of cracks in the braze joint with these conditions:

a) They are not more than 2.0 in. (50.8 mm) in length.

b) There are no gaps in the cracks.

2) Any number of cracks not in the braze are permitted up to 0.30 in. (7.6 mm) in length.

NOTE: The above limits are serviceable conditions and, if met, it is not necessary to do additional inspections of the stage 2 nozzle assembly. If any of the above limits are more than specified, it is necessary for the stage 2 nozzle assembly to be fully inspected.

SUBTASK 72-00-00-220-041-H00

(19) Examine the HPT stage 2 nozzle assembly surfaces

NOTE: The limits that follow are for the expand inspection of the stage 2 nozzle assembly and are to be used to find engine serviceability if the above limits for the stage 2 nozzle borescope segment are more than specified or in case of HPT stage 2 blade leading edge impact damage. The limits that follow are defined to support inspection of the full set of stage 2 nozzle segments. Serviceable limits and Continue-In-Service limits are contained in the steps that follow.

NOTE: If it is necessary to fully inspect the stage 2 nozzle assembly, a flexible borescope must be used. A minimum length of 3.5 meters is necessary to examine all of the nozzle segments.

(a) Coating that is missing from the airfoil surfaces

1) Permitted.

(b) Nicks, scores, scratches, and dents on the nozzle surfaces

1) Any number is permitted with these conditions:

a) They are not more than 0.25 inch (6.3 mm) in diameter.

b) They are not more than 0.03 in. (0.8 mm) in depth

SUBTASK 72-00-00-220-042-H00

(20) Examine the HPT stage 2 nozzle assembly leading edge surfaces

NOTE: The limits that follow are for the expand inspection of the stage 2 nozzle assembly and are to be used to find engine serviceability if the above limits for the stage 2 nozzle borescope segment are more than specified or in case of HPT stage 2 blade leading edge impact damage. The limits that follow are defined to support inspection of the full set of stage 2 nozzle segments. Serviceable limits and Continue-In-Service limits are contained in the steps that follow.

NOTE: If it is necessary to fully inspect the stage 2 nozzle assembly, a flexible borescope must be used. A minimum length of 3.5 meters is necessary to examine all of the nozzle segments.

(a) Axial cracks in the vane leading edges

1) One axial crack for each vane is permitted if it is not more than 0.30 in. (7.6 mm) in length.

2) Any number of coating cracks are permitted if the surface coating does not separate.

(b) Axial cracks in Area C.

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

1) Area C is defined as the area within 0.5 in. (12.7 mm) from the outer platform and extends from the concave side cooling holes, wraps around the leading edge, and ends at the convex side cooling holes.
   a) Continue-In-Service (C-I-S) limits for axial cracks in Area C:
      <1> Borescope the area every 125 cycles.
      <2> Any number of cracks within the fillet area permitted with these conditions:
         <a> Only one airfoil in the nozzle segment can have cracks.
         <b> No cracks permitted in the platform braze joints.
      <3> Any number of cracks that extend into the concave airfoil fillet is permitted up to a maximum of 2.7 in. (69.0 mm) beyond the concave side cooling holes with these conditions:
         <a> Only one airfoil in the nozzle segment can have cracks.
         <b> No cracks permitted in the platform braze joints.
      <4> Remove the engine within 25 cycles if any cracks extend beyond 2.7 in. (69.0 mm) aft of the concave airfoil cooling holes.
      <5> Remove the engine within 10 cycles if you find cracks in either of the platform braze joints.
      <6> Remove the engine within 10 cycles if you find cracks in both airfoils of the nozzle segment.

(c) Oxidation at the leading edge
   1) Permitted with these conditions:
      a) No more than 0.40 sq-in (258.1 sq-mm) in area.
      b) There is not a hole burned through the surface material.

SUBTASK 72-00-00-220-043-H00

(21) Examine the HPT stage 2 nozzle assembly trailing edge surfaces

NOTE: The limits that follow are for the expand inspection of the stage 2 nozzle assembly and are to be used to find engine serviceability if the above limits for the stage 2 nozzle borescope segment are more than specified or in case of HPT stage 2 blade leading edge impact damage. The limits that follow are defined to support inspection of the full set of stage 2 nozzle segments. Serviceable limits and Continue-In-Service limits are contained in the steps that follow.

NOTE: If it is necessary to fully inspect the stage 2 nozzle assembly, a flexible borescope must be used. A minimum length of 3.5 meters is necessary to examine all of the nozzle segments.

(a) Axial cracks in the vane trailing edge that are more than 0.4 in. (10.2 mm) from the inner and outer platforms
   1) Any number of cracks is permitted if they are not more than 0.09 in. (2.3 mm) in length.
   2) Two cracks are permitted for each vane with these conditions:
      a) They are not more than 0.50 in. (12.7 mm) in length.
      b) They are separated from each other by a minimum of 0.25 in. (6.4 mm).
   3) All types of cracks in the vane trailing edge that are less than 0.40 in. (10.2 mm) from the inner and outer platforms

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

a) Any number is permitted if they do not extend more than 1.00 in. (25.4 mm) from the trailing edge.

4) Material that is missing from the trailing edge

a) Missing material is permitted up to 0.125 sq-in (80.6 sq-mm).

SUBTASK 72-00-00-220-044-H00

(22) Examine the HPT stage 2 nozzle assembly airfoil concave surfaces

NOTE: The limits that follow are for the expand inspection of the stage 2 nozzle assembly and are to be used to find engine serviceability if the above limits for the stage 2 nozzle borescope segment are more than specified or in case of HPT stage 2 blade leading edge impact damage. The limits that follow are defined to support inspection of the full set of stage 2 nozzle segments. Serviceable limits and Continue-In-Service limits are contained in the steps that follow.

NOTE: If it is necessary to fully inspect the stage 2 nozzle assembly, a flexible borescope must be used. A minimum length of 3.5 meters is necessary to examine all of the nozzle segments.

(a) Cracks not related to the row of cooling holes

1) Permitted with these conditions:

a) Two cracks for each vane concave surface if they are not more than 0.75 inch (19.1 mm) in length.

2) Continue-In-Service (C-I-S) limits for cracks and missing material on the concave side of the vane not related to the row of cooling holes:

a) Borescope the area every 250 cycles.

b) Any number of cracks for each vane concave surface if they do not extend past (forward) the row of cooling holes.

c) Cracks can intersect if there is no material that goes out into the flow path.

d) Missing material is permitted up to 0.05 sq-in (32.3 sq-mm) with these conditions:

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on three segments total.

3) Continue-In-Service (C-I-S) limits for cracks and missing material on the concave side of the vane not related to the row of cooling holes:

a) Borescope the area every 125 cycles.

b) Two cracks for each vane concave surface that extend less than 0.25 in. (6.4 mm) past (forward) the row of cooling holes.

c) Cracks can intersect if there is no material that goes into the flow path.

d) Missing material is permitted up to 0.20 sq-in (129.0 sq-mm) with these conditions:

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on three segments total.

4) Continue-In-Service (C-I-S) limits for cracks and missing material on the concave side of the vane not related to the row of cooling holes:

a) Borescope the area every 50 cycles.

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

b) Any number of cracks for each vane concave surface that extend less than 0.35 in. (8.9 mm) past (forward) the row of cooling holes.

c) Cracks can intersect.

d) Material that protrudes into the flowpath is permitted.

e) Missing material is permitted up to 0.30 sq-in (194.0 sq-mm) with these conditions:

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on three segment total.

f) Remove the engine in or less than 10 cycles if the missing material is between 0.30-0.50 sq-in (194.0-323.0 sq-mm).

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on one segment total.

g) Remove the engine immediately if the missing material is larger than 0.50 sq-in (322.6 sq-mm) or extends into the nozzle leading edge.

h) Remove the engine in or less than 10 cycles if cracks extend more than 0.35 in. (8.9 mm) past (forward) the row of cooling holes.

(b) Cracks at the row of cooling holes

1) Not permitted.

2) Continue-In-Service (C-I-S) limits for cracks and missing material on the concave side of the vane at the row of cooling holes:

a) Borescope the area every 250 cycles.

b) Any number of cracks that do not extend more than 0.25 in. (6.4 mm) past (forward) the row of cooling holes.

c) Any length cracking aft of the row of cooling holes is permitted.

d) Missing material is permitted up to 0.05 sq-in (32.3 sq-mm) with these conditions:

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on three segment total.

3) Continue-In-Service (C-I-S) limits for cracks and missing material on the concave side of the vane at the row of cooling holes:

a) Borescope the area every 125 cycles.

b) Any number of cracks that do not extend more than 0.25 in. (6.4 mm) past (forward) the row of cooling holes

c) Any length cracking aft of the row of cooling holes is permitted.

d) Missing material is permitted up to 0.20 sq-in (126.0 sq-mm) with these conditions.

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on three segment total.

4) Continue-In-Service (C-I-S) limits for cracks and missing material on the concave side of the vane at the row of cooling holes:

a) Borescope the area every 50 cycles.

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

b) Any number of cracks that do not extend more than 0.35 in. (8.9 mm) past (forward) the row of cooling holes.

c) Any length cracking aft of the row of cooling holes is permitted.

d) Material that goes into the flowpath is permitted.

e) Missing material is permitted up to 0.30 sq-in (194.0 sq-mm) with these conditions:

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on three segment total.

f) Remove the engine in or less than 10 cycles if the missing material is between 0.30-0.50 sq-in (194.0-323.0 sq-mm).

<1> Missing material can only be on one airfoil of a two-vane segment.

<2> Missing material can only be on one segment total.

g) Remove the engine immediately if the missing material is larger than 0.50 sq-in (322.6 sq-mm) or extends into the nozzle leading edge.

h) Remove the engine in or less than 10 cycles if cracks extend more than 0.35 in. (8.9 mm) past (forward) the row of cooling holes.

(c) Oxidation in the concave surface

1) Permitted with these conditions:

a) No more than 2.00 sq-in (1290.3 sq-mm) in area.

b) There is not a hole burned through the surface material.

SUBTASK 72-00-00-220-045-H00

(23) Examine the HPT stage 2 nozzle assembly airfoil convex surfaces

NOTE: The limits that follow are for the expand inspection of the stage 2 nozzle assembly and are to be used to find engine serviceability if the above limits for the stage 2 nozzle borescope segment are more than specified or in case of HPT stage 2 blade leading edge impact damage. The limits that follow are defined to support inspection of the full set of stage 2 nozzle segments. Serviceable limits and Continue-In-Service limits are contained in the steps that follow.

NOTE: If it is necessary to fully inspect the stage 2 nozzle assembly, a flexible borescope must be used. A minimum length of 3.5 meters is necessary to examine all of the nozzle segments.

(a) Cracks in the convex vane to outer platform fillet area to a maximum of 0.50 in. (12.7 mm) from the outer platform

1) Not permitted.

2) Continue-In-Service (C-I-S) limits for cracks in the convex side of the vane in the outer platform fillet area to a maximum of 0.50 in. (12.7 mm) from the outer platform.

a) Borescope the area every 250 cycles.

b) Any length cracking aft of the row of cooling holes is permitted.

NOTE: A crack can connect to an Area C crack.

(b) Cracks in the vane convex surfaces

1) Two cracks are permitted for each vane with these conditions:

a) They are not more than 0.50 in. (12.7 mm) in length.

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

b) They are more than 0.50 in. (12.7 mm) from the inner and outer platform.

(c) Oxidation in the convex surface

1) Permitted with these conditions:

a) No more than 2.00 sq-in (1290.3 sq-mm) in area.

b) There is not a hole burned through the surface material.

SUBTASK 72-00-00-220-046-H00

(24) Examine the HPT stage 2 nozzle assembly inner and outer platforms

NOTE: The limits that follow are for the expand inspection of the stage 2 nozzle assembly and are to be used to find engine serviceability if the above limits for the stage 2 nozzle borescope segment are more than specified or in case of HPT stage 2 blade leading edge impact damage. The limits that follow are defined to support inspection of the full set of stage 2 nozzle segments. Serviceable limits and Continue-In-Service limits are contained in the steps that follow.

NOTE: If it is necessary to fully inspect the stage 2 nozzle assembly, a flexible borescope must be used. A minimum length of 3.5 meters is necessary to examine all of the nozzle segments.

(a) Cracks from the nozzle borescope port

1) Any number is permitted with these conditions:

a) Cracks can be the full length of the inner diameter of the hole.

b) There is no limit to the number of cracks up to a maximum length of 0.20 in. (5.1 mm).

(b) Cracks between the vanes and between the adjacent nozzle segment split lines.

1) Any number is permitted if they are not more than 0.30 in. (7.6 mm) in length.

(c) Cracks in the inner or outer platform braze joint

1) Any number is permitted with these conditions:

a) Cracks are not more than 3.0 in. (76.2 mm) in length.

b) The gap width is less than 0.015 in. (0.4 mm).

(d) Voids or mismatch in the braze joint in the nozzle segment

1) Permitted.

(e) Nicks, scores, scratches, and dents in the inner and outer platform surfaces

1) Any number is permitted if they are not more than 0.03 in. (0.8 mm) in depth.

(f) Craze cracks

1) Any number is permitted.

(g) Cracks in the outer platform trailing edge not in the braze joint

1) Any number is permitted if they are not more than 0.40 in. (10.2 mm) in length

2) One long crack between the vanes is permitted with these conditions:

a) It is not more than 1.0 in. (25.4 mm) in length

b) It does not go into the vane fillet radius

(h) Coating that is missing

1) Permitted.

(i) Oxidation on the inner platform

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

1) Not permitted.

(j) Cracks at the inner platform trailing edge not in the braze joint

1) It is permitted for one crack to extend from the inner platform trailing edge to the lead vane trailing edge.

2) Continue-In-Service (C-I-S) limits for cracks at the inner platform trailing edge not in the braze joint.

a) Borescope the area every 400 cycles.

b) It is permitted for one crack to extend from the inner platform trailing edge past the lead vane, but it must not touch the convex side of the trail vane.

3) Continue-In-Service (C-I-S) limits for cracks at the inner platform trailing edge not in the braze joint.

a) Borescope the area every 250 cycles.

b) Any number of cracks that are not more than 0.50 in. (12.7 mm) in length.

c) Two cracks are permitted with these conditions:

<1> They are not more than 0.70 in. (17.8 mm) in length.

<2> They are separated by a minimum of 0.30 in. (7.6 mm).

SUBTASK 72-00-00-211-001-H01

(25) Examine the stage 2 HPT shroud as follows:

NOTE: This inspection is limited to what can be seen with the rigid borescope.

(a) Cracking - none permitted.

(b) Rubs - any amount is permitted.

(c) Missing material - none permitted.

(d) Surface oxidation / corrosion / craze cracking - any amount.

1) A hole through the shroud flowpath surface is not permitted.

(e) Missing material from split line oxidation / corrosion - any amount.

1) The spline seal slot that is exposed is permitted.

2) Spline seal that is missing is permitted

NOTE: The split line region is the end of each shroud to 0.1 in. (2.54 mm) from the end.

SUBTASK 72-00-00-290-009-H01

(26) When the examination is complete turn the borescope light source, SPL-570 off.

(a) Let the light source blower to stay on for a while to cool the lamp and case.

SUBTASK 72-00-00-410-014-H01

(27) Install the borescope plugs as follow:

(a) Do a visual inspection of the locking insert (lock ring) on the borescope ports for inserts that are loose or missing.

1) Replace locking inserts (lock rings) that are loose or missing with new ones (TASK 70-11-13-960-801-H00).

(b) Do a visual inspection of the borescope plugs for broken, bent or deformed spring fingers.

1) If you find more than one broken or bent spring finger or deformation, replace the borescope plug.

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

(c) Put pure nickel special compound, D50017 [C02-071] or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the combustor borescope plug threads.

(d) Install the borescope plugs in HPT ports Q and R.

(e) Tighten the plugs to 190.0 in-lb (21.5 N·m) - 210.0 in-lb (23.7 N·m).

(f) Continue-In-Service (C-I-S) limits for loose/missing locking insert.

CAUTION

USE ANTISEIZE COMPOUND IN THE CASE BEFORE YOU INSTALL THE PLUG. IF NOT, THE PLUG CAN SEIZE IN THE CASE.

1) If you find that the locking insert is loose/missing and the running torque is less than 15 in-lb (1.7 N·m), then over tighten the plug to 350 in-lb (39.5 N·m).

2) Remove the plug in or less than 50 cycles and replace the locking insert (TASK 70-11-13-960-801-H00).

3) If there is no running torque during the installation of the plug after replacement of the locking insert, replace the borescope plug.

(g) Continue-In-Service (CIS) limits for missing/broken collar spring.

1) If it is found that the collar spring of the BSI plug is broken/missing, replace the plug as soon as one is available or within 150 cycles, if the plug spring and spring fingers are working correctly.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-080-003-H01

(1) Remove the manual or the electrical motoring tool and install the motoring pad cover (TASK 72-00-00-980-802-H01 or TASK 72-00-00-980-801-H01).

SUBTASK 72-00-00-860-020-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-00-00-410-015-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.

(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

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

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

1) Close these access panels:

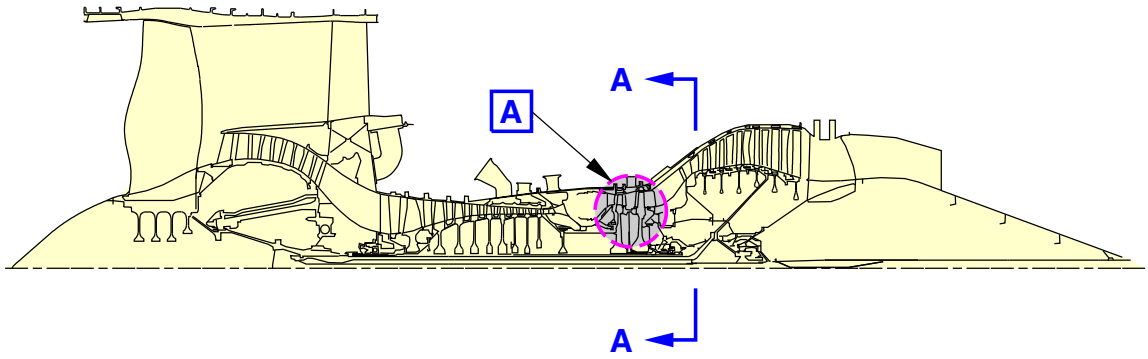
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

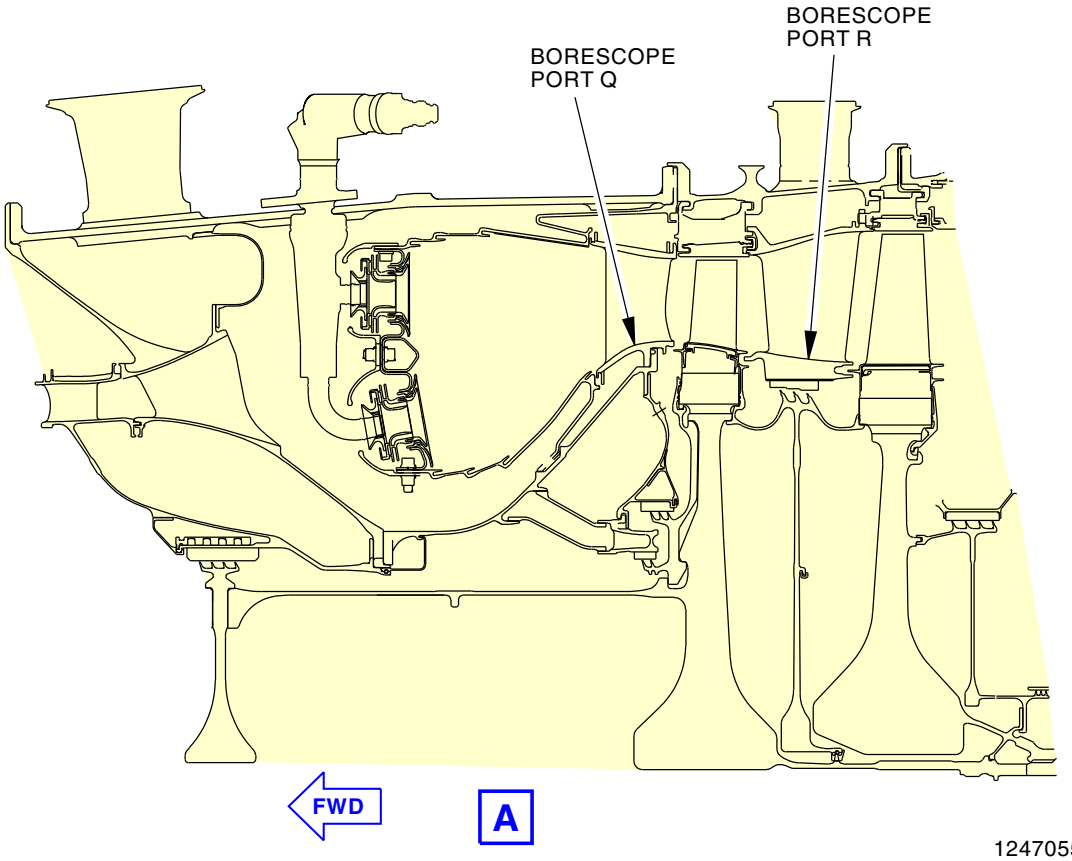
(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(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



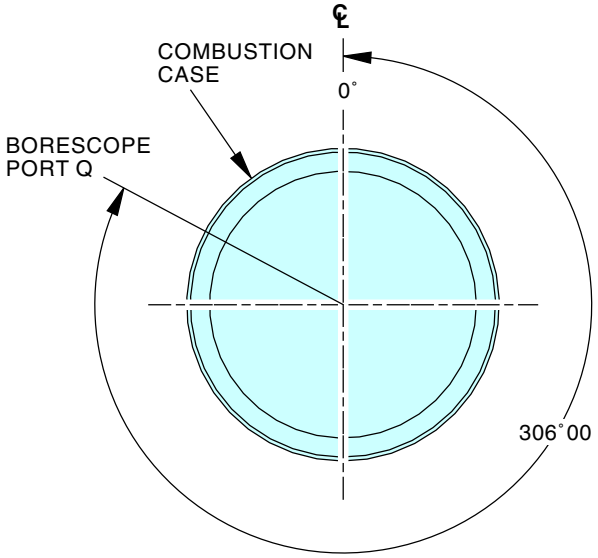


1247055-00

M06762 S0004285797_V4

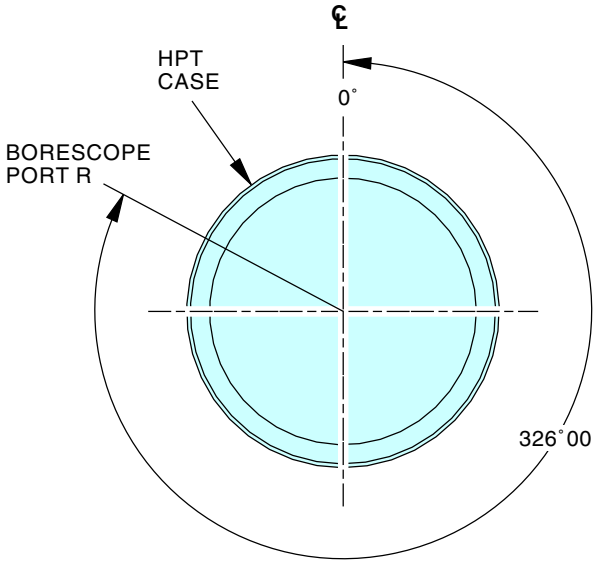
HPT Section Borescope Port Locations
Figure 613/72-00-00-990-814-H01 (Sheet 1 of 2)

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



BORESCOPE PORT Q
(VIEW IN THE FORWARD DIRECTION)

A-A



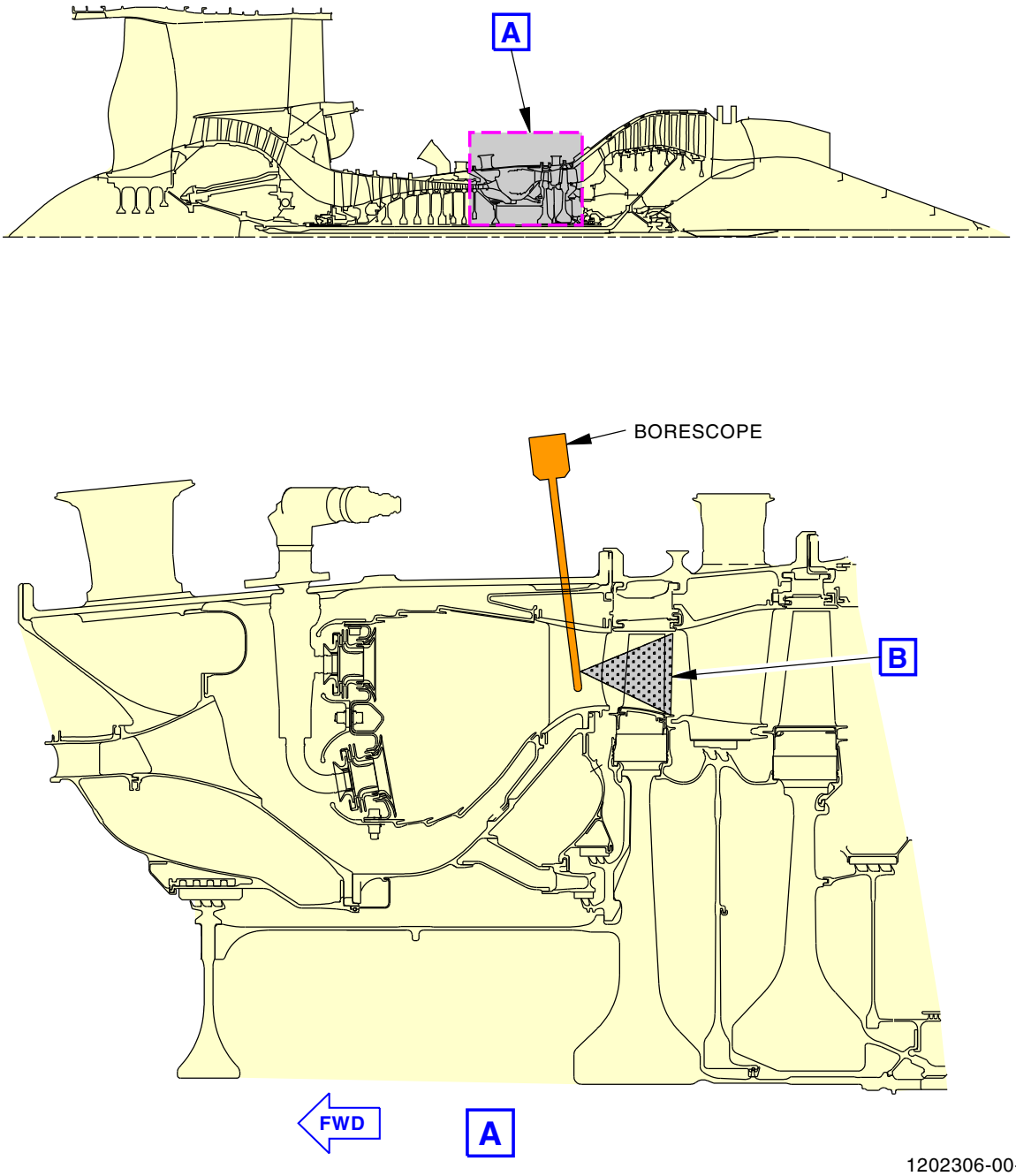
BORESCOPE PORT R
(VIEW IN THE FORWARD DIRECTION)

A-A

1247056-00
M06763 S0004285798_V4

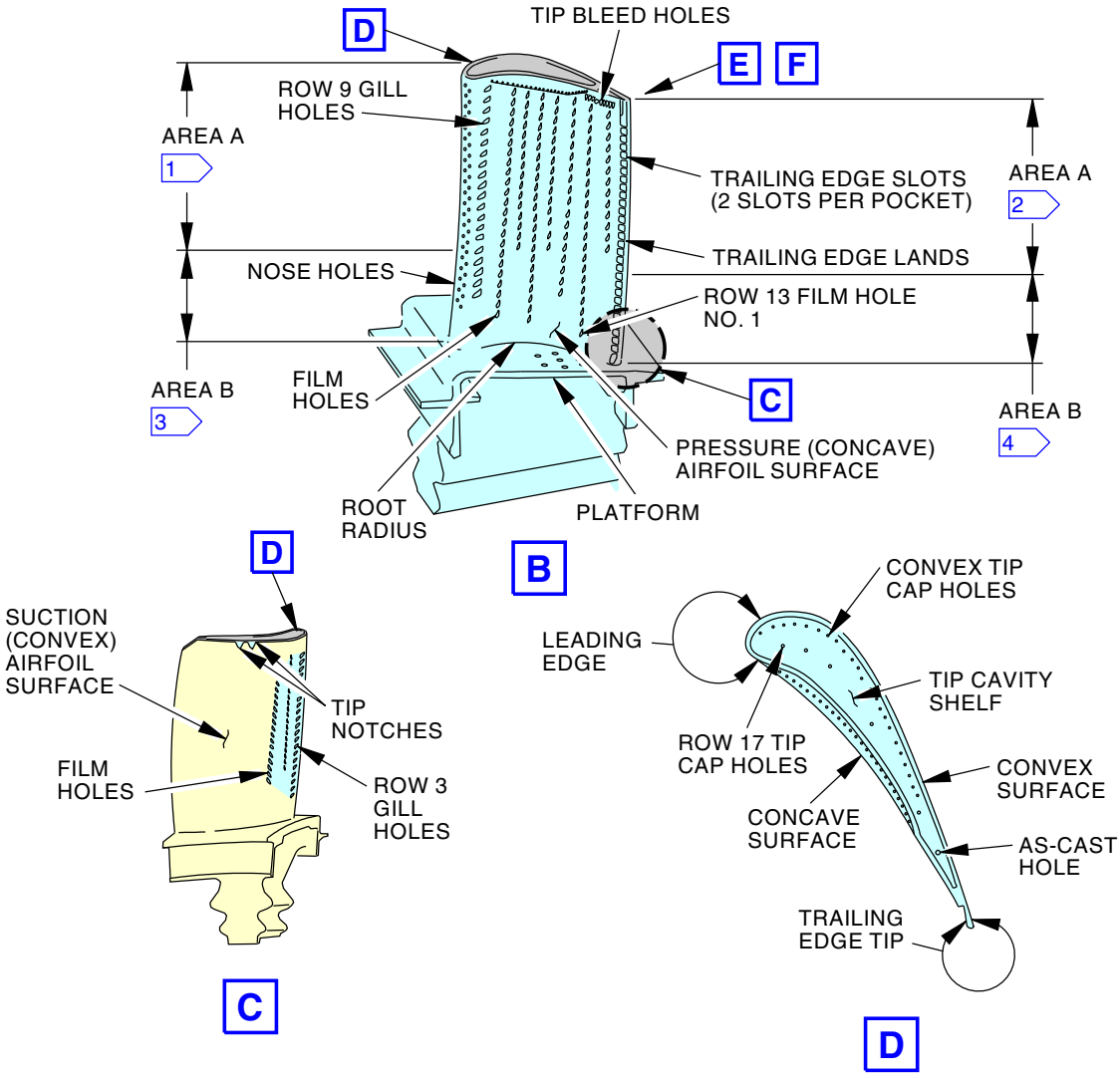
HPT Section Borescope Port Locations
Figure 613/72-00-00-990-814-H01 (Sheet 2 of 2)

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



HPT Rotor Section Stage One Blade Inspection
Figure 614/72-00-00-990-815-H01 (Sheet 1 of 5)

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



1 AREA A AT THE LEADING EDGE IS DEFINED AS THE AREA FROM THE TIP OF THE BLADE TO THE 5TH COOLING HOLE FROM THE PLATFORM IN ROW 9 (APPROXIMATELY 70% OF THE AIRFOIL FROM THE TIP).

2 AREA A AT THE TRAILING EDGE IS DEFINED AS THE AREA BETWEEN THE BLADE TIP AND 0.7 INCH FROM THE PLATFORM (APPROXIMATELY 70% OF THE AIRFOIL FROM THE TIP).

3 AREA B AT THE LEADING EDGE IS DEFINED AS THE AREA FROM THE BLADE PLATFORM TO THE 5TH COOLING HOLE FROM THE PLATFORM IN ROW 9 (APPROXIMATELY 30% OF THE AIRFOIL FROM THE PLATFORM).

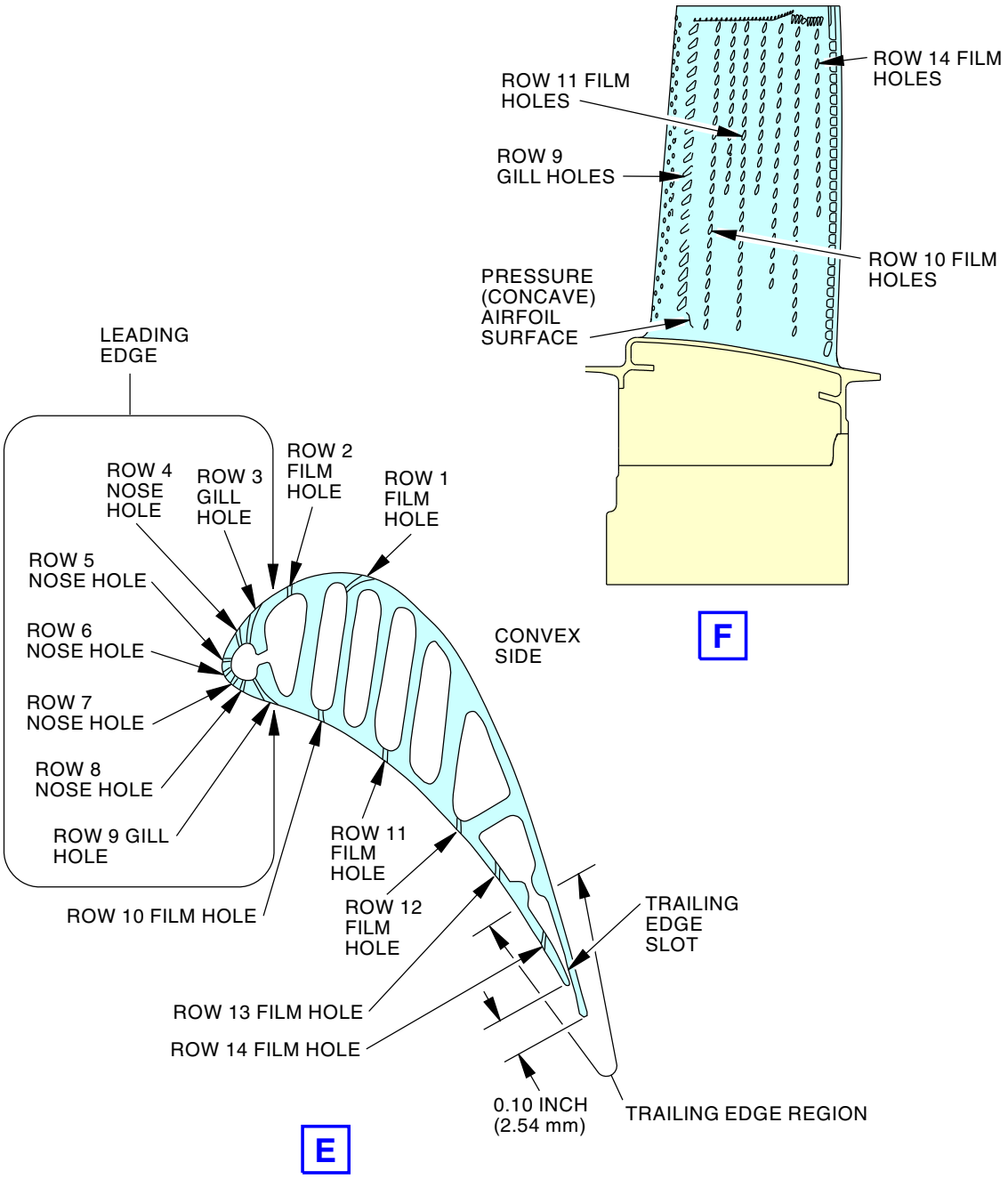
4 AREA B AT THE TRAILING EDGE IS DEFINED AS THE AREA BETWEEN THE BLADE PLATFORM AND 0.7 INCH FROM THE PLATFORM (APPROXIMATELY 30% OF THE AIRFOIL FROM THE PLATFORM).

1199226-02-A

M06765 S0004285800_V12

HPT Rotor Section Stage One Blade Inspection
Figure 614/72-00-00-990-815-H01 (Sheet 2 of 5)

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

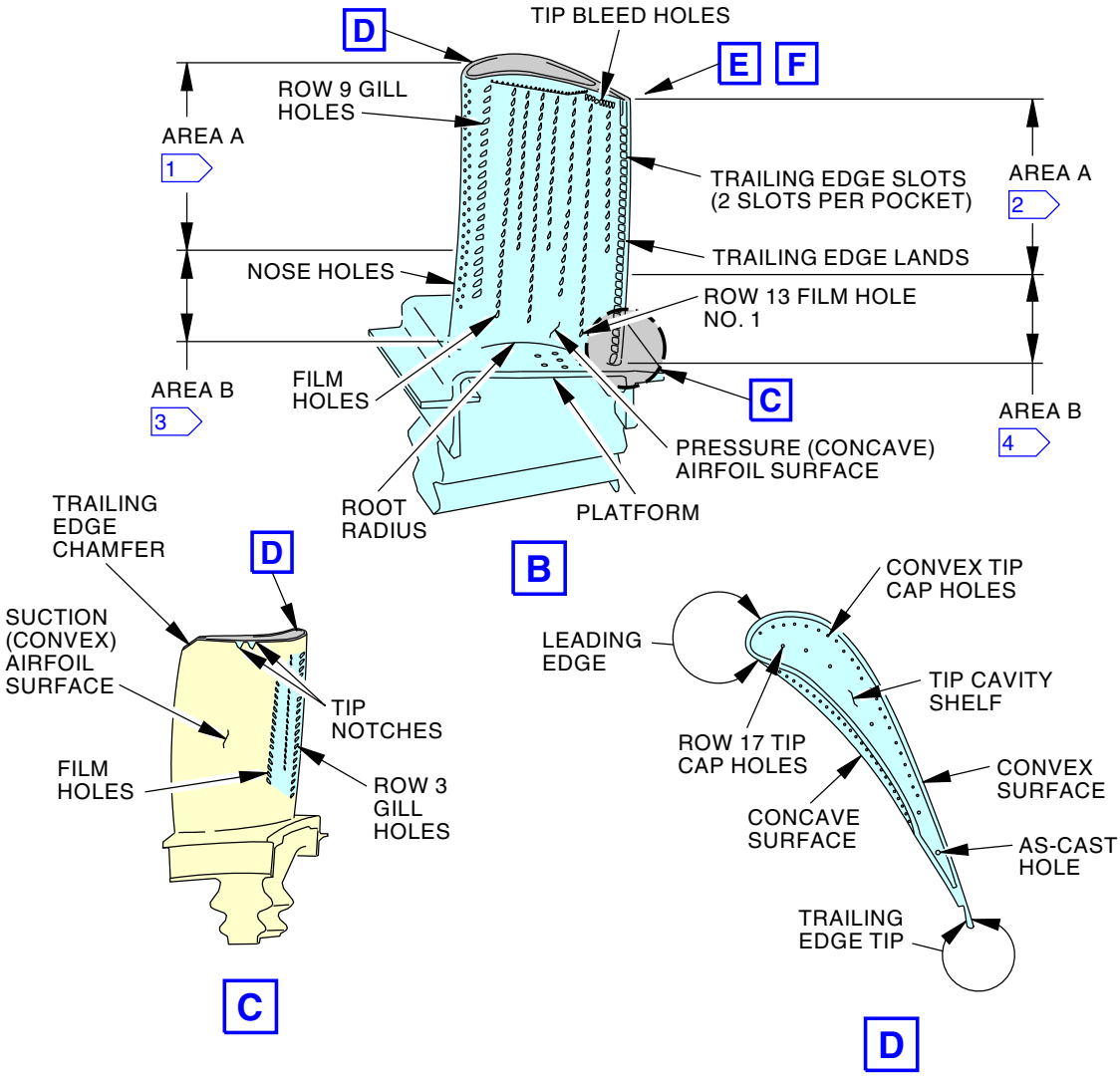


1199227-00-A

M06766 S0004285801_V9

HPT Rotor Section Stage One Blade Inspection
Figure 614/72-00-00-990-815-H01 (Sheet 3 of 5)

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



1 AREA A AT THE LEADING EDGE IS DEFINED AS THE AREA FROM THE TIP OF THE BLADE TO THE 5TH COOLING HOLE FROM THE PLATFORM IN ROW 9 (APPROXIMATELY 70% OF THE AIRFOIL FROM THE TIP).

2 AREA A AT THE TRAILING EDGE IS DEFINED AS THE AREA BETWEEN THE BLADE TIP AND 0.7 INCH FROM THE PLATFORM (APPROXIMATELY 70% OF THE AIRFOIL FROM THE TIP).

3 AREA B AT THE LEADING EDGE IS DEFINED AS THE AREA FROM THE BLADE PLATFORM TO THE 5TH COOLING HOLE FROM THE PLATFORM IN ROW 9 (APPROXIMATELY 30% OF THE AIRFOIL FROM THE PLATFORM).

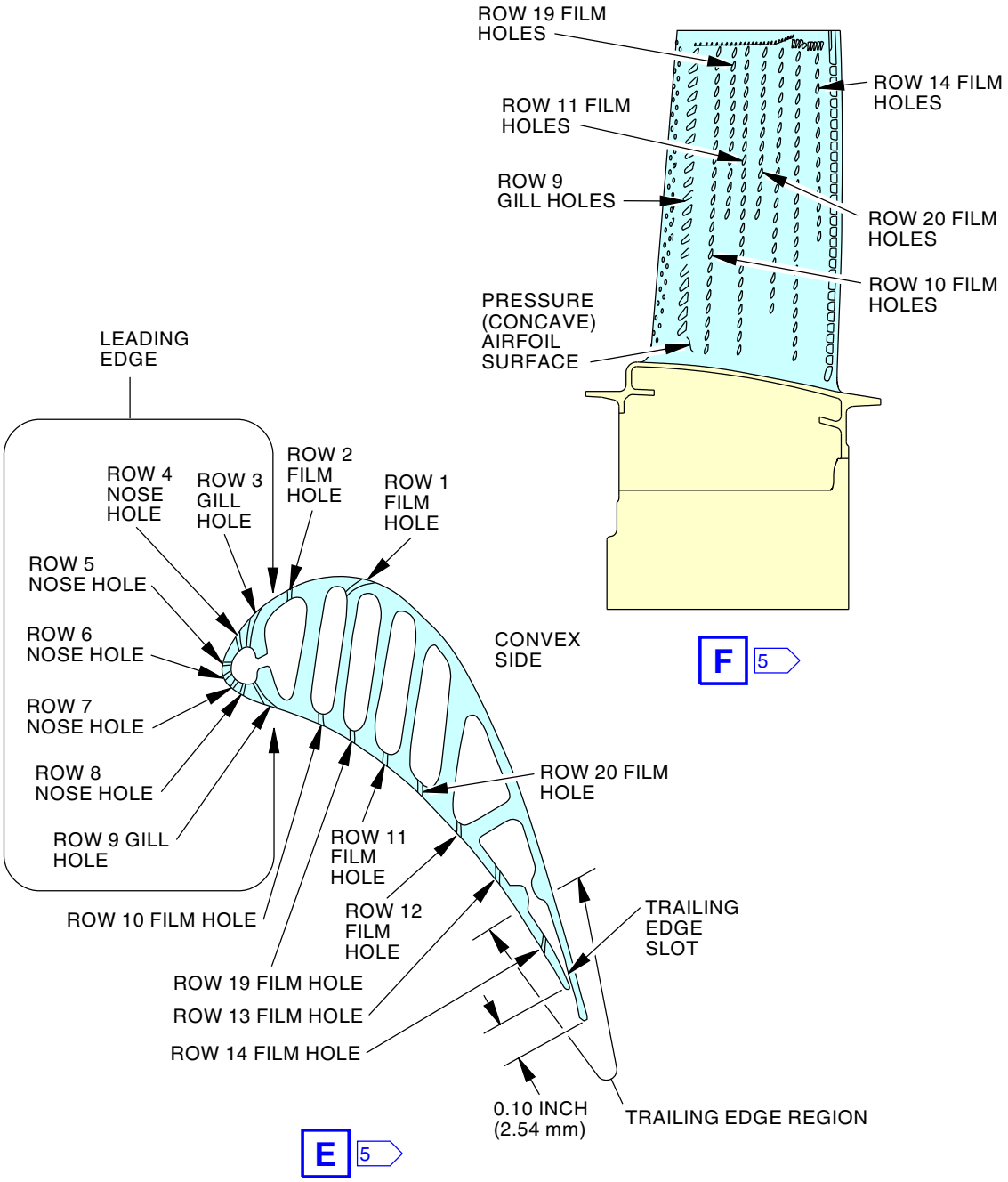
4 AREA B AT THE TRAILING EDGE IS DEFINED AS THE AREA BETWEEN THE BLADE PLATFORM AND 0.7 INCH FROM THE PLATFORM (APPROXIMATELY 30% OF THE AIRFOIL FROM THE PLATFORM).

1199226-02-A

2387686 S0000548501_V3

HPT Rotor Section Stage One Blade Inspection
Figure 614/72-00-00-990-815-H01 (Sheet 4 of 5)

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

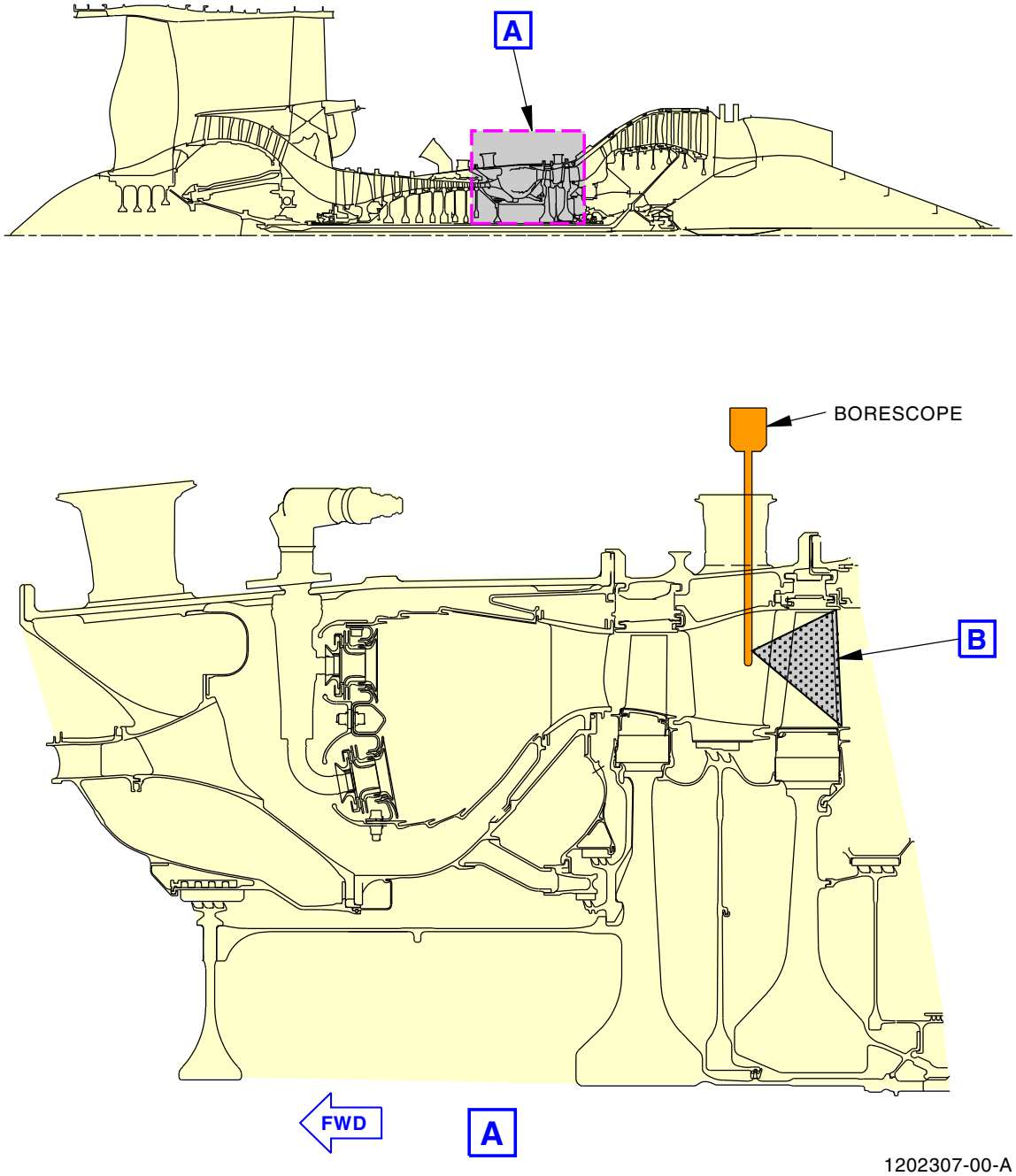


5 CONVEX AIRFOIL COOLING ROWS ARE THE SAME AS PRE-GE-SB 72-0595.

5008773-00
2315484 S0000526363_V5

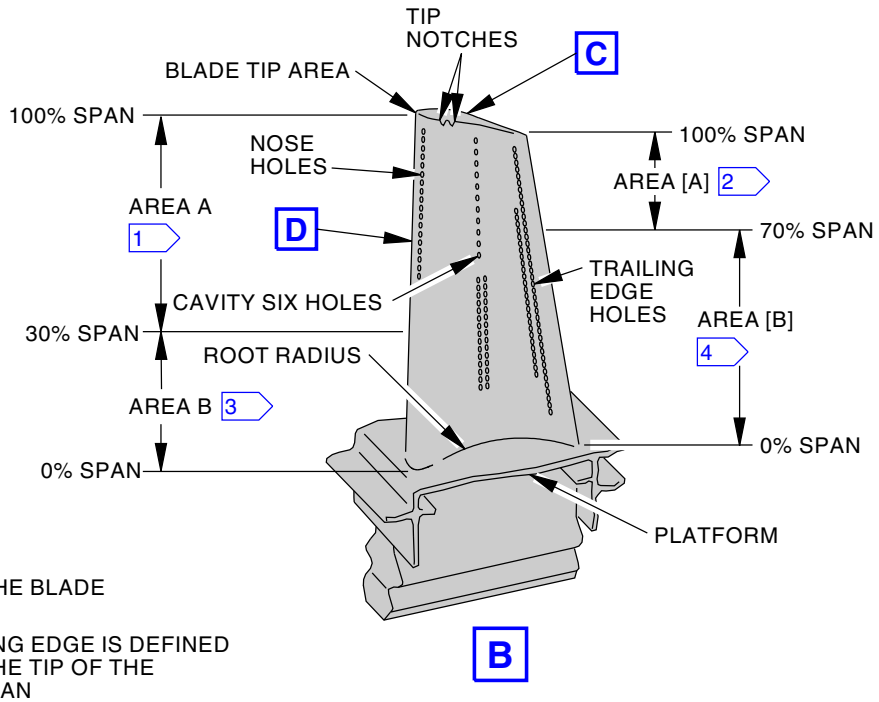
HPT Rotor Section Stage One Blade Inspection
Figure 614/72-00-00-990-815-H01 (Sheet 5 of 5)

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



HPT Rotor Section Stage Two Blade Inspection
Figure 615/72-00-00-990-816-H01 (Sheet 1 of 2)

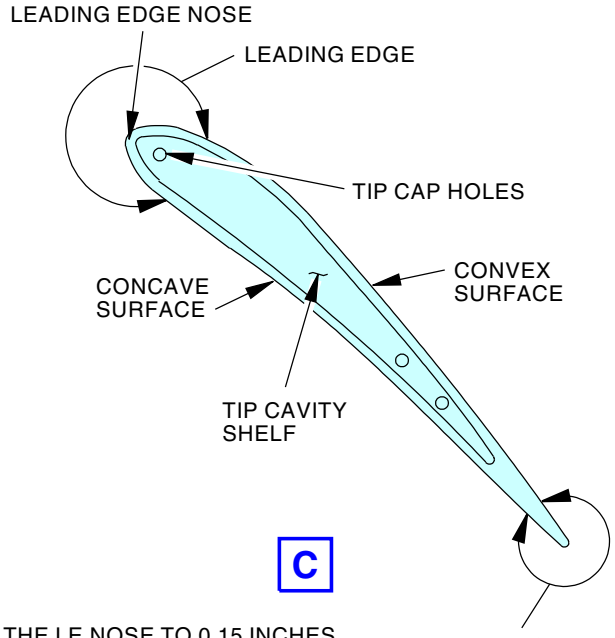
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOTE:

SPAN IS MEASURED FROM THE BLADE PLATFORM.

1. AREA A AT THE LEADING EDGE IS DEFINED AS THE AREA FROM THE TIP OF THE BLADE TO THE 30% SPAN (APPROXIMATELY 2.7 INCH (65.6 mm) FROM THE TIP) OF THE AIRFOIL
2. AREA A AT THE TRAILING EDGE IS DEFINED AS THE AREA FROM THE TIP OF THE BLADE TO THE 70% SPAN (HOLE NUMBER 13 IN THE TRAILING EDGE HOLES) (APPROXIMATELY 1.2 INCH (30.5 mm) FROM THE TIP) OF THE AIRFOIL.
3. AREA B AT THE LEADING EDGE IS DEFINED AS THE AREA FROM THE BLADE PLATFORM TO THE 30% SPAN (APPROXIMATELY 1.2 INCH (30.5 mm) FROM THE PLATFORM) OF THE AIRFOIL.
4. AREA B AT THE TRAILING EDGE IS DEFINED AS THE AREA FROM THE BLADE PLATFORM TO THE 70% SPAN (HOLE NUMBER 13 IN THE TRAILING EDGE HOLES) (APPROXIMATELY 2.7 INCH (65.6 mm) FROM THE PLATFORM) OF THE AIRFOIL.



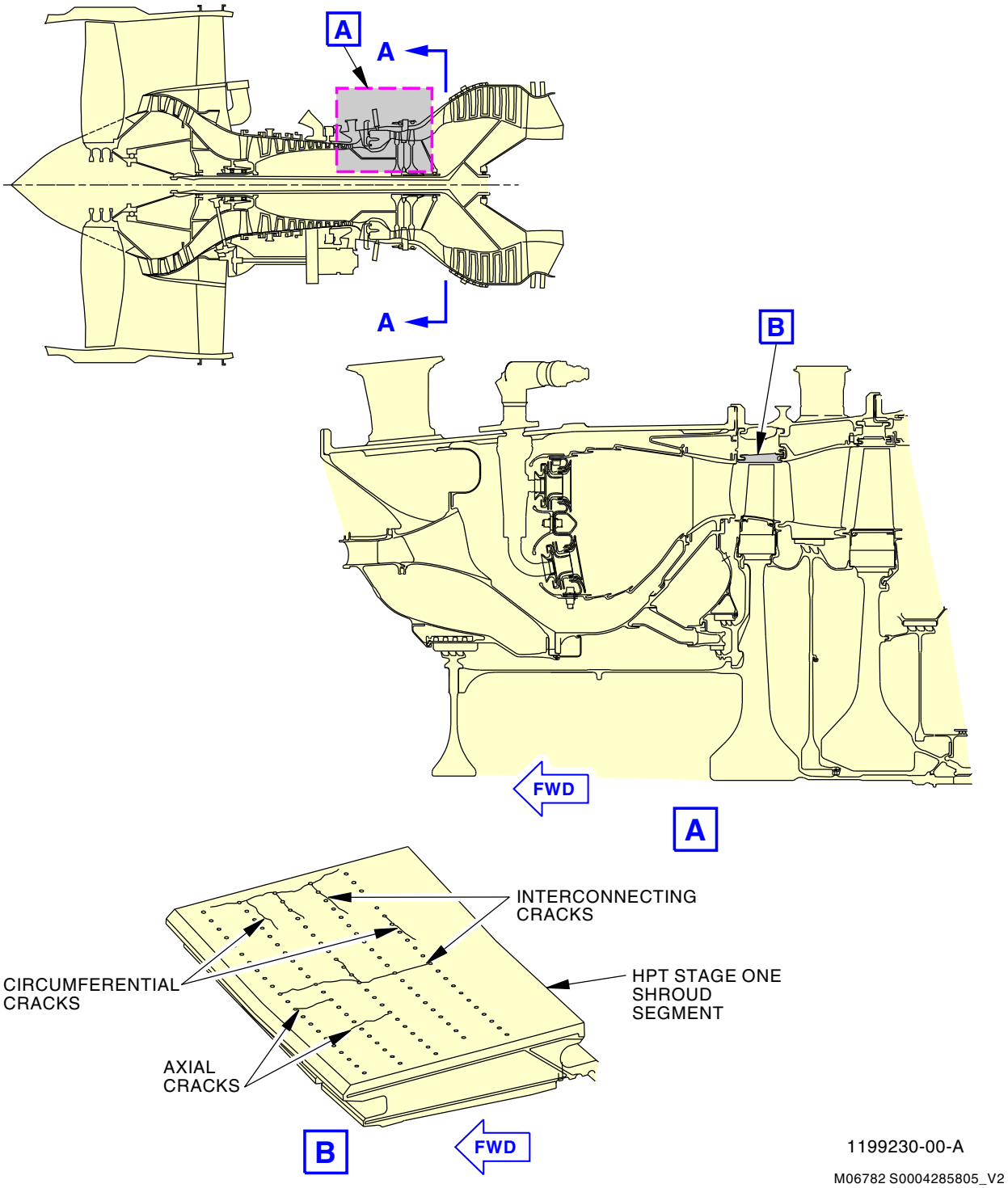
NOTE:

THE LEADING EDGE IS DEFINED AS THE REGION FROM THE LE NOSE TO 0.15 INCHES AFT ON THE CONCAVE SIDE, AND FROM THE LE NOSE TO 0.20 INCHES AFT ON THE CONVEX SIDE. IN THE RADIAL DIRECTION, THE LE REGION EXTENDS FROM PLATFORM TO TIP. THE NOSE HOLES ARE WITHIN THE LE REGION.

1199228-00-A
M06768 S0004285803_V7

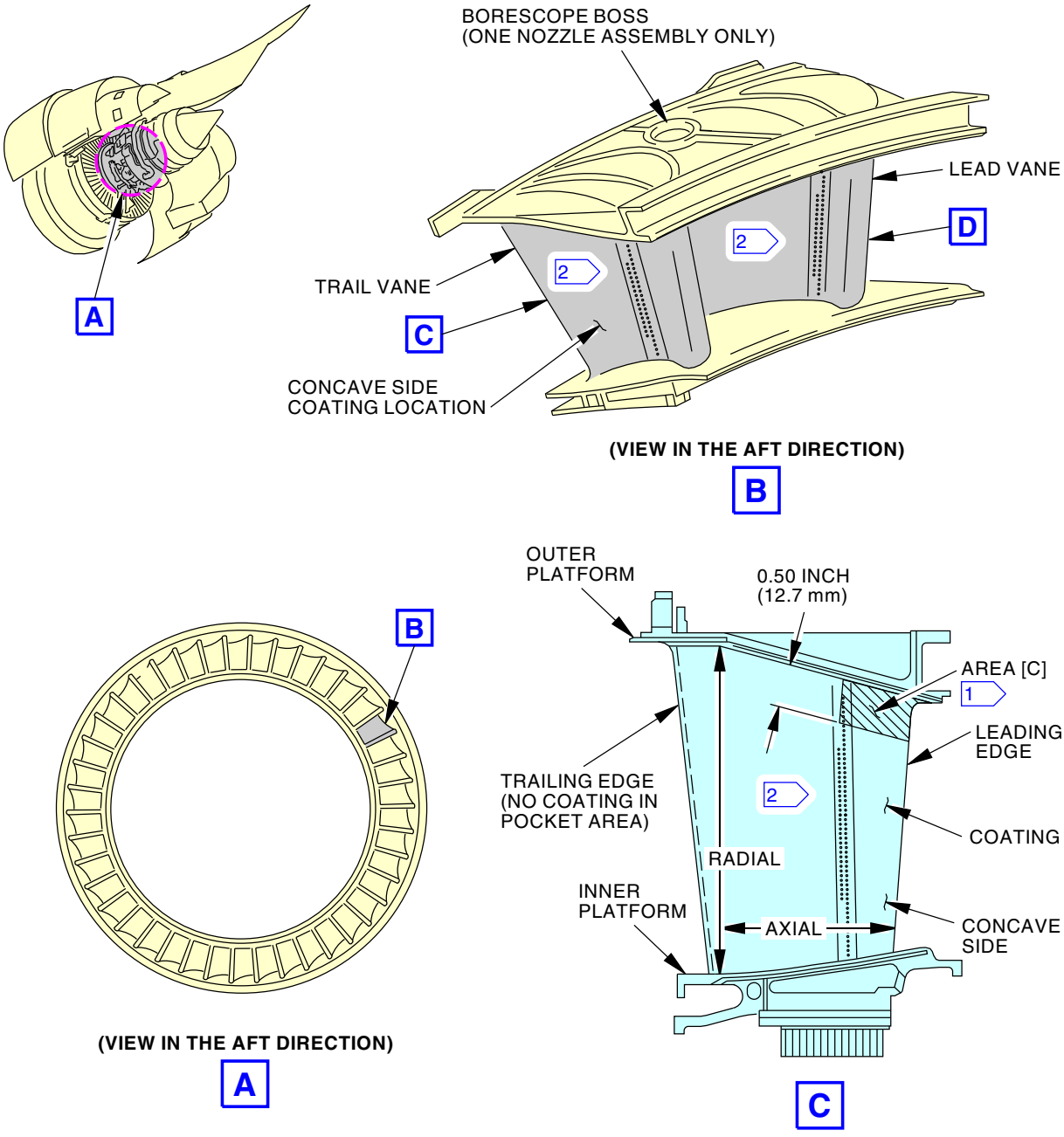
HPT Rotor Section Stage Two Blade Inspection
Figure 615/72-00-00-990-816-H01 (Sheet 2 of 2)

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



HPT Section Stage One Shroud Inspection
Figure 616/72-00-00-990-817-H01

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



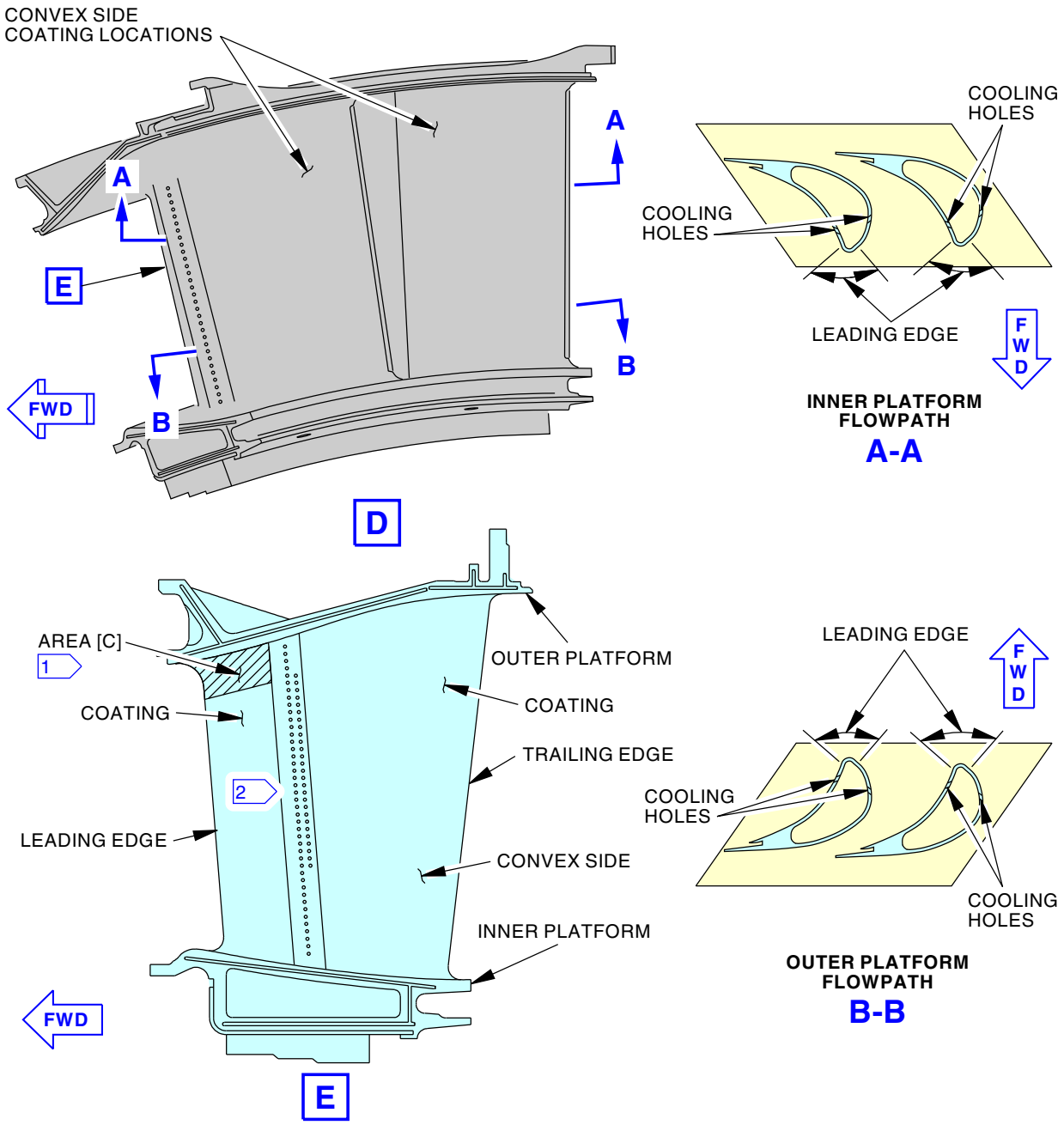
1 AREA C IS DEFINED AS THE AREA WITHIN 0.5 INCH (12.7 mm) FROM THE OUTER PLATFORM AND EXTENDS FROM THE CONCAVE SIDE COOLING HOLES, WRAPS AROUND THE LEADING EDGE, AND ENDS AT THE CONVEX SIDE COOLING HOLES.

2 ENGINES WITH ADDITIONAL PARTIAL ROW OF COOLING HOLES IN THE CONCAVE PANEL.

1209869-00-A
M06783 S0004285806_V7

HPT Section Stage Two Nozzle Inspection
Figure 617/72-00-00-990-818-H01 (Sheet 1 of 6)

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



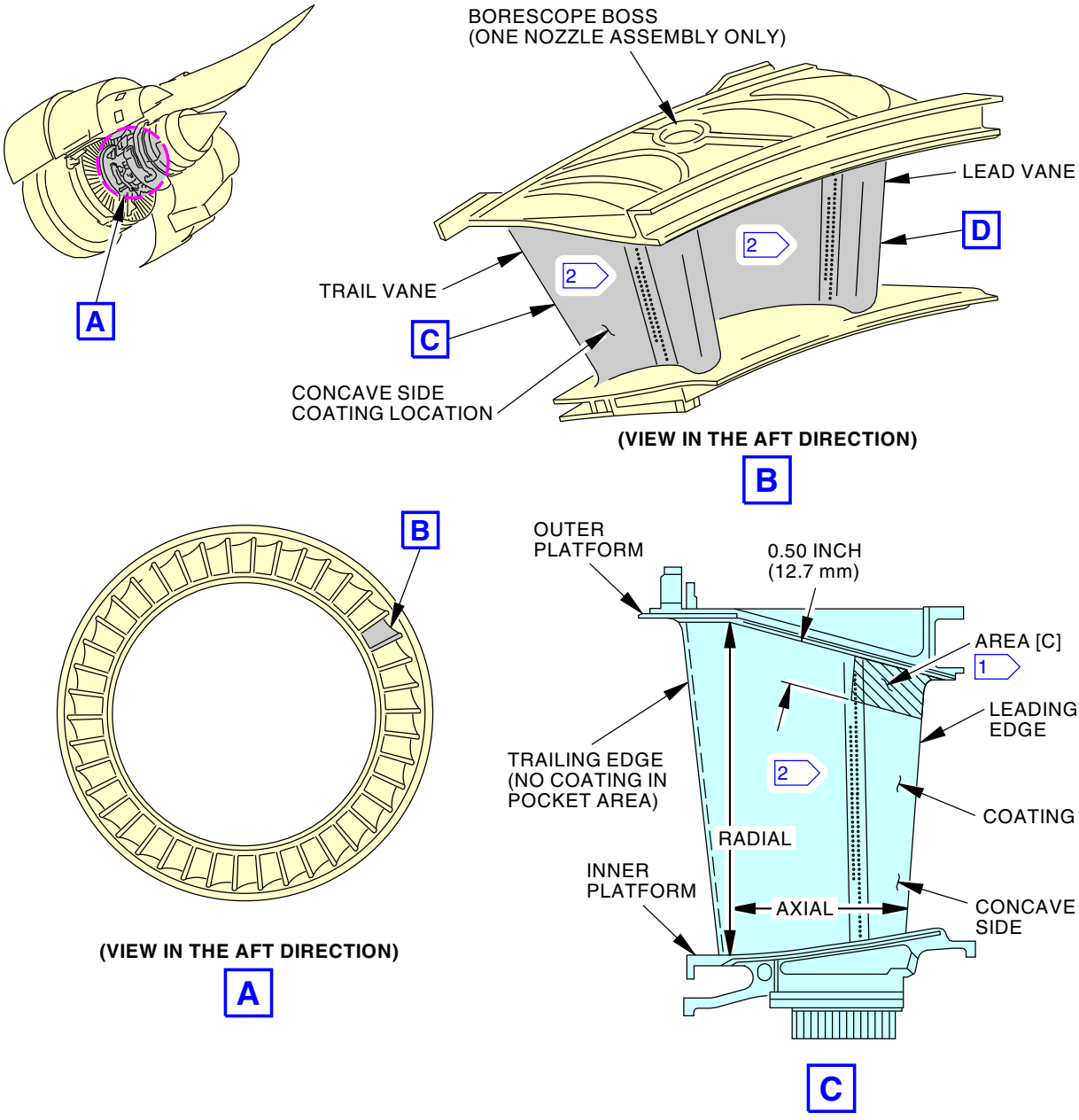
1 AREA C IS DEFINED AS THE AREA WITHIN 0.5 INCH (12.7 mm) FROM THE OUTER PLATFORM AND EXTENDS FROM THE CONCAVE SIDE COOLING HOLES, WRAPS AROUND THE LEADING EDGE, AND ENDS AT THE CONVEX SIDE COOLING HOLES.

2 ENGINES WITH ADDITIONAL PARTIAL ROW OF COOLING HOLES IN THE CONCAVE PANEL.

1199232-00-A
M06784 S0004285807_V5

HPT Section Stage Two Nozzle Inspection
Figure 617/72-00-00-990-818-H01 (Sheet 2 of 6)

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



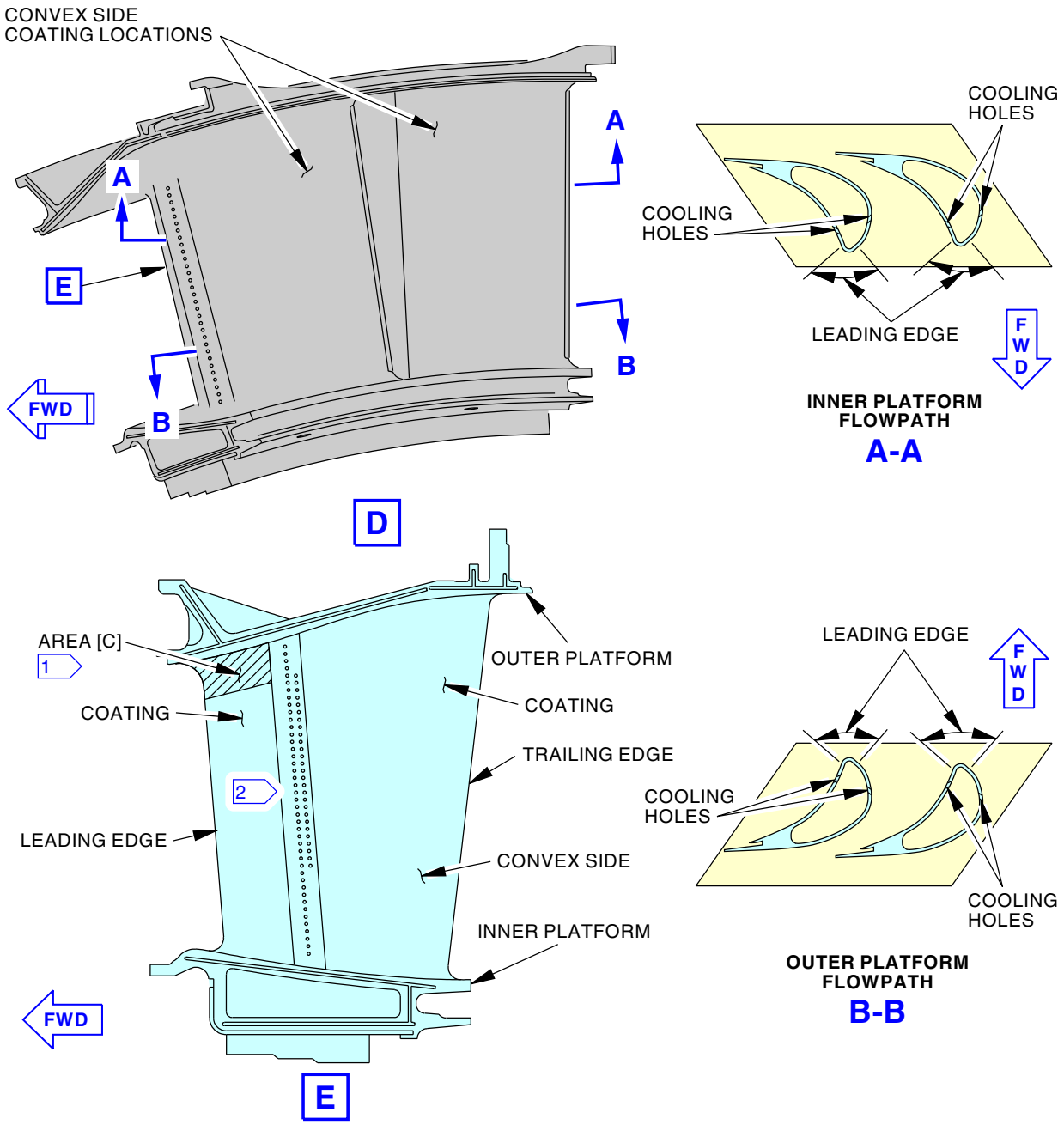
1 AREA C IS DEFINED AS THE AREA WITHIN 0.5 INCH (12.7 mm) FROM THE OUTER PLATFORM AND EXTENDS FROM THE CONCAVE SIDE COOLING HOLES, WRAPS AROUND THE LEADING EDGE, AND ENDS AT THE CONVEX SIDE COOLING HOLES.

2 ENGINES WITH ADDITIONAL PARTIAL ROW OF COOLING HOLES IN THE CONCAVE PANEL.

1209869-00-A
2368195 S0000542370_V3

HPT Section Stage Two Nozzle Inspection
Figure 617/72-00-00-990-818-H01 (Sheet 3 of 6)

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



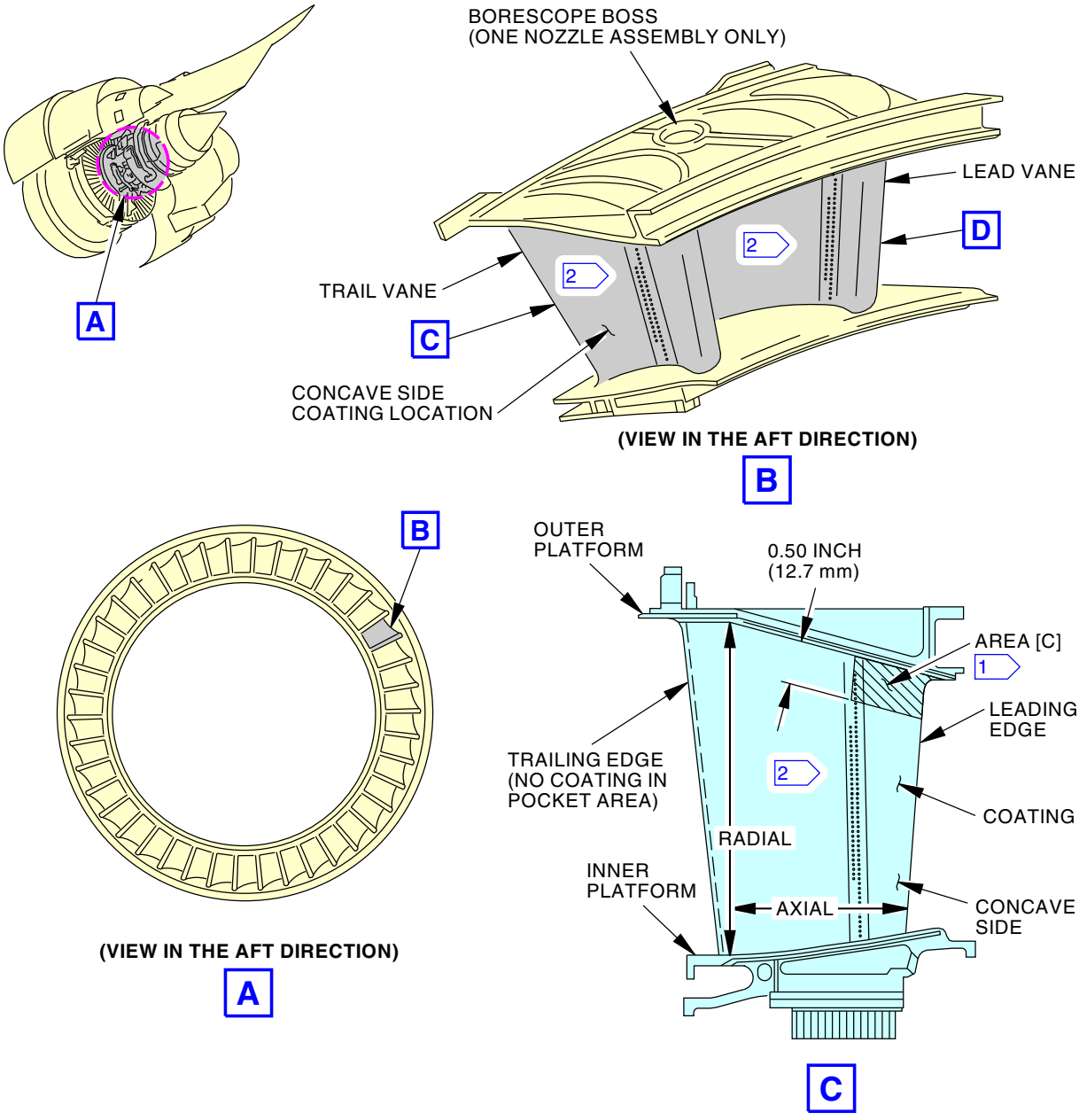
1 AREA C IS DEFINED AS THE AREA WITHIN 0.5 INCH (12.7 mm) FROM THE OUTER PLATFORM AND EXTENDS FROM THE CONCAVE SIDE COOLING HOLES, WRAPS AROUND THE LEADING EDGE, AND ENDS AT THE CONVEX SIDE COOLING HOLES.

2 ENGINES WITH ADDITIONAL PARTIAL ROW OF COOLING HOLES IN THE CONCAVE PANEL.

1199232-00-A
2368209 S0000542371_V3

HPT Section Stage Two Nozzle Inspection
Figure 617/72-00-00-990-818-H01 (Sheet 4 of 6)

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



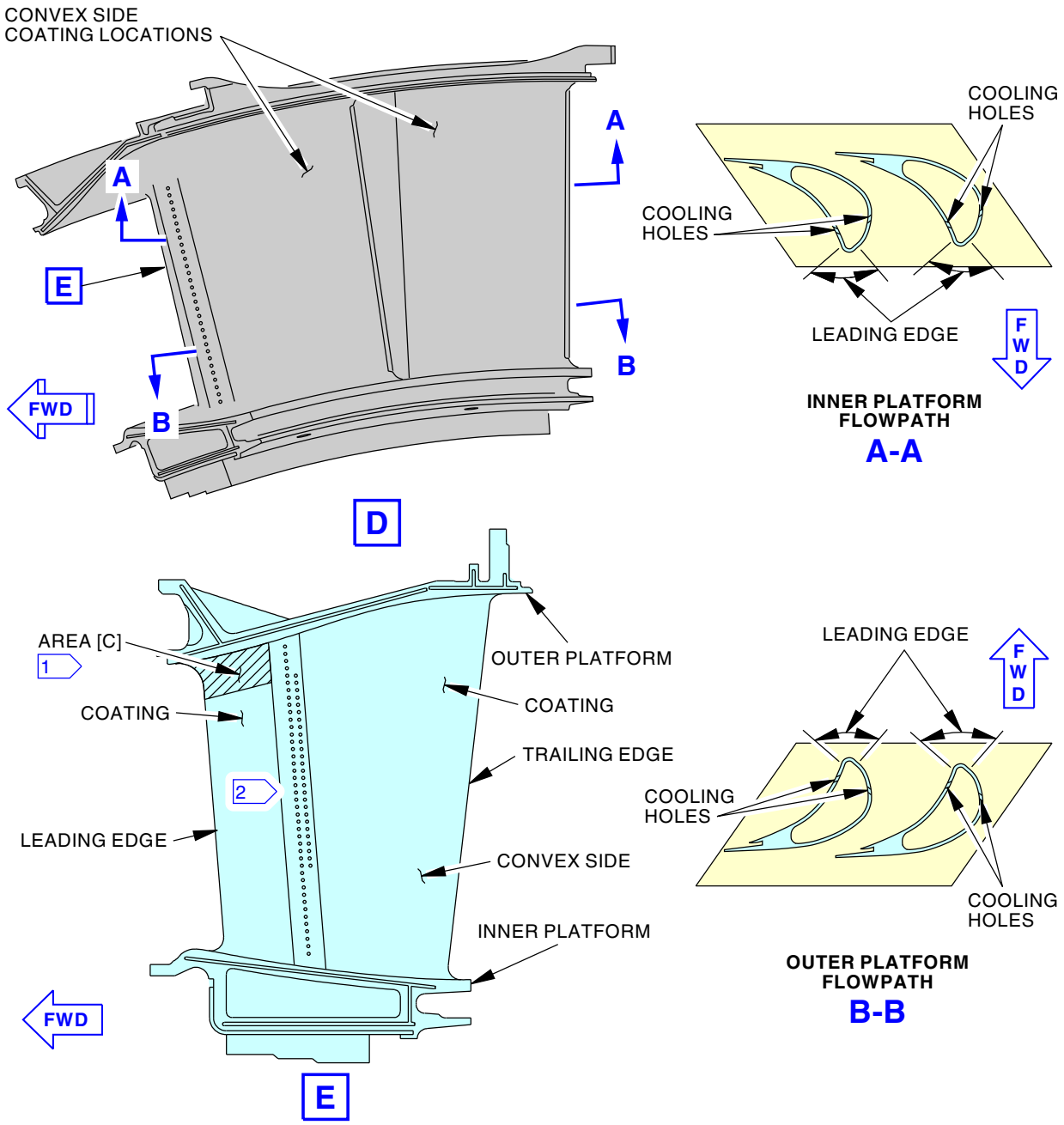
1 AREA C IS DEFINED AS THE AREA WITHIN 0.5 INCH (12.7 mm) FROM THE OUTER PLATFORM AND EXTENDS FROM THE CONCAVE SIDE COOLING HOLES, WRAPS AROUND THE LEADING EDGE, AND ENDS AT THE CONVEX SIDE COOLING HOLES.

2 ENGINES WITH ADDITIONAL PARTIAL ROW OF COOLING HOLES IN THE CONCAVE PANEL.

1209869-00-A
2481230 S0000583198_V2

HPT Section Stage Two Nozzle Inspection
Figure 617/72-00-00-990-818-H01 (Sheet 5 of 6)

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



1 AREA C IS DEFINED AS THE AREA WITHIN 0.5 INCH (12.7 mm) FROM THE OUTER PLATFORM AND EXTENDS FROM THE CONCAVE SIDE COOLING HOLES, WRAPS AROUND THE LEADING EDGE, AND ENDS AT THE CONVEX SIDE COOLING HOLES.

2 ENGINES WITH ADDITIONAL PARTIAL ROW OF COOLING HOLES IN THE CONCAVE PANEL.

1199232-00-A
2481232 S0000583199_V2

HPT Section Stage Two Nozzle Inspection
Figure 617/72-00-00-990-818-H01 (Sheet 6 of 6)

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

TASK 72-00-00-290-807-H01

8. Low Pressure Turbine Section Rotor Inspection

(Figure 618, Figure 619 and Figure 620)

A. General

(1) This provides the instructions on how to examine the low pressure turbine section rotor.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-11-13-960-801-H00	Engine Case Borescope Bosses Locking Insert Replacement (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-116	Borescope - Rigid, GE Engines Part #: 9C1300P01 Supplier: 06083
SPL-570	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D50003 [C02-061]	Compound - Antiseize - Milk of Magnesia (unflavored)	
D50017 [C02-071]	Compound - Antiseize And Lubricating - Pure Nickel Special Grade	GE Spec D6Y28C1 or A50TF198

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-00-00-010-017-H01

(1) If it is necessary, do this task: Borescope Inspection Preparation, TASK 72-00-00-290-801-H01.

H. Low Pressure Turbine Section Rotor Inspection

SUBTASK 72-00-00-020-001-H01

(1) Remove borescope plugs S and T to examine the low pressure turbine (LPT) stage 1 through 4 rotor blades.

NOTE: Do the inspections that follows on the parts of LPT stages 5 and 6 that you can see and the borescope ports on the engine. Plug S (Figure 618 (Sheet 2)) must be there to do the inspection of the LPT stage 1 blade trailing edge and LPT stage 2 blade leading edge.

NOTE: Not all engines are equipped with port S.

SUBTASK 72-00-00-290-010-H01

(2) Turn the borescope light source, SPL-570 on and insert the rigid borescope, SPL-116 in its position for the examination.

SUBTASK 72-00-00-980-006-H01

(3) Manually turn the fan rotor in a clockwise (CW) direction (aft as you look forward) to turn the LPT rotor.

SUBTASK 72-00-00-220-024-H01

(4) Examine all areas of the LPT rotor blades.

(a) Cracks are not permitted unless specified differently.

SUBTASK 72-00-00-220-037-H00

(5) Examine the LPT rotor blade leading edge of stage 1.

NOTE: The leading edge is not visible through the borescope plug(s). Limits are provided if blades are examined with a flexible borescope.

(a) Nicks that are less than 0.015 inch (0.38 mm) in depth are permitted.

(b) Dents that exclude Area X and Y (Figure 619 (Sheet 2))

1) Permitted with these conditions:

a) No cuts or tears are permitted in the bottom or of any dent.

b) Any amount, with no protrusion to opposite side.

c) Three dents with protrusion to the opposite side not more than 0.025 in. (0.64 mm).

SUBTASK 72-00-00-220-025-H01

(6) Examine the LPT rotor blade leading edges of stages 2 and 4 and the trailing edges of stages 1 and 3:

NOTE: Plug S (Figure 618 (Sheet 2)) must be there to do an inspection of the LPT stage 1 blade trailing edge and LPT stage 2 blade leading edge.

(a) Nicks

1) Nicks that are less than 0.04 inch (1.02 mm) in depth are permitted.

(b) Dents (small)

1) All small dents are permitted if they do not go through the opposite side of the blade.

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

2) Five small dents are permitted if distortion is less than 0.055 inch (1.40 mm) on the opposite side of the blade.

(c) Dents (large) or pieces of metal that are missing

1) Two damaged areas are permitted on the same or opposite sides of the blade with these conditions.

a) The damaged areas are separated by a minimum radial distance of 0.5 inch (12.7 mm) from the leading edge.

b) The damaged areas are separated by a minimum radial distance of 0.394 inch (10.01 mm) from the trailing edge.

(d) Cracks in the dented areas

1) Permitted with these conditions:

a) There are no cracks that go out of the damaged area.

b) Cracks must be less than 0.394 inch (10.01 mm).

(e) Tears

1) Not permitted.

SUBTASK 72-00-00-220-026-H01

(7) Examine the concave and convex surfaces of the LPT rotor blades.

(a) Dents and Nicks

1) Permitted if less than 0.03 inch (0.76 mm) in depth and with these conditions:

a) They are separated by 0.25 inch (6.40 mm) minimum.

b) They do not go through to the opposite side of the blade.

2) Five damaged areas on each side of the blade are permitted when the distortion is less than 0.02 inch (0.51 mm) on the opposite side.

SUBTASK 72-00-00-220-027-H01

(8) Examine the top surface of the blade platform (not to include the blade root radius).

(a) Nick and dents

1) All damage that is less than 0.02 inch (0.51 mm) in depth is permitted.

SUBTASK 72-00-00-220-028-H01

(9) Examine the angel wings.

(a) Examine the OD surface:

1) Material that is rubbed, twisted, or missing is not permitted.

SUBTASK 72-00-00-220-029-H01

(10) Examine the circumferential mate faces on the LPT shroud.

(a) Signs of wear (irregular or jagged)

1) Permitted if there are no signs of wear on the interlock area of the mate face.

SUBTASK 72-00-00-220-030-H01

(11) Examine the LPT shroud interlocks.

NOTE: It is recommended to examine the LPT Stage 6 (S6) blade interlock wear from the aft side of the engine with a borescope.

(a) Wear (irregular or jagged)

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

1) Permitted if the axial preload is present.

NOTE: Axial preload is the contact between two interlock surfaces.

(b) Shingled or not latched

1) Not permitted.

(c) Wear to the extent that there is no axial preload.

NOTE: Axial preload is the contact between two interlock surfaces.

1) Not permitted.

SUBTASK 72-00-00-210-009-H01

(12) Examine the LPT blades for metal splatter.

(a) Metal splatter on the LPT blades is permitted.

SUBTASK 72-00-00-210-015-H00

(13) Examine the LPT blades stages 1, 2 and 3 for corrosion as follows:

(a) Corrosion on the airfoil and the tip and root fillets

1) Permitted, if there is no missing, chipped or peeled coating.

(b) Corrosion on the platform (and on the forward and aft angel wings)

1) Permitted.

(c) Missing, chipped or peeled coating on the airfoil and the tip and root fillets

1) Not permitted except in nicks or dents.

(d) Missing, chipped or peeled coating on the platform (and on the forward and aft angel wings)

1) Permitted.

SUBTASK 72-00-00-080-004-H01

(14) When the examination is complete turn the borescope light source, SPL-570 off and do this step:

(a) Let the light source blower to stay on for a while to cool the lamp and case.

SUBTASK 72-00-00-420-001-H01

(15) Install the borescope plugs as follow:

(a) Do a visual inspection of the locking insert (lock ring) on the borescope ports for inserts that are loose or missing.

1) Replace locking inserts (lock rings) that are loose or missing with new ones (TASK 70-11-13-960-801-H00).

(b) Do a visual inspection of the borescope plugs for broken, bent or deformed spring fingers.

1) If you find more than one broken or bent spring finger or deformation, replace the borescope plug.

(c) Put pure nickel special compound, D50017 [C02-071] or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the combustor borescope plug threads.

(d) Install the borescope plugs in LPT ports S and T.

NOTE: Not all engines are equipped with port S.

(e) Tighten the plugs to 110.0-140.0 pound-inches (12.4-15.8 Newton-meters).

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

SUBTASK 72-00-00-210-013-H00

(16) Look at the visible parts of the LPT stages 5 and 6 rotor blades, and the stage 6 nozzle, through the primary nozzle and TRF.

SUBTASK 72-00-00-210-014-H00

(17) Examine the LPT stage 6 rotor blade leading and trailing edges, and the stage 5 trailing edges.

(a) Nicks

1) Nicks that are less than 0.04 inch (1.02 mm) deep are permitted.

(b) Dents (Small)

1) Permitted if they do not go through the opposite side of the blade.

2) Five small dents are permitted if the distortion is less than 0.055 inch (1.40 mm) on the opposite side of the blade.

(c) Dents (Large) or pieces of metal that are missing

1) Two damaged areas are permitted on the same or opposite sides of the blade with these conditions:

a) The damaged areas are separated by a minimum radial distance of 0.50 inch (12.7 mm) from the leading edge.

b) The damaged areas are separated by a minimum radial distance of 0.394 inch (10.01 mm) from the trailing edge.

(d) Cracks in the dented areas

1) Permitted with these conditions:

a) There are no cracks that go out of the damaged area.

b) Cracks must be less than 0.394 inch (10.01 mm) long.

SUBTASK 72-00-00-220-036-H00

(18) Examine the LPT stage 6 nozzles:

(a) Cracks

1) Cracks on the leading edge are not permitted.

2) Cracks on the trailing edge less than 0.075 inch (1.91 mm) in length are permitted.

(b) Nick, dents, scores and scratches

1) Permitted on the leading edge if less than 0.05 inch (1.27 mm) in depth.

2) Permitted on the trailing edge if less than 0.075 inch (1.91 mm) in depth.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-00-00-860-021-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-00-00-410-016-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:

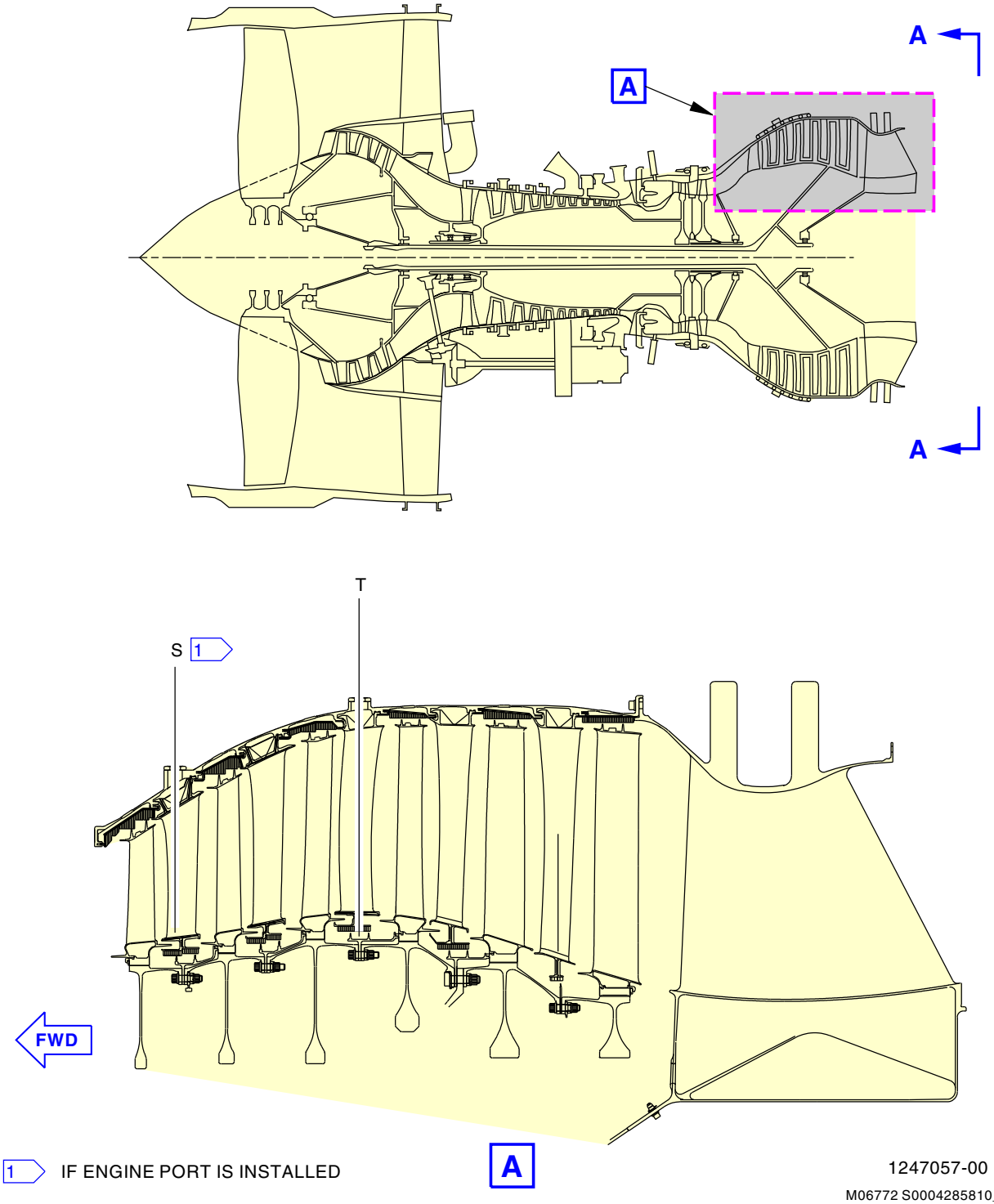
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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.

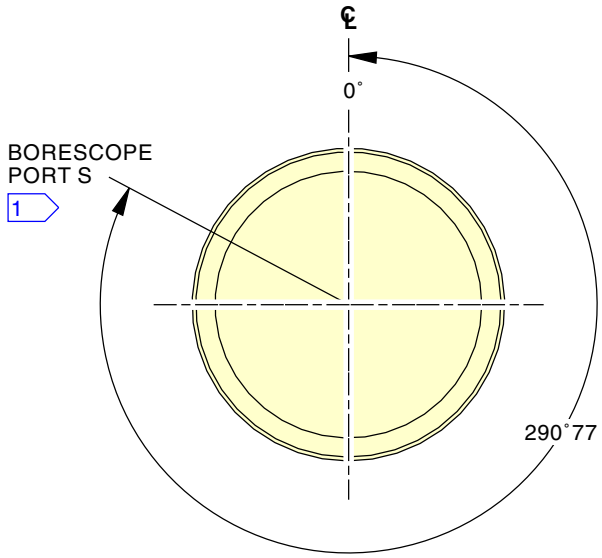
——— END OF TASK ———

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



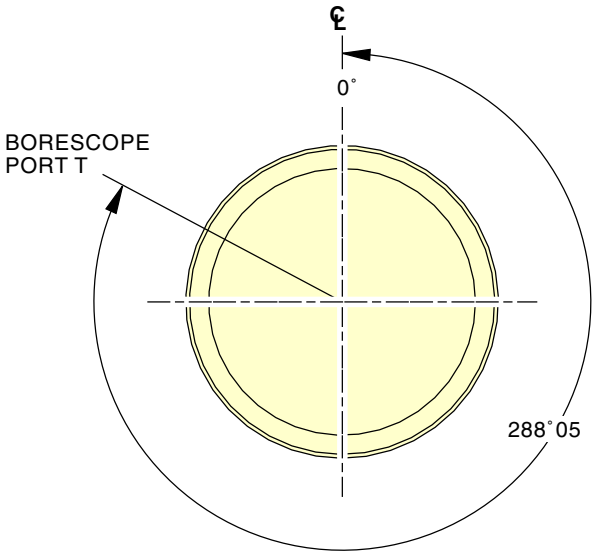
LPT Rotor Section Borescope Port Locations
Figure 618/72-00-00-990-819-H01 (Sheet 1 of 2)

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



LPT CASE 2ND-STAGE
BORESCOPE PORT S 1
(VIEW IN THE FORWARD DIRECTION)

A-A



LPT CASE 4TH-STAGE
BORESCOPE PORT T
(VIEW IN THE FORWARD DIRECTION)

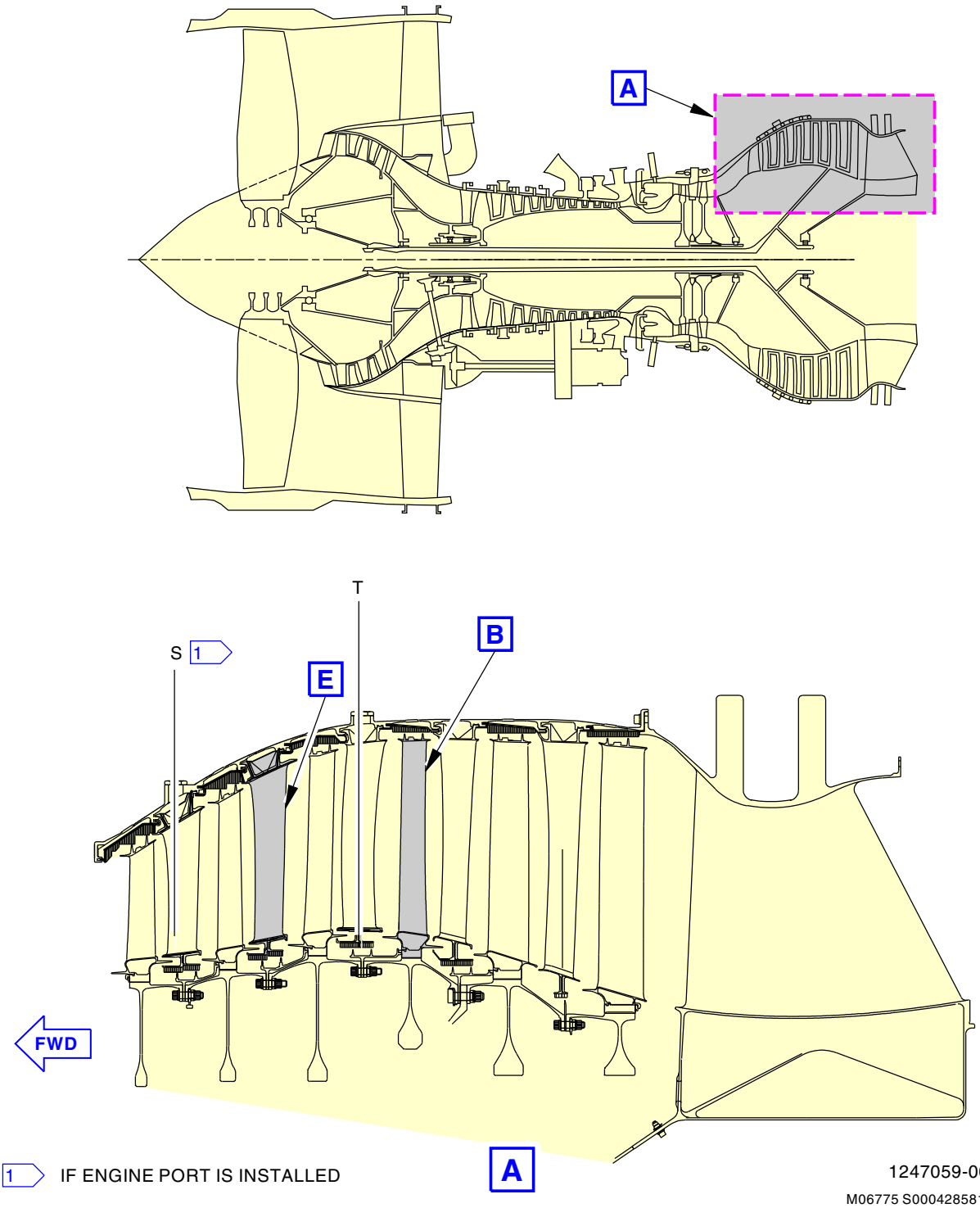
A-A

1 IF ENGINE PORT IS INSTALLED

1247058-00
M06773 S0004285811_V5

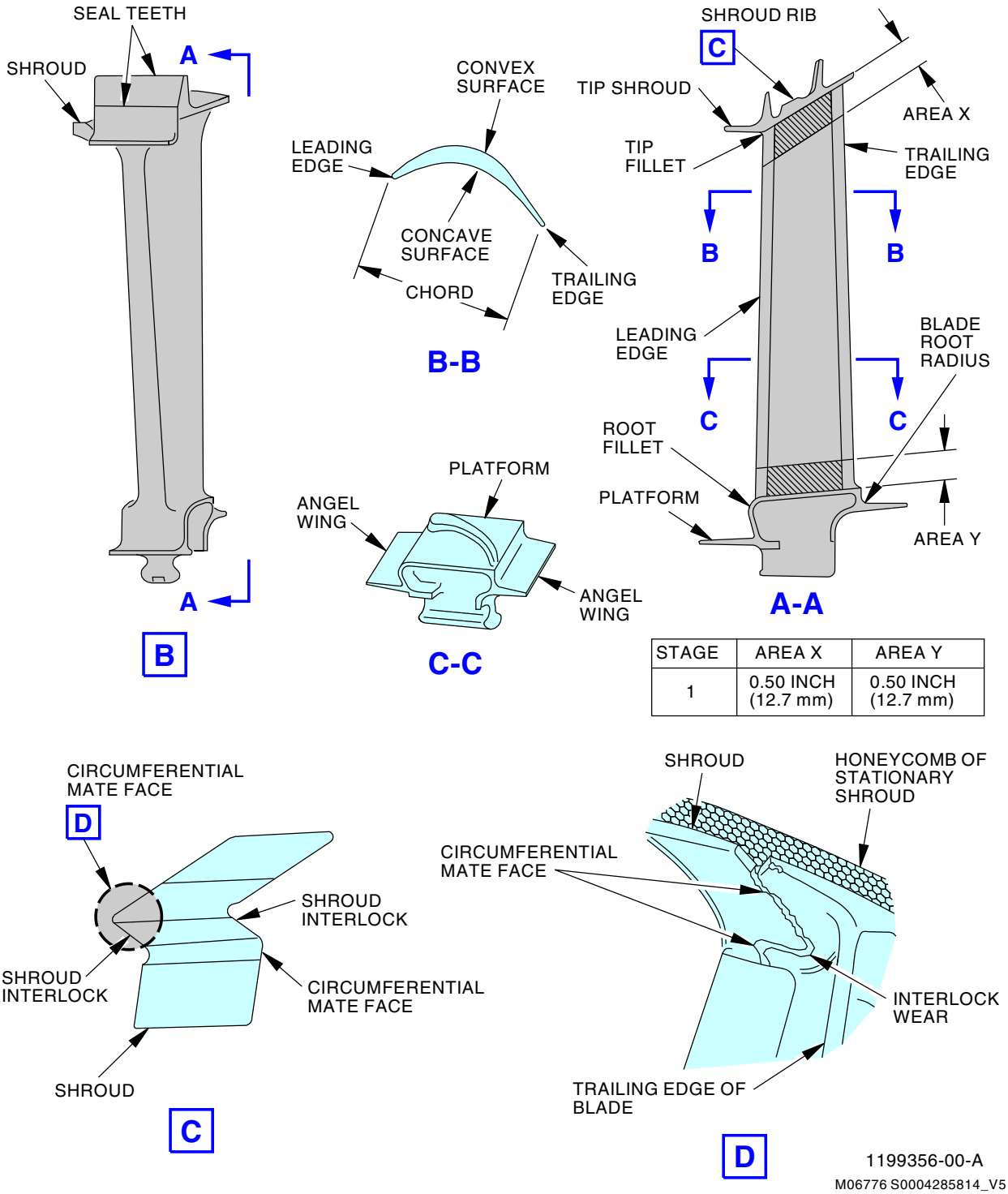
LPT Rotor Section Borescope Port Locations
Figure 618/72-00-00-990-819-H01 (Sheet 2 of 2)

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



LPT Rotor Section Blade Inspection
Figure 619/72-00-00-990-820-H01 (Sheet 1 of 3)

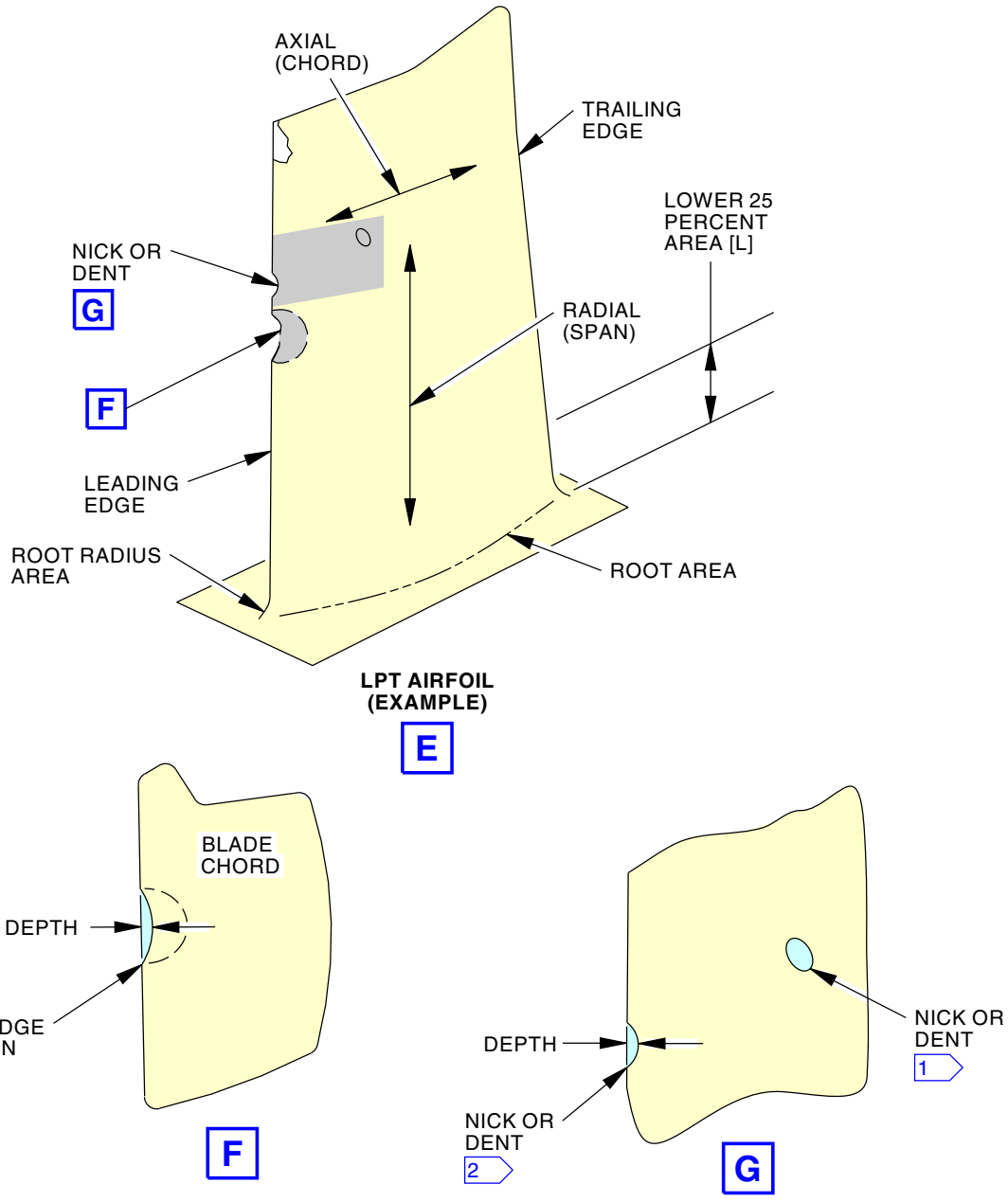
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



STAGE	AREA X	AREA Y
1	0.50 INCH (12.7 mm)	0.50 INCH (12.7 mm)

LPT Rotor Section Blade Inspection
Figure 619/72-00-00-990-820-H01 (Sheet 2 of 3)

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



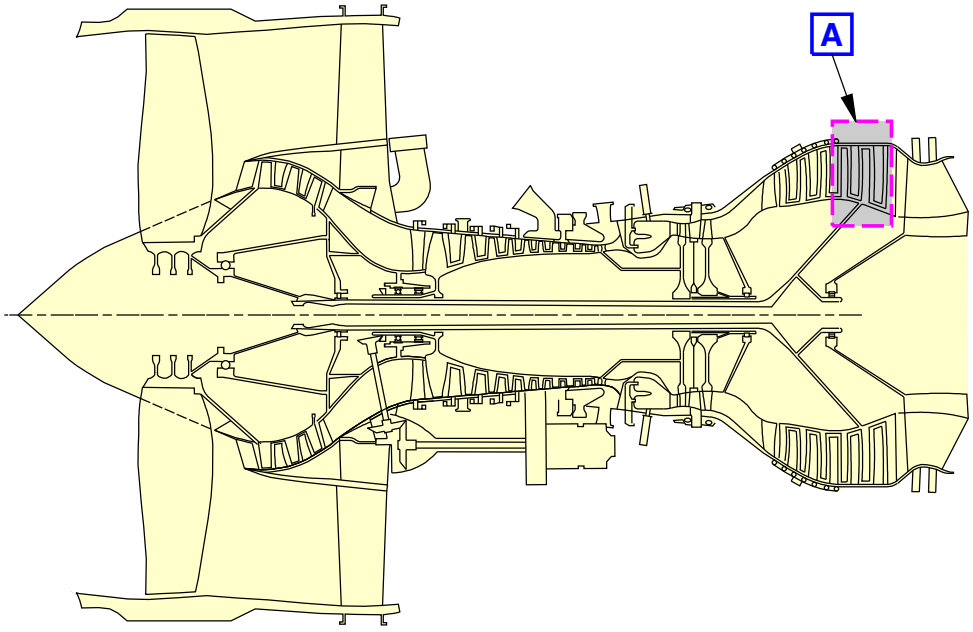
1 NICK/DENT AWAY FROM LEADING/TRAILING EDGE: DEPTH IS MEASURED INTO THE METAL/NORMAL TO AIRFOIL SURFACE.

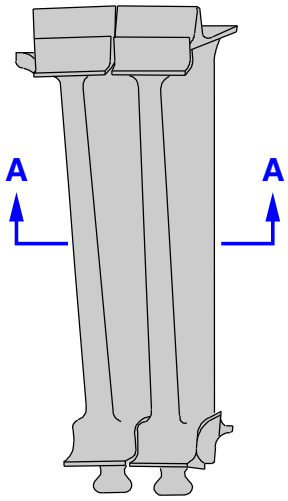
2 NICK/DENT ON LEADING/TRAILING EDGE: DEPTH IS MEASURED FROM THE EDGE.

2791220 S0000634506_V1

LPT Rotor Section Blade Inspection
Figure 619/72-00-00-990-820-H01 (Sheet 3 of 3)

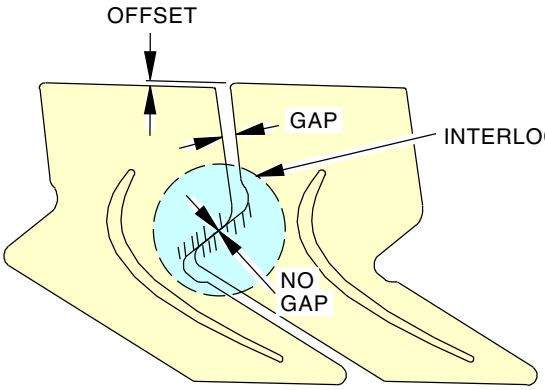
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





VIEW IN THE FORWARD DIRECTION

A



- BLADE FORWARD/AFT EDGES OFFSET
- SMOOTH INTERLOCK WEAR
- AXIAL PRELOAD PRESENT

SERVICEABLE

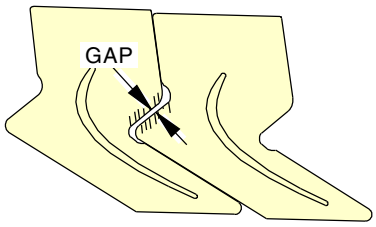
A-A

1117827-00-A

M06777 S0004285815_V2

LPT Rotor Section Blade Shroud Circumferential Inspection
Figure 620/72-00-00-990-821-H01 (Sheet 1 of 3)

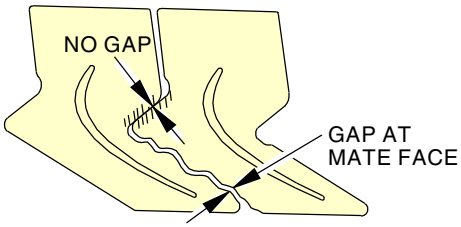
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



- LOSS OF AXIAL PRELOAD CONTACT BETWEEN TWO INTERLOCKING SURFACES

NOT SERVICEABLE

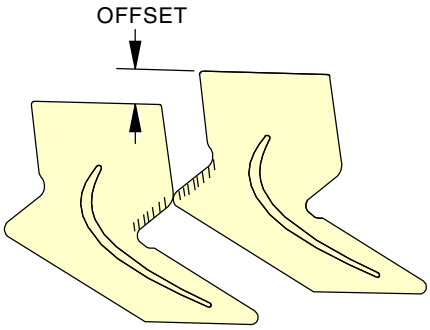
A-A



- SMOOTH/IRREGULAR WEAR ON CIRCUMFERENTIAL MATE FACE
- AXIAL PRELOAD CONTACT BETWEEN TWO INTERLOCKING SURFACES PRESENT

SERVICEABLE

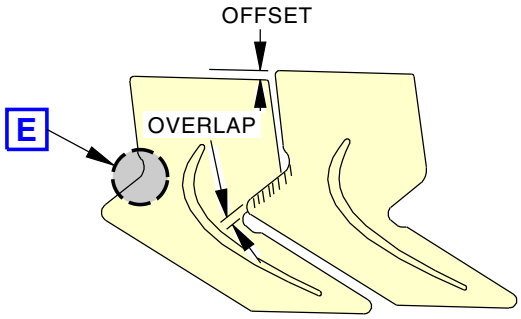
A-A



- BLADE FORWARD/AFT EDGES OFFSET
- EXCESSIVE CIRCUMFERENTIAL MOVEMENT ALLOWING INTERLOCK DISCONNECT (UNLATCHING)

NOT SERVICEABLE

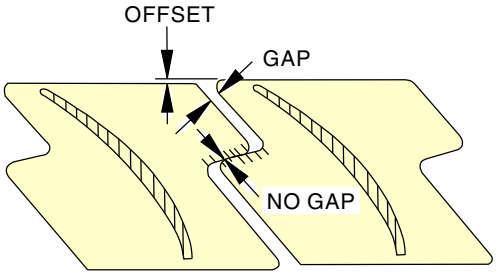
A-A



- BLADE FORWARD/AFT EDGES OFFSET
- AXIAL PRELOAD CONTACT BETWEEN TWO INTERLOCKING SURFACES PRESENT
- TIP SHROUDS OVERLAPPED BUT NOT SHINGLED AT INTERLOCK SURFACE CIRCUMFERENTIAL MATE FACE

SERVICEABLE

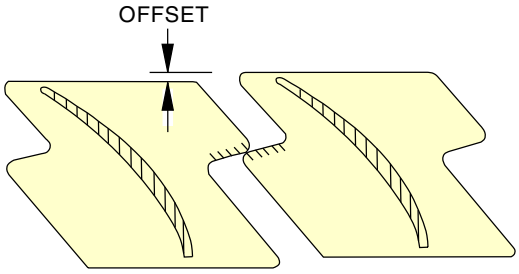
A-A



- BLADE FWD/AFT EDGES OFFSET
- AXIAL PRELOAD CONTACT BETWEEN TWO INTERLOCK SURFACES PRESENT

SERVICEABLE

A-A



- BLADE FWD/AFT EDGES OFFSET
- AXIAL PRELOAD CONTACT BETWEEN TWO INTERLOCK SURFACES PRESENT

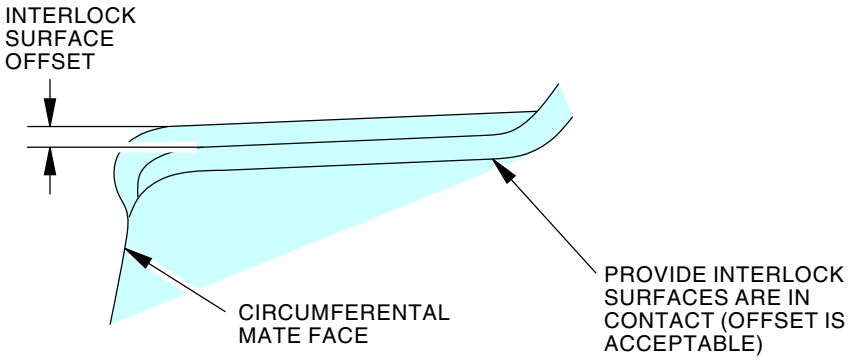
SERVICEABLE

A-A

1117827-00-A
M06778 S0004285816_V5

LPT Rotor Section Blade Shroud Circumferential Inspection
Figure 620/72-00-00-990-821-H01 (Sheet 2 of 3)

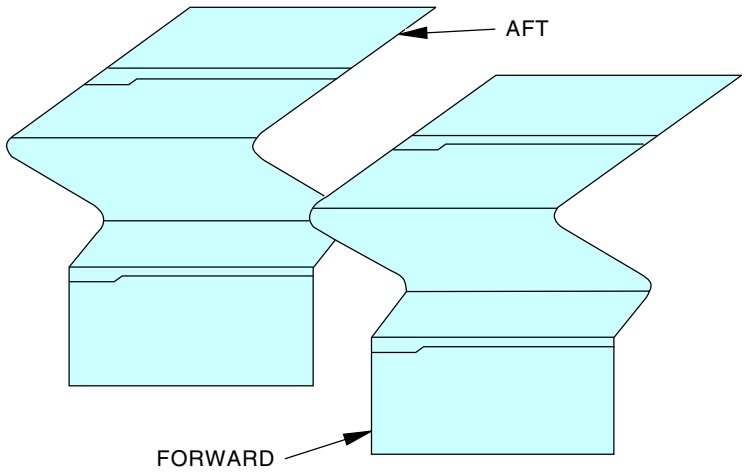
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



- AXIAL PRELOAD (CONTACT BETWEEN TWO INTERLOCK SURFACES) PRESENT
- BLADE OFFSET AT THE INTERLOCK SURFACE
  (PROVIDED THERE IS CONTACT AT THE INTERLOCK SURFACES)

SERVICEABLE

E



- SHINGLED CONDITION
- LOSS OF AXIAL PRELOAD (CONTACT BETWEEN TWO INTERLOCK SURFACES)

NOT SERVICEABLE

A-A

1507939 S0000276150_V4

LPT Rotor Section Blade Shroud Circumferential Inspection
Figure 620/72-00-00-990-821-H01 (Sheet 3 of 3)

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

ENGINE - CLEANING/PAINTING

1. General

A. This procedure contains one task:

(1) Engine gas path cleaning (Juniper Wash Cart Method)

TASK 72-00-00-100-801-H01

2. Engine Gas Path Cleaning (Juniper Wash Cart Method)

(Figure 701)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the steps on how to clean the engine gas path with the Juniper wash cart.

(2) You may use a soap solution followed by water rinse(s) or do the water rinses only to do the cleaning procedure.

(3) The gas path cleaner, G02351 [C04-140] is available pre-mixed (no dilution necessary) or as a concentrate that must be diluted with water as specified by the manufacturer.

(4) Make sure that you follow the starter duty guidelines (TASK 71-00-00-800-802-H01).

(5) Use of an alternative engine core wash procedure and tooling is permitted.

B. References

Reference	Title
12-13-01-130-803-002	Engine Oil Replenishing (P/B 301)
12-22-01-610-805-002	Engine Oil Change (P/B 301)
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)
70-51-00-910-801-H01	Instruction for Torque (P/B 201)
71-00-00-700-802-H01	Test No. 2 - Dry Motor leak Check (P/B 501)
71-00-00-700-804-H01	Test No. 5 - Idle Leak Check (P/B 501)
71-00-00-700-813-H01	Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test) (P/B 501)
71-00-00-700-818-H01	Test No. 19 - Variable Stator Vane Operational Test (MAT Initiated test) (P/B 501)
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)
71-11-04-010-814-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)
73-21-15-000-801-H01	EEC (FADEC) Removal (P/B 401)
73-21-15-400-801-H01	EEC (FADEC) 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)

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

(Continued)

Reference	Title
78-31-00-440-805-H00	Thrust Reverser Activation After Ground Maintenance (P/B 201)
FIM 73-22 TASK 846	PS3 Fault - Fault Isolation
FIM 73-22 TASK 847	P3B/PS3 System Fault - Fault Isolation
FIM 73-22 TASK 848	P3B Fault - Fault Isolation

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-2288	Cart - Water Wash, Engine Part #: JMP/CFM56/D/4777/C200 Supplier: U2066 Part #: JMP/LUFT/D/4972/C500 Supplier: U2066 Opt Part #: JMP/CF6/D/4038/C200 Supplier: U2066 Opt Part #: JMP/GE90/D/4038 Supplier: U2066
COM-5013	Probes - Long, Water Wash, T/R Closed, GE90 Engine Part #: JMP/GE90-115B/D/4948 Supplier: U2066
COM-14318	Handheld TDS digital meter, TDS range 0-9990 PPM +/-2% Accuracy Part #: TDS-3 Supplier: 6VU32

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
C50034 [C02-051]	Compound - Corrosion inhibitor - Brayco 599	D50TF6, Class A
G02351 [C04-140]	Cleaner - Liquid Gas Path	MIL-PRF-85704

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Gas Path Cleaning

CAUTION

DO NOT DO THIS PROCEDURE ON MORE THAN ONE ENGINE DURING THE SAME MAINTENANCE TASK. IF IT IS NOT POSSIBLE TO PREVENT MAINTENANCE ON MORE THAN ONE ENGINE AT THE SAME TIME, IT IS RECOMMENDED THAT DIFFERENT TEAMS SERVICE EACH ENGINE. THIS IS TO MAKE SURE THAT THERE IS MINIMUM INCORRECT MAINTENANCE DONE BY THE SAME TEAM.

NOTE: Make sure the dryout run can be done in less than two hours after the engine wash.

NOTE: The JMP/GE90-115B/D/4948 long engine wash probes is the preferred probes for this task. JMP/GE90-115B/D/4949 short engine wash probes is approved for alternative.

NOTE: When you use the JMP/GE90-115B/D/4948 wash probe, it is not necessary to open the thrust reversers.

SUBTASK 72-00-00-410-017-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 72-00-00-020-013-H00

(2) Disconnect the pressure sensor hose B-nuts PS3, P3B, PT25 (if installed).

(a) To disconnect the pressure sensor hose B-nuts PS3, P3B, PT25 from the EEC (FADEC) do this task: (EEC (FADEC) Removal, TASK 73-21-15-000-801-H01).

(b) As an alternative procedure, disconnect the pressure sensor hose B-nuts PS3, P3B, PT25 as follows (Figure 702):

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

1) The PS3 Tube [1] can be removed from the engine at the 1:15 o'clock (ALF) position on the CDN case.

2) The P3B Tube [2] can be removed from the Bleed Bias Sensor [3] at the 3:00 o'clock (ALF) position on the CDN case.

3) The PT25 tube (if Installed) can be removed from the PT25 sensor at the fan frame 7:00 o'clock position.

NOTE: Put a cap on all the open ports at engine CDN casing and sensor to avoid water leakage in core cowl compartment and put a cap on the open end of the PS3, P3B and PT25 tubes to avoid water or FOD particles that can go inside these tubes.

SUBTASK 72-00-00-170-007-H00

(3) Prepare the Juniper wash cart as follows:

(a) Fill the Juniper wash cart with clean water.

(b) Use water with the specifications that follow:

NOTE: Water that you can drink usually meets the specification. Better water wash results occur with lower total dissolved solids levels.

NOTE: Deionized water will clean the engine more effectively.

1) Total dissolved solids - 500 ppm or less
2) Chlorides - 250 ppm or less
3) Fluoride - 2 ppm or less
4) Sodium - 20 ppm or less
5) Sulfate - 250 ppm or less.

(c) Measure the amount of dissolved solids in the water with the TDS meter, COM-14318 and make a record of the value to use again.

(d) Prepare the Juniper water wash cart for cold weather operation, if it is necessary.

NOTE: Do not water wash at temperatures below 14 degrees F(-10 degrees C).

1) Make sure there is no ice in the water.

NOTE: Ice can cause damage to the engine.

2) If the ambient temperature is below 41°F (5°C), do these steps:

WARNING PRECAUTIONS FOR FLAMMABLE AGENTS MUST BE OBEYED WHEN YOU USE ANTIFREEZE SOLUTIONS WITH LOW FLASH POINTS. A FIRE CAN OCCUR IF YOU USE THE ANTIFREEZE INCORRECTLY. DO NOT MIX ALCOHOL IN THE ANTIFREEZE SOLUTION IF YOU USE IMMERSION HEATER. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION DO NOT USE THIS PROCEDURE IF THE AMBIENT AIR TEMPERATURE IS COLDER THAN THE SPECIFIED LIMIT. VERY LOW AMBIENT AIR TEMPERATURES CAN CAUSE THE WASH FLUID TO FREEZE. IF YOU DO NOT OBEY THIS INSTRUCTION, DAMAGE TO THE ENGINE CAN OCCUR.

a) If the water wash cart has an immersion heater, disconnect it from the electrical power supply.

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

b) Based on the ambient temperature use the appropriate proposition of the Antifreeze solution and Water mixture for water wash as given in the following table.

NOTE: The wash tank on the engine water wash cart, COM-2288 has graduations in liters and imperial gallons. This procedure will use liters as the primary measuring unit (1.0 imperial gallon = 1.2 U.S. gallon = 4.5 liters).

Table 701/72-00-00-993-805-H00 Antifreeze Solution and Water Mixture Proposition

Ambient Temperatures		Antifreeze Solution Quantity - alcohol, B00130		Water Quantity	
Degree F	Degree C	%	Liters	%	Liters
14 to 20	-10 to -6	36%	32	64%	58
20 to 25	-6 to -3	24%	22	76%	68
25 to 30	-3 to -1	18%	16	82%	74
30 to 35	-1 to 1	12%	11	88%	79
35 to 40	1 to 4	6%	5	94%	85

WARNING DO NOT GET CLEANING SOLUTION IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM CLEANING SOLUTION. PUT ON GOGGLES, AND GLOVES WHEN YOU USE CLEANING SOLUTION. CLEANING SOLUTION IS POISONOUS, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

3) If you use isopropyl alcohol in the water wash cart, the cart has an immersion heater and isopropyl alcohol is not necessary, do this step:

a) Flush the isopropyl alcohol from the cart with water two times before you connect it to the electrical power supply.

NOTE: Fully fill and empty the cart with water twice to remove all isopropyl alcohol from the cart.

4) If you will use cleaning solution, prepare the cleaning solution as follows:

NOTE: You can ignore this step if you will use either a pre-mixed cleaning solution, an automatic mixing cart, or if you only use water to do the cleaning procedure.

WARNING DO NOT GET CLEANING SOLUTION IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM CLEANING SOLUTION. PUT ON GOGGLES, AND GLOVES WHEN YOU USE CLEANING SOLUTION. CLEANING SOLUTION IS POISONOUS, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

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

(WARNING PRECEDES)

WARNING KEEP THE CLEANING SOLUTIONS AWAY FROM SPARKS, FLAMES, AND HEAT. CLEANING SOLUTIONS ARE FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL.

a) Mix 72 liters (16 imperial gallons; 19 U.S. gallons) of water with 18 liters (4 imperial gallons; 5 U.S. gallons) of the gas path cleaner, G02351 [C04-140] or mix at the ratio specified by the manufacturer of the cleaner.

<1> If you need to mix cleaning solution, antifreeze solution and water together, refer to Table 702 for mixture proposition.

NOTE: The subject table mixture proposition is based on 4 parts of water (72 liters) with 1 part of cleaning solution (18 liters). If you use antifreeze with water, the 4 parts of water are divided into water and antifreeze.

Table 702/72-00-00-993-806-H00 Cleaning Solution, Antifreeze Solution and Water Mixture Proposition

Ambient Temperatures		Antifreeze Solution Quantity - alcohol, B00130		Water Quantity		Cleaning Solution	
Degree F	Degree C	%	Liters	%	Liters	%	Liters
14 to 20	-10 to -6	36%	26	64%	46	20%	18
20 to 25	-6 to -3	24%	17	76%	55	20%	18
25 to 30	-3 to -1	18%	13	82%	59	20%	18
30 to 35	-1 to 1	12%	9	88%	63	20%	18
35 to 40	1 to 4	6%	4	94%	68	20%	18

5) If you do not use isopropyl alcohol, the water wash cart is equipped with immersion heaters and any cleaning solution used is not flammable, heat the water to more than 70 degrees C with the immersion heaters.

CAUTION MAKE SURE THAT THE NITROGEN CYLINDERS ARE FULLY CHARGED. FULLY CHARGED NITROGEN CYLINDERS ARE NECESSARY TO KEEP THE CORRECT FLOW RATES FOR THE NECESSARY LENGTH OF TIME.

6) Do a test of the fluid flow rate of the Juniper Cart before installation.

a) Make sure that the flow rates of the two probes, when added together, have a total flow rate of 38-42 liters per minutes (8-9 imperial gallons; 10-11 U.S gallons per minute).

NOTE: The wash tank on the Juniper Wash Rig Model JMP/GE/D/4038 has graduations in liters and imperial gallons. To Be as clear as possible, this procedure is used liters as the primary unit (1.0 imperial gallon = 1.2 U.S gallon = 4.5 liters).

<1> Find the tank pressure necessary for the correct flow from the rinse tank and use this same pressure for the wash tank.

<2> Fill the Juniper wash cart tank with clean water.

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

SUBTASK 72-00-00-800-009-H01

(4) Do these steps to install the two water injection probes from the engine water wash cart, COM-2288 and refer to manufacturers installation instructions.

NOTE: If you use Juniper Wash Rig Model JMP/GE90/D/4038, for core engine water wash, this system uses two probes inserted through the fan by-pass airstream exit duct to inject water or solution into the booster inlet.

CAUTION

MAKE SURE THE NITROGEN CYLINDERS ARE FULLY CHARGED. IF THE NITROGEN CYLINDERS ARE NOT FULLY CHARGED, YOU WILL NOT BE ABLE TO MAINTAIN THE CORRECT FLOW RATES FOR THE NECESSARY LENGTH OF TIME.

(a) Attach the probe clamping assemblies on the fan reverser inner support ring at approximately the 4:00 o'clock and 8:00 o'clock positions.

NOTE: This step is not necessary if you use the long probe, COM-5013 wash probe.

(b) Put the probes through the fan outlet guide vanes (OGV's) from the aft side at locations at approximately the 3:00 o'clock and 9:00 o'clock positions.

1) Put the probes over the booster/fan splitter so the tips point between the booster inlet guide vanes into the booster.

2) Put each probe mounting bracket onto the clamping assembly bolt at both the 3:00 and 9:00 positions.

NOTE: This step is not necessary if you use the long probe, COM-5013 wash probe.

3) Adjust each probe clamping assembly to hold the probes safely in place.

NOTE: This step is not necessary if you use the long probe, COM-5013 wash probe.

4) Tighten the clamping assembly knurled nuts on the probe mounting brackets.

NOTE: This step is not necessary if you use the long probe, COM-5013 wash probe.

5) If you use the JMP/GE90-115B/D/4948 wash probe, attach the aft hooks of the probe to the thrust reverser lips.

a) Tighten the straps.

6) Make sure the probes are safely held in place.

7) Make sure the fan rotor is free to rotate.

(c) Hang the fluid delivery manifold with a strap to the plumbing mast at the 6:00 o'clock position.

(d) Connect the water supply hoses between the water distribution manifold and the probes.

(e) Connect the water supply hoses to the Juniper wash cart.

SUBTASK 72-00-00-170-002-H01

(5) Add 1 liter (1 quart) of the Brayco 599 corrosion inhibitor, C50034 [C02-051] to the oil tank before you begin to clean the engine.

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

H. Put the cleaning solution or water into the engine gas path.

SUBTASK 72-00-00-170-003-H01

WARNING	DO NOT GET CLEANING SOLUTION IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM CLEANING SOLUTION. PUT ON GOGGLES, AND GLOVES WHEN YOU USE CLEANING SOLUTION. CLEANING SOLUTION IS POISONOUS, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

WARNING	KEEP THE CLEANING SOLUTIONS AWAY FROM SPARKS, FLAMES, AND HEAT. CLEANING SOLUTIONS ARE FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL.

CAUTION	YOU MUST USE THE DRY MOTOR PROCEDURE TO CLEAN THE ENGINE. ENGINE DAMAGE CAN OCCUR IF THE PROCEDURE IS NOT FOLLOWED.

CAUTION	MAKE SURE THE FAN ROTOR TURNS FREELY WHEN YOU PUT THE CLEANING SOLUTION INTO THE ENGINE. DAMAGE TO THE ENGINE CAN OCCUR IF THE FAN ROTOR DOES NOT TURN FREELY.

CAUTION	DO NOT PUT THE CLEANING SOLUTION OR WATER INTO THE ENGINE IF A FIRE EXTINGUISHING AGENT WAS USED. DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION	DO NOT WATER WASH THE ENGINE IF THE EGT INDICATION IS MORE THAN 150 °F (66 °C). DAMAGE TO THE ENGINE CAN OCCUR.

CAUTION	DO NOT USE A WATER FLOW THAT IS MORE THAN 38-42 LITERS PER MINUTE (10-11 U.S. GALLONS PER MINUTE). DAMAGE TO THE ENGINE CAN OCCUR.

(1) Make sure that the aircraft bleed system is turned off on the engine to be washed.

NOTE: Do not water wash at temperatures below 14 degrees F(-10 degrees C).

(a) Make sure there is no ice in the water.

NOTE: Ice can cause damage to the engine.

(b) Select the applicable L(R) ENG BLEED AIR switch to OFF on the Overhead Panel.

SUBTASK 72-00-00-860-026-H01

CAUTION	DO NOT EXCEED STARTER DUTY CYCLE LIMITS. CONTINUOUS STARTER OPERATION, UP TO 5 MINUTES MAXIMUM, MUST BE FOLLOWED BY COOLING PERIOD OF 30 SECONDS FOR EACH MINUTE OF OPERATION. WHEN A 5 MINUTE CYCLE PLUS COOLING PERIOD IS FOLLOWED BY ADDITIONAL 5 MINUTE CYCLES, A 10 MINUTE COOLING PERIOD IS REQUIRED BETWEEN CYCLES.

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

(CAUTION PRECEDES)

CAUTION

DAMAGE CAN OCCUR TO THE STARTER IF THE TIME CYCLE LIMITS ARE NOT OBEYED.

(2) Dry Motor the engine with the Test No. 19 - Variable Stator Vane Operational Test (MAT Initiated test), TASK 71-00-00-700-818-H01.

NOTE: Test No. 19 - Variable Stator Vane Operational Test (MAT Initiated test), TASK 71-00-00-700-818-H01 gives a more effective water wash.

NOTE: Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test), TASK 71-00-00-700-813-H01 can be used as an alternative.

NOTE: If the FDA is used, the variable bleed valves (VBV's) will be fully closed for approximately 40 seconds during the motoring. This will decrease the amount of solution lost that goes into the core airstream through the Bypass doors.

NOTE: If you do the variable stator vane operational test, the variable bleed valves (VBV's) will be fully closed and the variable stator vanes (VSV's) will be fully open during the monitoring. This will decrease the amount of solution lost from entering the core airstream through the bypass doors.

(a) Keep other engine components power at a minimum and make sure the starter air pressure is at maximum to achieve as high of a motoring speed as possible.

NOTE: Keep the core speed more than 20% while fluid is being injected.

(b) Monitor the water solution of the Juniper Cart through two probes to make sure the total flow rate is 38-42 liters per minute (8-9 imperial gallons per minutes; 10-11 U.S. gallons per minute).

1) Adjust the fluid tank pressure as necessary to get 38-42 liters per minute (8-9 imperial gallons per minute).

NOTE: The Juniper Cart's sight glass and a stop watch can be used to make sure the flow rate is in the approved limits.

(c) When the N2 speed reaches 20%, begin injecting the water solution at a rate of 38-42 liters (8-9 imperial gallons per minute).

(d) Inject the water solution until the 90 liters (20 imperial gallons; 24 U.S. gallons) tank is empty and you have motored for 3 minutes.

SUBTASK 72-00-00-160-001-H01

(3) Set the START/IGNITION switch to the NORM position to stop the engine (TASK 71-00-00-800-837-H00).

SUBTASK 72-00-00-170-004-H01

(4) Let the engine soak for 10-15 minutes or follow the recommendations given by the cleaning solution manufacturer if you use cleaning solution.

I. Do the water wash procedure steps above again.

SUBTASK 72-00-00-860-036-H00

(1) Put the 90 Liters (20 imperial gallons; 24 U.S. gallons) of cleaning solution or water into the engine gas path with hot water if at all possible.

SUBTASK 72-00-00-160-003-H00

(2) If cleaning solution was used, do at least one additional water wash with water only.

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

SUBTASK 72-00-00-860-037-H00

(3) Collect a small sample of the water which falls to the ground directly below the engine.

(a) Measure the amount of dissolved solids in the water with the TDS meter, COM-14318.

(b) Do a check of the amount of dissolved solids in the water.

1) If the amount is higher than 150 parts per million above the value of the water you put into the Juniper water wash cart, do the water wash procedure as many times as necessary.

NOTE: This step will provide a more effective water wash.

SUBTASK 72-00-00-860-038-H00

(4) If you do not monitor the amount of dissolved solids in the water which falls to the ground below the engine, do at least four water wash procedures.

SUBTASK 72-00-00-170-005-H01

CAUTION DO NOT USE A WATER FLOW THAT IS MORE THAN 38-42 LITERS PER MINUTE (10-11 U.S. GALLONS PER MINUTE). DAMAGE TO THE ENGINE CAN OCCUR.

(5) Use a maximum water flow of 38-42 liters per minute (8-9 imperial gallons per minute) to water wash the engine.

SUBTASK 72-00-00-170-006-H01

(6) If the ambient temperature is below 40 °F (5 °C), do these steps:

WARNING PRECAUTIONS FOR FLAMMABLE AGENTS MUST BE OBEYED WHEN YOU USE ANTIFREEZE SOLUTIONS WITH LOW FLASH POINTS. A FIRE CAN OCCUR IF YOU USE THE ANTIFREEZE INCORRECTLY. DO NOT MIX ALCOHOL IN THE ANTIFREEZE SOLUTION IF YOU USE IMMERSION HEATER. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(a) If the water wash cart has an immersion heater, disconnect it from the electrical power supply.

(b) Based on the ambient temperature, use the applicable mixture of the antifreeze solution and water for the water wash procedure as given in the Antifreeze Solution and Water Mixture Proposition/Table 701.

SUBTASK 72-00-00-860-030-H01

(7) Stop the engine (TASK 71-00-00-800-837-H00).

SUBTASK 72-00-00-160-002-H01

CAUTION DO NOT BLOW COMPRESSED AIR INTO THE FADEC. DAMAGE TO THE FADEC COULD OCCUR.

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

(CAUTION PRECEDES)

CAUTION

MAKE SURE THAT NO WATER STAYS IN THE SENSE LINES. IF YOU DO NOT REMOVE ALL WATER FROM THE SENSE LINES ENGINE OPERATION PROBLEMS CAN OCCUR.

(8) Make sure no water stays in the pressure sense hoses, tubes, and sensors.

NOTE: If you have used an alternative procedure to disconnect PS3, P3B and PT25 tube B-Nut (if installed) at the engine case and all the open ports of the pressure sense lines were capped correctly and no water has entered the line, then the operator can choose not to carry out the procedure of blowing the pressure sense lines as given in this step.

(a) Connect a low pressure filtered air source 20-100 psi (138-690 kPa), to the B-nut [4] of the PS3 line.

1) Connect at the B-nut which usually attaches to the FADEC unit.

(b) Blow low pressure filtered air through the PS3 sense line for a minimum of 1 minute or until there is no water in the lines.

1) Make sure that the air flows freely from the PS3 Weep Hole [5] in the lower bifurcation (Figure 703).

2) Do the steps that follow again if the weep hole is clogged or blocked:

a) Use a piece of 0.02 in. (0.51 mm) diameter safety wire to clean the blockage in the PS3 Weep Hole [5].

b) Blow low pressure filtered air through the PS3 sense line for a minimum of 1 minute or until there is no water in the lines.

c) Make sure that the air flows freely from the PS3 Weep Hole [5] in the lower bifurcation.

(c) Do the steps above again for the P3B sense line. Make sure P3B line weep holes are not clogged or blocked (Figure 703).

(d) Do the steps above for PT25 (if installed) sense lines.

SUBTASK 72-00-00-420-002-H01

CAUTION

MAKE SURE THE PS3, THE P3B AND THE PT25 SENSE B-NUTS ARE AT THE CORRECT TORQUE AND ARE NOT LOOSE. LOOSE B-NUTS CAN CAUSE FAILURE TO START, FAILURE TO REACH TAKEOFF POWER, OR POWER LOSS EVENTS BECAUSE OF ICE BLOCKAGE.

(9) Connect the pressure sense hose B-nuts PS3, P3B, PT25 (if installed) to the FADEC unit.

(a) To connect the pressure sense hose B-nuts PS3, P3B, PT25 (if installed) to the FADEC unit do this task: (EEC (FADEC) Installation, TASK 73-21-15-400-801-H01).

1) Tighten the B-nuts (Instruction for Torque, TASK 70-51-00-910-801-H01).

2) Make sure the PS3 and P3B pressure sense hose B-nuts are tightened to a torque of 260-310 in-lb (29.4-35 N·m).

(b) If the alternative procedures were used, do the following steps (Figure 702):

1) Connect the PS3 tube B-nut [4] at the 1:15 o'clock (ALF) position on the CDN case.

a) Tighten the PS3 B-nut [4] to 262-308 in-lb (29.6-34.8 N·m).

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

b) Attach the B-nut with C10-071 safety wire or C10-143 safety cable Safety Cable Installation, TASK 70-41-00-910-802-H01.

2) Connect the P3B tube B-nut [6] at the 3:00 o'clock (ALF) position on the CDN case.

a) Tighten the P3B B-nut [6] to 263-297 in-lb (29.7-33.6 N·m).

3) Connect the PT25 tube (if installed) B-nut at PT25 sensor at the fan frame 7:00 o'clock position and tighten the PT25 (if installed) B-nut to 262-308 in-lb (29.6-34.8 N·m).

SUBTASK 72-00-00-080-007-H01

(10) Remove the water injection probes, probe clamping assemblies, and fluid delivery manifold.

J. Put the Airplane Back to its Usual Condition

SUBTASK 72-00-00-410-026-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.

K. Operational Test

SUBTASK 72-00-00-720-001-H01

(1) You must do one of these operation tests that follow:

NOTE: There are two alternate operational tests. You can do the ground idle operational test, or you can drain and replenish the engine oil (alternate test).

(a) Ground Idle Operation Test (Prefer Test):

1) Operate the engine to remove all of the water from the oil system at not more than 120 minutes after the last wash cycle (TASK 71-00-00-800-835-H00).

2) Set the L(R) ENG BLEED AIR switch to OFF.

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

3) Turn the air conditioning packs OFF before you operate the engine at ground idle.

4) Operate the engine at ground idle for 10 minutes. After the first five minutes of the ground operation, operate the air conditioning packs.

NOTE: During ground idle operation, operate the air conditioning packs and make sure there is no unusual odor. If there is an odor, continue to operate the engine until the odor is removed.

a) On the overhead panel, set the L(R) ENG BLEED AIR switch to ON.

b) Turn the air conditioning packs ON and make sure there is no unusual odor.

c) If there is an odor, continue to operate the engine until the odor goes away.

5) During the engine operational test, check for PS3 / P3B System Maintenance Messages 73-34771, 73-34772, 73-35101, 73-35102, 73-34791 or 73-34792.

a) If the maintenance messages are generated, do the applicable FIM procedure (FIM 73-22 TASK 846, or FIM 73-22 TASK 847), or FIM 73-22 TASK 848).

6) Operate the engine at ground idle for 5 minutes for cool down and to complete the dryout procedure.

7) Stop the engine (TASK 71-00-00-800-837-H00).

(b) Drain and replenish the engine oil (Alternate Test):

1) Drain and replenish the engine oil to remove all of the water from the oil system at not more than 120 minutes after the last wash cycle.

a) Drain the oil from the oil tank (TASK 12-22-01-610-805-002).

b) Replenish the oil (TASK 12-13-01-130-803-002).

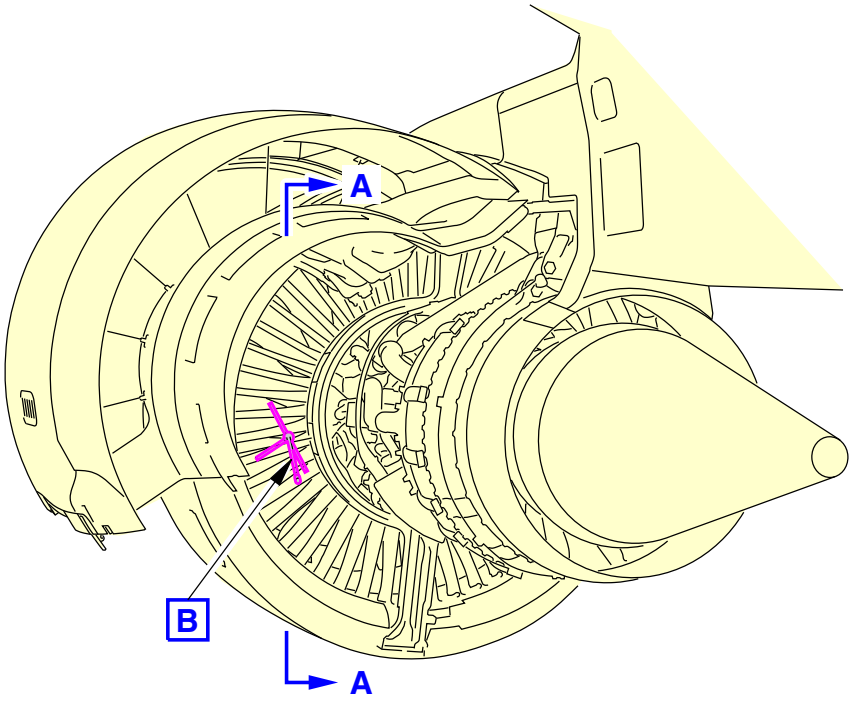
c) Add 1 quart (1 liter) of the Brayco 599 corrosion inhibitor, C50034 [C02-051] to the oil tank.

d) Do this task: Test No. 2 - Dry Motor leak Check, TASK 71-00-00-700-802-H01 for a period of two minutes.

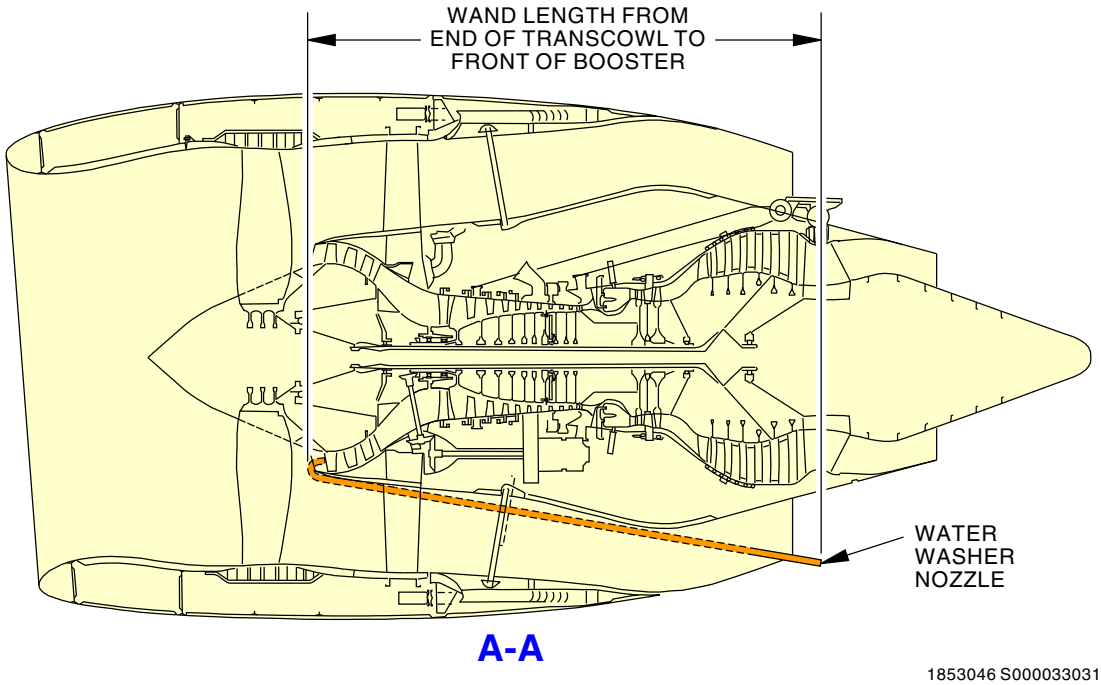
e) Do this task: Test No. 5 - Idle Leak Check, TASK 71-00-00-700-804-H01 or do a flight within 24 hours of the last wash cycle.

——— END OF TASK ———

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



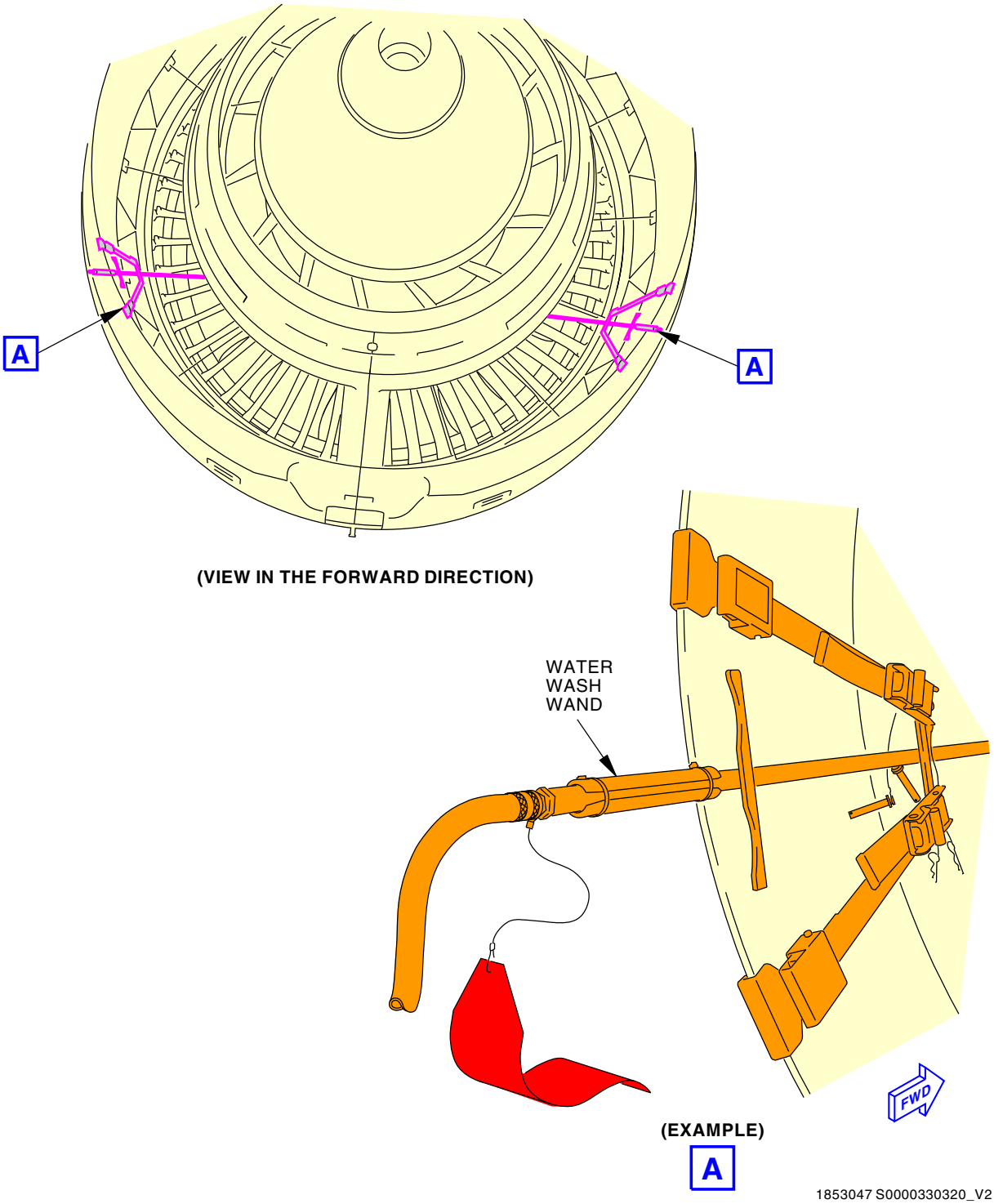
(VIEW IN THE FORWARD DIRECTION)



1853046 S0000330319_V2

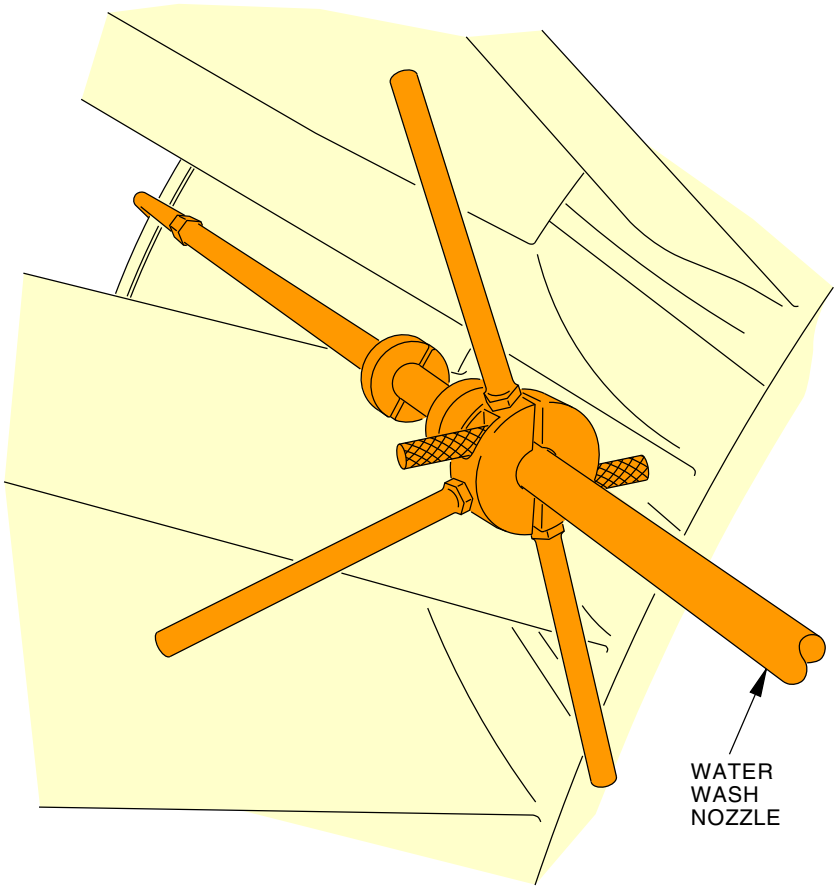
Engine Gas Path Cleaning
Figure 701/72-00-00-990-852-H00 (Sheet 1 of 3)

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



Engine Gas Path Cleaning
Figure 701/72-00-00-990-852-H00 (Sheet 2 of 3)

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

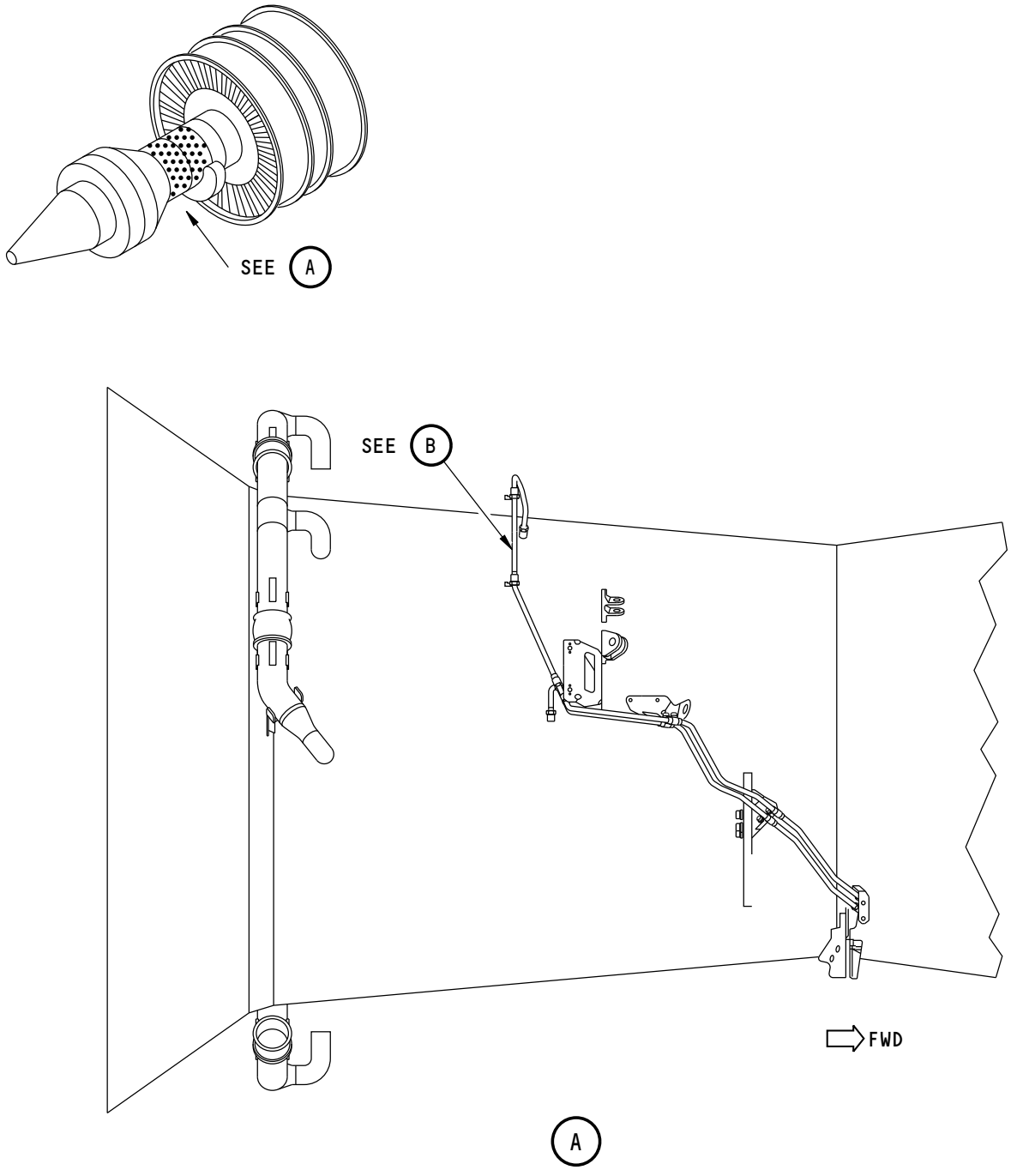


B

1853048 S0000330321_V2

Engine Gas Path Cleaning
Figure 701/72-00-00-990-852-H00 (Sheet 3 of 3)

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

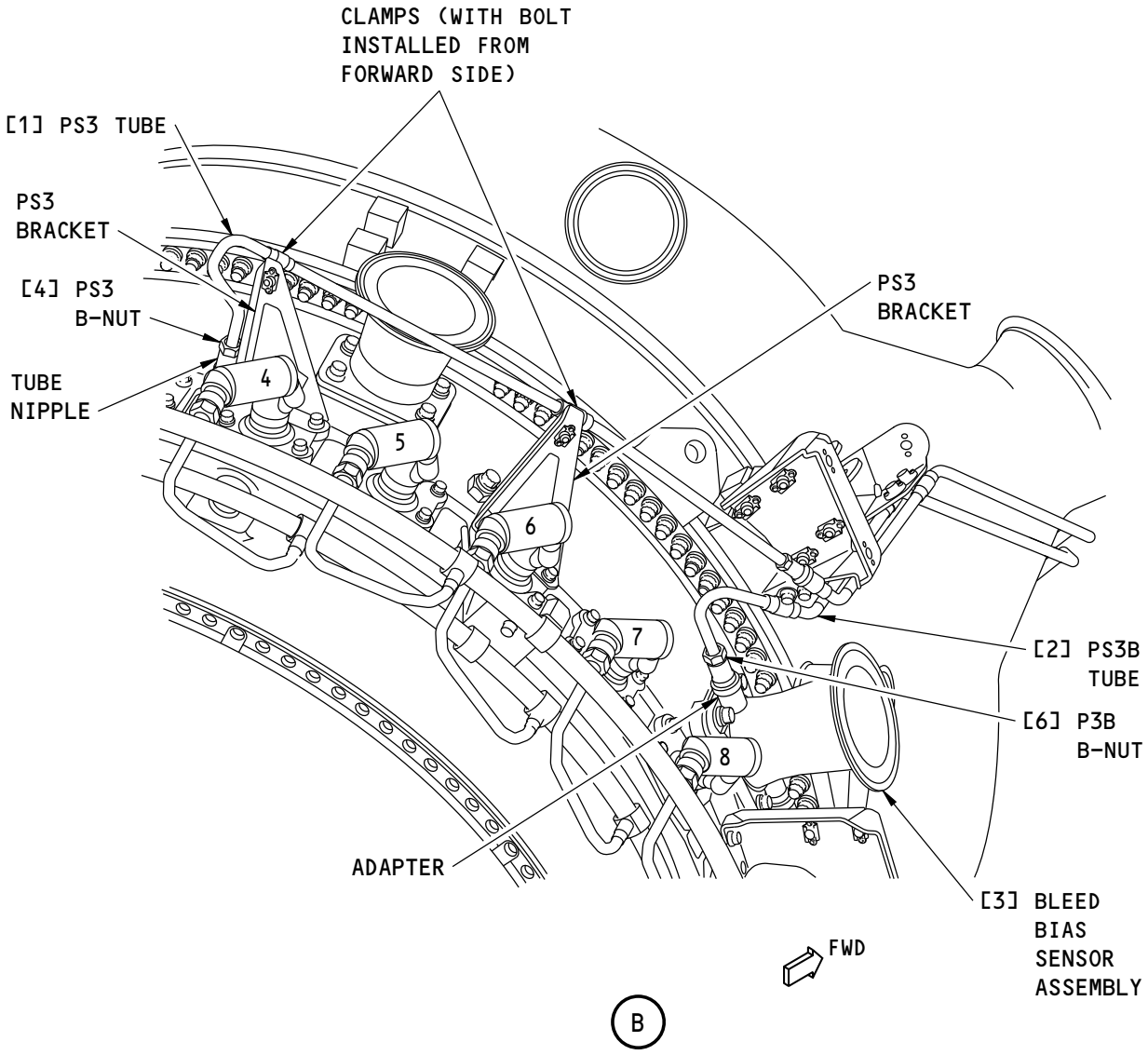


5027652-00

2481062 S0000582990_V1

PS3 and P3B Tubes and B-nuts Location.
Figure 702/72-00-00-990-853-H00 (Sheet 1 of 2)

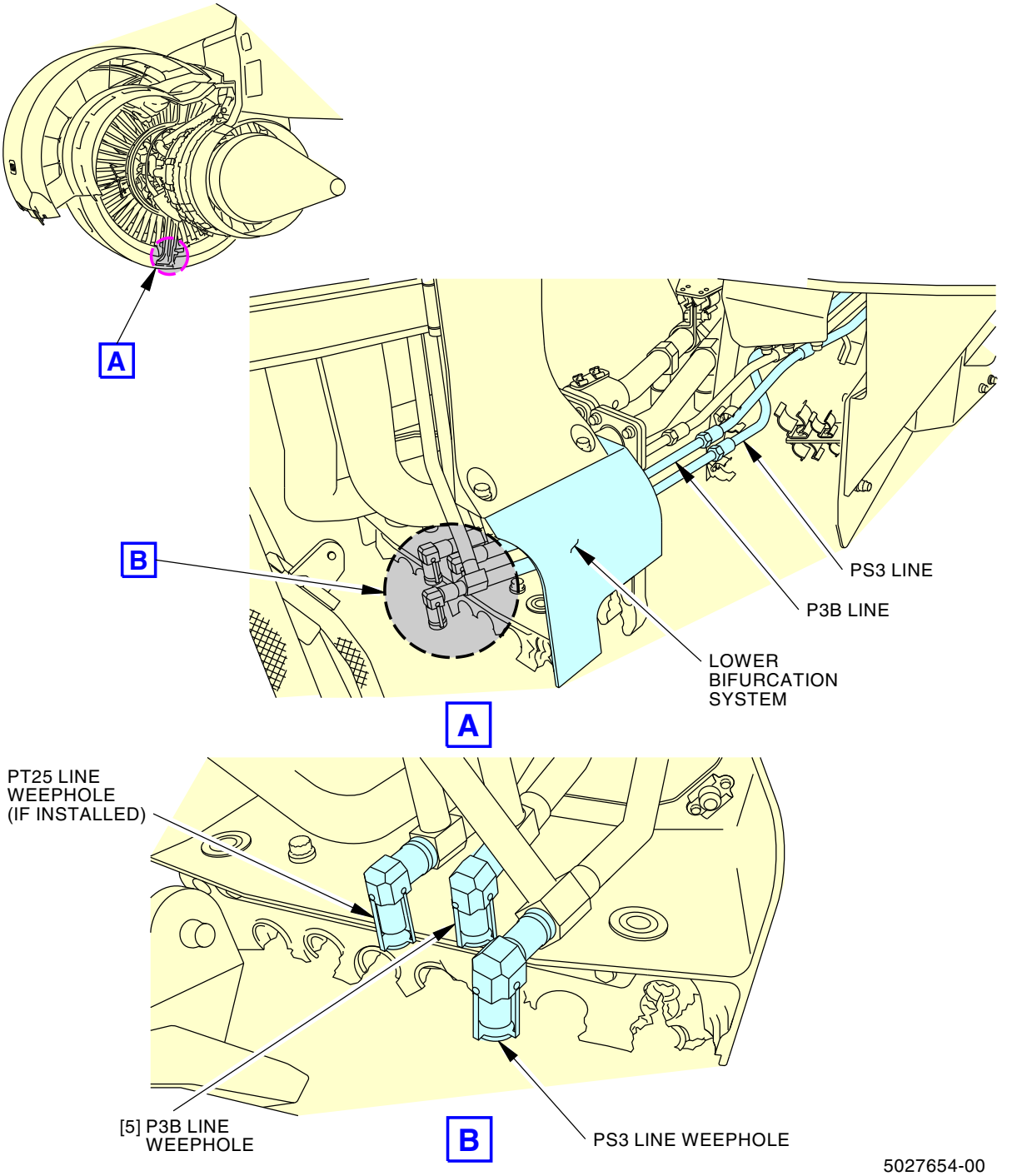
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5027653-00
2481119 S0000582989_V1

PS3 and P3B Tubes and B-nuts Location.
Figure 702/72-00-00-990-853-H00 (Sheet 2 of 2)

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



PS3 and P3B Sense Line Weep Hole Location.
Figure 703/72-00-00-990-854-H00

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

FAN BOOSTER ASSEMBLY - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has these tasks:

(1) An inspection of the fan rotor spinner and support ring.

(2) An inspection of the fan blades.

(3) An inspection of the fan platforms.

(4) An inspection of the flowpath spacer.

(5) An inspection of the outer shroud of the booster stage 1 vane.

(6) An inspection of the fan blade retainers.

(7) An inspection of the dovetail keys.

TASK 72-21-00-200-801-H01

2. Fan Rotor Spinner and Support Ring (Scheduled Maintenance Requirement) Inspection

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is the scheduled maintenance inspection procedure of the fan rotor spinner and the support ring.

(2) The fan rotor spinner and support ring are in the engine inlet.

B. 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

C. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

D. Prepare for the Inspection

SUBTASK 72-21-00-860-023-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-21-00-480-001-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-00-220-001-H01

(3) Visually examine the fan rotor spinner (Figure 601).

(a) Cracks

1) No cracks are permitted.

(b) Nicks and scratches are permitted with this condition.

1) They are not more than 0.03 inch (0.76 mm) in depth.

(c) Dents

1) Dents are permitted if they are not more than 0.125 inch (3.180 mm) in depth.

(d) Damaged surface protection

1) There is no limit to the amount of damage permitted to the surface protection.

(e) Surface protection that is missing

1) There is no limit to the amount of surface protection that can be missing.

NOTE: If the surface coating is needed, consult with the local GE Representative about the GE Repair Document No. RD 830-358-S1. This repair document puts a paint coating and a painted swirl on the forward spinner.

SUBTASK 72-21-00-220-002-H01

(4) Visually examine the support ring (Figure 601).

(a) Cracks

1) Cracks in the support ring are not permitted.

(b) Nicks, dents, and scratches in Area [A] of the support ring

1) There is no limit to the number of nicks, dents, and scratches if they are not more than 0.003 inch (0.076 mm) in depth.

(c) Nicks and dents in Area [B] of the support ring

1) There is no limit to the number of nicks, dents if they are not more than 0.005 inch (0.127 mm) in depth.

(d) Scratches in Area [B] of the support ring

1) There is no limit to the number of scratches if they are not more than 0.5 inch (12.7 mm) in length.

(e) Pits in Area [A] of the support ring

1) Any amount of pits are permitted if they are less than 0.003 inch (0.076 mm) in depth and 0.5 inch (12.7 mm) in diameter.

(f) Pits in Area [B] of the support ring

1) There is no limit to the number of pits if they are less than 0.005 inch (0.127 mm) in depth and 0.5 inch (12.7 mm) in diameter.

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

SUBTASK 72-21-00-080-001-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(5) Remove the protective mat, STD-585 from the engine inlet cowl.

SUBTASK 72-21-00-860-024-H01

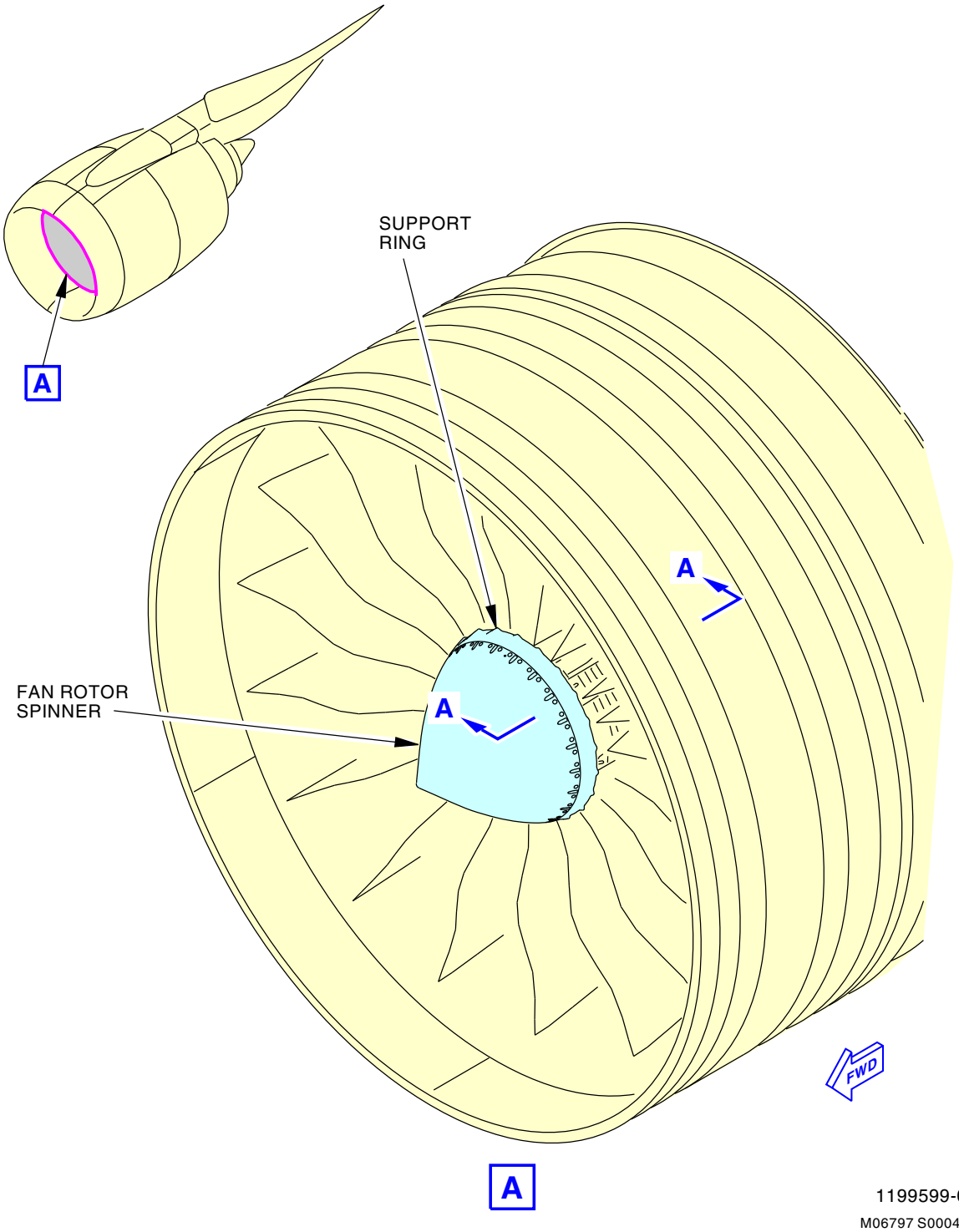
(6) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

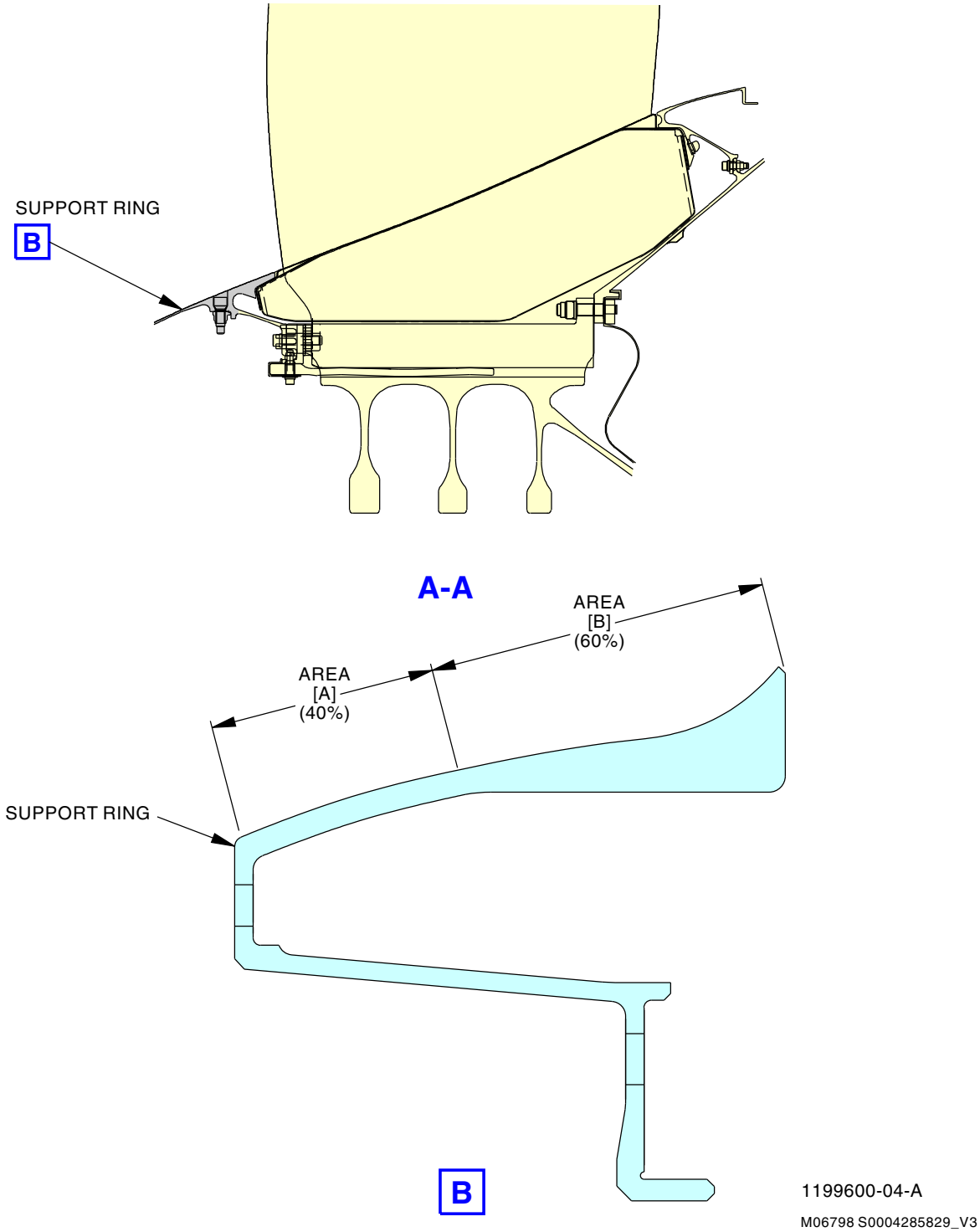
END OF TASK

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



Fan Rotor Spinner and Support Ring (Scheduled Maintenance Requirement) Inspection
Figure 601/72-21-00-990-801-H01 (Sheet 1 of 2)

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



Fan Rotor Spinner and Support Ring (Scheduled Maintenance Requirement) Inspection
Figure 601/72-21-00-990-801-H01 (Sheet 2 of 2)

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

TASK 72-21-00-200-803-H01

3. Fan Blade (Scheduled Maintenance Requirement) Inspection

(Figure 602, Figure 603 and Figure 604)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is the scheduled maintenance inspection procedure for the fan blade.

(2) Access to the fan blade is through the inlet cowl.

B. References

Reference	Title
72-21-02-300-804-H00	Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film (P/B 801)

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-600	Mirror - Inspection

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
G01659	Swab - Cotton Or Rayon, (Disposable)	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the Inspection

SUBTASK 72-21-00-860-013-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-00-480-005-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

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

G. Procedure

SUBTASK 72-21-00-210-002-H01

(1) Examine the fan blade metal leading edge nose in Area [N1].

(a) Nicks, dents, and scratches

1) Nicks, dents, and scratches are permitted in the Area [ZZ] to the limits in Table 601.

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZZ], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.07 inch (1.78 mm).

2) Nicks, dents, and scratches are permitted in areas other than the Area [ZZ] to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.52 mm).

(b) Continue-in-service limits (C-I-S) for nicks, dents, and scratches are as follows:

1) The C-I-S limit for nicks, dents, and scratches in Area [ZZ] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.07 inch (1.78 mm).

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZZ], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

2) The C-I-S limit for nicks, dents, and scratches in areas other than Area [ZZ] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.52 mm).

(c) Wear and erosion

1) Wear and erosion are permitted in Area [ZZ] if the depth of the wear and erosion is not more than 0.15 inch (3.81 mm).

2) Wear and erosion are permitted in areas other than Area [ZZ] if the depth of the wear and erosion is not more than 0.08 inch (2.03 mm).

(d) Cracks and tears

1) Cracks and tears are permitted if they are not more than 0.10 inch (2.54 mm) in length and are separated by at least 1.0 inch (25.4 mm).

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

Table 601/72-21-00-993-801-H01 Table 601

Area	Dist. from Tip	Max Serv-ice-able Depth (D)	Max Re-pair-able Depth (D)	Max Allow-able Blend-ed Depth (D)	Max Serv-ice-able Depth (S)	Max Re-pair-able Depth (S)	Max Allow-able Blend-ed Depth (S)	Max Blend-ed Area (Length x Width)	Max Blend-ed Allow-able Linear Length (L)
Area N1									
Area ZZ	0-12 inches (0-304.8 mm)	0.05 inch (1.2 mm)	0.135 inch (3.42 mm)	0.150 inch (3.81 mm)	---	---	---	---	1.2 inches (30 mm)
Areas other than Area ZZ	0-12 inches (0-304.8 mm)	---	---	---	0.05 inch (1.2 mm)	0.085 inch (2.15 mm)	0.100 inch (2.54 mm)	0.10 sq-inch (0.6 sq-cm)	---
Area N2									
Area ZY	12.001-33.311 inches (304.83-846.09 mm)	0.05 inch (1.2 mm)	0.105 inch (2.66 mm)	0.120 inch (3.04 mm)	---	---	---	---	1.0 inch (25 mm)
Areas other than Area ZY	12.001-33.311 inches (304.83-846.09 mm)	---	---	---	0.05 inch (1.2 mm)	0.085 inch (2.15 mm)	0.100 inch (2.54 mm)	0.10 sq-inch (0.6 sq-cm)	---
Area N3									
Area ZX	33.31-38.36 inches (846.1-974.3 mm)	0.05 inch (1.2 mm)	0.065 inch (1.65 mm)	0.080 inch (2.03 mm)	---	---	---	---	1.0 inch (25 mm)
Areas other than Area ZX	33.31-38.36 inches (846.1-974.3 mm)	---	---	---	0.020 inch (0.50 mm)	0.035 inch (0.88 mm)	0.050 inch (1.27 mm)	0.04 sq-inch (0.2 sq-cm)	---
Area N4									

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

Table 601/72-21-00-993-801-H01 Table 601 (Continued)

Area	Dist. from Tip	Max Serv-ice-able Depth (D)	Max Re-pair-able Depth (D)	Max Allow-able Blend-ed Depth (D)	Max Serv-ice-able Depth (S)	Max Re-pair-able Depth (S)	Max Allow-able Blend-ed Depth (S)	Max Blend-ed Area (Length x Width)	Max Blend-ed Allow-able Linear Length (L)
Area ZW	38.361-42.400 inches (974.37 -1076.9 mm)	0.015 inch (0.38 mm)	0.025 inch (0.63 mm)	0.040 inch 1.01 mm)	---	---	---	---	1.0 inch (25 mm)
Areas other than Area ZW	38.361-42.400 inches (974.37 -1076.9 mm)	---	---	---	0.005 inch (0.12 mm)	0.010 inch (0.25 mm)	0.025 inch (0.63 mm)	0.0025 sq-inch (0.016 sq-cm)	---
Area N4									
Area ZW	42.401 inches (1076.9 mm) - bottom	0.005 inch (0.12 mm)	0.010 inch (0.25 mm)	0.010 inch (0.25 mm)	---	---	---	---	0.1 inch (2.5 mm)
Areas other than Area ZW	42.401 inches (1076.9 mm) - bottom	---	---	---	0.005 inch (0.12 mm)	0.010 inch (0.25 mm)	0.010 inch (0.25 mm)	0.001 sq-inch (0.006 sq-cm)	---

Table 602/72-21-00-993-802-H01 Table 602

Area	Distance from Tip	C-I-S Depth (D)	C-I-S Depth (S)	C-I-S Max Area (Length x Width)(AxB)	C-I-S Max Linear Length (L)
Area N1					
Area ZZ	0.00-12.00 inches (0.0-304.8 mm)	0.135 inch (3.43 mm)	----	----	0.75 inch (19.0 mm)
Areas other than Area ZZ	0.00-12.00 inches (0.0-304.8 mm)	----	0.085 inch (2.16 mm)	0.05 sq-inch (0.3 sq-cm)	----

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

Table 602/72-21-00-993-802-H01 Table 602 (Continued)

Area	Distance from Tip	C-I-S Depth (D)	C-I-S Depth (S)	C-I-S Max Area (Length x Width)(AxB)	C-I-S Max Linear Length (L)
Area N2					
Area ZY	12.001-33.311 inches (304.83-846.09 mm)	0.105 inch (2.67 mm)	----	----	0.75 inch (19.0 mm)
Areas other than Area ZY	12.001-33.311 inches (304.83-846.09 mm)	----	0.085 inch (2.16 mm)	0.05 sq-inch (0.3 sq-cm)	----
Area N3					
Area ZX	33.31-38.36 inches (846.1-974.3 mm)	0.065 inch (1.65 mm)	----	----	0.75 inch (19.0 mm)
Areas other than Area ZX	33.31-38.36 inches (846.1-974.3 mm)	----	0.035 inch (0.89 mm)	0.02 sq-inch (0.1 sq-cm)	----
Area N4					
Area ZW	38.361-42.40 inches (974.37-1076.9 mm)	0.025 inch (0.64 mm)	----	----	0.75 inch (19.0 mm)
Areas other than Area ZW	38.361–42.40 inches (974.37–1076.9 mm)	----	0.010 inch (0.25 mm)	0.0013 sq-inch (0.008 sq-cm)	----
Area ZW	42.401 inches (1076.99 mm)-bottom	0.010 inch (0.25 mm)	----	----	0.1 inch (2.0 mm)
Areas other than Area ZW	42.401 inches (1076.99 mm)-bottom	----	0.010 inch (0.25 mm)	0.001 sq-inch (0.006 sq-cm)	----

SUBTASK 72-21-00-210-003-H01

(2) Examine the fan blade metal leading edge nose in Area [N2].

(a) Nicks, dents, and scratches

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

1) Nicks, dents, and scratches are permitted in the Area [ZY] to the limits in Table 601.

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZY], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.52 mm).

2) Nicks, dents, and scratches are permitted in areas other than the Area [ZY] to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.52 mm).

(b) Continue-in-service (C-I-S) limits for nicks, dents, and scratches

1) The C-I-S limit for nicks, dents, and scratches in Area [ZY] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.52 mm).

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZY], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

2) The C-I-S limit for nicks, dents, and scratches in areas other than Area [ZY] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.52 mm).

(c) Wear and erosion

1) Wear and erosion are permitted in Area [ZY] if the depth of the wear and erosion is not more than 0.10 inch (2.54 mm).

2) Wear and erosion are permitted in areas other than Area [ZY] if the depth of the wear and erosion is not more than 0.06 inch (1.52 mm).

(d) Cracks and tears

1) Not permitted.

SUBTASK 72-21-00-210-004-H01

(3) Examine the fan blade metal leading edge nose in Area [N3].

(a) Nicks, dents, and scratches

1) Nicks, dents, and scratches are permitted in the Area [ZX] to the limits in Table 601.

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZX], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

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

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.05 inch (1.27 mm).

2) Nicks, dents, and scratches are permitted in areas other than the Area [ZX] to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.025 inch (0.640 mm).

(b) Continue-in-service (C-I-S) limits for nicks, dents, and scratches are as follows:

1) The C-I-S limit for nicks, dents, and scratches in Area [ZX] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.05 inch (1.27 mm).

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZX], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

2) The C-I-S limit for nicks, dents, and scratches in areas other than Area [ZX] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.025 inch (0.640 mm).

(c) Wear and erosion

1) Wear and erosion are permitted in Area [ZX] if the depth of the wear and erosion is not more than 0.08 inch (2.03 mm).

2) Wear and erosion are permitted in areas other than Area [ZX] if the depth of the wear and erosion is not more than 0.035 inch (0.890 mm).

(d) Cracks and tears

1) Not permitted.

SUBTASK 72-21-00-210-005-H01

(4) Examine the fan blade metal leading edge nose in Area [N4].

(a) Nicks, dents, and scratches

1) Nicks, dents, and scratches are permitted in the Area [ZW] to the limits in Table 601.

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZW], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.025 inch (0.64 mm).

2) Nicks, dents, and scratches are permitted in areas other than the Area [ZW] to the limits in Table 601.

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

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.01 inch (0.26 mm).

(b) Continue-in-service (C-I-S) limits for nicks, dents, and scratches are as follows:

1) The C-I-S limit for nicks, dents, and scratches in Area [ZW] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.025 inch (0.640 mm).

NOTE: To measure the depth of a nick, dent, or scratch in Area [ZW], place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

2) The C-I-S limit for nicks, dents, and scratches in areas other than Area [ZW] is 125 cycles with these conditions:

a) The conditions are as described in Table 602 for each of the areas.

b) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (50.8 mm) if the depth of the nicks, dents, or scratches is more than 0.01 inch (0.26 mm).

(c) Wear and erosion

1) Wear and erosion are permitted in Area [ZW] if the depth of the wear and erosion is not more than 0.04 inch (1.01 mm).

2) Wear and erosion are permitted in areas other than Area [ZW] if the depth of the wear and erosion is not more than 0.025 inch (0.640 mm).

(d) Cracks and tears

1) Not permitted.

SUBTASK 72-21-00-210-006-H01

(5) Examine the fan blade metal leading edge sidewalls.

(a) Nicks, dents, and scratches

1) Nicks and dents are permitted if they are not more than 0.25 inch (6.35 mm) in diameter and the depth is not more than 0.04 inch (1.02 mm).

2) Scratches are permitted if they are not more than 0.01 inch (0.26 mm) in depth.

3) You must blend nicks and scratches smooth to remove high metal and then do an inspection.

(b) Continue-in-service (C-I-S) limits for nicks, dents, and scratches are as follows:

1) The C-I-S limit for unblended nicks and scratches is 125 cycles prior to repair or removal for return to the shop for repair.

(c) Wear and erosion

1) Wear and erosion are permitted if they did not go through the metal.

(d) Cracks and tears

1) Not permitted.

(e) Disbonded metal leading edge

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

1) Disbonded metal leading edge is permitted in the combined Areas [N1] and [N2] up to the sum of cumulative of 1.0 inch (25.4 mm) in length on the suction (convex) side of the fan blade.

2) Disbonded metal leading edge is permitted in the combined Areas [N1] and [N2] up to the sum of cumulative of 1.0 inch (25.4 mm) in length on the pressure (concave) side of the fan blade.

3) Disbonded metal leading edge is not permitted in the Areas [N3] and [N4].

SUBTASK 72-21-00-220-006-H01

(6) Examine for fan blade tip rub.

(a) Tip rub

1) Permitted.

SUBTASK 72-21-00-210-011-H01

(7) Examine the fan blade tip.

(a) Examine the tip area of the twenty-two fan blades between the fan abradable and the fan blade tip with a hand held inspection mirror, STD-600.

1) Clean the fan blade tip with a swab, G01659 and alcohol, B00130.

2) Examine the fan blade tip with a hand held inspection mirror, STD-600 inserted between the fan abradable and the fan blade tip.

3) Examine the fan blade tip for delamination.

(b) The Continue-In-Service (CIS) limit for a fan blade with tip delamination is 10 cycles with these conditions:

1) The delamination length is not more than 17.0 inches (431.8 mm).

2) There is no delamination of the fan blades on the other engine.

NOTE: The CIS limit is for one engine.

SUBTASK 72-21-00-220-007-H01

(8) Examine the trailing edge tip cap and trailing edge guard.

(a) Nicks and dents

1) Permitted if the nicks and dents did not go through the metal.

(b) Wear and erosion

1) Permitted if the wear and erosion did not go through the metal.

(c) Cracks and tears

1) Not permitted.

SUBTASK 72-21-00-220-025-H00

(9) Examine the tip cap as follows, refer to Figure 604:

(a) If you can see the tip cap metal in Area X on the concave (pressure side), then do an inspection for disbond between the metal and the underlying composite layers as follows:

NOTE: Tip cap metal is visible if the black polyurethane film layer is missing.

1) Try to insert a 0.003 in. (0.076 mm) to 0.005 in. (0.127 mm) in thickness feeler gage under the edge of the tip cap.

a) If the feeler gage can be inserted, then the area is disbonded.

2) If there is a disbond, do as follows:

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

a) If the disbond length in any direction is more than 0.375 in. (9.525 mm), replace the fan blade.

b) If the disbond length in any direction is less than or equal to 0.375 in. (9.525 mm), the continue-in-service limit is 10 cycles.

3) If there is no disbond and you can see the tip cap metal in Area X, then repeat this SUBTASK again within 150 cycles.

4) You can cover the tip cap metal to prevent the above CIS cycle limitation (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

(b) Outside Area X, disbonded tip cap is permitted to the total sum of 0.375 in. (9.525 mm) in length of the convex (suction) and concave (pressure) sides of the fan blade.

SUBTASK 72-21-00-220-026-H00

(10) Examine the trailing edge guard as follows:

(a) Disbonded trailing edge guard is permitted to the total sum of 0.50 in. (12.7 mm) in length of the suction and pressure sides of the fan blade.

SUBTASK 72-21-00-220-008-H01

(11) Examine the fan blade airfoil.

(a) Broken, damaged, or missing fibers

1) Broken, damaged, or missing fiber is permitted with these conditions:

a) Each area of broken, damaged, or missing fiber is not larger than the area size of 0.05 sq-inch (0.30 sq-cm) and depth is not more than 0.15 inch (3.80 mm).

b) Broken fibers are not more than 0.25 inch (6.35 mm) in length and 0.15 inch (3.80 mm) in depth.

c) There are no more than 6 areas (of convex and concave sides) of broken, damaged, or missing fiber.

2) The areas of broken, damaged, or missing fiber are separated by a minimum of 2.0 inches (51.0 mm).

3) You can repair the areas of broken, damaged, or missing fiber (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

(b) Delamination

1) Not permitted.

SUBTASK 72-21-00-210-007-H01

(12) Examine the 0.003 inch (0.080 mm) nominal thickness black paint top coat on the concave (pressure) and convex (suction) side of the fan blade.

(a) Paint coating that is eroded or missing is permitted.

(b) Paint coating that is loose or torn is permitted if the loose or torn material is cut away.

SUBTASK 72-21-00-210-008-H01

(13) Examine the 0.020 inch (0.51 mm) nominal thickness black rubber polyurethane erosion coating on the concave (pressure) side of the fan blade (if exposed).

NOTE: The black polyurethane erosion coating is located under the black paint.

(a) Polyurethane coating that is eroded or missing is permitted.

(b) Polyurethane coating that is loose or torn is permitted if the loose or torn material is cut away to prevent peeling.

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

(c) You can repair the areas of missing polyurethane coating (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

NOTE: Repair of small areas of missing polyurethane film can prevent future peeling.

SUBTASK 72-21-00-220-009-H01

(14) Examine the brown AF32 undercoat on the concave (pressure) and convex (suction) side of the fan blade (if exposed).

NOTE: The brown AF32 undercoat is located under the black polyurethane erosion coating on the concave (pressure) side.

(a) AF32 undercoat that is eroded through, or missing is not permitted.

1) An area of up to 50 in^2 (32,258 mm^2) of eroded through or missing AF32 can continue in service for 100 cycles.

2) The continue-in-service limit for AF32 that is eroded through or missing when exposed carbon fabric is in the fan blade composite surface is 10 cycles.

NOTE: Exposed carbon fabric are strands or threads that are no longer contained in epoxy. They can be broken, frayed or disconnected from the fabric around them.

3) You can repair the areas of missing AF32.

a) Small areas of exposed carbon usually caused by impact damage can be repaired to prevent the above CIS cycle limitations.

b) Poly paste can be applied (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

SUBTASK 72-21-00-220-010-H01

(15) Examine the black paint coating on the metal tip cap and trailing edge guard areas of the fan blade.

(a) Coating that is eroded or missing is permitted with this condition.

1) The paint that is eroded, missing, loose or torn is repairable.

SUBTASK 72-21-00-210-001-H01

(16) You must replace the fan blade for all damage that is more than the permitted limits unless you are given other instructions.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-00-080-005-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-00-860-014-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE

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

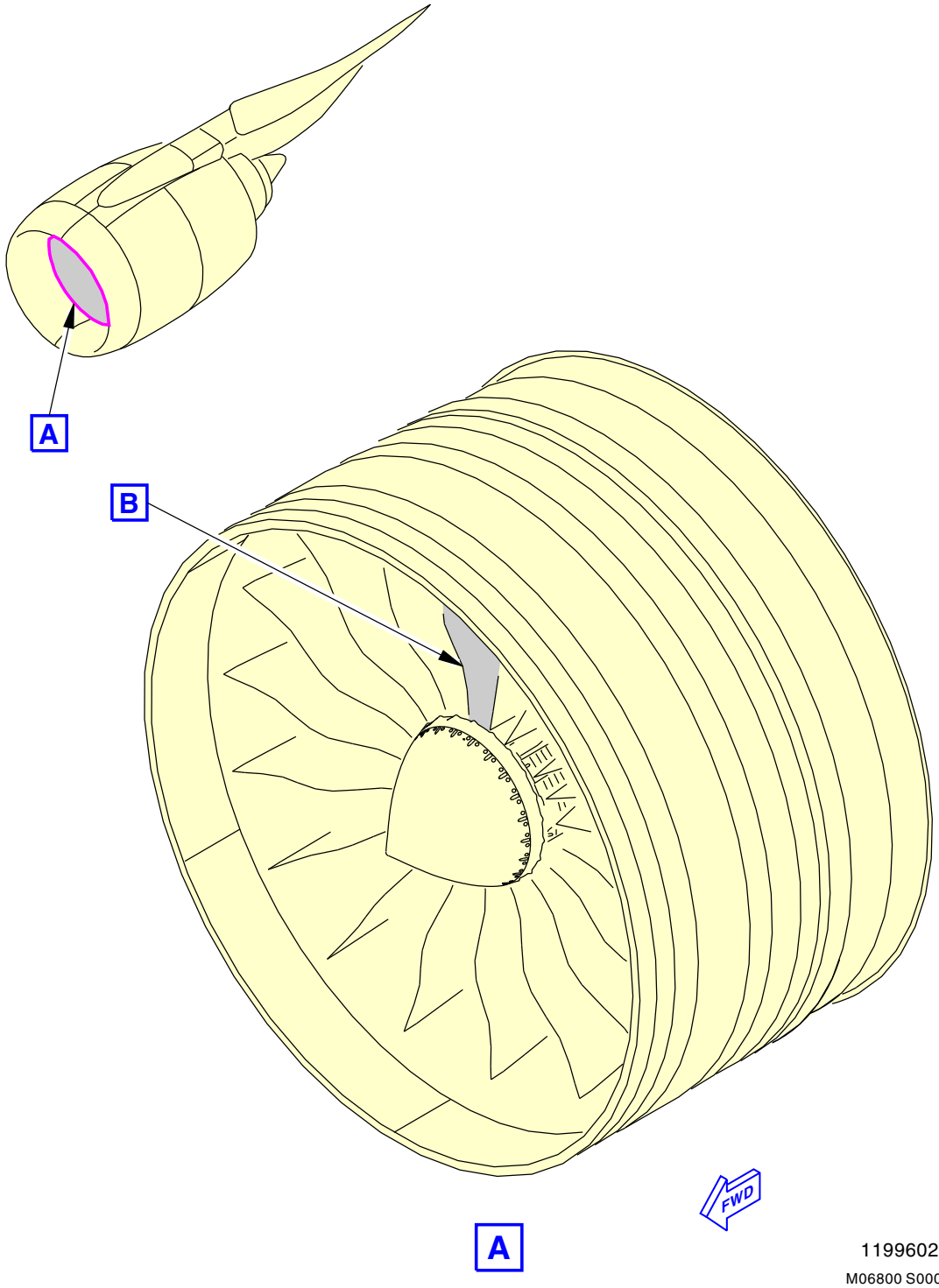
(Continued)

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	18	C80606	R ENG START SW

END OF TASK

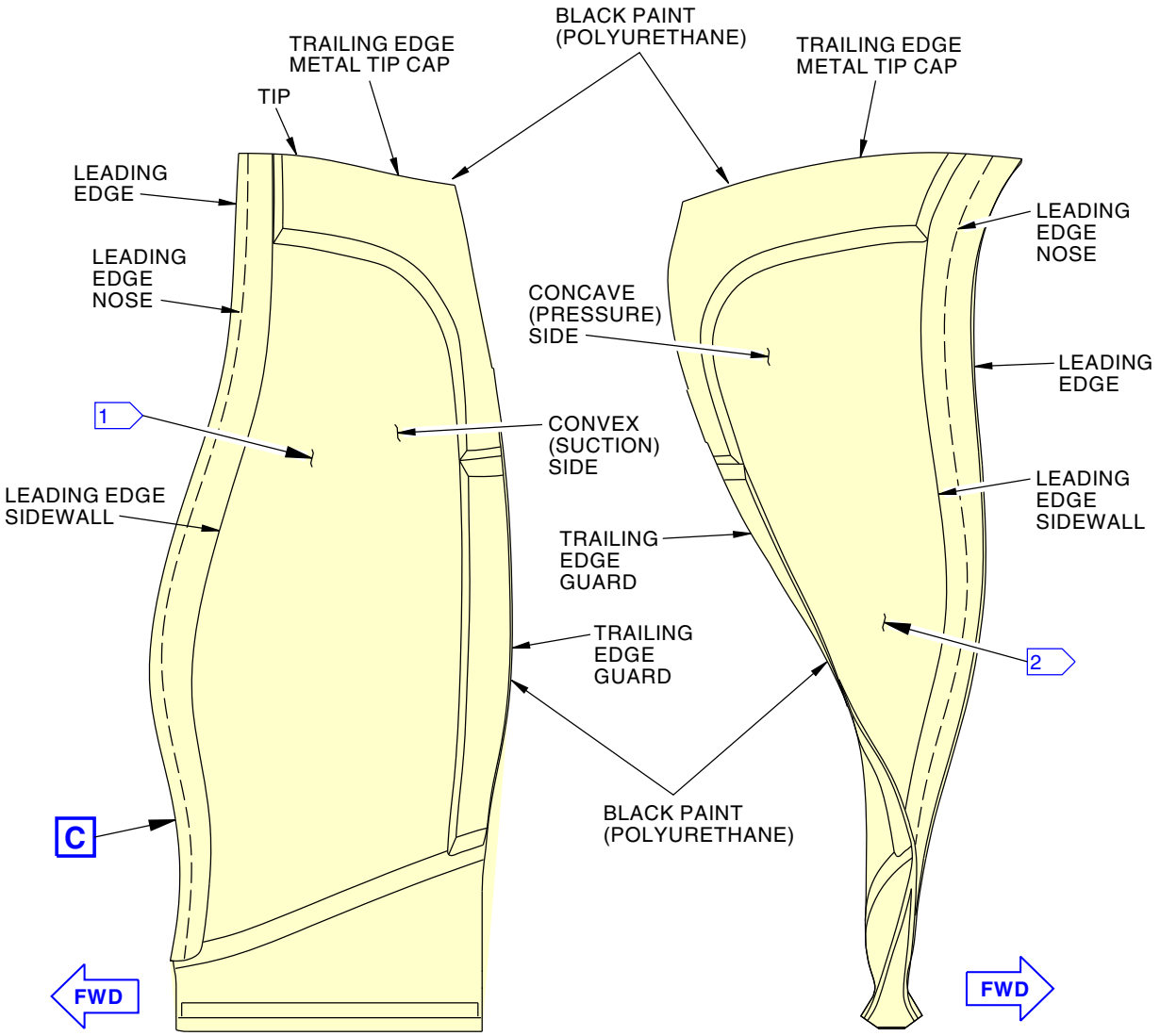
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1199602-00-A
M06800 S0004285831_V2

Fan Blade (Scheduled Maintenance Requirement) Inspection
Figure 602/72-21-00-990-803-H01 (Sheet 1 of 5)

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



CONVEX (SUCTION) SIDE

B

CONCAVE (PRESSURE) SIDE

B

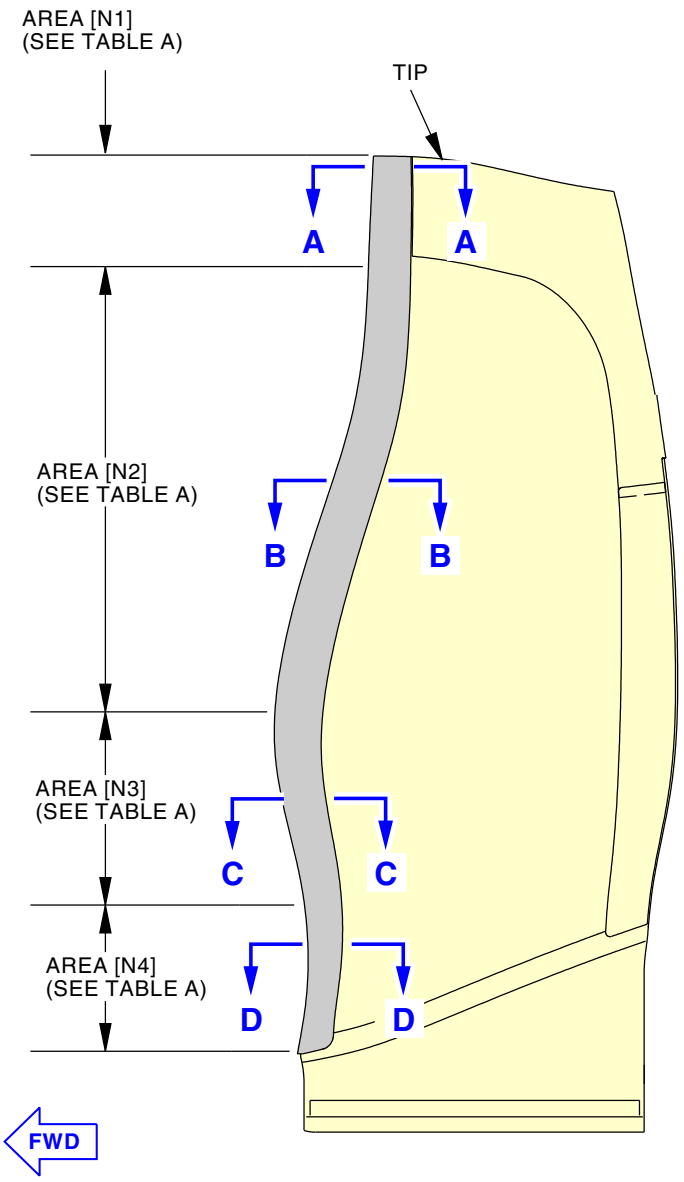
1 CONVEX SIDE COATING LAYERS FROM EXTERIOR SURFACE TO CARBON SURFACE OF BLADE:
1. BLACK PAINT
2. BLACK POLYURETHANE
3. BLACK SYNSKIN
ONLY PAINT ON METAL TIP CAP AND METAL TRAILING EDGE

2 CONCAVE SIDE COATING LAYERS FROM EXTERIOR SURFACE TO CARBON SURFACE OF BLADE:
1. BLACK PAINT
2. BLACK POLYURETHANE
3. BROWN AF2
ONLY PAINT ON METAL TIP CAP AND METAL TRAILING EDGE

1219677-00-A
M06801 S0004285832_V3

Fan Blade (Scheduled Maintenance Requirement) Inspection
Figure 602/72-21-00-990-803-H01 (Sheet 2 of 5)

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



DISTANCE FROM TIP	MLE ZONE
0.00-12.00 INCH (0.0-304.8 mm)	AREA [N1]
12.001-33.310 INCH (304.83-846.07 mm)	AREA [N2]
33.311-38.360 INCH (846.10-974.34 mm)	AREA [N3]
38.361 INCH - BOTTOM (974.37 mm) - BOTTOM	AREA [N4]

TABLE A

FAN BLADE METAL LEADING EDGE (MLE) NOSE INSPECTION ZONES
CONVEX (SUCTION) SIDE
(ZONES APPLY TO BOTH CONVEX AND CONCAVE SIDES)

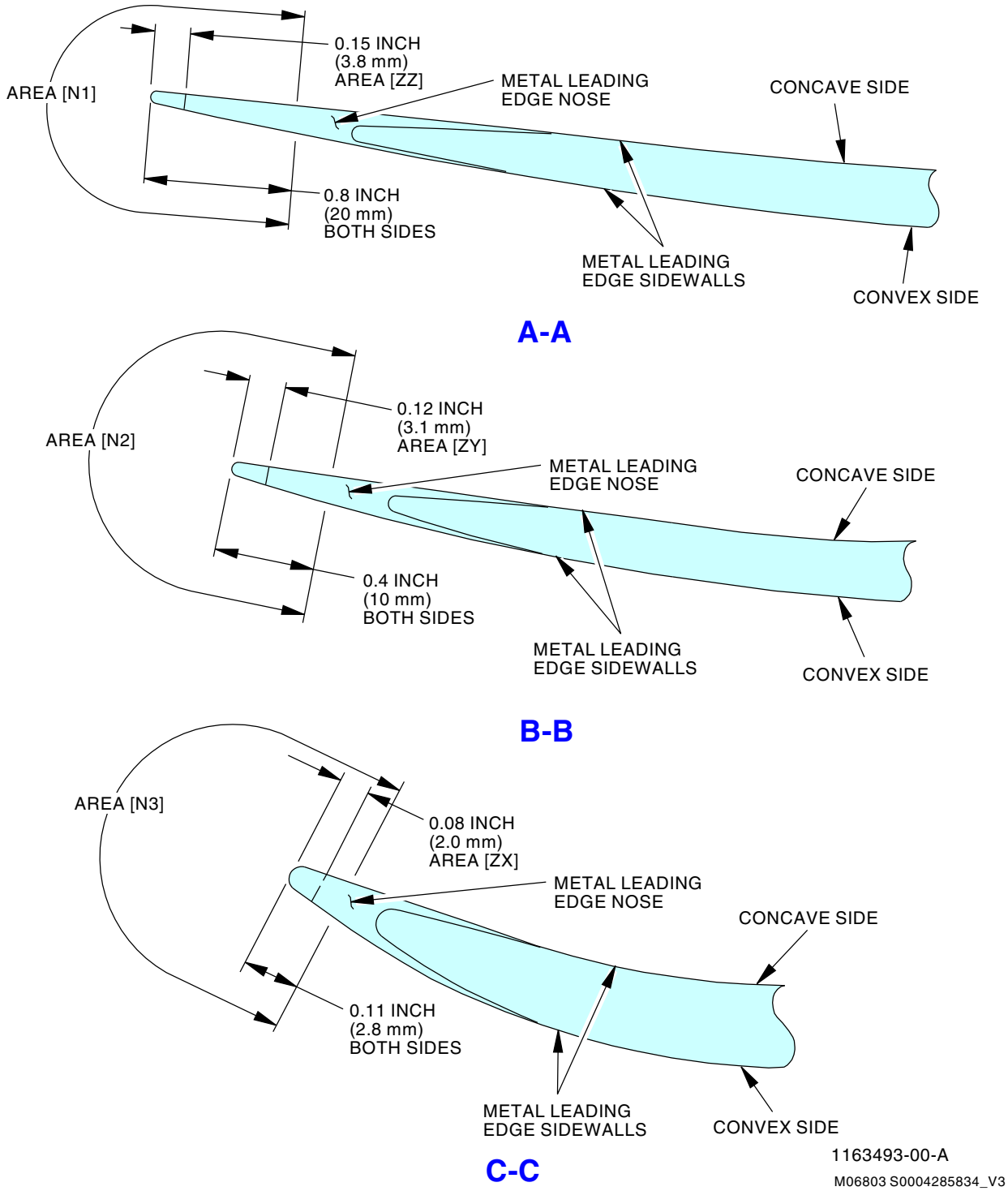
C

1199604-00-A

M06802 S0004285833_V2

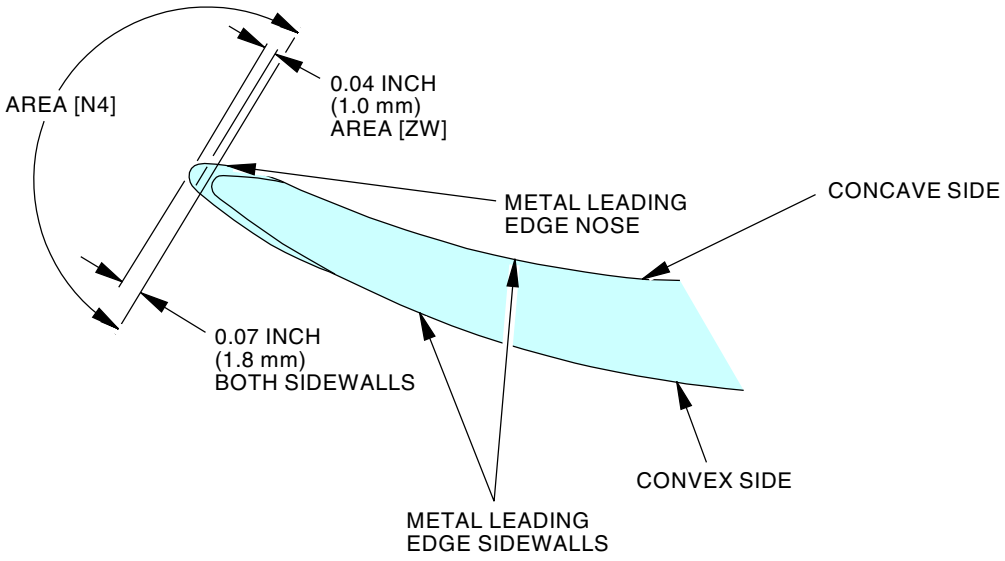
Fan Blade (Scheduled Maintenance Requirement) Inspection
Figure 602/72-21-00-990-803-H01 (Sheet 3 of 5)

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

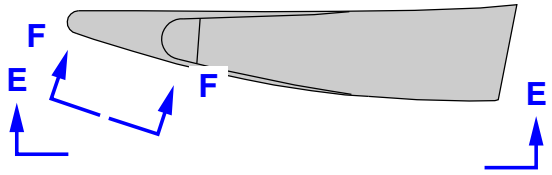


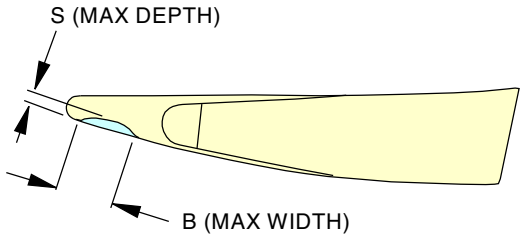
Fan Blade (Scheduled Maintenance Requirement) Inspection
Figure 602/72-21-00-990-803-H01 (Sheet 4 of 5)

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

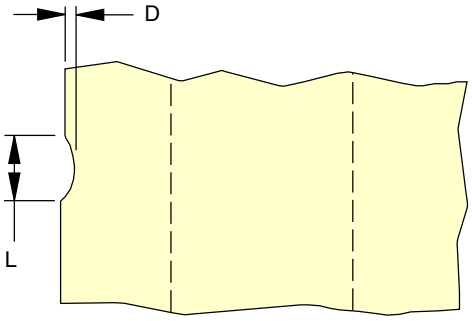


D-D



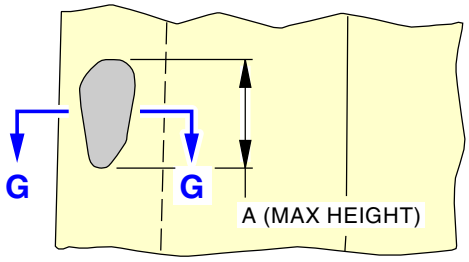


G-G



**NICKS, DENTS, SCRATCHES
AT FORWARD END OF MLE NOSE**

E-E



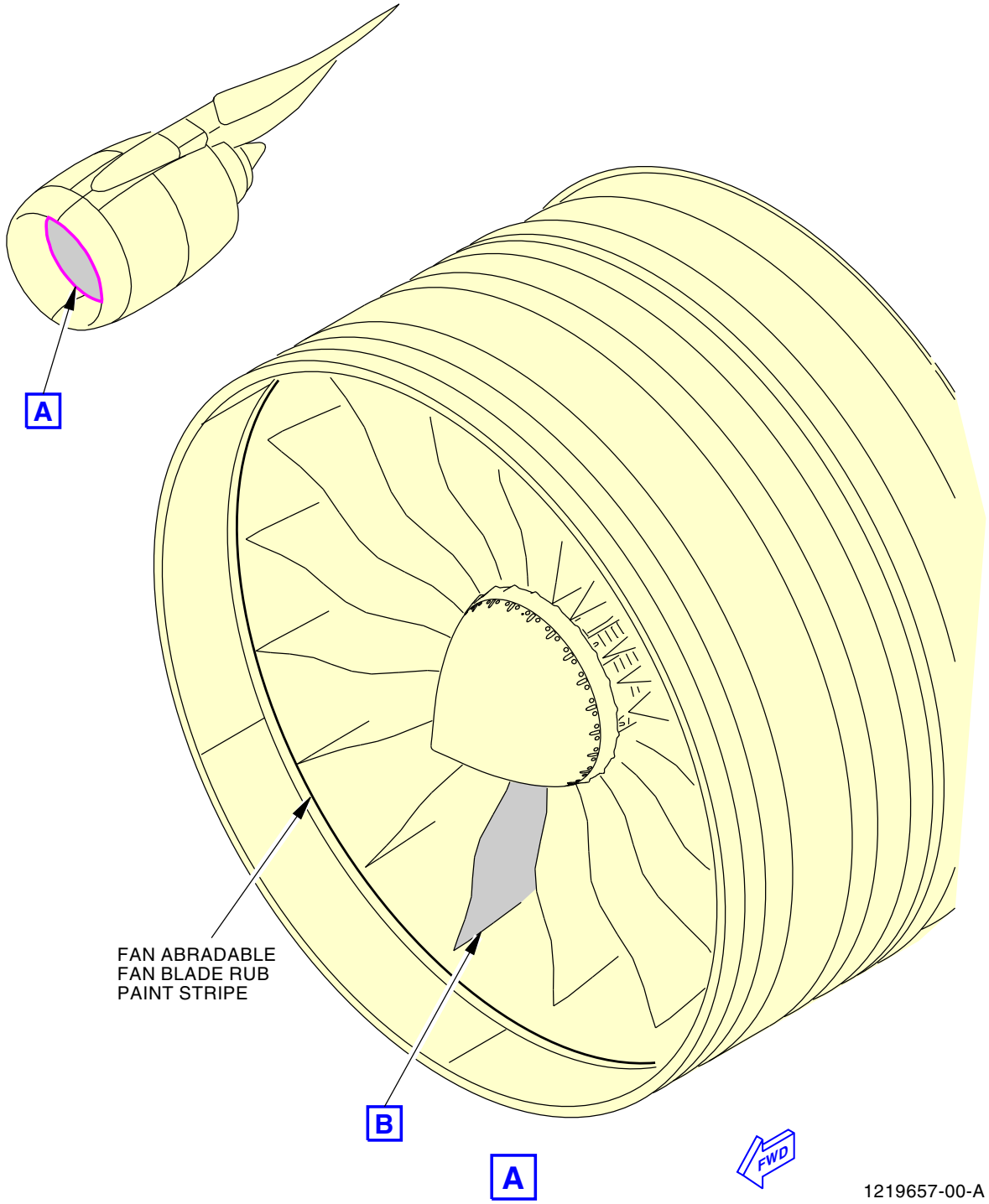
**TYPICAL NICK, DENT,
SCRATCH AT MLE NOSE
(ON PRESSURE OR SUCTION SIDE)**

F-F

1163494-00-A
M06804 S0004285835_V2

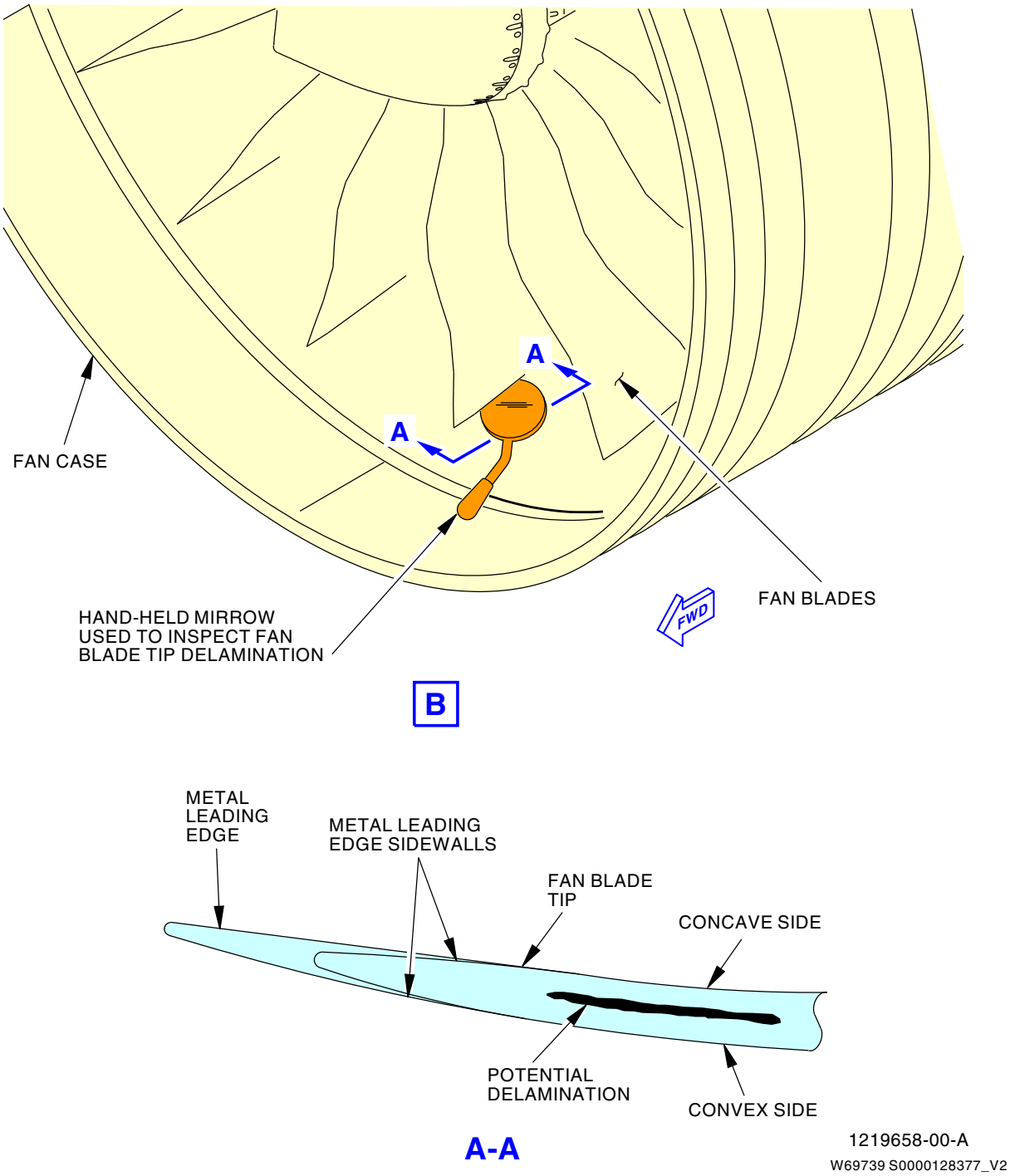
**Fan Blade (Scheduled Maintenance Requirement) Inspection
Figure 602/72-21-00-990-803-H01 (Sheet 5 of 5)**

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



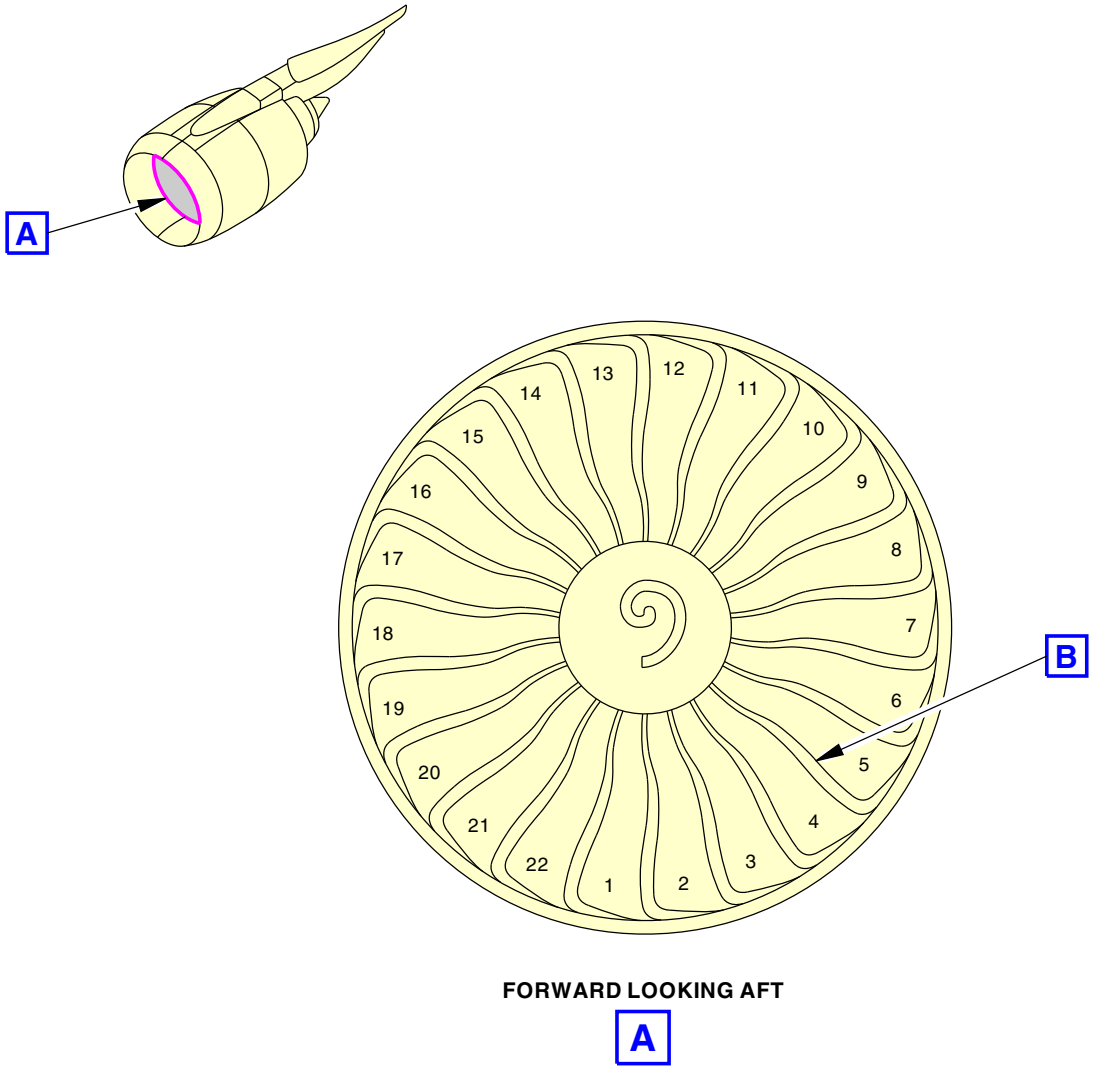
Fan Blade Tip Delamination Inspection
Figure 603/72-21-00-990-811-H01 (Sheet 1 of 2)

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



Fan Blade Tip Delamination Inspection
Figure 603/72-21-00-990-811-H01 (Sheet 2 of 2)

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



NOTES:

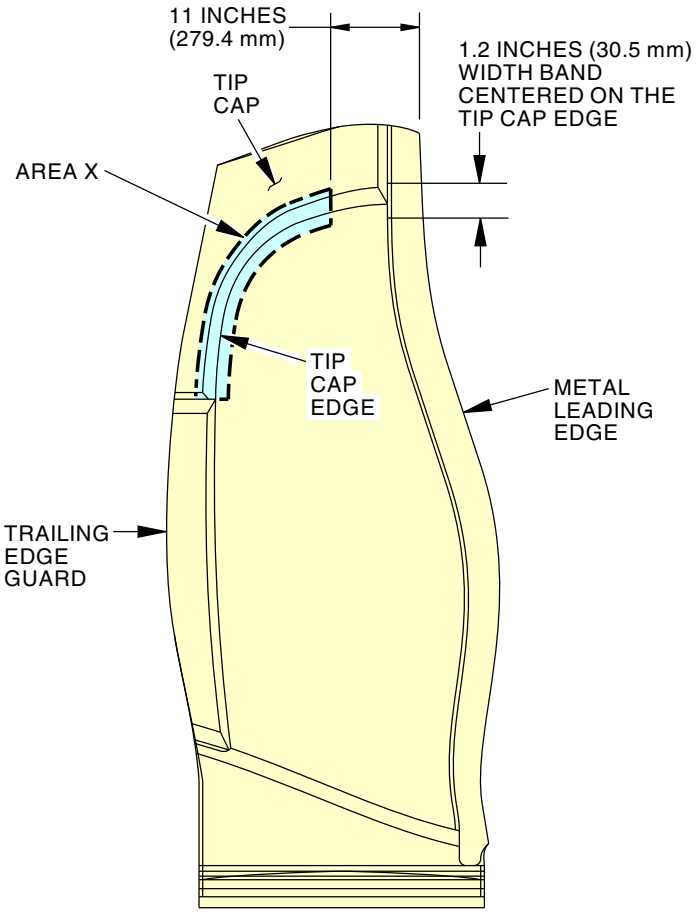
1. VIEW [B] IS THE BACK SIDE (CONCAVE, PRESSURE SIDE) OF THE BLADE.
2. WHEN LOOKING AT THE ENGINE FROM THE FRONT, THE CONVEX (SUCTION) SIDE OF THE BLADE IS VISIBLE.

5047462-00

2801705 S0000641968_V1

Fan Blade Tip Cap Edge Delamination Inspection
Figure 604/72-21-00-990-818-H00 (Sheet 1 of 3)

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

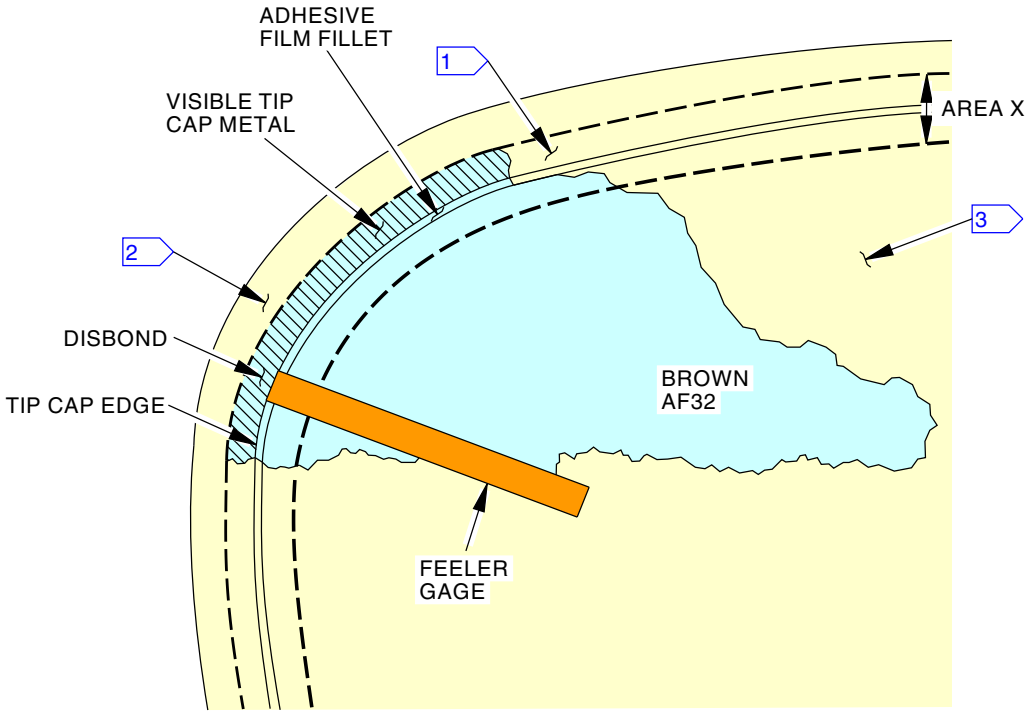


5047463-00

2802680 S0000641969_V2

Fan Blade Tip Cap Edge Delamination Inspection
Figure 604/72-21-00-990-818-H00 (Sheet 2 of 3)

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



CONCAVE (PRESSURE) SIDE

LAYERS FROM EXTERIOR SURFACE TO CARBON SURFACE OF BLADE:	1	2	3
BLACK PAINT	X	X	X
PRIMER	X	X	X
BLACK POLYURETHANE	X		X
METAL	X	X	
BROWN AF32			X

5047464-00

2802683 S0000641970_V2

Fan Blade Tip Cap Edge Delamination Inspection
Figure 604/72-21-00-990-818-H00 (Sheet 3 of 3)

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

TASK 72-21-00-220-803-H01

4. Fan Blade Platforms (Scheduled Maintenance Requirement) Inspection

(Figure 605)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task provides the instructions on how to examine the fan blade platforms.

(2) This task is a scheduled maintenance inspection task of the fan blade platforms.

(3) The fan blade platforms are installed between the fan blades on the fan disk.

(4) The fan blade platforms have an aluminum hail plate underneath the paint on the convex wing. The outline of this plate can be seen in the painted surface.

(5) These service bulletins are from the engine manufacturer and is referenced in this task:

ARO ALL POST SB 777-GE100-72-0382

(a) This Service Bulletin removes the aluminum hail plate underneath the paint on the convex wing of the fan blade platforms. No outline is present.

ARO ALL POST SB 777-GE100-72-0514 OR POST EM REPAIR 72-21-14 REPAIR 014

(b) This Service Bulletin replaces the paint top coat on the fan blade platforms with polyurethane film. The film has a dull, non-gloss appearance.

ARO ALL

B. References

Reference	Title
72-21-03-300-801-H01	Fan Blade Platform (Local Area Paint Touch-up) Repair (P/B 801)
72-21-03-300-802-H00	Fan Blade Platform Top Skin Repair (P/B 801)
72-21-03-300-803-H00	Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair (P/B 801)

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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Inspection

SUBTASK 72-21-00-860-015-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE

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

(Continued)

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	18	C80606	R ENG START SW

SUBTASK 72-21-00-480-006-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

F. Fan Blade Platforms Inspection

SUBTASK 72-21-00-220-011-H01

(1) Examine the fan blade platform top skin bonded surface for the conditions that follow:

(a) Cracks, tears, and broken fibers

1) Not permitted.

2) Continue-In-Service (C-I-S) limit for cracks, tears, and broken fibers is as follows:

a) Cracks, tears, and broken fibers up to a maximum depth of 0.02 inch (0.51 mm) and a maximum length of 1.0 inch (25.4 mm) are permitted for 10 cycles if you remove all loose materials.

(b) Delamination of the fabric layers

1) Not permitted.

(c) Bent edges along the perimeter of the platform

1) Not permitted.

2) Examine the adjacent fan blades for damage.

ARO ALL PRE SB 777-GE100-72-0514

(d) Top skin and coating damage in Area A:

1) Black paint/white primer layer

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage (TASK 72-21-03-300-801-H01 or TASK 72-21-03-300-803-H00).

2) Fiberglass layer

a) Exposed fiberglass layer is permitted.

b) Missing or eroded, scratched or nicked fiberglass layer is permitted if the composite ply is not exposed.

c) You can repair up to 2.0 square-inch (1290.32 square-mm) area (TASK 72-21-03-300-802-H00).

3) Composite plies

a) Exposed or broken plies are not permitted.

b) Continue-In-Service (C-I-S) limit for up to 1.0 square inch (645.16 square-mm) of exposed composite ply in areas A and C is as follows:

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

ARO ALL PRE SB 777-GE100-72-0514 (Continued)

<1> You must do the local top skin repair within 300 cycles (TASK 72-21-03-300-802-H00).

ARO ALL PRE SB 777-GE100-72-0382

(e) Top skin and coating damage in Area B:

1) Black paint/white primer layer

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage (TASK 72-21-03-300-801-H01 or TASK 72-21-03-300-803-H00).

2) Aluminum hail plate damage

a) Permitted if the damage is not through the sheet metal.

b) Any amount of missing material 0.10 inch (2.5 mm) or less of rear and side edges is permitted.

c) Missing material at the forward edge is not permitted.

<1> The Continue-In-Service (C-I-S) limit for missing material 0.50 inch (12.7 mm) or less of the forward edge is as follows:

<a> Cut away the loose material and repair in or less than 50 cycles (TASK 72-21-03-300-802-H00).

d) Disbond of hail plate is not permitted.

<1> The Continue-In-Service (C-I-S) limit for disbonded hail plate 0.50 inch (12.7 mm) from the edge is 50 cycles.

(f) Top skin and coating damage in Area C:

1) Permitted if the damage is not through the sheet metal.

2) Black paint/white primer layer

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage (TASK 72-21-03-300-801-H01 or TASK 72-21-03-300-803-H00).

3) Red adhesive layer

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage (TASK 72-21-03-300-802-H00).

4) Fiberglass layer

a) Missing or eroded, scratched or nicked layer are permitted if the composite ply is not exposed.

b) You can repair up to a 2.0 square-inch (1290.32 square-mm) area (TASK 72-21-03-300-802-H00).

5) Composite plies

a) Exposed or broken plies are not permitted.

b) Continue-In-Service (C-I-S) limit for up to 1.0 square inch (645.16 square-mm) exposed composite ply in areas A and C is as follows:

<1> You must do the local top skin repair within 300 cycles (TASK 72-21-03-300-802-H00).

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

ARO ALL POST SB 777-GE100-72-0382

(g) Top skin and coating damage on the convex wing (Area D) (no hail plate) platforms only:

NOTE: Areas A and D have the same configuration, but have different limits.

1) Black paint/white primer layer

a) Missing or eroded black paint/white primer is not permitted.

b) The Continue-In-Service (C-I-S) limit for missing or eroded black paint/white primer in Area D as follows:

<1> You must do the local missing paint repair in or less than 100 cycles (TASK 72-21-03-300-803-H00).

2) Fiberglass layer

a) Exposed fiberglass layer is not permitted.

b) The Continue-In-Service (C-I-S) limit for exposed fiberglass layer in Area D is as follows:

<1> You must do the local missing paint repair (Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00) or repair up to a 2.0 in^2 (1290.32 mm^2) area per the top skin repair (Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00) in less than 100 cycles.

3) Composite plies

a) Exposed or broken plies are not permitted.

b) The Continue-In-Service (C-I-S) limit for exposed or broken plies in Area D is as follows:

<1> You must do the local missing paint repair (Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00) or repair up to a 2.0 in^2 (1290.32 mm^2) area per the top skin repair (Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00) in less than 100 cycles.

ARO ALL POST SB 777-GE100-72-0514 OR POST EM REPAIR 72-21-14 REPAIR 014

(h) Polyurethane film top coat damage in Area A:

NOTE: The polyurethane film top coat can extend past the edges of the top surface of the platform and not fully cover the platform seals. It is permitted for the film to be disconnected from the seals.

1) Polyurethane film damage on the platform top surface is permitted, if the carbon ply is not exposed.

a) Exposed fiberglass layer is permitted.

b) Exposed or broken carbon plies are not permitted.

<1> Continue-In-Service (C-I-S) limit for up to 1.0 in^2 (645.16 mm^2) exposed composite ply is 300 cycles.

2) Polyurethane film top coat damage in Area D (convex wing)

a) Polyurethane film damage on the platform top surface is permitted if the carbon ply is not exposed.

<1> Exposed fiberglass layer is not permitted.

<a> Continue-In-Service (C-I-S) limit for exposed fiberglass is 100 cycles.

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

ARO ALL POST SB 777-GE100-72-0514 OR POST EM REPAIR 72-21-14 REPAIR 014 (Continued)

<2> Exposed or broken carbon plies are not permitted.

<a> Continue-In-Service (C-I-S) limit for up to 1.0 in^2 (645.16 mm^2) exposed composite ply is 100 cycles.

ARO ALL

(i) Resin crazing cracks at the leading and trailing edge radii

NOTE: The resin at the leading and the trailing edge radii can only be seen if the black paint (polyurethane) surface coating is missing in these areas.

1) Resin crazing cracks at the leading and trailing edge radii are permitted if there is no underlying fibers exposed.

NOTE: Exposed fibers that can be seen are no longer sealed by the resin.

2) Continue-In-Service (C-I-S) limit for resin crazing cracks at the leading and trailing edge radii that expose the underlying fibers is as follows:

a) Permitted for 50 cycles.

3) Continue-In-Service (C-I-S) limit for resin crazing cracks at the leading and trailing edge radii that go into the underlying fibers is as follows:

a) Permitted for 10 cycles.

(j) Chipped resin at the leading and trailing edge radii

1) Chipped resin at the leading and trailing edge radii is permitted if there are no underlying fibers exposed.

2) Continue-In-Service (C-I-S) limit for chipped resin at the leading and trailing edge radii that exposes the underlying fibers is as follows:

a) Permitted for 50 cycles.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-00-080-006-H01

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-00-860-016-H01

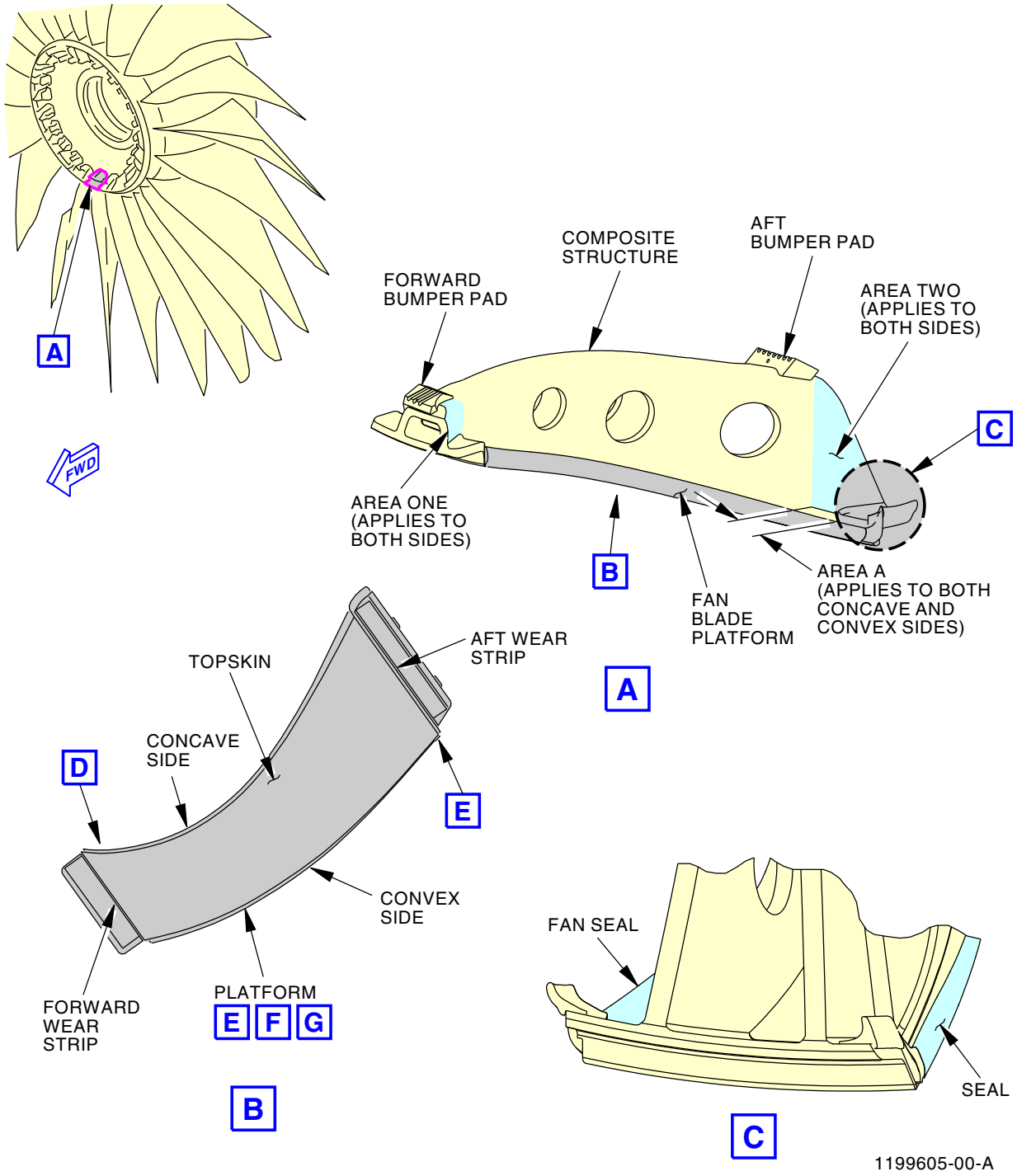
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

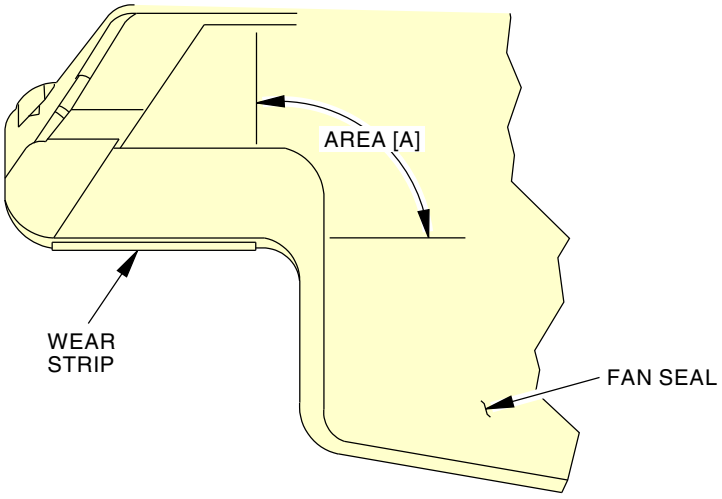
END OF TASK

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

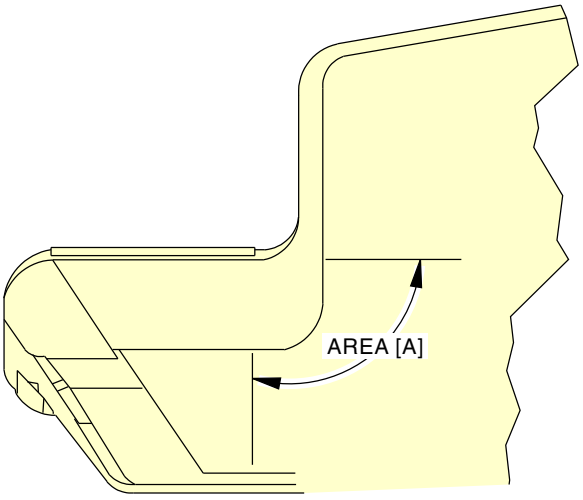


Fan Blade Platform Inspection
Figure 605/72-21-00-990-804-H01 (Sheet 1 of 6)

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



D

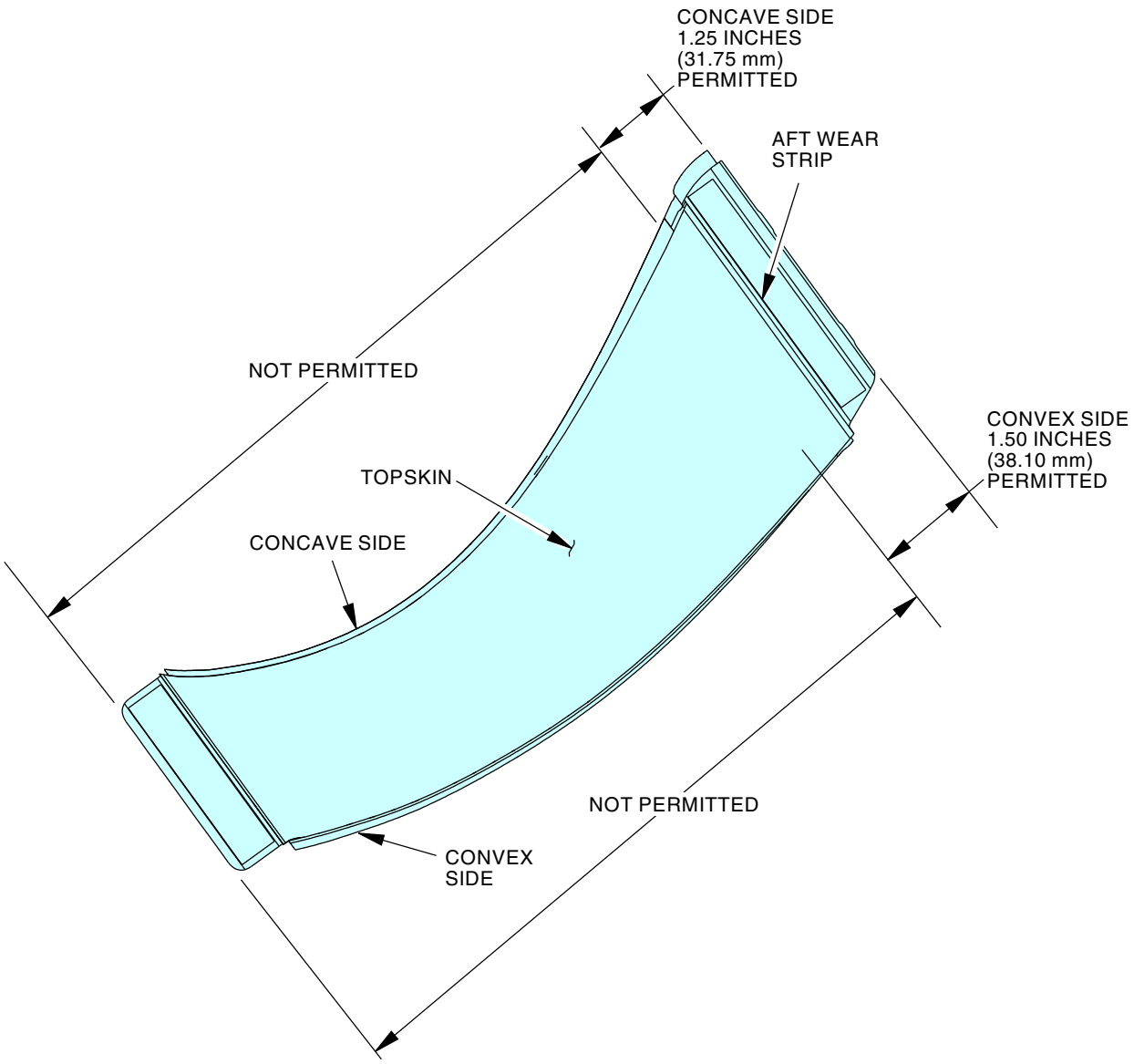


E

1199582-00-A
2117700 S0000453909_V2

Fan Blade Platform Inspection
Figure 605/72-21-00-990-804-H01 (Sheet 2 of 6)

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



TEARS, CUTS, BROKEN OR MISSING SECTIONS AFT END OF THE FAN BLADE PLATFORM SEAL

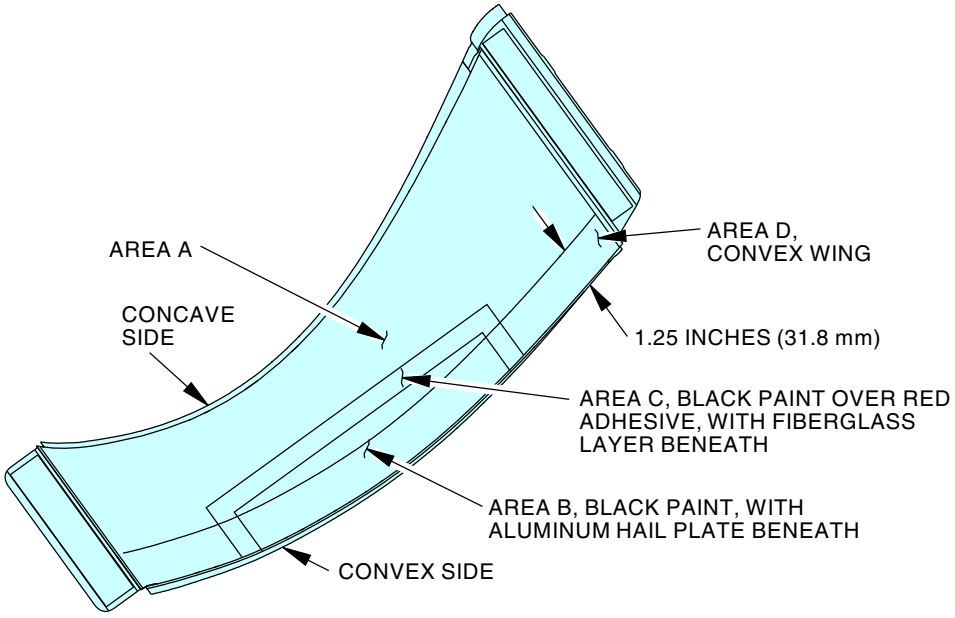
F

1221163-00-A

2117697 S0000453910_V2

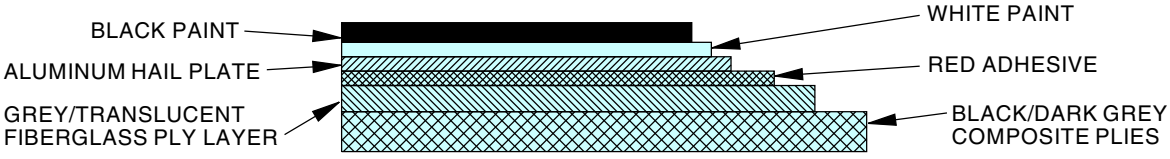
Fan Blade Platform Inspection
Figure 605/72-21-00-990-804-H01 (Sheet 3 of 6)

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



PLATFORM TOPSKIN AREA DESCRIPTION

G



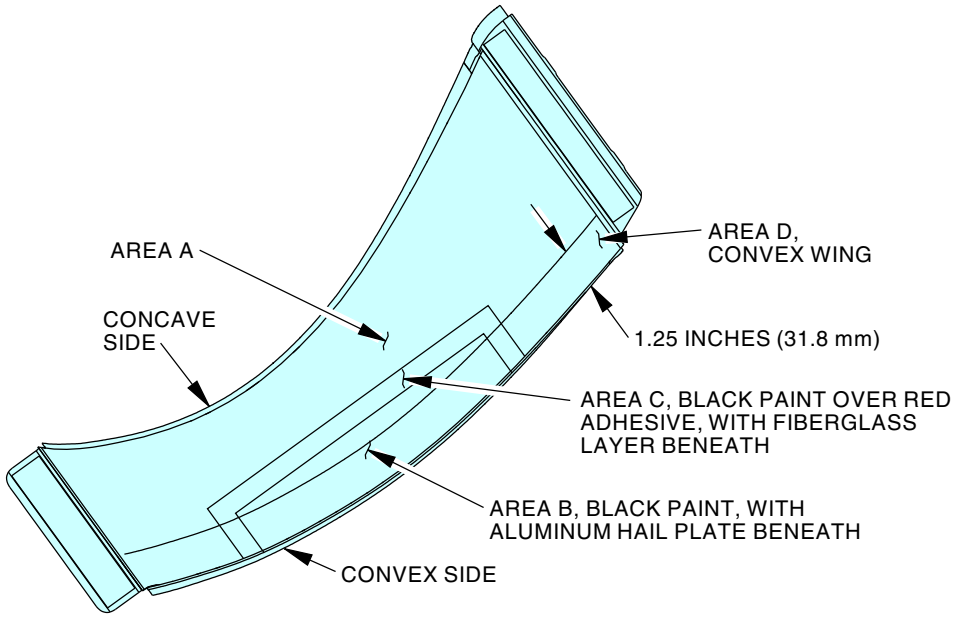
AREA A, B AND C COATING LAYERS 1

1 FAN BLADE PLATFORM WITH ALUMINUM HAIL PLATE UNDERNEATH THE PAINT.

1221163-00-A
1901669 S0000350343_V7

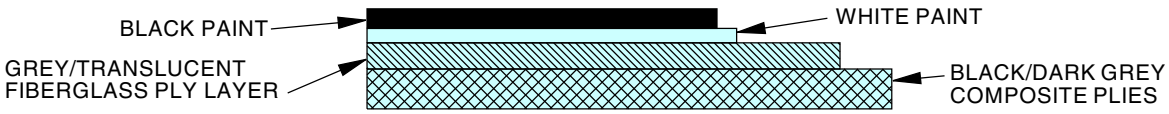
Fan Blade Platform Inspection
Figure 605/72-21-00-990-804-H01 (Sheet 4 of 6)

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



PLATFORM TOPSKIN AREA DESCRIPTION

G



AREA A, D COATING LAYERS 2

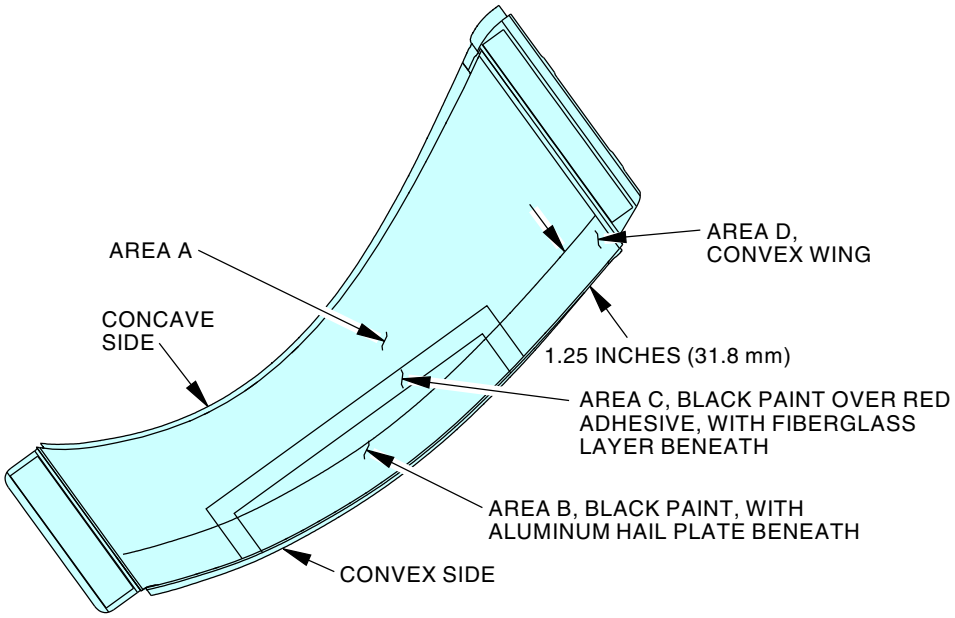
2 FAN BLADE PLATFORM WITHOUT ALUMINUM HAIL PLATE UNDERNEATH THE PAINT.

1221163-00-A

2376877 S0000544531_V2

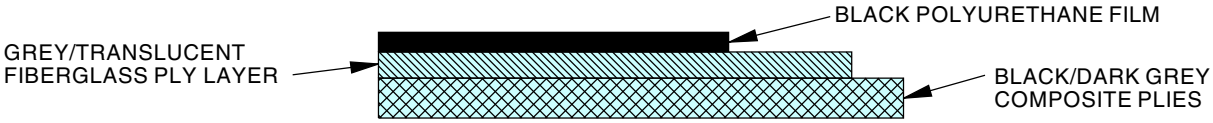
Fan Blade Platform Inspection
Figure 605/72-21-00-990-804-H01 (Sheet 5 of 6)

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



PLATFORM TOPSKIN AREA DESCRIPTION

G



AREA A, D COATING LAYERS 3

3 FAN BLADE PLATFORM WITH POLYURETHANE FILM TOPCOAT.

1221163-00-A
2376878 S0000544532_V2

Fan Blade Platform Inspection
Figure 605/72-21-00-990-804-H01 (Sheet 6 of 6)

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

TASK 72-21-00-220-801-H01

5. Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection

(Figure 606)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This is a scheduled maintenance inspection task of the fan booster flowpath spacer.

(2) The fan booster flowpath spacer (referred to as flowpath spacer) is attached to the inner flange of the fan booster assembly.

(3) Examine the flowpath spacer by looking between the individual fan blades.

(4) This service bulletin is from the engine manufacturer and is referenced in this task:

ARO ALL POST SB 777-GE100-72-0597

(a) This service bulletin introduces the composite flowpath spacer.

ARO ALL

B. References

Reference	Title
72-21-05-300-801-H00	Flowpath Spacer - Repair of Carbon Fiber Erosion (P/B 801)

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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Procedure

SUBTASK 72-21-00-860-017-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-00-480-002-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

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

SUBTASK 72-21-00-220-003-H01

(3) Visually examine the flowpath spacer for the conditions that follow.

(a) Cracks

1) Cracks are not permitted.

(b) Nicks, and scratches in Area [A] of the flowpath spacer is permitted with these conditions.

1) The depth of the nick or scratch is not greater than 0.003 inch (0.080 mm).

a) The nick or scratch is not greater than 0.5 inch (12.7 mm) in length after the high metal is removed.

(c) Nicks, and scratches in Area [B] of the flowpath spacer are permitted with these conditions.

1) The depth of the nick or scratch is not greater than 0.005 inch (0.130 mm).

2) The nick or scratch is not greater than 0.5 inch (12.7 mm) in length after the high metal is removed.

(d) Dents in Area [A] of the flowpath spacer are permitted with these conditions.

1) The depth of the dent is not greater than 0.003 inch (0.080 mm).

2) The dent is not greater than 0.5 inch (12.7 mm) in diameter after the high metal is removed.

(e) Dents in Area [B] of the flowpath spaces are permitted with these conditions.

1) The depth of the dent is not greater than 0.125 inch (3.180 mm).

2) The dent is not greater than 0.5 inch (12.7 mm) in diameter after the high metal is removed.

(f) Pits in Area [A] of the flowpath spacer are permitted with these conditions.

1) The depth of a pit is not greater than 0.003 inch (0.080 mm).

a) The pit is not greater than 0.5 inch (12.7 mm) in diameter or length after the high metal is removed.

(g) Pits in Area [B] of the flowpath spacer are permitted with these conditions:

1) The depth of the pit is not greater than 0.005 inch (0.130 mm).

2) The pit is not greater than 0.5 inch (12.7 mm) in diameter or length after the high metal is removed.

ARO ALL POST SB 777-GE100-72-0597

SUBTASK 72-21-00-220-014-H00

(4) Examine the coating in exposed areas of the flowpath spacer (Area F) for damage:

(a) Black paint or green primer layer

1) Missing or eroded, scratched or nicked layer is permitted.

a) You can repair the damaged coating. Refer to Flowpath Spacer - Repair of Carbon Fiber Erosion, TASK 72-21-05-300-801-H00.

(b) Fiberglass layer

1) Missing or eroded, scratched or nicked layer is permitted if the composite carbon ply is not exposed.

a) You can repair the damaged coating. Refer to Flowpath Spacer - Repair of Carbon Fiber Erosion, TASK 72-21-05-300-801-H00.

(c) Composite carbon plies

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

ARO ALL POST SB 777-GE100-72-0597 (Continued)

1) Exposed or broken plies are not permitted.

a) Continue-In-Service (C-I-S) limit for exposed composite carbon ply in area F with depth up to 0.030 in. (0.762 mm) from part surface and maximum width up to 1.5 in. (38.1 mm) is 100 cycles.

b) You must repair the damaged coating in or less than 100 cycles. Refer to Flowpath Spacer - Repair of Carbon Fiber Erosion, TASK 72-21-05-300-801-H00.

ARO ALL

SUBTASK 72-21-00-080-002-H01

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(5) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-00-860-018-H01

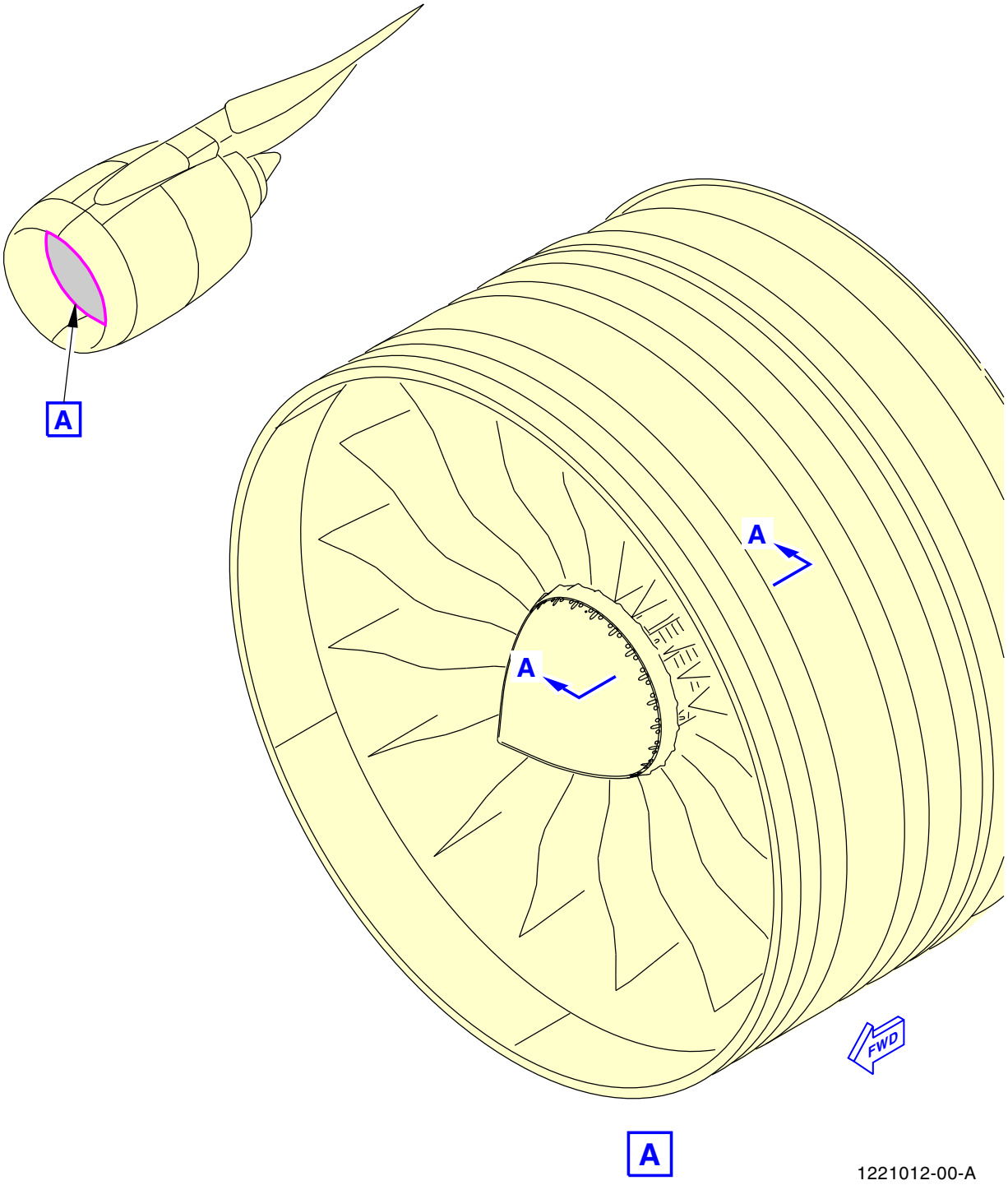
(6) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

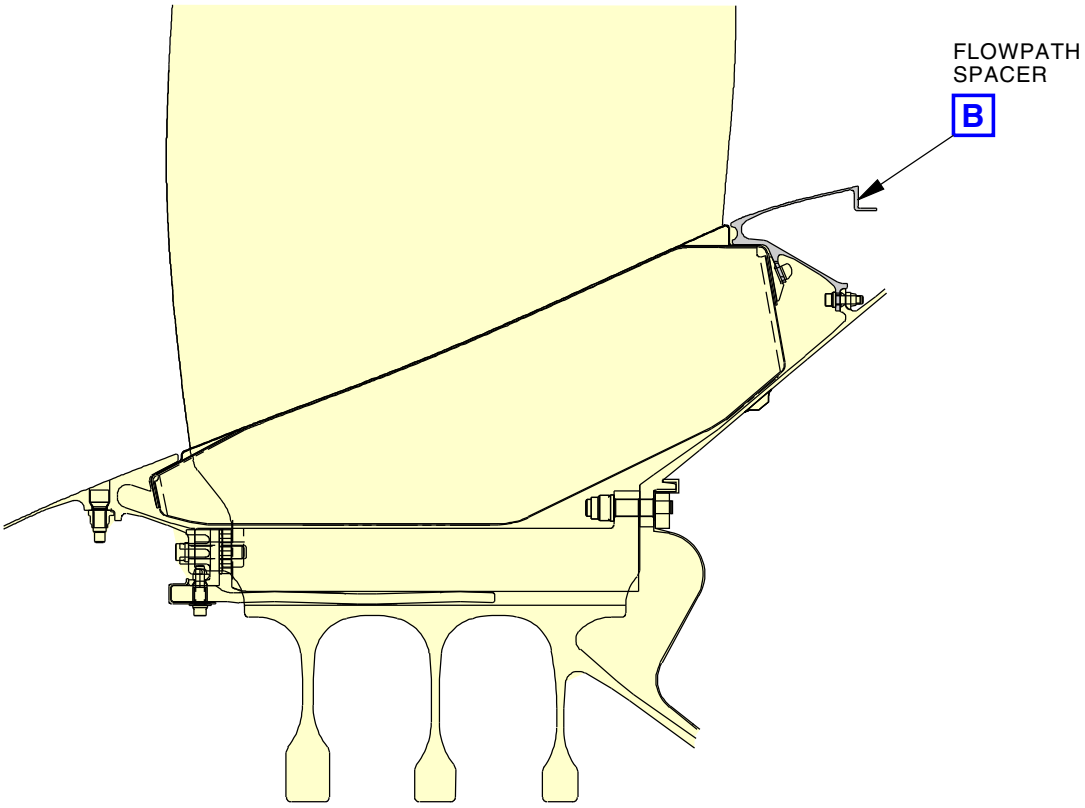
END OF TASK

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



Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection
Figure 606/72-21-00-990-812-H01 (Sheet 1 of 4)

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

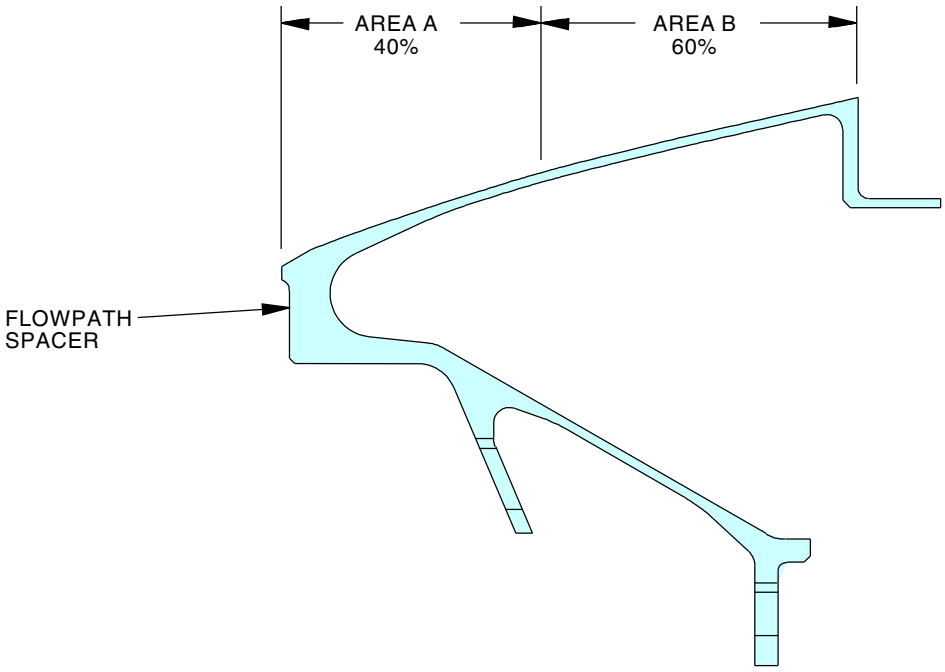


A-A

W71971 S0000128791_V2

Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection
Figure 606/72-21-00-990-812-H01 (Sheet 2 of 4)

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

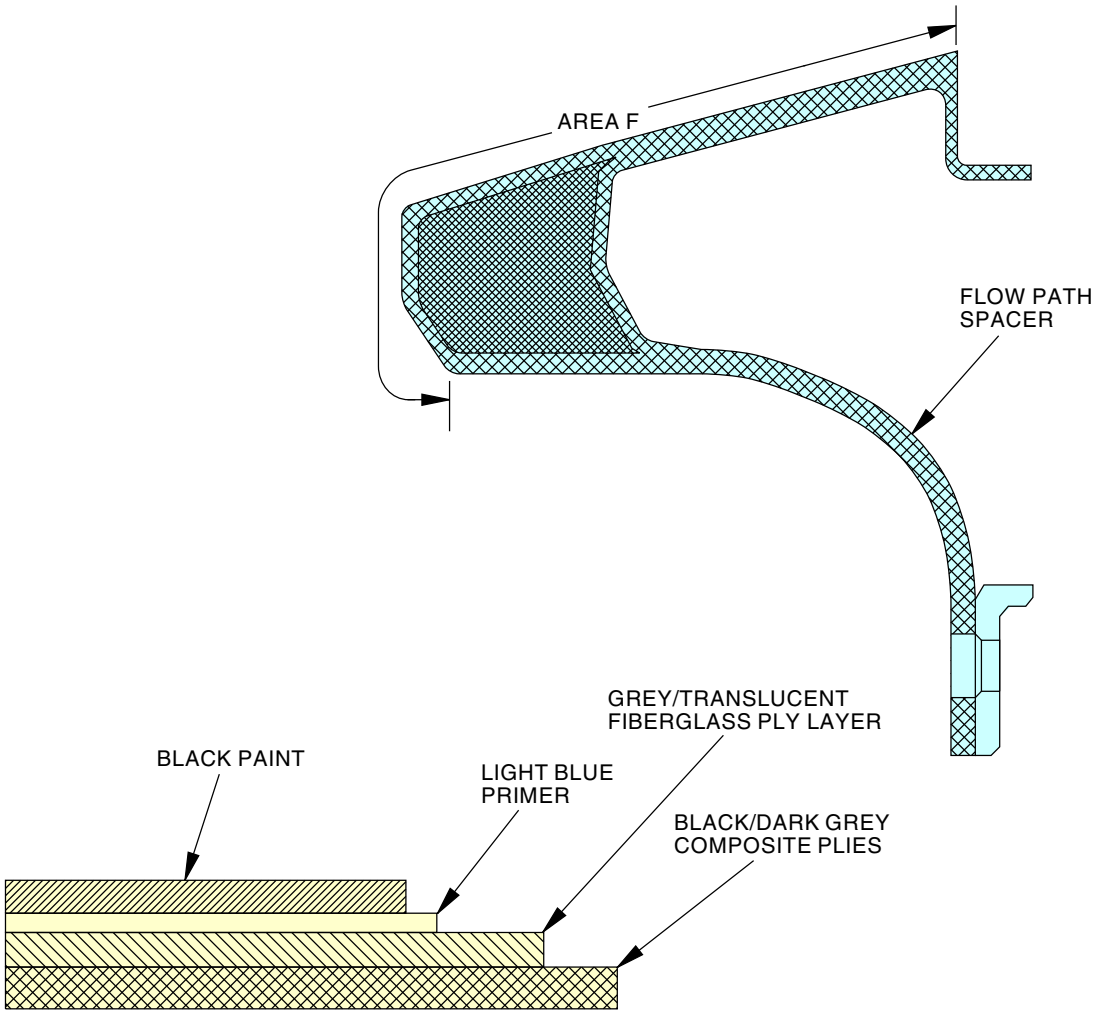


B

2539196 S0000603489_V1

Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection
Figure 606/72-21-00-990-812-H01 (Sheet 3 of 4)

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



AREA F COATING LAYERS

B

5031948-00

2537164 S0000601715_V1

Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection
Figure 606/72-21-00-990-812-H01 (Sheet 4 of 4)

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

TASK 72-21-00-200-802-H01

6. Fan Booster Stage 1 Vane Outer Shroud Inspection

A. General

(1) This task provides the instructions on how to examine the outer shroud of the fan booster stage 1 vane and the stage 1 vanes.

(2) The fan booster stage 1 vane/outer shroud is attached to the outer shroud of the stage two vane assembly.

(3) To get access to the booster stage 1 vane/outer shroud, you must look between the individual fan blades.

B. 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

C. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

D. Prepare for the Inspection

SUBTASK 72-21-00-860-021-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-00-480-004-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

E. Procedure

SUBTASK 72-21-00-220-013-H01

(1) Turn the fan rotor as necessary and visually examine the 1st-stage stator vanes through the fan blades for the conditions that follow (Figure 607):

(a) Broken vane

1) None permitted.

2) Replace the engine.

(b) Cracks and tears on airfoils area [A]

1) None permitted.

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

2) Replace the engine.

(c) Nicks, dents and scratches on airfoils area [A]

1) Any amount 0.04 inch (1.00 mm) max depth

2) A maximum service extension of 10 cycles/ 60 hours is permitted if the damage is less than 0.10 inch (2.54 mm) deep.

3) If the damage is more that these limits replace the engine.

(d) Nicks, dents and scratches on the leading and trailing edges area [B]

1) No maximum number in area [B] if the damage is less than 0.079 inch (2.010 mm) in depth.

2) A maximum service extension of 10 cycles/60 hours is permitted if the damage is less than 0.118 (3.000 mm) deep.

3) If the damage is more than these limits replace the engine.

(e) Distortion of the leading and the trailing edge

1) No maximum limit if the damage is less than 0.709 inch (18.000 mm) radially and 0.256 inch (6.500 mm) axially.

2) A maximum service extension of 10 cycles/60 hours is permitted if the damage is less than 1.0 inch (25.4 mm) radially and 0.492 inch (12.500 mm) axially.

3) If the damage is more that these limits replace the engine.

SUBTASK 72-21-00-220-005-H01

(2) Visually examine the outer shroud of the booster stage 1 vane for the conditions that follow (Figure 608):

(a) Cracks in the outer shroud of the booster stage 1 vane are permitted with these conditions.

1) A crack in the vane weld bead

a) The maximum length of the crack is not more than 3.15 inches (80.00 mm).

b) The crack does not go around more than one weld bead corner.

2) A crack that extends into the axial part of the weld bead

a) The crack can only extend into the outer shroud from the trailing edge corner of the stage 1 vane platform to the aft flange of the outer shroud.

b) The total length of the crack is not more than 3.15 inches (80.00 mm).

3) A crack, at a position other than the trailing edge corners, that extends from the weld bead of the outer shroud

a) The length of the crack is not more than 1.0 inch (25.4 mm).

4) There must be a minimum of five stage 1 vanes between 2 cracks.

5) No more than three cracks are permitted for all of the outer shroud of the stage 1 vanes.

SUBTASK 72-21-00-212-001-H01

(3) Turn the fan rotor as necessary and visually examine the stage 2 vane assembly abradable shroud through the fan blades and stage 1 vane airfoils for the condition that follows (Figure 608):

(a) Wear/erosion in the abradable material of the outer shroud

1) Any amount permitted.

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

SUBTASK 72-21-00-080-004-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(4) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-00-860-022-H01

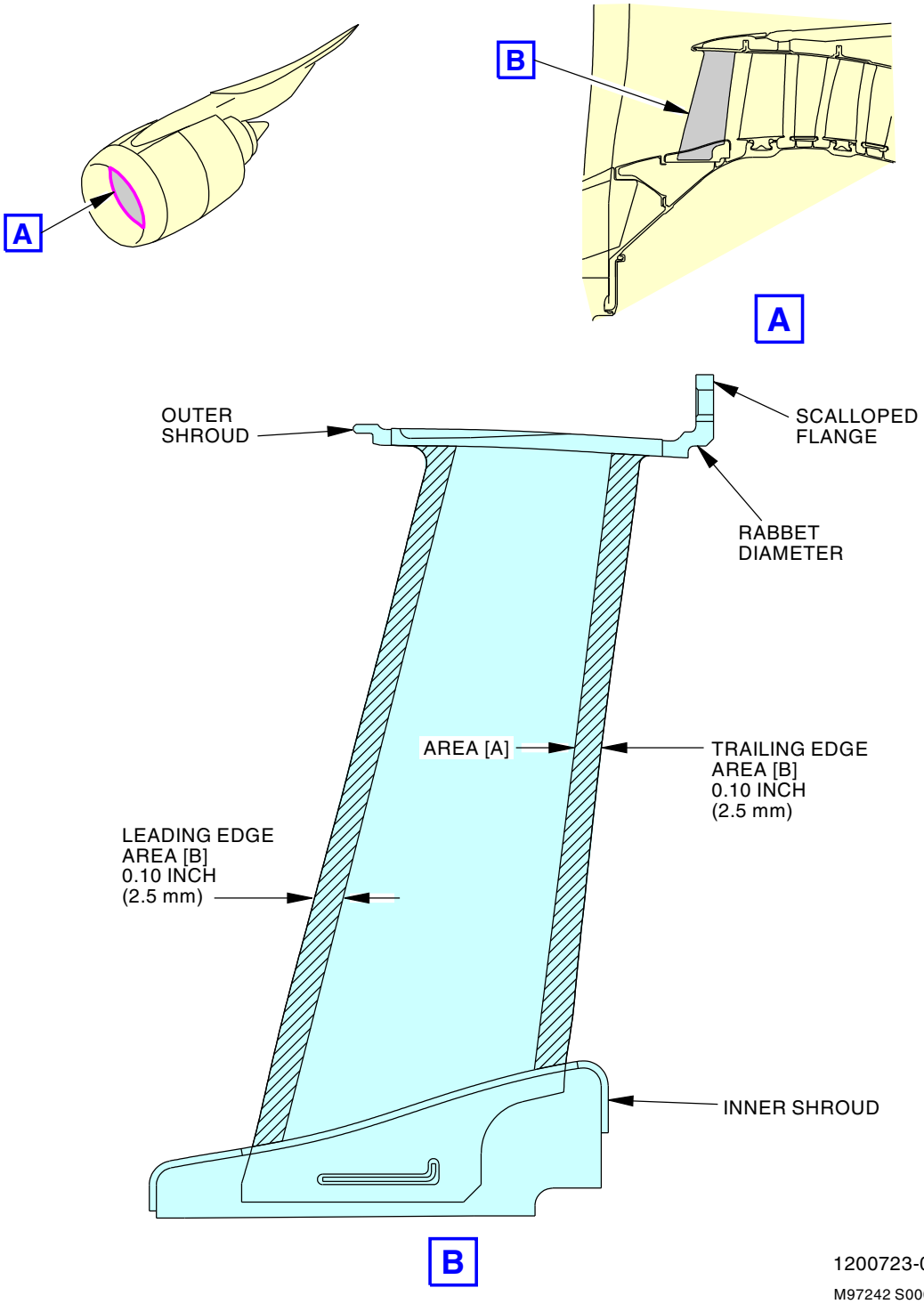
(5) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

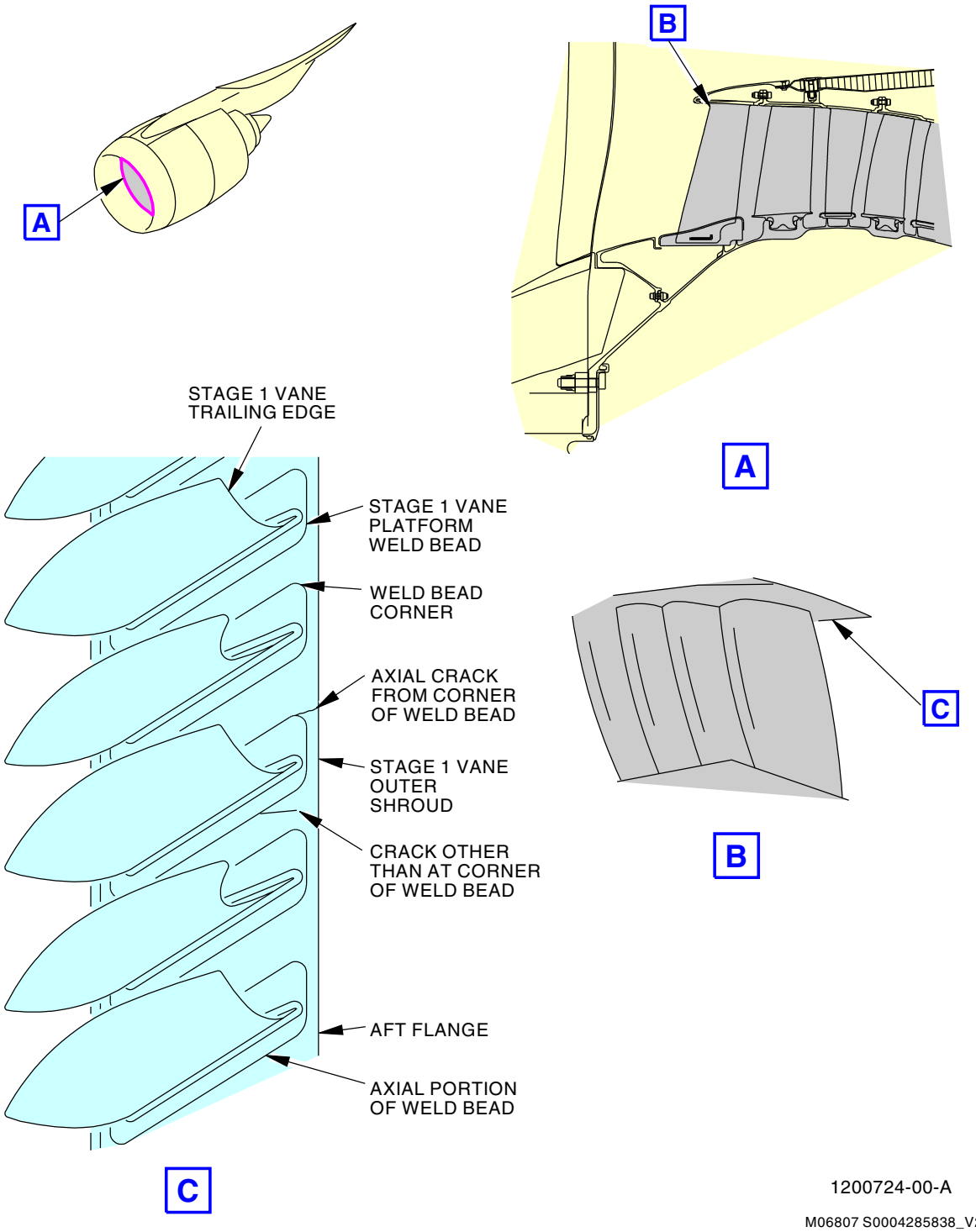
END OF TASK

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



Fan Booster Stage 1 Vane Assemblies Inspection
Figure 607/72-21-00-990-809-H01

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



Fan Booster Stage 1 Vane Outer Shroud Inspection
Figure 608/72-21-00-990-810-H01

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

TASK 72-21-00-200-804-H00

7. Fan Blade Retainer Inspection

(Figure 609)

A. General

(1) This is an inspection task for the fan blade retainers.

B. References

Reference	Title
70-43-42-300-801-H01	Blending Procedures (P/B 201)
70-48-13-300-801-H00	Shank Nut Repair (P/B 801)
72-21-00-300-801-H00	Fan Blade Retainer Repair (Molydag Coating Replacement) (P/B 801)
72-21-00-300-802-H01	Fan Blade Retainer Repair (Swage Nut Replacement) (P/B 801)

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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the inspection

SUBTASK 72-21-00-650-002-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-00-480-010-H00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and engine.

F. Procedure

SUBTASK 72-21-00-220-015-H00

(1) Examine the base of the fan blade retainers for the conditions that follow:

(a) Cracks:

1) Cracks are not permitted and are not repairable.

a) Replace the fan blade retainer.

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

(b) Nicks, dents, scratches, and fretting:

1) Any amount is permitted 0.010 in. (0.25 mm) deep after removal of high metal.

2) Nicks, dents, scratches, and fretting are not repairable.

a) Replace the fan blade retainer.

(c) Missing dry film lubricant on Area Q, including Surface P and adjacent radii:

1) Any amount up to 10 percent of missing dry film lubricant is permitted.

2) Any amount of missing dry film lubricant is repairable. Do this task: Fan Blade Retainer Repair (Molydag Coating Replacement), TASK 72-21-00-300-801-H00.

SUBTASK 72-21-00-220-016-H00

(2) Examine the honeycomb on the fan blade retainers for conditions that follow:

(a) Crushed or collapsed cells along the edges of the honeycomb:

1) Crushed or collapsed cells along the edges are permitted if not more than three locations and not more than 0.030 in. (0.76 mm) deep and 0.250 in. (6.35 mm) long.

2) Crushed or collapsed cells along the edges are not repairable.

a) Replace the fan blade retainer.

(b) Crushed or collapsed cells on all other areas of the honeycomb:

1) Crushed or collapsed cells on all other areas of the honeycomb are not permitted.

2) Crushed or collapsed cells on all other areas of the honeycomb are not repairable.

a) Replace the fan blade retainer.

(c) Disbonding of the adhesive:

1) Any amount of disbonding to adhesive visible along the edges of the cells is permitted.

(d) Cracks in the adhesive:

1) Any amount of cracks to adhesive visible along the edges of the cells is permitted.

(e) Separation of honeycomb from retainer base:

1) Separation of honeycomb from retainer base is not permitted.

2) Separation of honeycomb from retainer base is not repairable.

a) Replace the fan blade retainer.

SUBTASK 72-21-00-220-017-H00

(3) Examine the honeycomb sheet metal cover on the fan blade retainers for the conditions that follow:

(a) Cracks:

1) Cracks in the honeycomb sheet metal cover are not permitted.

2) Cracks in the honeycomb sheet metal cover are not repairable.

a) Replace the fan blade retainer.

(b) Nicks, dents, and scratches along the edges of the honeycomb sheet metal cover:

1) Nicks, dents, and scratches along the edges of the honeycomb sheet metal cover are permitted if not more than three locations and not more than 0.030 in. (0.76 mm) deep and 0.25 in. (6.35 mm) long.

2) Nicks, dents, and scratches along the edges of the honeycomb sheet metal cover are not repairable.

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

a) Replace the fan blade retainer.

(c) Nicks, dents, and scratches on all other areas of the honeycomb sheet metal cover:

1) Nicks, dents, and scratches on all other areas of the honeycomb sheet metal cover are permitted if not more than three locations and not more than 0.020 in. (0.05 cm) deep and 0.10 in. (0.25 cm) long.

2) Nicks, dents, and scratches on all other areas of the honeycomb sheet metal cover are not repairable.

a) Replace the fan blade retainer.

(d) Bent, distorted or missing corners:

1) Bent, distorted or missing corners are not permitted

2) Any amount that you can remove blending to a maximum of 0.250 in. (6.35 mm) in length, 0.200 in. (5.08 mm) in width, and if you keep a minimum distance of 0.02 in. (0.51 mm) from the wear strip is repairable. Refer to Figure 609.

a) Blend the damaged corners of the sheet metal cover. Remove a minimum amount of material to get a smooth contour. If necessary blend on the full height of the peripheral honeycomb cell to make sure that there is no honeycomb edges facing more than the sheet metal cover. Refer to task: (Blending Procedures, TASK 70-43-42-300-801-H01).

SUBTASK 72-21-00-220-018-H00

(4) Examine the wear strip on the fan blade retainers for the conditions that follow:

(a) Wear:

1) Any amount of wear is permitted on the wear strip as long as no area is worn through and no area shows fraying of the fabric.

2) Wear on the wear strips is not repairable.

a) Replace the fan blade retainer.

(b) Nicks and dents:

1) Any amount of nicks and dents on the wear strips is permitted if not more than 0.10 in. (2.5 mm) wide and 0.01 in. (0.25 mm) deep after removal of raised material and they are separated by 1.0 in. (25.4 mm).

2) Nicks and dents in the wear strip are not repairable.

a) Replace the fan blade retainer.

(c) Missing wear strips:

1) Missing wear strips are not permitted.

a) Replace the fan blade retainer.

SUBTASK 72-21-00-220-019-H00

(5) Examine the swage nut on the fan blade retainers for the conditions that follow:

(a) Loose swage nuts:

1) Loose swage nuts are not permitted.

2) Any amount of loose swage nuts is repairable.

a) Flare the swage nut again. No movement permitted. Do this task: Shank Nut Repair, TASK 70-48-13-300-801-H00.

(b) Missing swage nuts:

1) Missing swage nuts are not permitted.

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

2) Missing swage nuts are repairable.

a) Missing swage nut is repairable. Do this task: Fan Blade Retainer Repair (Swage Nut Replacement), TASK 72-21-00-300-802-H01.

(c) Cracks in the swaged lip of the swage nuts:

1) Cracks in swaged lip are not permitted.

2) Cracks in swaged lip are not repairable.

a) Replace the fan blade retainer.

G. Put the engine back to the usual condition.

SUBTASK 72-21-00-080-009-H00

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-21-00-650-003-H00

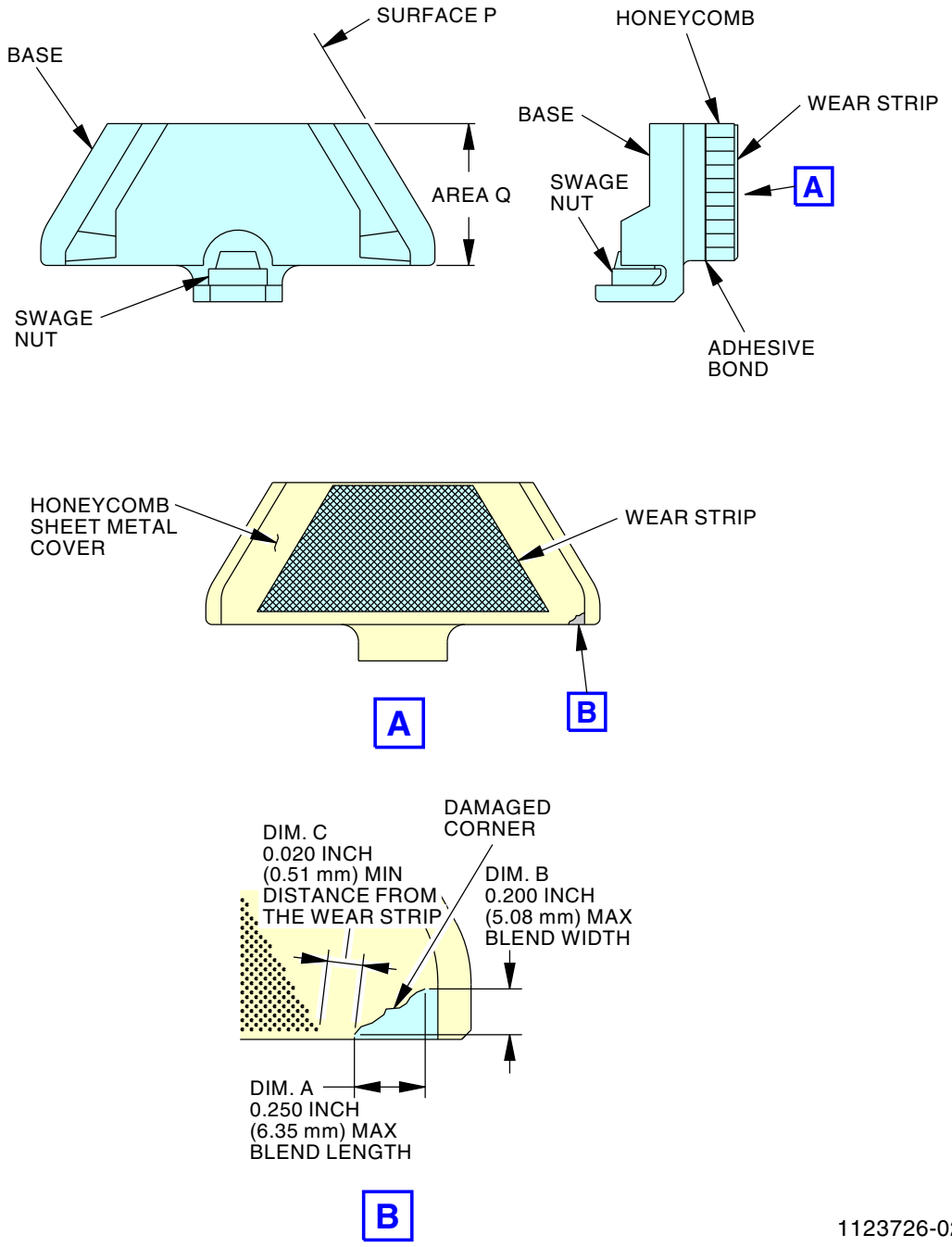
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



1123726-02-A
385020 S0000134729_V2

Fan Blade Retainer Inspection
Figure 609/72-21-00-990-814-H00

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

TASK 72-21-00-200-805-H00

8. Dovetail Key Inspection

(Figure 610)

A. General

(1) This is an inspection task for the dovetail keys.

B. References

Reference	Title
70-43-07-900-801-H01	Chemical Touch Up for Aluminum (P/B 201)
70-43-42-300-801-H01	Blending Procedures (P/B 201)

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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Inspection

SUBTASK 72-21-00-860-030-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-00-480-011-H00

CAUTION PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and engine.

F. Procedure

SUBTASK 72-21-00-220-020-H00

(1) Examine all the surfaces of the dovetail keys for the conditions that follow:

(a) Cracks

1) Cracks are not permitted.

(b) Corrosion

1) Corrosion is not permitted on the dovetail keys.

2) Corrosion on the dovetail keys is repairable.

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

a) Blend corrosion. Do this task: Blending Procedures, TASK 70-43-42-300-801-H01.

b) Mask the surrounding area and touch-up the area with anodize. Do this task: Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01.

c) Nicks, dents and scratches:

<1> Nicks, dents and scratches are not permitted.

<2> Nicks, dents and scratches up to 0.10 in. (2.5 mm) in length, 0.20 in. (5.1 mm) in width, and 0.25 in. (6.4 mm) in depth are repairable.

<a> Blend to remove high metal. Do this task: Blending Procedures, TASK 70-43-42-300-801-H01.

<b> Mask the surrounding area and touch-up the area with anodize. Do this task: Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01.

d) Fretting to the forward corners (area A) because of the contact with the fan blade retainers. Refer to Figure 610:

<1> Fretting is not permitted.

<2> Fretting up to 0.060 in. (1.52 mm) in depth and 0.420 in. (10.66 mm) in length is repairable.

<a> Blend to remove high metal. Do this task: Blending Procedures, TASK 70-43-42-300-801-H01.

<b> Mask the surrounding area and touch-up the area with anodize. Do this task: Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01.

SUBTASK 72-21-00-220-021-H00

(2) Examine the protective adhesive layer on the dovetail keys for the following conditions:

(a) Protective adhesive layer is worn through to the base metal.

1) Worn areas to the base metal are not permitted except in Area A, if Area A was repaired with SUBTASK 72-21-00-220-020-H00 (1) (d) 2).

2) Worn areas to the base metal are repairable.

a) Replace the dovetail key.

(b) Chipped or missing protective adhesive layer.

1) Chipped or missing areas of the protective adhesive layer is allowed if it is not more than 25 percent.

2) Chipped or missing areas of the protective adhesive layer is repairable.

a) Replace the dovetail key.

SUBTASK 72-21-00-220-022-H00

(3) Examine the protective anodize layer on the dovetail keys for the conditions that follow:

(a) Missing or worn areas of the protective anodize layer.

1) Missing or worn areas of the protective anodize coating are permitted if it does not exceed 25 percent of the surface area, and are not repairable.

a) Replace the fan blade spacer.

(b) Missing or worn areas of the protective adhesive layer are repairable.

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

1) Mask the surrounding area and touch up the area with anodize. Do this task: Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01.

G. Put the Engine Back to Its Usual Condition

SUBTASK 72-21-00-080-010-H00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-21-00-860-031-H00

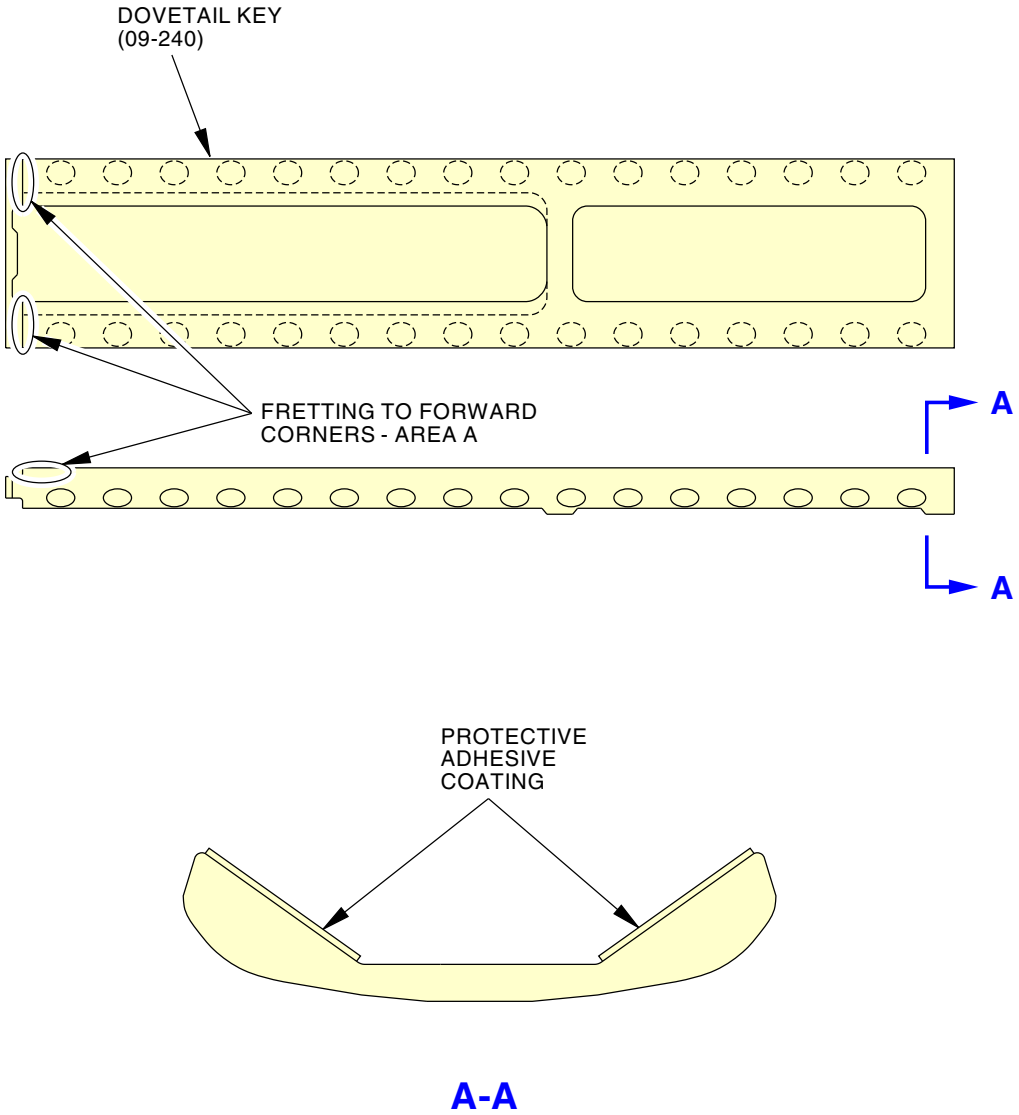
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



2608562 S0000626135_V1

Dovetail Key Inspection
Figure 610/72-21-00-990-815-H00

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

FAN BLADE RETAINER - REPAIR - MOLYDAG COATING REPLACEMENT

1. General

A. This procedure has one task.

(1) A repair of the molydag coating on the fan blade retainers.

TASK 72-21-00-300-801-H00

2. Fan Blade Retainer Repair (Molydag Coating Replacement)

Figure 801

A. General

(1) This procedure gives instructions to replace the molydag wear coating on the fan blade retainers.

B. References

Reference	Title
70-11-11-100-803-H00	Dry Abrasive Blast Cleaning (P/B 201)
70-43-19-600-801-H00	Solid Film Lubricant (P/B 201)

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

D. Consumable Materials

Reference	Description	Specification
D50070 [C02-027]	Lubricant - Solid Film, Heat Cured (Molydag 254)	
G50245 [C04-112]	Abrasive - Grit, 500 Mesh	
G50246 [C04-153]	Abrasive - Plastic Blast Media - PolyPlus 20/40 Mesh	MIL-P-85891 Type II Grade A
G50247 [C10-021]	Tape - Plastic	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the Repair

SUBTASK 72-21-00-860-028-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-21-00-480-008-H00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and engine.

G. Procedure

SUBTASK 72-21-00-211-002-H00

(1) Do a visual inspection of area Q, surface P, and the adjacent full radii. Look for solid film lubricant. If this inspection finds unserviceable lubricant, remove the lubricant as follows:

(a) Use plastic tape, G50247 [C10-021] to mask to the perimeter of the honeycomb.

NOTE: You can use equivalent alternatives for this consumable material.

CAUTION

REMOVE THE SOLID-FILM LUBRICANT CAREFULLY. DO NOT REMOVE SURFACE MATERIAL FROM THE PART. IF YOU DO, YOU WILL DAMAGE THE SURFACE MATERIAL.

(b) Use plastic blast media - PolyPlus 20/40 Mesh, G50246 [C04-153] or 500 mesh abrasive grit, G50245 [C04-112] with a dry abrasive blast to remove the solid film lubricant. Do this task: Dry Abrasive Blast Cleaning, TASK 70-11-11-100-803-H00.

NOTE: You can use equivalent alternatives for these consumable materials.

(c) Do a visual inspection of area Q, surface P, and the adjacent full radii, to make sure the solid film lubricant was removed.

SUBTASK 72-21-00-200-001-H00

(2) Make a coupon from a flat piece of stainless steel. Use the coupon to measure the thickness of the solid film lubricant.

SUBTASK 72-21-00-640-001-H00

(3) Apply a thin layer of Molydag 254 solid film lubricant, D50070 [C02-027] to area Q, surface P, the adjacent full radii, and to the coupon. Do this task: Solid Film Lubricant, TASK 70-43-19-600-801-H00.

(a) Apply the Molydag 254 solid film lubricant, D50070 [C02-027] in one or more layers to get a thickness of 0.0005 in. (0.013 mm) to 0.0015 in. (0.038 mm) after curing. Overspray is permitted, but not on surface T, the wear strip, or the sheet metal cover.

NOTE: You can use equivalent alternatives for this consumable material.

(b) Apply the Molydag 254 solid film lubricant, D50070 [C02-027] to the coupon with the same procedure and to the same thickness as the part.

SUBTASK 72-21-00-211-004-H00

(4) Do a visual inspection of the coating as follows:

(a) If the solid film lubricant is dark green or if it has a glossy finish, it was not fully mixed. Remove the lubricant. Refer to H72-21-00-211-002-H00.

(b) Measure the thickness of the coupon in the area where the solid film lubricant was applied and in the area without the lubricant. Make sure the difference is 0.0005 in. (0.013 mm) to 0.0015 in. (0.038 mm).

1) If the solid film lubricant is too thick, remove it. Refer to H72-21-00-211-002-H00.

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

2) If the solid film lubricant is too thin, apply more lubricant. Refer to H72-21-00-120-001-H00.

H. Put the engine back to the usual condition.

SUBTASK 72-21-00-080-008-H00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-21-00-860-029-H00

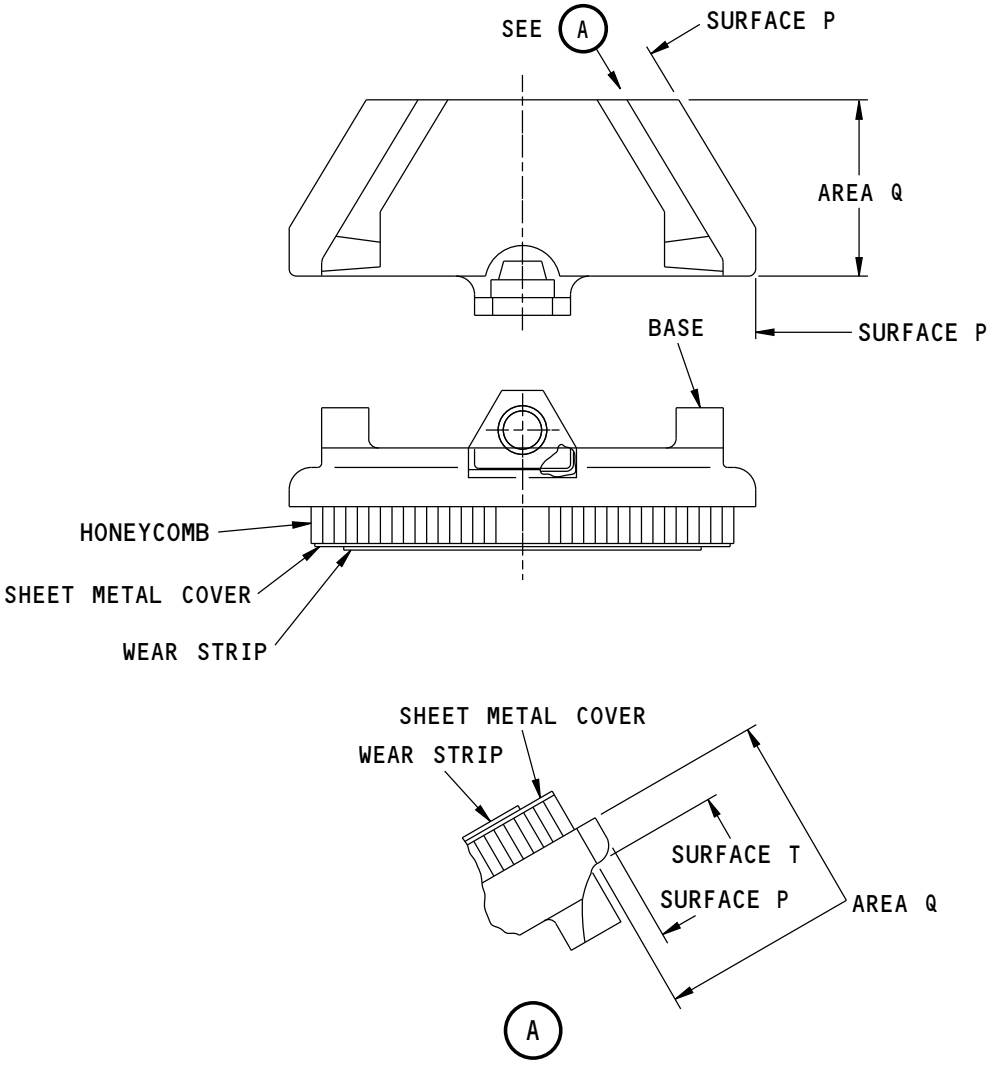
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



1175143-00-A
385167 S0000134734_V1

Fan Blade Retainer Repair
Figure 801/72-21-00-990-813-H00

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

FAN BLADE RETAINER - REPAIR – SWAGE NUT REPLACEMENT

1. General

A. This procedure has one task.

(1) This procedure gives instructions to repair the fan blade retainer by replacing the unserviceable swage nut.

TASK 72-21-00-300-802-H01

2. Fan Blade Retainer Repair (Swage Nut Replacement)

(Figure 801)

A. General

(1) This procedure gives instructions to repair the fan blade retainer by replacing the unserviceable swage nut.

B. References

Reference	Title
70-11-06-230-801-H01	Fluorescent Penetrant Inspection (P/B 201)
70-48-13-300-801-H00	Shank Nut Repair (P/B 801)

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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Repair

SUBTASK 72-21-00-860-032-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-00-480-012-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and engine.

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

F. Dimensional Information.

SUBTASK 72-21-00-220-023-H01

NOTE: The dimensional data identified within this repair procedure was designed using inches as the base unit of measurement for dimensional values. The conversion to millimeters is rounded to one less decimal digit than inches. For minimum dimensions, converted values are rounded up. For maximum dimensions, converted values are rounded down. To prevent conversion errors, do not re-convert from millimeters to inches.

(1) Refer the table below for dimensional information:

Table 801/72-21-00-993-804-H01

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Angle A			60 degrees	64 degrees	
Dia D			0.308 in. (7.83 mm)	0.312 in. (7.92 mm)	

G. Procedure

SUBTASK 72-21-00-020-002-H01

(1) Remove the damaged swage nut as follows. Refer to TASK 70-48-13-300-801-H00 and Figure 801.

CAUTION BE CAREFUL WHEN YOU MACHINE THE SHANK NUT NOT TO DAMAGE THE RETAINER HOLE. DAMAGE TO DIAMETER D AND CHAMFER A CAN OCCUR.

(a) Remove the flared shank of the nut and do as follows:

1) Use a drill bit 0.500 in. (12.70 mm) in diameter with 60 degrees conical cutting edge.

2) Push out the unserviceable swage nut with the swage tool.

SUBTASK 72-21-00-220-024-H01

(2) Do a dimensional inspection of the swage nut hole as follows. Refer to Table 801 and Figure 801, View A.

(a) If the swage nut hole does not agree with dimensions in Table 801, you cannot repair the retainer swage nut with this procedure.

SUBTASK 72-21-00-200-002-H01

(3) Do an inspection of the swage nut hole as follows. Refer to TASK 70-11-06-230-801-H01 and Figure 801, View A.

(a) Linear indications are not permitted.

NOTE: Linear indications are indications that are at least four times longer than they are wide.

(b) Through indications are not permitted.

(c) Indications less than 0.015 in. (0.38 mm) are permitted.

(d) Indications between 0.015 in. (0.38 mm) - 0.030 in. (0.76 mm) are permitted if there is a minimum space of 0.25 in. (6.4 mm) between them.

(e) Indications must not go across corners.

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

SUBTASK 72-21-00-400-001-H01

(4) Install the new swage nut as follows. Refer to TASK 70-48-13-300-801-H00.

(a) Movement between the swaged nut and the blade retainer is not permitted under hand pressure.

SUBTASK 72-21-00-211-005-H01

(5) Do a visual inspection of the new swage nut as follows:

(a) Use 4X magnification.

(b) Surface flaws are not permitted.

SUBTASK 72-21-00-200-003-H01

(6) Do a push-out test of the swage nut as follows:

(a) Apply a load of 100 lb (45 kg) to the threads of the new swage nut reacting thru the retainer.

(b) Do an inspection of the swage nut assembly as follows:

1) Relative movement between the retainer and swage nut is not permitted.

2) Separation between the retainer and the swage nut is not permitted.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-00-020-001-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-21-00-860-033-H01

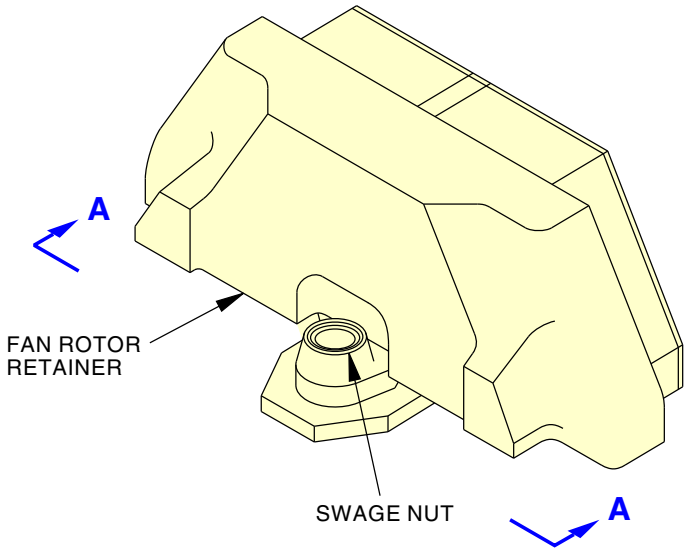
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



MATERIAL:

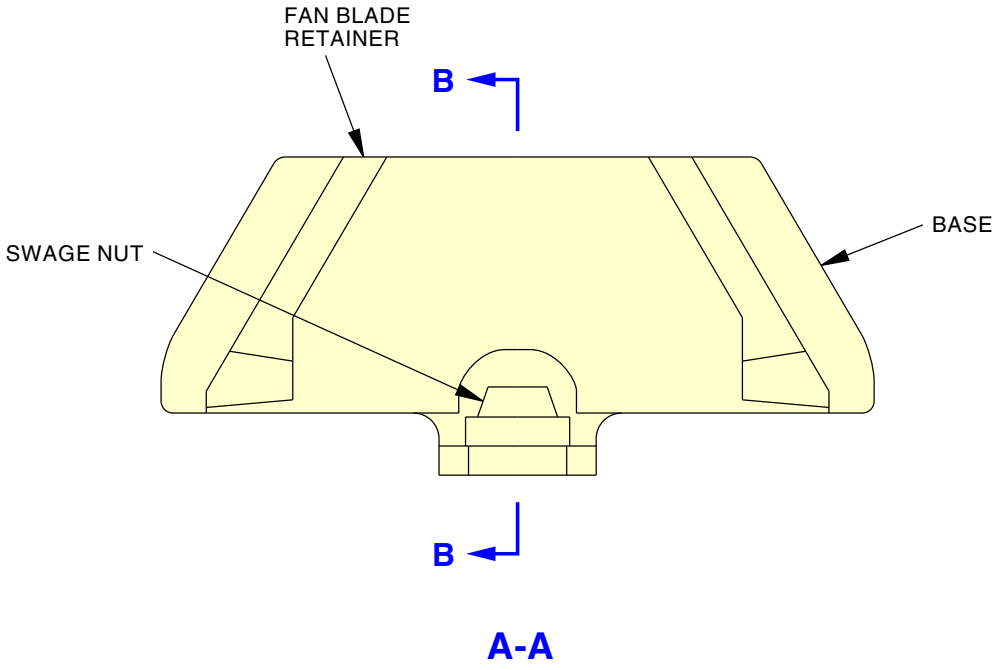
FAN ROTOR RETAINER: TI-6-4

5041370-00

2608970 S0000627128_V1

Dimensional Information
Figure 801/72-21-00-990-816-H01 (Sheet 1 of 4)

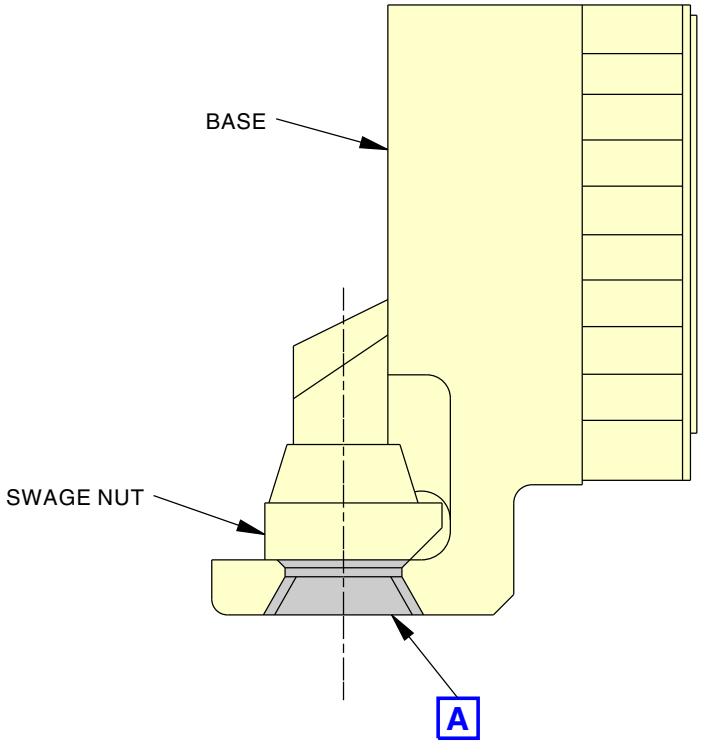
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5041371-00
2608971 S0000627129_V1

Dimensional Information
Figure 801/72-21-00-990-816-H01 (Sheet 2 of 4)

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

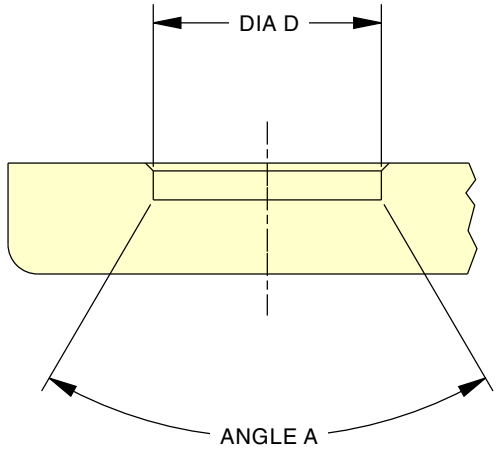


B-B

5041372-00
2608972 S0000627130_V1

Dimensional Information
Figure 801/72-21-00-990-816-H01 (Sheet 3 of 4)

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



A

NOTE:
SHANK NUT NOT SHOWN

5041373-00
2608973 S0000627131_V1

Dimensional Information
Figure 801/72-21-00-990-816-H01 (Sheet 4 of 4)

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

FAN ROTOR SPINNER - REMOVAL/INSTALLATION

1. General

A. This procedure contains two tasks:

(1) A removal of the fan rotor spinner assembly

(2) An installation of the fan rotor spinner assembly.

TASK 72-21-01-000-801-H01

2. Fan Rotor Spinner Removal

(Figure 401)

A. General

(1) This task is the removal procedure for the fan rotor spinner.

(2) The fan rotor spinner is attached to the support ring.

(3) The spinner support ring is attached to the fan disk.

(4) Access to the fan rotor spinner is through the inlet cowl of the engine.

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-7890	Fixture - Removal/Installation, Fan Rotor Spinner Part #: 9C3036G01 Supplier: 06083
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. Consumable Materials

Reference	Description	Specification
G02350 [C10-012]	Tape - High Temperature Masking	
G02417 [C10-021]	Tape - Duct	
G02448 [C05-003]	Marker - Pens	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Removal

SUBTASK 72-21-01-865-002-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-21-01-480-001-H01

CAUTION: PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to protect the inlet cowl and the engine.

F. Fan Rotor Spinner Removal

SUBTASK 72-21-01-020-001-H01

(1) Remove the fan rotor spinner [1].

CAUTION: IF THE FAN ROTOR SPINNER IS NOT REPLACED, DO NOT LOOSEN OR REMOVE THE BALANCE BOLTS. AN UNBALANCED CONDITION COULD OCCUR AFTER THE SPINNER IS REINSTALLED AND THE ENGINE IS RUN.

(a) If you are replacing the spinner [1], mark the size of the balance bolts [2] on the support ring [4] with tape, G02350 [C10-012] and marker, G02448 [C05-003].

NOTE: If the spinner [1] and the support ring [4] are removed, the balance bolts [2] sizes should be marked on the fan disk [3] with tape, G02350 [C10-012] and a marker, G02448 [C05-003].

WARNING: BE CAREFUL WHEN YOU MOVE THE FAN ROTOR SPINNER. THE SPINNER WEIGHS APPROXIMATELY 40 POUNDS (18.1 KG). INJURIES TO PERSONS CAN OCCUR. TWO PEOPLE ARE REQUIRED TO LIFT THE SPINNER.

CAUTION: MAKE SURE THAT THE SPINNER DOES NOT DROP WHEN YOU REMOVE IT FROM THE SUPPORT RING. DAMAGE TO THE SPINNER COULD OCCUR.

(b) Loosen and remove the 22 bolts [6] that attach the spinner [1] to the support ring [4].

(c) Use the removal/installation fixture, SPL-7890 to remove the spinner [1].

(d) Put the spinner [1] in a protective cover.

(e) Install a protective cover over the fan disk [3] opening.

SUBTASK 72-21-01-020-002-H01

(2) If you will remove the fan rotor spinner support ring [4], do the steps that follow.

(a) If you are not replacing the support ring [4], make an alignment mark on the support ring [4] and the fan disk [3] with tape, G02350 [C10-012] and a marker, G02448 [C05-003].

CAUTION: MAKE SURE THE PLATFORMS DO NOT DROP WHEN THE SUPPORT RING IS REMOVED. DAMAGE TO THE PLATFORMS OR INLET CAN OCCUR.

(b) Use tape, G02417 [C10-021] or an equivalent to hold each platform in place to the adjacent fan blade. Put tape around the entire circumference taping the fan blades and the platforms to prevent platforms from falling out.

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

1) Make sure that the tape, G02417 [C10-021] will not be in the way when the support ring is removed.

CAUTION

MAKE SURE THAT THE SUPPORT RING DOES NOT DROP WHEN YOU REMOVE IT FROM THE FAN DISK. DAMAGE TO THE SUPPORT RING COULD OCCUR.

(c) Loosen and remove the 22 bolts [5] that attach the support ring [4] to the fan disk [3].

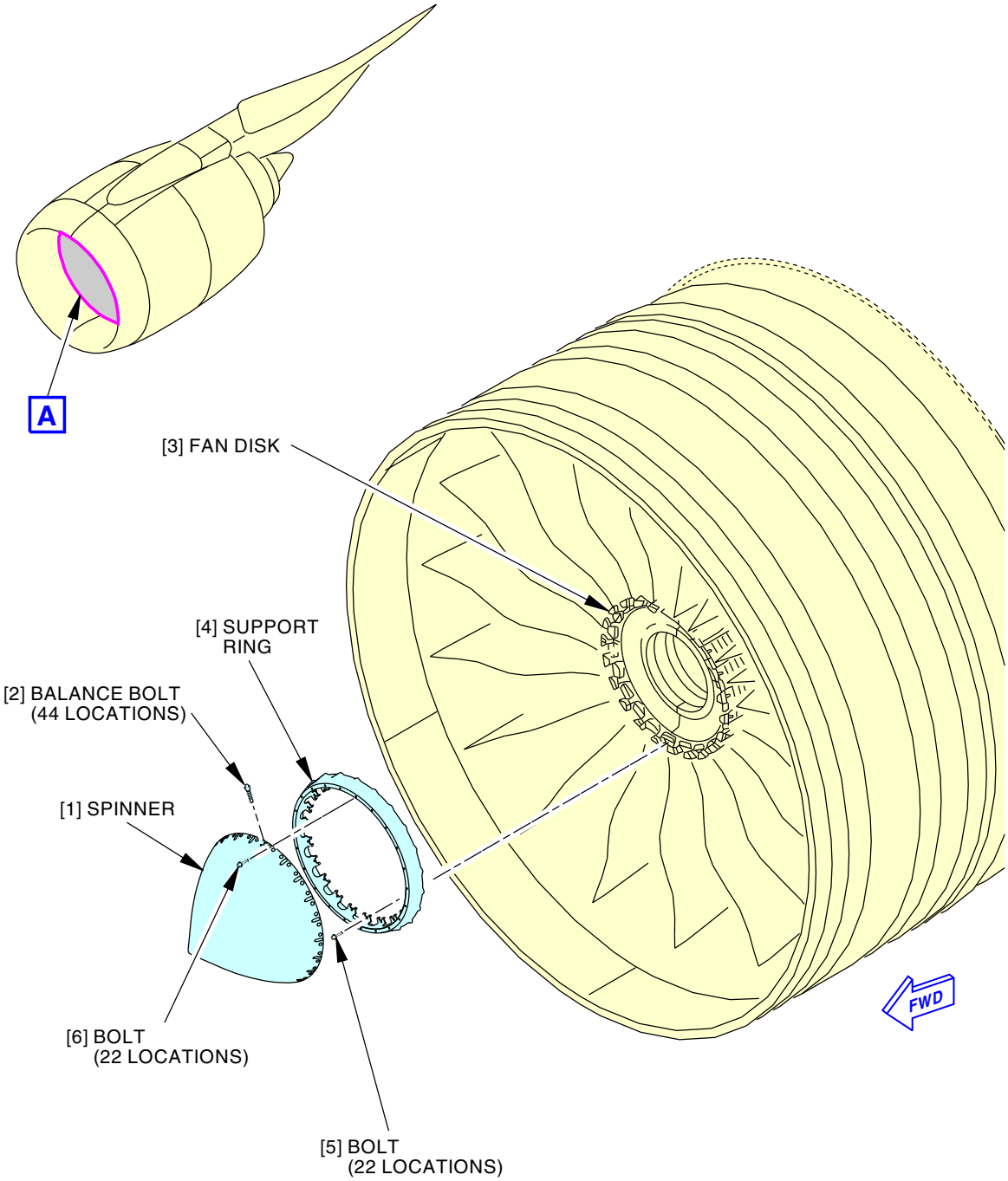
(d) Remove the support ring [4].

(e) Put the support ring [4] in a protective cover.

(f) Install a protective cover over the fan disk [3] opening.

——— END OF TASK ———

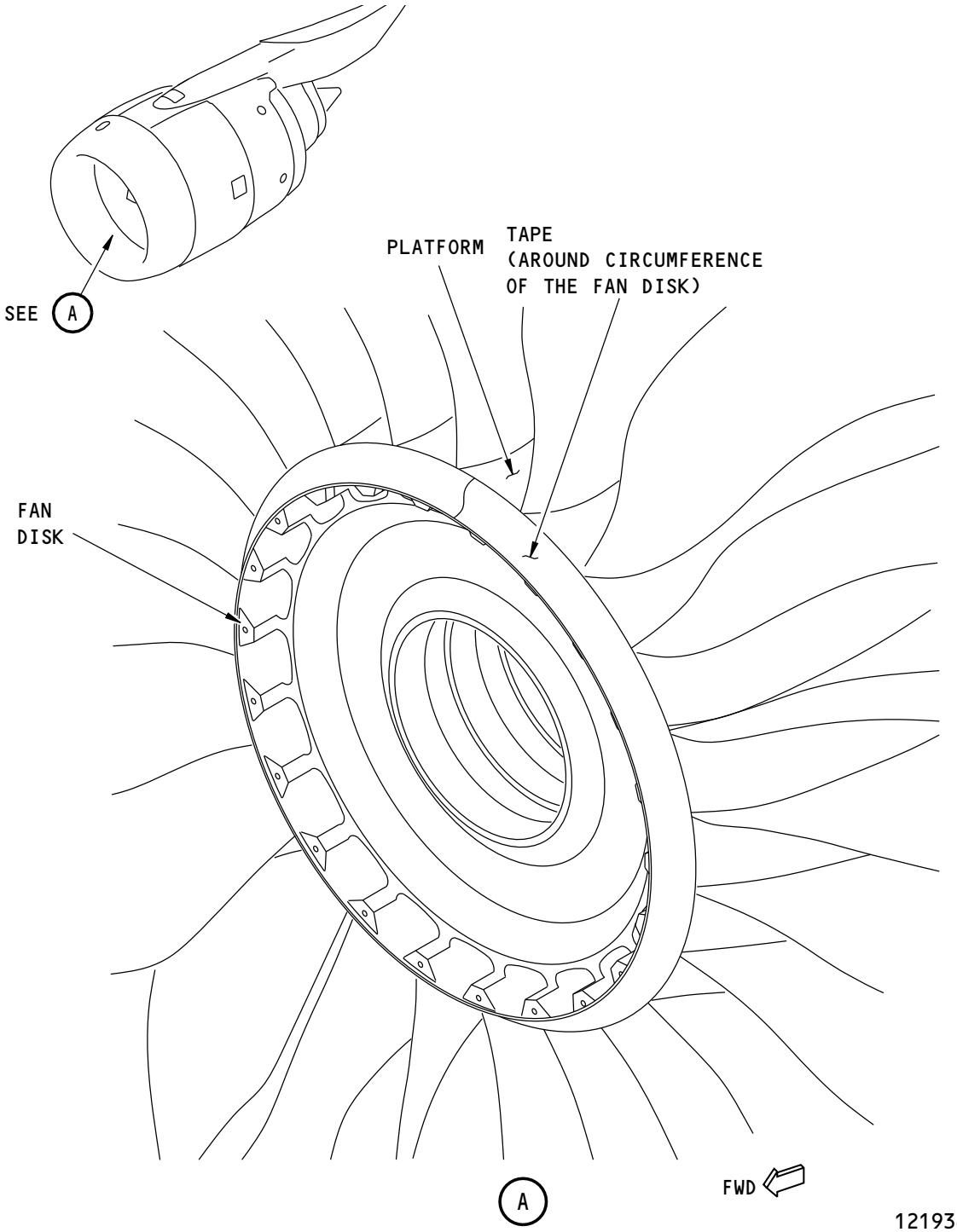
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1198665-00-A
M06814 S0004285845_V3

Fan Rotor Spinner and Support Ring Installation
Figure 401/72-21-01-990-801-H01 (Sheet 1 of 2)

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



Fan Rotor Spinner and Support Ring Installation
Figure 401/72-21-01-990-801-H01 (Sheet 2 of 2)

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

TASK 72-21-01-400-801-H01

3. Fan Rotor Spinner Installation

(Figure 401)

A. General

(1) This task is the installation procedure for the fan rotor spinner.

B. References

Reference	Title
71-00-00-700-809-H01	Test No. 10 - Low Pressure System (Fan/LPT) Vibration Survey (P/B 501)

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

D. Consumable Materials

Reference	Description	Specification
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
G02417 [C10-021]	Tape - Duct	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Spinner	72-00-51-09A-085	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

G. Prepare for the Installation

SUBTASK 72-21-01-480-002-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(1) Put the protective mat, STD-585 in the lower half of the inlet cowl to protect the inlet cowl and the engine.

H. Fan Rotor Spinner Installation

SUBTASK 72-21-01-020-003-H01

(1) Remove the protective cover from the fan disk.

SUBTASK 72-21-01-420-001-H01

(2) Do the steps that follow to install the support ring [4]:

(a) Make sure that the base of the blade platforms are seated against the fan disk parts.

(b) Remove the support ring [4] from the protective cover.

(c) Apply Acheson GP460 compound, D50043 [C02-058] to the threads of the 22 bolts [5].

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

(d) Remove the tape, G02417 [C10-021] that holds the fan platforms to the blades.

CAUTION MAKE SURE THAT THE SUPPORT RING DOES NOT DROP WHEN YOU INSTALL IT ON THE FAN DISK. DAMAGE TO THE SUPPORT RING COULD OCCUR.

(e) Install the support ring [4] as follows:

1) Align the offset bolt holes in the support ring [4] to the fan disk [3].

a) A number 1 is stamped on each side of the offset bolt hole on the rear and forward faces of the aft flange of the spinner support ring [4].

b) A number 1 is stamped on each side of the number 1 fan blade slot on the forward face of the fan disk [3].

c) Move the number 1 fan blade to the 12:00 o'clock position.

d) The fan disk [3] offset bolt hole is to the right of the number 1 fan blade as viewed from the front of the engine.

(f) Install the 22 bolts [5] and hand tighten.

(g) Tighten a minimum of 10 percent of the equally spaced circumferential bolts [5] to 154-168 pound-inches (17.4-19.0 Newton-meters).

(h) Loosen the bolts [5] that you tightened one-half turn.

(i) Tighten the 22 bolts [5] in a criss-cross pattern to 205-225 pound-inches (23.1-25.4 Newton-meters).

SUBTASK 72-21-01-420-002-H01

(3) Do these steps to install the fan rotor spinner [1]:

(a) Remove the fan rotor spinner [1] from the protective cover.

(b) Apply a light coat of Acheson GP460 compound, D50043 [C02-058] to threads of the 22 bolts [6].

(c) Remove the protective cover over the fan disk [3] opening.

WARNING BE CAREFUL WHEN YOU MOVE THE FAN ROTOR SPINNER. THE SPINNER WEIGHS APPROXIMATED 40 POUNDS (18.1 KG), INJURIES TO PERSONS CAN OCCUR. TWO PEOPLE ARE REQUIRED TO LIFT THE AFT SPINNER ASSEMBLY.

CAUTION MAKE SURE THAT THE FAN ROTOR SPINNER DOES NOT DROP WHEN YOU INSTALL IT ON THE SUPPORT RING. DAMAGE TO THE SPINNER COULD OCCUR.

(d) Install the spinner [1] on the support ring [4].

NOTE: If you are not replacing the spinner, use the temporary alignment marks applied during removal.

1) Align the offset bolt holes in the spinner [1] to the support ring [4].

a) The offset hole in the spinner [1] is located close to the trim balance weight hole marked with the number 1.

b) The number 1 is stamped next to the offset hole on the face of the forward flange of the support ring [4].

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

(e) Install the 22 bolts [6] and hand tighten.

(f) Tighten a minimum of 10 percent of the equally spaced circumferential bolts [6] to 60-75 pound-inches (6.8-8.5 Newton-meters).

(g) Loosen bolts [6] that you tightened one-half turn.

(h) Tighten the 22 bolts [6] in a criss-cross pattern to 80-100 pound-inches (9.1-11.3 Newton-meters).

(i) Do the steps that follow to install a new fan rotor spinner:

1) Install the 44 balance bolts [2] in the same locations as marked during the removal of the spinner.

NOTE: If the previous locations of the balance bolts are not known, install the baseline balance bolts in all of the balance weight holes in the spinner.

2) Tighten the balance bolts [2] to 150-170 pound-inches (16.9–19.2 Newton-meters).

I. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-01-080-001-H01



CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-21-01-865-001-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

J. Fan Rotor Spinner Installation Test

SUBTASK 72-21-01-710-001-H01

(1) If you change the balance (weight) bolt with a different (weight) bolt, do this task: Test No. 10 - Low Pressure System (Fan/LPT) Vibration Survey, TASK 71-00-00-700-809-H01.

NOTE: If you did not replace the support ring and did not change the balance bolts (weights and locations) in the spinner, you do not need to do this test.

——— END OF TASK ———

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

FAN ROTOR SPINNER - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) An inspection of the fan rotor spinner.

TASK 72-21-01-200-801-H01

2. Fan Rotor Spinner Inspection

(Figure 601)

A. General

(1) This task is the inspection procedure for the fan rotor spinner.

(2) The fan rotor spinner is inside the inlet on the fan disk.

(3) Examine the fan rotor spinner for damage.

B. 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

C. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

D. Prepare for the Inspection

SUBTASK 72-21-01-865-003-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-01-480-003-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to protect the inlet cowl and the engine.

E. Fan Rotor Spinner Inspection

SUBTASK 72-21-01-220-001-H01

(1) Visually examine the fan rotor spinner for the damage:

(a) Cracks

1) Cracks are not permitted.

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

2) If you see cracks, replace the fan rotor spinner.

(b) Nicks and scratches

1) Nicks and scratches are permitted if they are not more than 0.03 inch (0.76 mm) in depth.

(c) Dents

1) Dents are permitted if they are not more than 0.125 inch (3.180 mm) in depth.

(d) Damaged surface protection

1) All amounts are permitted.

NOTE: If the surface coating is needed, consult with the local GE Representative about the GE Repair Document No. RD 830-622. This repair document puts a paint coating and a painted swirl on the forward spinner. This procedure is also in ESM 72-21-13, REPAIR 001.

(e) Surface protection that is missing

1) All amounts are permitted.

NOTE: If the surface coating is needed, consult with the local GE Representative about the GE Repair Document No. RD 830-622. This repair document puts a paint coating and a painted swirl on the forward spinner. This procedure is also in ESM 72-21-13, REPAIR 001.

F. Put the Airplane Back to Its Usual condition

SUBTASK 72-21-01-865-004-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-01-080-002-H01

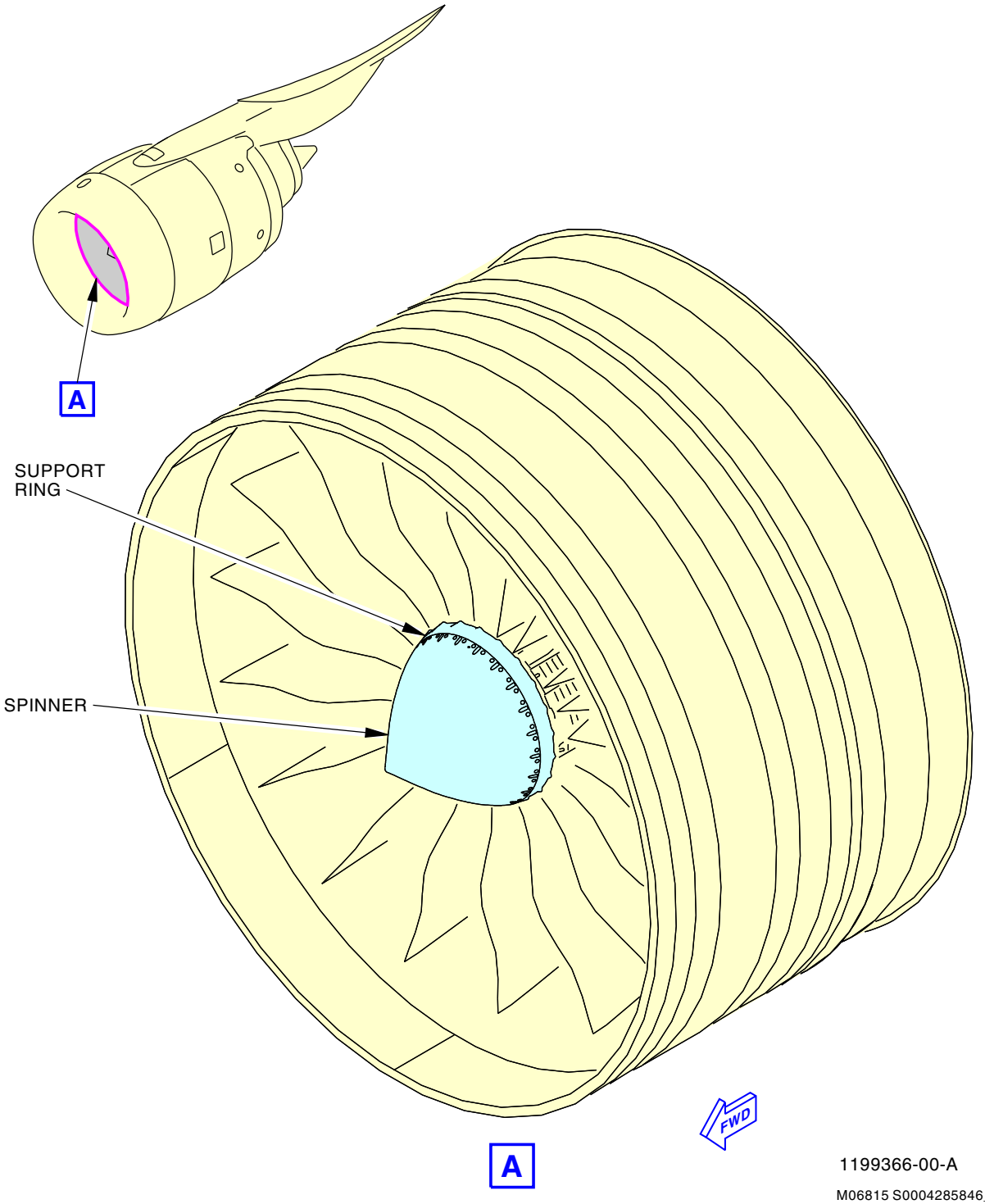
CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS OR OTHER UNWANTED MATERIAL IN THE INLET AREA. DAMAGE TO EQUIPMENT COULD OCCUR.

(2) Remove the protective mat, STD-585 from the engine inlet cowl.

——— END OF TASK ———

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



Fan Rotor Spinner Inspection
Figure 601/72-21-01-990-802-H01

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

FAN BLADE - REMOVAL/INSTALLATION

1. General

A. This procedure contains six tasks:

(1) A removal of fan blades (Selection)

(2) An installation of the fan blades (Selection).

(3) A removal of a set of fan blades

(4) An installation of a set of fan blades

(5) A removal of one fan blade

(6) An installation of one fan blade

B. You can use this procedure for the removal and installation of one fan blade, or a complete set of fan blades.

TASK 72-21-02-020-801-H01

2. Fan Blades Removal (Selection)

A. General

(1) The purpose of this task is to permit mechanics to select the applicable method to remove the fan blade.

B. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

C. Procedure

SUBTASK 72-21-02-020-002-H01

(1) Do one of these tasks to remove the fan blade(s):

(a) Do this task: One Fan Blade Removal, TASK 72-21-02-020-803-H01..

(b) Do this task: Fan Blade Set Removal, TASK 72-21-02-020-802-H01.

END OF TASK

TASK 72-21-02-400-801-H01

3. Fan Blades Installation (Selection)

A. General

(1) The purpose of this task is to permit mechanics to select the applicable method to install the fan blade(s).

B. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

C. Procedure

SUBTASK 72-21-02-420-002-H01

(1) Do one of these tasks to install the fan blade(s):

(a) Do this task: One Fan Blade Installation, TASK 72-21-02-400-803-H01..

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

(b) Do this task: Fan Blade Set Installation, TASK 72-21-02-400-802-H01.

——— END OF TASK ———

TASK 72-21-02-020-802-H01

4. Fan Blade Set Removal

A. General

(1) This task is the removal procedure for a set of fan blades and a set of fan blade platforms.

(2) Access to the fan blades and fan blade platforms is through the inlet cowl. You will not have to remove access panels to do this task.

(3) You will need the fan blade spacer removal tool.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-03-000-801-H01	Fan Blade Platform 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-939	Tool - Removal, Spacer Fan Blade, Hydraulically Powered Part #: 9C3001G01 Supplier: 06083 Opt Part #: 9C1278P02 Supplier: 06083
SPL-941	Tool - Removal, Spacer Fan Blade, Slide Hammer Part #: 9C1202G02 Supplier: 06083
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
G02061	Marker - Permanent, Felt Tip Pen	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the Removal

SUBTASK 72-21-02-860-020-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-21-02-480-002-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-02-020-003-H01

(3) Remove the fan rotor spinner assembly. To remove the spinner, do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

G. Fan Blade Set Removal

SUBTASK 72-21-02-020-008-H01

WARNING

DO THE FAN BLADE SET REMOVAL IN THIS SEQUENCE: MOVE THE NUMBER 1 FAN BLADE TO THE 6 O'CLOCK POSITION. REMOVE THE NUMBER 1 FAN BLADE. TURN THE FAN DISK 180 DEGREES AND REMOVE THE NUMBER 2 FAN BLADE. DO THIS FOR EACH PAIR OF FAN BLADES. IF YOU DO NOT OBEY THIS INSTRUCTION, THE FAN CAN TURN SUDDENLY. THIS CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Remove the fan blade [1] set (Figure 401, Figure 402, Figure 403,and Figure 404).

(a) If you remove the fan blade set and reuse the same fan blade set, make sure you mark all fan blades [1], fan blade platforms [2], fan blade spacers [4], dovetail keys [6] and fan blade retainers [5] with a marker, G02061 for their positions for installation later.

NOTE: A visual inspection of the fan blades during their removal can prevent delays during their installation.

(b) Turn the fan assembly counterclockwise to put the fan blade [1] to be removed in the 6:00 o'clock position.

(c) Remove the fan blade platforms [2] adjacent to the fan blade [1] to be removed (TASK 72-21-03-000-801-H01).

NOTE: Lower the fan blade platform's leading edge until the aft end disengages and then remove the fan blade platforms.

NOTE: Make sure the fan blade platforms have protection from accidental damage.

(d) Remove the bolt [3] that holds the fan blade retainer [5] and the fan blade spacer [4] together.

(e) The slide hammer removal tool, SPL-941 is the primary fan blade spacer [4] removal tool.

1) If you use the slide hammer removal tool, SPL-941, put the detail pin into the fan blade spacer [4] bolt hole.

2) Move the slide hammer part of the slide hammer removal tool, SPL-941 forward and aft to remove the fan blade spacer [4] from the fan disk blade slot.

3) Remove the fan blade spacer [4] from the slide hammer removal tool, SPL-941.

(f) If you use the alternate hydraulic removal tool, SPL-939 to remove the fan blade spacer [4].

1) Retract the hydraulic cylinder of the hydraulic removal tool, SPL-939

2) Attach the pump to the hydraulic removal tool, SPL-939.

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

3) Insert the detail pin of hydraulic removal tool, SPL-939 into the fan blade spacer [4] bolt hole.

4) Hold the hydraulic removal tool, SPL-939 in its position, and operate the pump until the fan blade spacer [4] is pulled from the fan disk blade slot.

(g) Remove the dovetail key [6] from the fan disk blade slot.

(h) Remove the fan blade retainer [5] from the fan disk slot.

(i) Remove the fan blade [1] from the fan disk blade slot.

(j) Set the fan blade [1] on the protective mat.

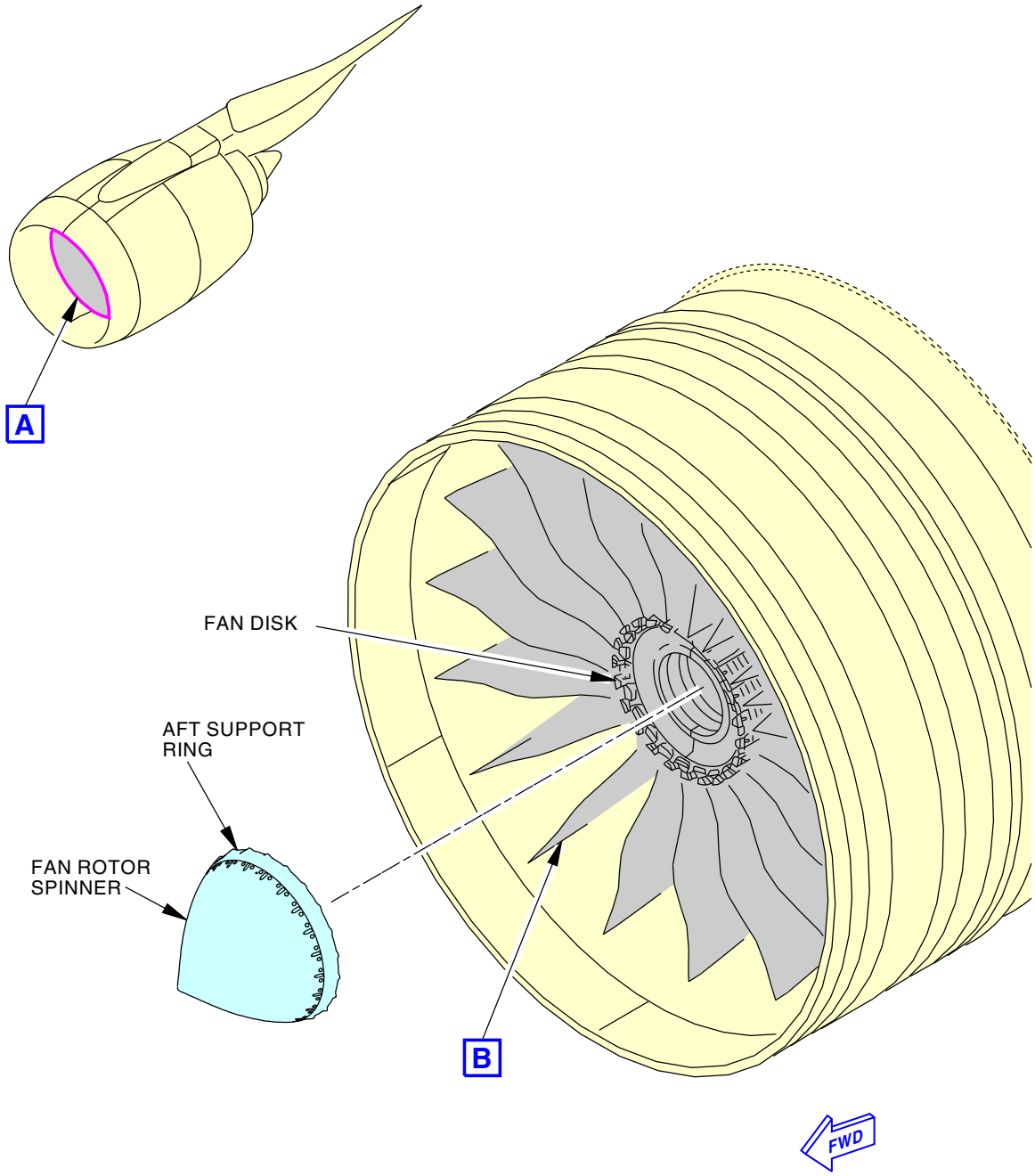
(k) Lift the fan blade [1] from the protective mat and remove it from the engine inlet cowl.

1) Make sure the fan blade [1] has protection from accidental damage.

2) Do not remove the fan blade shims from the fan disk posts when the fan blades [1] are removed.

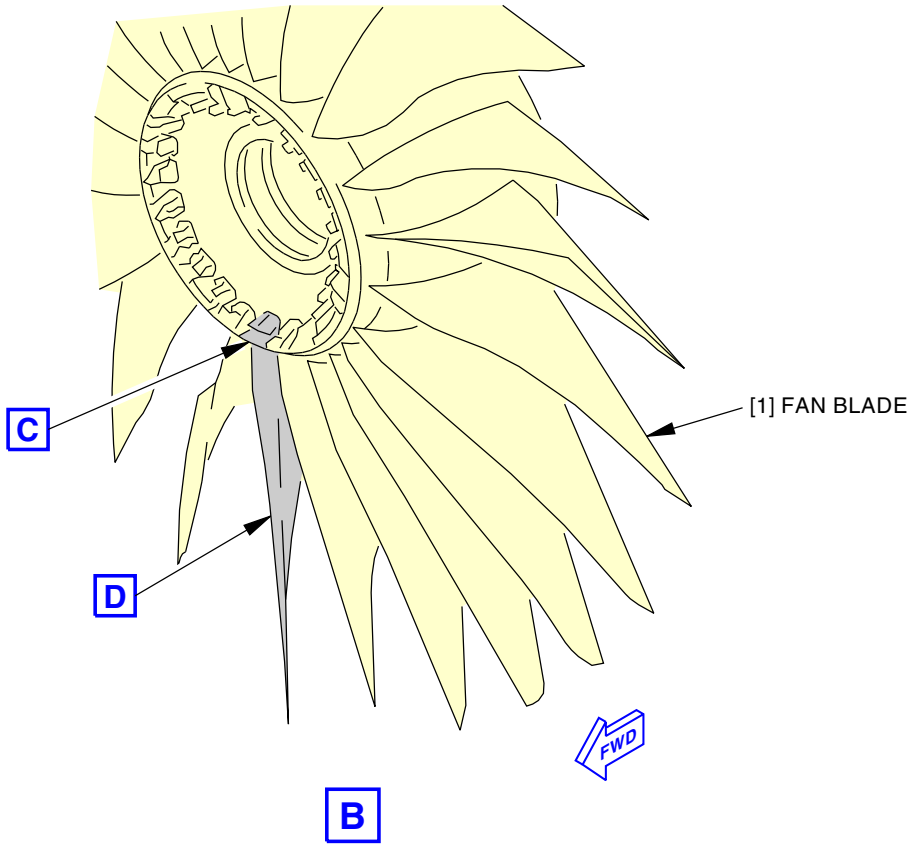
——— END OF TASK ———

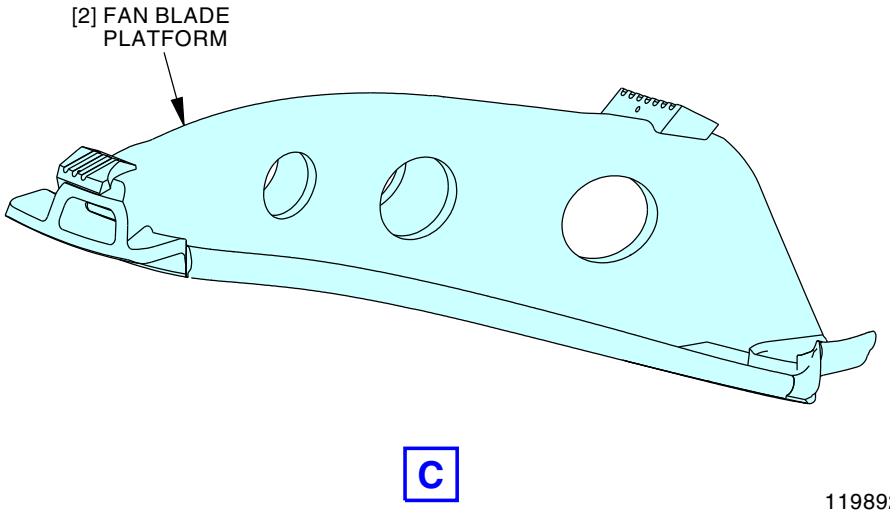
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Fan Blade Installation
Figure 401/72-21-02-990-826-H01 (Sheet 1 of 3)

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



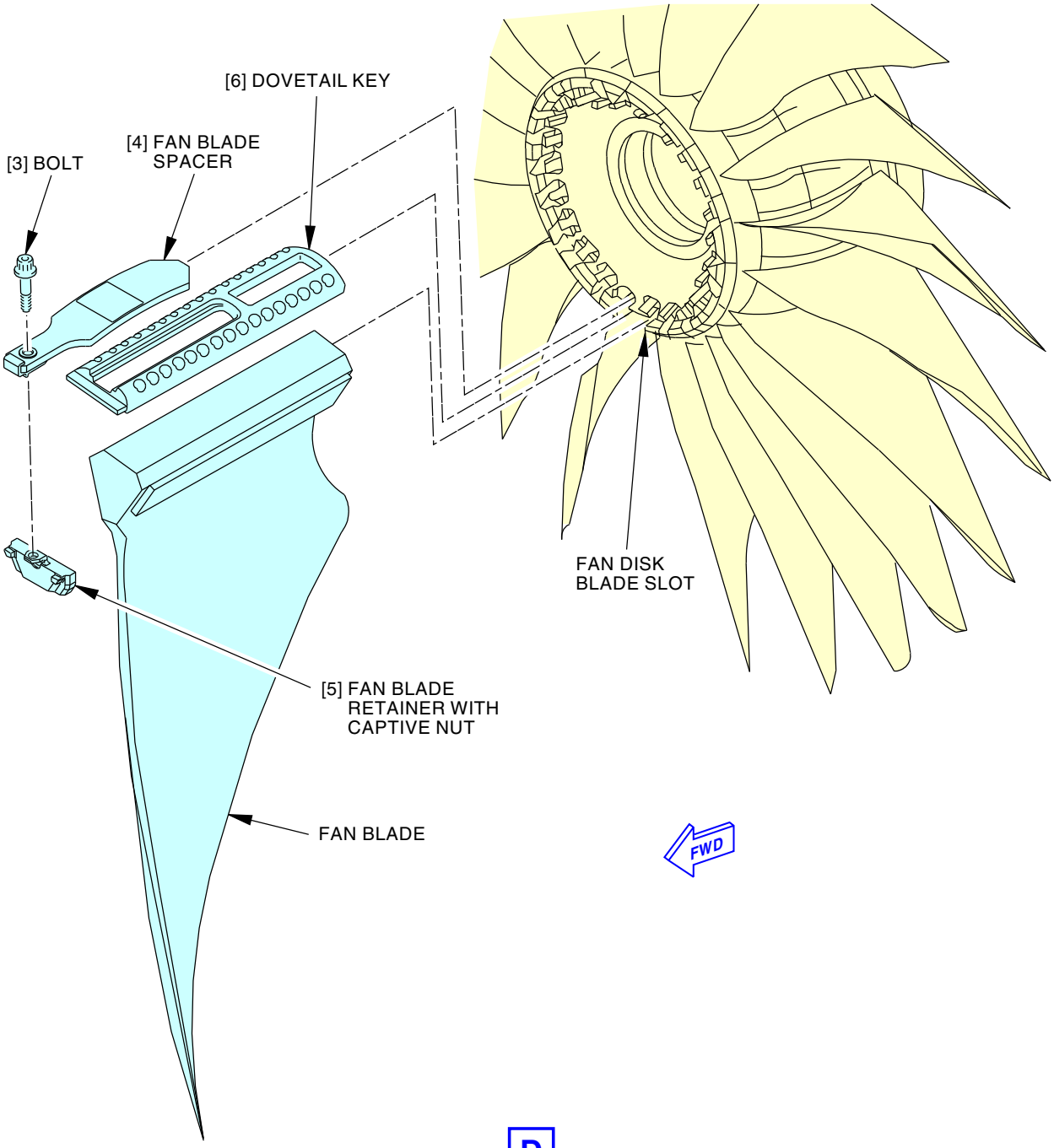


1198929-00-A

M06817 S0004285848_V2

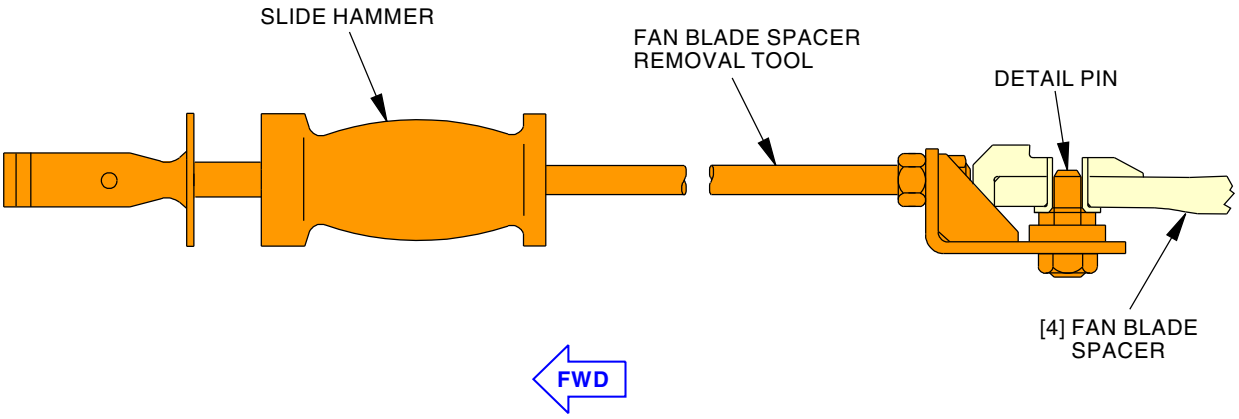
Fan Blade Installation
Figure 401/72-21-02-990-826-H01 (Sheet 2 of 3)

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



Fan Blade Installation
Figure 401/72-21-02-990-826-H01 (Sheet 3 of 3)

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



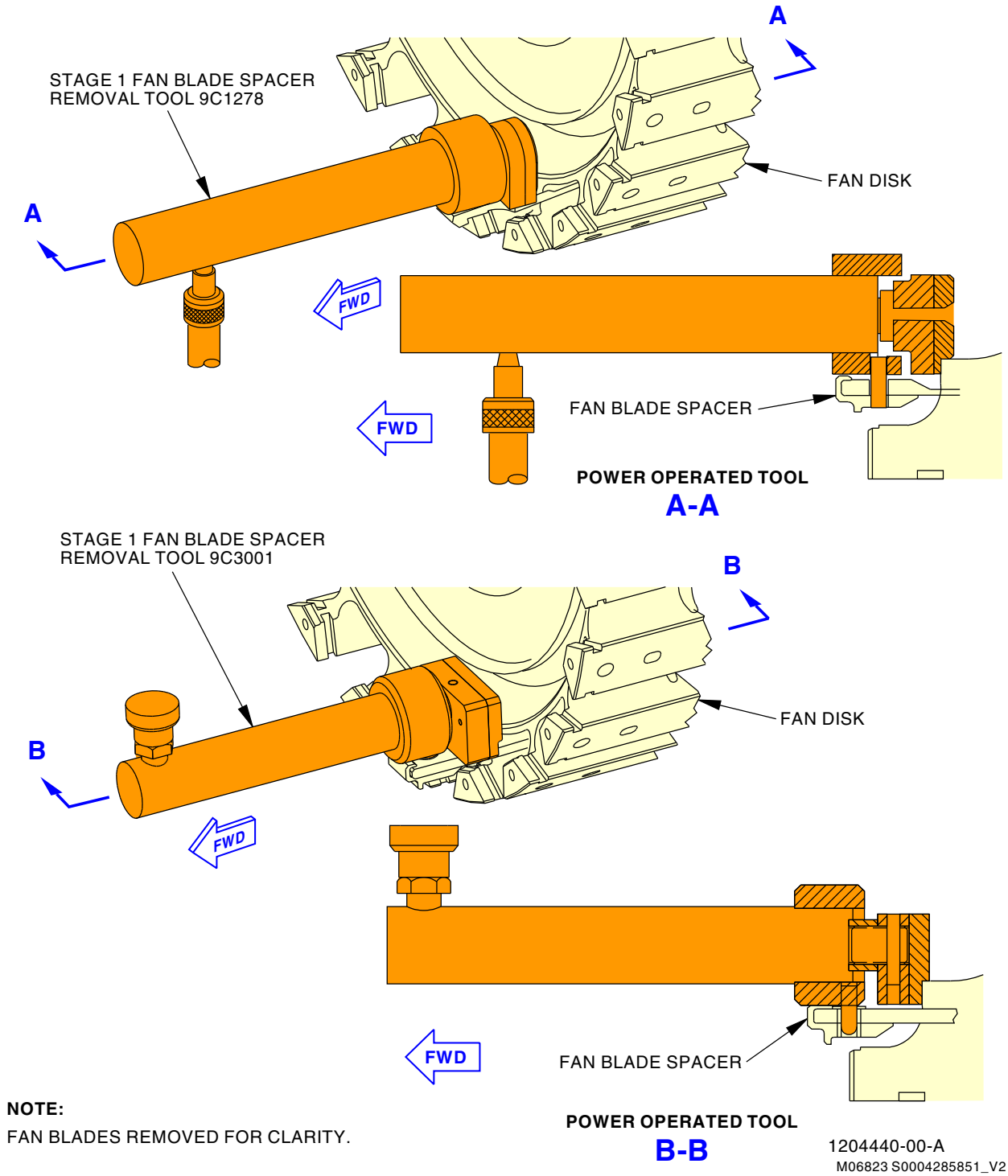
MANUALLY OPERATED TOOL

1130921-00-C

M06821 S0004285850_V2

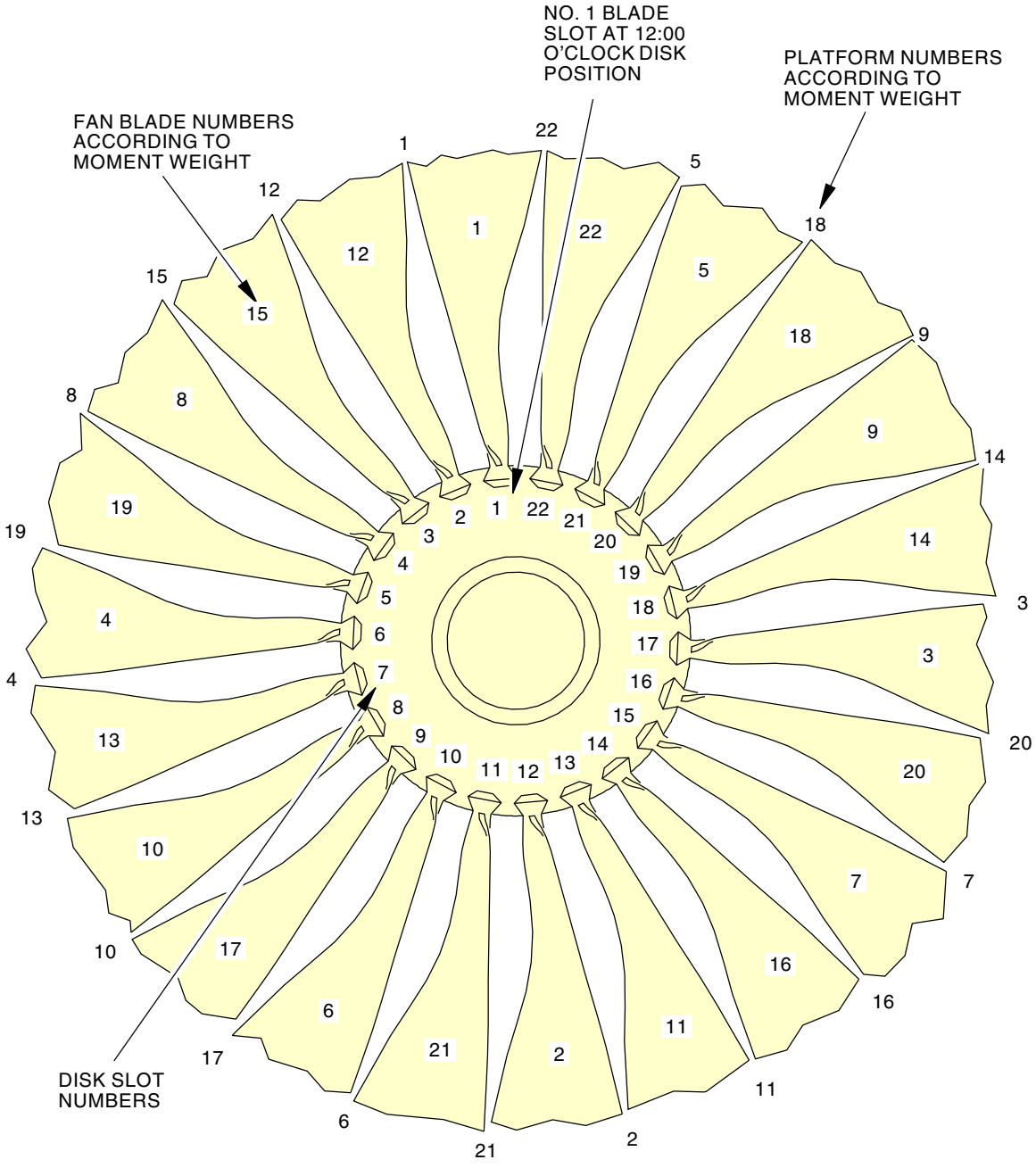
Fan Blade Spacer Removal Tool
Figure 402/72-21-02-990-827-H01 (Sheet 1 of 2)

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



Fan Blade Spacer Removal Tool
Figure 402/72-21-02-990-827-H01 (Sheet 2 of 2)

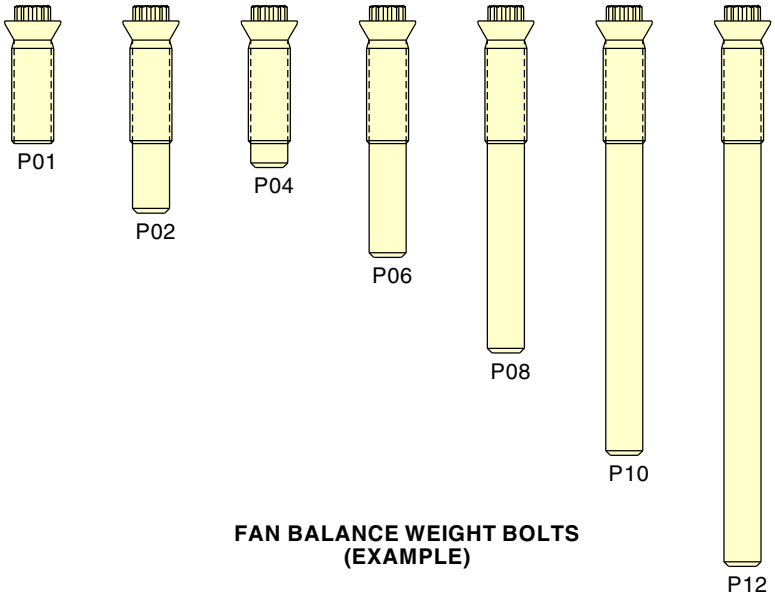
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



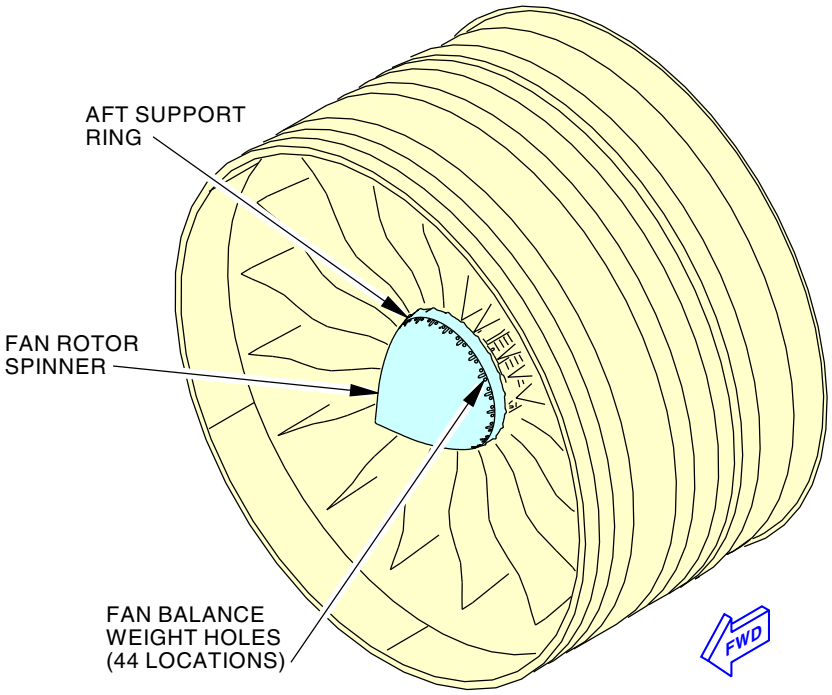
M06825 S0004285853_V3

Fan Blade Disk Slot and Platform Installation
Figure 403/72-21-02-990-828-H01

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



FAN BALANCE WEIGHT BOLTS (EXAMPLE)



NOTE:

FAN BALANCE WEIGHT HOLES ARE NUMBERED ON EVERY FOUR HOLES COUNTER CLOCKWISE WHICH START AT HOLE 1 MARK (DIMPLE MARK) ON THE AFT SPINNER.

1198925-00-A

M06826 S0004285854_V2

Fan Blade Balance Bolt Installation
Figure 404/72-21-02-990-829-H01

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

TASK 72-21-02-400-802-H01

5. Fan Blade Set Installation

A. General

(1) This task is the installation procedure for a set of fan blades and a set of fan blade platforms.

(2) After you install the fan blade set and the fan blade platform set, you must do the tests listed in the power plant test references table.

B. References

Reference	Title
71-00-00-700-811-H01	Test No. 12A - Low Pressure System (Fan/LPT) Trim Balance (For SCU P/N S332W401-200) (P/B 501)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-200-802-H01	Fan Blade Tip Clearance Inspection (P/B 601)
72-21-03-400-801-H01	Fan Blade Platform 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-696	Program - Fan Mapping Balance Part #: 9446M61G07 Supplier: 06083 Opt Part #: 9446M61G02 Supplier: 06083 Opt Part #: 9446M61G04 Supplier: 06083 Opt Part #: 9446M61G05 Supplier: 06083 Opt Part #: 9446M61G06 Supplier: 06083 Opt Part #: 9470M55G04 Supplier: 06083
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
B00130	Alcohol - Isopropyl	TT-I-735
D00630 [C10-013]	Lubricant - PTFE Release Agent - Miller-Stephenson MS-122XD (Replaces MS-122DF and MS-122V Lubricants)	
D50038 [C10-215]	Lubricant - Release Agent - MS-143XD-10	
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
D50347 [C10-013]	Lubricant - PTFE Release Agent - Miller-Stephenson MS-122AD (Replaces MS-122DF and MS-122V Lubricants)	C10-013
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02061	Marker - Permanent, Felt Tip Pen	
G02417 [C10-021]	Tape - Duct	

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

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Fan blade	72-00-51-09A-155	ARO ALL
		72-00-51-09A-157	ARO ALL
2	Fan blade platform	72-00-51-09A-117	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

G. Fan Blade Set Installation

SUBTASK 72-21-02-420-006-H01

(1) If a new fan blade set is installed, use these instructions to plot the installation location of the fan blades by moment-weight (Figure 403).

(a) Put the fan blades [1] in sequence, by their individual moment-weight, from the heaviest to the lightest blade.

NOTE: The moment-weight of the blade is found on the bottom of the dovetail.

(b) Number the fan blades [1] in ascending order (1 to 22) from the heaviest to the lightest.

1) Put a piece of tape, G02417 [C10-021] (yellow tape recommended) on each fan blade [1].

2) Use a marker, G02061 to mark on the tape, G02417 [C10-021] you put on the fan blade [1].

3) Put a number 1 on the heaviest fan blade [1] and continue the number sequence until the lightest blade is identified with a number 22.

(c) If the fan mapping balance program, SPL-696 is used, use the fan mapping balance program, SPL-696 to find the installation position of the fan blades as follows:

1) Make a record of the moment weight of each fan blade [1] for use with the fan mapping balance program, SPL-696.

2) Run the fan mapping balance program, SPL-696 for the correct blade installation positions.

3) Put a piece of tape, G02417 [C10-021] (yellow tape recommended) on each fan blade [1].

4) Use a marker, G02061 to mark the tape, G02417 [C10-021] on each fan blade [1] with the correct position number.

NOTE: This number is the fan disk slot number the blade should be installed in.

SUBTASK 72-21-02-420-007-H01

(2) If new fan blade platforms are installed, use these instructions to plot the installation location of the fan blade platforms [2] by moment-weight.

(a) Put the fan blade platforms [2] in sequence, by their individual moment-weight, from the heaviest to the lightest platform.

NOTE: The moment-weight of the fan blade platform is found on the aft concave sidewall.

(b) Number the fan blade platform [2] in ascending sequence from the heaviest to the lightest.

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

1) Use a marker, G02061 to mark on the tape, G02417 [C10-021] you put on the fan blade platform [2].

2) Put a number 1 on the heaviest fan blade platform [2] and continue the number sequence until the lightest fan blade platform [2] is identified with a number 22.

(c) If the fan mapping balance program, SPL-696 is used, use the fan mapping balance program, SPL-696 to find the installation position of the fan blade platforms as follows:

1) Make a record of the moment weight of each fan blade platform [2] for use with the fan mapping balance program, SPL-696.

2) Run the fan mapping balance program, SPL-696 for the correct platform installation positions.

3) Put a piece of tape, G02417 [C10-021] (yellow tape recommended) on each fan blade platform [2].

4) Use a marker, G02061 to mark the tape, G02417 [C10-021] on each fan blade platform [2] with the correct position number.

SUBTASK 72-21-02-420-008-H01

(3) If a new fan blade set or the same fan blade set is installed, use these instructions to put fan blades [1] in their correct location on the fan disk (Figure 403).

(a) The fan disk slot locations for the fan blades are given in a counterclockwise direction as viewed from the front of the engine inlet.

(b) A number 1 is stamped on each side of the number 1 fan disk slot on the forward face of the fan disk.

1) This is to identify the number 1 of the fan blade [1] installation location.

(c) A number 5 is stamped on the forward face of the fan disk at the number 5 fan disk slot location.

1) This gives you the counterclockwise reference direction for fan blade platforms [2] installation.

2) Start at the number 1 fan blade slot and count in a counterclockwise direction to find number 5 fan disk slot.

SUBTASK 72-21-02-420-009-H01

(4) Install the fan blades [1] set (Figure 401)and (Figure 403).

WARNING DO NOT GET ISOPROPYL ALCOHOL (IPA) IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IPA. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IPA. KEEP IPA AWAY FROM SPARKS, FLAME, AND HEAT. IPA IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Wipe the sides of all the fan blade shims, which interface with the fan blade dovetail, with a cotton wiper, G00034 moist with alcohol, B00130 to remove all previously applied lubricant.

NOTE: The fan blade shims are installed on the fan disk posts. The shims were not removed from the fan disk posts after the removal of the fan blades.

1) Permit the solvent to air dry.

(b) Make sure the fan blade shims are seated fully aft before the fan blades [1] are installed.

(c) Wipe the fan blade dovetail surfaces with a cotton wiper, G00034 moist with alcohol, B00130 to remove all previously applied release agent.

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

1) Permit the solvent to air dry.

CAUTION THE LUBRICANT IS FLAMMABLE. DO NOT STORE NEAR A HEAT SOURCE, IN DIRECT SUNLIGHT, OR WHERE THE TEMPERATURE WILL BE MORE THAN 120 DEGREES F (49 DEGREES C). DO NOT DAMAGE OR PUNCTURE THE CONTAINER.

(d) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to the large, flat surfaces of the fan blade dovetails.

NOTE: The shelf life of the lubricant is one year from the date of the shipment.

1) Spray the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] on the fan blade dovetail surfaces.
2) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] four times, approximately one time per second.

NOTE: Overspray is permitted.

3) Permit the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to air dry for 20 minutes.
4) Make sure that there is full coverage of the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013].

NOTE: A white powder residue will develop when the lubricant is dry.

(e) Alternate Procedure: Apply the MS-143XD-10 lubricant, D50038 [C10-215] to the entire fabric coating dovetail surface areas.

NOTE: Make sure lubricant is thoroughly mixed before and during application.

1) Spray the MS-143XD-10 lubricant, D50038 [C10-215] on the entire fabric coating dovetail surface.
2) Apply four coats of MS-143XD-10 lubricant, D50038 [C10-215] to each fabric strip.
3) Permit lubricant to air dry 20 minutes.
4) Make sure there is full coverage of the MS-143XD-10 lubricant, D50038 [C10-215].

NOTE: A white powder residue will develop when the release agent is dry.

(f) Put the fan blade [1] on the protective mats in the inlet cowl.

(g) Turn the fan assembly counterclockwise to put the fan disk blade slot for the fan blade [1] to be installed in the 6:00 o'clock position.

CAUTION BEFORE YOU GO TO THE NEXT FAN BLADE SLOT, INSTALL THE RETAINER, DOVETAIL KEY, AND SPACER. WITHOUT THEM, THE FAN BLADE CAN FALL INTO THE SLOT. DAMAGE TO THE FAN BLADE WILL OCCUR.

(h) Install the fan blades [1], the fan blade retainers [5], the dovetail keys [6], and the fan blade spacer [4] one slot position at a time. See (Table 401) below:

NOTE: The fan blade identified with a number 1 must be the heaviest blade

NOTE: The fan blade identified with a number 22 should be the lightest blade.

NOTE: The fan blade identified with a number 21 should be the second lightest blade.

1) Do not make contact with the coated dovetail surface when you install the fan blades [1].

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

Table 401/72-21-02-993-811-H01 Fan Blade Positioning

FAN BLADE NUMBER ARRANGED BY MOMENT-WEIGHT	FAN DISK SLOT NUMBER
1*[1]	1*[2]
2	12
3	17
4	6
5	21
6	10
7	15
8	4
9	19
10	8
11	13
12	2
13	7
14	18
15	3
16	14
17	9
18	20
19	5*[3]
20	16
21	11
22*[4]	22

*[1] The fan blade identified with number 1 should be the heaviest fan blade.

*[2] The number 1 position is identified on the fan disk.

*[3] The number 5 position is identified on the fan disk.

*[4] The fan blade identified with number 22 should be the lightest fan blade.

(i) Install the fan blades [1] into the slot.

(j) Install the fan blade retainer [5] into the fan disk blade slots.

(k) With the horizontal bar part of the dovetail key [6] toward you, install the dovetail key [6] into the fan disk blade slots.

(l) Wipe the two sides of the fan blade spacer [4] with a cotton wiper, G00034 moist with a alcohol, B00130 to remove all previously applied lubricant.

1) Permit the solvent to air dry.

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

CAUTION

THE RELEASE AGENT IS FLAMMABLE. DO NOT STORE NEAR A HEAT SOURCE, IN DIRECT SUNLIGHT, OR WHERE THE TEMPERATURE WILL BE MORE THAN 120 DEGREES F (49 DEGREES C). DO NOT DAMAGE OR PUNCTURE THE CONTAINER.

(m) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to the large, flat surfaces of the fan blade spacers [4] as follows:

NOTE: The shelf life of the lubricant is one year from the date of the shipment.

1) Spray the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] on the fan blade spacers [4].

NOTE: Do not apply the lubricant to the end block which houses the threaded bushing.

NOTE: Overspray is permitted.

2) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] four times, approximately two times per second.

3) Permit the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to air dry for 20 minutes.

4) Make sure that there is full coverage of the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013].

NOTE: A white powder residue will develop when the lubricant is dry.

(n) Alternate Procedure: Apply MS-143XD-10 lubricant, D50038 [C10-215] to both sides of the fan blade spacer [4].

NOTE: Make sure lubricant is thoroughly mixed before and during application.

1) Spray the MS-143XD-10 lubricant, D50038 [C10-215] to both sides of the fan blade spacer [4].

NOTE: Do not apply to the end block which houses the threaded bushing.

2) Permit the lubricant to air dry 20 minutes.

3) Make sure there is full coverage of the MS-143XD-10 lubricant, D50038 [C10-215].

NOTE: A white powder residue will develop when the MS-143XD-10 lubricant, D50038 [C10-215] is dry.

(o) Insert the fan blade spacer [4] between the fan rotor disk and the dovetail key [6] as follows:

1) Put the fan blade spacer [4] in the dovetail key [6] spacer guide.

CAUTION

MAKE SURE THAT YOU ALIGN THE FAN BLADE SPACER CORRECTLY IN THE DOVETAIL KEY. MAKE SURE THAT YOU SQUARELY HIT THE FORWARD FACE OF THE FAN BLADE SPACER WITH THE PLASTIC MALLET. IF THE FACE OF THE PLASTIC MALLET IS NOT FLAT TO THE FORWARD FACE, DAMAGE TO THE FAN BLADE SPACER CAN OCCUR.

2) Hit the fan blade spacer [4] with a plastic mallet until fully installed.

NOTE: Make sure there is space between the dovetail key [6] and the fan blade spacer [4]. The dovetail key [6] should be loose.

(p) Put Acheson GP460 compound, D50043 [C02-058] on the threads of the bolt [3].

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

(q) Install the bolt [3] that holds the fan blade retainer [5] and the fan blade spacer [4] together.

(r) Tighten the bolt [3] to 100-120 pound-inches (11.0-14.0 Newton-meters).

(s) Apply a spreading pressure to the fan blades [1] with your hands to make sure that the fan blade platforms [2] do not scratch the convex (suction) side of the fan blades [1].

(t) Install the fan blade platforms [2] adjacent to the fan blades [1] (TASK 72-21-03-400-801-H01):

1) See the (Table 402) below to find the platform locations.

Table 402/72-21-02-993-807-H01 Fan Blade Platform Positioning

FAN BLADE PLATFORM NUMBER ARRANGED BY MOMENT-WEIGHT	BETWEEN FAN BLADE LOCATION NUMBERS
1	1-12
2	2-11
3	3-14
4	4-13
5	5-22
6	6-21
7	7-20
8	8-19
9	9-18
10	10-17
11	11-16
12	12-15
13	13-10
14	14-9
15	15-8
16	16-7
17	17-6
18	18-5
19	19-4
20	20-3
21	21-2
22	22-1

(u) Hold the fan blade platform to one of the adjacent fan blades with tape, G02417 [C10-021].

NOTE: Put the tape in a position that will not be in the way when the support ring and/or spinner is installed.

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

(v) Remove the tape, G02417 [C10-021] used for identification from the fan blades.

NOTE: Do not confuse the tape used to identify the fan blades with the tape that holds the fan blade platforms to the fan blades. The tape that holds the fan blade platforms to the fan blades will be removed when the support ring and spinner are installed. Do not remove the tape at this time.

SUBTASK 72-21-02-210-001-H01

(5) Do a check of the part numbers for the fan balance weight bolts currently installed in the aft spinner (Figure 404).

NOTE: If the fan blades and fan blade platforms had their unbalance calculated, it is optional to install fan balance weight bolts that is the same as the unbalance fan mapping balance program, SPL-696 gives you.

(a) If a new fan blade set is installed or a new mapping was calculated, replace any fan balance weight bolts that are not a 2013M80P01.

1) Put Acheson GP460 compound, D50043 [C02-058] on the threads of the replacement fan balance weight bolt(s).

2) Tighten the replacement bolts(s) to 150-170 pound-inches (16.9–19.2 Newton-meters).

3) Access the Maintenance Access Terminal and record the fan balance weight bolt(s) configuration in the On Board Engine Balance System (OEBS) (TASK 71-00-00-700-811-H01)

(b) If the same fan blade set is installed on the same position, use the same fan balance weight bolts.

1) Put Acheson GP460 compound, D50043 [C02-058] on the threads of the fan balance weight bolts.

2) Tighten the fan balance weight bolts to 150-170 pound-inches (16.9–19.2 Newton-meters).

SUBTASK 72-21-02-420-010-H01

(6) Do this task:Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

SUBTASK 72-21-02-200-001-H01

(7) Do this task: Fan Blade Tip Clearance Inspection, TASK 72-21-02-200-802-H01.

NOTE: This inspection is necessary only if more than three replacement blades are installed. This inspection is not necessary when the same blade(s) is(are) installed, as removed.

NOTE: This inspection and rework (if necessary) of the fan case abradable to get the correct tip clearance can be done during different maintenance events but both (if necessary) must be accomplished within 125 cycles of the blade installation. It is recommended to do the inspection much before the 125 cycle limit in order to have time to plan for the rework (if necessary) of the fan case abradable.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-02-080-003-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

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

SUBTASK 72-21-02-860-021-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

I. Fan Blade Installation Test

SUBTASK 72-21-02-710-006-H01

(1) Do the tests listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

——— END OF TASK ———

TASK 72-21-02-020-803-H01

6. One Fan Blade Removal

A. General

(1) This task is the removal procedure for one fan blade.

(2) Access to the fan blades is through the inlet cowl. You will not have to remove access panels to do this task.

(3) The fan blade spacer removal tool is necessary for this task.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-03-000-801-H01	Fan Blade Platform 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-939	Tool - Removal, Spacer Fan Blade, Hydraulically Powered Part #: 9C3001G01 Supplier: 06083 Opt Part #: 9C1278P02 Supplier: 06083
SPL-941	Tool - Removal, Spacer Fan Blade, Slide Hammer Part #: 9C1202G02 Supplier: 06083
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
G02061	Marker - Permanent, Felt Tip Pen	

E. Location Zones

Zone	Area
411	Engine, Left

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

(Continued)

Zone	Area
421	Engine, Right

F. Prepare for the Removal

SUBTASK 72-21-02-860-022-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-02-480-003-H01

CAUTION PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-02-020-004-H01

(3) Do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

G. One Fan Blade Removal

SUBTASK 72-21-02-020-005-H01

(1) Remove the fan blade [1] (Figure 405, Figure 406 and Figure 407:

(a) Mark the fan blade [1] and adjacent fan blade platforms [2] to be removed with a marker, G02061.

(b) Turn the fan assembly counterclockwise to put the fan blade [1] and fan blade platforms [2] to be removed in the 6 o'clock position.

(c) Remove the fan blade platforms [2] adjacent to the fan blade [1] to be removed (TASK 72-21-03-000-801-H01).

NOTE: Lower the fan blade platform leading edge until the aft end disengages and then remove the fan blade platform.

NOTE: Make sure the fan blade platforms have protection from accidental damage.

(d) Remove the bolt [3] that holds the fan blade retainer [5] and the fan blade spacer [4] together.

(e) The slide hammer removal tool, SPL-941 is the primary fan blade spacer [4] removal tool.

1) If you use the slide hammer removal tool, SPL-941 put the detail pin of the tool into the fan blade spacer [4] bolt hole.

2) Move the slide hammer part of the slide hammer removal tool, SPL-941 forward and aft to remove the fan blade spacer [4] from the fan disk blade slot.

3) Remove the fan blade spacer [4] from the slide hammer removal tool, SPL-941.

(f) If you use the alternate hydraulic removal tool, SPL-939 to remove the fan blade spacer [4], do these steps:

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

1) Retract the hydraulic cylinder of the hydraulic removal tool, SPL-939.
2) Attach the pump to the hydraulic removal tool, SPL-939.
3) Insert the detail pin of hydraulic removal tool, SPL-939 into the fan blade spacer [4] bolt hole.
4) Hold the hydraulic removal tool, SPL-939 in its position, and operate the pump until the fan blade spacer [4] is pulled from the fan disk blade slot.

(g) Remove the dovetail key [6] from the fan disk blade slot.

(h) Remove the fan blade retainer [5] from the fan disk slot.

(i) Remove the fan blade [1] from the fan disk blade slot.

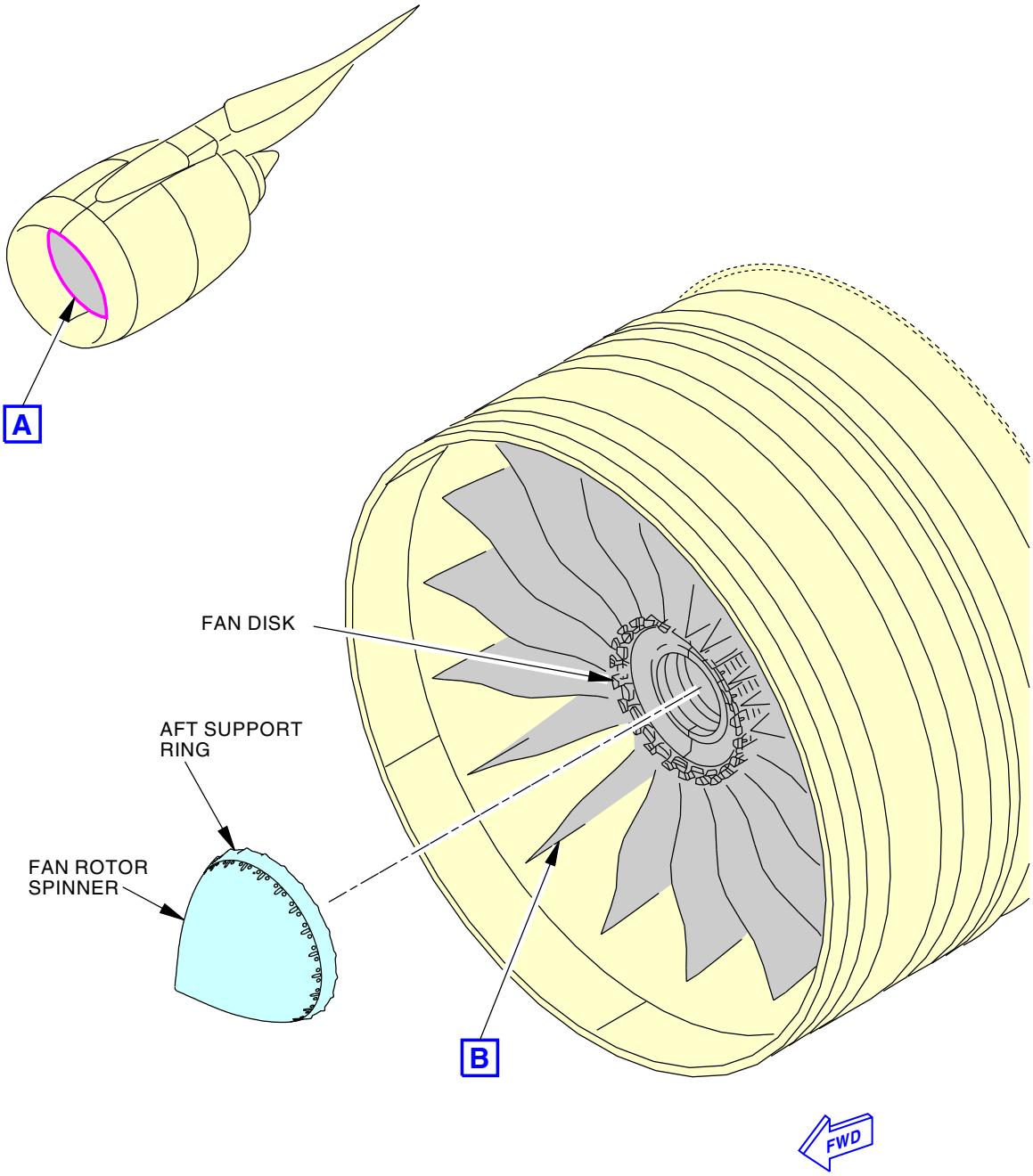
(j) Set the fan blade on the protective mat.

(k) Lift the fan blade [1] from the protective mat and remove it from the engine inlet cowl.
1) Make sure the fan blade [1] has protection from accidental damage.

(l) Do not remove the fan blade shims from the fan disk posts when the fan blade [1] is removed.

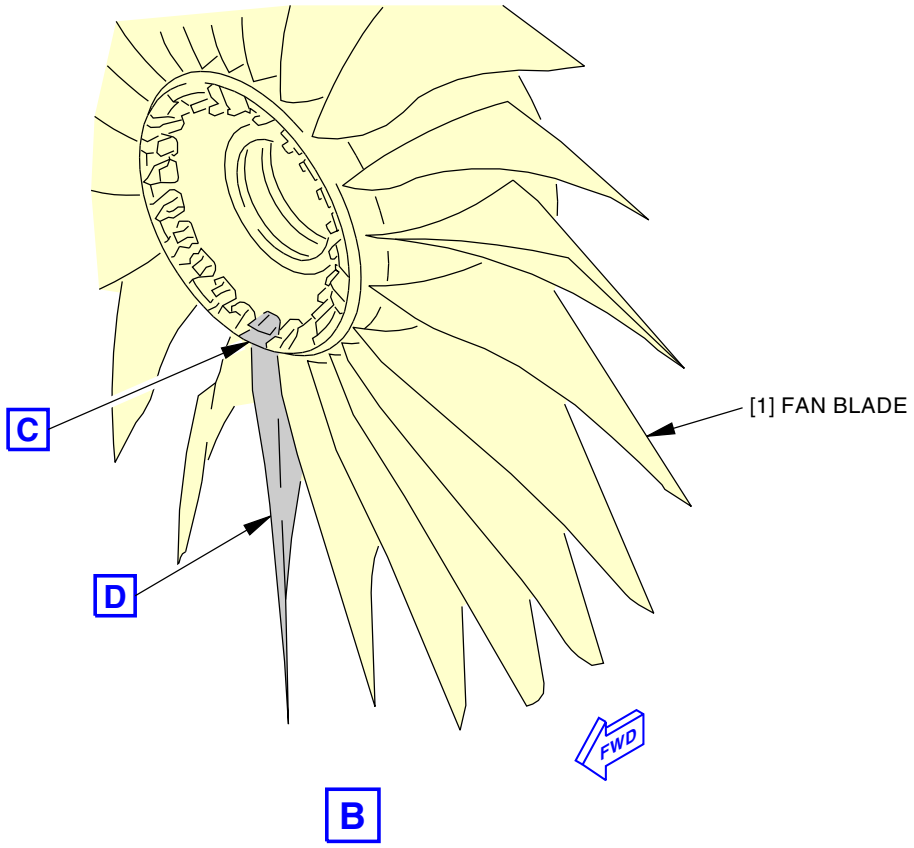
——— END OF TASK ———

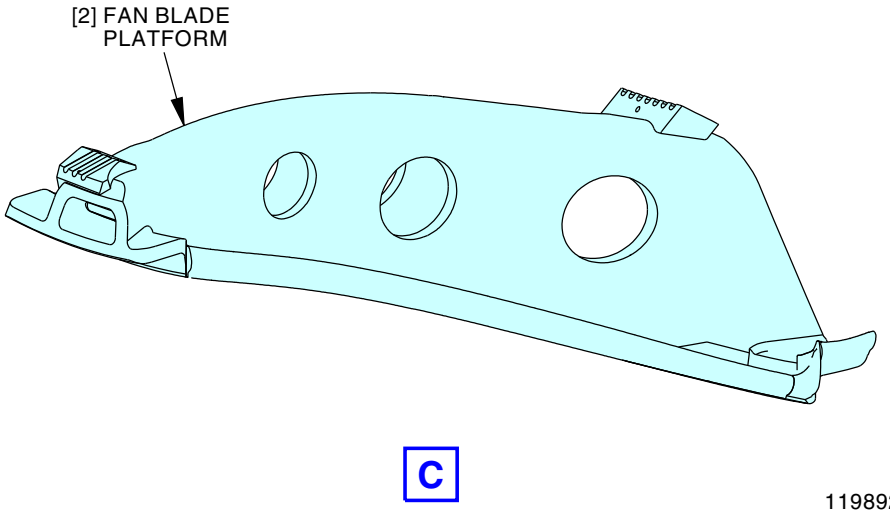
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Fan Blade Installation
Figure 405/72-21-02-990-830-H01 (Sheet 1 of 3)

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



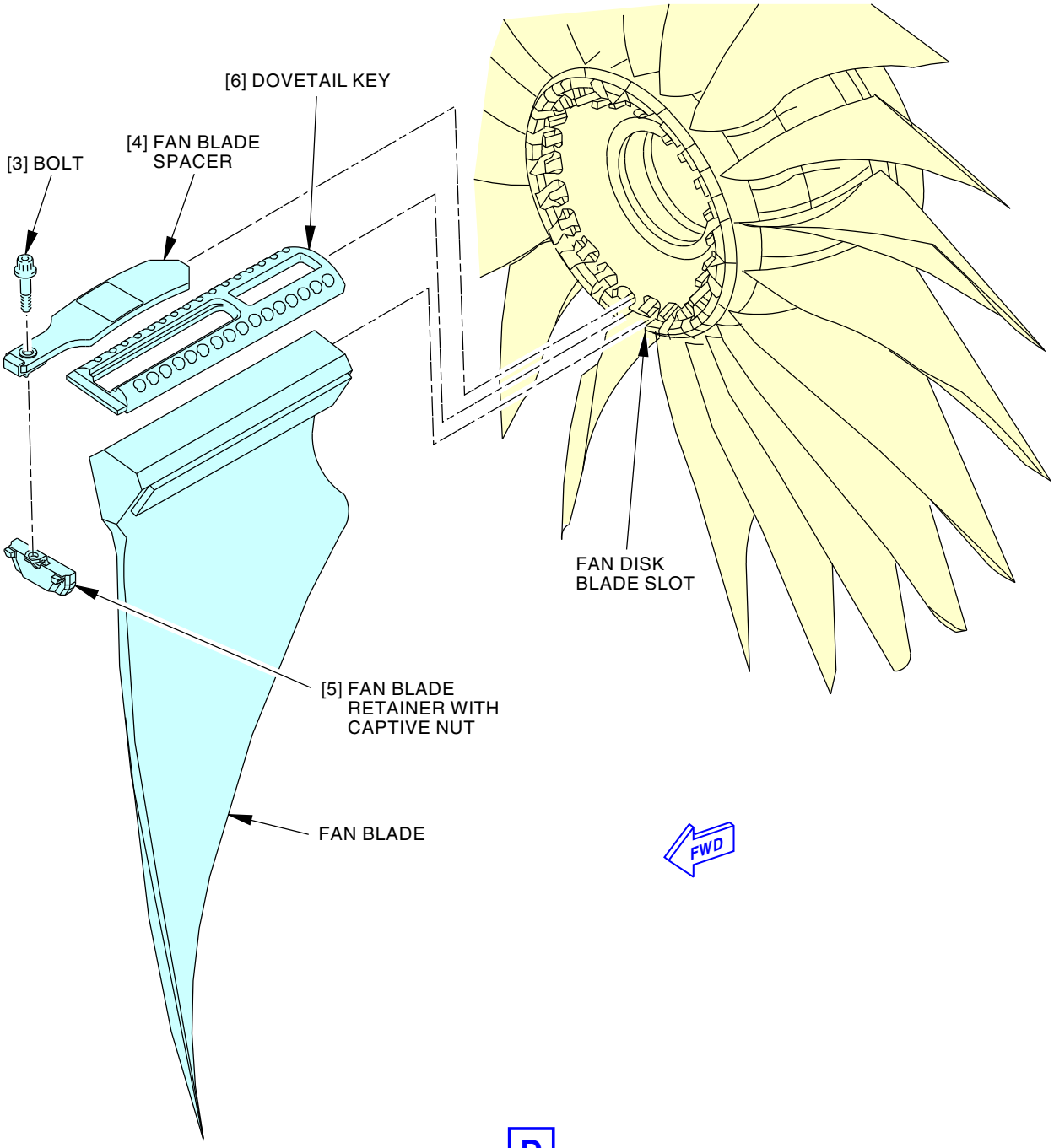


1198929-00-A

M06817 S0004285848_V2

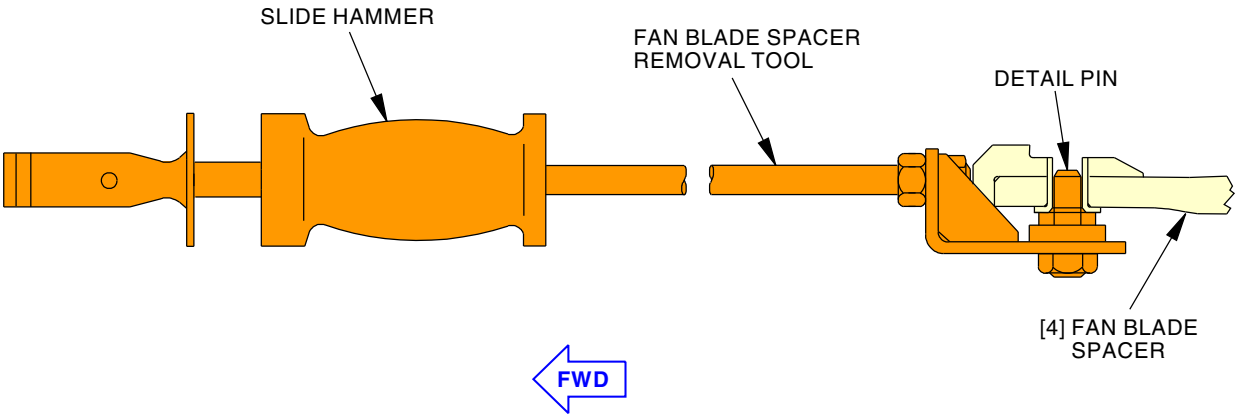
Fan Blade Installation
Figure 405/72-21-02-990-830-H01 (Sheet 2 of 3)

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



Fan Blade Installation
Figure 405/72-21-02-990-830-H01 (Sheet 3 of 3)

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



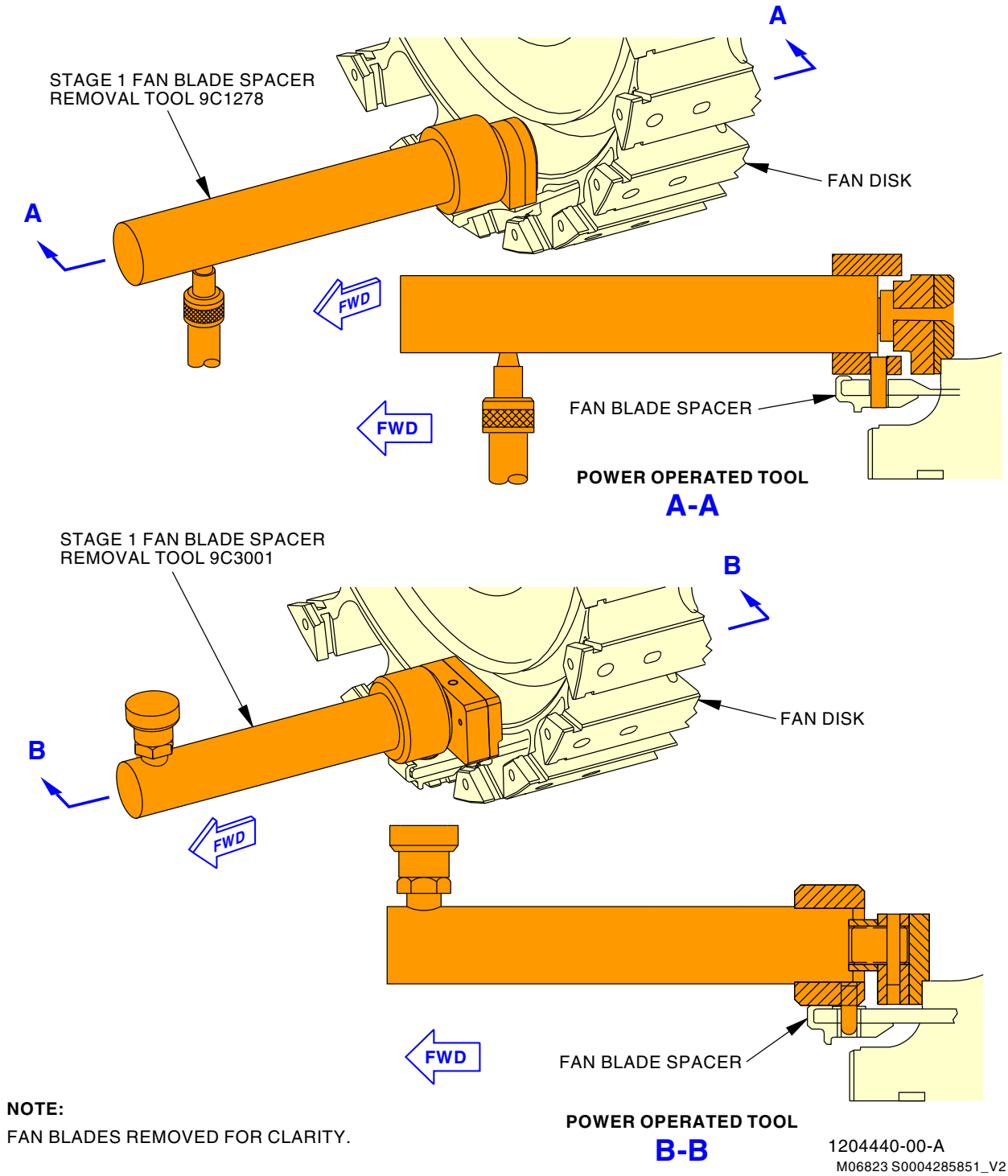
MANUALLY OPERATED TOOL

1130921-00-C

M06821 S0004285850_V2

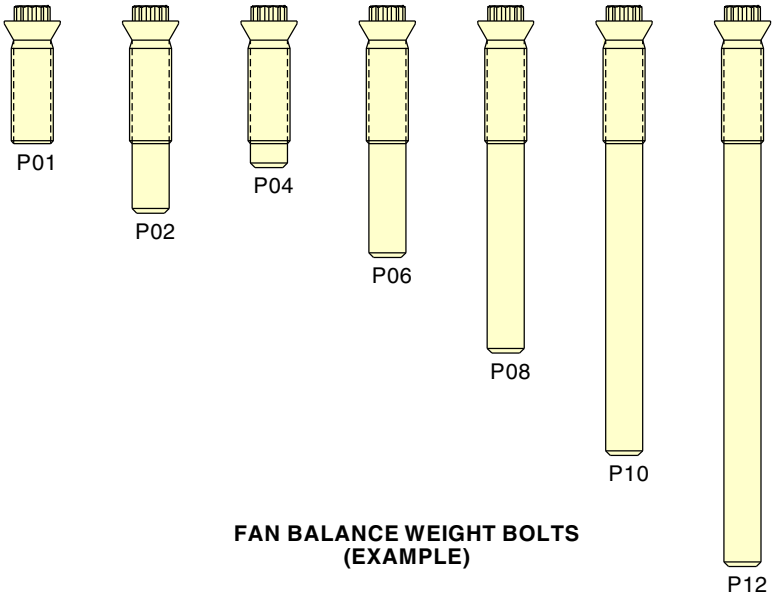
Fan Blade Spacer Removal Tool
Figure 406/72-21-02-990-831-H01 (Sheet 1 of 2)

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

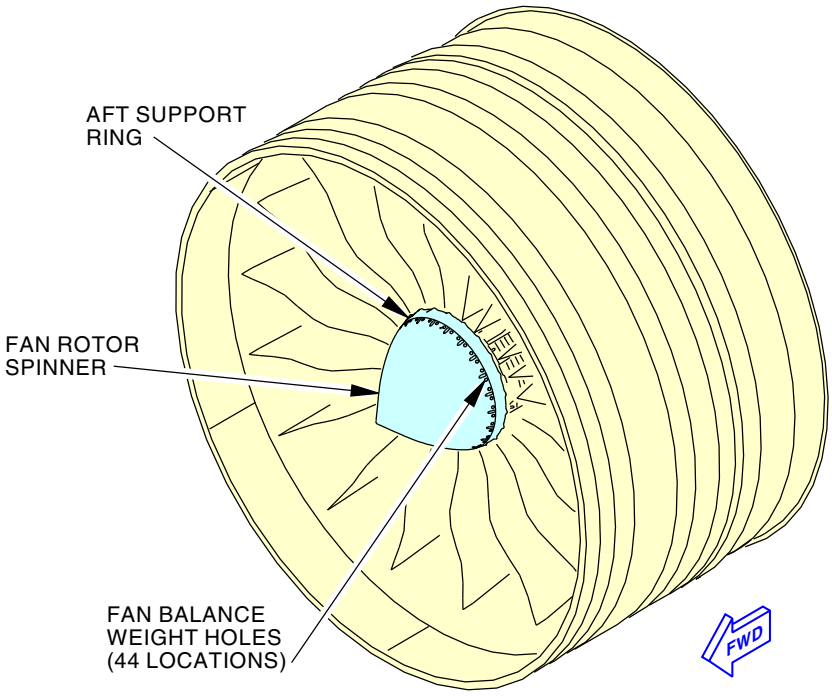


Fan Blade Spacer Removal Tool
Figure 406/72-21-02-990-831-H01 (Sheet 2 of 2)

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



FAN BALANCE WEIGHT BOLTS (EXAMPLE)



NOTE:

FAN BALANCE WEIGHT HOLES ARE NUMBERED ON EVERY FOUR HOLES COUNTER CLOCKWISE WHICH START AT HOLE 1 MARK (DIMPLE MARK) ON THE AFT SPINNER.

1198925-00-A

M06826 S0004285854_V2

Fan Blade Balance Bolt Installation
Figure 407/72-21-02-990-833-H01

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

TASK 72-21-02-400-803-H01

7. One Fan Blade Installation

A. General

(1) This task is the installation replacement procedure for one fan blade.

(2) After you install the fan blade, you must do the tests listed in the power plant test reference table.

B. References

Reference	Title
71-00-00-700-811-H01	Test No. 12A - Low Pressure System (Fan/LPT) Trim Balance (For SCU P/N S332W401-200) (P/B 501)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-200-802-H01	Fan Blade Tip Clearance Inspection (P/B 601)
72-21-03-400-801-H01	Fan Blade Platform 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

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
D00630 [C10-013]	Lubricant - PTFE Release Agent - Miller-Stephenson MS-122XD (Replaces MS-122DF and MS-122V Lubricants)	
D50038 [C10-215]	Lubricant - Release Agent - MS-143XD-10	
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
D50347 [C10-013]	Lubricant - PTFE Release Agent - Miller-Stephenson MS-122AD (Replaces MS-122DF and MS-122V Lubricants)	C10-013
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02417 [C10-021]	Tape - Duct	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Fan blade	72-00-51-09A-155	ARO ALL
		72-00-51-09A-157	ARO ALL
2	Fan blade platform	72-00-51-09A-117	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

G. One Fan Blade Installation

SUBTASK 72-21-02-970-003-H01

(1) If you install a new blade and if you do not know the moment-weight of this new blade, then you must do the calculation to find the amount of unbalanced correction.

NOTE: This step is only necessary if you replace the fan blade with a new fan blade.

(a) Record the moment-weight of the removed fan blade [1] and the replacement blade.

NOTE: The moment-weight of the blade is found near the bottom of the dovetail.

(b) Calculate the moment-weight difference between the removed fan blade [1] and the replacement blade.

(c) If the calculated moment-weight difference is greater than 9000 gram-inches, or it is greater then the correction capability that remains in the spinner, do one of the steps that follow:

1) Replace the replacement fan blade [1] and the fan blades that were not replaced with a replacement fan blade set (TASK 72-21-02-400-802-H01).

2) Or rearrange the replacement fan blade [1] with the fan blades that were not replaced by the map process.

SUBTASK 72-21-02-420-011-H01

(2) Install the fan blade [1] (Figure 405):

(a) Put the fan blade [1] into the engine inlet cowl and on the protective mats.

(b) Turn the fan assembly counterclockwise to put the fan disk blade slot for the fan blade [1] to be installed in the 6:00 o'clock position.

WARNING DO NOT GET ISOPROPYL ALCOHOL (IPA) IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IPA. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IPA. KEEP IPA AWAY FROM SPARKS, FLAME, AND HEAT. IPA IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(c) Wipe the sides of the fan blade shims, which interface with the fan blade dovetail, with a cotton wiper, G00034 moist with alcohol, B00130 to remove all previously applied lubricant.

NOTE: The fan blade shims are installed on the fan disk posts. The shims were not removed from the fan disk posts after the removal of the fan blades.

(d) Make sure the fan blade shims are seated fully aft before the fan blade [1] is installed.

(e) Wipe the fan blade dovetail surfaces with a cotton wiper, G00034 moist with alcohol, B00130 to remove all previously applied release agent.

(f) Permit the solvent to air dry.

CAUTION THE LUBRICANT IS FLAMMABLE. DO NOT STORE NEAR A HEAT SOURCE, IN DIRECT SUNLIGHT, OR WHERE THE TEMPERATURE WILL BE MORE THAN 120 DEGREES F (49 DEGREES C). DO NOT DAMAGE OR PUNCTURE THE CONTAINER.

(g) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to the large, flat surfaces of the fan blade dovetail.

NOTE: The shelf life of the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] is one year from the date of the shipment.

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

1) Spray the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] on the fan blade dovetail surfaces.
2) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] four times, approximately one time per second. Overspray is permitted.
3) Permit the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to air dry for 20 minutes.
4) Make sure that there is full coverage of the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013].

NOTE: A white powder residue will develop when the lubricant is dry.

(h) Alternate Procedure: Apply the MS-143XD-10 lubricant, D50038 [C10-215] to the entire fabric coating dovetail surface areas.

NOTE: Make sure lubricant is thoroughly mixed before and during application.

1) Spray the MS-143XD-10 lubricant, D50038 [C10-215] on the entire fabric coating dovetail surface.
2) Apply four coats of MS-143XD-10 lubricant, D50038 [C10-215] to each fabric strip.
3) Permit lubricant to air dry 20 minutes.
4) Make sure there is full coverage of the MS-143XD-10 lubricant, D50038 [C10-215].

NOTE: A white powder residue will develop when the lubricant is dry.

(i) Install the fan blade [1] into the fan disk blade slot.

NOTE: Do not make contact with the coated dovetail surface when you install the fan blade [1].

(j) Install the fan blade retainer [5] into the fan disk blade slot.

(k) With the horizontal bar part of the dovetail key [6] toward you, install the dovetail key [6] into the fan disk blade slot.

(l) Wipe the two sides of the fan blade spacer [4] with a cotton wiper, G00034 moist with alcohol, B00130 to remove all previously applied lubricant.

(m) Permit the solvent to air dry.

CAUTION

THE RELEASE AGENT IS FLAMMABLE. DO NOT STORE NEAR A HEAT SOURCE, IN DIRECT SUNLIGHT, OR WHERE THE TEMPERATURE WILL BE MORE THAN 120 DEGREES F (49 DEGREES C). DO NOT DAMAGE OR PUNCTURE THE CONTAINER.

(n) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to the large, flat surfaces of the fan blade spacer [4].

NOTE: The shelf life of the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] is one year from the date of the shipment.

1) Spray the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] on the fan blade spacer [4].

NOTE: Do not apply the lubricant to the end block which houses the threaded bushing.

2) Apply the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] four times, approximately two times per second. Overspray is permitted.
3) Permit the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013] to air dry for 20 minutes.

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

4) Make sure that there is full coverage of the MS-122XD lubricant, D00630 [C10-013] or MS-122AD lubricant, D50347 [C10-013].

NOTE: A white powder residue will develop when the lubricant is dry.

(o) Alternate Procedure: Apply MS-143XD-10 lubricant, D50038 [C10-215] to both sides of the fan blade spacer [4].

NOTE: Make sure lubricant is thoroughly mixed before and during application.

1) Spray the MS-143XD-10 lubricant, D50038 [C10-215] to both sides of the fan blade spacer [4].

NOTE: Do not apply to the end block which houses the threaded bushing.

2) Permit lubricant to air dry 20 minutes.

3) Make sure there is full coverage of the MS-143XD-10 lubricant, D50038 [C10-215].

NOTE: A white powder residue will develop when the lubricant is dry.

(p) Insert the fan blade spacer [4] between the fan blade [1] and the dovetail key [6].

(q) Put the fan blade spacer [4] in the dovetail key [6] spacer guide.

CAUTION

MAKE SURE THAT YOU ALIGN THE FAN BLADE SPACER CORRECTLY IN THE DOVETAIL KEY. MAKE SURE THAT YOU SQUARELY HIT THE FORWARD FACE OF THE FAN BLADE SPACER WITH THE PLASTIC MALLET. IF THE FACE OF THE PLASTIC MALLET IS NOT FLAT TO THE FORWARD FACE, DAMAGE TO THE FAN BLADE SPACER CAN OCCUR.

(r) Hit the fan blade spacer [4] with a plastic mallet until fully installed.

(s) Make sure there is space between the dovetail key [6] and the fan blade spacer [4].

NOTE: The dovetail key should be loose.

(t) Put Acheson GP460 compound, D50043 [C02-058] on the threads of the bolt [3].

(u) Install the bolt [3] that holds the fan blade retainer [5] and the fan blade spacer [4] together.

(v) Tighten the bolt [3] to 100-120 pound-inches (11.0-14.0 Newton-meters).

(w) Install the fan blade platforms [2] adjacent to the fan blade [1] (TASK 72-21-03-400-801-H01).

NOTE: Use the position marks on the fan blade platforms from the removal task.

(x) Hold the fan blade platforms to one of the adjacent fan blades with tape, G02417 [C10-021].

NOTE: Put the tape in a position that will not be in the way when the support ring and spinner are installed.

SUBTASK 72-21-02-970-004-H01

(3) If the new blade installed, install new balance weight bolt(s) in the aft spinner to correct an unbalance condition (Figure 407):

NOTE: This step is only necessary if you replace the fan blade with a new fan blade and if you want to replace the balance weight bolt(s). If you did not replace the fan blade, skip this step.

NOTE: This procedure is a requirement which will reduce the need for fan trim balance. This procedure is necessary if the difference between the moment-weight of the replaced blade and the replacement blade is more than 200 gram-inches (positive or negative).

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

(a) Select the classification of fan balance weight bolt(s) that equal the difference between the replaced blade and the replacement blade.

(b) Install the fan balance weight bolt(s) as follows:

1) If the replacement blade is lighter than the removed blade, then install the weight in the spinner hole in front of the blade.

2) If the replacement blade is heavier than the replaced blade, then install the weight in front of the blade opposite to the replacement blade.

3) Remove the existing fan balance weight bolt from the spinner and make sure it is a P01 bolt.

4) Put Acheson GP460 compound, D50043 [C02-058] on the threads of the replacement fan balance weight bolt.

5) Put the replacement bolt in the spinner hole.

6) Tighten the replacement bolt to 150-170 pound-inches (16.9-19.2 Newton-meters).

7) If the fan balance weight bolt is not a P01 then, make sure of the moment-weight of the replaced bolt. Then add the moment-weight of the replaced bolt to the necessary difference in moment-weight, to find the moment-weight and P designation of the replacement bolt.

Table 403/72-21-02-993-810-H01 Moment Weight Calculation

WT. BALANCE	WEIGHT
moment-weight difference needed	500 grams
moment-weight of replaced bolt	200 grams (P02)
Total	700 grams

(c) Access the Maintenance Access Terminal and record the fan balance weight bolt(s) configuration in the On Board Engine Balance System (OEBS) (TASK 71-00-00-700-811-H01).

Table 404/72-21-02-993-804-H01 Balance Bolt Moment Weight

PART NUMBER ON MAT (EBS)	LENGTH (INCHES)	WEIGHT (GRAMS)	MOMENT-WEIGHT (GRAM-INCHES)
P01*[1]	1.1	15	100
P02	1.9	21	200
P04	1.5	33	400
P06	2.4	46	600
P08	3.3	59	800
P10	4.3	74	1000
P12	5.4	89	1200

*[1] P01 standard bolts do not show in the OEBS fan balance weight list.

SUBTASK 72-21-02-420-014-H01

(4) If the same fan blade is installed, install balance weight bolt(s) in the aft spinner Figure 407.

(a) Put Acheson GP460 compound, D50043 [C02-058] on the threads of the replacement fan balance weight bolt.

(b) Put the replacement bolt in the spinner hole.

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

(c) Tighten the replacement bolt to 150-170 pound-inches (16.9-19.2 Newton-meters).

SUBTASK 72-21-02-420-012-H01

(5) Do this task: Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

SUBTASK 72-21-02-220-001-H01

(6) Do this task: Fan Blade Tip Clearance Inspection, TASK 72-21-02-200-802-H01.

NOTE: This inspection is necessary only if more than three blades are installed.

NOTE: This inspection and rework (if necessary) of the fan case abradable to get the correct tip clearance can be done during different maintenance events but both (if necessary) must be accomplished within 125 cycles of the blade installation. It is recommended to do the inspection much before the 125 cycle limit in order to have time to plan for the rework (if necessary) of the fan case abradable.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-02-080-004-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-21-02-860-023-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

I. Fan Blade Installation Test

SUBTASK 72-21-02-710-007-H01

(1) Do the tests listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

——— END OF TASK ———

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

FAN BLADE - INSPECTION/CHECK

1. General

A. This procedure has two tasks:

(1) An inspection of the fan blades

(2) An inspection of the fan blade tip clearances.

TASK 72-21-02-200-801-H01

2. Fan Blade Inspection

(Figure 601 and Figure 602)

A. General

(1) This task is the inspection procedure for the fan blades.

(2) This is inspection task of the fan blades that are removed from the engine.

(3) This task also gives instructions if the fan blades are attached to the fan disk.

(a) The spinner assembly will need to be removed to get access.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-020-803-H01	One Fan Blade Removal (P/B 401)
72-21-02-300-804-H00	Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film (P/B 801)
72-21-02-400-803-H01	One Fan Blade 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-12701	Lens - Magnifying, 10X Magnification

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
G02348 [C10-010]	Pad - Abrasive - Scotch-Brite 7447	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for Inspection

SUBTASK 72-21-02-860-013-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE

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

(Continued)

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-02-480-005-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-02-020-009-H01

(3) Do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

G. Fan Blade Inspection

SUBTASK 72-21-02-020-010-H01

(1) Replace the fan blades for all damage that is more than the permitted limits unless given other instructions (TASK 72-21-02-020-803-H01 and TASK 72-21-02-400-803-H01).

SUBTASK 72-21-02-210-002-H01

(2) Examine the fan blade metal leading edge nose in Area N1.

(a) Nicks, dents, and scratches

NOTE: To measure the depth of a nick, dent, or scratch in Area ZZ, place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

1) Permitted in the Area ZZ to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.07 inch (1.70 mm).

2) Permitted in areas other than the Area ZZ to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.50 mm).

(b) Wear and erosion

1) Permitted in Area ZZ if the depth of the wear and erosion is not more than 0.15 inch (3.80 mm).

2) Permitted in areas other than Area ZZ if the depth of the wear and erosion is not more than 0.08 inch (2.00 mm).

(c) Cracks and tears

1) Permitted if they are not more than 0.10 inches (2.5 mm) in length and are separated by at least 1.0 inch (25.0 mm).

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

Table 601/72-21-02-993-806-H01 Table 601

Area	Dist. from Tip	Max Serviceable Depth (D)	Max Repairable Depth (D)	Max Allow Blended Depth (D)	Max Serviceable Depth (S)	Max Repairable Depth (S)	Max Allow blended Depth (S)	Max Blend Area (Length x Width)	Max Blended Allow Linear Length (L)
Area N1									
Area ZZ	0-12 in (0-304.8 mm)	0.05 in (1.2 mm)	0.135 in (3.42 mm)	0.150 in (3.81 mm)	---	---	---	---	1.2 in (30 mm)
Areas other than Area ZZ	1-12 in (0-304.8 mm)	---	---	---	0.05 in (1.2 mm)	0.085 in (2.15 mm)	0.100 in (2.54 mm)	0.10 sq-in (0.6 sq-cm)	---
Area N2									
Area ZY	12.001-33.311 in (304.83-846.09 mm)	0.05 in (1.2 mm)	0.105 in (2.66 mm)	0.120 in (3.04 mm)	---	---	---	---	1.0 in (25 mm)
Areas other than Area ZY	12.001-33.311 in (304.83-846.09 mm)	---	---	---	0.05 in 1.2 mm)	0.085 in (2.15 mm)	0.100 in (2.54 mm)	0.10 sq-in (0.6 sq-cm)	---
Area N3									
Area ZX	33.31-38.36 in (846.1-974.3 mm)	0.05 in (1.2 mm)	0.065 in (1.65 mm)	0.080 in (2.03 mm)	---	---	---	---	1.0 in (25 mm)
Areas other than Area ZX	33.31-38.36 in (846.1-974.3 mm)	---	---	---	0.020 in (0.50 mm)	0.035 in (0.88 mm)	0.050 in (1.27 mm)	0.04 sq-in (0.2 sq-cm)	---
Area N4									

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

Table 601/72-21-02-993-806-H01 Table 601 (Continued)

Area	Dist. from Tip	Max Serviceable Depth (D)	Max Repairable Depth (D)	Max Allow Blended Depth (D)	Max Serviceable Depth (S)	Max Repairable Depth (S)	Max Allow blended Depth (S)	Max Blend Area (Length x Width)	Max Blended Allow Linear Length (L)
Area ZW	38.361-42.400 in (974.37-1076.9 mm)	0.015 in (0.38 mm)	0.025 in (0.63 mm)	0.040 in (1.01 mm)	---	---	---	---	1.0 in (25 mm)
Areas other than Area ZW	38.361-42.400 in (974.37-1076.9 mm)	---	---	---	0.005 in (0.12 mm)	0.010 in (0.25 mm)	0.025 in (0.63 mm)	0.0025 sq-in (0.016 sq-cm)	---
Area N4									
Area ZW	42.401 in (1076.9 mm) - bottom	0.005 in (0.12 mm)	0.010 in (0.25 mm)	0.010 in (0.25 mm)	---	---	---	---	0.1 in (2.5 mm)
Areas other than Area ZW	42.401 in (1076.9 mm) - bottom mm)	---	---	---	0.005 in (0.12 mm)	0.010 in (0.25 mm)	0.010 in (0.25 mm)	0.001 sq-in (0.006 sq-cm)	---

SUBTASK 72-21-02-210-003-H01

(3) Examine the fan blade metal leading edge nose in Area N2.

(a) Nicks, dents, and scratches

NOTE: To measure the depth of a nick, dent, or scratch in Area ZY, place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

1) Permitted in the Area ZY to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.50 mm).

2) Permitted in areas other than the Area ZY to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.06 inch (1.50 mm).

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

(b) Wear and erosion

1) Permitted in Area ZY if the depth of the wear and erosion is not more than 0.10 inch (2.50 mm).

2) Permitted in areas other than Area ZY if the depth of the wear and erosion is not more than 0.06 inch (1.50 mm).

(c) Cracks and tears

1) Not permitted.

SUBTASK 72-21-02-210-004-H01

(4) Examine the fan blade metal leading edge nose in Area N3.

(a) Nicks, dents, and scratches

NOTE: To measure the depth of a nick, dent, or scratch in Area ZX, place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

1) Permitted in the Area ZX to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.05 inch (1.20 mm).

2) Permitted in areas other than the Area ZX to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.025 inch (0.63 mm).

(b) Wear and erosion

1) Permitted in Area ZX if the depth of the wear and erosion is not more than 0.08 inch (2.0 mm).

2) Permitted in areas other than Area ZX if the depth of the wear and erosion is not more than 0.035 inch (0.880 mm).

(c) Cracks and tears

1) Not permitted.

SUBTASK 72-21-02-210-005-H01

(5) Examine the fan blade metal leading edge nose in Area N4.

NOTE: To measure the depth of a nick, dent, or scratch in Area ZW, place a straight edge along the leading edge and measure the depth in the direction perpendicular to the straight edge.

(a) Nicks, dents, and scratches

1) Permitted in the Area ZW to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.025 inch (0.063 mm).

2) Permitted in areas other than the Area ZW to the limits in Table 601.

a) Minimum separation between adjacent nicks, dents, or scratches is 2.0 inches (51.0 mm) if the depth of the nicks, dents, or scratches is more than 0.010 inch (0.250 mm).

(b) Wear and erosion

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

1) Permitted in Area ZW if the depth of the wear and erosion is not more than 0.04 inch (1.00 mm).

2) Permitted in areas other than Area ZW if the depth of the wear and erosion is not more than 0.025 inch (0.640 mm).

(c) Cracks and tears

1) Not permitted.

SUBTASK 72-21-02-210-006-H01

(6) Examine the fan blade metal leading edge sidewalls.

(a) Nicks, dents, and scratches

1) Permitted if they are not more than 0.25 inch (6.30 mm) in diameter and the depth is not more than 0.04 inch (1.00 mm).

2) Scratches are permitted if they are not more than 0.01 inch (0.20 mm) in depth.

3) Nicks and scratches must be blended smooth to remove high metal and then do an inspection.

(b) Wear and erosion

1) Permitted if they do not go through the metal.

(c) Cracks and tears

1) Not permitted.

(d) Disbonded metal leading edge

1) Permitted in the combined Areas N1 and N2 up to the sum of cumulative of 1.0 inch (25.0 mm) in length on the suction (convex) side of the fan blade.

2) Permitted in the combined Areas N1 and N2 up to the sum of cumulative of 1.0 inch (25.0 mm) in length on the pressure (concave) side of the fan blade.

3) Not permitted in the Areas N3 and N4.

SUBTASK 72-21-02-220-002-H01

(7) Examine the fan blade airfoil.

(a) Cracks and tears, and broken fiber

1) Cracks and tears are not permitted.

2) Broken, damaged, or missing fiber is permitted as follows.

a) Each area of broken, damaged, or missing fiber is not larger than the area size of 0.05 sq. inch (0.3 sq. cm) and the depth is not more than 0.15 inch (3.80 mm).

b) There are no more than 6 areas (of convex and concave sides) of broken, damaged, or missing fiber.

c) The areas of broken, damaged, or missing fiber are separated by a minimum of 2.0 inches (51.0 mm).

3) You can repair the areas of broken, damaged, or missing fiber (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

(b) Delamination

1) Not permitted.

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

SUBTASK 72-21-02-220-003-H01

(8) Examine the fan blade dovetail and shank.

(a) Cracks, tears, and broken fiber

1) Not permitted.

(b) Delamination

1) Not permitted, except as noted below.

(c) Examine the fan blade dovetail bottom surface.

1) Use a Scotch-Brite 7447 pad, G02348 [C10-010] with light to moderate hand pressure to clean the surface.

a) Use a wet cloth with alcohol, B00130 to wipe and clean the surface.

b) Let the surface dry.

2) Visually examine the dovetail bottom surface for delamination from the trailing edge forward along the dovetail bottom surface.

3) If you think there is delamination, do a visual inspection with white light and a magnifying lens, STD-12701.

a) A delamination will look different than the adjacent area.

b) A delamination will have depth and width when compared to the adjacent area that can be smooth or have shallow machine grooves.

NOTE: The surface of the blade dovetail and shank can show linear features that are normal because of the construction of the fan blade. These machine grooves can look like parallel lines and shallow grooves. They are not delaminations between plies.

NOTE: To make sure that there is delamination, you can look at the surface with white light at different angles to help find differences in depth and width that is different than a shallow groove.

NOTE: There is an information label on the bottom of the dovetail. You will not be able to do an inspection under the label.

4) Delamination is permitted in the areas that follow Figure 601 (Sheet 7)

a) Up to the full length of the dovetail bottom surface in Zone A.

b) On the aft or forward face of the dovetail not more than 0.85 in. (21.59 mm).

(d) Loose wear strips on dovetail pressure surfaces, and blade shank platform mating surface

1) Not permitted.

(e) Wear strips material on dovetail pressure surfaces that are missing.

1) Permitted if the missing material is not more than 0.032 inch (0.81 mm) from one of the edges.

(f) Wear strips on dovetail pressure surfaces and blade shank platform mating surfaces that are frayed or disbonded on the corners.

1) Permitted if the frayed or disbonded area is not more than 0.18 inch (4.5 mm) across the diagonal corner of the wear strip.

(g) Wear strips on dovetail pressure surfaces and blade shank platform mating surfaces that are frayed on the edges are permitted as follows:

1) The frayed area is not more than 0.032 inch (0.81 mm) from one of the edges.

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

2) If the frayed material is removed, and there is no disbonding evident on the remaining material.

(h) Wear strips on dovetail pressure surfaces and blade shank platform mating surfaces that have disbonded edges.

1) Not permitted.

(i) Wear strips material on blade shank platform and trailing edge mating surfaces that is missing.

1) Permitted if the missing material is not more than 0.032 inch (0.81 mm) from one of edge.

(j) Wear strips on dovetail pressure surfaces and blade shank platform mating surfaces that are worn.

1) Permitted if the worn area is not worn through to the blade surface and does not show frayed fabric.

2) Wear strip on the pressure side blade shank platform mating area that is eroded at the top edge is permitted if the wear strip not worn through to the brown AF32 layer.

a) The Continue-In-Service (C-I-S) limit for missing or eroded platform wear strip that shows the brown AF32 layer is 500 cycles with an inspection for exposed black carbon fabric necessary every 100 cycles.

b) The Continue-In-Service (C-I-S) limit for missing or eroded platform wear strip with the brown AF32 layer eroded through and shows the black carbon fabric is 100 cycles.

(k) Wear strips on dovetail pressure surfaces and blade shank platform mating surfaces that are dented.

1) Permitted if the dented area have not worn through to the blade surface and does not show frayed fabric.

(l) Wear strips on dovetail pressure surfaces that have black wear coating transferred from the shim.

CAUTION DO NOT USE HARD TOOLS OR SOLVENTS TO REMOVE THE COATING. DAMAGE TO THE WEAR STRIP, OR THE FAN BLADE CAN OCCUR.

1) Permitted provided all loose coatings are carefully removed from the fan blade dovetail wear strip.

SUBTASK 72-21-02-210-007-H01

(9) Examine the 0.003 inch (0.080 mm) nominal thickness black paint top coat on the concave (pressure) and convex (suction) side of the fan blade.

(a) All paint coating that is eroded or missing is permitted.

(b) All paint coating that is loose or torn is permitted if the loose or torn material is cut away.

SUBTASK 72-21-02-210-008-H01

(10) Examine the 0.020 inch (0.510 mm) nominal thickness black rubber polyurethane erosion coating on the concave (pressure) side of the fan blade (if exposed).

NOTE: The black polyurethane erosion coating is located under the black paint.

(a) All polyurethane coating that is eroded or missing is permitted.

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

(b) All polyurethane coating that is loose or torn is permitted if the loose or torn material is cut away to prevent peeling.

(c) You can repair the areas of missing polyurethane coating (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

NOTE: Repair of small areas of missing polyurethane film can prevent future peeling.

SUBTASK 72-21-02-220-004-H01

(11) Examine the brown AF32 undercoat on the concave (pressure) side of the fan blade (if exposed).

NOTE: The brown AF32 undercoat is located under the black polyurethane erosion coating on the concave (pressure) side.

(a) AF32 undercoat that is eroded through or missing is not permitted.

1) The Continue-In-Service (C-I-S) limit for AF32 that is missing or eroded through in a combined area of 50 in^2 (32,258 mm^2) is 100 cycles.

NOTE: Eroded or missing AF32 shows the underlying black carbon fiber contained in epoxy surface.

2) The Continue-In-Service (C-I-S) limit for AF32 that is missing or eroded through when exposed carbon fabric is in the fan blade composite surface is 10 cycles.

NOTE: Exposed carbon fabric are strands or threads that are no longer contained in epoxy. They can be broken, frayed or disconnected from the fabric around them.

3) You can repair areas of missing AF32.

a) Small areas of exposed carbon usually caused by impact damage can be repaired to prevent the above CIS cycle limitations.

b) Poly paste can be applied (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

SUBTASK 72-21-02-220-005-H01

(12) Examine the fan blade tips.

(a) Tip rubs

1) Tip rubs that do not impact the rub stripe are permitted.

SUBTASK 72-21-02-220-006-H01

(13) Examine the trailing edge tip cap and edge guard.

(a) Nicks and dents

1) Permitted as long as they do not go through the metal.

(b) Wear and deterioration

1) Permitted as long as they do not go through the metal.

(c) Cracks and tears

1) Not permitted.

SUBTASK 72-21-02-220-007-H01

(14) Examine the tip cap as follows:

(a) If you can see the tip cap metal in Area X on the concave (pressure side), then do an inspection for disbond between the metal and the underlying composite layers as follows:

NOTE: Tip cap metal is visible if the black polyurethane film layer is missing.

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

1) Try to insert a 0.003 in. (0.076 mm) to 0.005 in. (0.127 mm) in thickness feeler gage under the edge of the tip cap. If the feeler gage can be inserted, then the area is disbonded.

2) If there is a disbond, do as follows:

a) If the disbond length in any direction is more than 0.375 in. (9.525 mm), replace the fan blade.

b) If the disbond length in any direction is less than or equal to 0.375 in. (9.525 mm), the continue-in-service limit is 10 cycles.

3) If there is no disbond and you can see the tip cap metal in Area X, then do this subtask again within 150 cycles.

4) You can cover the tip cap metal to prevent the above CIS cycle limitation (refer to Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film, TASK 72-21-02-300-804-H00).

(b) Outside Area X, disbonded tip cap is permitted to the total sum of 0.375 in. (9.525 mm) in length of the convex (suction) and concave (pressure) sides of the fan blade.

SUBTASK 72-21-02-220-008-H01

(15) Disbonded trailing edge guard

(a) Permitted to the total sum of 0.50 inch (12.70 mm) in length of the suction and pressure sides of the fan blade.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-420-013-H01

(1) Do this task: Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

SUBTASK 72-21-02-080-005-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(2) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-02-860-014-H01

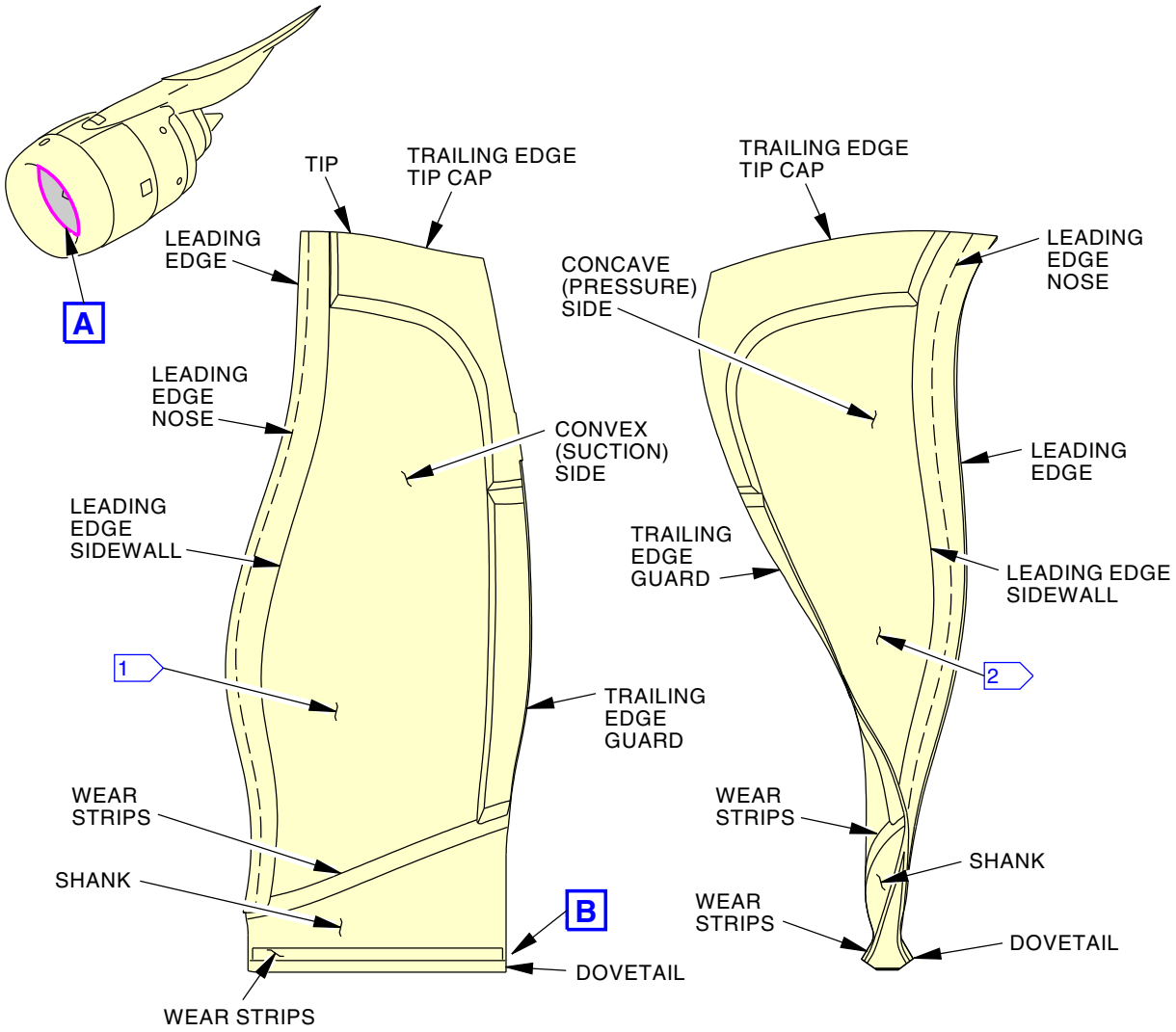
(3) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



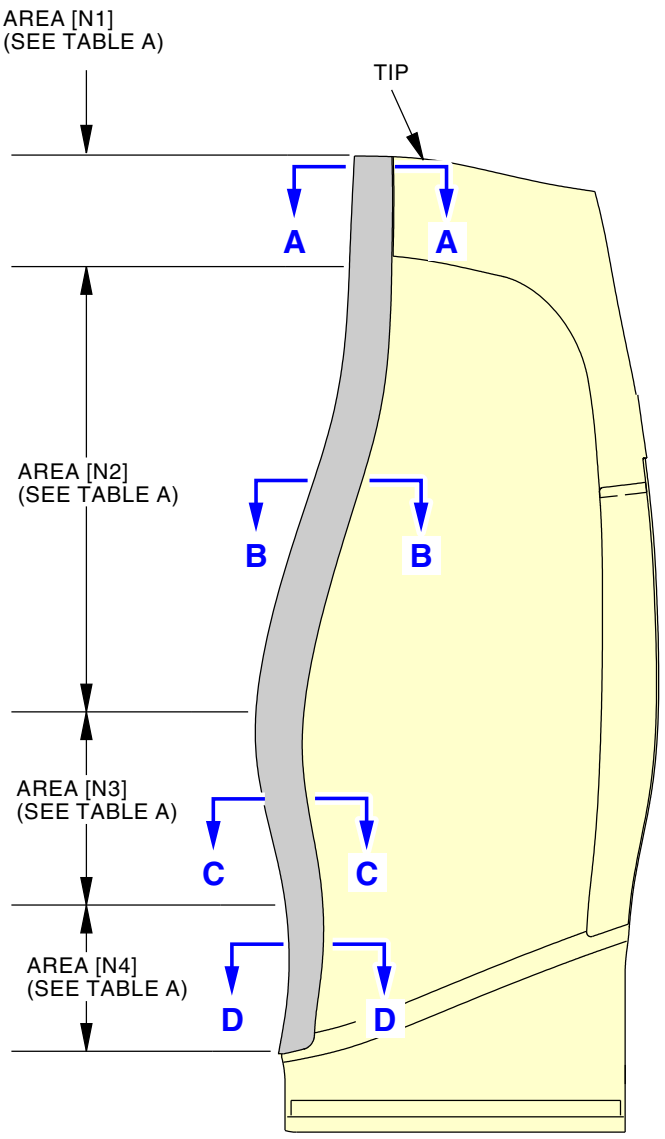
1 CONVEX SIDE COATING LAYERS FROM EXTERIOR SURFACE TO CARBON SURFACE OF BLADE:
1. BLACK PAINT
2. BLACK POLYURETHANE
3. BLACK SYNSKIN
ONLY PAINT ON METAL TIP CAP AND METAL TRAILING EDGE

2 CONCAVE SIDE COATING LAYERS FROM EXTERIOR SURFACE TO CARBON SURFACE OF BLADE:
1. BLACK PAINT
2. BLACK POLYURETHANE
3. BROWN AF2
ONLY PAINT ON METAL TIP CAP AND METAL TRAILING EDGE

M06827 S0004285855_V3

Fan Blade Inspection
Figure 601/72-21-02-990-810-H01 (Sheet 1 of 7)

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



DISTANCE FROM TIP	MLE ZONE
0.00-12.00 INCH (0.0-304.8 mm)	AREA [N1]
12.001-33.310 INCH (304.83-846.07 mm)	AREA [N2]
33.311-38.360 INCH (846.10-974.34 mm)	AREA [N3]
38.361 INCH - BOTTOM (974.37 mm) - BOTTOM	AREA [N4]

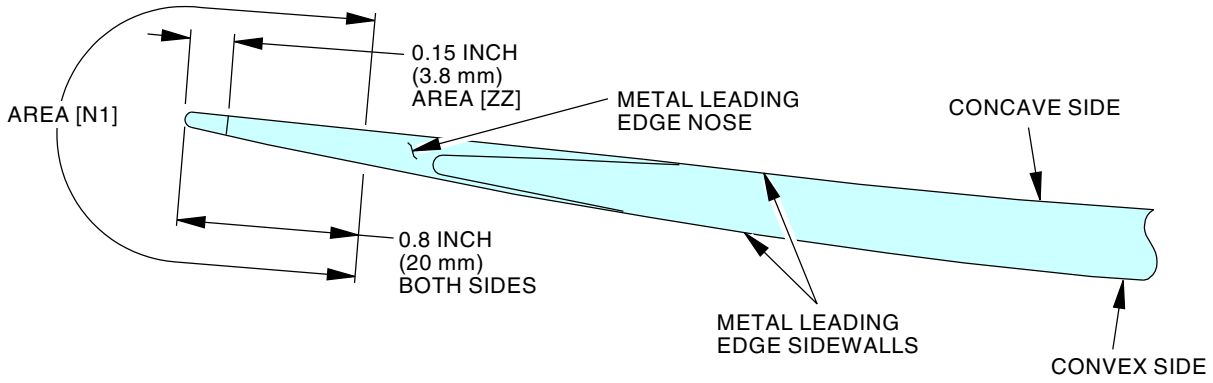
TABLE A

FAN BLADE METAL LEADING EDGE (MLE) NOSE INSPECTION ZONES
CONVEX (SUCTION) SIDE
(ZONES APPLY TO BOTH CONVEX AND CONCAVE SIDES)

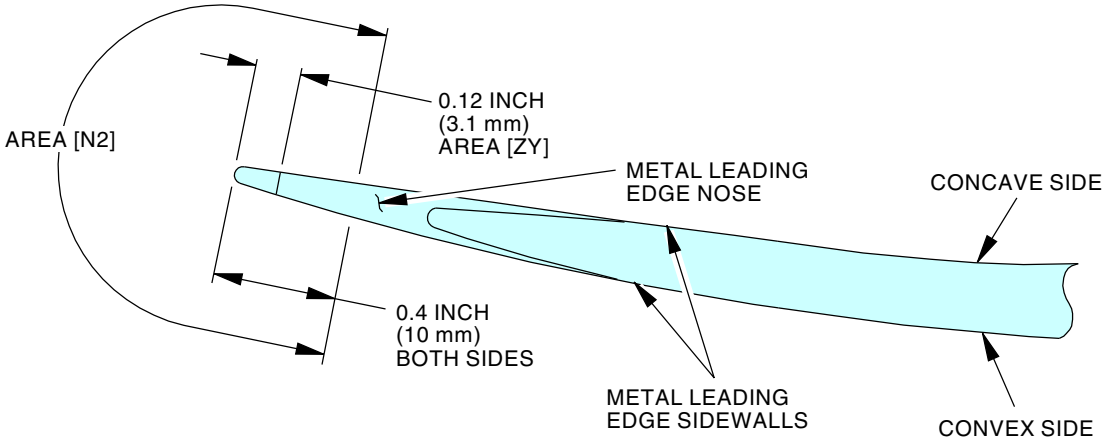
1199604-00-A
M06828 S0004285856_V3

Fan Blade Inspection
Figure 601/72-21-02-990-810-H01 (Sheet 2 of 7)

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



A-A

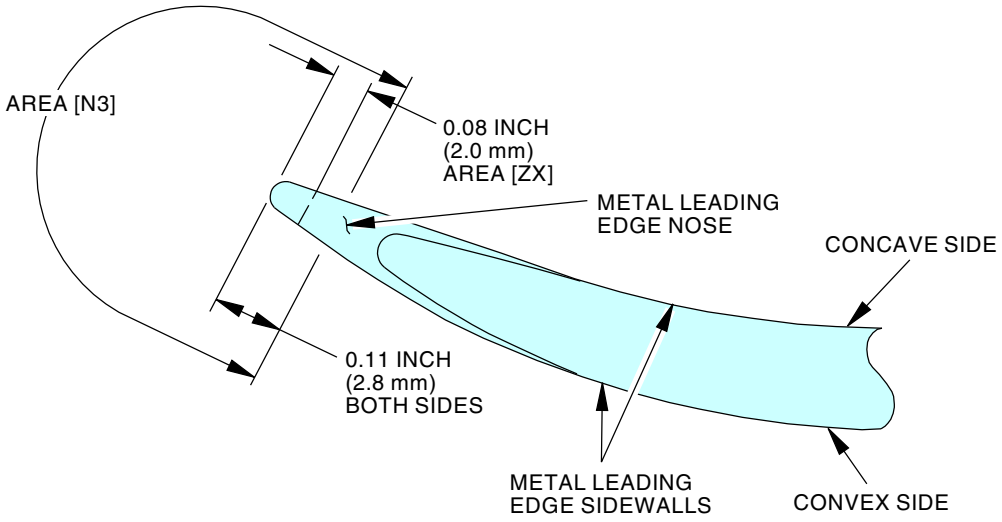


B-B

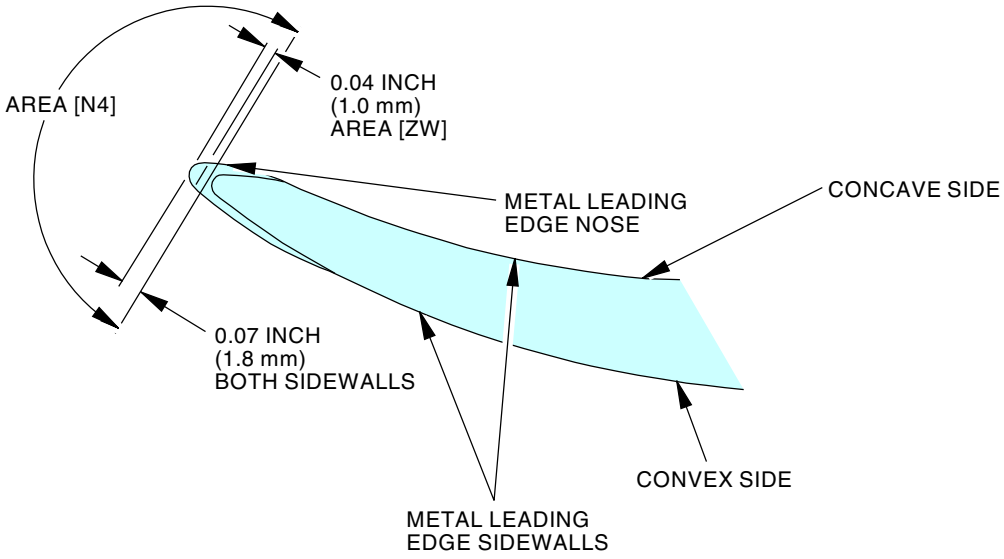
1163493-00-A
M06829 S0004285857_V3

Fan Blade Inspection
Figure 601/72-21-02-990-810-H01 (Sheet 3 of 7)

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



C-C

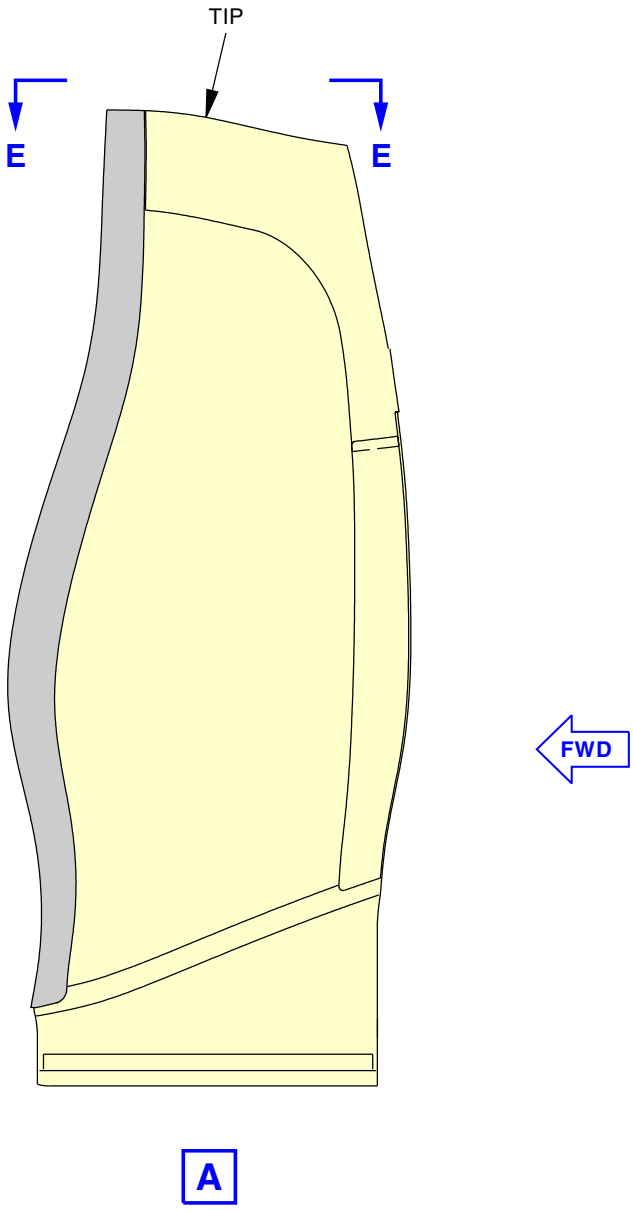


D-D

1163494-00-A
M06830 S0004285858_V3

Fan Blade Inspection
Figure 601/72-21-02-990-810-H01 (Sheet 4 of 7)

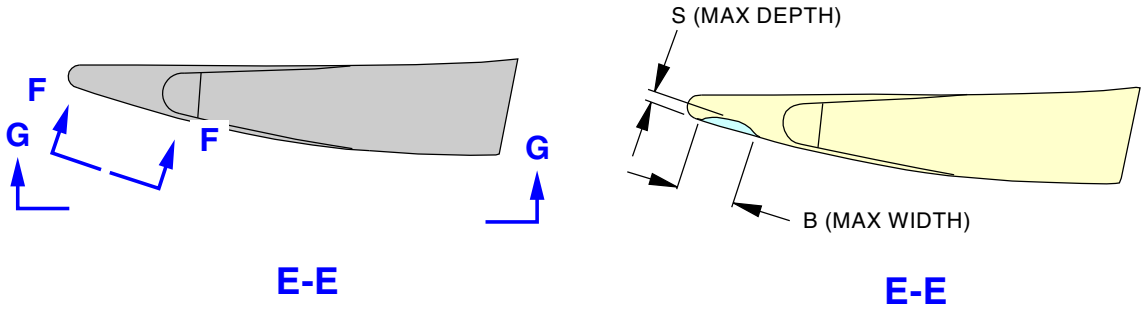
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



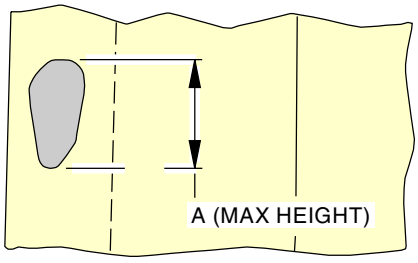
2796125 S0000637006_V1

Fan Blade Inspection
Figure 601/72-21-02-990-810-H01 (Sheet 5 of 7)

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

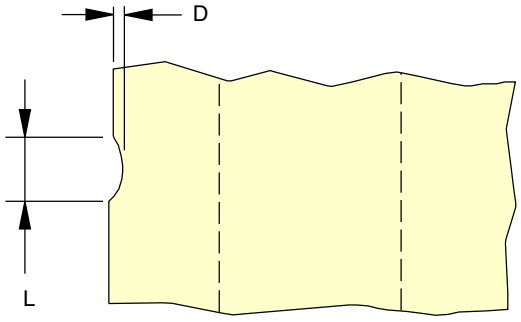


ALONG FULL METAL LEADING EDGE (EXAMPLE)



TYPICAL NICK, DENT, SCRATCH AT MLE NOSE (ON PRESSURE OR SUCTION SIDE)

F-F



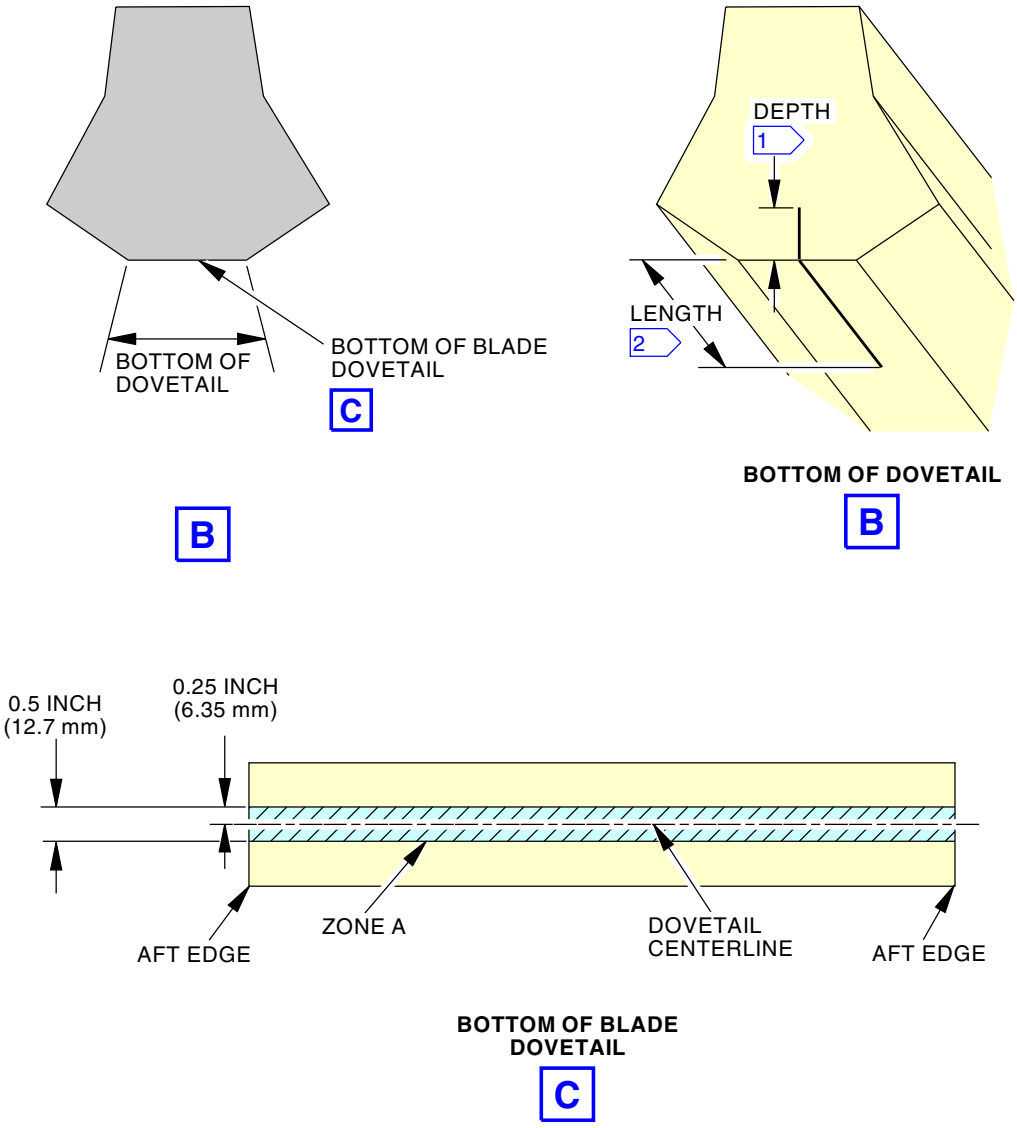
NICKS, DENTS, SCRATCHES AT FORWARD END OF MLE NOSE

G-G

2796126 S0000637007_V1

Fan Blade Inspection
Figure 601/72-21-02-990-810-H01 (Sheet 6 of 7)

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



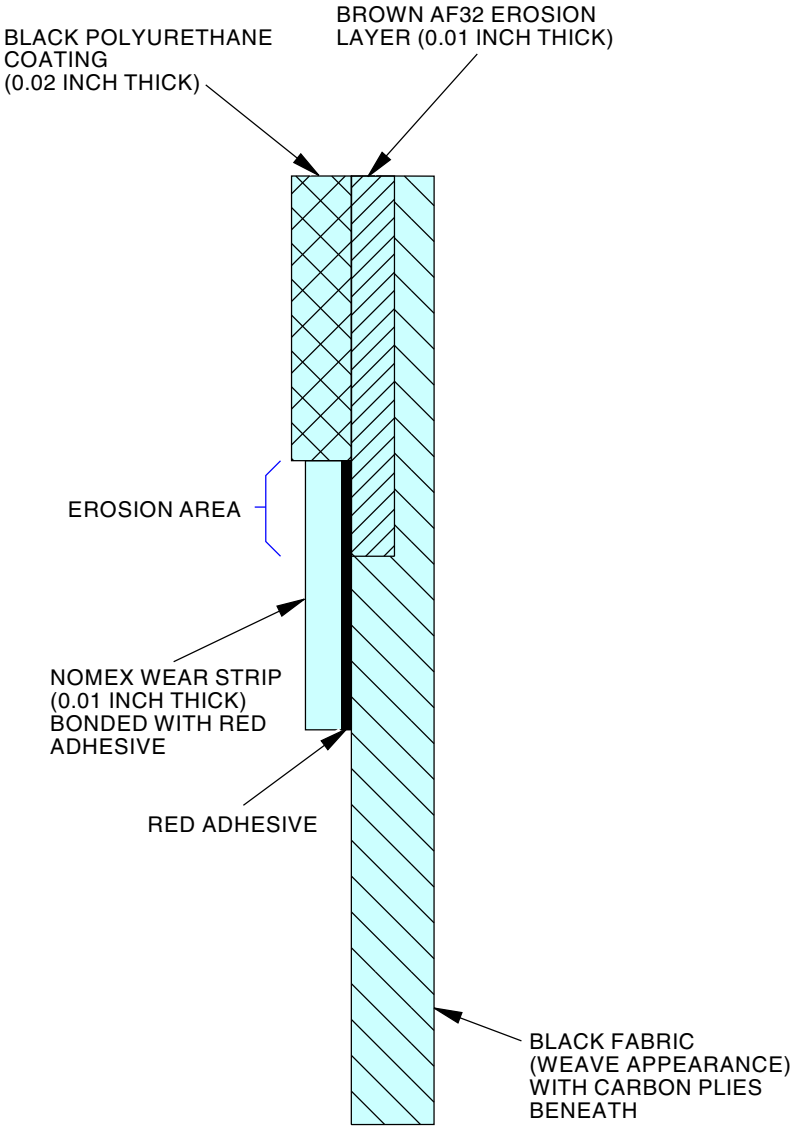
1 THE DEPTH OF DELAMINATION MAY BE VISIBLE IF DELAMINATION IS LOCATED AT THE AFT OR FORWARD EDGE OF THE DOVETAIL BOTTOM.

2 A DELAMINATION LOCATED AT THE AFT OR FORWARD EDGE OF THE DOVETAIL BOTTOM.

2796127 S0000636878_V1

Fan Blade Inspection
Figure 601/72-21-02-990-810-H01 (Sheet 7 of 7)

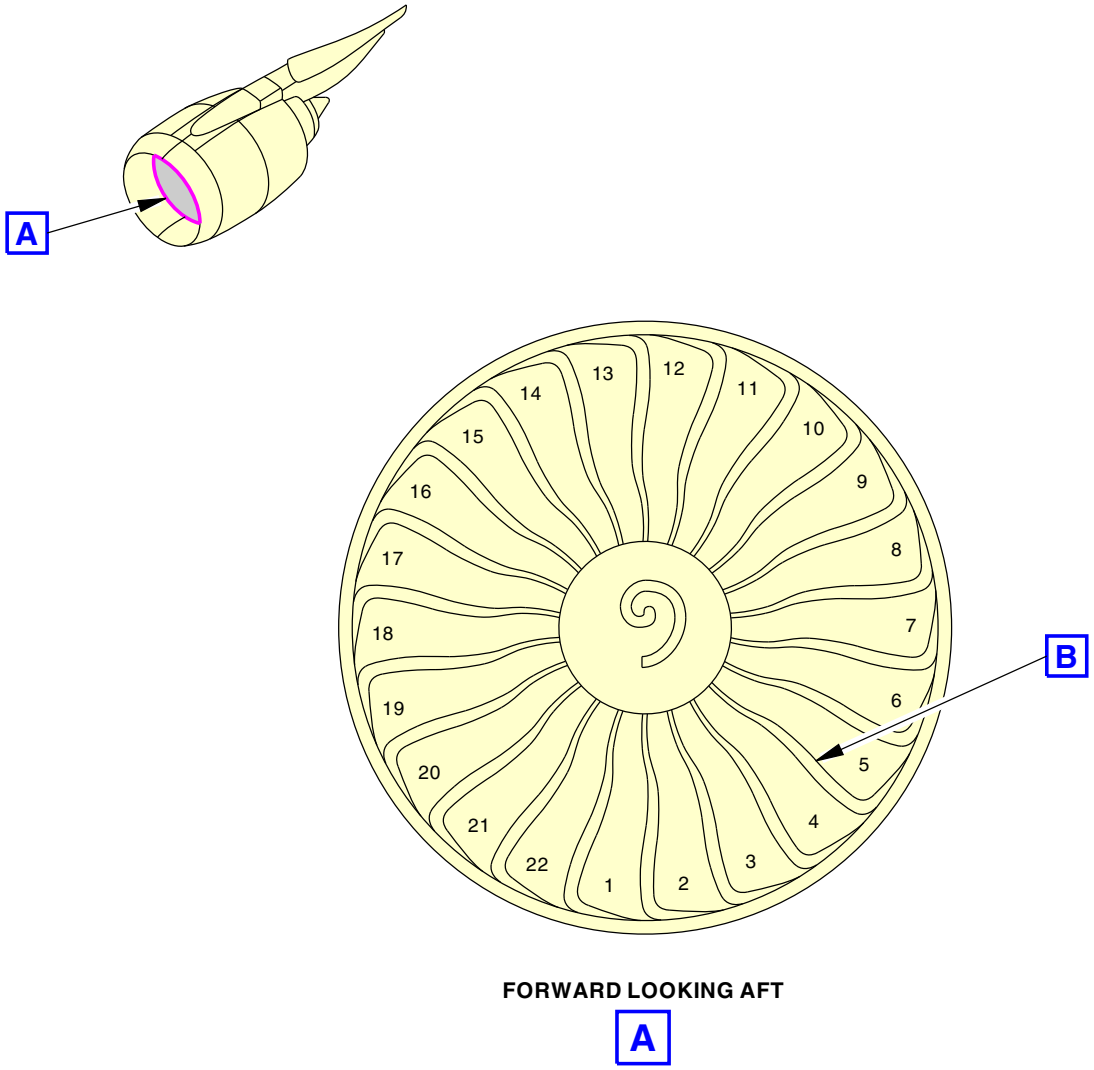
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1365381-00
2195366 S0000488160_V2

Platform Wear Strip Inspection
Figure 602/72-21-02-990-842-H00

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



NOTES:

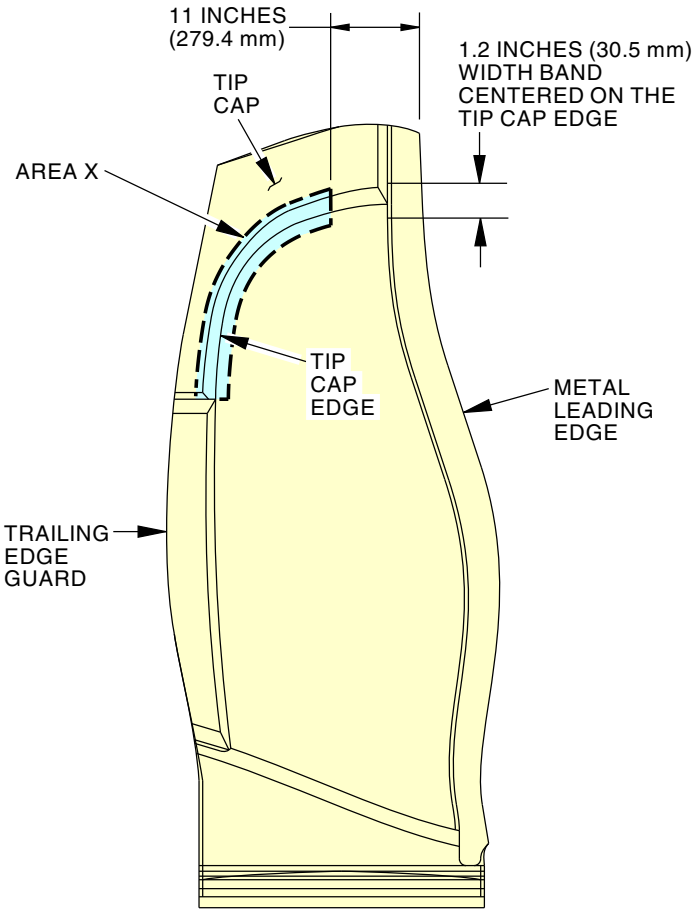
1. VIEW [B] IS THE BACK SIDE (CONCAVE, PRESSURE SIDE) OF THE BLADE.
2. WHEN LOOKING AT THE ENGINE FROM THE FRONT, THE CONVEX (SUCTION) SIDE OF THE BLADE IS VISIBLE.

5047462-00

2801705 S0000641968_V1

Fan Blade Tip Cap Edge Delamination Inspection
Figure 603/72-21-02-990-848-H00 (Sheet 1 of 3)

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

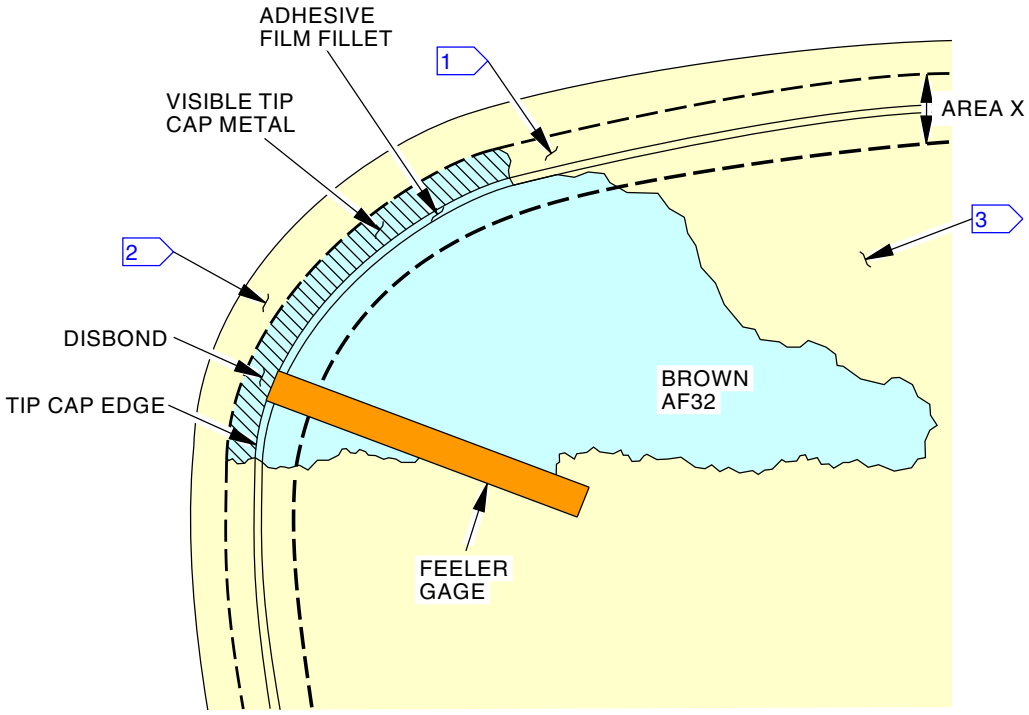


5047463-00

2802680 S0000641969_V2

Fan Blade Tip Cap Edge Delamination Inspection
Figure 603/72-21-02-990-848-H00 (Sheet 2 of 3)

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



CONCAVE (PRESSURE) SIDE

LAYERS FROM EXTERIOR SURFACE TO CARBON SURFACE OF BLADE:	1	2	3
BLACK PAINT	X	X	X
PRIMER	X	X	X
BLACK POLYURETHANE	X		X
METAL	X	X	
BROWN AF32			X

5047464-00

2802683 S0000641970_V2

Fan Blade Tip Cap Edge Delamination Inspection
Figure 603/72-21-02-990-848-H00 (Sheet 3 of 3)

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

TASK 72-21-02-200-802-H01

3. Fan Blade Tip Clearance Inspection

(Figure 604, Figure 605, Figure 606, Figure 607, Figure 608, Figure 609 and Figure 610)

A. General

(1) This task measures the clearances for each fan tip and the average of all fan tip clearances. The average clearance comes from the average fan blade length and the average fan case diameter.

(2) This task must be done by a well trained mechanic. For the untrained mechanic, it is recommended to have the supervision of the local GE representative present during this task.

(3) This procedure will do an inspection of each fan tip clearance and the average fan tip clearances.

(4) If you measure the fan blade tip clearance with your weight on the inlet, you will get incorrect indications.

(5) The fan blade tip clearances change with the temperature. Thus, it is important to make sure that the fan tip clearance measurements and also the temperature measurements in the steps that follow are done as quickly as possible with no stops.

B. References

Reference	Title
70-11-07-900-802-H01	Marking Methods (P/B 201)
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-020-802-H01	Fan Blade Set Removal (P/B 401)
72-21-02-020-803-H01	One Fan Blade Removal (P/B 401)
72-21-02-400-803-H01	One Fan Blade Installation (P/B 401)
72-21-03-000-801-H01	Fan Blade Platform Removal (P/B 401)
72-21-03-400-801-H01	Fan Blade Platform 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-2317	Gauge - Taper Gauge Part #: 9C1341P01 Supplier: 06083
SPL-4398	Fixture - Fan Case Runout (GE90-115B) Part #: 9C3039G01 Supplier: 06083
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-1336	Thermometer - Digital, 0-150 +/- 2 Degrees F, with a Probe, Thermocouple or Equivalent
STD-1337	Feeler Gauge Set - 0-0.150 Inch (0-3.81 mm)

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)
G02448 [C05-003]	Marker - Pens	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for Inspection

SUBTASK 72-21-02-860-015-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-02-410-001-H00

CAUTION

THE FAN COWL PANELS ON THE ENGINE MUST BE CLOSED BEFORE YOU DO THIS TASK OR DAMAGE TO THE ENGINE CAN OCCUR.

(2) Make sure that the fan cowl panels are closed.

SUBTASK 72-21-02-480-006-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(3) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

G. Fan Blade Tip Clearance Inspection

SUBTASK 72-21-02-930-001-H01

(1) Use a marker, G02448 [C05-003] to mark a number on each of the fan blades in sequence counterclockwise (CCW) forward looking aft (FLA) from 1 to 22.

NOTE: Refer to the Fan Blade Set Removal (TASK 72-21-02-020-802-H01) and the Marking Methods (TASK 70-11-07-900-802-H01) to identify the blade sequence before marking.

SUBTASK 72-21-02-930-002-H01

(2) Mark the F1.5 location on the abradable surface with a marker, G02448 [C05-003], as follows:

(a) Find the lowest axial splitline between the fan abradable panels.

NOTE: This is the 6:00 o'clock position of the engine. If the engine is on-wing, it is possible that the lowest split line will not be at the lowest position of the case.

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

(b) Mark the fan case from the forward edge of the trench filler axially across the abradable surface, at the 6:00 o'clock position.

(c) Make a mark to show the F1.5 axial measurement position as follows:

1) For pre SB 72-0622: Measure 8.3 in. (210 mm) aft from the leading edge of the trench filler or 18.57 in. (472 mm) from the face of the fan case forward flange. Refer to Figure 604.

2) For post SB 72-0622: Measure 18.57 in. (472 mm) from the face of the fan case forward flange. Refer to Figure 604.

NOTE: This will be the location to measure F1.5 for each blade.

NOTE: If you measure the fan blade tip clearance with your weight on the inlet, you will get incorrect indications.

SUBTASK 72-21-02-840-002-H01

(3) Make sure that the temperature of the fan rotor and the fan case are close to the air around the engine as follows:

NOTE: The fan blade tip clearances change with temperature. Thus, it is important to make sure that the fan tip clearance measurements and also the temperature measurements in the steps that follow are done as quickly as possible with no stops.

NOTE: It is recommended that the engine fan case and the fan rotor be closed to the same temperature as the air around the engine before you can begin this task. When possible, do the inspection indoors to prevent changes because of sun and wind. If this inspection must be done outdoors, you can average the fan case temperatures and fan rotor temperatures at 4 locations listed below.

(a) Use a 0-150 +/- 2 degrees F digital thermometer, STD-1336 to measure the temperature of the air around the engine, the average temperature of the fan rotor, and the average temperature of the fan case (Figure 604).

NOTE: When possible, do this inspection indoors to prevent temperature changes because of the sun and wind.

NOTE: Make sure that the engine has had time to cool down before you do the measurement.

NOTE: To find the fan case average temperature, average the temperature recorded around the case at 1:30 o'clock, 4:30 o'clock, 7:30 o'clock, and 10:30 o'clock. Measure all temperatures on the outside diameter of the fan case at the axial location shown in Figure 604.

NOTE: To find the fan rotor average temperature, average the temperature recorded around the spinner aft support ring or fan disk forward flange at 1:30 o'clock, 4:30 o'clock, 7:30 o'clock, and 10:30 o'clock.

(b) If the average temperatures of the fan rotor and the fan case are not more than 7.0°F or 3.9°C more or less than the air around the engine, continue to the step below to measure the blade tip clearance.

(c) If the average temperature recorded are more than 7.0°F or 3.9°C more or less than the air around the engine, do the temperature check step again.

(d) If all fan rotor temperatures recorded are not more than 7.0°F or 3.9°C from each other, continue to the step below to measure the blade tip clearance.

(e) If the average temperature recorded are more than 7.0°F or 3.9°C, do the temperature check step again.

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

(f) Record the fan case average temperature from the above step.

NOTE: You will need this temperature to calculate an overall fan case temperature.

SUBTASK 72-21-02-970-005-H01

CAUTION

MAKE SURE THAT YOU MEASURE THE FAN BLADE TIP CLEARANCE DIMENSION AT F1.5 AS SOON AS POSSIBLE AFTER YOU RECORD TEMPERATURES IN THE PREVIOUS STEP. IF YOU DO NOT FOLLOW THE INSTRUCTIONS IN THIS PROCEDURE, INCORRECT TIP CLEARANCE CALCULATIONS CAN OCCUR.

(4) Measure and record the fan blade tip clearance dimension at the F1.5 location as follows:

(a) Hold the blades near to the spinner and turn the fan rotor clockwise (CW) forward looking aft (FLA) two complete revolutions (Figure 604).

NOTE: As an alternative, you can turn the fan rotor counter clockwise (CCW) during F1.5 if it is difficult to turn the fan rotor in clockwise (CW).

(b) Continue to turn the rotor clockwise (CW) forward you look aft (FLA) until fan blade number 1 is aligned over the 6:00 o'clock positioning mark on the fan case.

NOTE: Do not hold the blade when you measure.

NOTE: As an alternative, you can turn the fan rotor counter clockwise (CCW) during F1.5 if it is difficult to turn the fan rotor in clockwise (CW).

(c) Do the steps that follow:

NOTE: If you measure the fan blade tip clearance with your weight on the inlet, you will get incorrect indications.

NOTE: Use any amount of shim stock in combination with the SPL-2317 tapered gauge to bring the gauge into its useful range of measurement.

1) Use the shim stock and a fan blade/case taper gauge, SPL-2317 to measure between the fan blade and the abradable surface at the F1.5 position (Figure 604).

2) Angle the shims away from the fan blade/case taper gauge, SPL-2317 to let the taper gauge move freely under the fan blade.

3) Add the shim stock thickness to the gauge reading and enter the F1.5 measurements on the F1.5 dimension form (Figure 605).

(d) Turn the fan rotor CW (FLA) to position the next fan blade at the 6:00 o'clock position at the measurement location.

1) Do the procedure above again to measure the fan tip clearance at F1.5 for blade 2 through 22.

SUBTASK 72-21-02-220-009-H01

CAUTION

MAKE SURE THAT YOU MEASURE THE FAN CASE AVERAGE TEMPERATURE AS SOON AS POSSIBLE AFTER YOU COMPLETE CLEARANCE DIMENSIONS THAT YOU MEASURED IN THE PREVIOUS STEP. IF YOU DO NOT FOLLOW THE INSTRUCTIONS IN THIS PROCEDURE, INCORRECT TIP CLEARANCE CALCULATIONS CAN OCCUR.

(5) Measure the fan case average temperature again.

(a) Measure the fan case average temperature and use the same procedure as in the step above.

1) Record this new temperature.

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

(b) Calculate the fan case average temperature as follows:

1) Get the average of the fan case temperature from the step above and the new fan case average temperature.

NOTE: This result is the overall fan case average temperature.

2) Record the overall average temperature (as calculated in the step before) on the F1.5 dimension form (Figure 605).

SUBTASK 72-21-02-940-001-H01

(6) Prepare for the measurement of the fan case F1.5 full indicator reading (FIR):

(a) Do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

(b) Remove all the fan blade platforms, do this task: Fan Blade Platform Removal, TASK 72-21-03-000-801-H01.

NOTE: If the fan blade root is lubricated again as shown in TASK 72-21-02-020-803-H01, it can have an effect on fan balance. It is possible to remove an install the single fan blade necessary for F1.5 measurement and not remove the original lubrication on the fan blade dovetail as well as in the fan disk slot.

(c) Remove the fan blade number 18. To remove fan blade number 18, do this task: One Fan Blade Removal, TASK 72-21-02-020-803-H01.

NOTE: The fan disk posts have numbers at the 1 and 5 positions to help you find blade 18. Blades are numbered counterclockwise (CCW).

(d) Attach the fan case runout, SPL-4398 fixture (9C3039G01) as follows:

1) Attach the Rabbet plate to the aft spinner mounting holes on the fan disc.

a) Put the Rabbet plate on the location rabbet of the fan rotor with the TOP VERT CL at the disc post marked 0/1.

b) Install the slave attachment bolts in the holes.

c) Make sure that the diamond pin on the plate is adjacent to the empty blade slot.

d) Tighten the bolts in a crisscross pattern.

2) Turn the rotor so that the diamond pin on the plate and the empty blade slot are at the 6:00 o'clock position.

3) Put the indicator set master against the outboard face of the fixture frame at the F1.5 position and zero the indicator.

4) Install the fixture frame.

a) Get the four 5/16 X 1-1/4 inch long bolts.

b) Hold the fixture frame against the plate and fit between the fan blades.

c) Find the pins on the rabbet plate in the outboard bushed holes in the fixture frame.

d) Attach the fixture frame with the four 5/16 inch bolts.

<1> Tighten the four bolts.

SUBTASK 72-21-02-970-006-H01

(7) Measure the fan case F1.5 full indicator reading (FIR) dimensions as follows:

(a) Make sure that the fan blade/case taper gauge, SPL-2317 or 0-0.150 Inch (0-3.81 mm) feeler gauge set, STD-1337 indicator is free to move 0.20 inch (5.08 mm) up and down.

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

(b) Hold the blades near to the spinner and turn the fan (and the fixture) CW forward looking aft (Figure 604).

NOTE: Do not hold the fixture to turn the fan blades.

(c) Turn the fan two to three revolutions and make sure the indicator reading goes back to zero before you take the measurements.

NOTE: Do not move the fan in the opposite direction when you get the measurements.

NOTE: If you measure the fan blade tip clearance with your weight on the inlet, you will get incorrect indications.

(d) Do the F1.5 runout measurements as follows:

1) Put the indicator tip on the case and zero the indicator.

2) Turn the fan blades and read the remote display on the F1.5 indicator to find the maximum inner movement of the indicator.

NOTE: The indicator value should decrease as the fan case radius decreases. The indicator can incorrectly read positive as the fan case radius gets smaller. To check this, lift the indicator off the abradable surface. Reverse the readout on the display if it is necessary. The readout should read positive when the case radius increases.

3) Zero the indicator at the location of maximum inner movement of the indicator (location of the smallest fan case radius).

4) Turn the fan rotor to put the indicator at the 6:00 o'clock position.

5) Enter the fan blade/case taper gauge, SPL-2317 or 0-0.150 Inch (0-3.81 mm) feeler gauge set, STD-1337 indicator reading (at the 6:00 o'clock position) on the F1.5 FIR Dimensions Form.

6) Put a mark on the abradable surface with a temporary marker, G02448 [C05-003] or Scotch Flatback Masking Tape 250, G00270 to mark the circumferential location of the fan blade leading edge nose (at the blade tip) for 2 different fan blades.

NOTE: These marks will help you find how far to rotate the fan rotor between FIR readings.

7) Turn the fan CW forward looking aft until the subsequent blade tip is at the marks.

8) Enter the indicator reading on the F1.5 FIR dimensions form (Figure 606).

9) Do the above measurements until you have 22 F1.5 FIR readings around the case.

(e) Remove the runout measurement fixture.

SUBTASK 72-21-02-970-007-H01

(8) Calculate the corrected F1.5 maximum and minimum dimension (blade tip clearance for each of the 22 positions) as follows (Figure 608):

NOTE: The temperature correction factor adjusts for the fan case and rotor as they expand and get smaller because of differences in temperature. The temperature correction will add 0.00063 inch (0.01600 mm) to F1.5 for each °F of average temperature of the fan case that is below 68.0°F (20.0°C). The correction will decrease F1.5 measurements by 0.00063 (0.01600 mm) for each °F of average temperature of the fan case that is above 68.0°F (20.0°C). Refer to the fan blade tip clearance temperature correction factors.

(a) Use the data from the F1.5 Dimensions Form, the F1.5 FIR Dimensions Form, and the Temperature Correction Form to calculate the corrected F1.5 fan blade clearance maximum and minimum dimensions (Figure 605, Figure 606, Figure 609, Figure 608).

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

(b) The corrected F1.5 fan blade tip clearance dimensions should be in these limits:

1) F1.5 = 0.236 in. (5.994 mm) - 0.486 in. (12.34 mm)

SUBTASK 72-21-02-970-008-H01

(9) Calculate the corrected average F1.5 dimensions (average blade, average case clearances) for the engine (Figure 608).

NOTE: The temperature correction factor adjusts for the fan case and rotor as they expand and get smaller because of differences in temperature. The temperature correction will add 0.00063 inch (0.01600 mm) to F1.5 for each °F of average temperature of the fan case that is below 68.0°F (20.0°C). The correction will decrease F1.5 measurements by 0.00063 inch (0.01600 mm) for each °F the temperature if the average temperature of the fan case that is above 68°F (20.0°C). Refer to the fan blade tip clearance temperature correction factors (Figure 609).

(a) Use the F1.5 clearances from the F1.5 Dimensions Form to calculate the 22 blade average (Figure 605).

(b) Use the data from the F1.5 FIR Dimensions Form to calculate the average F1.5 FIR at the 22 fan case positions (Figure 606).

(c) Use the average data from the F1.5 Dimensions Form, the F1.5 FIR Dimensions Form, and the Temperature Correction Form to calculate the corrected average F1.5 fan blade clearances (Figure 605, Figure 606, Figure 609).

(d) The corrected average F1.5 fan blade clearances must be in these limits:

1) F1.5 = 0.277-0.376 inch (7.05-9.55 mm).

SUBTASK 72-21-02-710-009-H01

(10) If the corrected average F1.5 fan blade tip clearance is not in the limits, contact GE Fleet Support for additional assistance.

SUBTASK 72-21-02-710-010-H01

(11) If the corrected average F1.5 fan blade tip clearance is in limits, do these steps that follow:

NOTE: If the fan blade root is lubricated again as shown in TASK 72-21-02-020-803-H01, it can have an effect on fan balance. It is possible to remove an install the single fan blade necessary for F1.5 measurement and not remove the original lubrication on the fan blade dovetail as well as in the fan disk slot.

(a) Install the fan blade number 18. (TASK 72-21-02-400-803-H01).

(b) Install all the fan blade platforms (TASK 72-21-03-400-801-H01).

(c) Do this task: Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-080-006-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

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

SUBTASK 72-21-02-860-016-H01

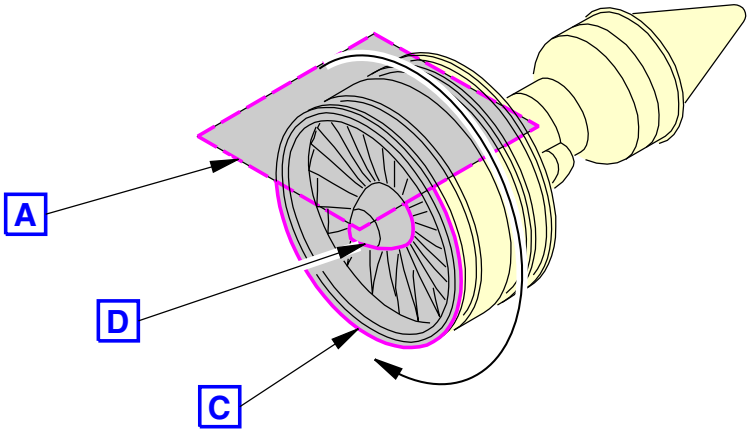
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

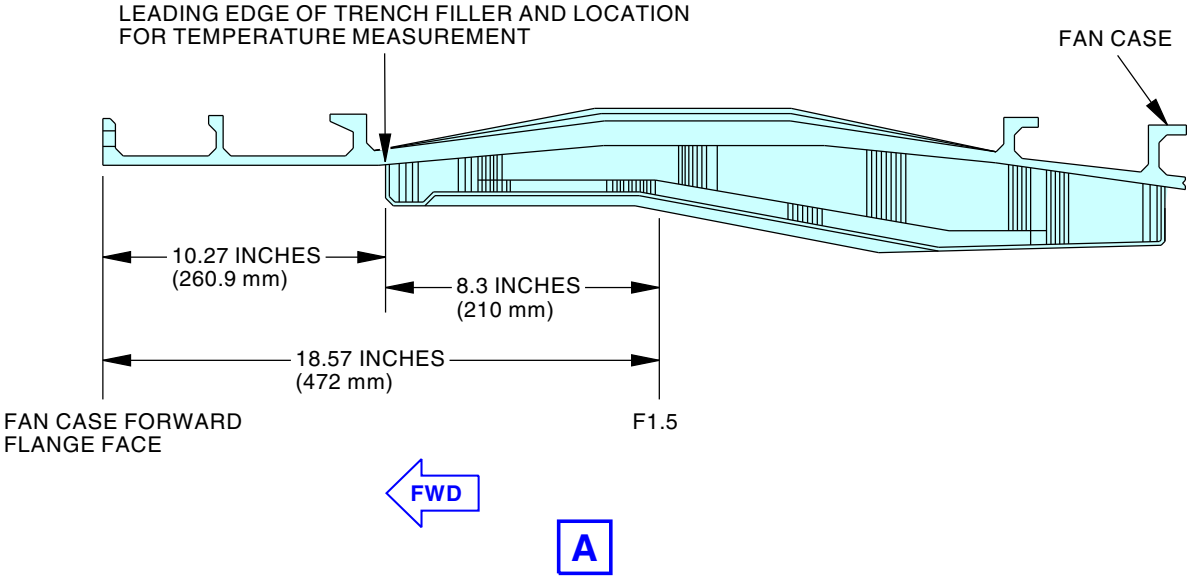
Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



**ROTATE ENGINE IN CLOCKWISE DIRECTION
WHEN TAKING MEASUREMENTS
(VIEW IN THE AFT DIRECTION)**

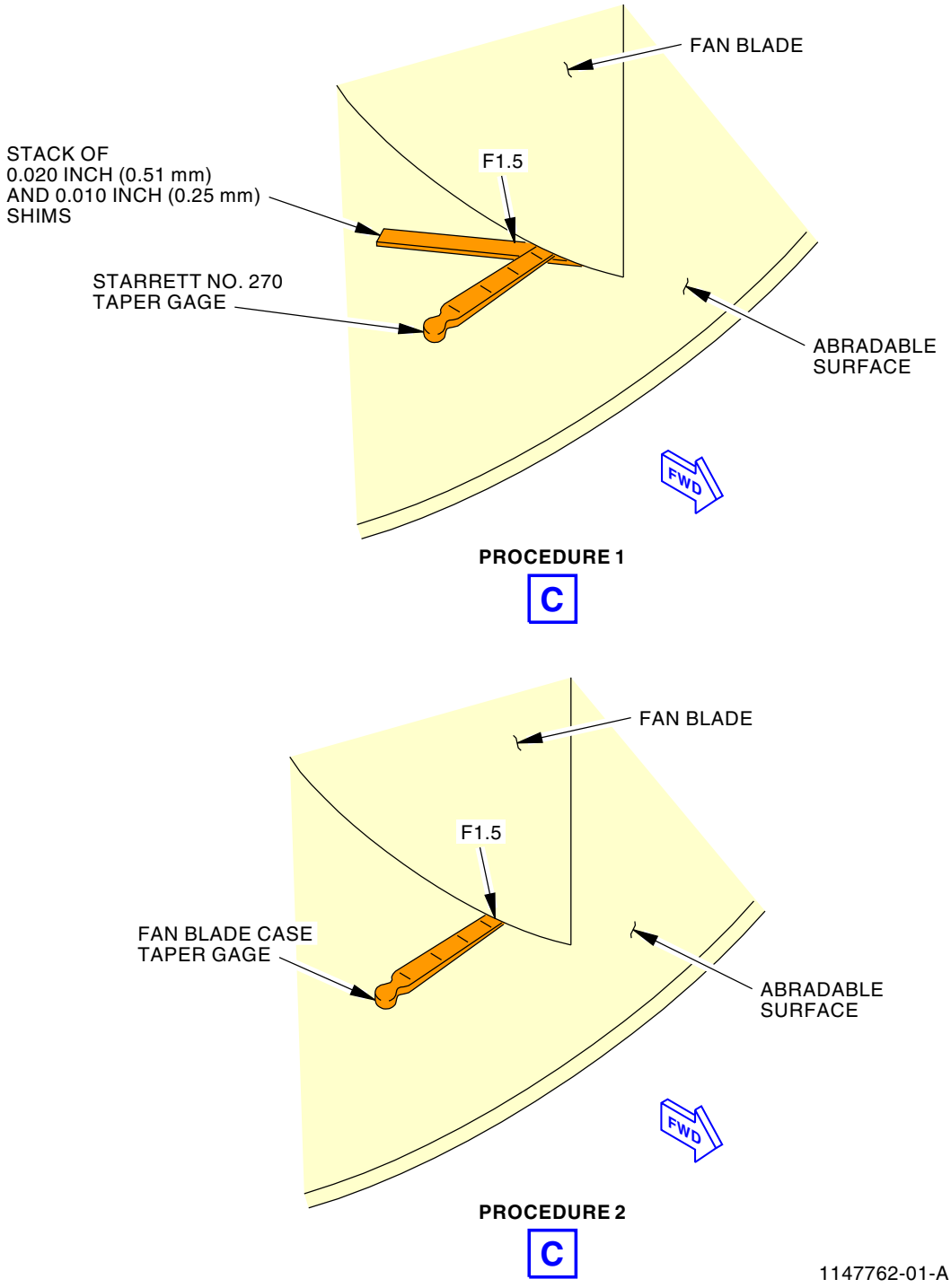


5022855-00

M06831 S0004285859_V4

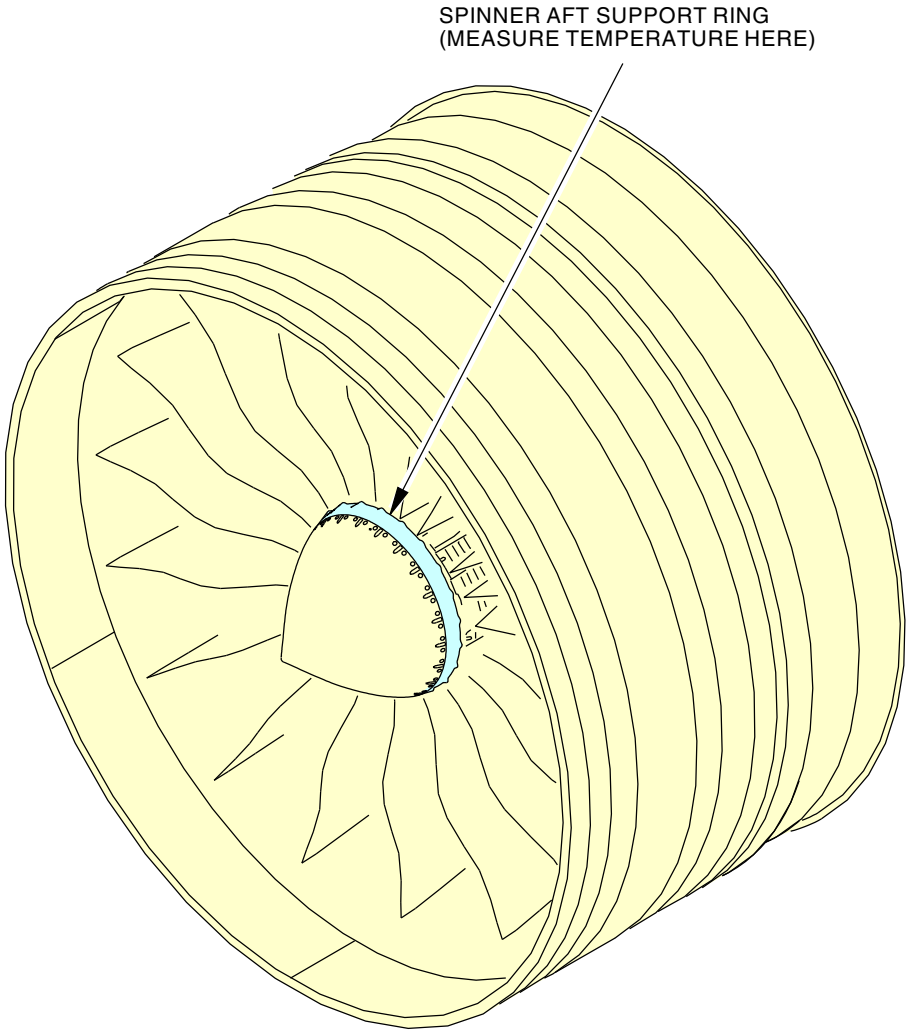
**Fan Blade Tip Clearance Measurement
Figure 604/72-21-02-990-811-H01 (Sheet 1 of 3)**

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



Fan Blade Tip Clearance Measurement
Figure 604/72-21-02-990-811-H01 (Sheet 2 of 3)

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



D

NOTE:

IF SPINNER IS REMOVED, TAKE TEMPERATURE MEASUREMENT OF THE ROTOR ON THE FAN DISK FORWARD FLANGE (AT THE LOCATION WHERE THE SPINNER AFT SUPPORT RING ATTACHES TO THE FAN DISK).

1199619-00-A

M06833 S0004285861_V2

Fan Blade Tip Clearance Measurement
Figure 604/72-21-02-990-811-H01 (Sheet 3 of 3)

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

F1.5 DIMENSIONS MEASURED AT THE 6 O'CLOCK POSITION

AVERAGE FAN CASE TEMPERATURE_____

FAN BLADE	F1.5 DIMENSION
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____
9	_____
10	_____
11	_____
12	_____
13	_____
14	_____
15	_____
16	_____
17	_____
18	_____
19	_____
20	_____
21	_____
22	_____

$$\text{AVERAGE F1.5} = \frac{\left(\text{F1.5 (BLADE 1)} + \text{F1.5 (BLADE 2)} + (\ldots+)\text{F1.5 (BLADE 22)}\right)}{22} = _____$$

LONGEST F1.5 FAN BLADE NO._____ F1.5 DIMENSION_____

SHORTEST F1.5 FAN BLADE NO._____ F1.5 DIMENSION_____

NOTE: THE LONGEST FAN BLADE IS THE BLADE WITH THE SMALLEST F1.5 CLEARANCE.
THE SHORTEST FAN BLADE IS THE BLADE WITH LARGEST F1.5 CLEARANCE.

M06834 S0004285862_V1

F1.5 Dimensions Form
Figure 605/72-21-02-990-812-H01

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

FAN CASE FIR @ F1.5 AS MEASURED WITH A DIAL INDICATOR.
SET THE INDICATOR TO ZERO FOR THE MINIMUM FAN CASE ABRADABLE RADIUS.

POSITION	FIR @ F1.5 POSITION
1 (6:00)	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____
9	_____
10	_____
11	_____
12	_____
13	_____
14	_____
15	_____
16	_____
17	_____
18	_____
19	_____
20	_____
21	_____
22	_____

$$\text{AVERAGE CASE FIR} = \frac{\left(\text{(FIR @ F1.5)}_{@1} + \text{(FIR @ F1.5)}_{@2} + (\ldots) + \text{(FIR @ F1.5)}_{@22}\right)}{22} = _____$$

NOTE: ALL DIMENSIONS MUST BE POSITIVE (+).

M06835 S0004285863_V1

F1.5 FIR Dimensions Form
Figure 606/72-21-02-990-813-H01

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

CALCULATE THE CORRECTED FAN BLADE TIP CLEARANCE DIMENSION (MAXIMUM AND MINIMUM) FOR EACH BLADE WITH THE FOLLOWING EQUATIONS:

1. MAXIMUM CORRECTED FAN BLADE TIP CLEARANCE (F1.5):

MAXIMUM F1.5 BLADE TIP DIMENSION (MEASURED AT THE 6:00 O'CLOCK POSITION FROM FIGURE 604) _____

MEASURED MAXIMUM F1.5 FIR DIMENSION (AT LOCATION ON CASE WHERE THE CLEARANCE IS LARGEST, FROM FIGURE 605) ADD (+) _____

MEASURED F1.5 FIR DIMENSION (6:00 O'CLOCK POSITION FROM FIGURE 605) SUBTRACT (-) _____

TEMPERATURE CORRECTION FACTOR (FROM FIGURE 608) ADD OR SUBTRACT _____

NOTE: USE AVERAGE FAN CASE TEMPERATURE FROM FIGURE 604.

MAXIMUM CORRECTED F1.5 FAN BLADE TIP CLEARANCE DIMENSION EQUAL (=) _____

IF F1.5 MAX CORRECTED FAN TIP CLEARANCE FOR THE SHORTEST BLADE IS IN THE LIMIT SHOWN IN SUBTASK 970-007-H01, IT IS NOT NECESSARY TO COMPLETE SHEET 2 OF FIG. 606. DO THE PROCEDURE AGAIN FOR EACH FAN BLADE AND RECORD ON SHEET 2 OF FIG. 606 IF F1.5 MAX CORRECTED TIP CLEARANCE FOR THE SHORTEST BLADE IS NOT IN THE LIMIT.

2. MINIMUM CORRECTED FAN BLADE TIP CLEARANCE (F1.5):

MINIMUM F1.5 BLADE TIP DIMENSION (MEASURED AT THE 6:00 O'CLOCK POSITION FROM FIGURE 604) _____

MEASURED MINIMUM F1.5 FIR DIMENSION. THIS VALUE SHOULD EQUAL ZERO. IF NOT, REPEAT MEASUREMENT TO MAKE SURE PROCEDURES ARE DONE CORRECTLY. ADD (+) _____-0-_____

MEASURED F1.5 FIR DIMENSION (6:00 O'CLOCK POSITION FROM FIGURE 605) SUBTRACT (-) _____

TEMPERATURE CORRECTION FACTOR (FROM FIGURE 608) ADD OR SUBTRACT _____

NOTE: USE AVERAGE FAN CASE TEMPERATURE FROM FIGURE 604.

MINIMUM CORRECTED F1.5 FAN BLADE TIP CLEARANCE DIMENSION EQUAL (=) _____

IF F1.5 MIN CORRECTED FAN TIP CLEARANCE FOR THE LONGEST BLADE IS IN THE LIMIT SHOWN IN SUBTASK 970-007-H01, IT IS NOT NECESSARY TO COMPLETE SHEET 2 OF FIG. 606. DO THE PROCEDURE AGAIN FOR EACH FAN BLADE AND RECORD ON SHEET 2 OF FIG. 606 IF F1.5 MIN CORRECTED TIP CLEARANCE FOR THE LONGEST BLADE IS NOT IN THE LIMIT.

M06836 S0004285864_V3

Corrected Fan Blade Clearances Calculations Forms
Figure 607/72-21-02-990-814-H01 (Sheet 1 of 2)

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

CALCULATE THE MAXIMUM AND MINIMUM CORRECTED FAN BLADE TIP CLEARANCES FOR EACH FAN BLADE (REFER TO FIG. 606, SHEET 1).

FAN BLADE	CORRECTED MAX. F1.5	CORRECTED MIN. F1.5
1	_____	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____
11	_____	_____
12	_____	_____
13	_____	_____
14	_____	_____
15	_____	_____
16	_____	_____
17	_____	_____
18	_____	_____
19	_____	_____
20	_____	_____
21	_____	_____
22	_____	_____

M06837 S0004285865_V2

Corrected Fan Blade Clearances Calculations Forms
Figure 607/72-21-02-990-814-H01 (Sheet 2 of 2)

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

CALCULATE THE CORRECTED AVERAGE FAN BLADE TIP CLEARANCE DIMENSION WITH THE EQUATION THAT FOLLOWS:

		F1.5
AVERAGE F1.5 (22 BLADE AVERAGE AT 6:00 O'CLOCK POSITION FROM FIGURE 604)	ADD (+)	_____
FAN CASE F1.5 FIR (MEASURED AT THE 6:00 O'CLOCK POSITION FROM FIGURE 605)	SUBTRACT (-)	_____
AVERAGE F1.5 FIR (AVERAGE OF 22 POSITIONS FROM FIGURE 605)	ADD (+)	_____
TEMPERATURE CORRECTION FACTOR (FROM FIGURE 608)	ADD (+)	_____
(NOTE: USE AVERAGE FAN CASE TEMPERATURE FROM FIGURE 604).		
CALCULATED AVERAGE F1.5 FAN BLADE TIP CLEARANCE DIMENSION	EQUAL (=)	_____

M06838 S0004285866_V2

Corrected Average Fan Blade Tip Clearances Calculations Form
Figure 608/72-21-02-990-815-H01

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

INSPECTION TEMPERATURE		CORRECTION FACTOR		INSPECTION TEMPERATURE		CORRECTION FACTOR	
DEGREE F	DEGREE C	(IN.)	(mm)	DEGREE F	DEGREE C	(IN.)	(mm)
120	48.9	-0.033	-0.83	91	32.8	-0.014	-0.37
119	48.3	-0.032	-0.82	90	32.2	-0.014	-0.35
118	47.8	-0.032	-0.80	89	31.7	-0.013	-0.34
117	47.2	-0.031	-0.78	88	31.1	-0.013	-0.32
116	46.7	-0.030	-0.77	87	30.6	-0.012	-0.30
115	46.1	-0.030	-0.75	86	30.0	-0.011	-0.29
114	45.6	-0.029	-0.74	85	29.4	-0.011	-0.27
113	45.0	-0.028	-0.72	84	28.9	-0.010	-0.26
112	44.4	-0.028	-0.70	83	28.3	-0.009	-0.24
111	43.9	-0.027	-0.69	82	27.8	-0.009	-0.22
110	43.3	-0.026	-0.67	81	27.2	-0.008	-0.21
109	42.8	-0.026	-0.66	80	26.7	-0.008	-0.19
108	42.2	-0.025	-0.64	79	26.1	-0.007	-0.18
107	41.7	-0.025	-0.62	78	25.6	-0.006	-0.16
106	41.1	-0.024	-0.61	77	25.0	-0.006	-0.14
105	40.6	-0.023	-0.59	76	24.4	-0.005	-0.13
104	40.0	-0.023	-0.58	75	23.9	-0.004	-0.11
103	39.4	-0.022	-0.56	74	23.3	-0.004	-0.10
102	38.9	-0.021	-0.54	73	22.8	-0.003	-0.08
101	38.3	-0.021	-0.53	72	22.2	-0.003	-0.06
100	37.8	-0.020	-0.51	71	21.7	-0.002	-0.05
99	37.2	-0.020	-0.50	70	21.1	-0.001	-0.03
98	36.7	-0.019	-0.48	69	20.6	-0.000	-0.02
97	36.1	-0.018	-0.46	68	20.0	0.000	0.00
96	35.6	-0.018	-0.45	67	19.4	0.000	0.02
95	35.0	-0.017	-0.43	66	18.9	0.001	0.03
94	34.4	-0.016	-0.42	65	18.3	0.002	0.05
93	33.9	-0.016	-0.40	64	17.8	0.003	0.06
92	33.3	-0.015	-0.38	63	17.2	0.003	0.08

M06839 S0004285867_V1

Fan Blade Tip Clearance Temperature Correction Factors
Figure 609/72-21-02-990-816-H01 (Sheet 1 of 3)

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

INSPECTION TEMPERATURE		CORRECTION FACTOR		INSPECTION TEMPERATURE		CORRECTION FACTOR	
DEGREE F	DEGREE C	(IN.)	(mm)	DEGREE F	DEGREE C	(IN.)	(mm)
62	16.7	0.004	0.10	34	1.1	0.021	0.54
61	16.1	0.004	0.11	33	0.6	0.022	0.56
60	15.6	0.005	0.13	32	0.0	0.023	0.58
59	15.0	0.006	0.14	31	−0.6	0.023	0.59
58	14.4	0.006	0.16	30	−1.1	0.024	0.61
57	13.9	0.007	0.18	29	−1.7	0.025	0.62
56	13.3	0.008	0.19	28	−2.2	0.025	0.64
55	12.8	0.008	0.21	27	−2.8	0.026	0.66
54	12.2	0.009	0.22	26	−3.3	0.026	0.67
53	11.7	0.009	0.24	25	−3.9	0.027	0.69
52	11.1	0.010	0.26	24	−4.4	0.028	0.70
51	10.6	0.011	0.27	23	−5.0	0.028	0.72
50	10.0	0.011	0.29	22	−5.6	0.029	0.74
49	9.4	0.012	0.30	21	−6.1	0.030	0.75
48	8.9	0.013	0.32	20	−6.7	0.030	0.77
47	8.3	0.013	0.34	19	−7.2	0.031	0.78
46	7.8	0.014	0.35	18	−7.8	0.032	0.80
45	7.2	0.014	0.37	17	−8.3	0.032	0.82
44	6.7	0.015	0.38	16	−8.9	0.033	0.83
43	6.1	0.016	0.40	15	−9.4	0.033	0.85
42	5.6	0.016	0.42	14	−10.0	0.034	0.86
41	5.0	0.017	0.43	13	−10.6	0.035	0.88
40	4.4	0.018	0.45	12	−11.1	0.035	0.90
39	3.9	0.018	0.46	11	−11.7	0.036	0.91
38	3.3	0.019	0.48	10	−12.2	0.037	0.93
37	2.8	0.020	0.50	9	−12.8	0.037	0.94
36	2.2	0.020	0.51	8	−13.3	0.038	0.96
35	1.7	0.021	0.53	7	−13.9	0.038	0.98

M06840 S0004285868_V1

Fan Blade Tip Clearance Temperature Correction Factors
Figure 609/72-21-02-990-816-H01 (Sheet 2 of 3)

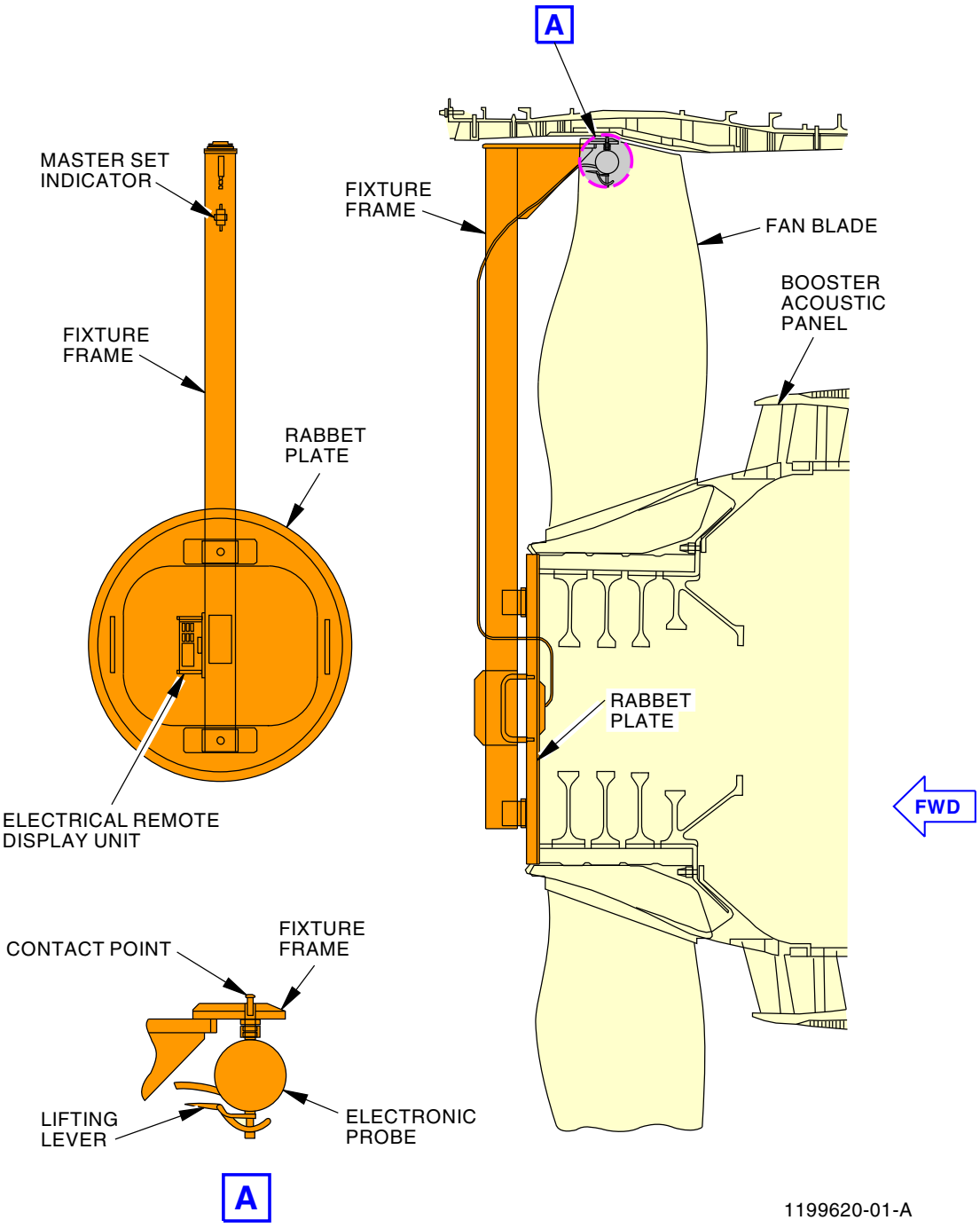
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

INSPECTION TEMPERATURE		CORRECTION FACTOR		INSPECTION TEMPERATURE		CORRECTION FACTOR	
DEGREE F	DEGREE C	(IN.)	(mm)	DEGREE F	DEGREE C	(IN.)	(mm)
6	-14.4	0.039	0.99	-8	-22.2	0.048	1.22
5	-15.0	0.040	1.01	-9	-22.8	0.049	1.23
4	-15.6	0.040	1.02	-10	-23.3	0.049	1.25
3	-16.1	0.041	1.04	-11	-23.9	0.050	1.26
2	-16.7	0.042	1.06	-12	-24.4	0.050	1.28
1	-17.2	0.042	1.07	-13	-25.0	0.051	1.30
0	-17.8	0.043	1.09	-14	-25.6	0.052	1.31
-1	-18.3	0.043	1.10	-15	-26.1	0.052	1.33
-2	-18.9	0.044	1.12	-16	-26.7	0.053	1.34
-3	-19.4	0.045	1.14	-17	-27.2	0.054	1.36
-4	-20.0	0.045	1.15	-18	-27.8	0.054	1.38
-5	-20.6	0.046	1.17	-19	-28.3	0.055	1.39
-6	-21.1	0.047	1.18	-20	-28.9	0.055	1.41
-7	-21.7	0.047	1.20	----	----	----	----

M06841 S0004285869_V1

Fan Blade Tip Clearance Temperature Correction Factors
Figure 609/72-21-02-990-816-H01 (Sheet 3 of 3)

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



Fan Case Runout Measurement Fixture
Figure 610/72-21-02-990-817-H01

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

FAN BLADE - CLEANING/PAINTING

1. General

A. This procedure contains one task:

(1) A cleaning of the fan blades.

TASK 72-21-02-100-801-H01

2. Fan Blade Cleaning

A. General

(1) This task gives the instructions to clean the fan blades.

B. Tools/Equipment

Reference	Description
STD-120	Bottle - Spray
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. Consumable Materials

Reference	Description	Specification
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G02348 [C10-010]	Pad - Abrasive - Scotch-Brite 7447	
G02351 [C04-140]	Cleaner - Liquid Gas Path	MIL-PRF-85704

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Fan Blade Cleaning

SUBTASK 72-21-02-865-003-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-02-869-005-H00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and engine.

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

F. Procedure

SUBTASK 72-21-02-110-001-H00

WARNING DO NOT GET CLEANING SOLUTION IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM CLEANING SOLUTION. PUT ON GOGGLES, AND GLOVES WHEN YOU USE CLEANING SOLUTION. CLEANING SOLUTION IS POISONOUS, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

WARNING KEEP THE CLEANING SOLUTIONS AWAY FROM SPARKS, FLAMES, AND HEAT. CLEANING SOLUTIONS ARE FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL.

(1) Prepare a cleaning solution with 20 percent (by volume) of gas path cleaner, G02351 [C04-140] and 80 percent (by volume) of water, or use a pre-mixed cleaning solution.

(a) Use water that meets these specifications:

NOTE: Water that is drinkable usually meets the criteria that follows:

1) Total dissolved solids - 500 ppm or less
2) Chlorides - 250 ppm or less
3) Fluoride - 2 ppm or less.
4) Sodium - 20 ppm or less
5) Sulfate - 250 ppm or less
6) PH - 6.4 to 8.5.

SUBTASK 72-21-02-160-005-H00

(2) Clean the fan blades as follows:

(a) Apply room temperature cleaning solution to the two sides of the fan blades with a spray bottle, STD-120.

(b) Clean the fan blades with a clean cotton wiper, G00034 moist with the cleaning solution to remove light particles.

1) Flush the fan blades with room temperature clean water from a spray bottle, STD-120.
2) Dry the blades with a clean cotton wiper, G00034.

(c) If necessary, remove the heavier particles from the fan blades with a Scotch-Brite 7447 pad, G02348 [C10-010] moist with cleaning solution.

1) Flush the fan blades with warm clean water from a spray bottle, STD-120.
2) Dry the blades with a clean cotton wiper, G00034.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-869-003-H00

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

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

SUBTASK 72-21-02-869-004-H00

(2) Make sure that there is no debris, tools, or other unwanted material in the inlet.

SUBTASK 72-21-02-865-004-H00

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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

FAN BLADE - REPAIRS

1. General

A. This procedure has four tasks:

(1) Fan blade metal leading edge (blend) repair

(2) Fan blade (local area paint touch-up) repair

(3) Fan blade platform wear strip repair

(4) Fan blade AF32 coating repair.

TASK 72-21-02-300-801-H01

2. Fan Blade Metal Leading Edge (Blend) Repair

A. General

(1) This repair procedure gives instructions to do blend repairs for nicks, dents, and scratches on the fan blade metal leading edge. This repair is applicable to the metal leading edge, titanium material of the fan blade only.

B. References

Reference	Title
72-21-00-200-803-H01	Fan Blade (Scheduled Maintenance Requirement) Inspection (P/B 601)
72-21-02-200-801-H01	Fan Blade Inspection (P/B 601)

C. Tools/Equipment

Reference	Description
STD-562	Lens - Magnifying, 10x
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
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	
G02348 [C10-010]	Pad - Abrasive - Scotch-Brite 7447	
G02494 [C10-062]	Cloth - Abrasive, Water Proof Silicon Carbide, 2X16 LDG, 1/4 inch Staggered, Slashed Loadings, 320 grit	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

F. Prepare for the repair

SUBTASK 72-21-02-865-001-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-02-869-001-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

G. Blend Repair Procedure on the Fan Blade Nose Area of the Metal Leading Edge for Nicks, Dents or Scratches

SUBTASK 72-21-02-220-010-H01

(1) Examine the fan blades for all damage that is more than the permitted limits.

(a) Do these tasks: Fan Blade Inspection, TASK 72-21-02-200-801-H01 and Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01.

SUBTASK 72-21-02-160-001-H01

(2) Do these steps to clean the repaired areas.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION

DO NOT CLEAN AREAS OF THE BLADE THAT ARE PAINTED OR HAVE A URETHANE COATING WITH ISOPROPYL ALCOHOL. ISOPROPYL ALCOHOL CAN CAUSE DETERIORATION OR MAKE THE PAINT OR URETHANE COATING SOFT.

(a) Put alcohol, B00130 on a clean cotton wiper, G00034 to make moist.

NOTE: Do not over moist the cloth.

(b) Use the cotton wiper, G00034 and wipe over the repaired areas.

(c) If the cotton wiper, G00034 is dirty, turn the cotton wiper, G00034 to a clean area and wipe the repaired areas again.

(d) Wipe the repaired areas with a dry clean cotton wiper, G00034.

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

SUBTASK 72-21-02-320-001-H01

WARNING DO NOT BREATH THE PARTICLES FROM BLENDING OR LET THE PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(3) Do these steps to blend the fan blade nose area of the metal leading edge for nicks, dents or scratches.

(a) Find the depth of the scratch, dent, or nick.

(b) Make a mark around the damaged area with a marker, G02061.

(c) Make sure the damage to the leading edge is only in the local area and that the metal leading edge has not been bent from its initial contour.

NOTE: Bends can be found visually as you look for local shape irregularities compared to the undamaged areas and undamaged blades.

NOTE: This repair does not apply to bent metal leading edge.

(d) Do a tap inspection of the bond joints on the metal leading edge sidewalls as follows:

1) Tap around the damaged area. Tap for not less than 6.0 inches (152.0 mm) on each side of the damage to the aft edge of the blade metal leading edge.

2) Tap on the two sides of the blade.

NOTE: Do not tap forward of the bond joint of the metal leading edge.

3) If a solid click is heard, the area does not have disbonds.

4) If the hollow sound is heard, the area has disbonds.

NOTE: This repair does not apply to disbonded areas of the metal leading edge.

(e) Find the repairable damage.

1) Do these tasks: Fan Blade Inspection, TASK 72-21-02-200-801-H01 and Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01.

(f) Damage that is not repairable by this procedure is.

1) Damage that is equal to or deeper than the maximum blend depth permitted.

2) Bending of the leading edge nose

3) Metal leading edge that is disbonded.

CAUTION MAKE SURE THAT YOU DO NOT REMOVE TOO MUCH MATERIAL FROM THE LEADING EDGE OF THE BLADE. THE METAL LEADING EDGE MUST BE REPLACED IF TOO MUCH MATERIAL IS REMOVED.

(g) Manually blend the nicks, dents, scratches and tears on the metal leading edge of the blade as follows:

1) Use a fine file 320 grit abrasive cloth, G02494 [C10-062], or an abrasive stone to blend the nicks, dents, scratches, or tears.

NOTE: Do not make a thin or deep blend in the metal leading edge.

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

2) Make sure the blend length to length ratio is not less than 8 to 1 with a minimum fillet radius of 0.25 inch (6.40 mm).

NOTE: When a nick or dent has a depth of D and is not more than 4D of the leading edge tip, keep the depth D to the tip during the blend. Other leading edge defects use the 4D blending ratio.

3) Make sure the blend is smooth with adjacent areas and there are no sudden changes in the contour of the blend.

4) Examine the repaired area of the metal leading edge with a 10x magnifying lens, STD-562 and bright light.

5) Make sure there is no crack.

6) Use 320 grit abrasive cloth, G02494 [C10-062] to remove the material and make the surface smooth around the defect.

(h) Do a inspection of the repaired areas.

1) Measure the depth of the blend repair and compare the depth to the adjacent areas of the metal leading edge.

a) Make sure the blend is within limits.

2) Do a touch and visual inspection of the surface finish of the repaired areas.

a) Make sure that the surface finish of the repaired area is the same as the adjacent area.

(i) If it is necessary, polish the blend repair of the metal leading edge to the initial surface finish.

NOTE: Use 320 grit abrasive cloth, G02494 [C10-062] or Scotch-Brite 7447 pad, G02348 [C10-010] with a small air grinder.

CAUTION

DO NOT LET THE AREA YOU ARE POLISHING GET HOT. IF YOU ALLOW THE AREA TO GET HOT YOU CAN DAMAGE THE ADHESIVE AND COMPOSITE LAMINATE OF THE FAN BLADE.

1) If you use the Scotch-Brite 7447 pad, G02348 [C10-010], do these steps:

a) Use Scotch-Brite 7447 pad, G02348 [C10-010] on a small air grinder.

b) Work slowly to prevent temperature damage to the adhesive and composite laminate.

c) Wipe metal with a moist cotton wiper, G00034. If the moisture on the metal dries quickly, allow the metal to cool and then continue to polish.

SUBTASK 72-21-02-160-002-H01

(4) Clean the blend repair of the blade with alcohol, B00130 and a clean cotton wiper, G00034.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

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

(WARNING PRECEDES)

CAUTION

DO NOT CLEAN AREAS OF THE BLADE THAT ARE PAINTED OR HAVE A URETHANE COATING WITH ISOPROPYL ALCOHOL. ISOPROPYL ALCOHOL CAN CAUSE DETERIORATION OR MAKE THE PAINT OR URETHANE COATING SOFT.

(a) Put alcohol, B00130 on a clean cotton wiper, G00034 to make moist.

NOTE: Do not over moist the cloth.

(b) Use the cotton wiper, G00034 and wipe across the repaired areas.

(c) If the cotton wiper, G00034 is dirty, turn the cotton wiper, G00034 to a clean area and wipe the repaired areas again.

(d) Wipe the repaired areas with a dry clean cotton wiper, G00034.

H. Blend Repair Procedure Not on the Fan Blade Nose Area of the Metal Leading Edge for Nicks, Dents or Scratches

SUBTASK 72-21-02-211-001-H01

(1) Examine the fan blades for all damage that is more than the permitted limits:

(a) Do these tasks: Fan Blade Inspection, TASK 72-21-02-200-801-H01 and Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01.

SUBTASK 72-21-02-160-003-H01

(2) Do these steps to clean the repaired areas:

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION

DO NOT CLEAN AREAS OF THE BLADE THAT ARE PAINTED OR HAVE A URETHANE COATING WITH ISOPROPYL ALCOHOL. ISOPROPYL ALCOHOL CAN CAUSE DETERIORATION OR MAKE THE PAINT OR URETHANE COATING SOFT.

(a) Put alcohol, B00130 on a clean cotton wiper, G00034 to make moist.

NOTE: Do not over moist the cloth.

(b) Use the cotton wiper, G00034 and wipe over the repaired areas.

(c) If the cotton wiper, G00034 is dirty, turn the cotton wiper, G00034 to a clean area and wipe the repaired areas again.

(d) Wipe the repaired areas with a dry clean cotton wiper, G00034.

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

SUBTASK 72-21-02-320-002-H01

WARNING DO NOT BREATH THE PARTICLES FROM BLENDING OR LET THE PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(3) Do these steps to blend the nicks, dents or scratches not on the fan blade nose area of the metal leading edge.

(a) Find the depth of the scratch, dent, or nick.

(b) Make a mark around the damaged area with a marker, G02061.

(c) Make sure the damage to the leading edge is only in the local area and that the metal leading edge has not been bent from its initial contour.

NOTE: Bends can be found visually as you look for local shape irregularities compared to the undamaged areas and undamaged blades.

NOTE: This repair does not apply to bent metal leading edge.

(d) Do a tap inspection of the bond joints on the metal leading edge as follows:

1) Tap around the damaged area.

a) Tap for not less than 6.0 inches (152.0 mm) on each side of the damage to the aft edge of the blade metal leading edge.

2) Tap on the two sides of the blade.

NOTE: Do not tap forward of the bond joint of the metal leading edge.

3) If a solid click is heard, the area does not have disbonds.

4) If the hollow sound is heard, the area has disbonds.

NOTE: This repair does not apply to disbonded areas of the metal leading edge.

(e) Find the repairable damage.

1) Do these tasks: Fan Blade Inspection, TASK 72-21-02-200-801-H01 and Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01.

(f) Damage that is not repairable by this procedure is.

1) Damage that is equal to or deeper than the maximum blend depth permitted.

2) Bending of the leading edge nose

3) Metal leading edge that is disbonded.

CAUTION MAKE SURE THAT YOU DO NOT REMOVE TOO MUCH MATERIAL FROM THE LEADING EDGE OF THE BLADE. THE METAL LEADING EDGE MUST BE REPLACED IF TOO MUCH MATERIAL IS REMOVED.

(g) Manually blend the nicks, dents, scratches and tears on the metal leading edge of the blade as follows:

1) Make sure you do not blend more than the depth of dent, scratch, or nick.

2) Remove high metal to produce a smooth contour with the adjacent material.

3) Make sure all blends of high metal are smooth with the adjacent areas.

4) Examine the repaired area of the metal leading edge with a 10x magnifying lens, STD-562 and bright light.

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

5) Make sure there is no crack.

(h) Do a inspection of the repaired areas.

1) Measure the depth of the blend repair and compare the depth to the adjacent areas of the metal leading edge.

a) Make sure the blend is within limits.

2) Do a touch and visual inspection of the surface finish of the repaired areas.

a) Make sure that the surface finish of the repaired area is the same as the adjacent area.

(i) If it is necessary, polish the blend repair of the metal leading edge to the initial surface finish.

NOTE: Use 320 grit abrasive cloth, G02494 [C10-062] or Scotch-Brite 7447 pad, G02348 [C10-010] with a small air grinder.

1) If you use the Scotch-Brite 7447 pad, G02348 [C10-010], do these steps:

CAUTION DO NOT LET THE AREA YOU ARE POLISHING GET HOT. IF YOU ALLOW THE AREA TO GET HOT YOU CAN DAMAGE THE ADHESIVE AND COMPOSITE LAMINATE OF THE FAN BLADE.

a) Use Scotch-Brite 7447 pad, G02348 [C10-010] on a small air grinder.

b) Work slowly to prevent temperature damage to the adhesive and composite laminate.

c) Wipe metal with a moist cotton wiper, G00034. If the moisture on the metal dries quickly, allow the metal to cool and then continue to polish.

SUBTASK 72-21-02-160-004-H01

(4) Clean the blend repair of the blade with alcohol, B00130 and a clean cotton wiper, G00034.

WARNING DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION DO NOT CLEAN AREAS OF THE BLADE THAT ARE PAINTED OR HAVE A URETHANE COATING WITH ISOPROPYL ALCOHOL. ISOPROPYL ALCOHOL CAN CAUSE DETERIORATION OR MAKE THE PAINT OR URETHANE COATING SOFT.

(a) Put alcohol, B00130 on a clean cotton wiper, G00034 to make moist.

NOTE: Do not over moist the cloth.

(b) Use the cotton wiper, G00034 and wipe across the repaired areas.

(c) If the cotton wiper, G00034 is dirty, turn the cotton wiper, G00034 to a clean area and wipe the repaired areas again.

(d) Wipe the repaired areas with a dry clean cotton wiper, G00034.

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

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-869-002-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the mats from the engine inlet cowl.

SUBTASK 72-21-02-865-002-H01

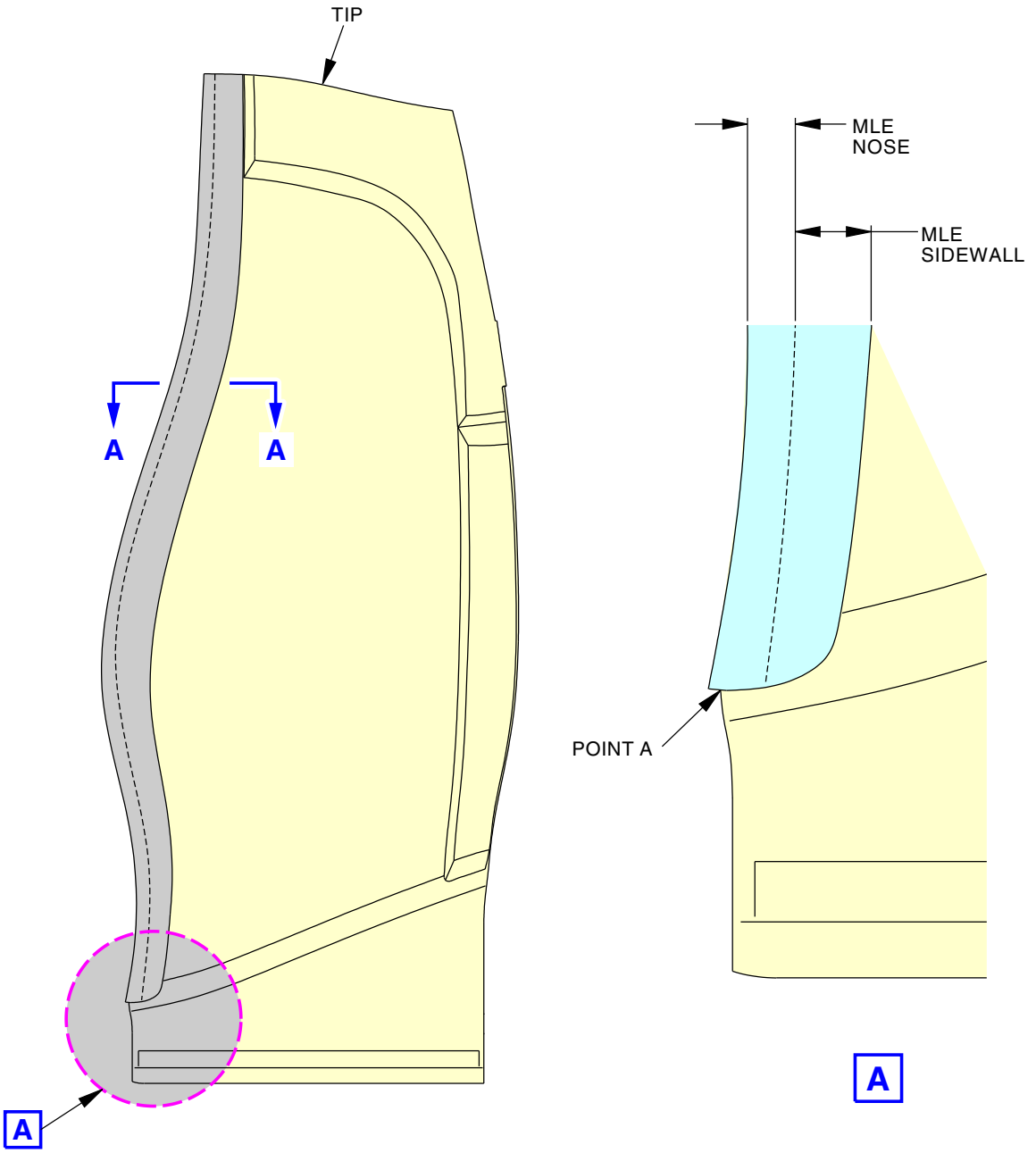
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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

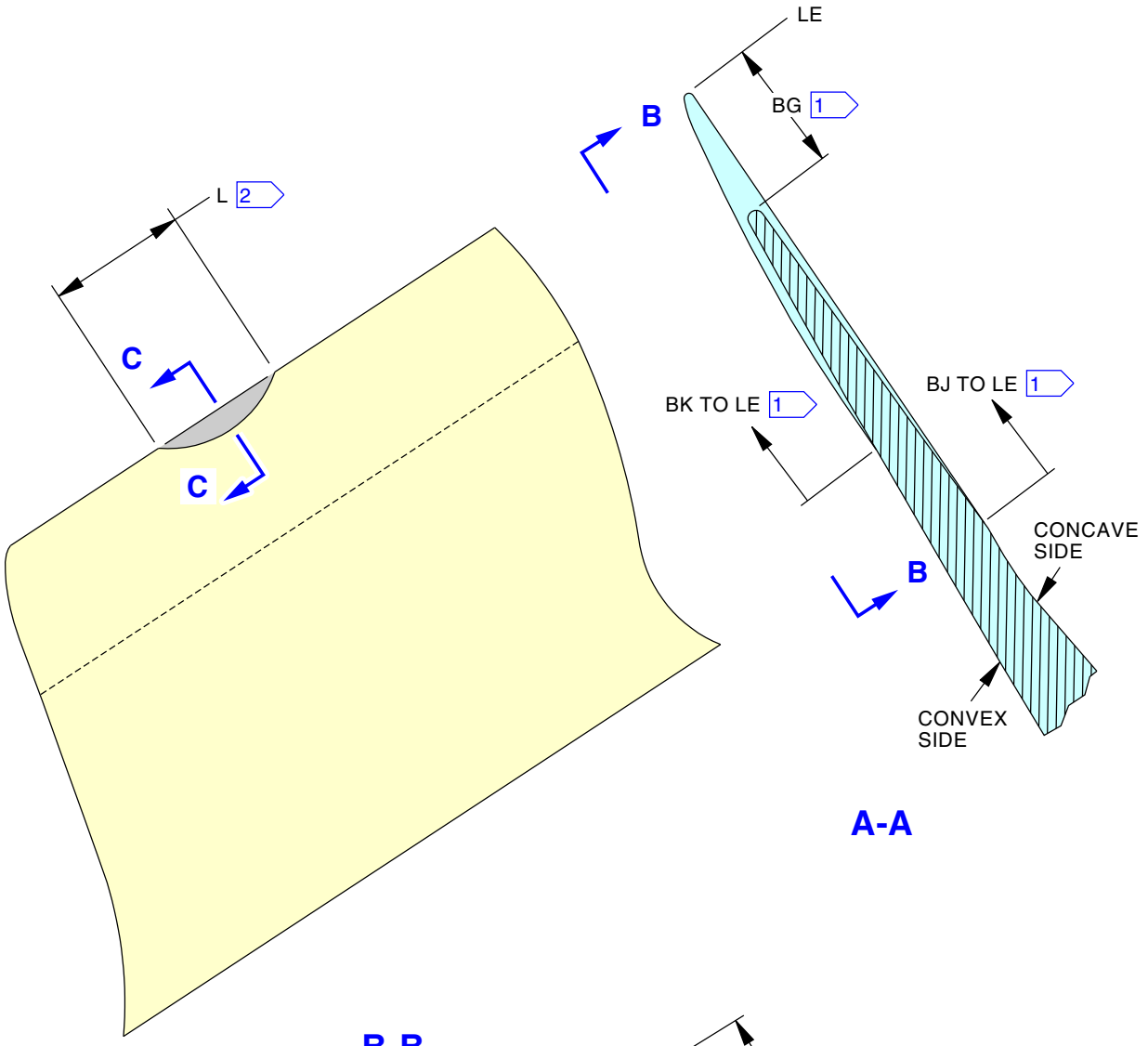


CONCAVE (SUCTION) SIDE

1201972-00-A
M06808 S0004285839_V2

Metal Leading Edge (MLE)
Figure 801/72-21-02-990-822-H01 (Sheet 1 of 4)

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



1 VALUES FOR BJ, BK AND BG ARE LISTED BY SPAN LOCATION IN FIGURE TITLED LEADING EDGE DIMENSIONS.

2 FOR VALUE OF L, SEE FIGURE TITLED BLENDED NOSE PROFILE.

3 FOR CONTOUR GUIDELINES, SEE FIGURE TITLED NOSE BLEND CONTOUR.

1208973-00-A
M06809 S0004285840_V2

Metal Leading Edge (MLE)
Figure 801/72-21-02-990-822-H01 (Sheet 2 of 4)

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

TIP SECTIONS	SECTION A-A DISTANCE FROM TIP 1 INCH (mm)	SECTION A-A DISTANCE FROM "A" 1 INCH (mm)	BG INCH (mm)	BJ PRESSURE SIDE INCH (mm)	BK SUCTION INCH (mm)
TIP	0.00 (0.0)	48.00 (1219.2)	--	--	--
	0.50 (12.7)	47.50 (1206.5)	--	--	--
	1.00 (25.4)	47.00 (1193.8)	0.150 (3.81)	4.105 (104.27)	2.478 (62.94)
	1.50 (38.1)	46.50 (1181.1)	0.150 (3.81)	4.005 (101.73)	2.379 (60.43)
	2.00 (50.8)	46.00 (1168.4)	0.152 (3.86)	3.906 (99.21)	2.280 (57.91)
	3.00 (76.2)	45.00 (1143.0)	0.172 (4.37)	3.777 (95.94)	2.150 (54.61)
	4.00 (101.6)	44.00 (1117.6)	0.206 (5.23)	3.761 (95.53)	2.132 (54.15)
	5.00 (127.0)	43.00 (1092.2)	0.247 (6.27)	3.821 (97.05)	2.192 (55.68)
	6.00 (152.4)	42.00 (1066.8)	0.293 (7.44)	3.924 (99.67)	2.282 (57.96)
	7.00 (177.8)	41.00 (1041.4)	0.342 (8.69)	4.065 (103.25)	2.375 (60.33)
	8.00 (203.2)	40.00 (1016.0)	0.393 (9.98)	4.253 (108.03)	2.470 (62.74)
	10.00 (254.0)	38.00 (965.2)	0.498 (12.65)	4.805 (122.05)	2.663 (67.64)
	12.00 (304.8)	36.00 (914.4)	0.603 (15.32)	5.535 (140.59)	2.859 (72.62)
	14.00 (355.6)	34.00 (863.6)	0.703 (17.86)	6.230 (158.24)	3.050 (77.47)
	16.00 (406.4)	32.00 (812.8)	0.793 (20.14)	6.629 (168.38)	3.225 (81.92)
	18.00 (457.2)	30.00 (762.0)	0.867 (22.02)	6.653 (168.99)	3.380 (85.85)
	20.00 (508.0)	28.00 (711.2)	0.923 (23.44)	6.409 (162.79)	3.514 (89.26)
	22.00 (558.8)	26.00 (660.4)	0.963 (24.46)	5.987 (152.07)	3.630 (92.20)
	24.00 (609.6)	24.00 (609.6)	0.986 (25.04)	5.486 (139.34)	3.734 (94.84)
	26.00 (660.4)	22.00 (558.8)	0.997 (25.32)	5.007 (127.18)	3.823 (97.10)
	28.00 (711.2)	20.00 (508.0)	1.000 (25.40)	4.646 (118.01)	3.905 (99.19)
	30.00 (762.0)	18.00 (457.2)	1.000 (25.40)	4.498 (114.25)	3.984 (101.19)
	32.00 (812.8)	16.00 (406.4)	1.000 (25.40)	4.559 (115.80)	4.059 (103.10)

GE90-115 FAN BLADE METAL LEADING EDGE DIMENSIONS

1 DIMENSIONS ARE MEASURED STRAIGHT LINE (i.e., TAPE MEASURE) FROM THE TIP OR FROM THE INNER TRIM OF THE METAL LEADING EDGE. IF THE METAL LEADING EDGE OVERALL LENGTH IS NOT 47.88 INCH (1216.2 mm) OR GREATER, DO NOT USE DIMENSIONS FROM THE TIP, USE ONLY POINT "A".

M06810 S0004285841_V2

Metal Leading Edge (MLE)
Figure 801/72-21-02-990-822-H01 (Sheet 3 of 4)

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

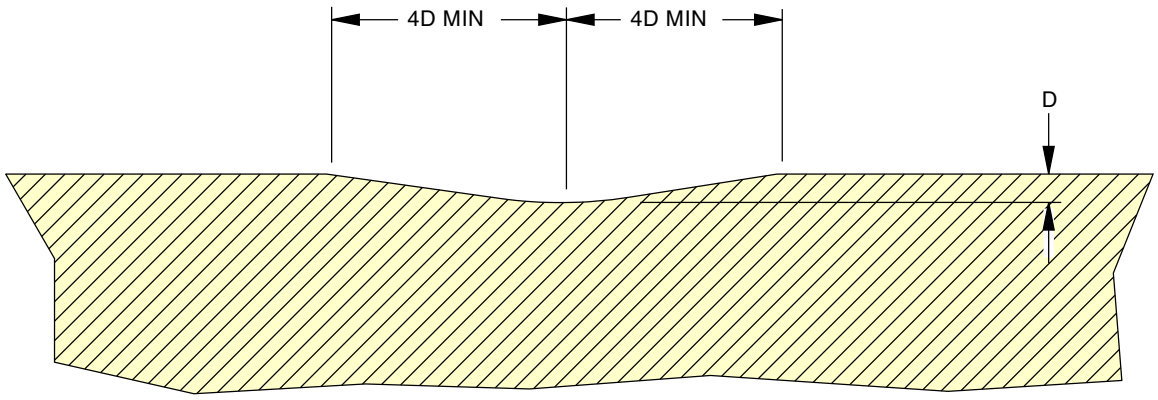
TIP SECTIONS	SECTION A-A DISTANCE FROM TIP 1 INCH (mm)	SECTION A-A DISTANCE FROM "A" 1 INCH (mm)	BG INCH (mm)	BJ PRESSURE SIDE INCH (mm)	BK SUCTION INCH (mm)
	34.00 (863.6)	14.00 (355.6)	1.000 (25.40)	4.631 (117.63)	4.131 (104.93)
	36.00 (914.4)	12.00 (304.8)	1.000 (25.40)	4.698 (119.33)	4.198 (106.63)
	38.00 (965.2)	10.00 (254.0)	1.005 (25.53)	4.771 (121.18)	4.271 (108.48)
	40.00 (1016.0)	8.00 (203.2)	1.056 (26.82)	4.886 (124.10)	4.386 (111.40)
	42.00 (1066.8)	6.00 (152.4)	1.138 (28.91)	5.042 (128.07)	4.542 (115.37)
	43.00 (1092.2)	5.00 (127.0)	1.179 (29.95)	5.120 (130.05)	4.620 (117.35)
	44.00 (1117.6)	4.00 (101.6)	1.214 (30.84)	5.190 (131.83)	4.690 (119.13)
	45.00 (1143.0)	3.00 (76.2)	1.239 (31.47)	5.250 (133.35)	4.750 (120.65)
	46.00 (1168.4)	2.00 (50.8)	1.250 (31.75)	5.294 (134.47)	4.794 (121.77)
	47.00 (1193.8)	1.00 (25.4)	1.250 (31.75)	5.323 (135.20)	4.823 (122.50)
TRIM	48.00 (1219.2)	0.00 (0.0)	1.250 (31.75)	5.340 (135.64)	4.840 (122.94)

GE90-115 FAN BLADE METAL LEADING EDGE DIMENSIONS

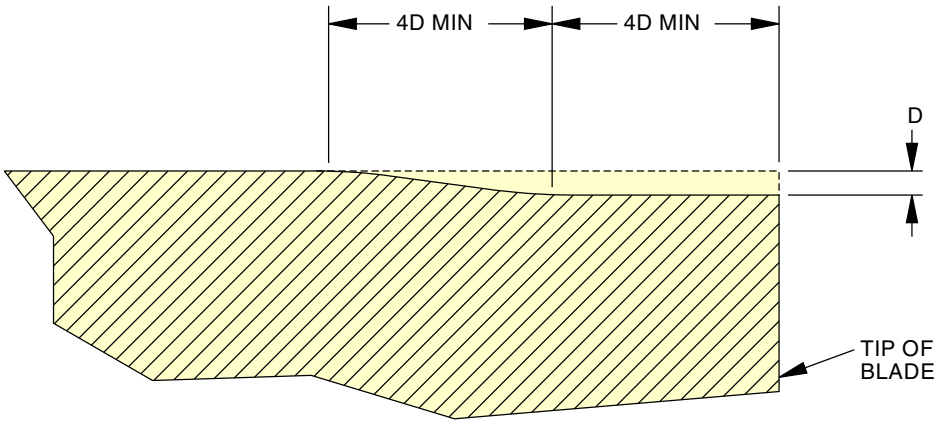
W28979 S0000120819_V1

Metal Leading Edge (MLE)
Figure 801/72-21-02-990-822-H01 (Sheet 4 of 4)

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



BLEND SMOOTHLY - TRUE RADIUS NOT REQUIRED

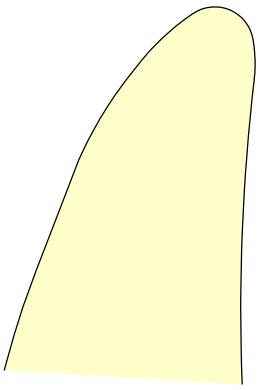


1163700-00-A

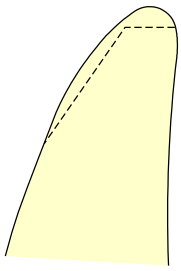
M06811 S0004285842_V2

Blended Nose Profile
Figure 802/72-21-02-990-824-H01

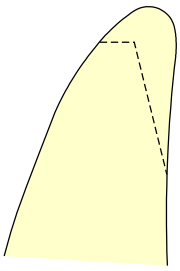
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



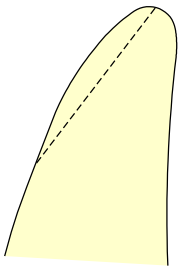
DEFINED CONTOUR



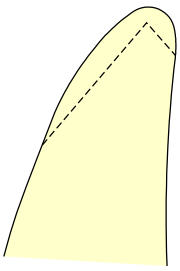
BLUNT AND NO SKEW



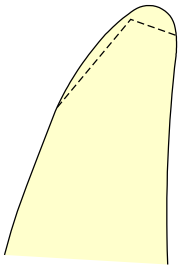
INCORRECT SKEW



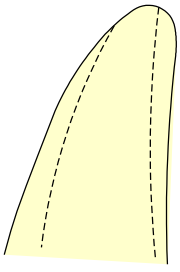
EXCESSIVELY FLAT AND SHARP



NO RADIUS



NO RADIUS AND SKEW



TOO THIN AND BLUNT

EXAMPLES OF INCORRECT LEADING EDGE SHAPES 1163700-00-A

M06812 S0004285843_V2

Nose Blend Contour
Figure 803/72-21-02-990-825-H01

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

TASK 72-21-02-300-802-H01

3. Fan Blade (Local Area Paint Touch-up) Repair

(Figure 804 or Figure 805 or Figure 806 or Figure 807)

A. General

(1) This procedure give instructions to repair the local areas of missing paint on the flow path surfaces of the stage 1 fan blades while the blades that are assembled on the fan case module.

B. References

Reference	Title
72-21-00-200-803-H01	Fan Blade (Scheduled Maintenance Requirement) Inspection (P/B 601)
72-21-02-020-801-H01	Fan Blades Removal (Selection) (P/B 401)
72-21-02-100-801-H01	Fan Blade Cleaning (P/B 701)

C. Tools/Equipment

Reference	Description
STD-183	Cleaner - Vacuum
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
B00130	Alcohol - Isopropyl	TT-I-735
C50035 [C03-074]	Primer - All Purpose, Gray - Krylon KS203	
C50036 [C03-075]	Paint - Enamel-Lacquerized, Gloss Black - Krylon 1601	
C50307 [C03-074]	Primer - All Purpose, Gray - Krylon K01318	
G01043	Cloth - Lint-free	
G02348 [C10-010]	Pad - Abrasive - Scotch-Brite 7447	
G02448 [C05-003]	Marker - Pens	
G02462 [C10-136]	Tape - Flash-Breaker - No. 855	
G02494 [C10-062]	Cloth - Abrasive, Water Proof Silicon Carbide, 2X16 LDG, 1/4 inch Staggered, Slashed Loadings, 320 grit	
G50035 [C10-182]	Cloth - Cleaning For Aircraft Structural	SAE-AMS 3819, BMS 15-5
G50210 [C10-190]	Paper - 400 grit Silicone carbide wet/dry abrasive paper	
G50211 [C10-191]	Paper - 600 grit Silicone carbide wet/dry abrasive paper	
G50212 [C10-037]	Abrasive - Light Deburring Wheel - Scotch-Brite Grade 5, Code 6B	
G50216 [C10-121]	Abrasive - Wet/dry Silicon Carbide Paper - 320 grit	

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

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the fan blade repair

SUBTASK 72-21-02-860-028-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-02-860-029-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the engine inlet cowl.

SUBTASK 72-21-02-110-002-H01

(3) Do this task: Fan Blade Cleaning, TASK 72-21-02-100-801-H01.

G. Procedure

SUBTASK 72-21-02-840-003-H01

(1) Mask around the repair area.

(a) Mask all the adjacent areas to prevent overspray that includes the exposed areas of the fan platform adjacent to the fan blade that is being repaired.

(b) If the repair area is near the edge of the paint.

1) Mask the edge of the paint application area with No. 855 tape, G02462 [C10-136].

SUBTASK 72-21-02-370-007-H01

(2) Do an inspection of the missing or damaged paint on the concave (pressure) side of the fan blade.

(a) The paint cover a layer of urethane material on the side of the blade.

1) Look for eroded, loose, or flaking paint.

a) Use the marker, G02448 [C05-003] to mark the damaged area.

2) If you see the paint that is missing.

a) Do an inspection of the urethane that was below the paint.

<1> If you can see the brown adhesive layer below the urethane, do not continue with this repair.

<2> Do this task: Fan Blades Removal (Selection), TASK 72-21-02-020-801-H01.

<3> Do this task: Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01.

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

SUBTASK 72-21-02-370-008-H01

(3) Do an inspection of the missing or damaged paint on the convex (suction) side of the fan blade.

(a) The paint covers a layer of urethane material on this side of the blade.

1) Look for eroded, loose, or flaking paint.

a) Use the marker, G02448 [C05-003] to mark the damaged area.

2) If you see the paint that is missing.

a) Do an inspection of the urethane that is below the paint.

<1> If you can see the grey or black carbon fiber composite material, do not continue with this repair.

<2> Do this task: Fan Blades Removal (Selection), TASK 72-21-02-020-801-H01.

<3> Do this task: Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01.

SUBTASK 72-21-02-370-009-H01

CAUTION DO NOT USE SOLVENTS TO REMOVE PAINT ON THE FAN BLADE. IF YOU USE SOLVENTS TO REMOVE PAINT, YOU WILL CAUSE DAMAGE TO THE BLADE COATINGS.

CAUTION DO NOT SAND INTO THE CARBON FIBER EPOXY LAMINATE ON THE CONVEX SIDE OF THE FAN BLADE OR THE BROWN ADHESIVE (AF32) LAYER ON THE CONCAVE SIDE OF THE FAN BLADE. IF YOU DO, YOU WILL CAUSE DAMAGE TO THE FAN BLADE COATINGS.

CAUTION DO NOT LET THE AREA YOU ARE POLISHING GET HOT. IF YOU ALLOW THE AREA TO GET HOT YOU CAN DAMAGE THE ADHESIVE AND COMPOSITE LAMINATE OF THE FAN BLADE.

(4) Remove all damage loose or flaking paint until the edge of the paint is tightly bonded.

(a) Use a Scotch-Brite 7447 pad, G02348 [C10-010] or light deburring wheel - Scotch-Brite (Grade 5, Code 6B), G50212 [C10-037].

1) Work very slowly to prevent the heat increase on the surface of the repair surface.

2) Use a lint-free cloth, G01043 moist with water to keep the surface cool.

NOTE: The paint is applied to overlap the metal leading edge of the convex side platform wear strip. Remove only the damaged paint. Removal of undamaged paint is not necessary or recommended.

SUBTASK 72-21-02-370-010-H01

WARNING DO NOT GET FUEL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE FUEL. PUT ON GOGGLES, AND GLOVES WHEN YOU USE FUEL. KEEP FUEL AWAY FROM SPARKS, FLAME, AND HEAT. FUEL IS POISONOUS AND FLAMMABLE. FUEL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(5) Sand the surface in the areas where the paint is not there or removed.

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

(a) Use a 320 grit abrasive cloth, G02494 [C10-062] or silicon carbide abrasive paper - 320 grit, G50216 [C10-121].

1) Remove any steps at the edges of the missing paint.

SUBTASK 72-21-02-370-011-H01

WARNING DO NOT GET FUEL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE FUEL. PUT ON GOGGLES, AND GLOVES WHEN YOU USE FUEL. KEEP FUEL AWAY FROM SPARKS, FLAME, AND HEAT. FUEL IS POISONOUS AND FLAMMABLE. FUEL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(6) Sand the repair surface and the paint around the repair surface.

(a) Use 400 grit silicon carbide abrasive paper, G50210 [C10-190] or 600 grit silicone carbide abrasive paper, G50211 [C10-191].

(b) Sand only until you make a constant matt finish.

(c) If it is necessary, sand special areas of the fan blade as follows:

CAUTION BE CAREFUL WHEN SANDING ADJACENT TO THE PLATFORM WEAR STRIP. IF YOU ARE NOT CAREFUL DAMAGE TO THE WEAR STRIP CAN OCCUR.

1) If the repair area is adjacent to the platform wear strip, do the steps that follow:

a) Sand in the direction of the length of the wear strip.

b) If the wear strip becomes damaged or loose, the fan blade will not be repairable using this repair.

2) If the repair area is adjacent to the metal leading edge, lightly sand the surface.

a) Do not sand into or try to remove the urethane or cream color adhesive layer.

b) The urethane goes below the metal leading edge.

c) The paint covers the cream color adhesive layer that bonds the metal leading edge.

d) The paint is on the urethane immediately aft of the metal leading edge.

CAUTION DO NOT SAND ON TOP OF THE URETHANE COATING OF THE FAN BLADE. IF YOU DO, YOU WILL CAUSE DAMAGE TO THE URETHANE COATING ON THE TIP CAP OF THE FAN BLADE.

3) If the paint on top of the tip cap that must be repaired, do the steps that follow:

a) Sand lightly to prevent damage to the edge of the urethane.

b) Do not try to remove the urethane from on top of the tip cap.

4) Do not remove the urethane that is below the paint on the suction side (convex) surface of the fan blade.

a) The urethane is applied only to the composite area.

b) If you can see the gray or black carbon fiber ply below the urethane, the fan blade is not repairable using this repair.

<1> Do this task: Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01.

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

SUBTASK 72-21-02-330-001-H01

(7) Remove the sand from the repair areas of the fan blade with a clean cloth, G50035 [C10-182] or a vacuum cleaner, STD-183.

SUBTASK 72-21-02-160-006-H01

WARNING DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(8) Clean the fan blade with alcohol, B00130 (TASK 72-21-02-100-801-H01).

NOTE: Do not touch the repair surfaces.

SUBTASK 72-21-02-960-001-H01

(9) Replace the masking material as follows.

(a) Remove the previous masking material.

(b) Apply new masking material (TASK 72-21-02-100-801-H01).

SUBTASK 72-21-02-210-011-H01

WARNING DO NOT GET FUEL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE FUEL. PUT ON GOGGLES, AND GLOVES WHEN YOU USE FUEL. KEEP FUEL AWAY FROM SPARKS, FLAME, AND HEAT. FUEL IS POISONOUS AND FLAMMABLE. FUEL CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(10) Apply the primer, C50035 [C03-074] or an alternate primer, C50307 [C03-074].

NOTE: Use the manufacturer's instructions and obey the manufacturer's precautions.

(a) Apply the primer, C50035 [C03-074] or an alternate primer, C50307 [C03-074], to a thickness of 0.0005 inch (0.013 mm) maximum.

SUBTASK 72-21-02-210-012-H01

(11) Apply the paint, C50036 [C03-075], gloss black.

NOTE: Use the manufacturer's instructions and obey the manufacturer's precautions.

(a) Apply the paint, C50036 [C03-075] to a thickness of 0.003 inch (0.08 mm) maximum.

(b) Apply the paint, C50036 [C03-075] in thin layers.

NOTE: This will reduce the risk of runs.

(c) Let the paint, C50036 [C03-075] dry to the manufacturer's recommendation.

(d) Remove all masking material.

SUBTASK 72-21-02-370-012-H01

(12) Do an inspection of the repaired area for these conditions:

(a) Grit

1) Any quantity is permitted.

2) The total collected quantity must not be more than 0.062 inch (1.57 mm) x 0.062 inch (1.57 mm) x 0.010 inch (0.25 mm) high in any 1.0 inch (645.0 mm) square area.

(b) Seeds

1) Any number is permitted.

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

2) The total collected quantity must not be more than 0.062 inch (1.57 mm) x 0.062 inch (1.57 mm) x 0.010 inch (0.25 mm) high in any 1.0 inch (645.0 mm) square area.

(c) Runs

1) It must not be more than 1.0 inch (25.4 mm) above the coating surface.

(d) Craters

1) Any number is permitted.

2) The total collected quantity must not be more than 0.125 inch (3.18 mm) x 0.125 inch (3.18 mm) x 0.010 inch (0.25 mm) high in any 1.0 inch (645.0 mm) square area.

(e) Blisters

1) None are permitted.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-010-001-H01

(1) Remove the protective mat, STD-585 from the engine inlet cowl.

SUBTASK 72-21-02-210-013-H01

(2) Make sure that there is no debris, tools, or other unwanted material in the inlet.

SUBTASK 72-21-02-860-030-H01

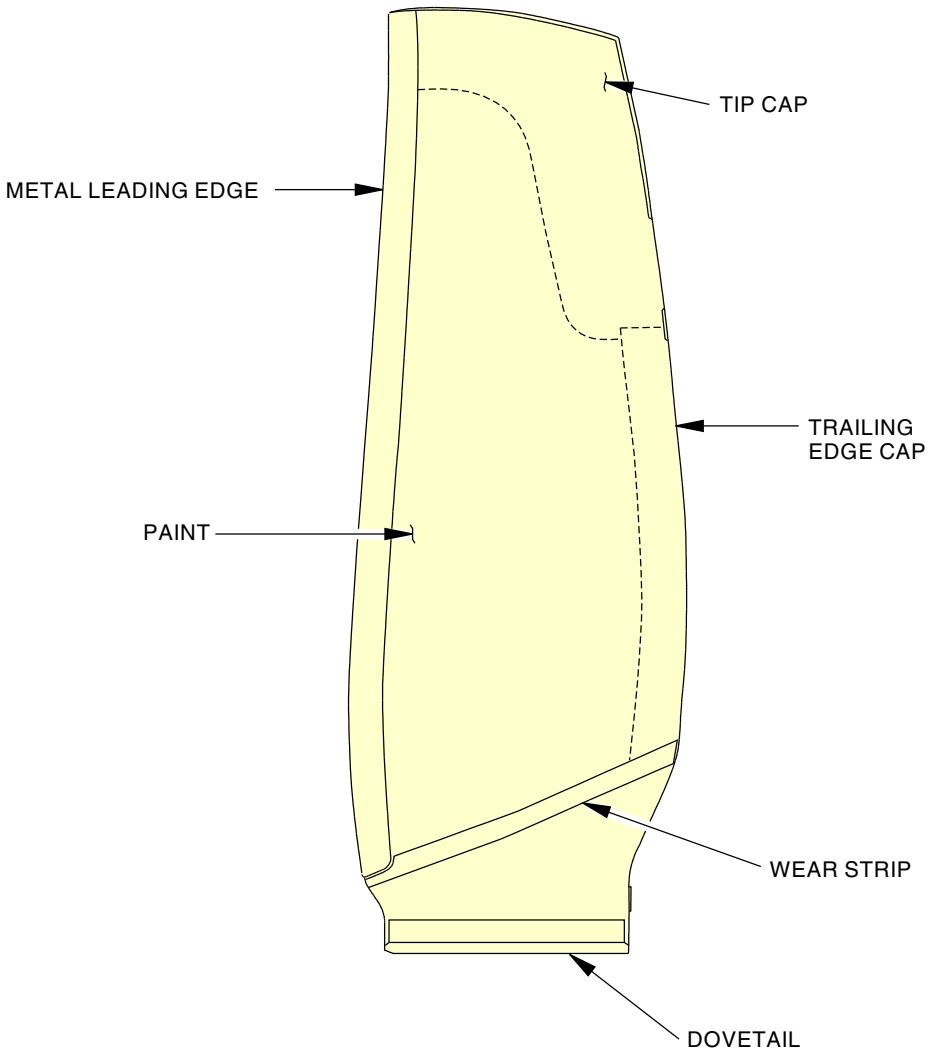
(3) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

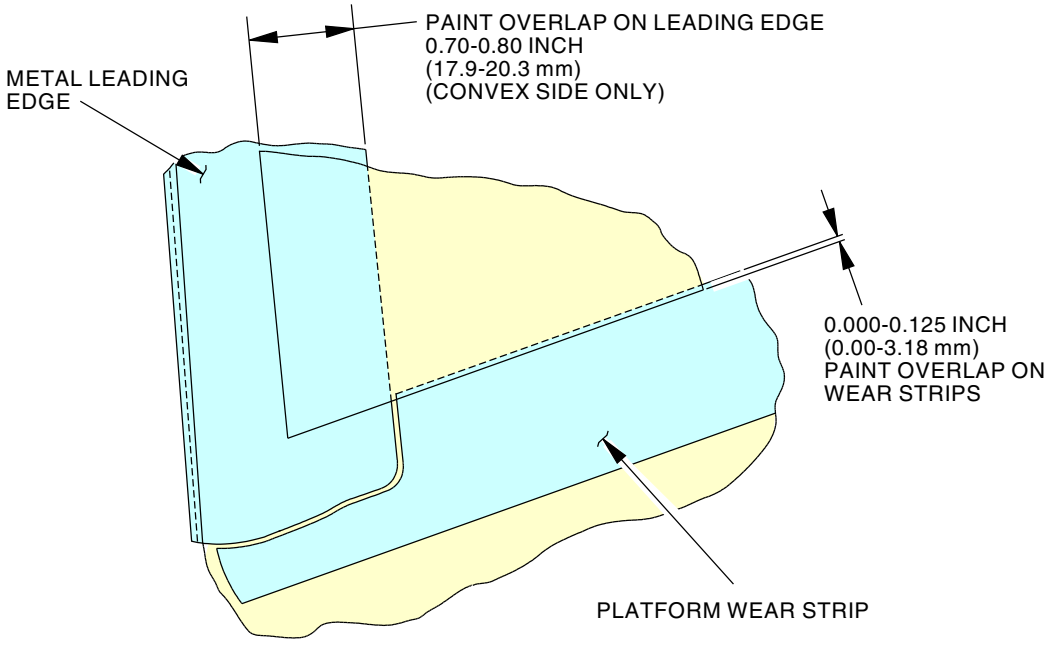
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1225749-00-A
1379634 S0000251059_V2

Fan Blade Orientation View
Figure 804/72-21-02-990-838-H01

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

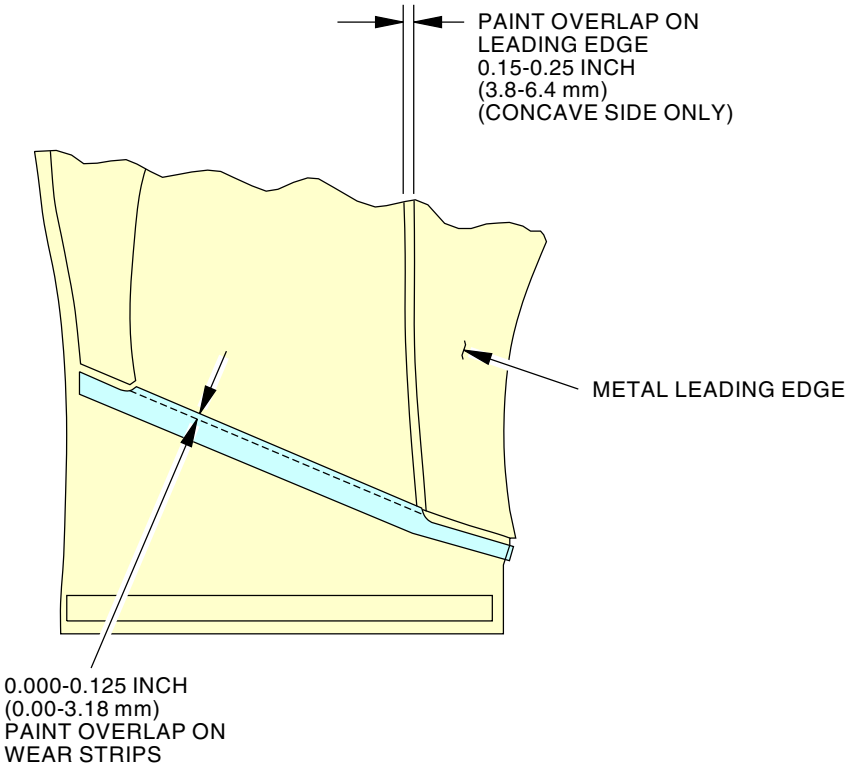


CONVEX SIDE

1225750-00-A
1379636 S0000251060_V2

Detail of Paint Overlap on the Wear Strip and Metal Leading Edge
Figure 805/72-21-02-990-839-H01 (Sheet 1 of 2)

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

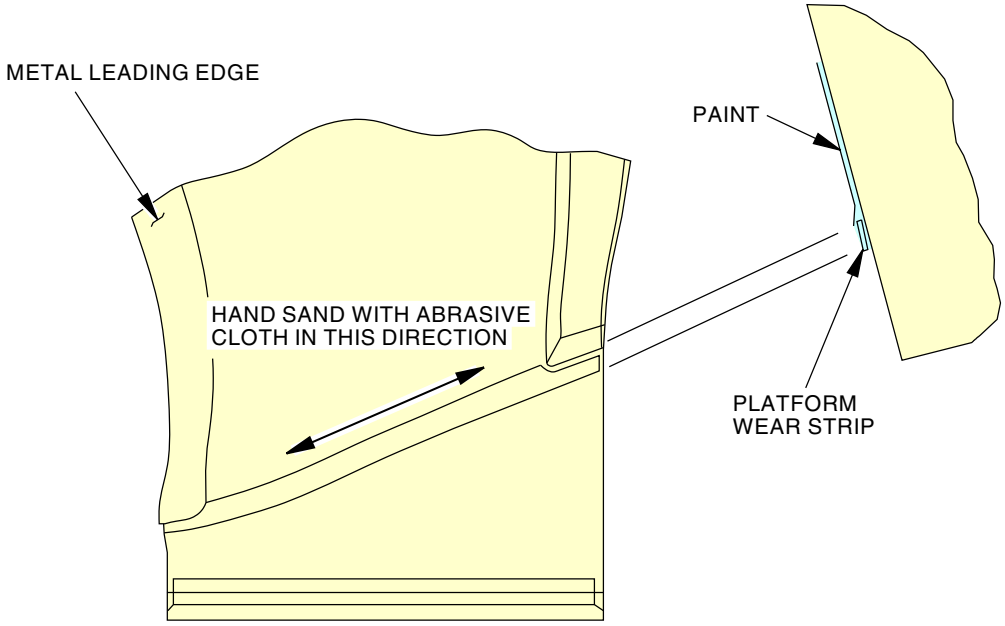


1225751-00

1379669 S0000251062_V2

Detail of Paint Overlap on the Wear Strip and Metal Leading Edge
Figure 805/72-21-02-990-839-H01 (Sheet 2 of 2)

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



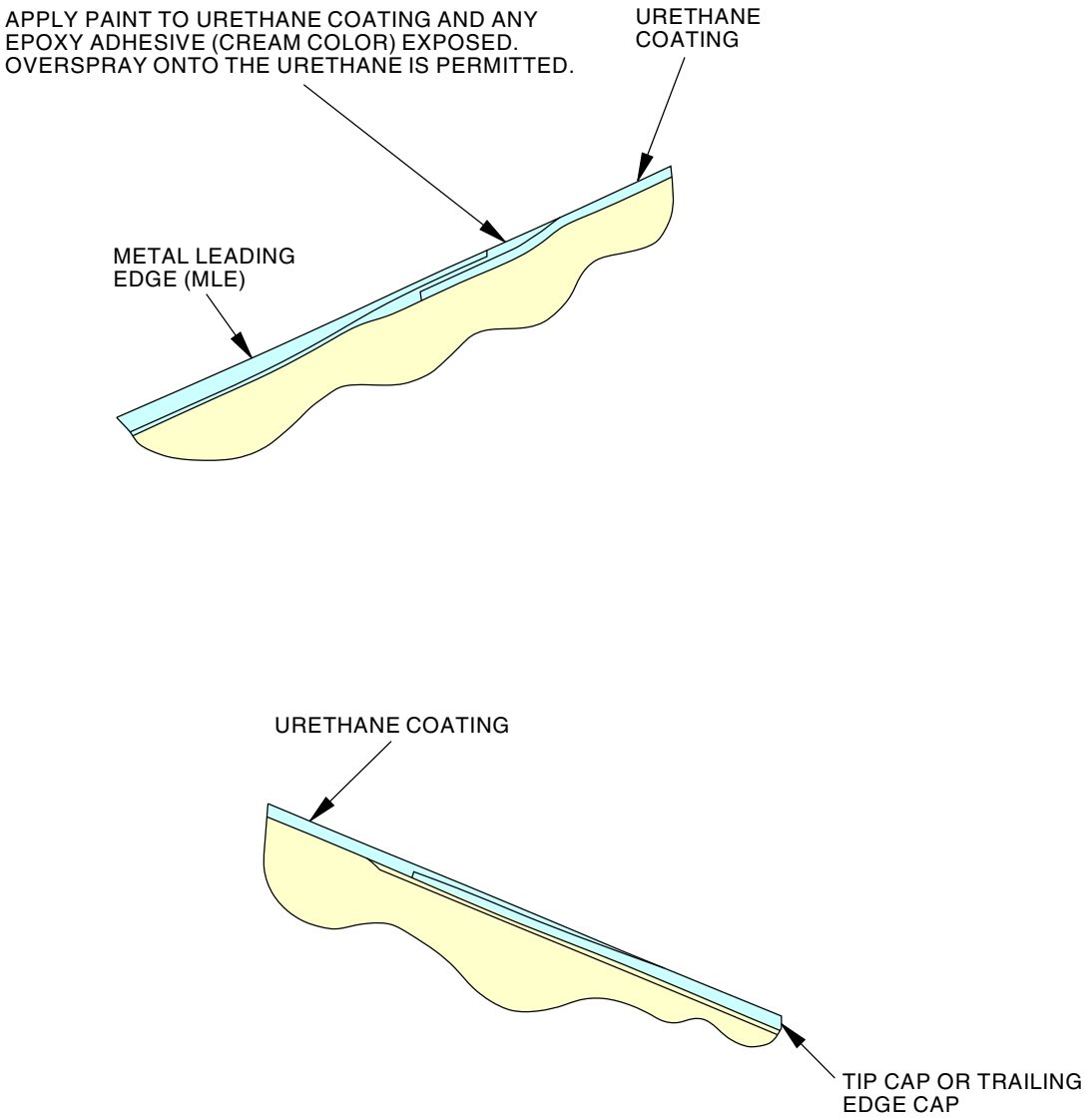
SUCTION SIDE

1225752-00-A

1379702 S0000251063_V2

Method of Hand Sanding Near Platform Wear Strip
Figure 806/72-21-02-990-840-H01

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



Detail of Paint Application on Tip Cap and Metal Leading Edge
Figure 807/72-21-02-990-841-H01

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

TASK 72-21-02-300-803-H00

4. Fan Blade Platform Wear Strip Repair

(Figure 808 and Figure 809)

A. General

(1) This task gives the instruction to repair the fan blade platform wear strip of the fan rotor stage 1 blades.

(2) To do this, it is necessary to remove the damage and apply polyurethane paste adhesive on the damaged wear strip area of the fan blade concave surface of the fan stator module.

B. References

Reference	Title
70-46-01-300-801-H00	Mask and Clean the Epoxy and Polyester Matrix Repair (P/B 201)
72-21-02-020-802-H01	Fan Blade Set Removal (P/B 401)
72-21-02-400-802-H01	Fan Blade Set Installation (P/B 401)
72-21-03-000-801-H01	Fan Blade Platform Removal (P/B 401)
72-21-03-220-801-H01	Fan Blade Platform Inspection (P/B 601)

C. Consumable Materials

Reference	Description	Specification
A50422 [C06-067]	Adhesive - Polyurethane Paste	GE Spec. A8B118
B00130	Alcohol - Isopropyl	TT-I-735
G02442 [C10-141]	Abrasive - 120 Grit, SiC, Wet/Dry, Abrasive Paper / 180 Grit, SiC, Wet/Dry, Abrasive Paper	
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50033 [C10-133]	Film, Polymer FEP, Unperforated, 0.001 inch (0.03 Mm) Thick	
G50035 [C10-182]	Cloth - Cleaning For Aircraft Structural	SAE-AMS 3819, BMS 15-5
G50263	Gloves - White Cotton Disposable	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Repair

SUBTASK 72-21-02-020-011-H00

(1) Do this task: Fan Blade Set Removal, TASK 72-21-02-020-802-H01.

SUBTASK 72-21-02-210-014-H00

(2) Do an inspection of the platform wear strip of the fan blade as follow (TASK 72-21-03-220-801-H01):

(a) If damage extends to more than the limits in Figure 808 and Table 801, then you cannot repair the fan blade with this procedure.

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

Table 801/72-21-02-993-812-H00 Dimensional Information

Description	Minimum In-Process Dimension	Maximum In-Process Dimension	Minimum Finish Dimension	Maximum Finish Dimension	Reference Dimension
Dim. A	-	0.150 in. (3.81 mm) *[1]	-	0.150 in. (3.81 mm) *[1]	-

*[1] NOTE: The table define the maximum in-process dimension. After the worn wear strip is trimmed and prepared for the repair, not more than 0.15 inch (3.81 mm) of material can be missing.

SUBTASK 72-21-02-300-001-H00

(3) If you do this repair on-wing, remove the fan platform adjacent to the fan blade damaged area (TASK 72-21-03-000-801-H01).

F. Fan Blade Platform Wear Strip Repair

SUBTASK 72-21-02-300-002-H00

WARNING PUT ON EYE PROTECTION BEFORE YOU CLEAN AND DRY THE BURST DISK, AND BEFORE YOU APPLY THE CORROSION INHIBITOR. IF THE CONTAINER RELEASES ITS CONTENTS, INJURIES TO PERSONNEL CAN OCCUR.

(1) Remove the damaged areas of the platform wear strip of the fan blade as follows (Figure 808):

(a) Use a sharp knife to cut the platform wear strip along line A.

1) Do not cut into the composite plies.

NOTE: There is a brown layer of AF32 adhesive below the platform wear strip. This layer does not have to be removed.

CAUTION DO NOT CUT INTO THE CARBON FABRIC WHEN YOU SAND THE FAN PLATFORM SURFACE. IF YOU CAUSE DAMAGE AND CUT INTO THE CARBON FABRIC, YOU CANNOT REPAIR THE FAN BLADE PLATFORM.

(b) Use a sharp knife or a single edge razor blade to lift a corner of the damaged area of the fabric wear strip.

(c) Use a pair of pliers to pull the damaged area of the platform wear strip off.

1) Pull the platform wear strip back over itself with a smooth continuous movement.

NOTE: If the erosion damage extends through the thickness of the platform wear strip, it is possible that you cannot remove the damaged area of the platform wear strip in one piece.

SUBTASK 72-21-02-210-015-H00

(2) Do a visual inspection of the fan blade area where you removed the damaged area of the platform wear strip and as follows:

(a) Make sure that the carbon fiber composite is not damaged.

SUBTASK 72-21-02-300-003-H00

(3) Clean the fan blade repair area as follows (TASK 70-46-01-300-801-H00):

(a) Use Composite Cleaning Method No. 5, but only use alcohol, B00130.

SUBTASK 72-21-02-300-004-H00

(4) Apply masking around the fan blade repair area as follows (TASK 70-46-01-300-801-H00):

(a) Use Composite Masking Method No.5.

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

SUBTASK 72-21-02-300-005-H00

WARNING DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(5) Sand the fan blade to make the surface rough as follows:

(a) Use abrasive paper, G02442 [C10-141] lightly and as follows:

1) If the erosion damage extends to the woven carbon fabric plies and the surface is smooth, then lightly sand the fan blade repair area to only make the surface rough.

NOTE: More carbon fiber material must not be removed.

SUBTASK 72-21-02-300-006-H00

WARNING USE EYE PROTECTION WHEN YOU USE COMPRESSED AIR TO CLEAN, COOL, OR DRY PARTS OR TOOLS. PARTICLES CAN CAUSE AN INJURY TO YOUR EYES. DO NOT USE MORE THAN 30 PSI (207 KPA). DO NOT POINT COMPRESSED AIR AT YOURSELF OR OTHER PERSONS.

(6) Blow contamination from the fan blade repair area with clean, dry, compressed air that contains no oil.

SUBTASK 72-21-02-210-016-H00

(7) Do a visual inspection of the fan blade repair area as follows:

(a) Make sure that you fully removed the damaged area of the platform wear strip.

(b) Make sure that the carbon fiber composite is not damaged.

SUBTASK 72-21-02-300-007-H00

(8) Remove the masking material that you applied before on the fan blade.

SUBTASK 72-21-02-300-008-H00

(9) Clean the fan blade repair area as follows (TASK 70-46-01-300-801-H00):

(a) Use Composite Cleaning Method No. 5, but only use alcohol, B00130.

SUBTASK 72-21-02-300-009-H00

CAUTION DO NOT TOUCH THE CLEAN PART SURFACES WITH YOUR BARE HANDS. USE WHITE COTTON GLOVES WHEN YOU TOUCH THE PART. IF YOU TOUCH THE CLEAN PART WITH YOUR BARE HAND, YOU CAN CAUSE CONTAMINATION ON THE CLEAN SURFACE OF THE PART.

(10) Apply masking around the fan blade repair area as follows (TASK 70-46-01-300-801-H00):

(a) Use glove, G50263 to touch the fan blade.

(b) Use Composite Masking Method No. 5.

SUBTASK 72-21-02-300-010-H00

(11) Prepare the weld repair paste, A50422 [C06-067] as follows:

(a) Put the weld repair paste, A50422 [C06-067] cartridge into the applicator.

(b) Remove the cap from the end of the cartridge and attach the mixing nozzle to the end of the cartridge.

(c) Begin to squeeze the trigger on the applicator to let the weld repair paste, A50422 [C06-067] flow into the mixing nozzle.

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

(d) Continue to squeeze the trigger on the applicator until the weld repair paste, A50422 [C06-067] starts to come out of the end of the mixing nozzle.

(e) Squeeze out a minimum of filled diameter of 1.0 inch (25 mm) by 0.05 inch (1.3 mm) in thickness of weld repair paste, A50422 [C06-067] from the applicator, and discard it before you use the weld repair paste, A50422 [C06-067] on the fan blade repair area.

NOTE: After the repair is completed, the mixing nozzle must be removed and discarded and the cap on the cartridge must be replaced. The shelf life of the cartridge is two weeks after is opened. Each new repair will have to use a new mixing nozzle.

SUBTASK 72-21-02-300-011-H00

(12) Apply the weld repair paste, A50422 [C06-067] to the fan blade repair area as follows:

(a) Apply a small quantity of the weld repair paste, A50422 [C06-067] to the fan blade repair area.

(b) Make the weld repair paste, A50422 [C06-067] smooth to make it level with the fan blade adjacent areas and as follows:

1) Alternative Procedure Available: Make a Teflon spatula as follows Figure 809:

a) Use the Teflon spatula to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

2) Alternative Procedure: Apply a piece of release film, G50033 [C10-133], on top of the polyurethane paste adhesive.

a) Use a roller on the release film, G50033 [C10-133], to make the weld repair paste, A50422 [C06-067] smooth and make it level with the adjacent area.

(c) Remove unwanted polyurethane paste adhesive with a cloth, G50035 [C10-182].

(d) Apply a piece of release film, G50033 [C10-133], on top of the weld repair paste, A50422 [C06-067].

1) Attach the release film, G50033 [C10-133] with Scotch 5490 tape, G50030 [C10-040].

SUBTASK 72-21-02-300-012-H00

(13) Alternative Procedure Available: Cure the weld repair paste, A50422 [C06-067] at room temperature, at a temperature range of 65 to 85°F (18 to 29°C), for 24 hours.

SUBTASK 72-21-02-300-013-H00

WARNING

USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(14) Alternative Procedure: Cure the weld repair paste, A50422 [C06-067] as follows:

(a) Put the fan blade in an air-circulating oven.

(b) Keep the fan blade at a temperature range of 170 to 190°F (77 to 88°C) for 60 minutes.

SUBTASK 72-21-02-300-014-H00

(15) Remove the release film, G50033 [C10-133], and masking from the fan blade.

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

SUBTASK 72-21-02-300-015-H00

WARNING DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(16) If it is necessary, sand the fan blade repair area as follows:

(a) Use abrasive paper, G02442 [C10-141], to blend the weld repair paste, A50422 [C06-067] to a smooth transition with the remaining platform wear strip and polyurethane film, but do not remove material from the platform wear strip.

NOTE: Sanding will cause the surface of the weld repair paste, A50422 [C06-067] to have a dull finish.

SUBTASK 72-21-02-210-017-H00

(17) Do a visual inspection of the fan blade repair area as follows:

(a) Do an inspection for bubbles, blisters, and contamination.

(b) If bubbles, blisters, or contamination is found, do the repair again.

(18) Make sure that the fan blade repair area is fully covered with weld repair paste, A50422 [C06-067].

(a) If the fan blade repair area is not fully covered, do the repair again.

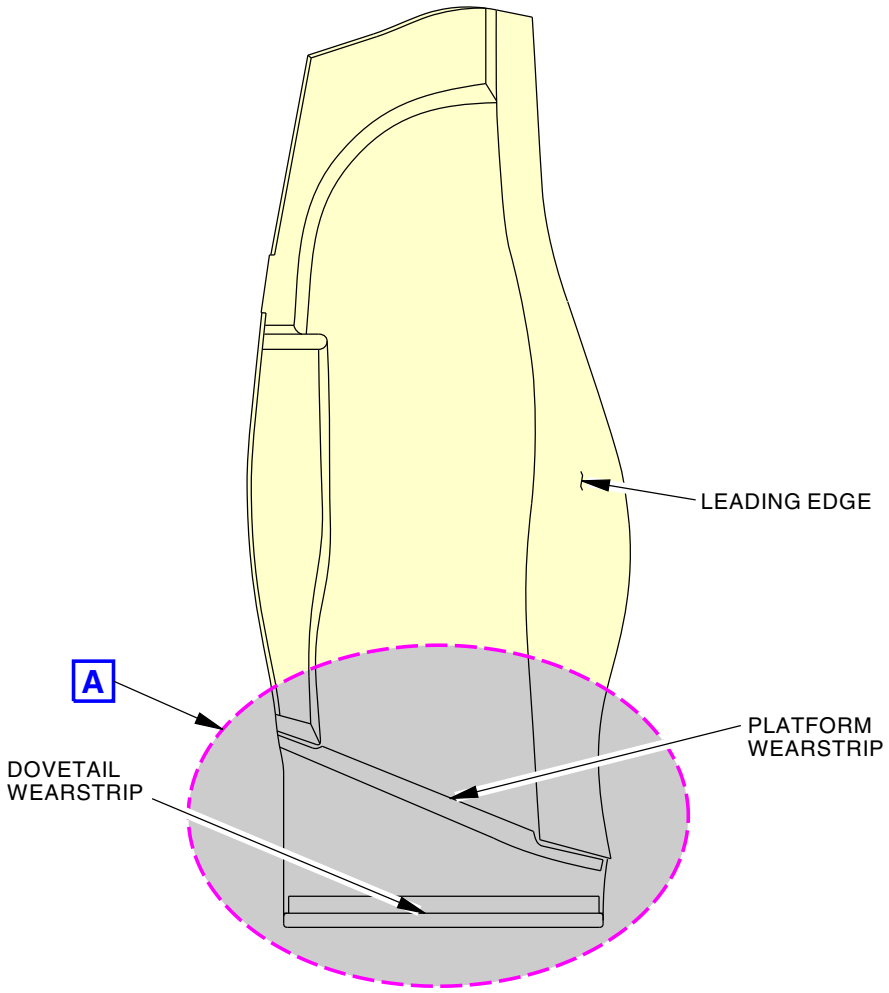
G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-02-420-015-H00

(1) Do this task: Fan Blade Set Installation, TASK 72-21-02-400-802-H01.

END OF TASK

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



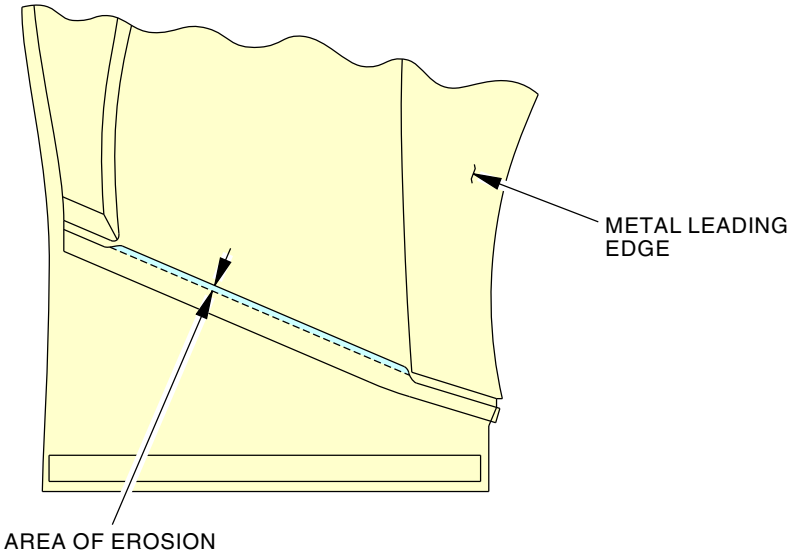
FAN BLADE
(CONCAVE SIDE)

5001134-00

2270930 S0000510330_V2

Fan Blade Platform Wear Strip Repair
Figure 808/72-21-02-990-843-H00 (Sheet 1 of 3)

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



FAN BLADE (CONCAVE SIDE)

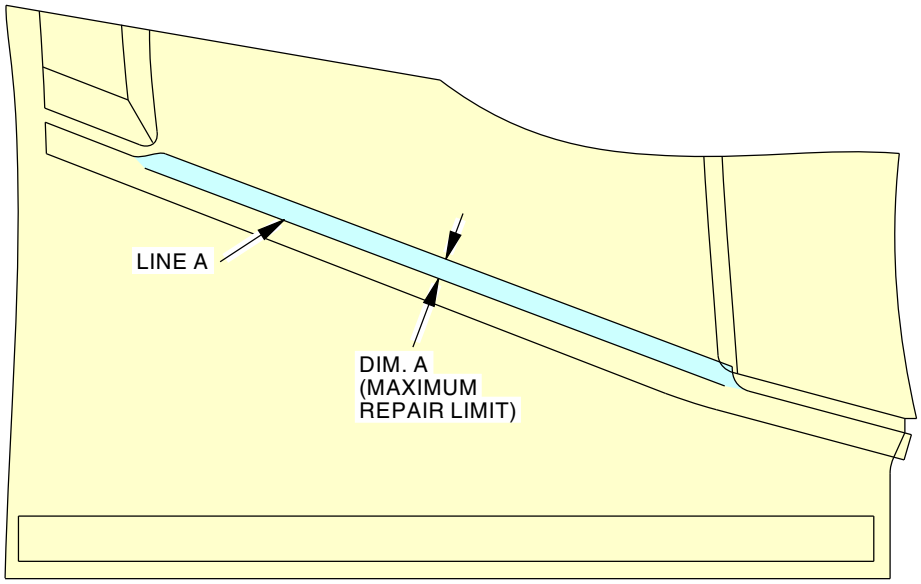
A

5001135-00

2270976 S0000510331_V2

Fan Blade Platform Wear Strip Repair
Figure 808/72-21-02-990-843-H00 (Sheet 2 of 3)

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



FAN BLADE
(CONCAVE SIDE)

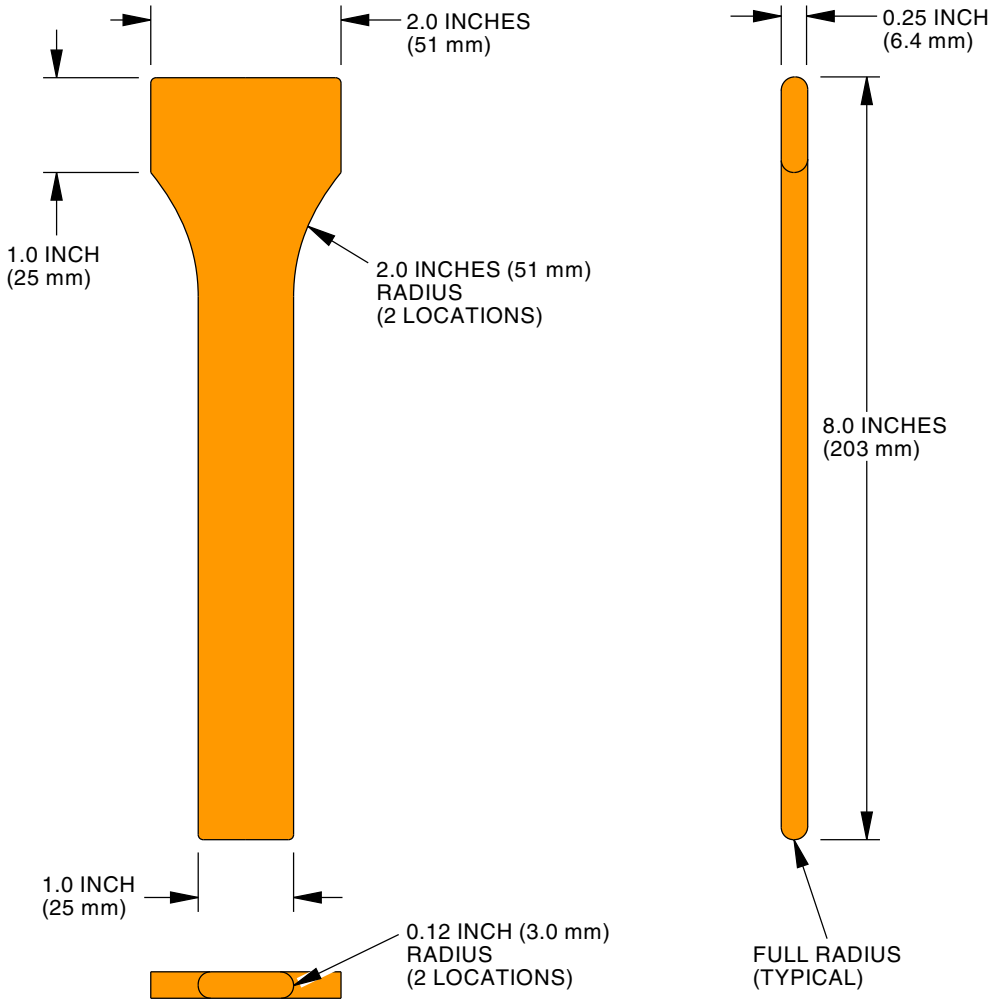
A

5001136-00

2270977 S0000510332_V2

Fan Blade Platform Wear Strip Repair
Figure 808/72-21-02-990-843-H00 (Sheet 3 of 3)

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



MATERIAL: TEFLON (PTFE)
TOLERANCE: ±0.010 INCH (0.38 mm)

5001137-00
2270993 S0000510333_V2

Teflon Spatula
Figure 809/72-21-02-990-844-H00

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

TASK 72-21-02-300-804-H00

5. Fan Rotor Stage 1 Blade Repair of AF32 Coating and Polyurethane film

(Figure 810, Figure 811, Figure 812)

A. General

(1) This procedure gives the instructions to repair the fan rotor stage 1 blades (fan blades) by doing these steps to the concave fan blade surface:

(a) Removing damage

(b) Applying polyurethane paste adhesive.

B. References

Reference	Title
70-46-01-300-801-H00	Mask and Clean the Epoxy and Polyester Matrix Repair (P/B 201)
72-21-00-200-803-H01	Fan Blade (Scheduled Maintenance Requirement) Inspection (P/B 601)
72-21-02-200-801-H01	Fan Blade Inspection (P/B 601)
72-21-02-400-802-H01	Fan Blade Set Installation (P/B 401)
72-21-03-000-801-H01	Fan Blade Platform Removal (P/B 401)
72-21-03-400-801-H01	Fan Blade Platform 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-14870	Mixing Nozzle - Adhesive Part #: 62-9171-9153-8 Supplier: 6A670
COM-14871	Adhesive Applicator - EPX Plus II Part #: 62-9170-9930-1 Supplier: 6A670
STD-14873	Spatula - Teflon

D. Consumable Materials

Reference	Description	Specification
A50422 [C06-067]	Adhesive - Polyurethane Paste	GE Spec. A8B118
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00130	Alcohol - Isopropyl	TT-I-735
C50368	Primer - 3M Single Step	
G02442 [C10-141]	Abrasive - 120 Grit, SiC, Wet/Dry, Abrasive Paper / 180 Grit, SiC, Wet/Dry, Abrasive Paper	
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50033 [C10-133]	Film, Polymer FEP, Unperforated, 0.001 inch (0.03 Mm) Thick	
G50035 [C10-182]	Cloth - Cleaning For Aircraft Structural	SAE-AMS 3819, BMS 15-5
G50263	Gloves - White Cotton Disposable	

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

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the Repair

SUBTASK 72-21-02-200-002-H00

(1) Do this task: Fan Blade (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-200-803-H01 (if fan blade is installed) and Fan Blade Inspection, TASK 72-21-02-200-801-H01 (if fan blade is removed).

SUBTASK 72-21-02-200-003-H00

(2) Do an inspection of the fan blade (Figure 810 and Figure 812) as follows:

(a) If damage is only present in Area T (Tip Cap) in Figure 812, go to: Repair the Visible Tip Cap Metal.

(b) If damage extends to more than the limits specified in Figure 810, then you cannot repair the fan blade with this procedure.

SUBTASK 72-21-02-200-004-H00

(3) Do an inspection of the fan blade for weld repair paste, A50422 [C06-067] applied before. Refer to the Aircraft Maintenance Manual (on-wing) or the Engine Shop Manual and as follows:

(a) Total polyurethane paste repair area on the fan blade must be less than or equal to 30 in^2 (19354 mm^2) and as follows:

1) You must include the calculated area of the weld repair paste, A50422 [C06-067] applied before on the fan blade, but do not include the repair area specified in Fan Blade Platform Wear Strip Repair, TASK 72-21-02-300-803-H00 and do not include the repair area specified in Area T (Figure 812).

(b) The separation of each carbon fiber damage area must be a minimum of 2.00 in. (50.80 mm).

(c) The maximum length of each repair area must be 10 in. (254 mm) in any direction.

(d) The maximum area of each repair area must be 15 in^2 (9677 mm^2).

SUBTASK 72-21-02-200-005-H00

(4) Do an inspection of the fan blade for carbon fiber damage as follows:

(a) Do an inspection of the visible carbon fiber on the fan blade for carbon fiber damage depth as follows:

1) Alternative Procedure Available. Carbon fiber must not be damaged 0.044 in. (1.118 mm) below the original painted surface of the fan blade in the repair area.

a) Alternative Procedure. Carbon fiber must not be damaged 0.018 in. (0.457 mm) below the original surface of the AF32 on the fan blade in the repair area.

b) Alternative Procedure. Carbon fiber must not be damaged 0.008 in. (0.20 mm) below the original surface of the carbon fiber on the fan blade in the repair area.

(b) Each area of exposed carbon fiber (individual broken, damaged or missing carbon fibers) must be less than 0.05 in^2 (32.2 mm^2) and as follows:

1) Do not include areas of carbon fiber that you can see in the area measurement if the fibers are still contained in the epoxy resin and there is no broken, damaged or missing carbon fiber.

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

2) If carbon fiber is visible and not exposed (individual broken, damaged or missing carbon fibers) then you can repair up to 1.5 in. (38 mm) diameter for each repair area.

3) The separation of each area of exposed carbon fiber (individual broken, damaged or missing carbon fibers) must be a minimum of 2.00 in. (50.8 mm).

NOTE: There is no limit on the separation of visible carbon fiber.

(c) Refer to Fan Blade Inspection, TASK 72-21-02-200-801-H01, for other repair alternatives.

SUBTASK 72-21-02-020-012-H00

(5) If you do this repair on-wing, if necessary, remove the fan platform adjacent to the fan blade damaged area. Refer to Fan Blade Platform Removal, TASK 72-21-03-000-801-H01.

G. Repair the AF32 Coating and Polyurethane Film

SUBTASK 72-21-02-120-004-H00

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO PERSONNEL. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION MAKE SURE THAT YOU DO NOT REMOVE OR SAND THROUGH THE BROWN LAYER OF AF32 COATING BELOW THE POLYURETHANE FILM. DAMAGE TO THE FAN BLADE CAN OCCUR.

CAUTION MAKE SURE THAT YOU DO NOT SAND INTO THE CARBON FIBER COMPOSITE AREA OF THE FAN BLADE. DAMAGE TO THE FAN BLADE CAN OCCUR.

(1) Remove loose or damaged black polyurethane film, and AF32 coating from the fan blade (Figure 810) and do as follows:

(a) Sand the fan blade repair area as follows:

1) Remove only damaged black polyurethane film or AF32 coating which is cracked, peeled, or damaged, but do not remove erosion damage.

2) Do not remove black polyurethane film or AF32 coating if it is only eroded.

3) Keep the repair area as small as possible.

4) Make sure that the length of each repair area is not more than 10 in. (254 mm).

5) Use abrasive paper, G02442 [C10-141] to lightly sand the repair area as follows:

a) Do not sand or remove additional carbon fiber.

b) Only make rough the black polyurethane film and the AF32 coating and carbon fiber if they are only eroded.

c) Use a cloth, G50035 [C10-182] wet with water to wipe the fan blade surface to keep it cool.

<1> No steam must rise from the surface you wipe.

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

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(b) If you use acetone solvent, B00062 to clean the fan blade, then you must remove the black polyurethane film from the repair area as follows:

1) Keep the repair area as small as possible.

2) Do not remove more AF32 coating.

3) Use abrasive paper, G02442 [C10-141] to sand the black polyurethane film.

SUBTASK 72-21-02-200-006-H00

(2) Do a visual inspection of the fan blade area where you removed damage from the black polyurethane film or AF32 coating as follows:

(a) Make sure that the length of each repair area is not more than 10 in. (254 mm).

(b) Make sure that the total repair area of all weld repair paste, A50422 [C06-067] repairs on the fan blade is not more than 30 in^2 (19354 mm^2) and as follows:

1) You must include the calculated area of the weld repair paste, A50422 [C06-067] applied before on the fan blade, but do not include the repair area specified in Fan Blade Platform Wear Strip Repair, TASK 72-21-02-300-803-H00 and do not include the repair specified in Area T (Figure 812).

SUBTASK 72-21-02-200-008-H00

(3) Do an inspection of the carbon fiber that you can see on the fan blade for damage after sanding as follows:

(a) Do an inspection of the carbon fiber damage depth as follows:

1) Alternative Procedure Available. Carbon fiber must not be damaged 0.044 in. (0.112 cm) below the original surface of the fan blade in the repair area.

a) Alternative Procedure. Carbon fiber must not be damaged 0.018 in. (0.457 mm) below the original surface of the AF32 on the fan blade in the repair area.

b) Alternative Procedure. Carbon fiber must not be damaged 0.008 in. (0.203 mm) below the original surface of the carbon fiber on the fan blade in the repair area.

(b) Each area of broken, damaged or missing carbon fiber must be less than 0.05 in^2 (32.2 mm^2) and as follows:

1) Do not include areas of carbon fiber that you can see in the area measurement if the carbon fibers are still contained in the epoxy resin and there are no broken, damaged or missing carbon fibers.

2) If the carbon fiber you can see that is not exposed (individual broken, damaged or missing carbon fibers) then you can repair up to 1.5 in. (38 mm) diameter for each repair area.

3) The separation of each area of exposed carbon fiber (individual broken, damaged or missing carbon fibers) must be a minimum of 2.00 in. (50.8 mm).

NOTE: There is no limit on the separation of carbon fiber you can see.

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

SUBTASK 72-21-02-100-001-H00

(4) Clean the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

NOTE: This step is necessary to remove dirt and unwanted material from sanding and prepare the repair area for masking.

(a) Use gloves, G50263 to touch the fan blade.

(b) Use Composite Cleaning Method No. 5 and as follows:

NOTE: It is recommended to use isopropyl alcohol to decrease the risk of damage to the fan blade that can be caused by acetone.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

CAUTION DO NOT LET ACETONE GO INTO THE PAINT, POLYURETHANE FILM, OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE, OF THE FAN BLADE. IT CAN MAKE SOFT OR DETERIORATE THE PAINT, POLYURETHANE FILM, OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE.

1) Alternative Procedure Available. Use alcohol, B00130.

a) Alternative Procedure. Use acetone solvent, B00062 and as follows:

<1> Make sure that the black polyurethane film is removed in the repair area to get the AF32 coating exposed.

<2> Apply masking to the repair area as follows:

<a> Use Composite Masking Method No. 5.

<3> Use small quantities of acetone solvent, B00062 to prevent damage of the adjacent areas.

<4> Do not let the solvent, B00062 stay on the repair area surface more than 3 seconds.

(c) If you used acetone solvent, B00062 then do an inspection of the area adjacent to the repair area as follows:

1) Use gloves, G50263 to touch the fan blade.

2) Remove the masking from the repair area.

3) Do an inspection of the paint, black polyurethane film and repair areas of weld repair paste, A50422 [C06-067] for damaged or soft areas as follows:

a) Do the repair again to remove any damaged or soft areas of paint, black polyurethane film and areas repaired with weld repair paste, A50422 [C06-067] from the fan blade.

SUBTASK 72-21-02-950-001-H00

(5) Apply masking around the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

(a) Use gloves, G50263 to touch the fan blade.

(b) Remove all masking that you applied before in the repair area.

(c) Use Composite Masking Method No. 5.

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

SUBTASK 72-21-02-100-002-H00

(6) Clean the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

NOTE: This step is necessary to prepare the repair area for bonding.

(a) Use gloves, G50263 to touch the fan blade.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

CAUTION DO NOT LET ACETONE GO INTO THE PAINT, POLYURETHANE FILM, OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE, OF THE FAN BLADE. IT CAN MAKE SOFT OR DETERIORATE THE PAINT, POLYURETHANE FILM, OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE.

(b) Use Composite Cleaning Method No. 5 and as follows:

NOTE: It is recommended to use alcohol, B00130 to decrease the risk of damage to the fan blade that can be caused by acetone.

1) Alternative Procedure Available. Use alcohol, B00130.

CAUTION MAKE SURE THAT ALL SYRINGE OR EYEDROPPER COMPONENTS ARE COMPATIBLE WITH ACETONE AND WILL NOT DEGRADE FROM EXPOSURE TO IT. IT CAN CONTAMINATE THE FAN BLADE REPAIR SURFACE AND PREVENT THAT THE POLYURETHANE PASTE ADHESIVE BONDS.

a) Alternative Procedure. Use solvent, B00062 and as follows:

<1> Make sure that the black polyurethane film is removed in the repair area to get the AF32 coating exposed.

<2> Use a clean syringe or a clean eyedropper.

<3> Flush the syringe or eyedropper with solvent, B00062 before you use it.

<4> Use the syringe or eyedropper to apply small quantities of solvent, B00062 to prevent damage to the black polyurethane film in the adjacent areas.

<5> Do not let the solvent, B00062 stay on the repair area surface more than 3 seconds.

SUBTASK 72-21-02-700-001-H00

(7) Do a water break test to the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

(a) Dry the fan blade in air for 30 minutes minimum after the test.

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

SUBTASK 72-21-02-300-016-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(8) Prepare the weld repair paste, A50422 [C06-067] as follows:

(a) Put the weld repair paste, A50422 [C06-067] cartridge into the applicator, COM-14871.

(b) Remove the cap from the end of the cartridge and attach the adhesive mixing nozzle, COM-14870 to the end of the cartridge.

(c) Begin to squeeze the trigger on the applicator, COM-14871 to let the weld repair paste, A50422 [C06-067] flow into the adhesive mixing nozzle, COM-14870.

(d) Continue to squeeze the trigger on the applicator until the weld repair paste, A50422 [C06-067] starts to come out of the end of the mixing nozzle.

(e) Squeeze-out a minimum of filled diameter of 1.0 in. (25.4 mm) by 0.05 in. (1.27 mm) in thickness of weld repair paste, A50422 [C06-067] from the applicator, COM-14871 and discard it before you use the weld repair paste, A50422 [C06-067] on the fan blade repair area.

NOTE: After the repair is completed, the mixing nozzle must be removed and discarded and the cap on the cartridge must be replaced. The shelf life of the cartridge is two weeks after it is opened. Each new repair will have to use a new mixing nozzle.

SUBTASK 72-21-02-300-017-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(9) Apply the weld repair paste, A50422 [C06-067] to the fan blade repair area as follows:

(a) Use gloves, G50263 to touch the fan blade.

(b) Make the weld repair paste, A50422 [C06-067] smooth to make it level with the fan blade adjacent areas and as follows:

1) Apply the weld repair paste, A50422 [C06-067] to cover all areas of the carbon fiber that you can see.

2) Optional procedure. Apply the weld repair paste, A50422 [C06-067] to damaged AF32 areas.

3) Optional procedure. Apply the weld repair paste, A50422 [C06-067] to damaged Polyurethane Film areas.

4) Alternative Procedure Available. Make a teflon spatula, STD-14873 (Figure 811) and do as follows:

a) Use the teflon spatula, STD-14873 to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

5) Alternative Procedure. Apply a piece of release film, G50033 [C10-133] on top of the weld repair paste, A50422 [C06-067].

a) Use a roller on the film, G50033 [C10-133] to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

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

(c) Remove unwanted polyurethane paste adhesive with a cloth, G50035 [C10-182].

(d) Apply a piece of release film, G50033 [C10-133] on top of the repair area to put a cover on the weld repair paste, A50422 [C06-067] as follows:

1) Attach the release film, G50033 [C10-133] with Scotch 5490 tape, G50030 [C10-040].

NOTE: It is not necessary for the release film to touch the polyurethane paste adhesive.

NOTE: To get a satisfactory cure, the release film is recommended if the fan blade is not cured in a low moisture environment (relative humidity is less than 40 percent).

NOTE: To get a better surface finish, it is recommended that the release film does not touch the surface of the polyurethane paste adhesive.

SUBTASK 72-21-02-800-001-H00

WARNING

REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

WARNING

USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(10) Alternative Procedure Available. Cure the weld repair paste, A50422 [C06-067] at room temperature, at a minimum temperature of 65°F (19°C), for 24 hours.

SUBTASK 72-21-02-280-001-H00

(11) Alternative Procedure. Cure the weld repair paste, A50422 [C06-067] (refer to SAE ARP 5144, Heat Application for Thermosetting Resin Curing) and do as follows:

NOTE: A relative humidity of more than 40 percent can prevent full curing of the polyurethane paste adhesive. Thus, it is recommended to use a heating device if the relative humidity is more than 40 percent.

(a) Use a heating device.

(b) Attach a minimum of one thermocouple at a maximum of 0.50 in. (12.70 mm) from each repair area.

(c) If you repair more than three areas on the fan blade, then only three thermocouples are necessary.

(d) If the repair area is adjacent to metal areas, attach a minimum of one thermocouple to the adjacent metal area and attach a minimum of one thermocouple to the composite (non-metal) area of the fan blade.

(e) Keep the repair area at a temperature range of 170°F (77°C) to 190°F (88°C) for 60-90 minutes.

(f) The temperature of the fan blade must not be more than 190°F (88°C).

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

SUBTASK 72-21-02-280-002-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

WARNING USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(12) Alternative Procedure. Cure the weld repair paste, A50422 [C06-067] (refer to SAE ARP 5144, Heat Application for Thermosetting Resin Curing) and do as follows:

(a) Use a heating device.

(b) Attach a minimum of one thermocouple to a maximum of 0.50 in. (12.70 mm) of each repair area.

(c) If you repair more than three areas of the fan blade, then only three thermocouples are necessary.

(d) If the repair area is adjacent to metal areas, attach a minimum of one thermocouple to the adjacent metal area and attach a minimum of one thermocouple to the composite (non-metal) area of the fan blade.

(e) Keep the fan blade at a temperature range of 130°F (54°C) to 170°F (77°C) for 120-150 minutes.

SUBTASK 72-21-02-950-002-H00

(13) Remove the release film, G50033 [C10-133] and masking from the fan blade.

SUBTASK 72-21-02-120-003-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(14) If necessary, sand the fan blade repair area as follows:

(a) Use abrasive paper, G02442 [C10-141] to sand the weld repair paste, A50422 [C06-067] to a smooth transition, to maximum of 0.003 in. (0.076 mm) higher or flush with the remaining paint or AF32 and as follows:

NOTE: Sanding will cause the surface of the weld repair paste, A50422 [C06-067] to have a dull finish, which is acceptable.

1) After you have removed the film, G50033 [C10-133], sanding is not necessary if the surface of the weld repair paste, A50422 [C06-067] has the necessary transition.

SUBTASK 72-21-02-200-007-H00

(15) Do a visual inspection of the fan blade repair area as follows:

(a) Do an inspection for bubbles, blisters, and contamination.

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

1) If you find bubbles, blisters, or contamination more than 0.005 in. (0.127 mm) in depth, do the repair again.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(b) Make sure that the carbon fiber that you can see and exposed carbon fiber in fan blade repair area is fully covered with weld repair paste, A50422 [C06-067].

1) If the carbon fiber that you can see and exposed carbon fiber in fan blade repair area is not fully covered, do the repair again.

(c) Do an inspection of the weld repair paste, A50422 [C06-067] to make sure that it is cured as follows:

1) Do an inspection of shape memory (surface keeps initial shape) as follows:

a) Apply force with the Teflon spatula to the cured surface to cause a movement of 0.001 in. (0.025 mm) to 0.003 in. (0.076 mm).

b) Remove the Teflon spatula.

c) Make sure that the surface of the weld repair paste, A50422 [C06-067] keeps the initial shape (shape memory).

2) Cured surface must be dry and not wet.

3) If the weld repair paste, A50422 [C06-067] is not cured, remove the non-cured polyurethane paste adhesive from the repair area and repeat the AF32 Repair procedure.

NOTE: Do not apply paint over the polyurethane paste adhesive repair area if you can still see AF32.

H. Repair the Visible Tip Cap Metal

SUBTASK 72-21-02-120-005-H00

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION MAKE SURE THAT YOU DO NOT REMOVE OR SAND THROUGH THE BROWN LAYER OF AF32 COATING BELOW THE POLYURETHANE FILM. DAMAGE TO THE FAN BLADE CAN OCCUR.

CAUTION MAKE SURE THAT YOU DO NOT SAND INTO THE CARBON FIBER COMPOSITE AREA OF THE FAN BLADE. DAMAGE TO THE FAN BLADE CAN OCCUR.

(1) Remove loose or damaged black polyurethane film and damaged AF32 coating from the fan blade Area T (Figure 812) and do as follows:

(a) Sand the fan blade repair area as follows:

1) Remove only damaged black polyurethane film which is cracked, peeled, or damaged, but do not remove erosion damage.

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

2) Remove only AF32 coating which is peeled or damaged, but do not remove erosion damage.

3) Do not remove AF32 coating if it is only cracked and still tightly bonded.

4) Do not remove the adhesive film flash/fillet at the edge of the tip cap metal if it is still tightly bonded.

5) Do not remove black polyurethane film or AF32 coating if it is only eroded.

6) Keep the repair area as small as possible.

CAUTION THE TIP CAP METAL THICKNESS IS THINNER AT THE EDGE OF THE TIP CAP. MAKE SURE THAT YOU DO NOT REMOVE OR SAND THROUGH THE TIP CAP METAL. DAMAGE TO THE FAN BLADE CAN OCCUR.

7) Use abrasive paper, G02442 [C10-141] to lightly sand the repair area as follows:

a) Do not sand or remove additional carbon fiber.

b) Do not use powered tools to sand the metal.

NOTE: Hand sanding is used to prevent damaging the tip cap metal and carbon fiber surface and prevent additional damage to the fan blade.

c) Lightly hand sand the visible tip cap metal to clean surface and remove oxidation.

d) Only make rough the black polyurethane film and the AF32 coating and carbon fiber if they are only eroded.

e) Use a cloth, G50035 [C10-182] that is wet with water to wipe the fan blade surface to keep it cool.

<1> No steam must rise from the surface you wipe.

SUBTASK 72-21-02-200-009-H00

(2) Do a visual inspection of the fan blade area where you removed damage from the black polyurethane film or AF32 coating as follows:

(a) Do a check for tip cap disbond (refer to TASK 72-21-02-200-801-H01, SUBTASK 72-21-02-220-007-H01).

(b) If it is disbonded, then the condition is not repairable with this procedure.

SUBTASK 72-21-02-200-010-H00

(3) Do an inspection of the exposed (individual broken, damaged or missing carbon fibers) carbon fiber on the fan blade for damage after sanding as follows:

(a) Do an inspection of the carbon fiber damage depth as follows:

1) Alternative Procedure Available. Carbon fiber must not be damaged 0.044 in. (0.112 cm) below the original surface of the fan blade in the repair area.

2) Alternative Procedure. Carbon fiber must not be damaged 0.018 in. (0.457 mm) below the original surface of the AF32 on the fan blade in the repair area.

3) Alternative Procedure. Carbon fiber must not be damaged 0.008 in. (0.203 mm) below the original surface of the carbon fiber on the fan blade in the repair area.

(b) Each area of exposed (individual broken, damaged or missing carbon fibers) carbon fiber must be less than 0.05 in^2 (32.2 mm^2) and as follows:

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

1) Do not include areas of visible carbon fiber in the area measurement if the carbon fibers are still contained in the epoxy resin and there are no broken, damaged or missing carbon fibers.

SUBTASK 72-21-02-100-003-H00

(4) Clean the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

NOTE: This step is necessary to remove dirt and unwanted material from sanding and prepare the repair area for masking.

(a) Use gloves, G50263 to touch the fan blade.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(b) Use Composite Cleaning Method No. 5 and use alcohol, B00130.

SUBTASK 72-21-02-950-003-H00

(5) Apply masking around the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

(a) Use gloves, G50263 to touch the fan blade.

(b) Remove all masking that you applied before in the repair area.

(c) Use Composite Masking Method No. 5.

SUBTASK 72-21-02-100-004-H00

(6) Clean the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

NOTE: This step is necessary to prepare the repair area for bonding.

(a) Use gloves, G50263 to touch the fan blade.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(b) Use Composite Cleaning Method No. 5 and use alcohol, B00130.

SUBTASK 72-21-02-700-002-H00

(7) Do a water break test to the fan blade repair area (refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00) as follows:

(a) Dry the fan blade in air for 30 minutes minimum after the test.

SUBTASK 72-21-02-300-018-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

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

(WARNING PRECEDES)

CAUTION WELD REPAIR PASTE MUST BE APPLIED WITHIN 10 MINUTES AFTER PRIMER APPLICATION. IF NOT, THE ADHESION QUALITIES OF THE PASTE WILL BE DECREASED.

(8) Apply 3M Single Step primer, C50368 to the visible Tip Cap metal in Area T as follows:

NOTE: It is recommended to prepare the weld repair paste and applicator before applying the single step primer. The paste must be applied to the primer within 10 minutes.

NOTE: Use detailed procedures, controls equipment, personal protection equipment, and environmental controls, recommended by the material manufacturer.

CAUTION ONLY 3M™ SINGLE STEP PRIMER (PN 08681 OR 08682) HAS BEEN TESTED TO MAKE SURE THE REPAIR PASTE WILL BOND TO THE METAL TIP-CAP SURFACE. USE OF ANY OTHER PRIMER CAN RESULT IN THE REPAIR PASTE DISBONDING DUE TO POOR BONDING AND THEN LEAD TO METAL TIP-CAP DAMAGE ON THE FAN BLADE.

(a) Do not use an alternative primer.

(b) Shake primer thoroughly to mix it.

(c) Apply a uniform thickness in a thin coat.

(d) Make sure there is full primer coverage of the bare metal surface repair area.

(e) Let the primer dry for 5 to 10 minutes.

SUBTASK 72-21-02-300-019-H00

(9) Prepare the weld repair paste, A50422 [C06-067] as follows:

(a) Put the weld repair paste, A50422 [C06-067] cartridge into the applicator, COM-14871.

(b) Remove the cap from the end of the cartridge and attach the adhesive mixing nozzle, COM-14870 to the end of the cartridge.

(c) Begin to squeeze the trigger on the applicator, COM-14871 to let the weld repair paste, A50422 [C06-067] flow into the adhesive mixing nozzle, COM-14870.

(d) Continue to squeeze the trigger on the applicator until the weld repair paste, A50422 [C06-067] starts to come out of the end of the mixing nozzle.

(e) Squeeze-out a minimum of filled diameter of 1.0 in. (25.4 mm) by 0.05 in. (1.27 mm) in thickness of weld repair paste, A50422 [C06-067] from the applicator, COM-14871 and discard it before you use the weld repair paste, A50422 [C06-067] on the fan blade repair area.

NOTE: After the repair is completed, the mixing nozzle must be removed and discarded and the cap on the cartridge must be replaced. The shelf life of the cartridge is two weeks after it is opened. Each new repair will have to use a new mixing nozzle.

SUBTASK 72-21-02-300-020-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(10) Apply the weld repair paste, A50422 [C06-067] to the fan blade repair area (Figure 812) as follows:

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

(a) Use gloves, G50263 to touch the fan blade.

(b) Weld repair paste must be applied within 10 minutes after primer application.

(c) Make the weld repair paste, A50422 [C06-067] smooth to make it level with the fan blade adjacent areas and as follows:

1) Apply the weld repair paste, A50422 [C06-067] to areas of missing polyurethane film in Area T.

2) Make a teflon spatula, STD-14873 (Figure 811) and do as follows:

a) Use the teflon spatula, STD-14873 to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

(d) Remove unwanted polyurethane paste adhesive with a cloth, G50035 [C10-182].

SUBTASK 72-21-02-950-004-H00

(11) Carefully remove the masking from the fan blade.

SUBTASK 72-21-02-950-005-H00

(12) Apply a piece of release film, G50033 [C10-133] on top of the repair area to put a cover on the weld repair paste, A50422 [C06-067] as follows:

(a) Attach the release film, G50033 [C10-133] with Scotch 5490 tape, G50030 [C10-040].

NOTE: It is not necessary for the release film to touch the polyurethane paste adhesive.

NOTE: To get a satisfactory cure, the release film is recommended if the fan blade is not cured in a low moisture environment (relative humidity is less than 40 percent).

NOTE: To get a better surface finish, it is recommended that the release film does not touch the surface of the polyurethane paste adhesive.

SUBTASK 72-21-02-800-002-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

WARNING USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(13) Alternative Procedure Available. Cure the weld repair paste, A50422 [C06-067] at room temperature, at a minimum temperature of 65°F (19°C), for 24 hours.

SUBTASK 72-21-02-280-003-H00

(14) Alternative Procedure. Cure the weld repair paste, A50422 [C06-067] (refer to SAE ARP 5144, Heat Application for Thermosetting Resin Curing) and do as follows:

NOTE: A relative humidity of more than 40 percent can prevent full curing of the polyurethane paste adhesive. Thus, it is recommended to use a heating device if the relative humidity is more than 40 percent.

(a) Use a heating device.

(b) Attach a minimum of one thermocouple at a maximum of 0.50 in. (12.70 mm) from each repair area.

(c) If you repair more than three areas on the fan blade, then only three thermocouples are necessary.

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

(d) If the repair area is adjacent to metal areas, attach a minimum of one thermocouple to the adjacent metal area and attach a minimum of one thermocouple to the composite (non-metal) area of the fan blade.

(e) Keep the repair area at a temperature range of 170°F (77°C) to 190°F (88°C) for 60-90 minutes.

(f) The temperature of the fan blade must not be more than 190°F (88°C).

SUBTASK 72-21-02-280-004-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

WARNING USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(15) Alternative Procedure. Cure the weld repair paste, A50422 [C06-067] (refer to SAE ARP 5144, Heat Application for Thermosetting Resin Curing) and do as follows:

(a) Use a heating device.

(b) Attach a minimum of one thermocouple to a maximum of 0.50 in. (12.70 mm) of each repair area.

(c) If you repair more than three areas of the fan blade, then only three thermocouples are necessary.

(d) If the repair area is adjacent to metal areas, attach a minimum of one thermocouple to the adjacent metal area and attach a minimum of one thermocouple to the composite (non-metal) area of the fan blade.

(e) Keep the fan blade at a temperature range of 130°F (54°C) to 170°F (77°C) for 120-150 minutes.

SUBTASK 72-21-02-120-006-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(16) If necessary, sand the fan blade repair area as follows:

(a) Use abrasive paper, G02442 [C10-141] to sand the weld repair paste, A50422 [C06-067] to make a smooth transition to areas adjacent to the repair.

NOTE: Sanding will cause the surface of the weld repair paste, A50422 [C06-067] to have a dull finish, which is acceptable.

SUBTASK 72-21-02-200-011-H00

(17) Do a visual inspection of the fan blade repair area as follows:

(a) Do an inspection for bubbles, blisters, and contamination.

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

1) If you find bubbles, blisters, or contamination more than 0.005 in. (0.127 mm) in depth, do the repair again.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(b) Make sure that the fan blade repair area in Area T is fully covered with weld repair paste, A50422 [C06-067] as follows:

1) All exposed metal within Area T must be covered with weld repair paste, A50422 [C06-067] or the original polyurethane film.

2) If the fan blade repair area is not fully covered, do the repair again.

(c) Do an inspection of the weld repair paste, A50422 [C06-067] to make sure that it is cured as follows:

1) Do an inspection of shape memory (surface keeps initial shape) as follows:

a) Apply force with the Teflon spatula to the cured surface to cause a movement of 0.001 in. (0.025 mm) to 0.003 in. (0.076 mm).

b) Remove the Teflon spatula.

c) Make sure that the surface of the weld repair paste, A50422 [C06-067] keeps the initial shape (shape memory).

2) Cured surface must be dry and not wet.

3) If the weld repair paste, A50422 [C06-067] is not cured, remove the non-cured polyurethane paste adhesive from the repair area and repeat the AF32 Repair procedure.

NOTE: Do not apply paint over the polyurethane paste adhesive repair area if you can still see AF32.

I. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-02-410-002-H00

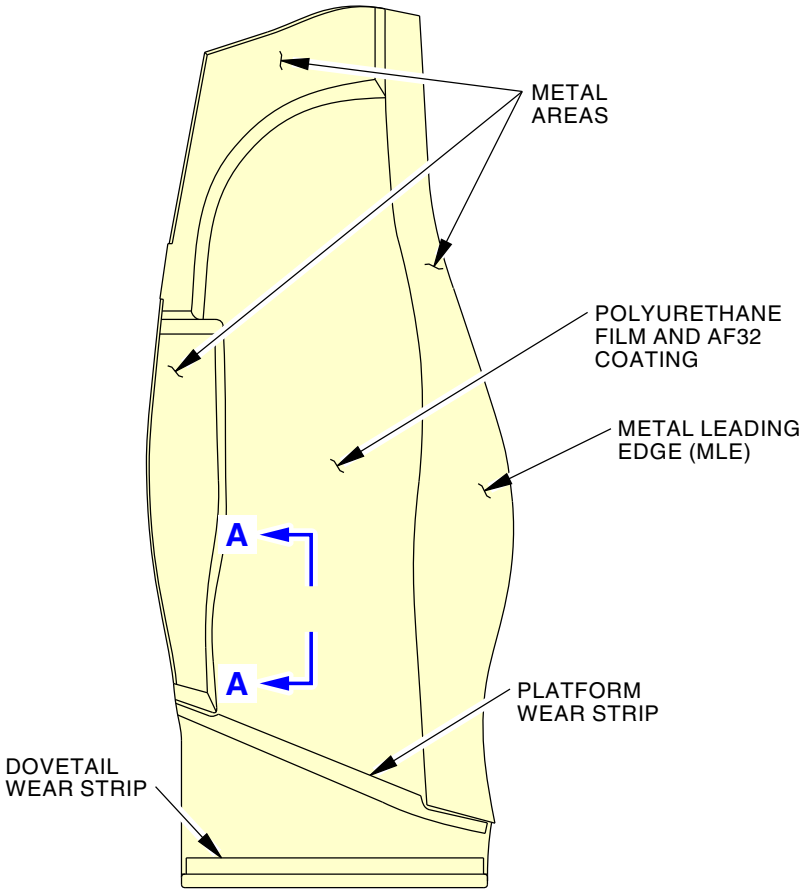
(1) If you did this repair on-wing and you removed the adjacent fan platform or the fan blade, install the fan platform adjacent to the fan blade damaged area or the fan blade again as follows:

(a) Do this task: Fan Blade Set Installation, TASK 72-21-02-400-802-H01.

(b) Do this task: Fan Blade Platform Installation, TASK 72-21-03-400-801-H01.

——— END OF TASK ———

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

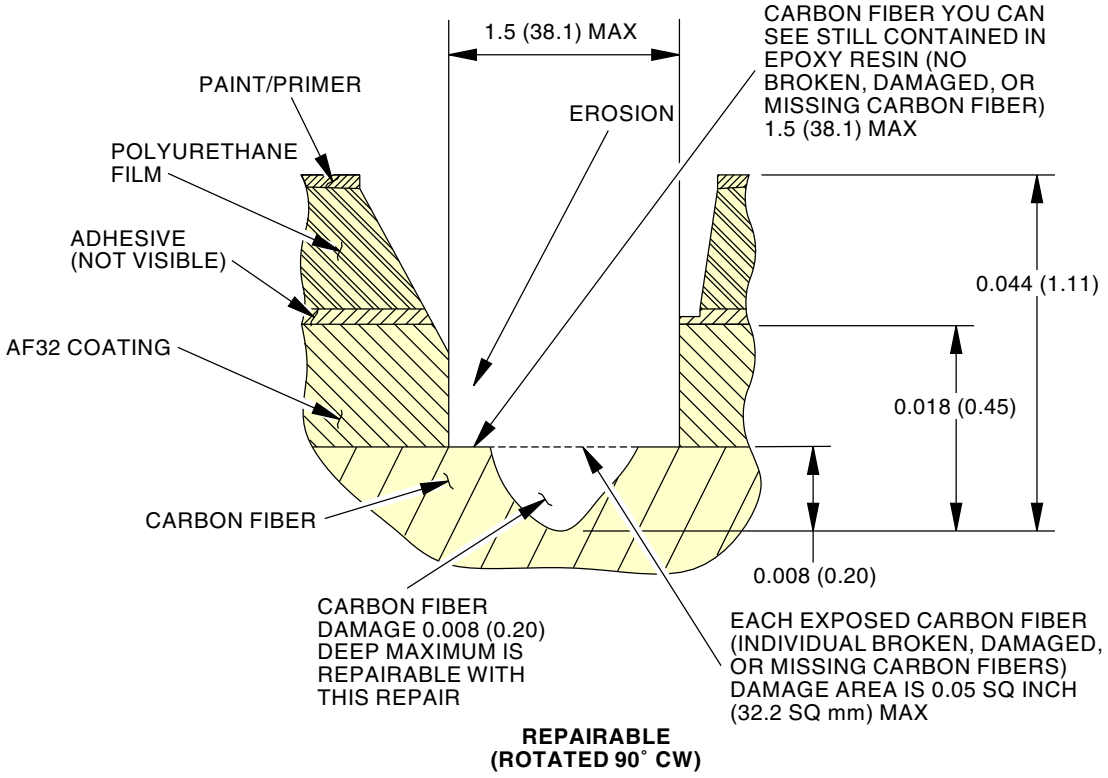


CONCAVE SIDE

5022611-00
2486680 S0000585166_V1

FAN BLADE
Figure 810/72-21-02-990-845-H00 (Sheet 1 of 3)

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



CONDITION	MAX AREA PER REPAIR LOCATION	EACH REPAIR LOCATION MAX SIZE	MIN SEPERATION OF REPAIR AREAS
AF32 VISIBLE (I.E. POLYURETHANE FILM MISSING)	15 SQ INCH (9677 SQ mm)	10 INCHES (254 mm) (LINEAR)	N/A
CARBON FIBER VISIBLE (FIBERS NOT EXPOSED PER BELOW)	REFER TO →	1.5 INCHES (38 mm) (DIAMETER)	N/A
CARBON FIBER EXPOSED (INDVIDUAL BROKEN, DAMAGED OR MISSING CARBON FIBERS)	0.05 SQ INCH (32.2 SQ mm)	REFER TO ←	2.00 INCHES (50.8 mm)

NOTE:

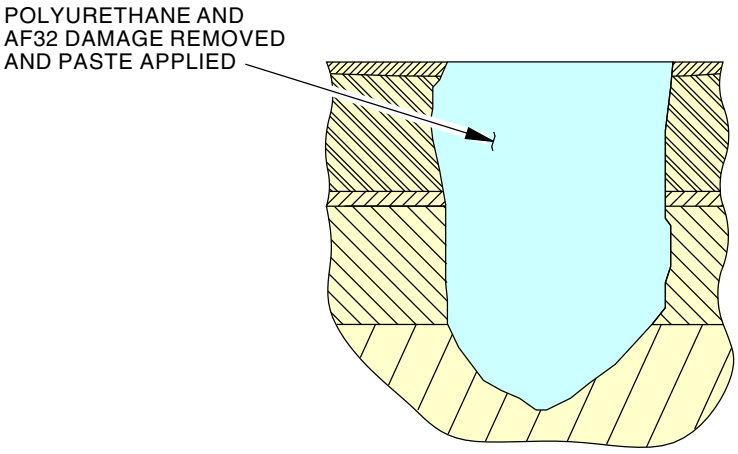
ALL DIMENSIONS ARE IN INCHES (mm).

5022612-00

2486681 S0000585167_V2

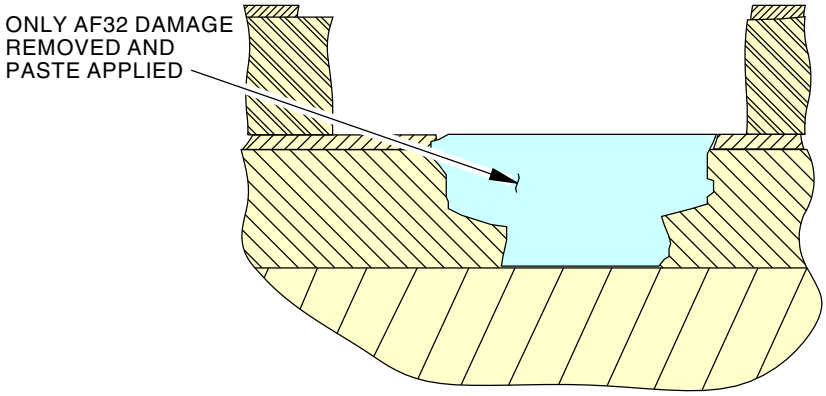
FAN BLADE
Figure 810/72-21-02-990-845-H00 (Sheet 2 of 3)

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



REPAIR COMPLETE
(ROTATED 90˚ CW)

A-A



REPAIR COMPLETE
(ROTATED 90˚ CW)

A-A

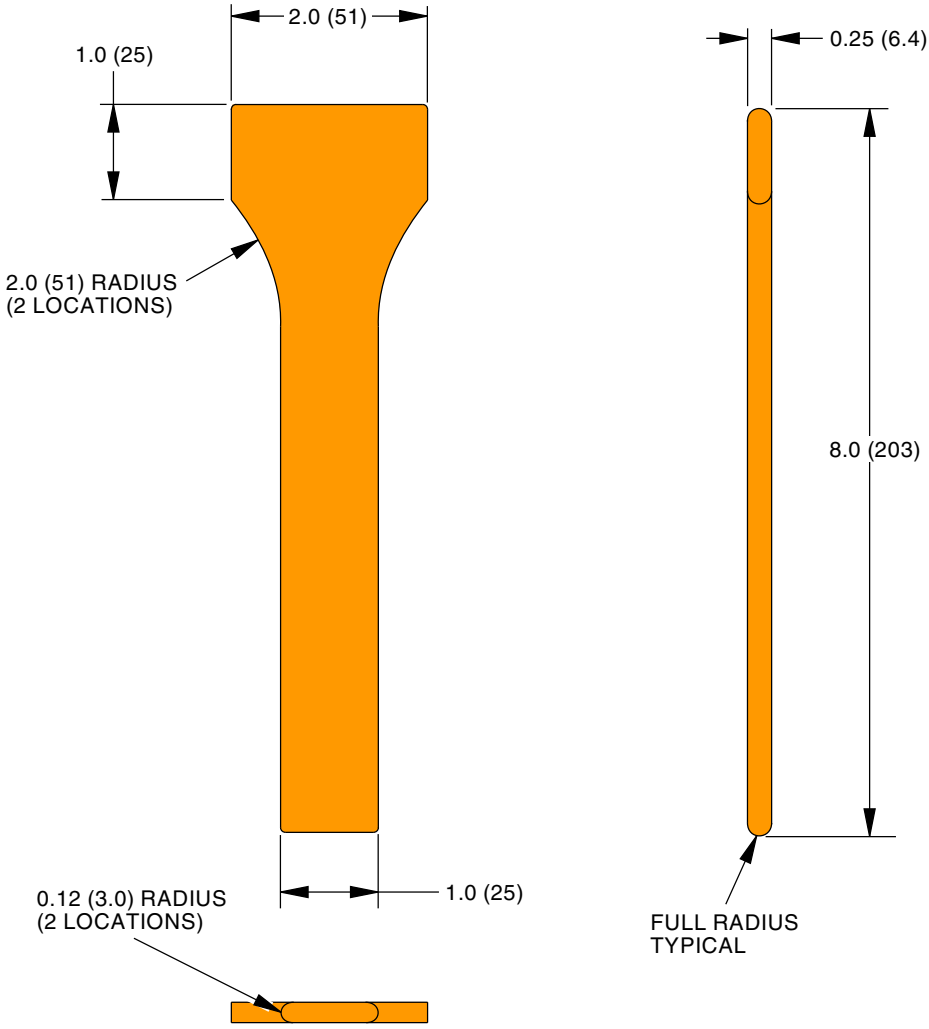
NOTE:

1. ALL DIMENSIONS ARE IN INCHES (mm).
2. ALL CARBON FIBER YOU CAN SEE AND IS EXPOSED MUST BE COVERED BY PASTE.
3. IT IS NOT REQUIRED FOR PASTE TO COVER ALL POLYURETHANE FILM.

5022613-00
2486682 S0000585170_V2

FAN BLADE
Figure 810/72-21-02-990-845-H00 (Sheet 3 of 3)

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



MATERIAL:

TEFLON (PTFE)

NOTE:

ALL DIMENSIONS ARE IN INCHES (mm).

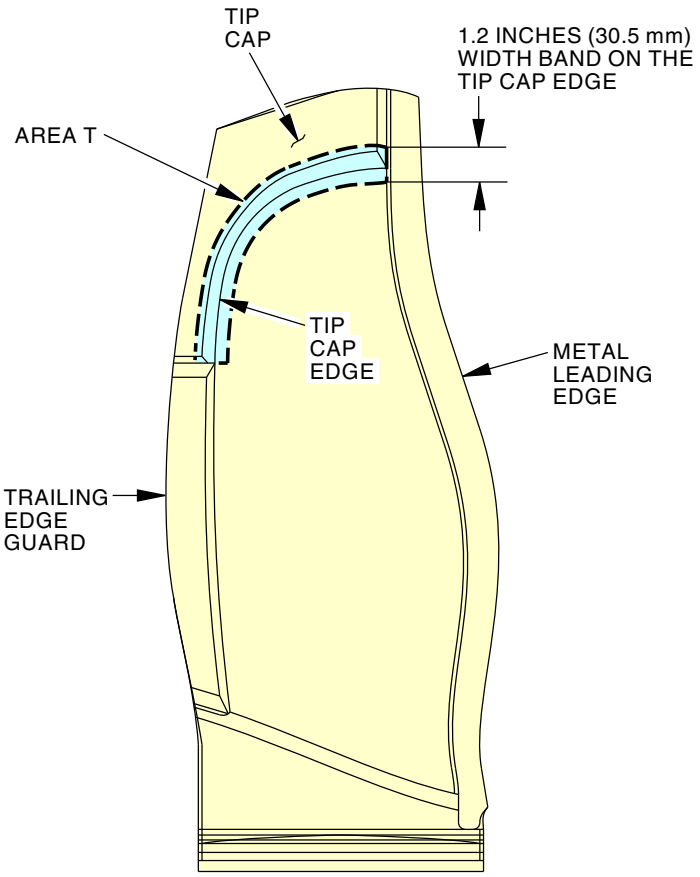
TOLERANCE:

+0.010 (0.25)

5022614-00
2486683 S0000585171_V1

TEFLON SPATULA
Figure 811/72-21-02-990-847-H00

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



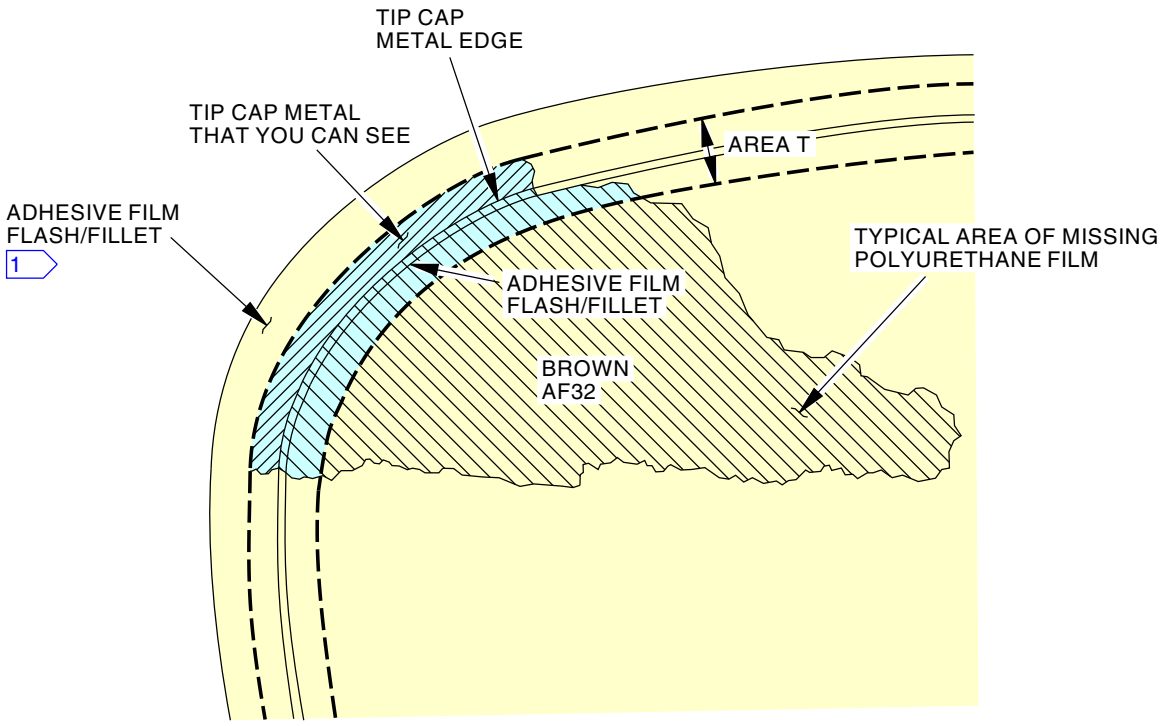
CONCAVE (PRESSURE) SIDE

5047463-00

2820091 S0000651675_V1

Fan Blade Tip Cap
Figure 812/72-21-02-990-849-H00 (Sheet 1 of 2)

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



CONCAVE (PRESSURE) SIDE

NOTE:

1 ADHESIVE FILM FLASH/FILLET CAN BE MISSING.

5047464-00

2820092 S0000651676_V1

Fan Blade Tip Cap
Figure 812/72-21-02-990-849-H00 (Sheet 2 of 2)

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

FAN BLADE PLATFORM - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks

(1) A removal of the fan blade platform

(2) An installation of the fan blade platform.

TASK 72-21-03-000-801-H01

2. Fan Blade Platform Removal

(Figure 402, Figure 401, Figure 403 and Figure 404)

A. General

(1) This task is the removal procedure for the fan blade platform.

(2) Access to the fan blade platform is through the inlet cowl.

(3) The fan blade balance weight bolts must be added or removed if the replacement blade platform has a moment-weight that is 200 gram-inches more or less than the blade platform to be replaced.

(4) It is necessary to remove the fan rotor spinner.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Removal

SUBTASK 72-21-03-865-001-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-21-03-869-001-H00

CAUTION

MAKE SURE YOU PUT A MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-03-020-003-H00

(3) Do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

F. Fan Blade Platform Removal

SUBTASK 72-21-03-020-004-H00

(1) Remove the fan blade platform [2] as follows:

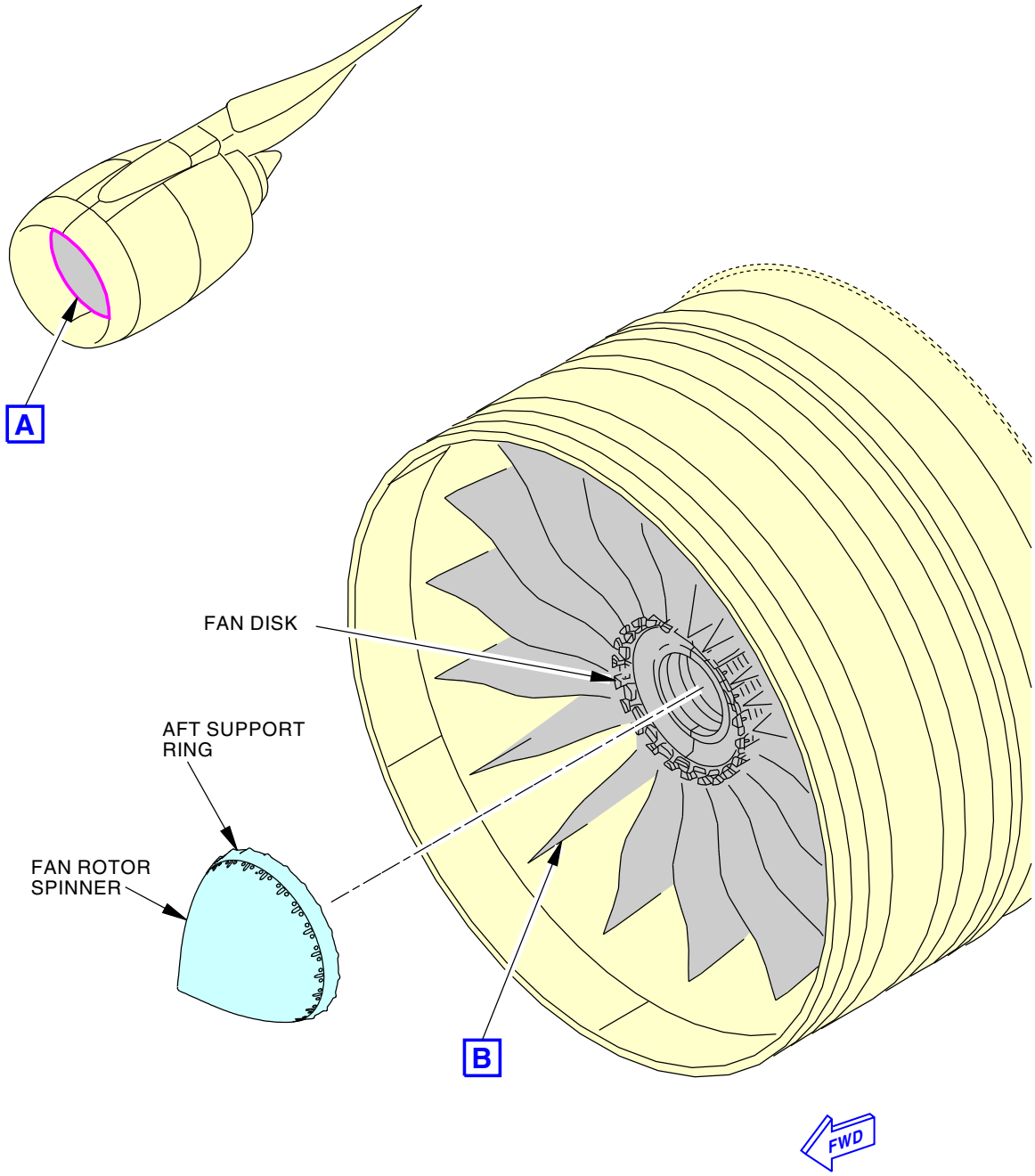
(a) Remove the fan blade platform [2] from its location adjacent to the fan blades [1].

1) Apply a spreading pressure to the fan blades [1] with your hands to make sure that the fan blade platform [2] does not scratch the convex (suction) side of the fan blades [1].

2) Make sure that the fan blade platform [2] has protection from accidental damage.

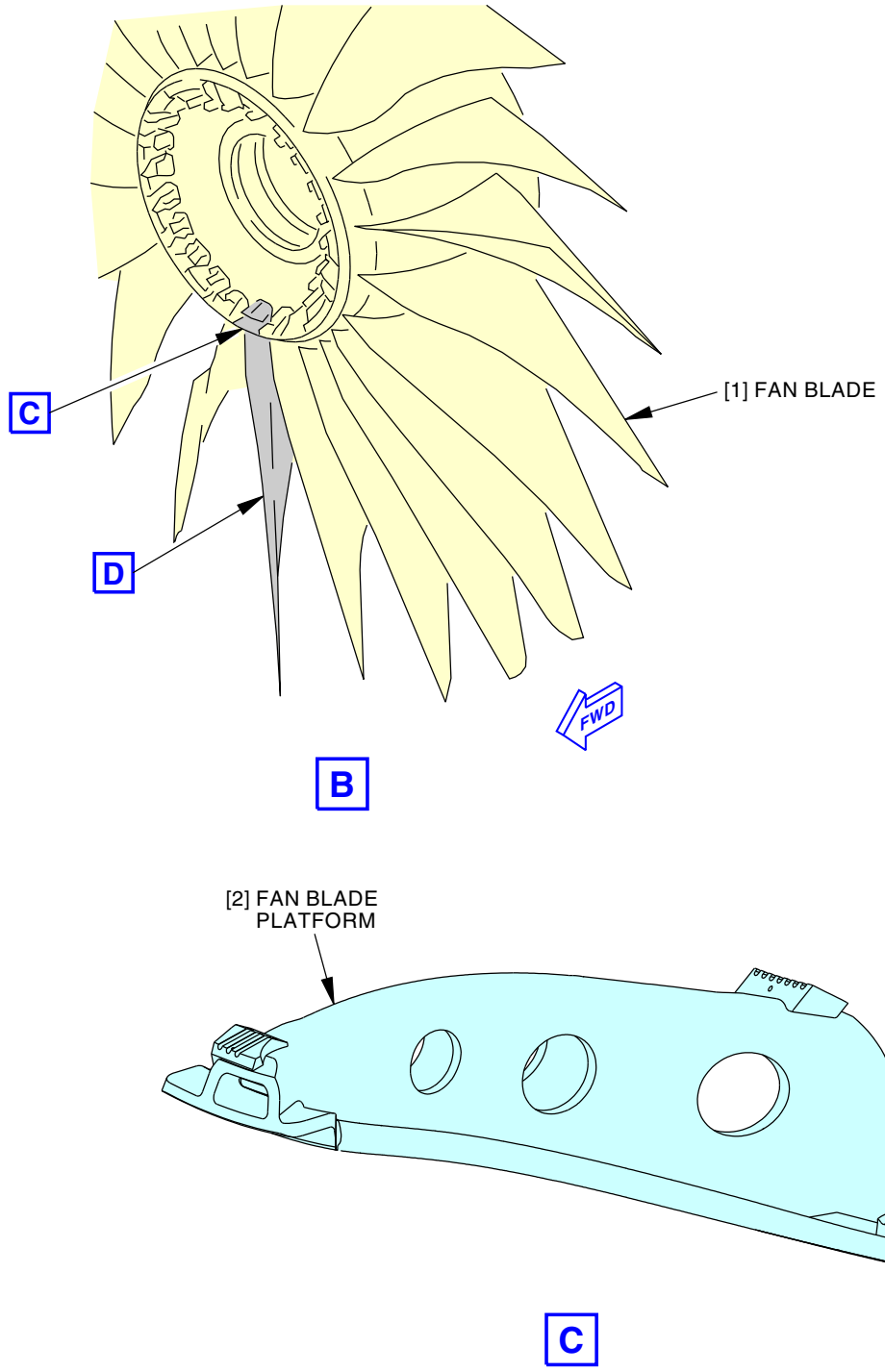
——— END OF TASK ———

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



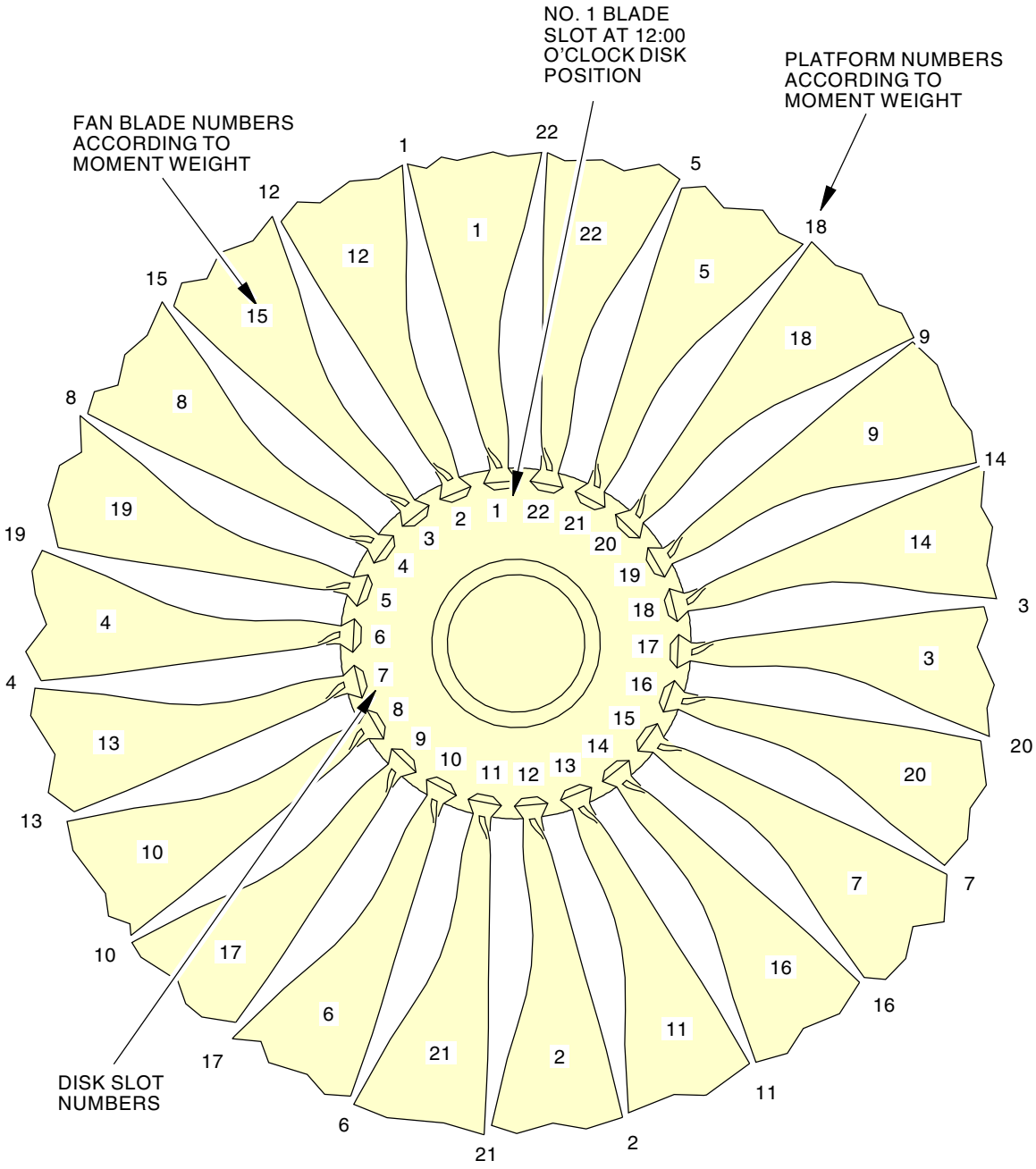
Fan Blade Installation
Figure 401/72-21-03-990-805-H01 (Sheet 1 of 2)

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



Fan Blade Installation
Figure 401/72-21-03-990-805-H01 (Sheet 2 of 2)

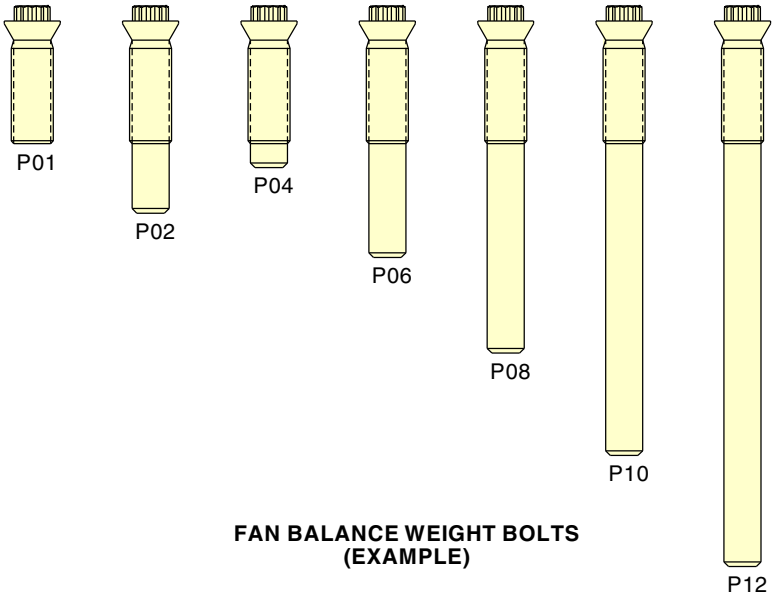
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



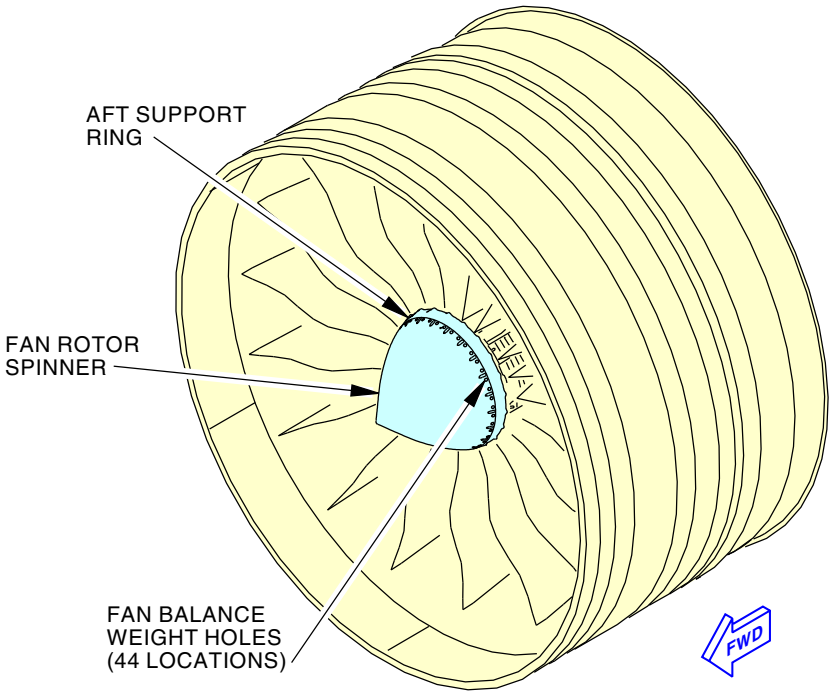
M06825 S0004285853_V3

Fan Blade Disk Slot and Platform Installation
Figure 402/72-21-03-990-804-H01

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



FAN BALANCE WEIGHT BOLTS (EXAMPLE)



NOTE:

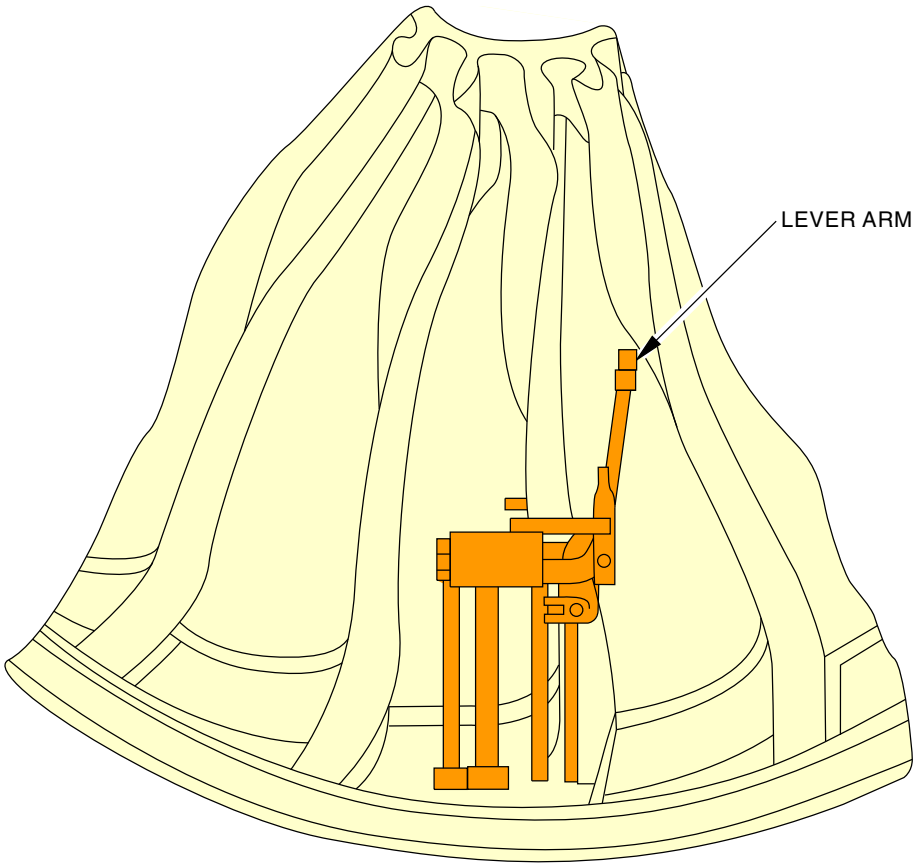
FAN BALANCE WEIGHT HOLES ARE NUMBERED ON EVERY FOUR HOLES COUNTER CLOCKWISE WHICH START AT HOLE 1 MARK (DIMPLE MARK) ON THE AFT SPINNER.

1198925-00-A

M06826 S0004285854_V2

Fan Blade Balance Bolt Installation
Figure 403/72-21-03-990-807-H01

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



1297363-00
2002370 S0000391312_V2

Fan Blade Spreading Tool Fixture
Figure 404/72-21-03-990-809-H00

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

TASK 72-21-03-400-801-H01

3. Fan Blade Platform Installation

A. General

(1) This task is the installation replacement procedure for the fan blade platform.

(2) The fan blade balance weight bolts must be added or removed if the replacement blade platform has a moment-weight that is 200 gram-inches more or less than the blade platform to be replaced.

(3) After you install the fan blade platform, you must do the tests listed in the power plant test reference table.

B. References

Reference	Title
71-00-00-700-811-H01	Test No. 12A - Low Pressure System (Fan/LPT) Trim Balance (For SCU P/N S332W401-200) (P/B 501)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
72-21-01-400-801-H01	Fan Rotor Spinner 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

D. Consumable Materials

Reference	Description	Specification
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
G02417 [C10-021]	Tape - Duct	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
2	Fan blade platform	72-00-51-09A-117	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

G. Fan Blade Platform Installation

SUBTASK 72-21-03-970-001-H00

(1) You must do this calculation to find the amount of unbalance correction:

NOTE: This step is only necessary if you replace the fan blade platform with a new one.

(a) Record the weight of the removed fan blade platform [2] and the replacement platform.

NOTE: The weight of the fan blade platform is found on the forward face of the platform.

(b) Calculate the weight difference between the removed fan blade platform [2] and the replacement fan blade platform [2].

1) Multiply the weight difference in grams by 20 inches (508 mm).

2) Record the calculation for later fan balance weight bolt class selection.

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

SUBTASK 72-21-03-420-003-H00

(2) Install the fan blade platform [2] (Figure 401 and Figure 402):

(a) Install the fan blade platform [2] adjacent to the fan blades [1] in its initial location.

1) Apply a spreading pressure to thefan blades [1] with your hands to make sure that the fan blade platform [2] do not scratch the convex (suction) side of the fan blades [1].

(b) Hold the fan blade platform [2] to one of the adjacent fan blades with tape, G02417 [C10-021].

NOTE: Put the tape in a position that will not be in the way when the support ring and/or spinner is installed.

SUBTASK 72-21-03-420-004-H00

(3) Install balance weight bolt(s) in the spinner to correct an unbalance condition (Figure 403):

NOTE: This step is only necessary if you replace the fan blade platform with a new one.

NOTE: This procedure is a requirement which will reduce the need for fan trim balance. This procedure is necessary if the difference between the moment-weight of the replaced platform and the replacement platform is more than 200 gram-inches.

(a) Select the classification of fan balance weight bolt(s) that equal the difference between the replaced fan blade platform and the replacement blade platform.

(b) Install the fan balance weight bolt as follows:

1) If the replacement fan blade platform is lighter than the removed blade platform, then install the bolt in the spinner hole in front of the platform.

2) If the replacement fan blade platform is heavier than the replaced blade platform, then install the bolt in front of the blade platform opposite to the replacement blade platform.

3) Remove the existing fan balance weight bolt from the aft spinner and make sure it is a P01 bolt (standard balance weight bolt).

4) Put Acheson GP460 compound, D50043 [C02-058] on the threads of the replacement fan balance weight bolt.

5) Put the replacement bolt in the spinner hole.

6) Tighten the replacement bolt to 150.0-170.0 pound-inches (17.0-19.2 Newton-meters).

7) If the fan balance weight bolt is not a P01, do these steps:

a) Make sure of the moment-weight of the replaced bolt (Table 401).

Table 401/72-21-03-993-801-H00 Moment Weight Calculation

WT. BALANCE	WEIGHT
moment-weight difference needed	500 grams
moment-weight of replaced bolt	200 grams (P02)
Total	700 grams

b) Add the moment-weight of the replaced bolt to the necessary difference in moment-weight.

<1> Use the value to find the moment-weight and P designation of the replacement bolt.

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

SUBTASK 72-21-03-869-002-H00

(4) Access the Maintenance Access Terminal and record the fan balance weight bolt(s) configuration in the On Board Engine Balance System (OEBS) (TASK 71-00-00-700-811-H01).

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-21-03-420-005-H00

(1) Do his task: Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

SUBTASK 72-21-03-869-003-H00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(2) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-21-03-865-002-H00

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

I. Fan Blade Installation Test

SUBTASK 72-21-03-710-001-H00

(1) Do the tests listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

——— END OF TASK ———

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

FAN BLADE PLATFORM - INSPECTION/CHECK

1. General

A. This procedure contains one task:

(1) An examination of the fan blade platform.

TASK 72-21-03-220-801-H01

2. Fan Blade Platform Inspection

(Figure 601)

A. General

(1) This task provides the instructions on how to perfom an inspection of the fan blade platforms.

(2) These service bulletins are from the engine manufacturer and is referenced in this task:

(a) The Service Bulletin SB 777-GE100-72-0382 removes the aluminum hail plate located underneath the paint on the convex wing of the fan blade platforms. You can see the outline of the hail plate through the paint on the pre SB platforms. It will not be on the post SB platforms.

(b) The Service Bulletin SB 777-GE100-72-0514 replaces the paint top coat on the fan blade platforms with polyurethane film. The film has a dull, non-gloss appearance.

(c) The Service Bulletin SB 777–GE100–72–0715 removes the aft bumper on the bottom of the fan blade platform.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-03-000-801-H01	Fan Blade Platform Removal (P/B 401)
72-21-03-300-801-H01	Fan Blade Platform (Local Area Paint Touch-up) Repair (P/B 801)
72-21-03-300-802-H00	Fan Blade Platform Top Skin Repair (P/B 801)
72-21-03-300-803-H00	Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair (P/B 801)
72-21-03-400-801-H01	Fan Blade Platform 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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

E. Prepare for the Inspection

SUBTASK 72-21-03-860-003-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-03-480-001-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put a protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-03-020-001-H01

(3) Do this task:Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

F. Fan Blade Platform Inspection

SUBTASK 72-21-03-020-002-H01

(1) Do this task: Fan Blade Platform Removal, TASK 72-21-03-000-801-H01.

SUBTASK 72-21-03-960-001-H00

(2) If you find damage on the fan blade platform that is not in the limits, replace the fan blade platform.

SUBTASK 72-21-03-220-001-H01

(3) Examine the fan blade platform top surface for the conditions that follow (Figure 601):

ARO ALL PRE SB 777-GE100-72-0382

(a) Coating and top skin damage in Area A:

1) Black paint/white primer coatings.

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage according to these tasks:

<1> To repair the black paint coating on the fan blade platforms flowpath surfaces, do this task: Fan Blade Platform (Local Area Paint Touch-up) Repair, TASK 72-21-03-300-801-H01.

<2> To repair the fan blade platform composite top skin, do this task: Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00.

2) Fiberglass top skin.

a) Exposed fiberglass top skin is permitted.

b) Missing or eroded, scratched or nicked fiberglass top skin is permitted if the carbon top skin or fabric is not exposed.

(b) Coating and top skin damage in Area B:

1) Black paint/white primer coatings.

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

ARO ALL PRE SB 777-GE100-72-0382 (Continued)

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage, according to these tasks:

<1> To repair the black paint coating on the fan blade platforms flowpath surfaces, do this task: Fan Blade Platform (Local Area Paint Touch-up) Repair, TASK 72-21-03-300-801-H01.

<2> To repair the fan blade platform composite top skin, do this task: Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00.

2) Aluminum hail plate damage.

a) Permitted if the damage is not through the sheet metal.

b) Any amount of missing material 0.1 in. (2.5 mm) or less of rear and side edges is permitted.

c) Missing material at the forward edge is not permitted.

<1> The Continue-In-Service (C-I-S) limit for missing material 0.5 in. (12.7 mm) or less of the forward edge is as follows:

<a> Cut away the loose material and repair in or less than 50 cycles (Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00).

d) Disbond of hail plate is not permitted.

<1> The Continue-In-Service (C-I-S) limit for disbonded hail plate 0.5 in. (12.7 mm) from the edge is 50 cycles.

(c) Coating and top skin damage in Area C:

1) Black paint/white primer coatings.

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage according to these tasks:

<1> To repair the black paint coating on the fan blade platforms flowpath surfaces, do this task: Fan Blade Platform (Local Area Paint Touch-up) Repair, TASK 72-21-03-300-801-H01.

<2> To repair the fan blade platform composite top skin, do this task: Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00.

2) Red adhesive layer.

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage, according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.

3) Fiberglass top skin.

a) Missing or eroded, scratched or nicked are permitted if the carbon top skin or fabric is not exposed.

b) Repair according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.

(d) Carbon top skin.

1) Exposed carbon top skin is not permitted.

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

ARO ALL PRE SB 777-GE100-72-0382 (Continued)

a) Continue-In-Service (C-I-S) limit for up to 1 in^2 (645 mm^2) exposed carbon top skin is as follows:

<1> Do the top skin repair in or less than 300 cycles, according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.

b) Cracks, tears, and exposed carbon fabric are not permitted.

NOTE: Exposed carbon fabric is strands or threads that are no longer contained in epoxy. This can mean they are broken, frayed or disconnected from the adjacent fabric.

<1> Continue-In-Service (C-I-S) limit for cracks, tears, and exposed carbon fabric is as follows:

<a> Cracks, tears, and exposed carbon fabric up to a maximum depth of 0.002 in. (0.051 mm) and a maximum length of 1 in. (25 mm) are permitted for 10 cycles if you remove all loose materials.

2) Delamination of the fabric layers is not permitted.

3) Bent edges along the perimeter of the platform are not permitted.

a) Examine the adjacent fan blades for damage.

ARO ALL POST SB 777-GE100-72-0382

(e) Coating and top skin damage in Area A:

NOTE: Areas A and D have the same coating configuration, but have different limits.

1) Black paint/white primer coatings.

a) Missing or eroded, scratched or nicked are permitted.

b) You can repair the damage, according to these tasks:

<1> To repair the black paint coating on the fan blade platforms flowpath surfaces, do this task: Fan Blade Platform (Local Area Paint Touch-up) Repair, TASK 72-21-03-300-801-H01.

<2> To repair the fan blade platform composite top skin, do this task: Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00.

2) Fiberglass top skin.

a) Missing or eroded, scratched or nicked fiberglass top skin is permitted if the carbon top skin or fabric is not exposed.

b) Repair according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.

(f) Coating and top skin damage in Area D (convex wing):

1) Black paint/white primer coatings.

a) Missing or eroded black paint/white primer is not permitted.

b) The Continue-In-Service (C-I-S) limit for missing or eroded black paint/white primer is as follows:

<1> Do the local missing paint repair in or less than 100 cycles, according to this task: Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00.

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

ARO ALL POST SB 777-GE100-72-0382 (Continued)

2) Fiberglass top skin.
   a) Exposed fiberglass top skin is not permitted.
   b) Continue-In-Service (C-I-S) limit for exposed fiberglass top skin is as follows:
      <1> Do one of these options in or less than 100 cycles:
         <a> Do the local missing paint repair, according to this task: Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00.
         <b> Repair according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.

(g) Carbon top skin.
   1) Exposed carbon top skin is not permitted.
      a) Continue-In-Service (C-I-S) limit for exposed carbon top skin in Area A is as follows:
         <1> You must do the top skin repair in or less than 300 cycles:
            <a> Repair according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.
      b) Continue-In-Service (C-I-S) limit for exposed carbon top skin in Area D is as follows:
         <1> Do one of the following steps in or less than 100 cycles:
            <a> Do local missing paint repair, according to this task: Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair, TASK 72-21-03-300-803-H00.
            <b> Repair according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.
      c) Cracks, tears, and exposed carbon fabric are not permitted.
         NOTE: Exposed carbon fabric is strands or threads that are no longer contained in epoxy. This can mean they are broken, frayed or disconnected from the adjacent fabric.
         <1> Continue-In-Service (C-I-S) limit for cracks, tears, and exposed carbon fabric is as follows:
            <a> Cracks, tears, and exposed carbon fabric up to a maximum depth of 0.02 inch (0.51 mm) and a maximum length of 1.0 inch (25.4 mm) are permitted for 10 cycles if you remove all loose materials.
   2) Delamination of the fabric layers is not permitted.
   3) Bent edges along the perimeter of the platform are not permitted.
      a) Examine the adjacent fan blades for damage.

ARO ALL POST SB 777-GE100-72-0514 OR POST EM REPAIR 72-21-14 REPAIR 014

(h) Coating and top skin damage in Area A:

NOTE: Areas A and D have the same coating configuration, but have different limits.

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

ARO ALL POST SB 777-GE100-72-0514 OR POST EM REPAIR 72-21-14 REPAIR 014 (Continued)

1) Polyurethane film coating.

NOTE: The polyurethane film coating can extend past the edges of the top surface of the platform and not fully cover the platform seals. It is permitted for the film to be disconnected from the seals.

a) Missing, eroded, scratched or nicked polyurethane film coating is permitted.

2) Fiberglass top skin.

a) Missing or eroded, scratched or nicked fiberglass top skin is permitted if the carbon top coat or fabric is not exposed.

(i) Coating and top skin damage in Area D (convex wing):

1) Polyurethane film coating.

a) Missing, eroded, scratched or nicked polyurethane film coating is permitted.

2) Fiberglass top skin.

a) Exposed fiberglass top skin is not permitted.

b) Continue-In-Service (C-I-S) limit for exposed fiberglass top skin is as follows:

<1> Repair in or less than 100 cycles according to this task: Fan Blade Platform Top Skin Repair, TASK 72-21-03-300-802-H00.

(j) Carbon top skin.

1) Exposed carbon top skin is not permitted.

a) Continue-In-Service (C-I-S) limit for exposed carbon top skin in Area A is as follows:

<1> Continue-In-Service (C-I-S) limit for up to 1 in^2 (645 mm^2) exposed carbon top skin is 300 cycles.

b) Continue-In-Service (C-I-S) limit for exposed carbon top skin in Area D is as follows:

<1> Continue-In-Service (C-I-S) limit for up to 1 in^2 (645 mm^2) exposed carbon top skin is 100 cycles.

c) Cracks, tears, and exposed carbon fabric are not permitted.

NOTE: Exposed carbon fabric is strands or threads that are no longer contained in epoxy. This could mean they are broken, frayed or disconnected from the adjacent fabric.

<1> Continue-In-Service (C-I-S) limit for cracks, tears, and exposed carbon fabric is as follows:

<a> Cracks, tears, and exposed carbon fabric up to a maximum depth of 0.02 in. (0.51 mm) and a maximum length of 1 in. (25.4 mm) are permitted for 10 cycles if you remove all loose materials.

2) Delamination of the fabric layers is not permitted.

3) Bent edges along the perimeter of the platform are not permitted.

a) Examine the adjacent fan blades for damage.

ARO ALL

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

(k) Resin crazing cracks at the leading and trailing edge radii.

NOTE: The resin at the leading and trailing edge radii will only be visible if the black paint or film (polyurethane) surface coating is missing in these areas.

1) Resin crazing cracks at the leading and trailing edge radii are permitted, if there are no underlying fibers exposed.

2) Continue-In-Service (C-I-S) limit for resin crazing cracks at the leading and trailing edge radii that expose the underlying fibers is as follows:

a) Permitted for 50 cycles.

3) Continue-In-Service (C-I-S) limit for resin crazing cracks at the leading and trailing edge radii that go into the underlying fibers is as follows:

a) Permitted for 10 cycles.

(l) Chipped resin at the leading and trailing edge radii.

1) Chipped resin at the leading and trailing edge radii is permitted, if there are no underlying fibers exposed.

2) Continue-In-Service (C-I-S) limit for chipped resin at the leading and trailing edge radii that exposes the underlying fibers is as follows:

a) Permitted for 50 cycles.

SUBTASK 72-21-03-220-002-H01

(4) Examine the seals of the fan blade platforms for the conditions that follow:

(a) Tears, cuts, broken or missing sections in the aft end of the fan blade platform seals

1) Tears or cuts in the seals at the aft end of the fan blade platform-to-flowpath spacer interface point are permitted with these conditions:

NOTE: The seal interface point is where the fan blade platform installs below the flowpath spacer.

a) The tears or cuts are not more than 2.5 inches (63.5 mm) in length from the aft end of the convex side of the seal.

b) The tears or cuts are not more than 2.5 inches (63.5 mm) in length from the aft end of the concave side of the seal.

2) Tears or cuts in the seals in all other areas are not permitted.

3) Broken or missing sections of fan blade platform seals are permitted with these conditions:

NOTE: The seal interface point is where the fan blade platform installs under the flowpath spacer.

a) The broken or missing section is not more than 1.50 inches (38.10 mm) in length on the convex side of the seal.

b) The broken or missing section is not more than 1.25 inches (31.80 mm) in length on the concave side of the seal.

c) Broken or missing sections of seals in all other areas of the fan blade platform are not permitted.

(b) Disbond of the seals from the fan blade platform

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

1) Full disbond of the seals from the fan blade platform for the area at the aft end of the platform are permitted with these conditions:

NOTE: The aft end of the fan blade platform is where the fan blade platform installs below the flowpath spacer.

a) The full disbond is not more than 2.00 inches (50.08 mm) in length from the aft end of the convex seal.

b) The full disbond is not more than 1.80 inches (45.72 mm) in length from the aft end of the concave seal

2) Seals that are not fully disbonded from the fan blade platform for the area forward of the rear edge of the platform's top surface is permitted under these conditions:

a) The quantity that the convex seal that is not fully disbonded is not more than 0.20 inch (5.08 mm) in depth.

b) The quantity that the concave seal is not fully disbonded is not more than 0.250 inch (6.35 mm) in depth.

3) Continue-In-Service (C-I-S) Limit for fully disbonded or not fully disbonded areas more than 0.20 inch (5.08 mm) in depth on the convex seal or 0.25 inch (6.35 mm) in depth on the concave seal for the area forward of the rear edge of the platform's top surface is as follows:

a) Fully or not fully disbonded areas of the fan blade platform seals are permitted for 10 cycles.

(c) Examine and calculate the seal wear (erosion) as follows:

1) Wear (erosion) through the fabric layer is permitted.

2) Wear (erosion) to a depth of 0.13 inch (3.30 mm) is permitted.

NOTE: A continue-in-service (C-I-S) limit of not more than 500 cycles is permitted for wear (erosion) depth that is more than 0.13 inch (3.30 mm) and less than 0.20 inch (5.08 mm).

a) Calculate the number of C-I-S cycles based on the deepest wear (erosion) depth measurement value as follows:

<1> C-I-S cycle = (0.20 inch - depth measurement) x 24390 = _____ cycles.

<2> If the C-I-S calculation result is more than 500 cycles, a re-inspection of the seals is necessary within 500 cycles.

<3> If the C-I-S calculation result is less than 500 cycles (i.e., 450 cycles), a re-inspection of the seals is necessary within that number (i.e., 450 cycles) of cycles.

<4> You can apply the C-I-S limit calculation after each new measurement.

SUBTASK 72-21-03-220-003-H01

(5) Examine the aft bumper of the fan blade platforms for the conditions that follow:

NOTE: The aft bumper was removed post SB-777–GE100–72–0715 and is no longer necessary on pre SB 72–0715 platforms.

(a) Missing pieces of the aft bumper on the fan blade platform are permitted

(b) A disbonded aft bumper on the fan blade platform is permitted.

SUBTASK 72-21-03-220-004-H01

(6) Examine the composite structure of the fan blade platforms for the conditions that follow:

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

(a) Cracked, damaged, or broken fibers in all areas of the composite structure

1) It is not permitted to have cracks, damaged, or broken fibers in the composite structure.

(b) Delaminations in all areas of the composite structure

1) Not permitted.

2) Continue-In-Service (C-I-S) limit for delaminations in the composite structure is as follows:

a) Delaminations up to a maximum size of 0.5 inch (12.7 mm) diameter are permitted for 10 cycles.

(c) Nicks and dents in all areas of the composite structure

1) It is permitted to have nicks and dents up to a maximum depth of 0.015 inch (0.380 mm).

2) Minimum separation between adjacent nicks and dents is 1.0 inch (25.4 mm), if the depth of the nicks and dents is more than 0.01 inch (0.25 mm).

3) There is no minimum separation limit to the separation distance between adjacent nicks and dents, if the depth of the nicks and dents is 0.01 inch (0.25 mm) or less.

(d) Scratches in all areas of the composite structure

1) It is permitted to have one scratches up to a maximum depth of 0.01 inch (0.25 mm).

2) There is no minimum separation limit to the separation distance between adjacent scratches.

(e) Resin crazing cracks on the radii in Area A

1) Resin crazing cracks on the radii in Area A are permitted if there are no underlying fibers exposed.

2) Continue-In-Service (C-I-S) limit for resin crazing cracks on the radii in Area A that expose the underlying fibers is as follows:

a) Permitted for 50 cycles.

3) Continue-In-Service (C-I-S) limit for resin crazing cracks on the radii in Area A that go into the underlying fibers is as follows:

a) Permitted for 10 cycles.

(f) Chipped resin on the radii in Area A

1) Permitted if there are no underlying fibers exposed.

2) Continue-In-Service (C-I-S) limit for chipped resin on the radii in Area A is as follows:

a) Permitted for 50 cycles.

SUBTASK 72-21-03-220-005-H01

(7) Examine the wear strips of the fan blade platforms for the conditions that follow:

(a) Worn, loose, or missing wear strips

1) Wear is permitted if the wear does not go through to the composite surface.

2) Loose or missing platform wear strips are not permitted.

SUBTASK 72-21-03-420-001-H01

(8) If no damage is found, do this task: Fan Blade Platform Installation, TASK 72-21-03-400-801-H01.

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

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-420-002-H01

(1) Do this task:Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

SUBTASK 72-21-03-080-001-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(2) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-03-860-004-H01

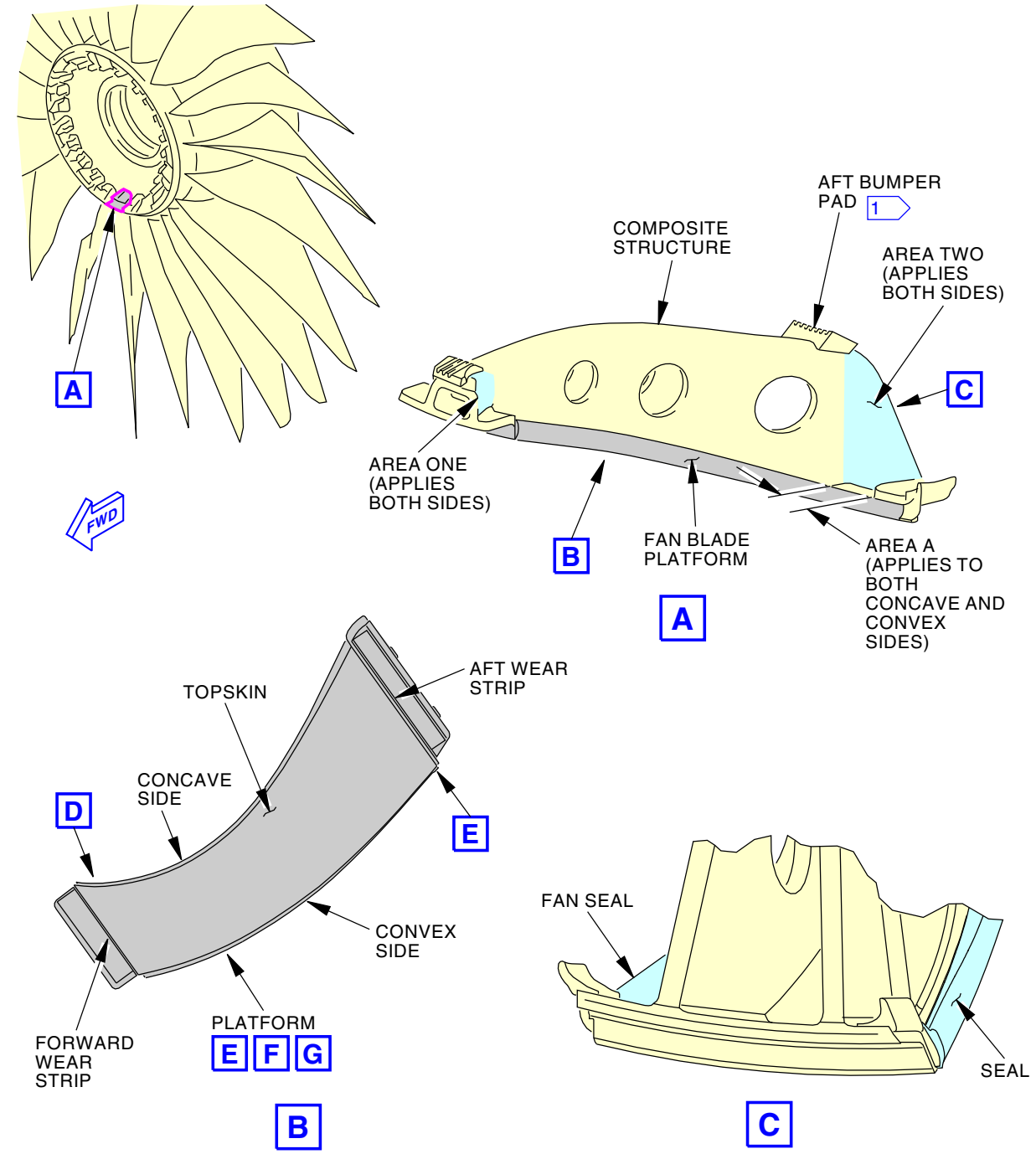
(3) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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

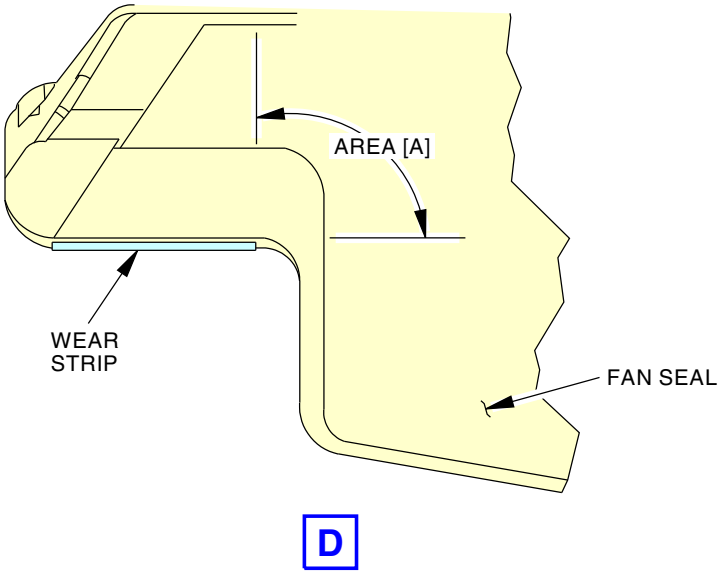


1 PRE SB 777-GE100-72-0715

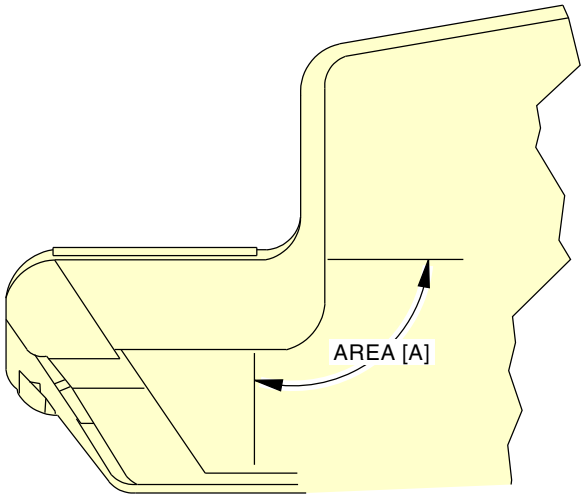
1199581-01-A
M06844 S0004285872_V4

Fan Blade Platform Inspection
Figure 601/72-21-03-990-801-H01 (Sheet 1 of 6)

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



D

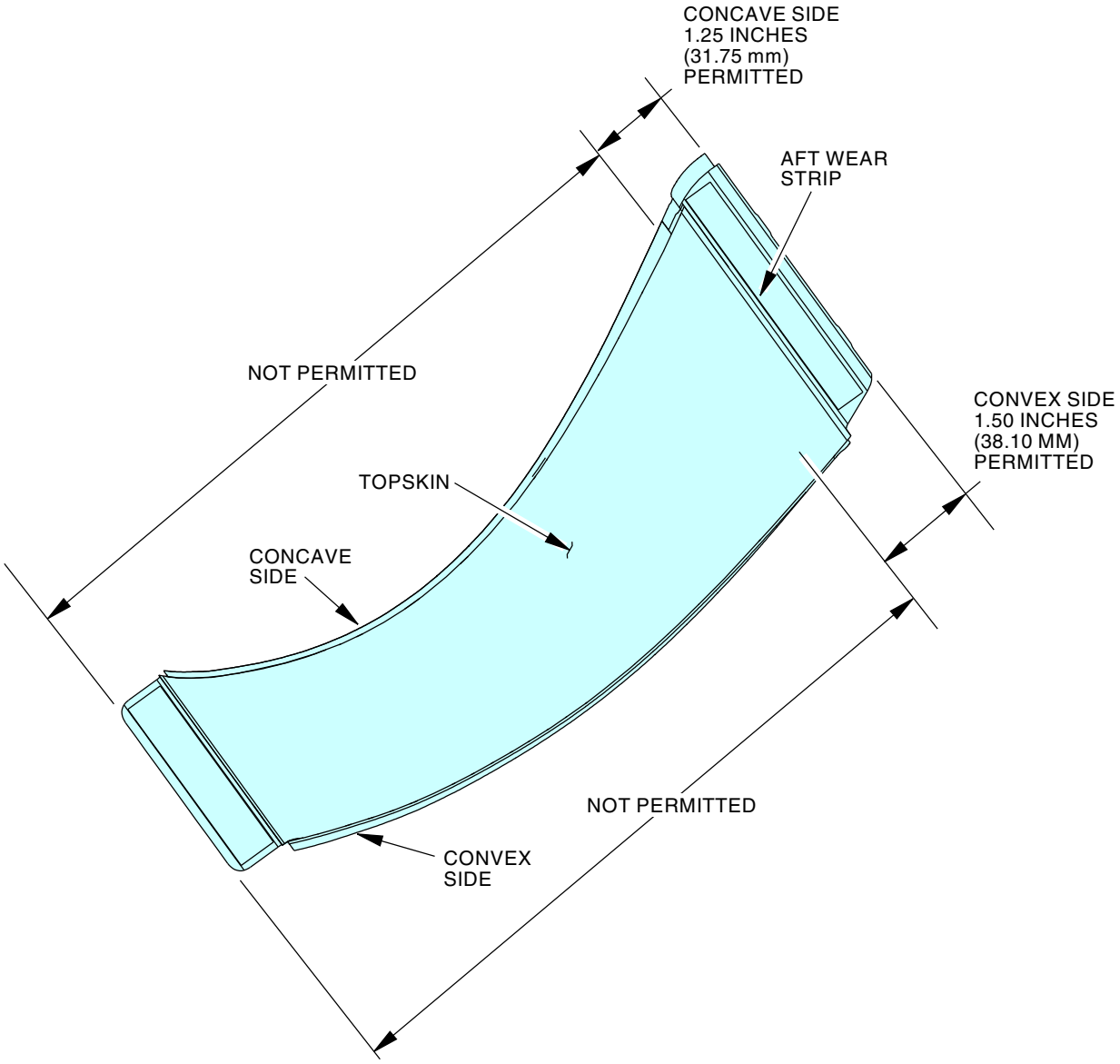


E

1199582-00-A
M06845 S0004285873_V2

Fan Blade Platform Inspection
Figure 601/72-21-03-990-801-H01 (Sheet 2 of 6)

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



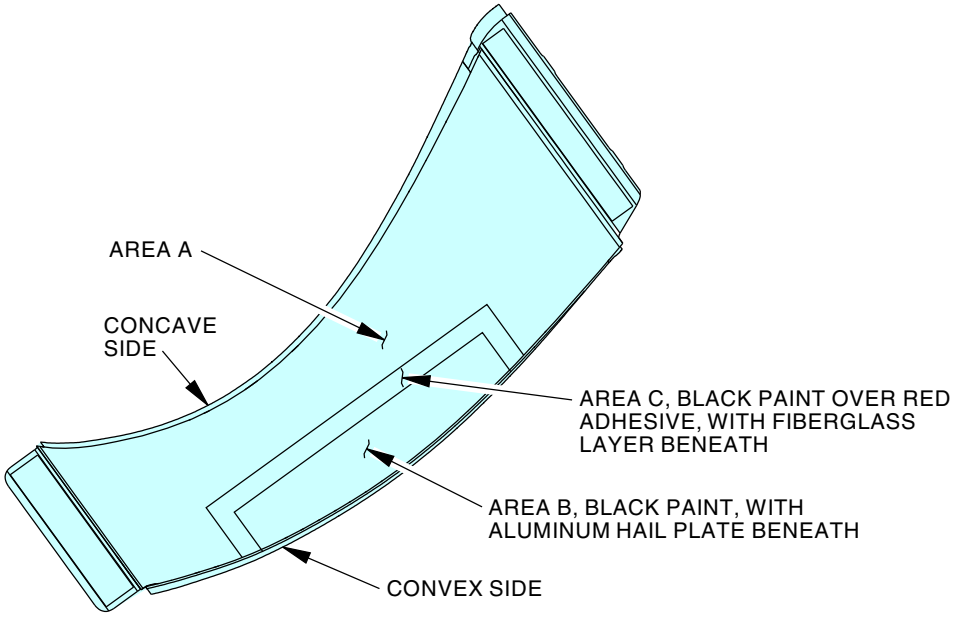
BROKEN OR MISSING SECTIONS
AFT END OF THE FAN BLADE PLATFORM SEAL

F

1221163-00-A
W72403 S0000129103_V2

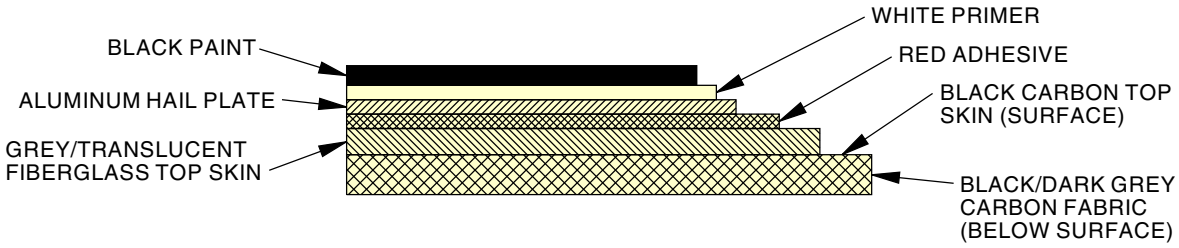
Fan Blade Platform Inspection
Figure 601/72-21-03-990-801-H01 (Sheet 3 of 6)

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



PLATFORM TOP SKIN AREA DESCRIPTION

G



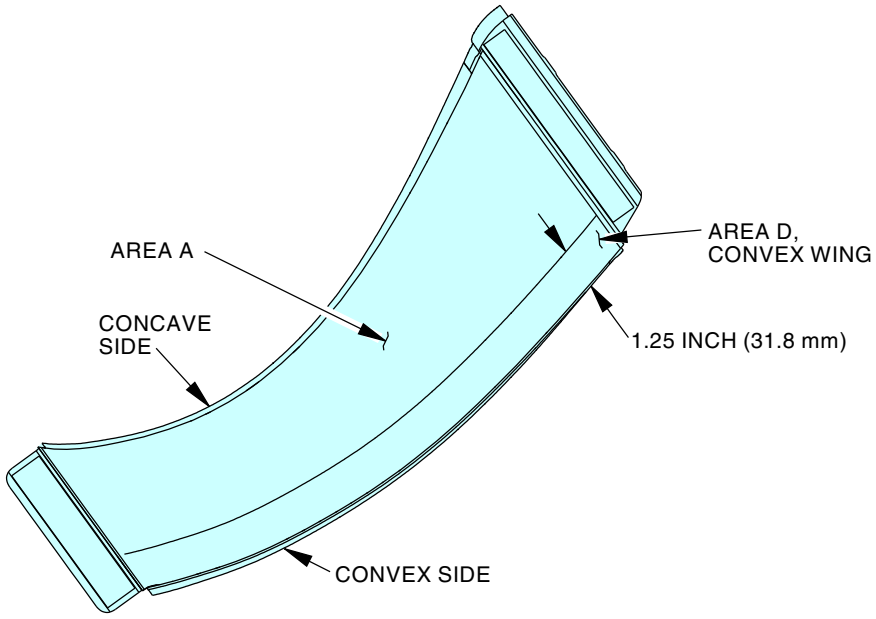
AREA A, B AND C COATING LAYERS 1

1 FAN BLADE PLATFORM WITH ALUMINUM HAIL PLATE UNDERNEATH THE PAINT

1221163-00-A
1901068 S0000350155_V6

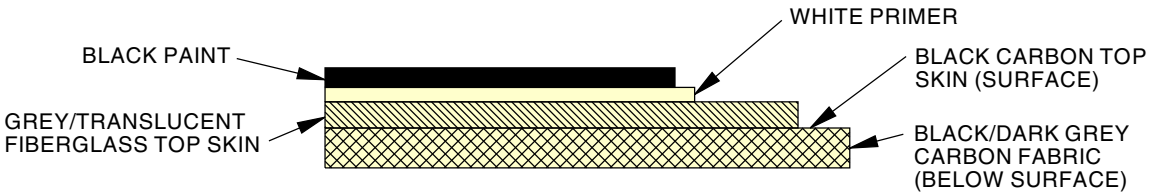
Fan Blade Platform Inspection
Figure 601/72-21-03-990-801-H01 (Sheet 4 of 6)

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



PLATFORM TOP SKIN AREA DESCRIPTION

G



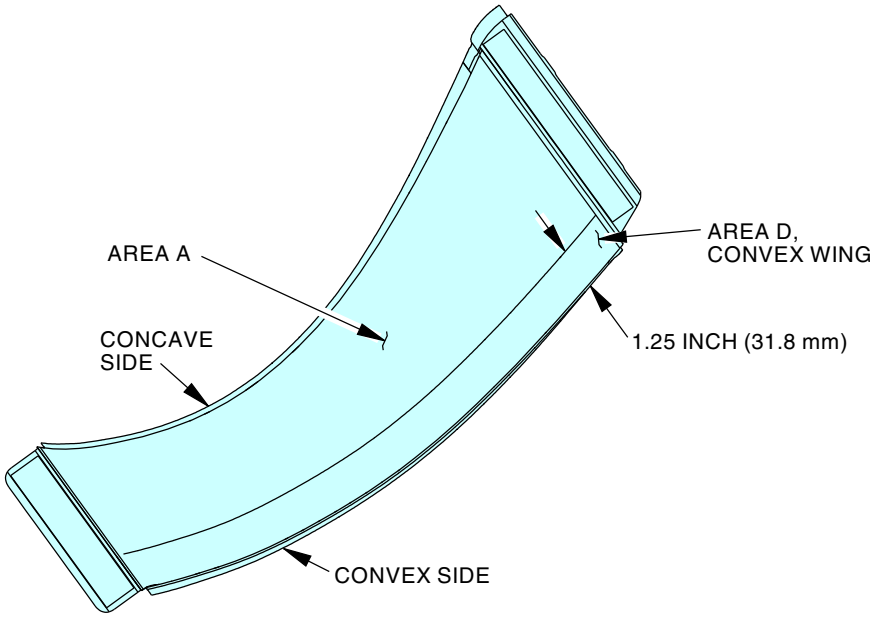
AREA A, D COATING LAYERS 2

2 FAN BLADE PLATFORM WITHOUT ALUMINUM HAIL PLATE UNDERNEATH THE PAINT

1221163-00-A
2376842 S0000544431_V2

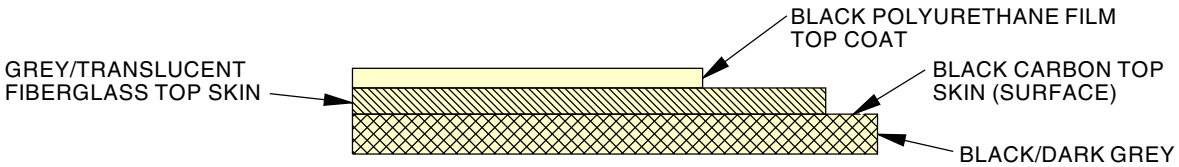
Fan Blade Platform Inspection
Figure 601/72-21-03-990-801-H01 (Sheet 5 of 6)

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



PLATFORM TOP SKIN AREA DESCRIPTION

G



AREA A, D COATING LAYERS 3

3 FAN BLADE PLATFORM WITH POLYURETHANE FILM TOP COAT.

1221163-00-A
2376843 S0000544432_V2

Fan Blade Platform Inspection
Figure 601/72-21-03-990-801-H01 (Sheet 6 of 6)

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

FAN BLADE PLATFORM - REPAIRS

1. General

A. This procedure contains these tasks:

(1) Fan blade platform (local area paint touch-up) repair

(2) Fan blade platform top skin repair

(3) Fan blade platform composite top skin (local missing paint) repair.

TASK 72-21-03-300-801-H01

2. Fan Blade Platform (Local Area Paint Touch-up) Repair

(Figure 801)

A. General

(1) This procedure gives instructions to repair the black paint coating on the fan blade platforms flowpath surfaces.

NOTE: This repair can be performed on fan blade platforms installed or removed.

B. References

Reference	Title
72-21-00-220-803-H01	Fan Blade Platforms (Scheduled Maintenance Requirement) Inspection (P/B 601)
72-21-02-100-801-H01	Fan Blade Cleaning (P/B 701)
72-21-03-220-801-H01	Fan Blade Platform Inspection (P/B 601)

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

D. Consumable Materials

Reference	Description	Specification
B00679 [C04-035]	Alcohol - Isopropyl	
C50035 [C03-074]	Primer - All Purpose, Gray - Krylon KS203	
C50036 [C03-075]	Paint - Enamel-Lacquerized, Gloss Black - Krylon 1601	
C50307 [C03-074]	Primer - All Purpose, Gray - Krylon K01318	
G02348 [C10-010]	Pad - Abrasive - Scotch-Brite 7447	
G02462 [C10-136]	Tape - Flash-Breaker - No. 855	
G02494 [C10-062]	Cloth - Abrasive, Water Proof Silicon Carbide, 2X16 LDG, 1/4 inch Staggered, Slashed Loadings, 320 grit	
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50033 [C10-133]	Film, Polymer FEP, Unperforated, 0.001 inch (0.03 Mm) Thick	
G50035 [C10-182]	Cloth - Cleaning For Aircraft Structural	SAE-AMS 3819, BMS 15-5
G50208 [C10-137]	Film - Vacuum bag, 0.001 or 0.002 inch width	

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

(Continued)

Reference	Description	Specification
G50209 [C10-142]	Film - Polyester (Mylar) film, 0.002-0.004 inch thick	
G50210 [C10-190]	Paper - 400 grit Silicone carbide wet/dry abrasive paper	
G50211 [C10-191]	Paper - 600 grit Silicone carbide wet/dry abrasive paper	
G50212 [C10-037]	Abrasive - Light Deburring Wheel - Scotch-Brite Grade 5, Code 6B	
G50216 [C10-121]	Abrasive - Wet/dry Silicon Carbide Paper - 320 grit	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare to touch-up repair the fan blade platforms

SUBTASK 72-21-03-865-003-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-03-490-001-H00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-03-160-001-H00

(3) Do this task: Fan Blade Cleaning, TASK 72-21-02-100-801-H01.

SUBTASK 72-21-03-211-001-H00

(4) Do an inspection of the repair area for missing paint covering.

NOTE: The paint covers a grey glass-fiber layer.

(a) Any amount of missing paint is permitted.

1) Any amount of missing paint can be repaired with this procedure.

(b) If you can see the black carbon material because of erosion to the grey fiberglass layer, then the platform is not repairable.

1) If the platform is not repairable, do the fan blade platform inspection for further instructions (TASK 72-21-03-220-801-H01 or TASK 72-21-00-220-803-H01).

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

G. Prepare the repair area for touch-up

SUBTASK 72-21-03-950-001-H00

(1) Mask around the repair area.

(a) Measure the size and shape of the damage area.

(b) Cut a piece of film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] to fit around the repair area at least 24.0 in. (609.6 mm) more than the damage area.

NOTE: Do not put film on the damage area so that you can do the repair.

1) Make the inside edge 1.0 in. (25.4 mm) more than the outside edge of the estimated repair area.

(c) Make the film smooth over the area around the repair area.

(d) Hold the film at each corner with small pieces of Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

(e) Put tape along the edges of the film next to the repair area.

1) If the film is folded, hold the folds down with a piece of tape.

2) Make sure that the tape around the edge covers the film edges at the fold.

(f) Put tape at the outer edges of the film at equal distances, as necessary, to hold it in postilions.

1) If the repair is in an open area put tape along all edges of the film.

(g) Rub the surface of the tape firmly with your fingers. Push any are bubbles to the edge of the tape.

1) Make sure all edges are firmly pushed down.

(h) Make sure all edges are held down with tape.

(i) Mask all adjacent areas to prevent overspray.

(j) If the repair is near the edge of the paint, mask the edge of the paint application with No. 855 tape, G02462 [C10-136].

SUBTASK 72-21-03-869-004-H00

(2) Remove all damaged loose or flaking paint until the edge of the paint is tightly bonded.

CAUTION DO NOT USE SOLVENTS TO REMOVE PAINT ON THE FAN BLADE. IF YOU USE SOLVENTS TO REMOVE PAINT, YOU WILL CAUSE DAMAGE TO THE BLADE COATINGS.

CAUTION DO NOT SAND INTO THE CARBON FIBER EPOXY LAMINATE ON THE CONVEX SIDE OF THE FAN BLADE OR THE BROWN ADHESIVE (AF32) LAYER ON THE CONCAVE SIDE OF THE FAN BLADE. IF YOU DO, YOU WILL CAUSE DAMAGE TO THE FAN BLADE COATINGS.

CAUTION DO NOT LET THE AREA YOU ARE POLISHING GET HOT. IF YOU ALLOW THE AREA TO GET HOT YOU CAN DAMAGE THE ADHESIVE AND COMPOSITE LAMINATE OF THE FAN BLADE.

(a) Use a Scotch-Brite 7447 pad, G02348 [C10-010] or a light deburring wheel - Scotch-Brite (Grade 5, Code 6B), G50212 [C10-037].

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

(b) Work very slowly to prevent heat increase on the repair surface.

1) Use a cloth, G50035 [C10-182] moist with water to keep the surface cool.

SUBTASK 72-21-03-869-005-H00

(3) Sand the surface in the area where there is no paint or where it has been removed.

(a) Use a 320 grit abrasive cloth, G02494 [C10-062] or silicon carbide abrasive paper - 320 grit, G50216 [C10-121].

(b) Remove any steps at the edges of the missing paint.

SUBTASK 72-21-03-869-006-H00

(4) Sand the repair surface and the paint round the repair surface.

(a) Use 400 grit silicon carbide abrasive paper, G50210 [C10-190] or 600 grit silicone carbide abrasive paper, G50211 [C10-191].

(b) Sand only until you make a uniform dull finish.

(c) Sand special requirement area as follows:

CAUTION BE CAREFUL WHEN YOU SAND THE FAN BLADE PLATFORM. MAKE SURE THAT YOU DO NOT SAND TOO CLOSE TO THE PLATFORM WEAR STRIP. IF YOU DO, THE WEAR STRIP CAN BE DAMAGED OR LOOSENED AND WILL MAKE THE FAN PLATFORM NOT REPAIRABLE.

1) If the repair area is adjacent to the platform wear strip, apply No. 855 tape, G02462 [C10-136] over the wear strip.

a) If the wear strip becomes loose or frayed, the platform will not be repairable using this repair.

2) If you can see the gray-black carbon fiber plies, then the platform is not repairable using this procedure.

NOTE: Do not removed the glass fiber ply that is under the black paint covering.

a) If the platform is not repairable, do the fan blade platform inspection for further instructions (TASK 72-21-03-220-801-H01 or TASK 72-21-00-220-803-H01).

SUBTASK 72-21-03-160-002-H00

(5) Use a clean cloth, G50035 [C10-182], or small vacuum to remove dust from the repair area.

SUBTASK 72-21-03-130-001-H00

(6) Clean the fan blade platform (TASK 72-21-02-100-801-H01).

WARNING DO NOT GET ISOPROPYL ALCOHOL (IPA) IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IPA. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IPA. KEEP IPA AWAY FROM SPARKS, FLAME, AND HEAT. IPA IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Use only alcohol, B00679 [C04-035].

(b) Do not touch the prepared surface.

SUBTASK 72-21-03-869-007-H00

(7) Remove the masking material.

SUBTASK 72-21-03-869-008-H00

(8) Apply new masking material as follows:

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

(a) Cut a piece of film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] approximately 6.0 in. (152.4 mm) more than all around the exposed repair area.

(b) Put the film over the repair and hold it in place with pieces of Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

1) Put the tape at equal distances, as necessary, to hold it in position.

(c) If the repair is out in an open area where wind, rain, or dust could fall on it, do the steps that follow:

1) Put tape along the edges of the film.

a) If the film is folded, hold the folds down with a piece of tape.

b) Make sure the tape around the edge covers the film edge at the fold.

H. Apply paint touch-up to the fan blade platform

SUBTASK 72-21-03-869-009-H00

WARNING

DO NOT GET PRIMER AND SEALANT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM PRIMER AND SEALANT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE PRIMER AND SEALANT. KEEP PRIMER AND SEALANT AWAY FROM SPARKS, FLAME, AND HEAT. PRIMER AND SEALANT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(1) Apply the primer, C50035 [C03-074] or an alternate primer, C50307 [C03-074] to the repair area.

(a) Use the primer manufacturers instructions and obey the manufacturer's precautions.

(b) Apply the primer to the repair area to a maximum thickness of 0.0005 in. (0.0127 mm).

SUBTASK 72-21-03-869-010-H00

(2) Apply the paint, C50036 [C03-075] to the repair area.

(a) Use the primer manufacturers instructions and obey the manufacturer's precautions.

(b) Apply the primer to the repair area to a maximum thickness of 0.003 in. (0.076 mm).

(c) Apply the paint in thin layers to prevent runs.

(d) Allow the paint to dry to the manufacturer's recommendation.

(e) Remove all masking material.

SUBTASK 72-21-03-211-002-H00

(3) Do this inspection after repaired the painted area for the following conditions.

(a) Grit

1) Any amount is acceptable.

2) The total collected amount must not be more than 0.062 in. (1.575 mm) x 0.062 in. (1.575 mm) x 0.010 in. (0.254 mm) high in any 1.0 sq-inch (645.0 sq-mm) area.

(b) Seeds

1) Any number is acceptable.

2) The total collected amount must not be more than 0.062 in. (1.575 mm) x 0.062 in. (1.575 mm) x 0.010 in. (0.254 mm) high in any 1.0 sq-inch (645.0 sq-mm) area.

(c) Runs

1) Must be more than 0.010 in. (0.254 mm) above the coating surface.

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

(d) Craters

1) Any number is acceptable.

2) The total collected amount must not be more than 0.125 in. (3.175 mm) x 0.125 in. (3.175 mm) x 0.010 in. (0.254 mm) high in any 1.0 sq-inch (645.0 sq-mm) area.

(e) Blisters

1) None are permitted.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-080-002-H00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-21-03-865-004-H00

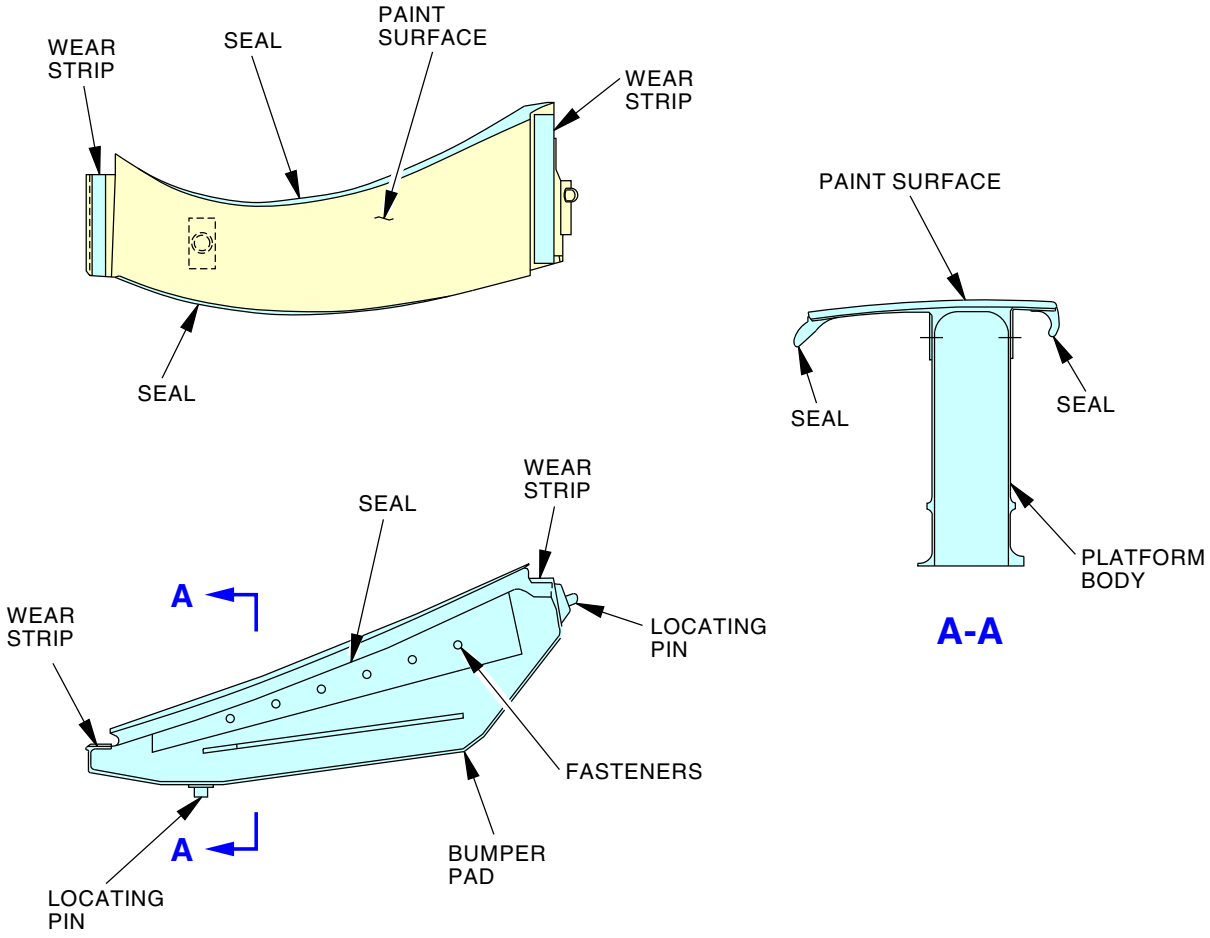
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



1198369-00-A

U92608 S0000223932_V2

Fan Blade Platforms Repairs
Figure 801/72-21-03-990-808-H00

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

TASK 72-21-03-300-802-H00

3. Fan Blade Platform Top Skin Repair

A. General

(1) This procedure gives instructions to repair the top skin fiberglass layer of the fan blade platform.

(2) You can repair up to 2 square inches of the top skin fiberglass layer of the fan blade platform.

B. References

Reference	Title
72-21-02-100-801-H01	Fan Blade Cleaning (P/B 701)
72-21-03-000-801-H01	Fan Blade Platform Removal (P/B 401)
72-21-03-400-801-H01	Fan Blade Platform Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-572	Light - White
STD-809	Spatula
STD-813	Spatula - Stainless Steel
STD-6161	Magnifying Glass

D. Consumable Materials

Reference	Description	Specification
A50013 [C01-147]	Adhesive - Structural, Liquid (Hysol EA 9396)	
B00065	Alcohol - Denatured, Ethyl (Ethanol)	AMS 3002 (Supersedes O-A-396)
C50177 [C04-029]	Reducer	MIL-T-81772 Type I or Type II
G02442 [C10-141]	Abrasive - 120 Grit, SiC, Wet/Dry, Abrasive Paper / 180 Grit, SiC, Wet/Dry, Abrasive Paper	
G50031 [C10-108]	Brush - Disposable, Natural Bristle - No. 7237T4 or 7798T2	
G50216 [C10-121]	Abrasive - Wet/dry Silicon Carbide Paper - 320 grit	
G50357	Tape - PTFE Film (3M 5498)	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the Fan Blade Platform Repair

SUBTASK 72-21-03-020-005-H00

(1) Remove the damaged fan blade platform (TASK 72-21-03-000-801-H01).

SUBTASK 72-21-03-210-001-H00

(2) Use a magnifying glass, STD-6161and strong white light, STD-572 to find the depth and dimensions of the damage.

(a) If the damage goes through the glass fiber ply and into the carbon fabric, the fan blade platform is not repairable.

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

SUBTASK 72-21-03-950-002-H00

(3) Use teflon tape, G50357 to mask around the repair area.

SUBTASK 72-21-03-120-001-H00

WARNING DO NOT BREATHE PARTICLES FROM BLENDING OR LET PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION DO NOT CUT INTO THE CARBON FABRIC WHEN YOU SAND THE FAN PLATFORM SURFACE. IF YOU CAUSE DAMAGE AND CUT INTO THE CARBON FABRIC, YOU CANNOT REPAIR THE FAN BLADE PLATFORM.

CAUTION DO NOT USE CHEMICAL STRIPPERS TO REMOVE PAINT. IF YOU USE CHEMICAL STRIPPERS AND CAUSE DAMAGE TO THE FAN BLADE PLATFORM, YOU CANNOT REPAIR THE FAN BLADE PLATFORM.

(4) Remove paint from the repair area as follows:

(a) Use abrasive paper, G02442 [C10-141] to remove the paint down to the erosion material in the repair area.

SUBTASK 72-21-03-100-001-H00

WARNING DO NOT GET ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES. DO NOT BREATHE THE FUMES. KEEP ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. MAKE SURE THAT THERE IS SUFFICIENT AIR FLOW IN THE WORK AREA. ALCOHOL IS POISONOUS AND FLAMMABLE. YOU CAN ABSORB POISONOUS MATERIALS FROM THE ALCOHOL THROUGH YOUR SKIN. IT CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(5) Clean the repair area with alcohol, B00065.

SUBTASK 72-21-03-120-002-H00

(6) Use abrasive paper, G02442 [C10-141] to remove the erosion material as follows:

(a) For erosion damage, remove the erosion material down to the carbon fabric in the repair area.

(b) For cuts, scratches, or gouges, remove the fiber and resin that is above the surface.

1) Do not blend out the damage

SUBTASK 72-21-03-100-002-H00

(7) Clean the repair area of the fan blade platform (TASK 72-21-02-100-801-H01).

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

G. Procedure

SUBTASK 72-21-03-330-001-H00

WARNING

DO NOT GET EPOXY PAINT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM EPOXY PAINT. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES WHEN YOU USE EPOXY PAINT. KEEP EPOXY PAINT AWAY FROM SPARKS, FLAME, AND HEAT. EPOXY PAINT IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

WARNING

YOU MUST NOT MIX MORE THAN THE MANUFACTURERS RECOMMENDED QUANTITIES OF EPOXY RESINS OR FILLERS AT A TIME. IF THE QUANTITY IS TOO LARGE, THERE CAN BE A DANGEROUS BUILD-UP OF HEAT. THIS CAN CAUSE AN INJURY OR DAMAGE TO COMPONENTS.

(1) Prepare the Hysol EA 9396 adhesive, A50013 [C01-147] as follows:

(a) You must use the mixed adhesive in less than 75 minutes.

1) Make sure the adhesive is at room temperature before you open the container.

(b) Make an estimate of the quantity of adhesive that you will use.

1) You can mix between 50 grams and 250 grams of the liquid adhesive.

(c) Use a clean metal or unwaxed paper container and a stainless steel spatula, STD-813.

(d) Weigh sufficient quantities of each component in a proportion of:

1) 100 units of Hysol EA 9396 adhesive, A50013 [C01-147].

2) 30 units of reducer, C50177 [C04-029].

(e) Mix the adhesive components until you can not see streaks of the components.

SUBTASK 72-21-03-950-003-H00

(2) Remove the masking material from the repair area.

SUBTASK 72-21-03-330-002-H00

(3) Apply the structural liquid adhesive to the repair area as follows:

(a) Use a No. 7237T4 or 7798T2 brush, G50031 [C10-108] to apply the liquid adhesive to the repair area.

1) Apply so that it is level with the undamaged material around the repair area.

(b) Use a Teflon spatula, STD-809 to remove all the air bubbles and unwanted liquid adhesive from the repair area.

1) Make the adhesive surface so that it is level with the surface around the repair area.

SUBTASK 72-21-03-880-001-H00

(4) Let the adhesive cure for five days at room temperature.

NOTE: The alternative steps that follow can also be used for a shorter cure time.

SUBTASK 72-21-03-880-002-H00

WARNING

WEAR THERMAL GLOVES AT ALL TIMES WHEN HANDLING HEATED PARTS TO AVOID HAND INJURIES.

(5) Cure the adhesive as follows (Alternative method):

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

(a) Let the adhesive cure for eight hours at room temperature.

(b) Put the fan blade platform in an oven.

(c) Increase the oven temperature to 150°F (66°C).

(d) Keep the oven at 140°F (60°C) to 160°F (71°C) for a minimum of 60 minutes.

(e) Let the fan blade platform cool to room temperature.

(f) Remove the fan blade platform from the oven.

SUBTASK 72-21-03-210-002-H00

(6) Do a visual inspection of the cured liquid adhesive repair as follows:

(a) No runs, bubbles, blisters, or caught air is permitted.

NOTE: Caught air is air that has been put in the liquid when you mix the adhesive. It makes the adhesive look white and not transparent.

(b) If you see runs, bubbles, blisters, or caught air, do this step:

1) Use silicon carbide abrasive paper - 320 grit, G50216 [C10-121] with your hand to make the surface smooth.

SUBTASK 72-21-03-340-001-H00

(7) If it is necessary, use abrasive paper, G02442 [C10-141] to sand the repair area to be the same contour as the surrounding area.

SUBTASK 72-21-03-100-003-H00

(8) Clean the fan blade (TASK 72-21-03-300-803-H00).

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-410-001-H00

(1) Install the fan blade platform (TASK 72-21-03-400-801-H01).

——— END OF TASK ———

TASK 72-21-03-300-803-H00

4. Fan Blade Platform Composite Top Skin (Local Missing Paint) Repair

(Figure 802)

A. General

(1) This procedure gives instructions to repair the fan blade platform composite top skin (fan blade platform) by painting areas of local missing paint. It can be applied to the fan blade platform installed on the engine, and at piece part.

B. References

Reference	Title
72-21-00-220-803-H01	Fan Blade Platforms (Scheduled Maintenance Requirement) Inspection (P/B 601)
72-21-03-220-801-H01	Fan Blade Platform Inspection (P/B 601)

C. Tools/Equipment

Reference	Description
STD-120	Bottle - Spray
STD-1331	Strainer - Paint, 150 Mesh
STD-6554	Gun - Heat
STD-13498	Infrared Heat Lamp, 250 Watts

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

D. Consumable Materials

Reference	Description	Specification
B00679 [C04-035]	Alcohol - Isopropyl	
C50158 [C03-079]	Primer - Epoxy, Deft 44-W-7	MIL-P-53030
C50227	Coating - Epoxy Waterborne Primer Coating	MIL-PRF-85582
C50279 [C03-069]	Paint - Polyurethane, Gloss Black	Mil-PRF-85285 Type 1; FED STD-595 Color Code 17038
C50280 [CO3-011]	Reducer - Epoxy	MIL-T-81772 Type II
G01659	Swab - Cotton Or Rayon, (Disposable)	
G02348 [C10-010]	Pad - Abrasive - Scotch-Brite 7447	
G02462 [C10-136]	Tape - Flash-Breaker - No. 855	
G02494 [C10-062]	Cloth - Abrasive, Water Proof Silicon Carbide, 2X16 LDG, 1/4 inch Staggered, Slashed Loadings, 320 grit	
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50033 [C10-133]	Film, Polymer FEP, Unperforated, 0.001 inch (0.03 Mm) Thick	
G50035 [C10-182]	Cloth - Cleaning For Aircraft Structural	SAE-AMS 3819, BMS 15-5
G50208 [C10-137]	Film - Vacuum bag, 0.001 or 0.002 inch width	
G50209 [C10-142]	Film - Polyester (Mylar) film, 0.002-0.004 inch thick	
G50210 [C10-190]	Paper - 400 grit Silicone carbide wet/dry abrasive paper	
G50211 [C10-191]	Paper - 600 grit Silicone carbide wet/dry abrasive paper	
G50212 [C10-037]	Abrasive - Light Deburring Wheel - Scotch-Brite Grade 5, Code 6B	
G50216 [C10-121]	Abrasive - Wet/dry Silicon Carbide Paper - 320 grit	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the Repair

SUBTASK 72-21-03-020-006-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-21-03-200-001-H00

(2) Do an inspection of the fan platform (TASK 72-21-00-220-803-H01 or TASK 72-21-03-220-801-H01).

SUBTASK 72-21-03-300-001-H00

(3) For Post SB 72-0382 platforms, do an inspection of the fan platform repair area for missing paint (TASK 72-21-03-220-801-H01).

NOTE: The black paint and white primer is on top of a grey glass-fiber layer.

(a) If you find the grey fiberglass layer eroded, do this step:

NOTE: Exposed carbon top skin is specified as an area where the grey fiberglass layer is fully eroded away, not areas where you can see the carbon top skin below the grey fiberglass layer.

NOTE: Paint repair of exposed carbon top skin of the platform is permitted. However, exposed carbon top skin with exposed carbon fabric is not repairable. Exposed carbon fabric are strands of threads that are no longer contained in epoxy. This could mean they are broken, frayed or detached from the adjacent fabric

1) Do this task: Fan Blade Platform (Local Area Paint Touch-up) Repair, TASK 72-21-03-300-801-H01.

G. Procedure

SUBTASK 72-21-03-300-002-H00

(1) Clean the fan platform as follows:

(a) Get some clean cloth, G50035 [C10-182].

(b) Get some alcohol, B00679 [C04-035].

(c) Put the alcohol, B00679 [C04-035] on a clean cloth, G50035 [C10-182] to make the cloth moist.

NOTE: Do not use so much that drops of alcohol, B00679 [C04-035] fall from the cloth, G50035 [C10-182].

(d) Move the first cloth, G50035 [C10-182] lightly in one direction across the part that is to be cleaned.

(e) Use a second dry cloth, G50035 [C10-182] to wipe the part before the alcohol, B00679 [C04-035] dries on the part.

(f) Do this procedure until a clean part of the cloth, G50035 [C10-182] stays clean.

(g) Do the last wipe with a clean dry cloth, G50035 [C10-182] before the alcohol, B00679 [C04-035] dries on the part.

(h) Use swab, G01659 in the small areas to make sure that all areas are clean.

SUBTASK 72-21-03-300-003-H00

(2) Apply masking around the fan platform repair area as follows:

(a) Measure the size and shape of the damaged area.

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

WARNING MAKE SURE YOU USE THE APPROVED SAFETY EQUIPMENT FOR YOUR EYES AND EARS. THIS WILL PREVENT INJURIES TO PERSONS.

(b) Cut a piece of film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] to a minimum of 24.0 inches (610.0 mm) more than the damaged area, and as follows:

NOTE: Do not put film on the damaged area until you can do the repair.

1) Make the inner edge 1.0 inch (25.4 mm) more than the outer edge of the estimated repair area.

(c) Make the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] smooth on the area around the repair area.

(d) Hold the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] at each corner with small pieces of Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

(e) Put Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] along the edges of the film adjacent to the repair area and do as follows:

1) If the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] is folded, hold the folded area down with a piece of Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

2) Make sure that the Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] around the edge gives a cover to the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] edges at the folded area.

(f) Put Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] at the outer edges of the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] at equal distances, as necessary, to hold it in position and do as follows:

1) If the repair is in an open area, put Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] along all edges of the film.

(g) Rub the surface of the Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] tightly with your fingers and do as follows:

1) Push all bubbles to the edge of the Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

2) Make sure that all edges are tightly pushed down.

(h) Make sure that all edges are held down with Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

(i) Apply film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] to all the adjacent areas to prevent overspray.

(j) If the repair is near the edge of the paint, apply Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] to the edge where you will apply the paint.

SUBTASK 72-21-03-300-004-H00

(3) Remove all damaged loose or flaking paint until the edge of the paint is tightly bonded.

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

CAUTION

DO NOT USE SOLVENTS TO REMOVE PAINT ON THE FAN BLADE. IF YOU USE SOLVENTS TO REMOVE PAINT, YOU WILL CAUSE DAMAGE TO THE BLADE COATINGS.

CAUTION

DO NOT LET THE AREA YOU ARE POLISHING GET HOT. IF YOU ALLOW THE AREA TO GET HOT YOU CAN DAMAGE THE ADHESIVE AND COMPOSITE LAMINATE OF THE FAN BLADE.

(a) Use a Scotch-Brite 7447 pad, G02348 [C10-010] or a light deburring wheel - Scotch-Brite (Grade 5, Code 6B), G50212 [C10-037] deburring abrasive wheel.

(b) Do the work very slowly to make sure that the heat does not increase on the repair surface.

1) Use a cloth, G50035 [C10-182] moist with water to keep the surface cool.

SUBTASK 72-21-03-300-005-H00

WARNING

DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(4) Sand the surface in the area where there is no paint or where there is paint removal and do as follows:

(a) Use a 320 grit abrasive cloth, G02494 [C10-062] or silicon carbide abrasive paper - 320 grit, G50216 [C10-121].

(b) Remove all steps at the edges of the missing paint.

SUBTASK 72-21-03-300-006-H00

WARNING

DO NOT BREATHE THE PARTICLES, OR GET THEM IN YOUR MOUTH, EYES, OR ON YOUR SKIN. PUT ON A RESPIRATOR, GOGGLES, AND GLOVES AND OTHER EQUIPMENT FOR PROTECTION. THESE PARTICLES CAN CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(5) Sand the fan platform repair area and the paint around the repair surface.

(a) Use 400 grit silicon carbide abrasive paper, G50210 [C10-190] or 600 grit silicone carbide abrasive paper, G50211 [C10-191].

(b) Sand only until you make a constant matte finish and do as follows:

NOTE: A matte finish is one that does not have luster, shine, or bright.

1) If you sand an area with exposed black carbon, sand only to remove contaminants.

(c) Make sure that you remove a minimum quantity of material of the fiberglass and carbon fiber layer.

(d) Do an inspection of the sanded area as follows:

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

CAUTION BE CAREFUL WHEN YOU SAND THE FAN BLADE PLATFORM. MAKE SURE THAT YOU DO NOT SAND TOO CLOSE TO THE PLATFORM WEAR STRIP. IF YOU DO, THE WEAR STRIP CAN BE DAMAGED OR LOOSENED AND WILL MAKE THE FAN PLATFORM NOT REPAIRABLE.

1) If the repair area is adjacent to the platform wear strip, apply No. 855 tape, G02462 [C10-136] on the wear strip.
   a) If the wear strip becomes loose or frayed, you cannot repair the fan platform with this procedure.

SUBTASK 72-21-03-300-007-H00

(6) Use a clean cloth, G50035 [C10-182] or a small vacuum to remove dust from the repair area.

SUBTASK 72-21-03-300-008-H00

(7) Clean the fan platform as follows:

WARNING DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Get some clean cloth, G50035 [C10-182].

(b) Get some alcohol, B00679 [C04-035].

(c) Put the alcohol, B00679 [C04-035] on a clean cloth, G50035 [C10-182] to make the cloth moist.
   1) Do not use so much that drops of alcohol, B00679 [C04-035] fall from the cloth, G50035 [C10-182].

(d) Move the first cloth, G50035 [C10-182] lightly in one direction across the part that is to be cleaned.

(e) Use a second dry cloth, G50035 [C10-182] to wipe the part before the alcohol, B00679 [C04-035] dries on the part.

(f) Do this procedure until a clean part of the cloth, G50035 [C10-182] stays clean.

(g) Do the last wipe with a clean dry cloth, G50035 [C10-182] before the alcohol, B00679 [C04-035] dries on the part.

(h) Use swab, G01659 in the small areas to make sure that all areas are clean.

SUBTASK 72-21-03-300-009-H00

(8) Clean the platform repair area with a spray bottle or cloth as follows:

(a) If the spray bottle, STD-120 is used, put de-ionized or distilled water in a clean spray bottle, STD-120 and spray the water into the prepared surface until the surface is immediately covered.

(b) If the cloth, G50035 [C10-182] is used, put de-ionized or distilled water on a clean cloth, G50035 [C10-182] and move it across the surface to put a thin layer of water on the surface.

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

(c) Look at the water on the surface and do as follows:

NOTE: The water will have a thin layer on the surface with no areas where the surface tension causes the water to separate into drops or beads.

NOTE: The water must keep the surface fully covered.

1) Keep the water on the surface for 30 seconds.

NOTE: The water must stay on all of the surface.

2) If the water separates or there are drops or beads in 30 seconds, do steps 1.G. (6) thru 1.G. (7) again.

(d) After you do the test, dry the surface with a dry clean cloth, G50035 [C10-182].

(e) Dry the fan platform before you apply the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 as follows:

1) Use a infrared heat lamp, STD-13498 or heat gun, STD-6554.

2) Increase the temperature of the repair area to a temperature range of 130 to 150°F (54 to 66°C) for 30 minutes.

NOTE: If you repair the fan platform installed on the engine, make sure that you do not increase the temperature of the fan blade adjacent to the fan platform.

SUBTASK 72-21-03-300-010-H00

(9) Apply masking to the fan platform repair area as follows:

WARNING

EYE PROTECTION MUST BE WORN BY ALL PERSONS WHO WORK NEAR THE AIRCRAFT WHILE THE ENGINE OPERATES. AT HIGH ENGINE SPEEDS, THE EXHAUST CAN COLLECT AND BLOW LOOSE DIRT, STONES, SAND, AND OTHER UNWANTED MATERIAL A LARGE DISTANCE.

(a) Cut a piece of film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] approximately 6.0 inches (152.0 mm) more than all around the exposed repair area.

(b) Put the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] on the repair area and hold it in position with pieces of Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136], and do as follows:

1) Put the Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] at equal distances, as necessary, to hold it in position.

(c) If the repair is out in an open area where wind, rain, or dust could fall on it, do the steps that follow:

1) Put Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] along the edges of the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142].

a) If the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] is folded, hold the folded area down with a piece of Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

b) Make sure that the Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] around the edge gives a cover to the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] edge at the folded area.

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

SUBTASK 72-21-03-300-011-H00

(10) Apply Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 to the fan platform as follows:

WARNING SOLVENTS ARE TOXIC AND HIGHLY FLAMMABLE. AVOID PROLONGED INHALATION OF VAPORS OR CONTACT WITH THE SKIN. TAKE PRECAUTIONS AGAINST FIRE.

(a) If the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] is used, do the steps that follow:

1) Make an estimate of the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] that will be necessary.

(b) Mix the quantities as follows:

1) Component A (pigmented) - 3 parts by volume.

NOTE: The container of the component A must be rubbed with a paint stirrer to make sure that no solids stay on the bottom of the container.

2) Component B (clear) - 1 part by volume.

(c) Mix filtered deionized water with component A and component B until the viscosity of the mixture is between 18 and 22 seconds as measured with a No. 2 Zahn cup.

(d) Wait for a minimum of 30 minutes before you apply the Deft 44-W-7 Epoxy Primer, C50158 [C03-079].

(e) Put the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] through a paint strainer, STD-1331.

(f) Put the mixture in the spray cup and continue to shake the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] until you complete the procedure.

(g) Mix only the quantity of the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] that you will use in 4 hours.

SUBTASK 72-21-03-300-012-H00

(11) If coating, C50227 is used, do the steps that follow:

(a) Make an estimate of the coating, C50227 that will be necessary.

(b) Mix the quantities as follows:

1) Component A (pigmented) - 1 part by volume.

2) Component B (clear) - 1 part by volume.

(c) Mix filtered deionized water with component A and component B until the viscosity of the mixture is between 18 and 22 seconds as measured with a No. 2 Zahn cup.

(d) Wait for a minimum of 30 minutes before you apply the coating, C50227.

(e) Put the coating, C50227 through a paint strainer, STD-1331.

(f) Put the mixture in the spray cup and continue to shake the coating, C50227 until you complete the spray procedure.

(g) Mix only the quantity of the coating, C50227 that you will use in 4 hours.

SUBTASK 72-21-03-300-013-H00

(12) Apply the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 as follows:

NOTE: Make sure that the spray has constant atomization and pattern.

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

(a) Remove the masking material from the repair area.

NOTE: Refer to step 1.G.(2).

(b) Apply the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 to the repair area as follows:

1) You must apply the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 as a continuous, constant thickness layer.

2) If more layers are necessary to get the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 thickness, do not let the primer become touch-dry between layers.

3) A maximum of 2 layers are permitted.

(c) Let the mixed Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 cure for a minimum of 2 hours at a temperature of 77°F (25°C).

SUBTASK 72-21-03-300-014-H00

(13) Apply masking to the fan platform repair area to give protection to the Deft 44-W-7 Epoxy Primer, C50158 [C03-079] or coating, C50227 as follows:

WARNING EYE PROTECTION MUST BE WORN BY ALL PERSONS WHO WORK NEAR THE AIRCRAFT WHILE THE ENGINE OPERATES. AT HIGH ENGINE SPEEDS, THE EXHAUST CAN COLLECT AND BLOW LOOSE DIRT, STONES, SAND, AND OTHER UNWANTED MATERIAL A LARGE DISTANCE.

(a) Cut a piece film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] approximately 6.0 inches (152.4 mm) more than all around the exposed repair area.

(b) Put the film, G50033 [C10-133], vacuum bag film, G50208 [C10-137], or 0.002 - 0.004 inch thick polyester film, G50209 [C10-142] on the repair area and hold it in position with pieces of Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136].

1) Put the Scotch 5490 tape, G50030 [C10-040] or No. 855 tape, G02462 [C10-136] at equal distances, as necessary, to hold it in position.

SUBTASK 72-21-03-300-015-H00

(14) Paint the fan platform as follows:

(a) Mix the paint, C50279 [C03-069] as follows:

NOTE: Refer to FED Standard 595.

1) Make an estimate of the paint, C50279 [C03-069] that will be necessary.

2) Mix the quantities as follows:

a) Component A (black liquid) - 30 parts by volume.

NOTE: The container of the component A must be rubbed with a paint stirrer to make sure that no solids stay on the bottom of the container.

b) Component B (clear liquid) - 30 parts by volume.

c) The reducer, C50280 [CO3-011] - 15 parts maximum by volume.

d) Mix only the quantity of paint that you will use in 4 hours.

(b) Mix the reducer, C50280 [CO3-011] with component A and component B until the viscosity of mixture is between 18 and 22 seconds as measured with a No. 2 Zahn cup.

1) Do not use more than the maximum volume of the reducer, C50280 [CO3-011].

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

(c) Continue to mix the paint for a minimum of 10 minutes.

1) Make sure that the paint stays mixed or does not have unusual discoloration.

SUBTASK 72-21-03-300-016-H00

(15) Apply the paint, C50279 [C03-069] as follows:

WARNING MAKE SURE TO PUT ON THE CORRECT RESPIRATORY PROTECTION FOR THE CONDITION OF THE FUEL TANK. HIGH CONCENTRATIONS OF FUEL FUMES CAN CAUSE INJURY TO PERSONNEL.

(a) Put the paint solution into a clean spray cup through a paint strainer, STD-1331.

NOTE: Make sure that the spray has constant atomization and pattern.

(b) Remove the masking material from the repair area.

NOTE: Refer to step 1.G.(2).

(c) Apply the paint, C50279 [C03-069] to the repair area and do as follows:

1) You must apply the paint, C50279 [C03-069] as a continuous, constant thickness layer.

2) If more layers are necessary to get the paint thickness, do not let the paint, C50279 [C03-069] dry between layers.

3) A maximum of 2 layers are permitted.

(d) After you apply the paint, C50279 [C03-069], do an inspection of the fan platform paint as follows:

1) Make sure that all painted areas are fully covered.

2) The finish must not have sags, runs, orange peel conditions or contamination.

(e) If you find defects in the paint, C50279 [C03-069], use the solvent that the supplier recommends to remove the applied uncured paint, C50279 [C03-069], and do as follows:

1) Dry the solvent for a minimum of 1 hour before you paint again.

SUBTASK 72-21-03-300-017-H00

(16) Remove the masking material adjacent to the wet paint. Carefully remove all the masking material from the fan platform.

NOTE: Refer to step 1.G.(4).

SUBTASK 72-21-03-300-018-H00

(17) Let the paint, C50279 [C03-069] cure for a minimum of 12 hours at a temperature of 77°F (25°C).

NOTE: You can handle the platforms after 6 hours.

SUBTASK 72-21-03-300-019-H00

(18) If it is necessary, do a visual inspection of the paint in the repair area for signs of roughness, pinholes, lint or fibers. If there are signs of roughness, pinholes, lint or fibers, do the steps below to remove them:

NOTE: This procedure will make the visual conditions of the fan platform better.

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

WARNING DO NOT BREATHE PARTICLES FROM BLENDING OR LET PARTICLES TOUCH YOU. PARTICLES FROM BLENDING CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(a) Use 400 grit silicon carbide abrasive paper, G50210 [C10-190] or 600 grit silicone carbide abrasive paper, G50211 [C10-191] to lightly sand the incorrectly painted area.

1) Clean the fan platform as follows:

WARNING DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

a) Get some clean cloth, G50035 [C10-182].

b) Get some alcohol, B00679 [C04-035].

c) Put the alcohol, B00679 [C04-035] on a clean cloth, G50035 [C10-182] to make the cloth moist.

<1> Do not use so much that drops of alcohol, B00679 [C04-035] fall from the cloth, G50035 [C10-182].

d) Move the first cloth, G50035 [C10-182] lightly in one direction across the part that is to be cleaned.

e) Use a second dry cloth, G50035 [C10-182] to wipe the part before the alcohol, B00679 [C04-035] dries on the part.

f) Do this procedure until a clean part of the cloth, G50035 [C10-182] stays clean.

g) Do the last wipe with a clean dry cloth, G50035 [C10-182] before the alcohol, B00679 [C04-035] dries on the part.

h) Use swab, G01659 in the small areas to make sure that all areas are clean.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-03-420-006-H00

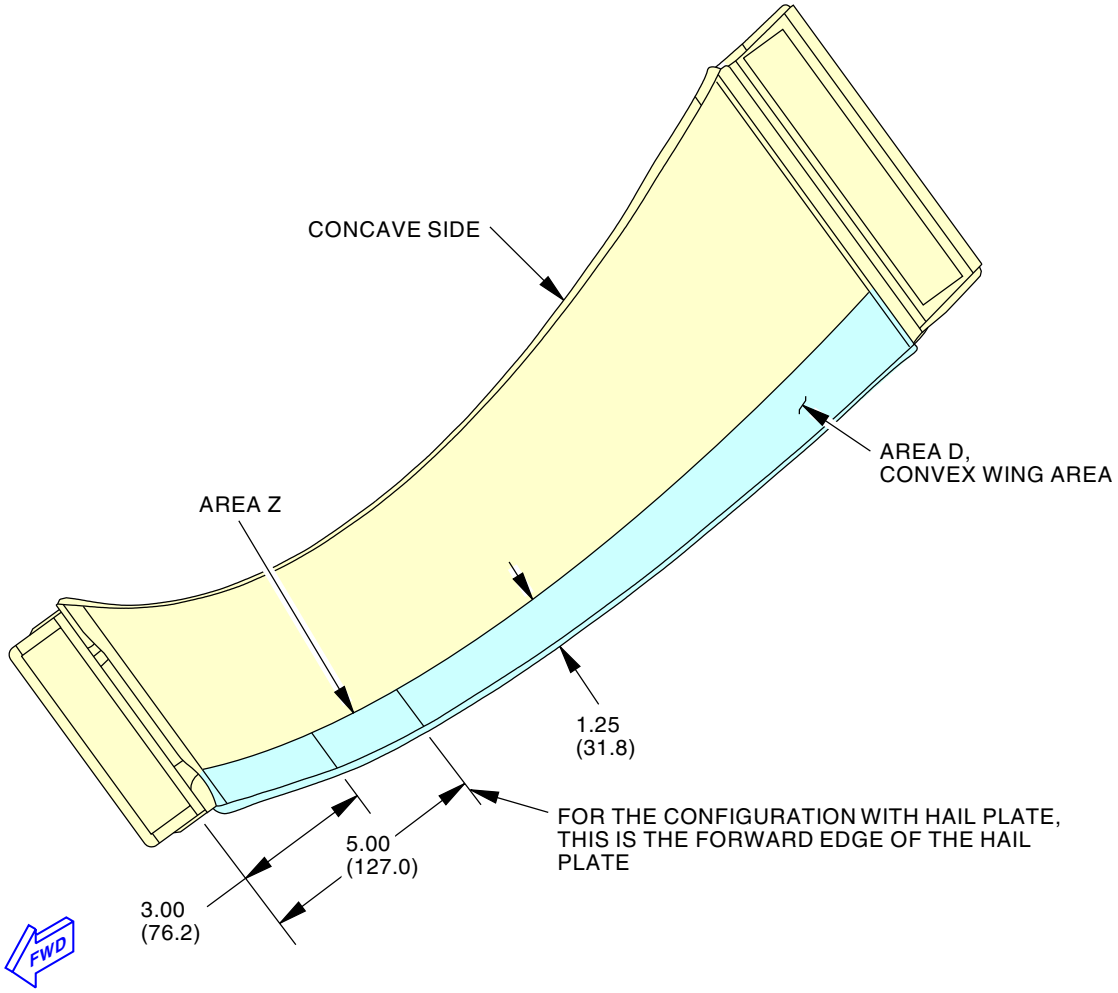
(1) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



NOTE:

DIMENSIONS ARE IN INCHES
(MILLIMETERS ARE IN PARENTHESES)

1363781-00
2175953 S0000479823_V2

Fan Platform Top Skin Repair
Figure 802/72-21-03-990-810-H00

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

FAN BOOSTER ACOUSTIC PANEL - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the fan booster acoustic panel

(2) An installation of the fan booster acoustic panel.

TASK 72-21-04-000-801-H01

2. Fan Booster Acoustic Panel Removal

A. General

(1) This task is the removal procedure for the fan booster acoustic panels.

(2) The fan booster acoustic panels (referred to as booster acoustic panels) are on the fan booster.

(3) Each engine has six booster acoustic panels.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-02-020-801-H01	Fan Blades Removal (Selection) (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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Removal

SUBTASK 72-21-04-865-002-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-04-480-001-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the cowl and engine.

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

SUBTASK 72-21-04-020-001-H01

(3) Do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

SUBTASK 72-21-04-010-001-H01

(4) Do this task:Fan Blades Removal (Selection), TASK 72-21-02-020-801-H01.

F. Fan Booster Acoustic Panel Removal

SUBTASK 72-21-04-020-002-H01

(1) Remove the applicable booster acoustic panel [1] from the fan booster Figure 401.

(a) Remove the screws [2] on each booster acoustic panel which attach the panel to the fan booster.

CAUTION

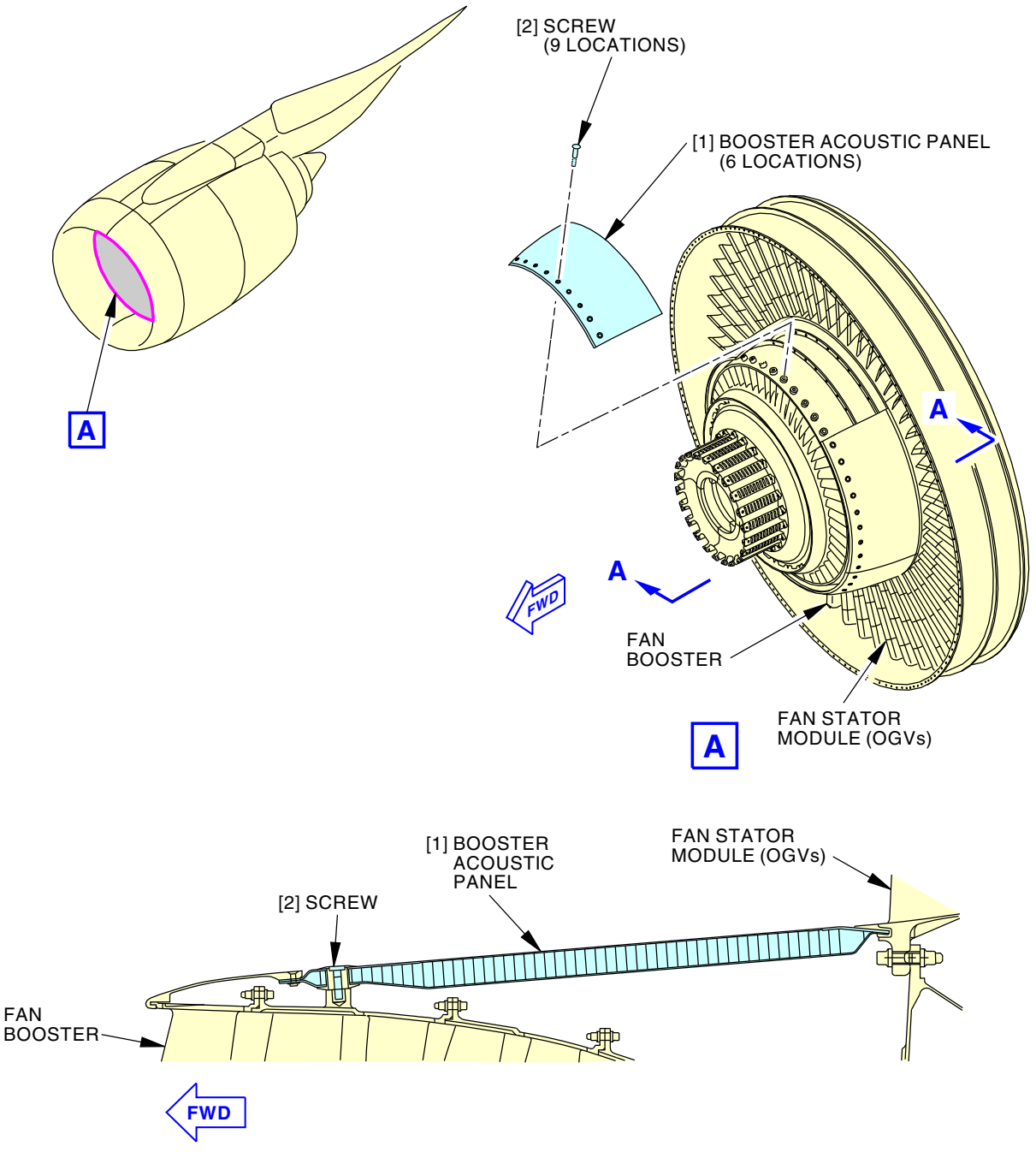
DO NOT USE A SHARP TOOL TO REMOVE THE ACOUSTIC PANELS. DAMAGE TO THE ACOUSTIC PANELS OR THE FAN BOOSTER CAN OCCUR.

(b) Pull the applicable panel forward to disengage it from the fan booster.

(c) Remove the panel from the fan booster.

END OF TASK

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



BOOSTER ACOUSTIC PANEL
(6 LOCATIONS)
A-A

1198667-00-A
M06846 S0004285874_V2

Fan Booster Acoustic Panel Installation
Figure 401/72-21-04-990-801-H01

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

TASK 72-21-04-400-801-H01

3. Fan Booster Acoustic Panel Installation

A. General

(1) This task is the installation procedure for the fan booster acoustic panels (referred to as booster acoustic panels) to the fan booster.

B. References

Reference	Title
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-400-801-H01	Fan Blades Installation (Selection) (P/B 401)

C. Consumable Materials

Reference	Description	Specification
D00504	Grease - Petrolatum	VV-P-236
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

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Booster acoustic panel	72-00-51-09A-195	ARO ALL

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Fan Booster Acoustic Panel Installation

SUBTASK 72-21-04-420-001-H01

(1) Install the booster acoustic panel [1] to the fan booster (Figure 401):

NOTE: If you removed all of the booster acoustic panels, make sure the first booster acoustic panel [1] that you install is at the 12:00 o'clock position.

(a) Apply Acheson GP460 compound, D50043 [C02-058] to the threads of the screws [2] and the friction surfaces at the booster acoustic panels [1].

(b) Apply grease, D00504 to the rubber bumpers of the booster acoustic panel [1].

(c) Push the booster acoustic panel [1] aft to engage it to the fan booster.

(d) Tighten the screws [2] to 60-70 pound-inches (6.7-7.9 Newton-meters).

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-04-410-001-H01

(1) Do this task: Fan Blades Installation (Selection), TASK 72-21-02-400-801-H01.

SUBTASK 72-21-04-420-002-H01

(2) Do this task: Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

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

SUBTASK 72-21-04-410-002-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(3) Remove the mats from the engine inlet cowl.

SUBTASK 72-21-04-865-003-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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

FAN BOOSTER ACOUSTIC PANEL - INSPECTION/CHECK

1. General

A. This procedure has two tasks:

(1) An visual inspection of the fan booster acoustic panel.

(2) An detailed inspection of the fan booster acoustic panel.

TASK 72-21-04-200-802-H01

2. Visually Examine the Fan Booster Acoustic Panels

A. General

(1) This is a visual inspection task for the fan booster acoustic panels.

(2) The fan booster acoustic panels are attached to the stage one vane assembly outer shroud of the fan booster assembly and the fan OGV forward mount flange.

(3) Access to the fan booster acoustic panels is to look between the individual fan blades.

B. 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

C. Consumable Materials

Reference	Description	Specification
A00944 [C01-056]	Adhesive - Silicone Elastomer - RTV 108 (translucent)	
G02329	Tape - Aluminum Foil, Pressure Sensitive - Vibration Damping Tape 434	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the Inspection

SUBTASK 72-21-04-865-004-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-21-04-869-001-H00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

F. Fan Booster Acoustic Panels Inspection

SUBTASK 72-21-04-220-001-H00

(1) Visually examine the booster acoustic panels for the conditions that follow:

(a) Missing paint

1) There is no limit to the amount of missing paint.

(b) Nicks and scratches

1) There is no limit to the amount of nicks and scratches.

(c) Dents

1) It is permitted to have a dent that is 0.10 inch (2.54 mm) deep.

2) It is permitted to have three dents maximum in a panel.

(d) Missing face sheet material

1) It is not permitted to have missing face sheet material. See the Continue-In-Service (C-I-S) limits.

(e) The C-I-S limit for missing face sheet material is 10 cycles or 50 hours with these conditions.

1) A maximum area that is missing is not more than 4.0 sq-in (25.8 sq- mm).

2) The maximum depth is not more than 0.5 inch (12.7 mm).

3) There must not be more than two damaged areas per panel.

4) The maximum length is not more tha 4.0 inches (101.6 mm).

5) Cover the damaged area with two layers of Vibration Damping Tape 434 tape, G02329 and seal the edges with RTV 108 adhesive, A00944 [C01-056].

6) Examine the damaged area within the Continue-In-Service period to make sure that the damage did not become larger.

(f) Tears and cuts

1) It is not permitted to have tears and cuts. See the Continue-In-Service (C-I-S) limits.

(g) The C-I-S limit for tears and cuts is 10 cycles or 50 hours with these conditions.

1) The maximum area is not more than 4.0 sq-in (25.8 sq-cm).

2) The maximum depth is not more than 0.5 inch (12.7 mm).

3) There must not be more than two damaged areas per panel.

4) The maximum length is not more than 4.0 inches (101.6 mm).

5) Cover the damaged area with two layers of Vibration Damping Tape 434 tape, G02329 and seal the edges with RTV 108 adhesive, A00944 [C01-056].

6) Examine the damaged area within the Continue-In-Service period to make sure that the damage did not become larger.

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

(h) Delamination

1) It is not permitted to have delamination on the booster acoustic panels.

(i) Loose bushings

1) It is not permitted to have loose bushings.

(j) Chipped bushing

1) It is permitted to have not more than 1/3 of the bushing flange chipped.

(k) Loose screws

1) Tighten the screws to 55-70 pound-inches (6.2-7.9 Newton-meters).

2) Replace the screws if they do not tighten.

SUBTASK 72-21-04-869-002-H00

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(2) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-04-865-005-H00

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

TASK 72-21-04-200-801-H01

3. Fan Booster Acoustic Panel Inspection

(Figure 601)

A. General

(1) This task gives the steps to do a detailed inspection of a fan booster acoustic panel (referred to as booster acoustic panel).

(2) There are six fan booster acoustic panels located radially on the fan booster.

(3) You must remove the fan booster acoustic panel to do this check.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-020-801-H01	Fan Blades Removal (Selection) (P/B 401)
72-21-02-400-801-H01	Fan Blades Installation (Selection) (P/B 401)
72-21-04-000-801-H01	Fan Booster Acoustic Panel Removal (P/B 401)
72-21-04-400-801-H01	Fan Booster Acoustic Panel Installation (P/B 401)

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

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

D. Consumable Materials

Reference	Description	Specification
A00635	Adhesive - RTV 108 Translucent Silicone Rubber RTV Paste, One-part	BAC5010 Type 60 Class A Grade 2 / MIL-A-46106 Type 1
A50119	Adhesive - Silicone Rubber - RTV 103 (Black)	MIL-A-46106

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

F. Prepare for the Fan Booster Acoustic Panel Inspection

SUBTASK 72-21-04-860-005-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-04-480-002-H01

CAUTION PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put a protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-04-020-003-H01

(3) Do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

SUBTASK 72-21-04-010-002-H01

(4) Do this task: Fan Blades Removal (Selection), TASK 72-21-02-020-801-H01.

G. Fan Booster Acoustic Panel Inspection

SUBTASK 72-21-04-900-001-H01

(1) In the inspections that follow, if you find damage that is not in the specified limits, replace the booster acoustic panel [1], unless other instructions are given. To replace the fan booster acoustic panels, do these tasks: Fan Booster Acoustic Panel Removal, TASK 72-21-04-000-801-H01 and Fan Booster Acoustic Panel Installation, TASK 72-21-04-400-801-H01.

SUBTASK 72-21-04-210-001-H01

(2) Examine the booster acoustic panel [1] for these conditions:

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

(a) Cracks and missing face sheet material in the perforated area of the booster acoustic panel [1].

1) Cracks or missing face sheet material that are more than 0.25 inch (6.3 mm) in length are not permitted.

2) Crack or missing face sheet material that is located less than 0.50 inch (12.7 mm) to an adjacent crack or missing face sheet material is not permitted.

3) A combined total area of all cracks and missing face sheet material more than 0.1 per cent of the total area of the face sheet material is not permitted.

(b) Delamination

1) Delamination is not permitted, replace the booster acoustic panel [1].

(c) Crushed areas

1) Crushed areas are not permitted, replace the booster acoustic panel [1].

(d) Leading Edge Erosion

1) Erosion of the leading edge [7] that is not more than 0.002 inch (0.050 mm) deep is permitted.

(e) Nicks

1) Nicks that are not more than 0.20 inch (5.10 mm) deep are permitted.

(f) Dents

1) Dents that are not more than 0.200 inch (5.10 mm) deep are permitted.

(g) Scratches

1) There is no limit for the number of scratches permitted.

(h) Tears or cuts in the face sheet material [10]

1) Tears or cuts in the face sheet material [10] are not permitted, replace the booster acoustic panel [1].

(i) Holes or punctures in the face sheet material [10]

1) Holes or punctures in the face sheet material [10] are not permitted, replace the booster acoustic panel [1].

(j) Holes or punctures in the back sheet material [5]

1) Holes or punctures in the back sheet material [5] are permitted when.

a) The holes or punctures are not more than 0.5 inch (12.7 mm) in length or width.

b) The cumulative sum of the holes and punctures is not more than 1.00 square-inch (6.45 square-cm).

2) Holes or punctures in the back sheet material [5] are not permitted, you must replace the booster acoustic panel [1] when the following occurs.

a) The holes or punctures are more than 0.5 inch (12.7 mm) in length or width.

b) The cumulative sum of the holes and punctures is more than 1.00 square-inch (6.54 square-cm).

(k) Cracked or broken bushings [9]

1) Cracked or broken bushings [9] are permitted when not more than 1/3 of the bushing is missing.

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

2) Cracked or broken bushings [9] are not permitted and the booster acoustic panel [1] must be replaced when the following occurs.
   a) There are more than 4 cracked or broken bushings [9].
   b) There is more than 1/3 of a bushing [9] missing from one booster acoustic panel [1].

(l) Axial edge seals
1) Disbonded (loose) material on the outer diameters [2] surfaces of the axial edge seals [6]
   a) Disbonded (loose) material must be removed (cut) from the axial edge seals [6].
   b) The total distance must not be more than 50 percent of the seal length.
   c) If you remove more than 50 percent of the seal material, replace the booster acoustic panel [1].
2) Disbonded (loose) material on the inner diameter [4] surfaces of the axial edge seals [6]
   a) Disbonded (loose) material must be removed (cut) from the axial edge seals [6].
   b) The total distance must not be more than 50 percent of the seal length.
   c) If you remove more than 50 percent of the seal material, replace the booster acoustic panel [1].
3) Cuts or tears in the axial edge seals [6]
   a) Disbonded (loose) material must be removed (cut) from the seal inner diameter [4] surfaces.
   b) If you remove more than 50 percent of the seal material, replace the booster acoustic panel [1].
4) Frayed edges or material from the axial edge seal [6] that extends into the flowpath
   a) Permitted

(m) Aft rubber seals
1) Forward portion of the aft rubber seals [3] on the outer diameter
   a) All amounts of disbond is permitted.
      <1> It is recommended to apply RTV 108 adhesive, A00635 or RTV 103 adhesive, A50119 to attach the seal to the panel again in order to stop more distress.
   b) All amounts of seal cuts, tears, and missing material is permitted.
      <1> It is permitted to apply RTV 108 adhesive, A00635 or RTV 103 adhesive, A50119 to replace the missing seal material in order to supply a smooth flowpath.
2) Aft portion of the aft rubber seal
   a) Disbonded areas are permitted up to 3.0 inch (76.2 mm).
      <1> Apply RTV 108 adhesive, A00635 or RTV 103 adhesive, A50119 to attach the seal to the panel again.
   b) Nicks and gouges that are not through the seal are permitted.

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

c) All amounts of seal material cuts and tears is permitted if adjacent seal material is bonded.

<1> Apply RTV 108 adhesive, A00635 or RTV 103 adhesive, A50119 to a disbonded cut or torn edge.

d) Missing material that is through the seal that shows the panel surface.

<1> Up to 2 inches (50.8 mm) cumulative on the outer area and 2 inches (50.8 mm) cumulative on the inner area are permitted, if the inner and outer areas do not overlap more that 1.0 inch (25.4 mm).

<2> Apply RTV 108 adhesive, A00635 or RTV 103 adhesive, A50119 to fill the missing material areas.

e) A Continue-In-Service (C-I-S) limit for 25 cycles is permitted for other disbonded or missing material in the aft portion if it is temporarily repaired with RTV 108 adhesive, A00635 or RTV 103 adhesive, A50119.

(n) Screws

1) Loose or missing retention rings on the screws [8] is permitted.

2) Missing screws are permitted as follows:

a) There are at least six screws securing each booster acoustic panel.

b) The missing screws are not adjacent.

c) The screws adjacent to the missing screws are fully serviceable.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-04-410-003-H01

(1) Do this task: Fan Blades Installation (Selection), TASK 72-21-02-400-801-H01.

SUBTASK 72-21-04-420-003-H01

(2) Do this task: Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

SUBTASK 72-21-04-080-001-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(3) Remove the protective mat, STD-585 from the engine inlet cowl.

SUBTASK 72-21-04-860-006-H01

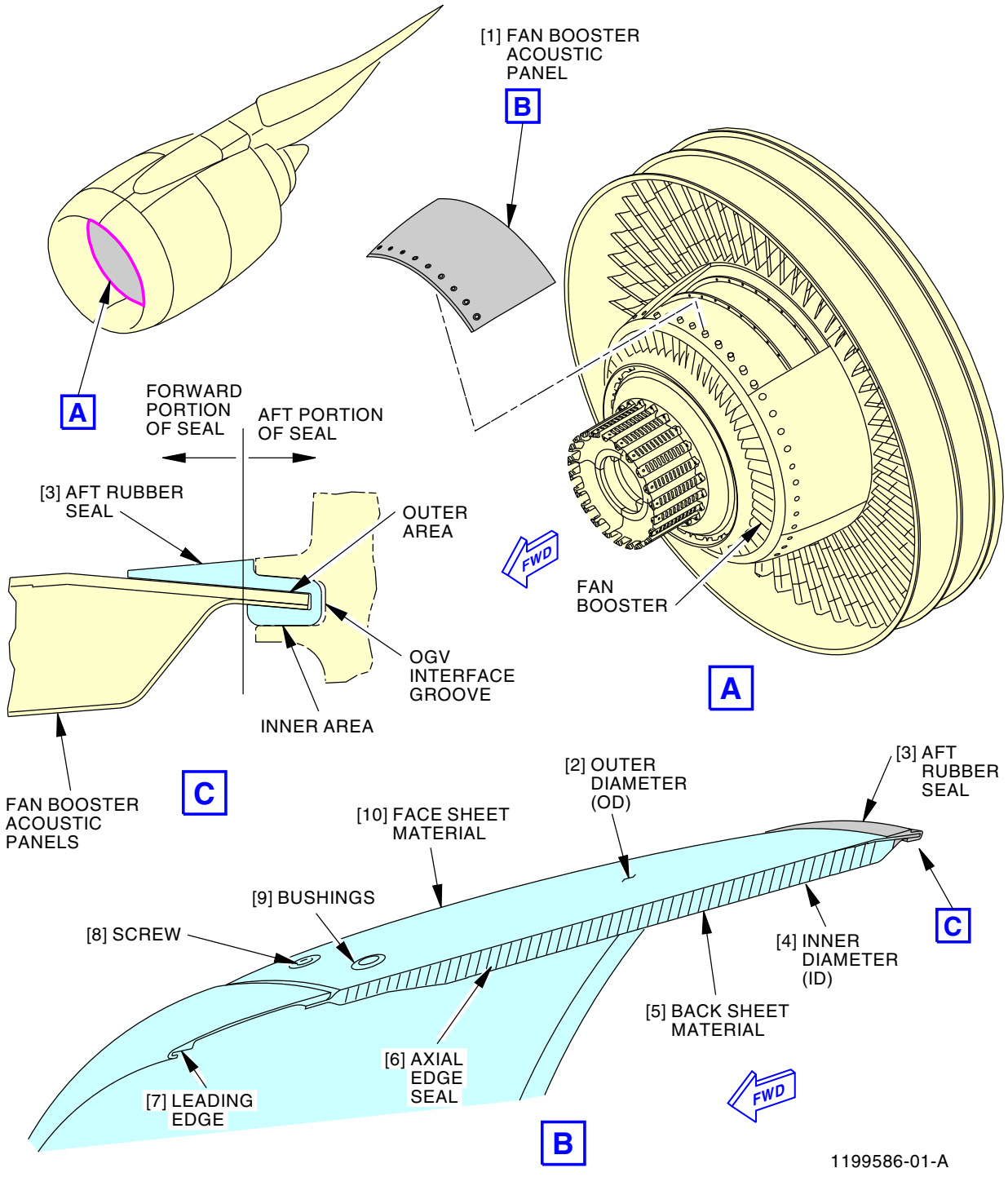
(4) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



Fan Booster Acoustic Panel Inspection
Figure 601/72-21-04-990-802-H01

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

COMPOSITE FLOWPATH SPACER - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the composite flowpath spacer

(2) An installation of the composite flowpath spacer.

TASK 72-21-05-000-801-H00

2. Composite Flowpath Spacer Removal

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405)

A. General

(1) This task is the removal procedure for the composite flowpath spacer.

(2) The composite flowpath spacer is located behind the booster spool.

NOTE: The composite flowpath spacer P/N 2454M40G01 must be installed with bolts P/N J814P041A, and washers P/N 2457M19P01. It is recommended to prepare spare bolts and washers to replace unserviceable hardware discovered during removal.

(3) Access to the composite flowpath spacer is through the inlet cowl of the engine.

(4) It is necessary to remove the fan rotor spinner, fan blades and fan blade platforms.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-02-020-801-H01	Fan Blades Removal (Selection) (P/B 401)
72-21-03-000-801-H01	Fan Blade Platform 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-14970	Jackscrew - Extraction Screw Set Part #: 9C2351G01 Supplier: 19623 Part #: 9C2351G02 Supplier: 19623 Part #: J1383P04 Supplier: 19623
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
411	Engine, Left
421	Engine, Right

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

E. Prepare for the Removal

SUBTASK 72-21-05-860-002-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-05-480-001-H00

CAUTION MAKE SURE YOU PUT A MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT CAN FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-21-05-010-001-H00

(3) Do this task: Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

SUBTASK 72-21-05-010-002-H00

(4) Do this task: Fan Blades Removal (Selection), TASK 72-21-02-020-801-H01.

SUBTASK 72-21-05-010-003-H00

(5) Do this task: Fan Blade Platform Removal, TASK 72-21-03-000-801-H01.

SUBTASK 72-21-05-950-001-H00

(6) Mask the fan disk to prevent damage to the part.

F. Composite Flowpath Spacer Removal

SUBTASK 72-21-05-020-001-H00

(1) Do these steps to remove the flowpath spacer [1]:

WARNING MAKE SURE TWO PEOPLE HOLD THE FLOWPATH SPACER IN PLACE DURING REMOVAL. PERSONNEL MUST BE IN POSITION TO SUPPORT FLOWPATH SPACER. IF THE PART ACCIDENTLY MOVES AND FALLS FROM THE BOOSTER SPOOL, IT CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO THE ENGINE OR TO THE ENGINE PARTS.

(a) Position two technicians to support the flowpath spacer [1] while the attaching hardware is removed and when the extraction screw set jackscrew, SPL-14970 is used (if necessary) to unseat the part from the booster.

(b) Remove the bolts [2] and washers [3] from the inner flange of the flowpath spacer [1].

(c) During the removal of flowpath spacer [1], make a record of the position of each removed bolt [2] and washer [3].

1) Do a general visual inspection of the removed bolts [2] and washers [3]. Discard the bolts [2] and washers [3] that are visually unserviceable.

(d) Install six equally spaced extraction screw set jackscrew, SPL-14970 in the inner flange of the flowpath spacer [1].

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

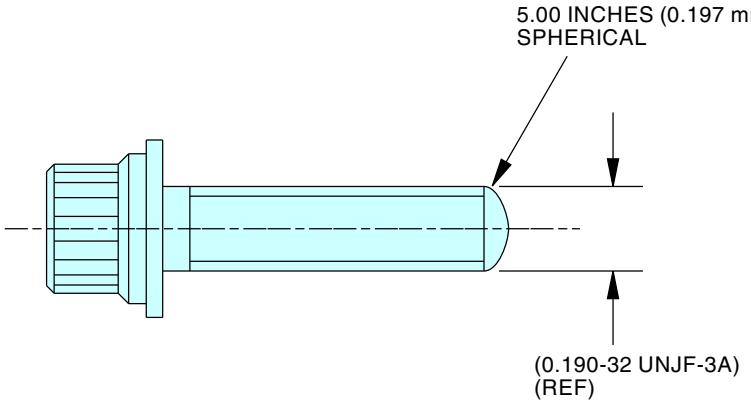
(e) Turn each extraction screw set jackscrew, SPL-14970 an equal amount to remove the flowpath spacer [1] from the booster spool.

(f) Remove the extraction screw set jackscrew, SPL-14970 from the flowpath spacer [1].

(g) Remove the flowpath spacer [1] from the booster spool.

——— END OF TASK ———

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

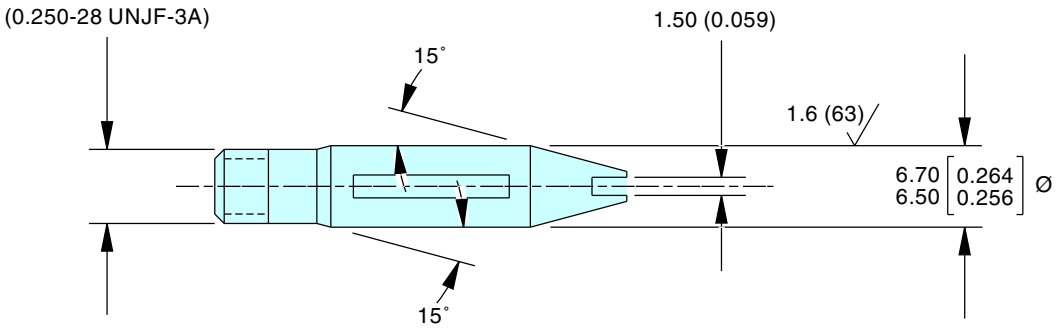


MADE FROM COMMERCIAL SCREW
DOUBLE HEX HD ALT J1383P04

5031152-00
2527042 S0000597042_V1

Jackscrew
Figure 401/72-21-05-990-801-H00

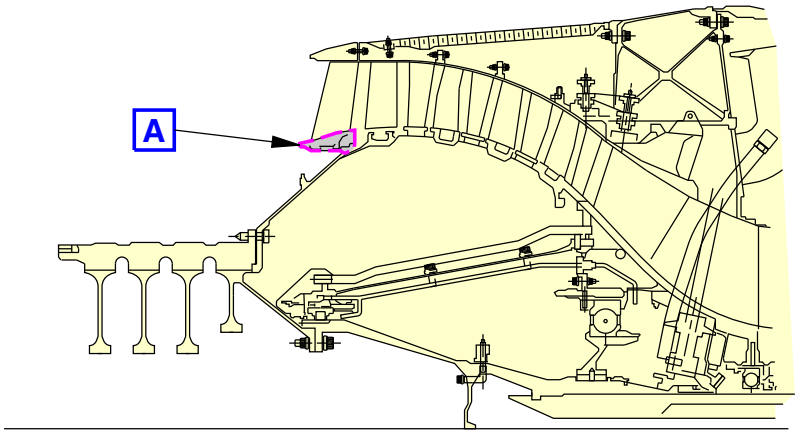
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

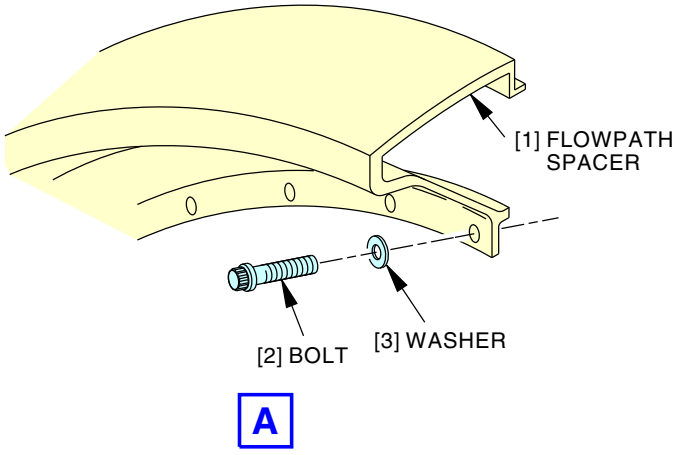


5031153-00
2527044 S0000597044_V1

Guide Pin
Figure 402/72-21-05-990-802-H00

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

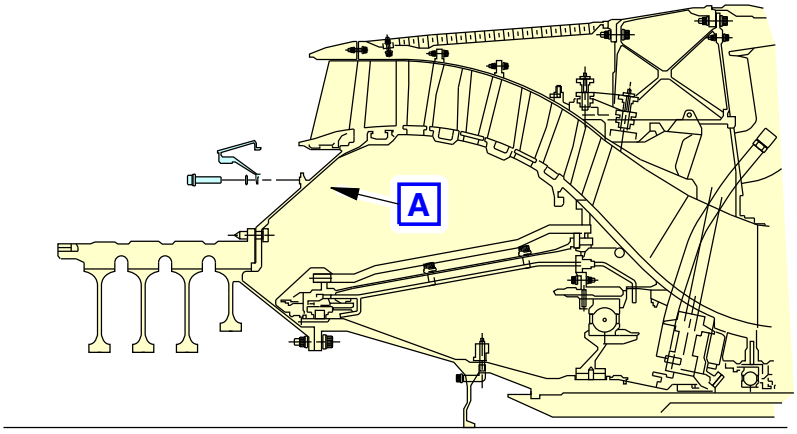


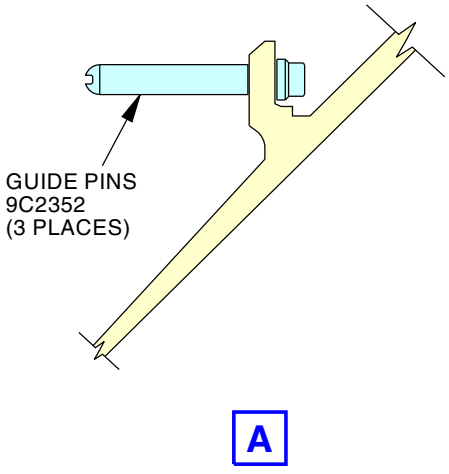


5031154-00
2527045 S0000597045_V1

Composite Flowpath Spacer Installation
Figure 403/72-21-05-990-803-H00

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

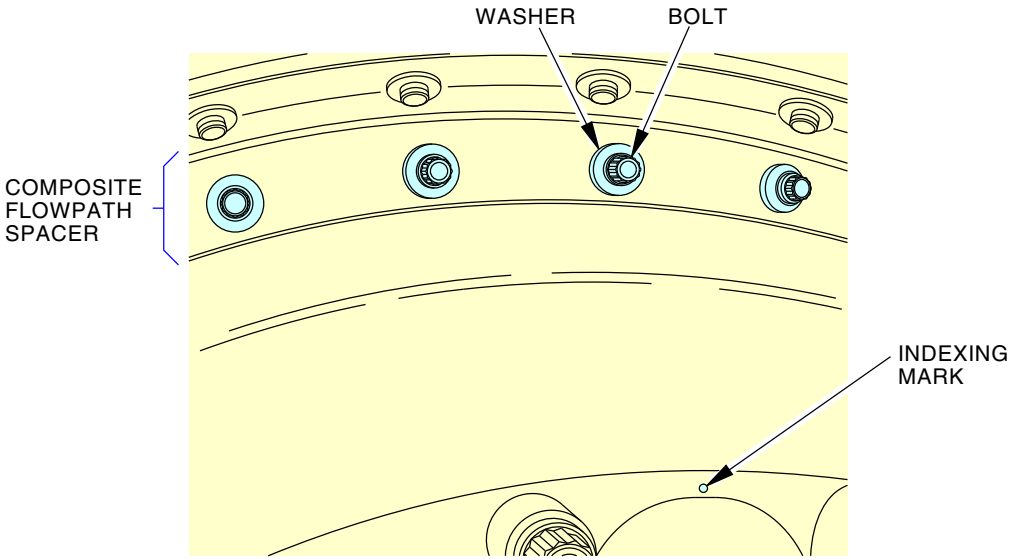




5031155-00
2527046 S0000597046_V1

Installation of Flowpath Spacer to Booster Spool
Figure 404/72-21-05-990-804-H00

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



5031156-00
2527047 S0000597047_V1

Flowpath Spacer and Booster Spool Alignment for Installation
Figure 405/72-21-05-990-805-H00

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

TASK 72-21-05-400-801-H00

3. Composite Flowpath Spacer Installation

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405)

A. General

(1) This task is the installation procedure to install the composite flowpath spacer to the booster spool.

B. References

Reference	Title
71-00-00-700-809-H01	Test No. 10 - Low Pressure System (Fan/LPT) Vibration Survey (P/B 501)
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-400-801-H01	Fan Blades Installation (Selection) (P/B 401)
72-21-03-400-801-H01	Fan Blade Platform 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-14970	Jackscrew - Extraction Screw Set Part #: 9C2351G01 Supplier: 19623 Part #: 9C2351G02 Supplier: 19623 Part #: J1383P04 Supplier: 19623
SPL-14971	Pins - Guide Part #: 9C2352G02 Supplier: 19623
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-14974	Shim - 0.008 inch (0.200 mm)

D. Consumable Materials

Reference	Description	Specification
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
G02448 [C05-003]	Marker - Pens	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

F. Prepare for the Installation

SUBTASK 72-21-05-480-002-H00

CAUTION

MAKE SURE YOU PUT A MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT CAN FALL ON THE INLET COWL SURFACE.

(1) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

G. Composite Flowpath Spacer Installation

SUBTASK 72-21-05-420-001-H00

NOTE: Make sure to install the same bolts and washers, unless you replace them with new bolts and washers, at the same position those were removed from and as recorded during removal.

(1) Do these steps to install the flowpath spacer [1] to the booster spool:

WARNING

BE CAREFUL WHEN YOU ALIGN AND INSTALL THE FLOWPATH SPACER TO THE FAN BOOSTER ASSEMBLY. PERSONNEL MUST BE IN POSITION TO SUPPORT FLOWPATH SPACER. IF THE PART ACCIDENTALLY MOVES OR FALLS FROM THE BOOSTER SPOOL, IT CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO THE ENGINE OR RELATED ENGINE PARTS.

(a) Position two technicians to support the flowpath spacer [1], while it is being aligned with guide pin, SPL-14971 and installed onto the inner flange of the fan booster assembly with attaching hardware.

(b) Install the guide pin, SPL-14971 into the holes in the flange of the booster spool.

(c) Find the top centerline recess mark on the OD of the booster spool flange. Make a mark with a marker, G02448 [C05-003].

(d) Find the location of serial/part number marking on the flange of the flowpath spacer [1] and make a mark with a marker, G02448 [C05-003].

(e) Apply Acheson GP460 compound, D50043 [C02-058] to the threads and washer surfaces of the bolts [2] and washers [3].

WARNING

BE CAREFUL WHEN YOU ALIGN AND INSTALL THE FLOWPATH SPACER TO THE FAN BOOSTER ASSEMBLY. PERSONNEL MUST BE IN POSITION TO SUPPORT FLOWPATH SPACER. IF THE PART ACCIDENTALLY MOVES OR FALLS FROM THE BOOSTER SPOOL, IT CAN CAUSE INJURY TO PERSONNEL OR DAMAGE TO THE ENGINE OR RELATED ENGINE PARTS.

(f) Align the location of serial/part number marking on the flowpath spacer [1] with the top centerline recess mark on the booster spool. Install the flowpath spacer [1] over the guide pin, SPL-14971.

(g) Install eight equally-spaced bolts [2] and washers [3]. Tighten the bolts [2] in a crisscross pattern.

(h) Install the thirty-three other bolts [2] with washers [3] at the open bolthole locations.

(i) Replace one of the three guide pin, SPL-14971 at a time with a bolt [2] and a washer [3]. Continue until all of the guide pin, SPL-14971 are replaced with bolts [2] and washers [3].

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

(j) Tighten the bolts [2] to 109.25 in-lb (12.35 N·m) - 120.75 in-lb (13.65 N·m). Tighten the bolts [2] in a crisscross pattern around the circumference of the flange.

(k) Make sure the flowpath spacer [1] is fully against the booster spool. Do a check around the full circumference of the part with a shim 0.008 Inch (0.200 mm), STD-14974.

(l) If necessary, remove the flowpath spacer [1] with the extraction screw set jackscrew, SPL-14970. Install the flowpath spacer [1] again.

(m) Clean any excess lubricant from bolts [2] and washers [3].

SUBTASK 72-21-05-950-002-H00

(2) Remove the protective masking from the fan disk.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-05-410-001-H00

(1) Do this task: Fan Blade Platform Installation, TASK 72-21-03-400-801-H01.

SUBTASK 72-21-05-410-002-H00

(2) Do this task: Fan Blades Installation (Selection), TASK 72-21-02-400-801-H01.

SUBTASK 72-21-05-410-003-H00

(3) Do this task: Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

SUBTASK 72-21-05-080-001-H00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(4) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-21-05-860-003-H00

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

I. Composite Flowpath Spacer Installation Test

SUBTASK 72-21-05-730-001-H00

(1) Do this task: Test No. 10 - Low Pressure System (Fan/LPT) Vibration Survey, TASK 71-00-00-700-809-H01.

END OF TASK

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

FLOWPATH SPACER - REPAIR

1. General

A. This procedure has one task:

(1) Fan Booster Flowpath Spacer (Carbon Fiber Erosion) Repair.

TASK 72-21-05-300-801-H00

2. Flowpath Spacer - Repair of Carbon Fiber Erosion

Figure 801, Figure 802, and Figure 803

A. General

(1) This procedure gives instructions to repair the flowpath spacer by use of polyurethane paste adhesive on the damaged area of the part. Refer to Figure 801.

NOTE: This repair can be done on-wing, with the flowpath spacer installed. It is permitted to remove the flowpath spacer to make the repair easy. Refer to Composite Flowpath Spacer Removal, TASK 72-21-05-000-801-H00.

B. References

Reference	Title
70-46-01-300-801-H00	Mask and Clean the Epoxy and Polyester Matrix Repair (P/B 201)
72-21-00-220-801-H01	Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection (P/B 601)
72-21-05-000-801-H00	Composite Flowpath Spacer Removal (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

D. Consumable Materials

Reference	Description	Specification
A50422 [C06-067]	Adhesive - Polyurethane Paste	GE Spec. A8B118
B00062	Solvent - Acetone (99.5% Grade)	ASTM D 329 (Supersedes O-A-51)
B00130	Alcohol - Isopropyl	TT-I-735
G02442 [C10-141]	Abrasive - 120 Grit, SiC, Wet/Dry, Abrasive Paper / 180 Grit, SiC, Wet/Dry, Abrasive Paper	
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50033 [C10-133]	Film, Polymer FEP, Unperforated, 0.001 inch (0.03 Mm) Thick	
G50035 [C10-182]	Cloth - Cleaning For Aircraft Structural	SAE-AMS 3819, BMS 15-5
G50263	Gloves - White Cotton Disposable	

E. Location Zones

Zone	Area
411	Engine, Left

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

(Continued)

Zone	Area
421	Engine, Right

F. Prepare for the Repair

SUBTASK 72-21-05-860-004-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-21-05-480-003-H00

CAUTION MAKE SURE YOU PUT A MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT CAN FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

G. Procedure

SUBTASK 72-21-05-200-001-H00

(1) Do an inspection of the flowpath spacer. Refer to Figure 801 and as follows:

NOTE: Before you do this procedure, do an inspection of the flowpath spacer. Refer to Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-220-801-H01.

(a) If damage extends to more than the limits specified in Figure 801, then you cannot repair the flowpath spacer with this procedure.

NOTE: Polyurethane paste cannot be applied over previously applied polyurethane paste. Polyurethane paste applied before in adjacent areas not part of the current repair area does not have to be removed.

(b) Do an inspection of the flowpath spacer for polyurethane paste adhesive in each repair area applied before in accordance with the Aircraft Maintenance Manual (on-wing) or the Engine Shop Manual and as follows:

1) Remove previously applied polyurethane paste as follows:

a) Mask the flowpath spacer repair area. Refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00 and as follows:

<1> Use Composite Masking Method No. 3.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

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

(WARNING PRECEDES)

CAUTION DO NOT LET ACETONE (C04-003) GO INTO THE PAINT OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE OF THE FLOW-PATH SPACER. IT CAN MAKE SOFT OR DETERIORATE THE PAINT OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE.

<2> Use a cloth, G50035 [C10-182] moist with solvent, B00062 to wipe the polyurethane paste applied before.

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION MAKE SURE THAT YOU DO NOT SAND INTO THE FIBERGLASS OR CARBON FIBER COMPOSITE AREA OF THE FLOW-PATH SPACER. DAMAGE TO THE FLOW-PATH SPACER CAN OCCUR.

<3> Use abrasive paper, G02442 [C10-141] to sand the polyurethane paste applied before.

<4> Do not remove additional carbon fiber.

<5> Repeat until the polyurethane paste applied before is removed.

(c) Do an inspection of the flowpath spacer for carbon fiber damage as follows:

1) Do a visual inspection for carbon fiber damage. Carbon fiber must not be damaged 0.030 in. (0.762 mm) below the original painted surface of the flowpath spacer.

(d) Refer to Fan Booster Flowpath Spacer (Scheduled Maintenance Requirement) Inspection, TASK 72-21-00-220-801-H01 for other repair alternatives.

SUBTASK 72-21-05-020-002-H00

(2) Alternate procedure: The repair is applicable on-wing with flowpath spacer installed. It is permitted to remove the flowpath spacer to make the repair easier. Refer to Composite Flowpath Spacer Removal, TASK 72-21-05-000-801-H00.

SUBTASK 72-21-05-160-001-H00

(3) Remove the paint and primer from the flowpath spacer repair area. Refer to Figure 802 and as follows:

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

CAUTION MAKE SURE THAT YOU DO NOT SAND INTO THE FIBERGLASS OR CARBON FIBER COMPOSITE AREA OF THE FLOW-PATH SPACER. DAMAGE TO THE FLOW-PATH SPACER CAN OCCUR.

(a) Identify repair areas as follows:

1) Areas of erosion with exposed carbon fiber.

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

2) Optional Procedure: Areas of fiber glass erosion without exposed or damaged carbon fiber.

3) Optional Procedure: Areas of paint or primer erosion.

WARNING DO NOT BREATHE THE PARTICLES WHEN SANDING. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PERSONAL PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

a) Use abrasive paper, G02442 [C10-141] to lightly sand the flowpath spacer repair area as follows:

<1> Remove paint and primer in the repair area, but do not remove erosion damage.

<2> Remove loose fiberglass and carbon fibers.

<3> Do not remove undamaged fiberglass or carbon fibers. Only make rough the carbon fiber if it is only eroded.

<4> Do not increase the depth of the repair area.

<5> The repair area must have a width of 1.40 in. (35.6 mm)—1.50 in. (38.1 mm) in Area A.

<6> The repair area must be centered on the erosion area.

<7> Use a cloth wet with water to wipe the flowpath spacer surface to keep it cool. No steam must rise from the surface you wipe.

SUBTASK 72-21-05-220-001-H00

(4) Do an inspection of the exposed carbon fiber on the flowpath spacer for damage after sanding. Refer to Figure 801 and Figure 802 and as follows:

(a) Carbon fiber must not be damaged 0.030 in. (0.762 mm) below the original surface of the flowpath spacer in the repair area.

SUBTASK 72-21-05-100-001-H00

(5) Clean the flowpath spacer repair area. Refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00 and as follows:

NOTE: This step is necessary to remove dirt and unwanted material from sanding and prepare the repair area for masking.

(a) Use glove, G50263 to touch the flowpath spacer.

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

CAUTION DO NOT LET ACETONE (C04-003) GO INTO THE PAINT OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE OF THE FLOW-PATH SPACER. IT CAN MAKE SOFT OR DETERIORATE THE PAINT OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE.

(b) Use Composite Cleaning Method No. 5 and as follows:

NOTE: It is recommended to use alcohol, B00130 to decrease the risk of damage to the flowpath spacer that can be caused by solvent, B00062.

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

1) Use alcohol, B00130.
2) Alternative Procedure: Use solvent, B00062 and as follows:
   a) Apply masking to the repair area as follows:
      <1> Use Composite Masking Method No. 5.
   b) Use small quantities of solvent, B00062 to prevent damage to the adjacent areas.
   c) Do not let the solvent, B00062 stay on the repair area surface more than 3 seconds.
3) If you used solvent, B00062, then do an inspection of the adjacent repair area as follows:
   a) Use glove, G50263 to touch the flowpath spacer.
   b) Remove the masking from the repair area.
   c) Do an inspection of the paint and previous repair areas of polyurethane paste adhesive for damaged or soft areas as follows:
      <1> Do the repair again to remove any damaged or soft areas of paint and areas repaired with polyurethane paste adhesive from the flowpath spacer.

SUBTASK 72-21-05-950-003-H00

(6) Apply masking around the flowpath spacer repair area. Refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00 and as follows:
   (a) Use glove, G50263 to touch the flowpath spacer.
   (b) Remove all masking that you applied before in the repair area.
   (c) Use Composite Masking Method No. 5.

SUBTASK 72-21-05-100-002-H00

(7) Clean the flowpath spacer repair area. Refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00 and as follows:

   NOTE: This step is necessary to prepare the repair area for bonding after the masking is applied.

   (a) Use glove, G50263 to touch the flowpath spacer.



WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.



CAUTION DO NOT LET ACETONE (C04-003) GO INTO THE PAINT OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE OF THE FLOW-PATH SPACER. IT CAN MAKE SOFT OR DETERIORATE THE PAINT OR REPAIR AREAS OF POLYURETHANE PASTE ADHESIVE.

   (b) Use Composite Cleaning Method No. 5 and as follows:

      NOTE: It is recommended to use alcohol, B00130 to decrease the risk of damage to the flowpath spacer.

      1) Use alcohol, B00130.

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

CAUTION

MAKE SURE THAT ALL SYRINGE OR EYEDROPPER COMPONENTS ARE COMPATIBLE WITH ACETONE (C04-003) AND WILL NOT DEGRADE FROM EXPOSURE TO IT. IT CAN CONTAMINATE THE FLOW-PATH SPACER REPAIR SURFACE AND THE POLYURETHANE PASTE ADHESIVE A50422 (C06-067) CANNOT BOND.

2) Alternative Procedure: Use solvent, B00062 as follows:

a) Use a clean syringe or a clean eyedropper.

b) Flush the syringe or eyedropper with solvent, B00062 before you use it.

c) Use the syringe or eyedropper to apply small quantities of solvent, B00062 to prevent damage of the adjacent areas.

d) Do not let the solvent, B00062 stay on the repair area surface more than 3 seconds.

SUBTASK 72-21-05-700-001-H00

(8) Do a water break test to the flowpath spacer repair area. Refer to Mask and Clean the Epoxy and Polyester Matrix Repair, TASK 70-46-01-300-801-H00 and as follows:

(a) Let the flowpath spacer air dry for a minimum of 30 minutes after the test.

SUBTASK 72-21-05-300-001-H00

(9) Prepare the weld repair paste, A50422 [C06-067] as follows:

(a) Put the weld repair paste, A50422 [C06-067] cartridge into the applicator.

(b) Remove the cap from the end of the cartridge and attach the mixing nozzle to the end of the cartridge.

(c) Start to squeeze the trigger on the applicator to let the weld repair paste, A50422 [C06-067] flow into the mixing nozzle.

(d) Continue to squeeze the trigger on the applicator until theweld repair paste, A50422 [C06-067] starts to come out of the end of the mixing nozzle.

(e) Squeeze-out a minimum of filled diameter of 1.0 in. (25 mm) by 0.05 in. (1.3 mm) in thickness of weld repair paste, A50422 [C06-067] from the applicator and discard it before you use the weld repair paste, A50422 [C06-067] on the flowpath spacer repair area.

NOTE: After the repair is completed, the mixing nozzle must be removed and discarded and the cap on the cartridge must be replaced. The shelf life of the cartridge is two weeks after it is opened. Each new repair will have to use a new mixing nozzle.

SUBTASK 72-21-05-300-002-H00

WARNING

REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(10) Apply the weld repair paste, A50422 [C06-067] to the flowpath spacer repair area. Refer to Figure 802 and as follows:

(a) Use glove, G50263 to touch the flowpath spacer.

(b) If the repair is done in Area B and C, make the weld repair paste, A50422 [C06-067] smooth to make it level with the flowpath spacer adjacent areas and as follows:

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

1) Use a Teflon spatula (Figure 803) as follows:

a) Use the Teflon spatula to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

2) Alternative Procedure: Apply a piece of film, G50033 [C10-133] on top of the weld repair paste, A50422 [C06-067]. Use a roller on the film, G50033 [C10-133] to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

(c) If the repair is done in Area A, apply the weld repair paste, A50422 [C06-067] to meet the thickness requirements of Figure 802.

NOTE: It is recommended to apply Scotch 5490 tape, G50030 [C10-040] in the surrounding repair area in order to meet the minimum 0.012 in. (0.305 mm) thickness requirement.

1) Use a Teflon spatula (Figure 803) as follows:

a) Use the Teflon spatula to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

2) Alternative Procedure: Apply a piece of film, G50033 [C10-133] on top of the weld repair paste, A50422 [C06-067]. Use a roller on the film, G50033 [C10-133] to make the weld repair paste, A50422 [C06-067] smooth to make it level with the adjacent area.

(d) Remove unwanted polyurethane paste adhesive with a cloth, G50035 [C10-182].

(e) Apply a piece of film, G50033 [C10-133] on top of the repair area to put a cover on the weld repair paste, A50422 [C06-067] as follows:

1) Attach the film, G50033 [C10-133] with Scotch 5490 tape, G50030 [C10-040].

NOTE: It is not necessary for the film, G50033 [C10-133] to touch the weld repair paste, A50422 [C06-067].

NOTE: To get a satisfactory cure, the film, G50033 [C10-133] is recommended if the flowpath spacer is not cured in a low moisture environment (relative humidity is less than 40 percent).

NOTE: To get a better surface finish, it is recommended that the film, G50033 [C10-133] does not touch the surface of the weld repair paste, A50422 [C06-067].

SUBTASK 72-21-05-880-001-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(11) Cure the weld repair paste, A50422 [C06-067] at room temperature, a temperature range of 65°F (18°C) to 85°F (29°C), for 24 hours.

SUBTASK 72-21-05-880-002-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

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

(WARNING PRECEDES)

WARNING USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(12) Alternative Procedure: Cure the weld repair paste, A50422 [C06-067]. Refer to SAE ARP 5144, Heat Application for Thermosetting Resin Curing, and as follows:

NOTE: A relative humidity of more than 40 percent can prevent full curing of the weld repair paste, A50422 [C06-067]. Thus, it is recommended to use a heating device if the relative humidity is more than 40 percent.

(a) Use a heating device.

(b) Attach a minimum of one thermocouple at a maximum of 0.50 in. (12.7 mm) from each repair area.

(c) If you repair more than three areas on the flowpath spacer and an oven is used to heat the part, then only three thermocouples are necessary.

(d) Keep the repair area at a temperature range of 170°F (77°C) to 190°F (88°C) for 60-90 minutes.

(e) The flowpath spacer must not be more than a temperature of 190°F (88°C).

SUBTASK 72-21-05-880-003-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

WARNING USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

(13) Alternative Procedure: Cure the weld repair paste, A50422 [C06-067]. Refer to SAE ARP 5144, Heat Application for Thermosetting Resin Curing, and as follows:

(a) Use a heating device.

(b) Attach a minimum of one thermocouple to a maximum of 0.50 in. (12.7 mm) of each repair area.

(c) If you repair more than three areas on the flowpath spacer and an oven is used to heat the part, then only three thermocouples are necessary.

(d) Keep the flowpath spacer at a temperature range of 130°F (54°C) to 170°F (77°C) for 120-150 minutes.

SUBTASK 72-21-05-950-004-H00

(14) Remove the film, G50033 [C10-133] and masking from the flowpath spacer.

SUBTASK 72-21-05-120-001-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

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

(WARNING PRECEDES)

WARNING DO NOT BREATHE THE PARTICLES WHEN YOU SAND. THE PARTICLES CAN CAUSE DAMAGE, INJURY, OR IRRITATION TO YOU. USE PROTECTION EQUIPMENT. USE LOCAL MECHANICAL EXHAUST VENTILATION OR AN APPROVED RESPIRATOR.

(15) If necessary, sand the flowpath spacer repair area as follows:

(a) Use abrasive paper, G02442 [C10-141] to sand the weld repair paste, A50422 [C06-067] to a smooth transition. Refer to Figure 802.

NOTE: Sanding will cause the surface of the weld repair paste, A50422 [C06-067] to have a dull finish, which is acceptable.

1) After you removed the film, G50033 [C10-133], sanding is not necessary if the surface of the weld repair paste, A50422 [C06-067] has the necessary transition.

SUBTASK 72-21-05-200-002-H00

WARNING REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(16) Do a visual inspection of the flowpath spacer repair area as follows:

(a) Do an inspection for bubbles, blisters, and contamination. If you find bubbles, blisters, or contamination more than 0.005 in. (0.127 mm) in depth, do the repair again.

(b) Make sure that the exposed carbon fiber in flowpath spacer repair area is fully covered with weld repair paste, A50422 [C06-067]. If the exposed carbon fiber in flowpath spacer repair area is not fully covered, do the repair again.

(c) Do an inspection of the weld repair paste, A50422 [C06-067] to make sure that it is cured as follows:

1) Do an inspection of shape memory (surface keeps initial shape) as follows:

a) Apply force with the Teflon spatula to the cured surface to cause a movement of 0.001 in. (0.025 mm)–0.003 in. (0.076 mm).

b) Remove the Teflon spatula.

c) Make sure that the surface of the weld repair paste, A50422 [C06-067] keeps the initial shape (shape memory).

2) Cured surface must be dry.

3) If the weld repair paste, A50422 [C06-067] is not cured, remove the non-cured polyurethane paste adhesive from the repair area and do the repair again. Refer to paragraph 2.G(1) through paragraph 2.G(14).

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-21-05-080-002-H00

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, DAMAGE TO THE ENGINE CAN OCCUR.

(1) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

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

SUBTASK 72-21-05-860-005-H00

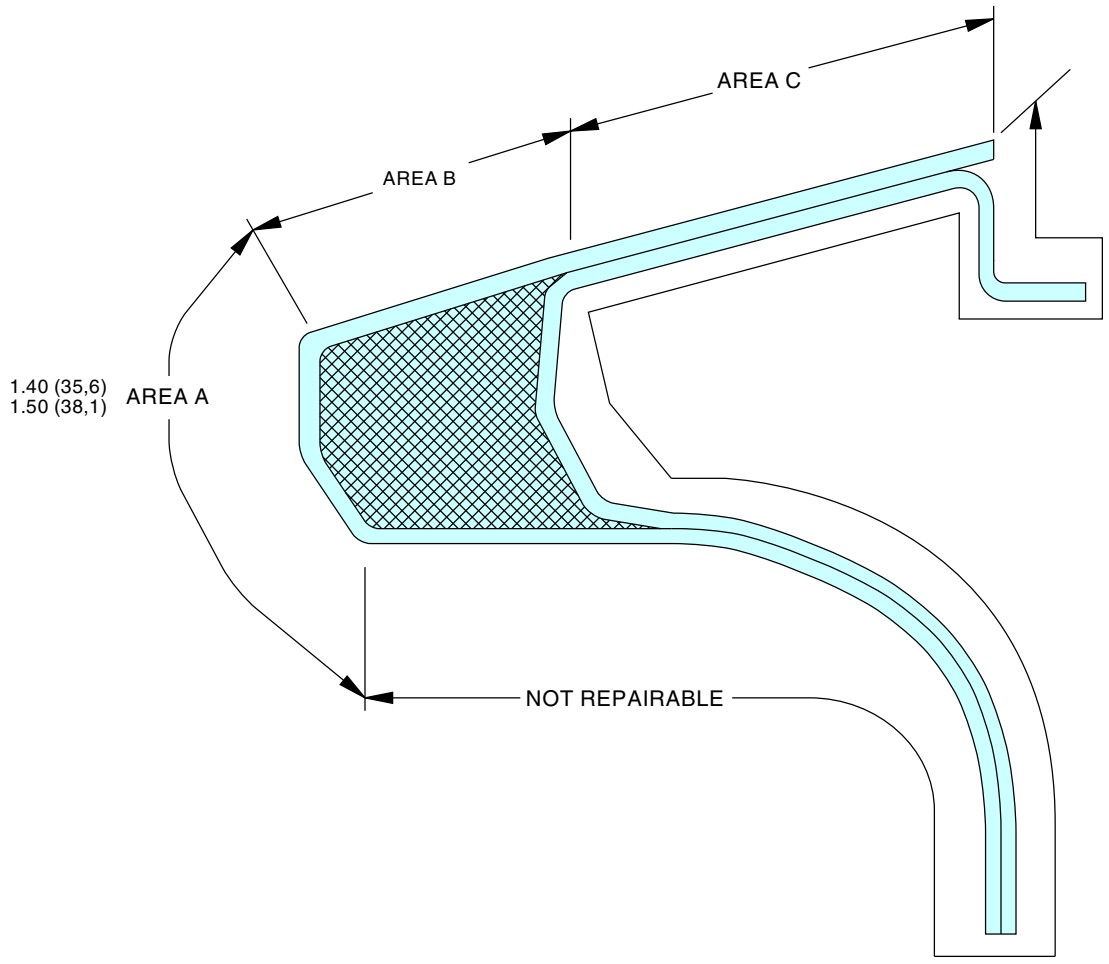
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



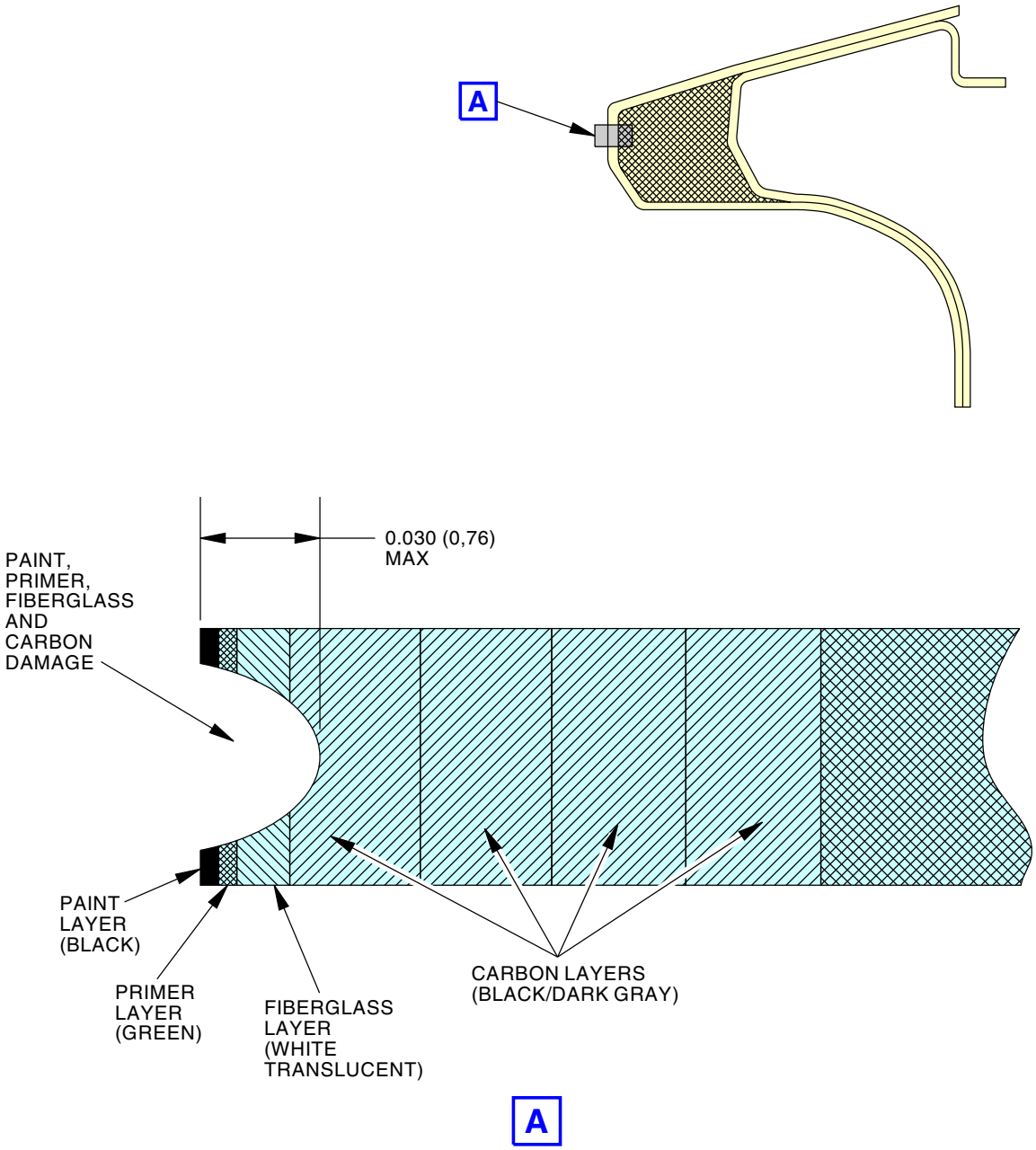
NOTE:

1. DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.
2. DAMAGE DEPTH MUST BE MEASURED FROM UNDAMAGED PAINT SURFACE.

5032134-00
2537275 S0000601618_V1

Flowpath Spacer
Figure 801/72-21-05-990-806-H00 (Sheet 1 of 2)

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



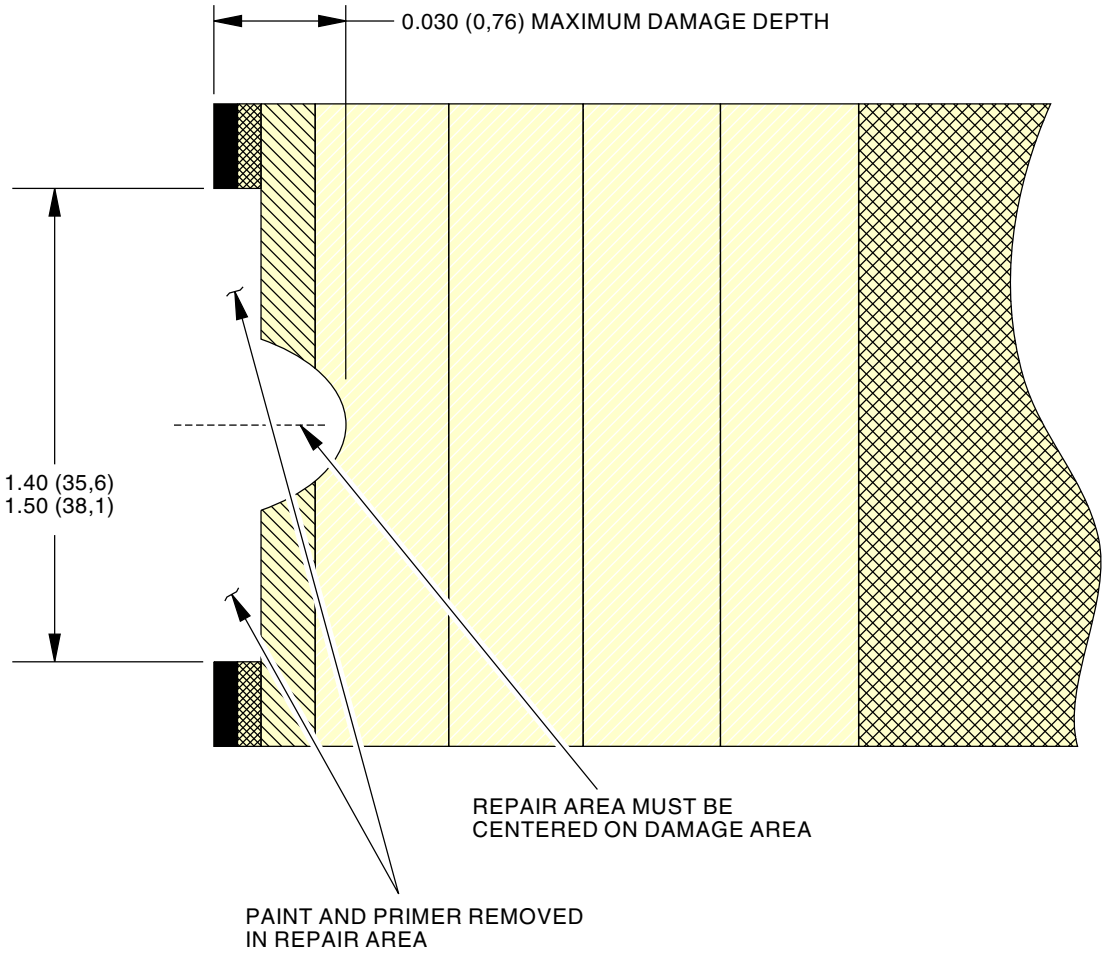
NOTE:

1. DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.
2. DAMAGE DEPTH MUST BE MEASURED FROM UNDAMAGED PAINT SURFACE.

5032135-00
2537284 S0000601619_V1

Flowpath Spacer
Figure 801/72-21-05-990-806-H00 (Sheet 2 of 2)

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



SANDING COMPLETE

A

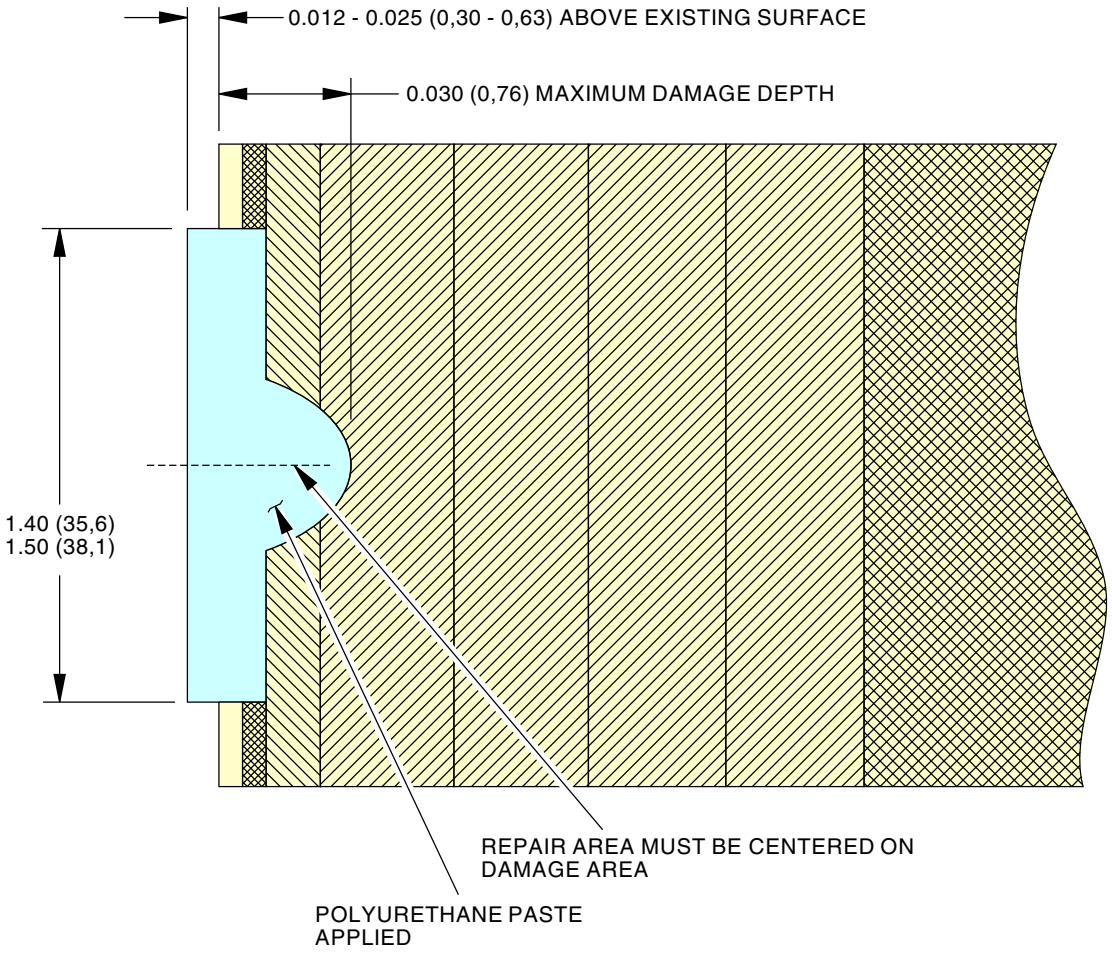
NOTE:

1. DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.
2. DAMAGE DEPTH MUST BE MEASURED FROM UNDAMAGED PAINT SURFACE.

5032136-00
2537301 S0000601620_V1

Flowpath Spacer Repair Area
Figure 802/72-21-05-990-807-H00 (Sheet 1 of 2)

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



REPAIR COMPLETE

A

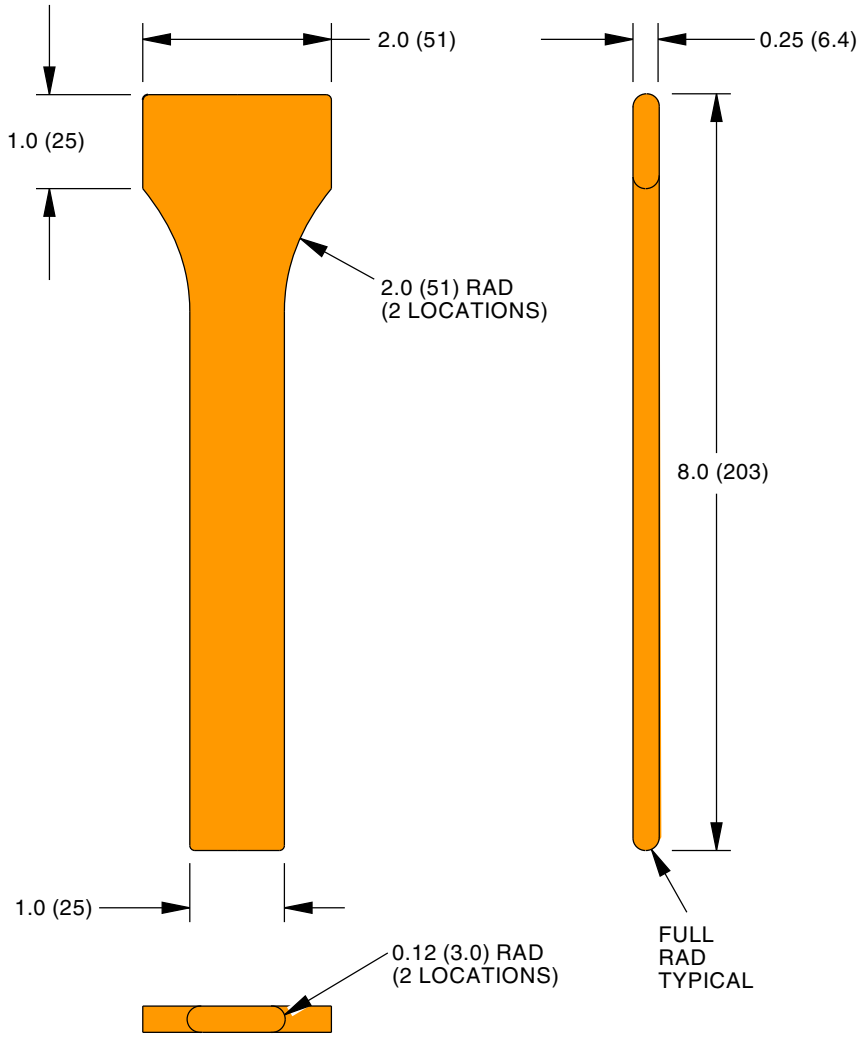
NOTE:

1. DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.
2. DAMAGE DEPTH MUST BE MEASURED FROM UNDAMAGED PAINT SURFACE.
3. THE MINIMUM THICKNESS OF THE POLYURETHANE PASTE AFTER REPAIR IN AREA A MUST BE 0.012 (0,30).
4. POLYURETHANE PASTE REPAIR IN AREA B AND AREA C MUST BE FLUSH TO THE SURROUNDING AREAS.

5032137-00
2537320 S0000601621_V1

Flowpath Spacer Repair Area
Figure 802/72-21-05-990-807-H00 (Sheet 2 of 2)

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



MATERIAL:
TEFLON (PTFE)

NOTE:
DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESIS.

TOLERANCE:
± 0.010 (0.25)

5032138-00
2537325 S0000601622_V1

Teflon Spatula
Figure 803/72-21-05-990-808-H00

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

FAN HUB FRAME ASSEMBLY - INSPECTION/CHECK

1. General

A. This procedure contains three tasks:

(1) An examination of the fan hub frame forward inner cowl support V-groove.

(2) An examination of the fan hub frame forward outer cowl support V-groove.

(3) An examination of the fan hub frame visible IGV guide pads.

TASK 72-23-00-220-801-H01

2. Fan Hub Frame Forward Inner Cowl Support V-groove Inspection

A. General

(1) This task gives an examination of the fan hub frame forward inner cowl support V-groove.

(2) The fan hub frame forward inner cowl support V-groove (referred to as forward inner cowl support V-groove) is attached to the fan hub frame assembly.

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)
72-23-00-370-801-H01	Fan Hub Frame (Forward Inner Cowl Support V-groove) Repair (P/B 801)
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. Consumable Materials

Reference	Description	Specification
C00943 [C03-006]	Coating - Chemical Conversion - Bonderite M-CR 1200S Aero (Formerly Alodine 1200S)	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

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

F. Prepare for the Examination

SUBTASK 72-23-00-410-001-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. Fan hub Frame Forward Inner Cowl Support V-groove Examination

SUBTASK 72-23-00-220-001-H01

(1) Examine the forward inner cowl support V-groove for wear coat that is missing:

(a) It is not permitted to have wear coat that is missing from the V-groove.

(b) Replace the missing wear coat. To replace the missing wear coat, do this task: Fan Hub Frame (Forward Inner Cowl Support V-groove) Repair, TASK 72-23-00-370-801-H01.

SUBTASK 72-23-00-220-002-H01

(2) Continue-in-service (C-I-S) limit for the forward inner cowl support V-groove missing wear coat on the V-groove.

(a) The CIS limit for missing wear coat on the V-groove is 250 cycles or 1000 hours with no limit on the amount of missing wear coat.

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

SUBTASK 72-23-00-220-003-H01

(3) Examine the top edge of the forward inner cowl support V-groove for cracks, dents, nicks, and scratches:

(a) It is permitted to have two areas with dents, nicks, and scratches with the conditions that follow:

1) The nicks, dents and scratches are less than 2.50 inches (63.5 mm) in length and 0.130 inches (3.30 mm) in depth.

2) Blend to remove the metal that is above the original surface contour.

3) Apply Bonderite M-CR 1200S Aero coating, C00943 [C03-006] to the blended surface.

(b) Cracks are not permitted.

H. Put the Airplane Back to its Usual Condition.

SUBTASK 72-23-00-410-002-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.

(1) 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.

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

TASK 72-23-00-200-801-H01

3. Fan Hub Frame Forward Outer Support V-Groove Inspection

A. General

(1) This task is the inspection procedure of the fan hub frame forward outer support V-groove.

(2) The fan hub frame forward outer support V-groove referred to as forward outer support V-groove is attached to the aft fan stator case assembly. You must open the thrust reversers to get access.

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)
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. Consumable Materials

Reference	Description	Specification
C00943 [C03-006]	Coating - Chemical Conversion - Bonderite M-CR 1200S Aero (Formerly Alodine 1200S)	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-23-00-865-001-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-23-00-010-002-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

(2) 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. Fan Hub Frame Forward Outer Support V-groove Inspection

SUBTASK 72-23-00-211-001-H01

(1) Examine the top edge of the forward outer support V-groove for dents, nicks and scratches:

(a) It is permitted to have two areas with dents, nicks, and scratches with the conditions that follow:

1) The dents, nicks and scratches are less than 2.5 inches (63.5 mm) in length and 0.02 inch (0.51 mm) in depth.

(b) Blend to remove the metal that is above the original surface contour.

(c) Apply Bonderite M-CR 1200S Aero coating, C00943 [C03-006] to the blended surface.

SUBTASK 72-23-00-210-001-H01

(2) Examine the top edge of the forward outer support V-groove for cracks.

(a) Cracks are not permitted.

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

H. Put the airplane back to its usual condition

SUBTASK 72-23-00-410-004-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.

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

SUBTASK 72-23-00-865-002-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

TASK 72-23-00-200-802-H00

4. Fan Hub Frame IGV Guide Pads Inspection

(Figure 601)

A. General

(1) This task gives an examination of the fan hub frame guide pads.

B. References

Reference	Title
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
27-81-00-440-801	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)
72-00-00-100-801-H01	Engine Gas Path Cleaning (Juniper Wash Cart Method) (P/B 701)
72-00-00-290-803-H01	High Pressure Compressor Section Rotor Inspection (P/B 601)
72-30-00-200-801-H01	High Pressure Compressor Section (HPC) Inspection (P/B 601)
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
SPL-13704	Wrench - Adapter Part #: 9C1700G02 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
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

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Examination

SUBTASK 72-23-00-200-001-H00

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 PERSONNEL 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.

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.

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

H. Fan Hub Frame IGV visible guide pads inspection

SUBTASK 72-23-00-200-002-H00

(1) Visually inspect all visible IGV guide pads [4] (Figure 601 (Sheet 1)) and the VSV guide pads - SUBTASK H72-30-00-210-001-H01 (High Pressure Compressor Section (HPC) Inspection, TASK 72-30-00-200-801-H01).

NOTE: This inspection is limited to only visible and accessible guide pads [4]. It is not necessary to remove any engine hardware to get access and do this inspection.

NOTE: Do an inspection of the IGV guide pads [4] and the VSV guide pads at the same time.

(a) The loose nut(s) are not permitted.

1) If you find the loose nut(s), remove the nut(s):

a) Use adapter wrench, SPL-13704 to unscrew the adjusting screw [7] of the affected guide pad [4] so that the affected guide pad [4] is against the actuating ring [8].

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

b) Apply Acheson GP460 compound, D50043 [C02-058] to the threads and washer surface of the nut [6].

NOTE: Use a minimum quantity of lubricant necessary for assembly. After assembly, remove unwanted lubricant with a clean cloth.

c) Tighten the nuts [6] to 83-90 lb in. (9.4-10.2 N.m).

<1> If necessary, tighten the nuts [6] 180 degrees apart from each other in a crisscross pattern and continue around the circumference.

d) Tighten all the nuts [6] again to 110-120 lb in. (12.4-13.6 N.m).

<1> If necessary, tighten the nuts [6] 180 degrees apart from each other in a crisscross pattern and continue around the circumference.

2) Refer to the Continue-In-Service Limits below.

(b) Missing the friction pad [5] is not permitted.

1) Refer to the Continue-In-Service Limits below.

(c) Excessive clearance between the fan hub frame and the friction surface of the guide pad [4]:

1) Any amount if not more than 0.040 in. (1.016 mm).

NOTE: Use a 0.040 in. (1.016 mm) thick feeler gage to check the clearance between the fan hub frame and the friction surface of the guide pad [4].

2) Refer to the Continue-In-Service Limits below.

(d) The guide pad [4] looseness is not permitted.

1) Refer to the Continue-In-Service Limits below.

(e) Missing the guide pad [4] is not permitted.

1) Refer to the Continue-In-Service Limits below.

(f) Continue-In-Service (CIS) limits. Conditions that are more than the above limits are permitted to continue in service for 150 flight cycles with these conditions:

1) The total number of guide pads [4] found out of the above limits is not more than four (4).

a) Refer to SUBTASK 72-30-00-210-001-H01 (High Pressure Compressor Section (HPC) Inspection, TASK 72-30-00-200-801-H01) for the VSV guide pads CIS.

2) If the total number of IGV guide pads found out of limits is more than the above limits and/or the VSV guide pads limits, remove the engine immediately.

3) Do a borescope inspection of the HPC stages 3, 5 and 8 blades for damage in or less than the next 50 flight cycles (High Pressure Compressor Section Rotor Inspection, TASK 72-00-00-290-803-H01).

NOTE: Borescope inspection of the HPC stage 3, 5 and 8 blades can be alleviate if you do a borescope inspection of the HPC stage 3, 5 and 8 blades in or less than 50 flight cycles before the guide pad inspection.

NOTE: The borescope inspection BSI of the HPC stages 3, 5 and 8 blades for damage is not necessary during Continue-In-Service accomplishment.

4) Do a water wash in a 300 flight cycle interval while this CIS limit is used (Engine Gas Path Cleaning (Juniper Wash Cart Method), TASK 72-00-00-100-801-H01).

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

(g) It is permitted to do the Continue-In-Service again. Before the revenue in-service, do an inspection of the guide pads [4] again (Fan Hub Frame Forward Inner Cowl Support V-groove Inspection, TASK 72-23-00-220-801-H01).

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-00-200-003-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.

(1) 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.

1) Close these access panels:

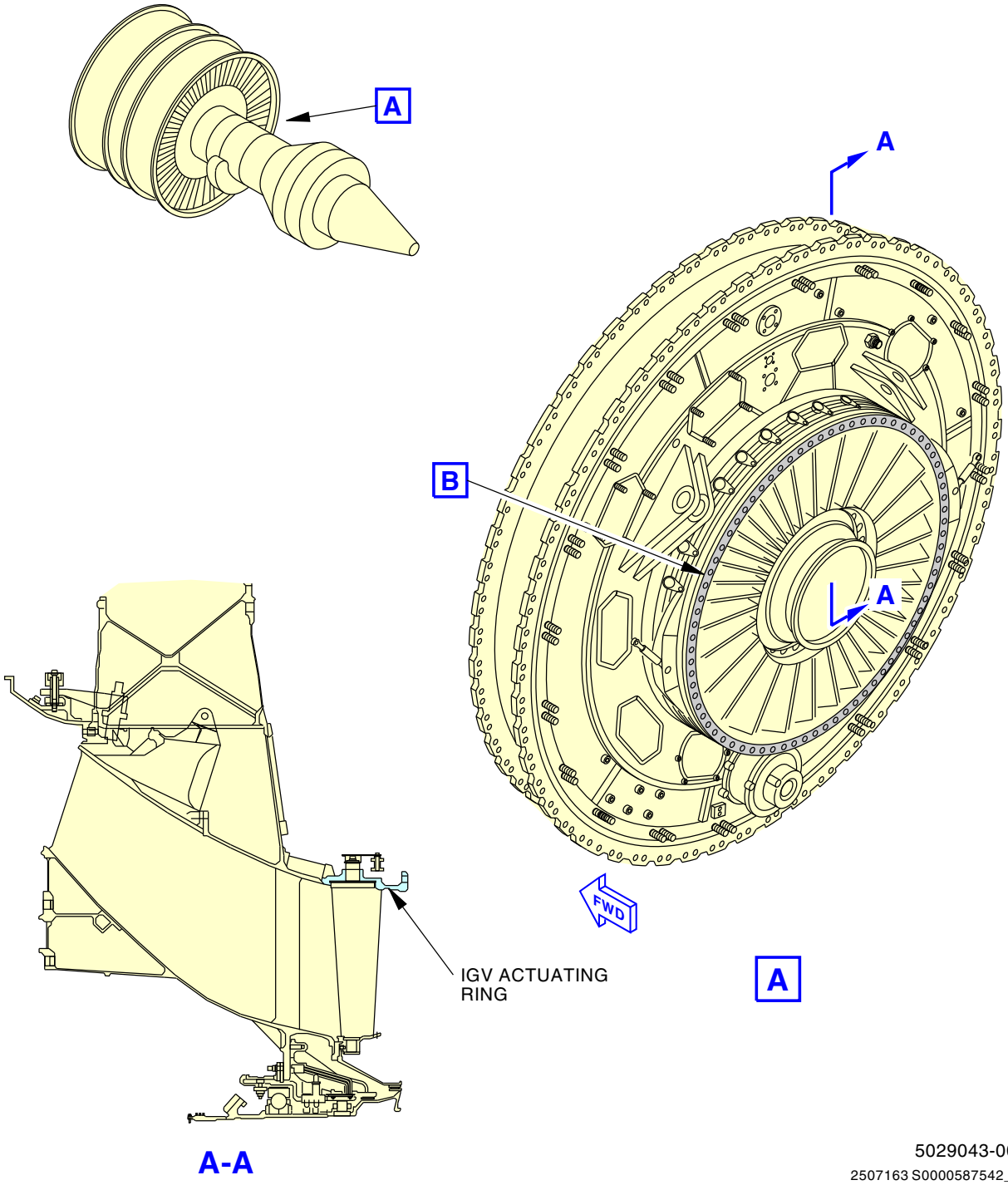
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine

(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.

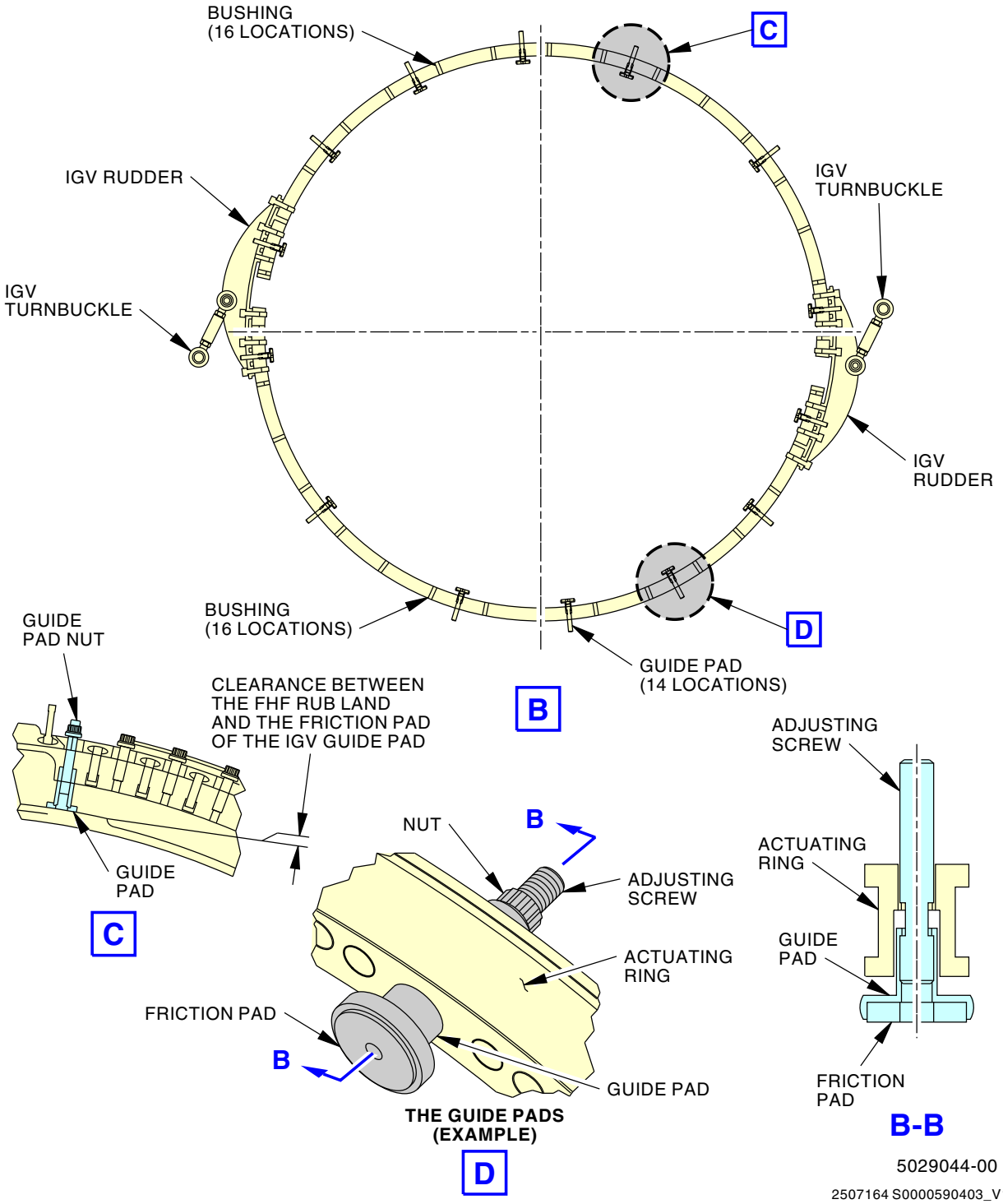
——— END OF TASK ———

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



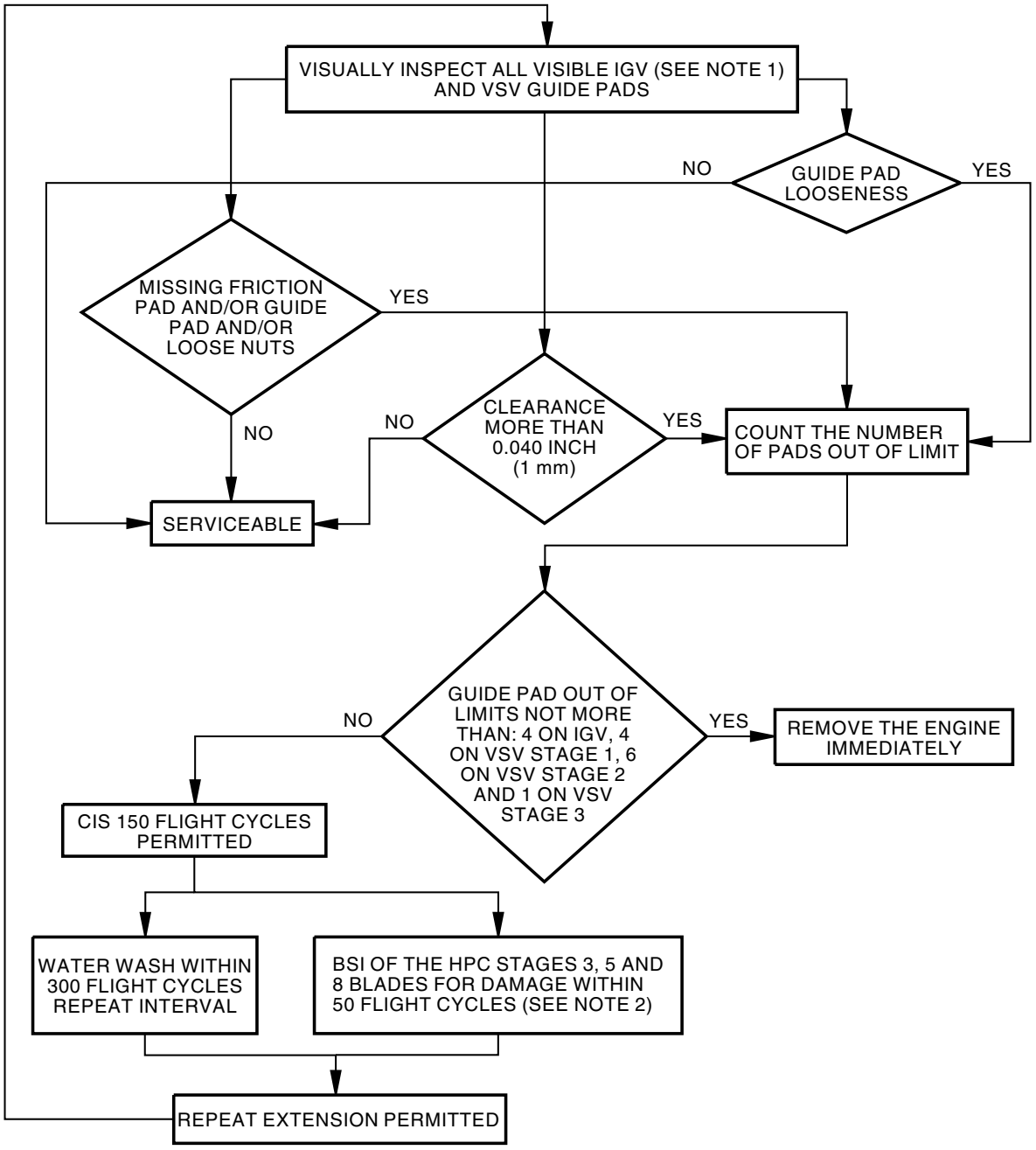
IGV actuating ring guide pads inspection
Figure 601/72-23-00-990-801-H00 (Sheet 1 of 3)

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



IGV actuating ring guide pads inspection
Figure 601/72-23-00-990-801-H00 (Sheet 2 of 3)

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



NOTE:

1. INSPECT THE VSV GUIDE PADS AND THE IGV GUIDE PADS AT THE SAME TIME. REFER TO TASK 72-30-00-200-801-H01.
2. BORESCOPE INSPECTION BSI OF THE HPC STAGES 3, 5 AND 8 BLADES FOR DAMAGE IS NOT NECESSARY WHEN YOU DO THE CONTINUE IN-SERVICE AGAIN.

5029045-00
2507165 S0000587544_V1

IGV actuating ring guide pads inspection
Figure 601/72-23-00-990-801-H00 (Sheet 3 of 3)

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

FAN HUB FRAME ASSEMBLY - REPAIRS

1. General

A. This procedure has one task:

(1) Fan Hub Frame (Forward Inner Cowl Support V-groove) Repair.

TASK 72-23-00-370-801-H01

2. Fan Hub Frame (Forward Inner Cowl Support V-groove) Repair

A. General

(1) This task is the wear coat repair procedure for the fan hub frame forward inner cowl support V-groove (referred to as forward inner cowl support V-groove).

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. Consumable Materials

Reference	Description	Specification
A01044 [C01-030]	Adhesive - Phenolic - Metcoseal AP	
B00130	Alcohol - Isopropyl	TT-I-735
B00674 [C01-031]	Thinner - Phenolic Sealer - Metroseal APT	
G00268	Brush - Soft Bristle, Paint	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Repair

SUBTASK 72-23-00-010-001-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. Fan Hub Frame (Forward Inner Cowl Support V-groove) Repair

SUBTASK 72-23-00-370-001-H01

(1) Clean the surface of the forward inner cowl support V-groove area to be repaired as follows:

> **WARNING** DO NOT GET CLEANING SOLUTION IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM CLEANING SOLUTION. PUT ON GOGGLES, AND GLOVES WHEN YOU USE CLEANING SOLUTION. CLEANING SOLUTION IS POISONOUS, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

> **WARNING** KEEP THE CLEANING SOLUTIONS AWAY FROM SPARKS, FLAMES, AND HEAT. CLEANING SOLUTIONS ARE FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL.

(a) Clean the forward inner cowl support V-groove surface with a brush, G00268 and alcohol, B00130 to remove all oil.

(b) Permit the surface to dry.

SUBTASK 72-23-00-370-002-H01

(2) Paint the area of the forward inner cowl support V-groove where the wear coat is missing:

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

(a) Mix equal parts of Metcoseal AP adhesive, A01044 [C01-030] and Metroseal APT thinner, B00674 [C01-031] together.

(b) Apply one layer of the adhesive mixture with a brush to the areas where the wear coat is missing from the forward inner cowl support V-groove.

(c) Permit the adhesive mixture to air dry for 30 minutes.

(d) Apply one more layer of adhesive over the areas of the forward inner cowl support V-groove where the mixture was previously applied.

(e) Permit the adhesive mixture to air dry for 30 minutes.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-23-00-410-003-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.

(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

FAN STATOR ASSEMBLY - INSPECTION/CHECK

1. General

A. This procedure contains these tasks:

(1) Fan Abradable Shroud Inspection

(2) Fan Stator Abradable Erosion Measurement Inspection

(3) Fan Case Inspection

(4) Fan Trench Filler Inspection

(5) Fan Outlet Guide Vane (OGV) Inspection

(6) Fan Stator Pneumatic Seal Inspection

(7) Fan Stator Case Outlet Guide Vane (OGV) Fairing Inspection.

TASK 72-24-00-200-802-H01

2. Fan Abradable Shroud Inspection

(Figure 601)

A. General

(1) This task gives the instructions on how to examine the fan abradable shroud.

(2) The stage one fan abradable shroud is on the inner side of the fan case radially out, adjacent to the fan blade tips.

B. References

Reference	Title
71-00-00-200-812-H01	Engine Birdstrike Inspection (P/B 601)
72-21-00-200-803-H01	Fan Blade (Scheduled Maintenance Requirement) Inspection (P/B 601)
72-24-01-200-801-H01	Fan Stator Case Forward Outer Acoustic Liner Inspection (P/B 601)
72-24-01-200-802-H01	Fan Stator Case Aft Outer Acoustic Liner Inspection (P/B 601)

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

D. Consumable Materials

Reference	Description	Specification
G02326 [C05-003]	Pen - Marking	
G02448 [C05-003]	Marker - Pens	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

F. Prepare for the Inspection

SUBTASK 72-24-00-865-001-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-480-002-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl.

G. Fan Abradable Shroud Inspection

SUBTASK 72-24-00-220-003-H01

(1) Examine the fan abradable shroud.

(a) Axial cracks at locations; 22.5 degrees, 67.5 degrees, 112.5 degrees, 157.5 degrees, 202.5 degrees, 247.5 degrees, 292.5 degrees, and 337.5 degrees.

NOTE: All locations are forward looking aft, from top.

1) Axial cracks are permitted to the full length of the abradable shroud.

(b) Shallow scratches, nicks and pits

1) There is no limit to the amount of shallow nicks, scratches and pits.

(c) Abradable shroud that is missing from the case.

1) Missing abradable shroud is permitted with these conditions.

a) The total area of the abradable shroud that is missing is not more than 500.0 square-inch (3225.0 square-cm).

b) The area of the abradable shroud where it is missing is not more than 200.0 square-inch (1290.0 square-cm).

(d) Fan abradable erosion

1) Fan abradable erosion is permitted in the area of the fan abradable that is swept by the fan blades.

NOTE: Erosion is usually found between the 10:00 o'clock and 2:00 o'clock positions.

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

a) Any amount of erosion is permitted within 2.00 inches (50.8 mm) of the yellow axial adhesive strips.

NOTE: There are eight axial adhesive strips, equally spaced that start at 12:00 o'clock.

NOTE: You can measure the erosion depth to calculate the Continue-In-Service (C-I-S) cycles (TASK 72-24-00-200-809-H00).

NOTE: If the abradable erosion is not in limits, refer to GE Repair Document No. 835-242-S3 or later version. This repair document gives the procedure to repair the abradable shroud.

2) Any amount of fan abradable erosion in the area aft of the trailing edge of the fan blade is permitted.

NOTE: Erosion in this area is usually caused by ice shedding.

SUBTASK 72-24-00-220-023-H01

(2) Examine the fan abradable shroud paint stripe for fan blade rub.

(a) Missing Paint

1) Missing paint is permitted with these conditions:

a) The total paint that is missing is not more than 65.0 square-inch (419.0 square-cm)

b) The area of paint where it is missing is not more than 3.5 square-inch (23.0 square-cm).

c) All areas of missing paint are separated by a minimum of 12.0 inches (304 mm).

(b) Evidence of fan blade rub

1) Paint stripe fan blade rub is not permitted.

a) Examine the fan blade tips for delamination if fan blade paint stripe rub is identified (TASK 72-21-00-200-803-H01).

b) Examine the forward outer and aft outer acoustic panels for damage (TASK 72-24-01-200-801-H01 and TASK 72-24-01-200-802-H01).

c) Examine the fan stator case outer fairing for damage (TASK 72-24-00-200-807-H01).

NOTE: Discoloration from water or carbon black stains are acceptable for service if the discoloration is not associated with any of the following: foreign material, loose material, linear indications of disbonds, non-filled regions or depressions due to lack of expansion, surface voids, dents, or scratches, and clean voids, dents, and scratches filled with fibrous abradable filler.

d) Examine the fan blades for birdstrike (TASK 71-00-00-200-812-H01).

NOTE: The birdstrike inspection is not necessary if there is no damage to the acoustic panel or OGV fairing.

e) Any amount of fan blade rub is repairable.

<1> Use a pen, G02326 [C05-003] or marker, G02448 [C05-003] to fill in the area where the paint is missing.

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

SUBTASK 72-24-00-080-002-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(3) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-24-00-865-002-H01

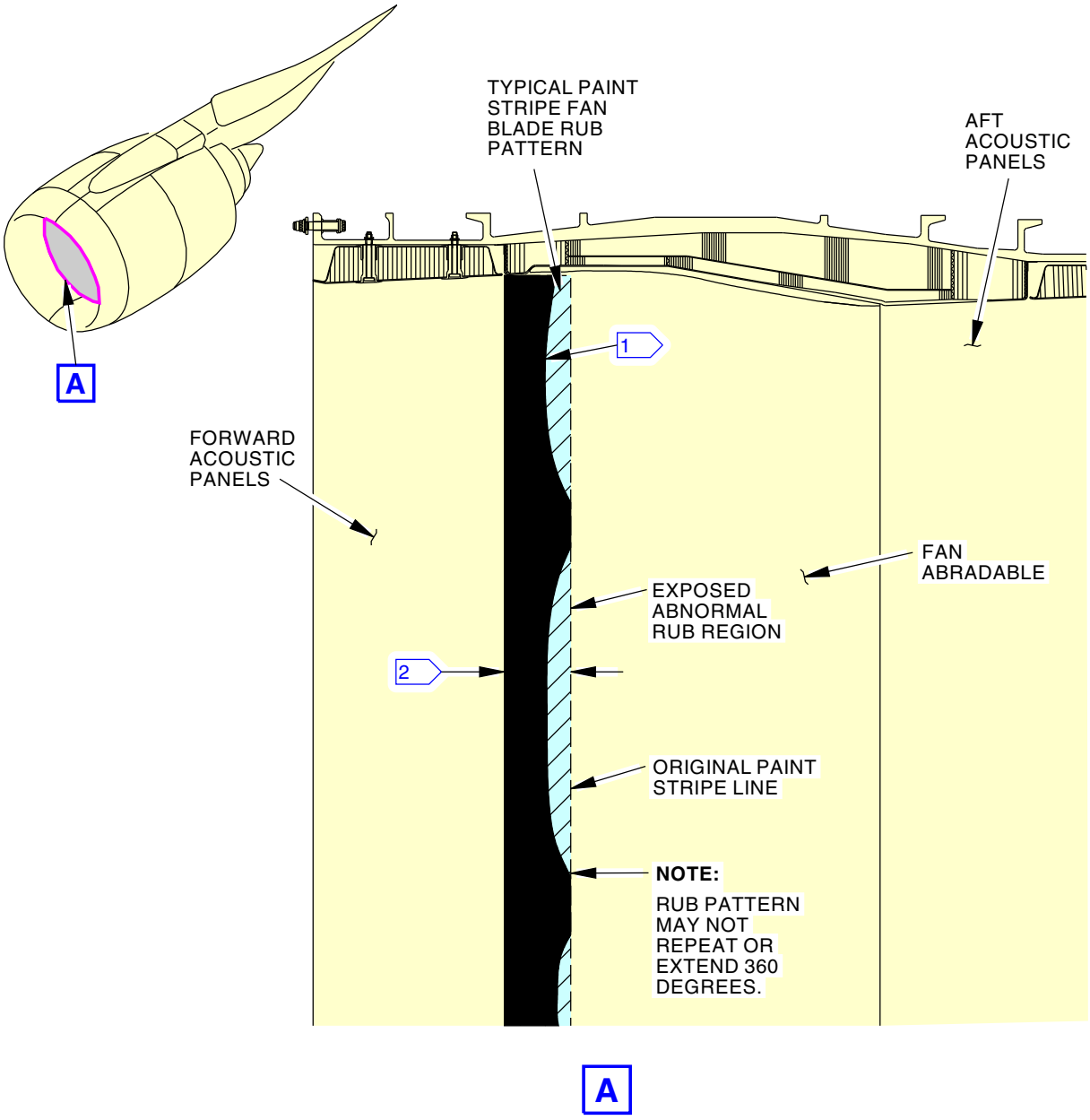
(4) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



NOTE:

THERE ARE TWO CONFIGURATIONS OF THE PAINT STRIPE (SEE SHEET 2).

1 THICKNESS 0.003-0.005 INCH (0.08-0.13 mm)
PAINT IS SURFACE APPLICATION OVER ABRADABLE MATERIAL.

2 3.57 INCH (90.7 mm) ABNORMAL RUB REGION DEFINED BY THE PAINT STRIPE.

1223455-00-A

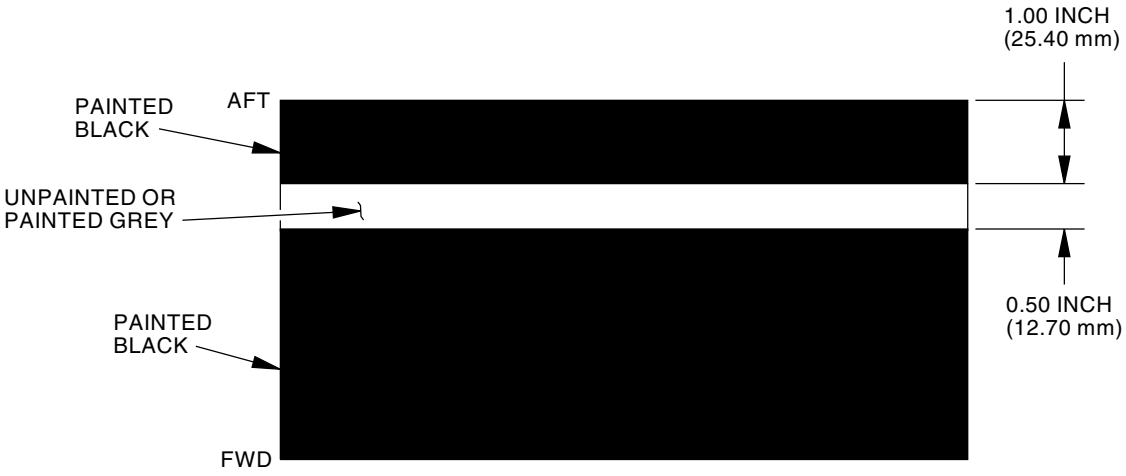
365595 S0000132900_V3

Fan Abradable Paint Stripe Inspection
Figure 601/72-24-00-990-808-H01 (Sheet 1 of 2)

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



**RUB STRIPE
CONFIGURATION 1**



**RUB STRIPE
CONFIGURATION 2**

NOTE:

THE RUB AREAS MISSING PAINT SHOULD BE REPAINTED WITH A CROSSHATCH PATTERN USING A BLACK PERMANENT MARKER.

1285304-00-A

1416984 S0000255650_V3

**Fan Abradable Paint Stripe Inspection
Figure 601/72-24-00-990-808-H01 (Sheet 2 of 2)**

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

TASK 72-24-00-200-809-H00

3. Fan Stator Abradable Erosion Measurement Inspection

(Figure 602, Figure 603, Figure 604, and Figure 605)

A. General

(1) This procedure gives the measurement method to find the effective erosion depth on the fan stator abradable shroud.

(a) This inspection is only applicable to the area of the fan abradable that is swept by the fan blades.

1) Typical erosion will occur on the top half of the stator from approximately 10:00 o'clock to 2:00 o'clock. This measurement can be used at any circumferential location on the abradable shroud that is swept by the fan blades where you find erosion.

2) This procedure gives steps to measure erosion depth on fan cases that have and have not had previous abradable repairs.

a) Fan cases that have had abradable repairs performed typically no longer have the correct axial adhesive strip dimension needed for measurement reference because of the adhesive strips that have been machined down.

b) On fan cases that have had abradable repairs, at least one fan blade needs to be removed to get access for a locally manufactured measurement tool.

c) On fan cases that have not had an abradable repair performed, it is possible to do the measurement with the fan blades installed.

B. 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

C. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

D. Prepare for the Inspection

SUBTASK 72-24-00-860-024-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

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

SUBTASK 72-24-00-480-004-H00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl.

E. Fan Stator Abradable Erosion Measurement Inspection

SUBTASK 72-24-00-200-009-H00

(1) Do these steps for the fan stator abradable erosion measurement inspection:

NOTE: Use this procedure only if the fan case has not had a previous abradable repair. All of the fan blades can be installed.

NOTE: If you see all of the yellow adhesive strips, the fan case has not been repaired before.

(a) Make a mark on 20 circumferential measurement locations with a temporary marker (Figure 603).

(b) For marking purposes, put tape on the forward side of any one fan blade tip.

1) Measure 18.6 in. (472.44 mm) axially rearward from the face of the forward flange of the fan case and make a mark of this point on the tape.

2) Measure 23.3 in. (591.82 mm) axially rearward from the face of the forward flange of the fan case and make a mark of this point on the tape.

(c) Measure and make a record of the tip clearance at the two axial reference locations. (Figure 603).

NOTE: You can use a six inch steel rule to make measurements as well as any other method that permits an accurate tip clearance measurement to the adhesive strip.

1) Move the marked blade to the adhesive strip nearest to the eroded area.

2) Measure and make a record of the drop dimensions from the blade tip at the previously marked positions on the fan blade to the adhesive strip.

(d) Measure and make a record of 40 erosion depths at the 20 circumferential measurement locations.

NOTE: You can use a six inch steel rule to make measurements as well as any method that permits good penetration into the eroded area.

1) Move the marked fan blade to the first measurement location.

2) Measure the drop dimensions from the blade tip at the two marked axial positions to the abradable surface. Move the blade to align each of the two measurement locations on the blade with the mark on the abradable before you take the measurement.

(e) Make a record of the erosion depth for each of the 40 locations (the difference in measurement values taken in steps (c) 2) and (d) 2) above).

(f) Calculate the effective erosion depth for both axial positions per SUBTASK 72–24–00–200–019–H00 and SUBTASK 72–24–00–200–020–H00.

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

SUBTASK 72-24-00-200-015-H00

(2) Do these steps if the fan case had an abradable repair before:

NOTE: The steps that follow can be used as an alternative procedure if the case has not been repaired before. One fan blade needs to be removed to permit access for the locally manufactured tool.

NOTE: If all of the yellow adhesive strips are not visible, this can be an indication of a repair that was done before. The strips can be hidden by repair abradable.

(a) Make the locally manufactured tool (Figure 602).

(b) Make a mark on 20 circumferential measurement locations with a temporary marker (Figure 603).

(c) Measure and make a record of erosion depths at each of the 20 marked locations.

NOTE: Pre SB 72–0622: Put the locally manufactured tool in position so that the forward datum is located at the leading edge of the trench filler (Figure 603).

NOTE: Post SB 72–0622: Put the locally manufactured tool in position so that the forward datum is located on the marks made 10.27 in. (260.86 mm) aft of the face of the fan case forward flange (Figure 603).

1) Measure and make a record of 40 drop dimensions from both the 8.3 in. (210.82 mm) and 13 in. (330.2 mm) marks on the locally manufactured tool to the abradable surface.

2) Subtract 2.29 in. (58.17 mm) from each drop taken at 8.3 in. (210.82 mm) and make a record of the result.

3) Subtract 1.41 in. (35.81 mm) from each drop taken at 13 in. (330.2 mm) and record the result.

4) Do steps (a) through (c) again for the remaining 19 locations.

(d) Calculate the effective erosion depth for both axial positions. Refer to SUBTASK 72–24–00–200–019–H00 and SUBTASK 72–24–00–200–020–H00.

SUBTASK 72-24-00-200-019-H00

(3) Calculate the effective erosion depth of the stator at the 8.3 in. axial location (Figure 604).

(a) Calculator the average value of six adjacent measurement locations.

1) Average = (D1+D2+D3+D4+D5+D6)/6.

(b) Calculate and record the 15 average values.

NOTE: There will be 15 groups of six adjacent measurement locations.

(c) The largest value of the 15 values you calculated in the above step is the effective erosion maximum depth for the stator at the forward location.

SUBTASK 72-24-00-200-020-H00

(4) Calculate the effective erosion depth of the stator at the 13 in. axial location (Figure 604).

(a) Calculate the average value of six adjacent measurement locations.

1) Average = (D1+D2+D3+D4+D5+D6)/6.

(b) Calculate and record the 15 average values.

NOTE: There will be 15 groups of six adjacent measurement locations

(c) The largest value of the 15 values you calculated in the above step is the effective erosion maximum depth for the stator at the aft location.

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

SUBTASK 72-24-00-200-021-H00

(5) Find the estimated number of Continue-in-Service (C-I-S) cycles of the fan abradable before abradable repair is necessary.

(a) Use the forward and aft maximum erosion depths calculated in the previous steps and utilize tables in Figure 605 to find the estimated permitted Continue-In-Service cycles.

(b) Erosion measurements can be done again and again to establish new C-I-S estimates.

F. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-00-020-005-H00

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-24-00-860-025-H00

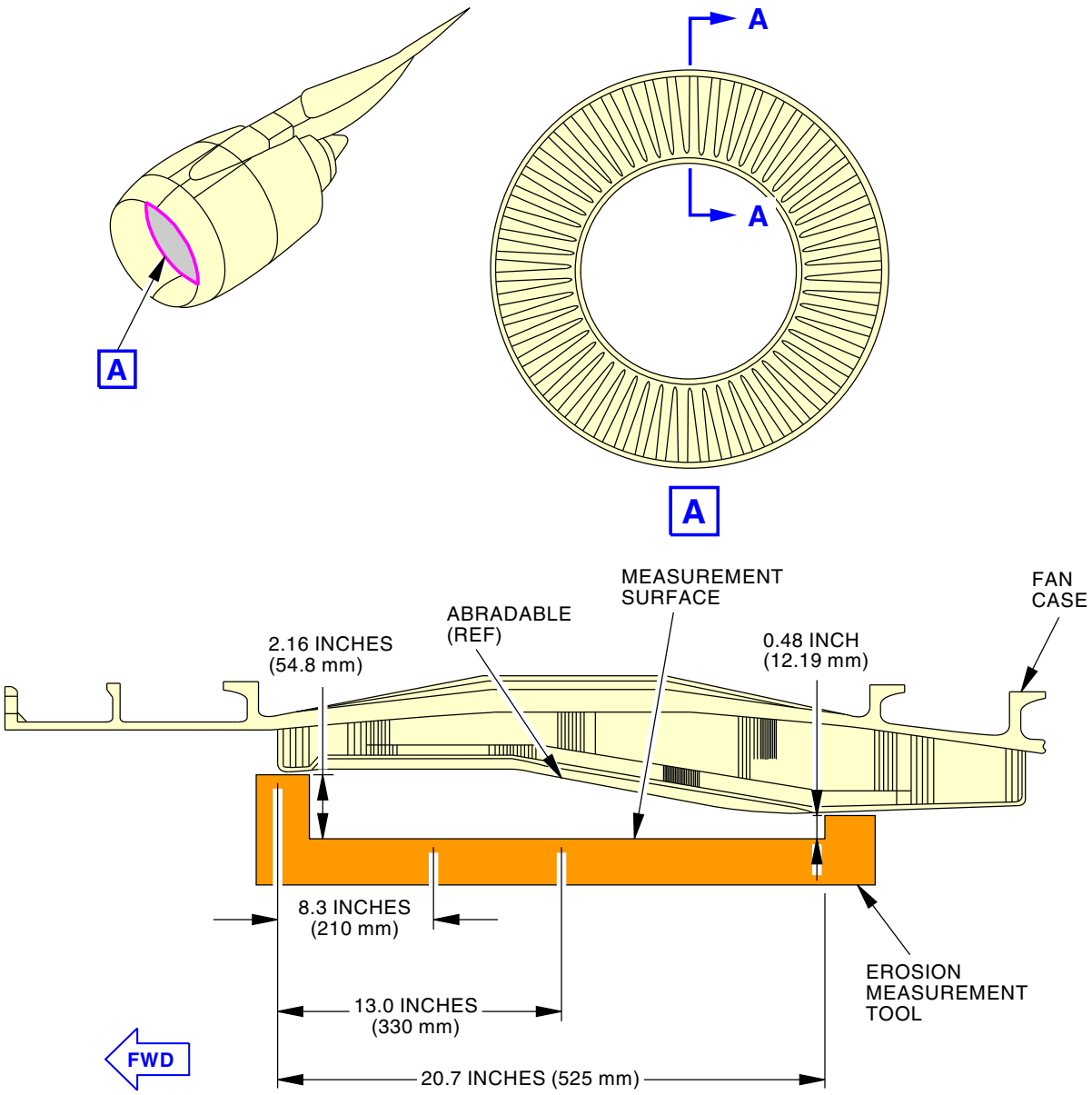
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



LOCALLY MANUFACTURED TOOL

A-A

MATERIAL:

ALUMINUM SHEET, APPROXIMATELY 0.08-0.15 INCH (2.03-3.81 mm) THICK.

NOTE:

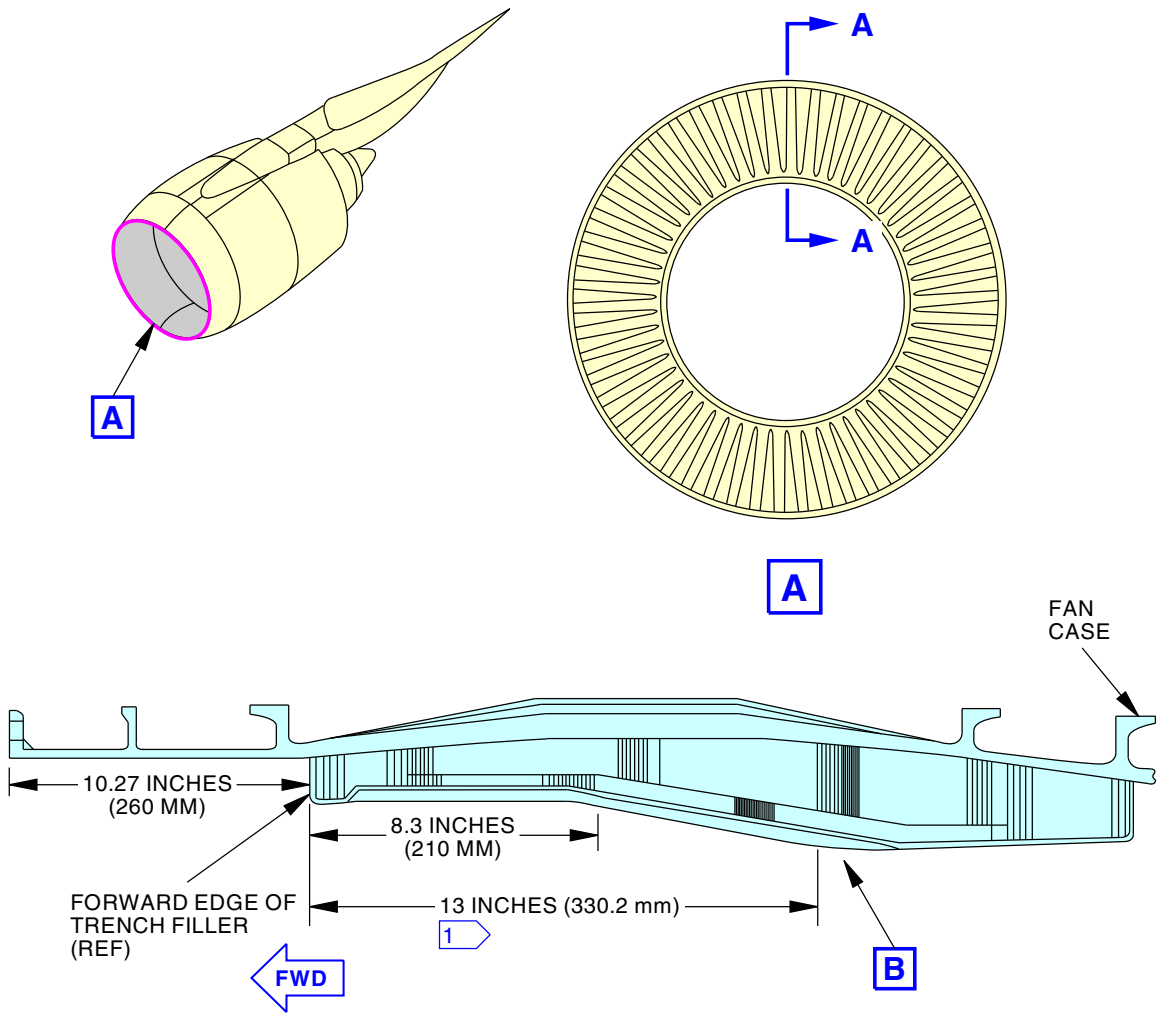
MAKE TOOL TO THE SPECIFIC DIMENSIONS SHOWN. MARK TOOL IN THE THREE LOCATIONS INDICATED TO GIVE MEASUREMENT POINTS.

1350719-00

2077213 S0000436023_V6

Erosion Measurement Tool
Figure 602/72-24-00-990-814-H00

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



DEPTH MEASUREMENTS-AXIAL POSITION

A-A

NOTE:

PRE SB 72-0622: PUT THE LOCALLY MANUFACTURED TOOL IN POSITION SO THAT THE FORWARD DATUM IS LOCATED AT THE LEADING EDGE OF THE TRENCH FILLER.

POST SB 72-0622: FOR EACH OF 20 CIRCUMFERENTIAL MEASUREMENT LOCATIONS, MAKE A MARK ON TRENCH FILLER 10.27 INCHES (260.86 mm) AFT OF THE FACE OF THE FAN CASE FORWARD FLANGE. PUT THE LOCALLY MANUFACTURED TOOL IN POSITION SO THAT THE FORWARD DATUM IS LOCATED ON THESE MARKS FOR EACH MEASUREMENT.

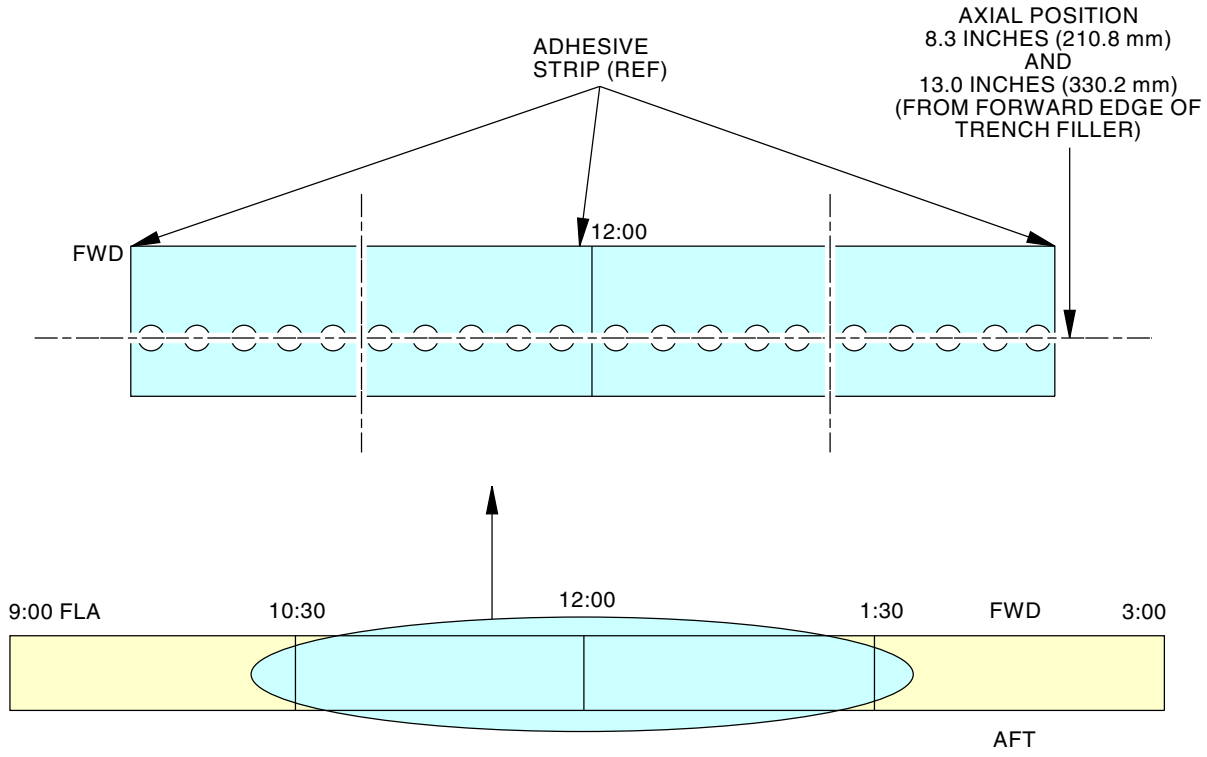
1 MEASUREMENTS MUST BE TAKEN AT THE 8.3 INCHES (210.8 mm) AND 13 INCHES (330.2 mm) AXIAL LOCATIONS.

1350731-00

2077222 S0000436045_V4

Erosion Measurement Locations Inspection
Figure 603/72-24-00-990-815-H00 (Sheet 1 of 3)

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



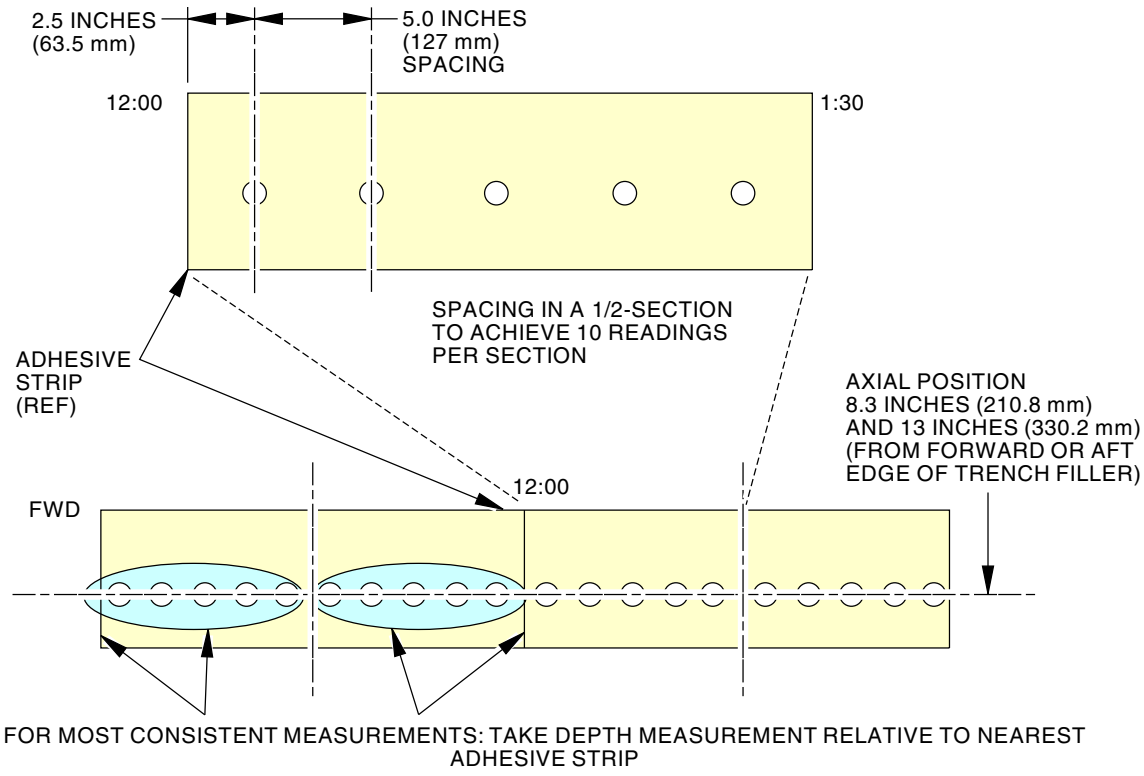
MAX EROSION CONFINED TO TOP TWO ABRADABLE SECTIONS

B-B

1350732-00
2077468 S0000436050_V4

Erosion Measurement Locations Inspection
Figure 603/72-24-00-990-815-H00 (Sheet 2 of 3)

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

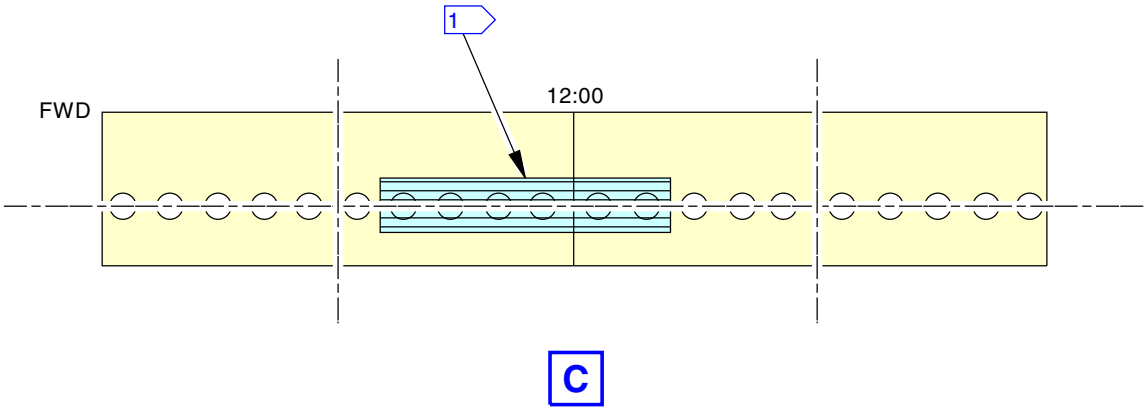


B-B

1350733-00
2077485 S0000436063_V4

Erosion Measurement Locations Inspection
Figure 603/72-24-00-990-815-H00 (Sheet 3 of 3)

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



1 EXAMPLE GROUP OF SIX LOCATIONS: CALCULATE THE AVERAGE VALUE OF ADJACENT MEASUREMENT LOCATIONS FOR THE 15 GROUPS OF SIX.

1350736-00
2077532 S0000436085_V2

Erosion Depth (Average of Six Locations) Calculation
Figure 604/72-24-00-990-817-H00

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

ALLOWABLE CIS CYCLES

MEASURED LE EROSION DEPTH (IN.)

MEASURED TE EROSION DEPTH (IN.)

	0.025	0.030	0.035	0.040	0.045	0.050	0.055	0.060	0.065	0.070	0.075	0.080	0.085	0.090	0.095	0.100	0.105	0.110	0.115	0.120	0.125	0.130	0.135
0.126	3,863	3,863	3,863	3,425	3,150	2,678	2,291	1,969	1,696	1,463	1,260	1,083	926	788	663	551	450	358	274	197	126	61	0
0.130	3,813	3,813	3,813	3,453	3,250	2,763	2,364	2,031	1,750	1,509	1,300	1,117	956	813	684	569	464	369	283	203	130	63	0
0.135	3,750	3,750	3,750	3,586	3,313	2,869	2,455	2,109	1,817	1,567	1,350	1,160	993	844	711	591	482	384	293	211	135	65	0
0.140	3,850	3,688	3,688	3,688	3,250	2,975	2,545	2,188	1,885	1,625	1,400	1,203	1,029	875	737	613	500	398	304	219	140	67	0
0.145	3,988	3,625	3,625	3,625	3,222	3,081	2,636	2,266	1,952	1,683	1,450	1,246	1,066	906	763	634	518	412	315	227	145	70	0
0.150	3,938	3,563	3,563	3,563	3,333	3,125	2,727	2,344	2,019	1,741	1,500	1,289	1,103	938	789	656	536	426	326	234	150	72	0
0.155	3,875	3,500	3,500	3,500	3,444	3,063	2,818	2,422	2,087	1,799	1,550	1,332	1,140	969	816	678	554	440	337	242	155	75	0
0.160	3,813	3,438	3,438	3,438	3,438	3,000	2,909	2,500	2,154	1,857	1,600	1,375	1,176	1,000	842	700	571	455	348	250	160	77	0
0.165	3,750	3,438	3,375	3,375	3,375	3,094	2,938	2,578	2,221	1,915	1,650	1,418	1,213	1,031	868	722	589	469	359	258	165	79	0
0.170	3,688	3,542	3,313	3,313	3,313	3,188	2,875	2,656	2,288	1,973	1,700	1,461	1,250	1,063	895	744	607	483	370	266	170	82	0
0.175	3,625	3,625	3,250	3,250	3,250	3,250	2,813	2,734	2,356	2,031	1,750	1,504	1,287	1,094	921	766	625	497	380	273	175	84	0
0.180	3,563	3,563	3,188	3,188	3,188	3,188	2,864	2,750	2,423	2,089	1,800	1,547	1,324	1,125	947	788	643	511	391	281	180	87	0
0.185	3,500	3,500	3,125	3,125	3,125	3,125	2,943	2,688	2,490	2,147	1,850	1,590	1,360	1,156	974	809	661	526	402	289	185	89	0
0.190	3,438	3,438	3,063	3,063	3,063	3,063	3,023	2,625	2,558	2,205	1,900	1,633	1,397	1,188	1,000	831	679	540	413	297	190	91	0
0.195	3,375	3,375	3,134	3,000	3,000	3,000	3,000	2,641	2,563	2,263	1,950	1,676	1,434	1,219	1,026	853	696	554	424	305	195	94	0
0.200	3,313	3,313	3,214	2,938	2,938	2,938	2,938	2,708	2,500	2,321	2,000	1,719	1,471	1,250	1,053	875	714	568	435	313	200	96	0
0.205	3,250	3,250	3,250	2,875	2,875	2,875	2,875	2,776	2,438	2,379	2,050	1,762	1,507	1,281	1,079	897	732	582	446	320	205	99	0
0.210	3,188	3,188	3,188	2,813	2,813	2,813	2,813	2,813	2,423	2,375	2,100	1,805	1,544	1,313	1,105	919	750	597	457	328	210	101	0
0.215	3,125	3,125	3,125	2,750	2,750	2,750	2,750	2,750	2,481	2,313	2,150	1,848	1,581	1,344	1,132	941	768	611	467	336	215	103	0
0.220	3,063	3,063	3,063	2,750	2,688	2,688	2,688	2,688	2,538	2,250	2,200	1,891	1,618	1,375	1.158	963	786	625	478	344	220	106	0
0.225	3,000	3,000	3,000	2,813	2,625	2,625	2,625	2,625	2,596	2,210	2,188	1,934	1,654	1,406	1,184	984	804	639	489	352	225	108	0
0.230	2,938	2,938	2,938	2,875	2,563	2,563	2,563	2,563	2,563	2,259	2,125	1,977	1,691	1,438	1,211	1,006	821	653	500	359	230	111	0
0.235	2,875	2,875	2,875	2,875	2,500	2,500	2,500	2,500	2,500	2,308	2,063	2,020	1,728	1,469	1,237	1,028	839	668	511	367	235	113	0
0.240	2,813	2,813	2,813	2,813	2,438	2,438	2,438	2,438	2,438	2,357	2,000	2,000	1,765	1,500	1,263	1,050	857	682	522	375	240	115	0
0.245	2,750	2,750	2,750	2,750	2,382	2,375	2,375	2,375	2,375	2,375	2,042	1,938	1,801	1,531	1,289	1,072	875	696	533	383	245	118	0
0.250	2,688	2,688	2,688	2,688	2,431	2,313	2,313	2,313	2,313	2,313	2,083	1,875	1,838	1,563	1,316	1,094	893	710	543	391	250	120	0
0.255	2,625	2,625	2,625	2,625	2,479	2,250	2,250	2,250	2,250	2,250	2,125	1,813	1,813	1,594	1,342	1,116	911	724	554	398	255	123	0
0.260	2,563	2,563	2,563	2,563	2,528	2,188	2,188	2,188	2,188	2,188	2,167	1,828	1,750	1,625	1,368	1,138	929	739	565	406	260	125	0
0.265	2,500	2,500	2,500	2,500	2,500	2,125	2,125	2,125	2,125	2,125	2,125	1,863	1,688	1,656	1,395	1,159	946	753	576	414	265	127	0
0.270	2,438	2,438	2,438	2,438	2,438	2,063	2,063	2,063	2,063	2,063	2,063	1,898	1,625	1,625	1,421	1,181	964	767	587	422	270	130	0
0.275	2,375	2,375	2,375	2,375	2,375	2,063	2,000	2,000	2,000	2,000	2,000	1,934	1,618	1,563	1,447	1,203	982	781	598	430	275	132	0
0.280	2,313	2,313	2,313	2,313	2,313	2,100	1,938	1,938	1,938	1,938	1,938	1,938	1,647	1,500	1,474	1,225	1,000	795	609	438	280	135	0
0.285	2,250	2,250	2,250	2,250	2,250	2,138	1,875	1,875	1,875	1,875	1,875	1,875	1,676	1,438	1,438	1,247	1,018	810	620	445	285	137	0
0.290	2,188	2,188	2,188	2,188	2,188	2,175	1,813	1,813	1,813	1,813	1,813	1,813	1,706	1,410	1,375	1,269	1,036	824	630	453	290	139	0
0.295	2,125	2,125	2,125	2,125	2,125	2,125	1,750	1,750	1,750	1,750	1,750	1,750	1,735	1,434	1,313	1,291	1,054	838	641	461	295	142	0

	MAX LIMITS		
	CASE 1	CASE 2	CASE 3
MAX LE EROSION LIMIT	0.080	0.125	0.135
MAX TE EROSION LIMIT	0.465	0.435	0.400

2408613 S0000557753_V2

Erosion Depth Measurements (Max LE and TE Limits)
Figure 605/72-24-00-990-819-H00 (Sheet 1 of 2)

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

MEASURED TE EROSION DEPTH (IN.)	ALLOWABLE CIS CYCLES	MEASURED LE EROSION DEPTH (IN.)																						
		0.025	0.030	0.035	0.040	0.045	0.050	0.055	0.060	0.065	0.070	0.075	0.080	0.085	0.090	0.095	0.100	0.105	0.110	0.115	0.120	0.125	0.130	0.135
0.300	2,063	2,063	2,063	2,063	2,063	2,063	1,705	1,688	1,688	1,688	1,688	1,688	1,688	1,458	1,250	1,250	1,071	852	652	469	300	144	0
0.305	2,000	2,000	2,000	2,000	2,000	2,000	1,733	1,625	1,625	1,625	1,625	1,625	1,625	1,483	1,204	1,188	1,089	866	663	477	305	147	0
0.310	1,938	1,938	1,938	1,938	1,938	1,938	1,761	1,563	1,563	1,563	1,563	1,563	1,563	1,507	1,224	1,125	1,107	881	674	484	310	149	0
0.315	1,875	1,875	1,875	1,875	1,875	1,875	1,790	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,243	1,063	1,063	895	685	492	315	151	0
0.320	1,813	1,813	1,813	1,813	1,813	1,813	1,813	1,438	1,438	1,438	1,438	1,438	1,438	1,438	1,263	1,000	1,000	909	696	500	320	154	0
0.325	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,283	1,016	938	923	707	508	325	156	0
0.330	1,688	1,688	1,688	1,688	1,688	1,688	1,688	1,375	1,313	1,313	1,313	1,313	1,313	1,313	1,303	1,031	875	875	717	516	330	159	0
0.335	1,625	1,625	1,625	1,625	1,625	1,625	1,625	1,396	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,047	813	813	728	523	335	161	0
0.340	1,563	1,563	1,563	1,563	1,563	1,563	1,563	1,417	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,063	810	750	739	531	340	163	0
0.345	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,438	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,078	821	688	688	539	345	166	0
0.350	1,438	1,438	1,438	1,438	1,438	1,438	1,438	1,438	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	833	625	625	547	350	168	0
0.355	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,375	1,024	1,000	1,000	1,000	1,000	1,000	1,000	1,000	845	605	563	555	355	171	0
0.360	1,313	1,313	1,313	1,313	1,313	1,313	1,313	1,313	1,313	1,038	938	938	938	938	938	938	938	857	614	500	500	360	173	0
0.365	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,053	875	875	875	875	875	875	875	869	622	438	438	365	175	0
0.370	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,188	1,067	813	813	813	813	813	813	813	813	631	402	375	370	178	0
0.375	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,082	750	750	750	750	750	750	750	750	639	408	313	313	180	0
0.380	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	688	688	688	688	688	688	688	688	648	413	250	250	183	0
0.385	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	688	625	625	625	625	625	625	625	625	418	201	188	185	0
0.390	938	938	938	938	938	938	938	938	938	696	563	563	563	563	563	563	563	563	563	424	203	125	125	0
0.395	875	875	875	875	875	875	875	875	875	705	500	500	500	500	500	500	500	500	500	429	206	63	63	0
0.400	813	813	813	813	813	813	813	813	813	714	438	438	438	438	438	438	438	438	438	435	208	0	0	0
0.405	750	750	750	750	750	750	750	750	750	723	375	375	375	375	375	375	375	375	375	375	211	0	0	0
0.410	688	688	688	688	688	688	688	688	688	688	342	313	313	313	313	313	313	313	313	313	214	0	0	0
0.415	625	625	625	625	625	625	625	625	625	625	346	250	250	250	250	250	250	250	250	250	216	0	0	0
0.420	563	563	563	563	563	563	563	563	563	563	350	187	187	187	187	187	187	187	187	187	187	0	0	0
0.425	500	500	500	500	500	500	500	500	500	500	354	125	125	125	125	125	125	125	125	125	125	0	0	0
0.430	438	438	438	438	438	438	438	438	438	438	358	62	62	62	62	62	62	62	62	62	62	0	0	0
0.435	375	375	375	375	375	375	375	375	375	375	362	0	0	0	0	0	0	0	0	0	0	0	0	0
0.440	313	313	313	313	313	313	313	313	313	313	313	0	0	0	0	0	0	0	0	0	0	0	0	0
0.445	250	250	250	250	250	250	250	250	250	250	250	0	0	0	0	0	0	0	0	0	0	0	0	0
0.450	188	188	188	188	188	188	188	188	188	188	188	0	0	0	0	0	0	0	0	0	0	0	0	0
0.455	125	125	125	125	125	125	125	125	125	125	125	0	0	0	0	0	0	0	0	0	0	0	0	0
0.460	63	63	63	63	63	63	63	63	63	63	63	0	0	0	0	0	0	0	0	0	0	0	0	0
0.465	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	MAX LIMITS		
	CASE 1	CASE 2	CASE 3
MAX LE EROSION LIMIT	0.080	0.125	0.135
MAX TE EROSION LIMIT	0.465	0.435	0.400

2408682 S0000557752_V2

Erosion Depth Measurements (Max LE and TE Limits)
Figure 605/72-24-00-990-819-H00 (Sheet 2 of 2)

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

TASK 72-24-00-200-803-H01

4. Fan Case Inspection

A. General

(1) This task provides the instructions on how to examine the fan case.

B. References

Reference	Title
70-11-06-230-801-H01	Fluorescent Penetrant Inspection (P/B 201)
70-43-07-900-801-H01	Chemical Touch Up for Aluminum (P/B 201)
70-43-24-110-802-H01	Swab Etching Procedure (P/B 201)
70-43-42-300-801-H01	Blending Procedures (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)
72-24-00-400-801-H01	Fan Case Outer Acoustic Liner Captive Nut of a Captive Nut Assembly Replacement (P/B 801)
72-24-00-400-802-H01	Fan Case Outer Acoustic Liner Captive Nut Assembly Replacement (P/B 801)

C. Consumable Materials

Reference	Description	Specification
C00259	Coating - Chemical And Solvent Resistant Finish, Corrosion Inhibiting Primer	BMS10-11 Type I
C00943 [C03-006]	Coating - Chemical Conversion - Bonderite M-CR 1200S Aero (Formerly Alodine 1200S)	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 72-24-00-010-002-H01

(1) 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

G. Fan Case Inspection

SUBTASK 72-24-00-220-004-H01

(1) Examine the forward fan case for damage.

(a) Cracks

1) Cracks are not permitted.

(b) Nicks and scratches

1) There is no limit to the amount with these conditions:

a) They are less than 0.10 inch (2.54 mm) in depth after the high metal is removed.

b) There must be a minimum separation of 1.0 inch (25.4 mm) between dents.

(c) Dents

1) There is no limit to the amount if they are smooth and less than 0.2 inch (5.0 mm) in depth.

(d) Rivets or nuts that are missing.

1) Replace the rivet or nut that is missing.

(e) Nuts that are loose.

1) Tighten the loose nut.

(f) Rivets that are loose.

1) Replace the loose rivet.

(g) Captive nut assemblies that are damaged.

1) Rivets that are loose or missing.

a) Do this task: Fan Case Outer Acoustic Liner Captive Nut Assembly Replacement, TASK 72-24-00-400-802-H01.

2) Captive nuts with less than 10 pound-inches (1.1 Newton-meters) of running torque

a) Do this task: Fan Case Outer Acoustic Liner Captive Nut of a Captive Nut Assembly Replacement, TASK 72-24-00-400-801-H01.

3) Captive nut cages that are damaged or missing.

a) Do this task: Fan Case Outer Acoustic Liner Captive Nut Assembly Replacement, TASK 72-24-00-400-802-H01.

(h) Areas of outer fan case damage around captive screw holes

1) Areas of outer fan case damage around captive screw holes are permitted if they are in all of these conditions.

a) The fan case wall thickness in the damage area is not less than 0.08 inch (2.03 mm).

b) The smallest diameter that fully covers the damaged area is not more than 1.0 inch (25.4 mm).

c) No more than two captive screws in an outer acoustic liner go through areas of outer fan case damage.

d) You can tighten each captive screw that goes through the outer fan case damage to 115-125 pound-inches (13.0-14.1 Newton-meters) with no captive nut thread damage.

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

2) If you find a captive screw hole with outer fan case damage that is not in all of the above conditions, refer to Continue-In-Service (C-I-S) limit.

3) The C-I-S limit for outer fan case damage around a captive screw hole is 50 cycles with this condition.

a) You must tighten the captive screw to 115-125 pound-inches (13.0-14.1 Newton-meters) with no captive nut thread damage.

SUBTASK 72-24-00-220-025-H01

(2) If you see the characteristics that follow on the forward fan case, do an inspection for damage:

(a) Elongation of bolt holes CD (Refer to Figure 606).

Any amount if the maximum diameter is less than 0.54 inch. Do the steps that follow:

1) Blend elongated bolt hole to smooth contour. Refer to task: (Blending Procedures, TASK 70-43-42-300-801-H01). Use a minimum blend radius 0.175 inch.

2) At the blended locations do these tasks:

a) Etch the blended area. Refer to task: TASK 70-43-24-110-802-H01. Use Class F etchant.

b) Do a Fluorescent Penetrant Inspection, TASK 70-11-06-230-801-H01. Use Class D penetrant.

3) At the blended locations, apply Bonderite M-CR 1200S Aero coating, C00943 [C03-006] to bare aluminum surfaces. Refer to task: (Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01).

4) At the blended locations, apply primer, C00259. Refer to manufacturer supplied instructions.

(b) Fretting/wear to aft faces related to bolt holes CD (Refer to Figure 606).

NOTE: Remove only the smallest quantity of parent material necessary to remove damage.

1) Blend to remove fretting/wear. Refer to task: (Blending Procedures, TASK 70-43-42-300-801-H01). Make sure the dimensions below are maintained after you blend:

a) Minimum flange thickness is 0.420 in. (10.67 mm).

b) Minimum of 0.250 in. (6.35 mm) transition radius at the edges.

c) Flange thickness variation is not more than 0.005 in. (0.13 mm) to make sure the spacer sits flush and the bolt is perpendicular to the flange faces after installation.

2) At the blended locations do these tasks:

a) Etch the blended area. Refer to task: TASK 70-43-24-110-802-H01. Use Class F etchant.

b) Do a Fluorescent Penetrant Inspection, TASK 70-11-06-230-801-H01. Use Class D penetrant.

3) At the blended locations, apply Bonderite M-CR 1200S Aero coating, C00943 [C03-006] to bare aluminum surfaces. Refer to task: (Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01).

4) At the blended locations, apply primer, C00259. Refer to manufacturer supplied instructions.

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

SUBTASK 72-24-00-220-005-H01

(3) Examine the aft fan case.

(a) Cracks in the circumferential plane of the OGV

1) No cracks are permitted in the circumferential plane of the OGV.

(b) Cracks in all other areas

1) It is permitted to have a crack in 1 out of 10 forward flange bolt holes if the crack is less than 0.25 inch (6.40 mm) in length.

2) It is permitted to have 1 crack that goes through the flange and into the case skin if.

a) The crack is no greater than 3.0 inch (76.2 mm) in length.

3) It is permitted to have a crack in 1 out of 5 lightening holes if the crack is less than 0.25 inch (6.40 mm) in length.

(c) Dents

1) Dents are permitted with these conditions:

a) They have a smooth contour.

b) They are less than 0.19 inch (4.83 mm) in depth.

c) There must be a minimum separation of 4.0 inch (102.0 mm) between dents.

(d) Nicks, scratches, and gouges

1) Nicks, scratches, and gouges are permitted if:

a) They are less than 0.03 inch (0.80 mm) in depth after the high metal is removed.

b) There must be a minimum separation of 1.0 inch (25.0 mm) between dents.

(e) Rivets or nuts that are missing.

1) Replace the missing rivets or nuts.

(f) Nuts that are loose.

1) Tighten the loose nuts.

(g) Rivets that are loose.

1) Replace the loose rivets.

(h) Captive nut assemblies that are damaged.

1) Rivets that are loose or missing

a) Do this task: Fan Case Outer Acoustic Liner Captive Nut Assembly Replacement, TASK 72-24-00-400-802-H01.

2) Captive nuts with less than 10 pound-inches (1.1 Newton-meters) of running torque

a) Do this task: Fan Case Outer Acoustic Liner Captive Nut of a Captive Nut Assembly Replacement, TASK 72-24-00-400-801-H01.

3) Captive nut cages that are damaged or missing

a) Do this task: Fan Case Outer Acoustic Liner Captive Nut Assembly Replacement, TASK 72-24-00-400-802-H01.

(i) Areas of outer fan case damage around captive screw holes

1) Areas of outer fan case damage around captive screw holes are permitted if they are in all of these conditions:

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

a) The fan case wall thickness in the damage area is not less than 0.090 inch (2.290 mm).

b) The smallest diameter that fully covers the damaged area is not more than 0.50 inch (12.70 mm).

c) No more than two captive screws in an outer acoustic liner go through areas of outer fan case damage.

d) You can tighten each captive screw that goes through the outer fan case damage to 115-125 pound-inches (13.0-14.1 Newton-meters) with no captive nut thread damage.

2) If you find a captive screw hole with outer fan case damage that is not in all of the above conditions, refer to Continue-In-Service (C-I-S) limit.

3) The C-I-S limit for outer fan case damage around a captive screw hole is 50 cycles with this condition.

a) You must tighten the captive screw to 115-125 pound-inches (13.0-14.1 Newton-meters) with no captive nut thread damage.

(j) Corrosion or discoloration

1) Permitted if there is no scale or pits.

(k) Paint that is missing.

1) There is no limit to the amount of missing paint.

SUBTASK 72-24-00-220-024-H01

(4) Examine the fan case aft lip for damage:

(a) Wear on the seal retainer on the aft lip of the fan case.

1) Wear is less than 0.065 inch (1.65 mm) in depth after high metal is removed.

2) Do the task: Blend high metal (TASK 70-43-42-300-801-H01).

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-00-410-001-H01

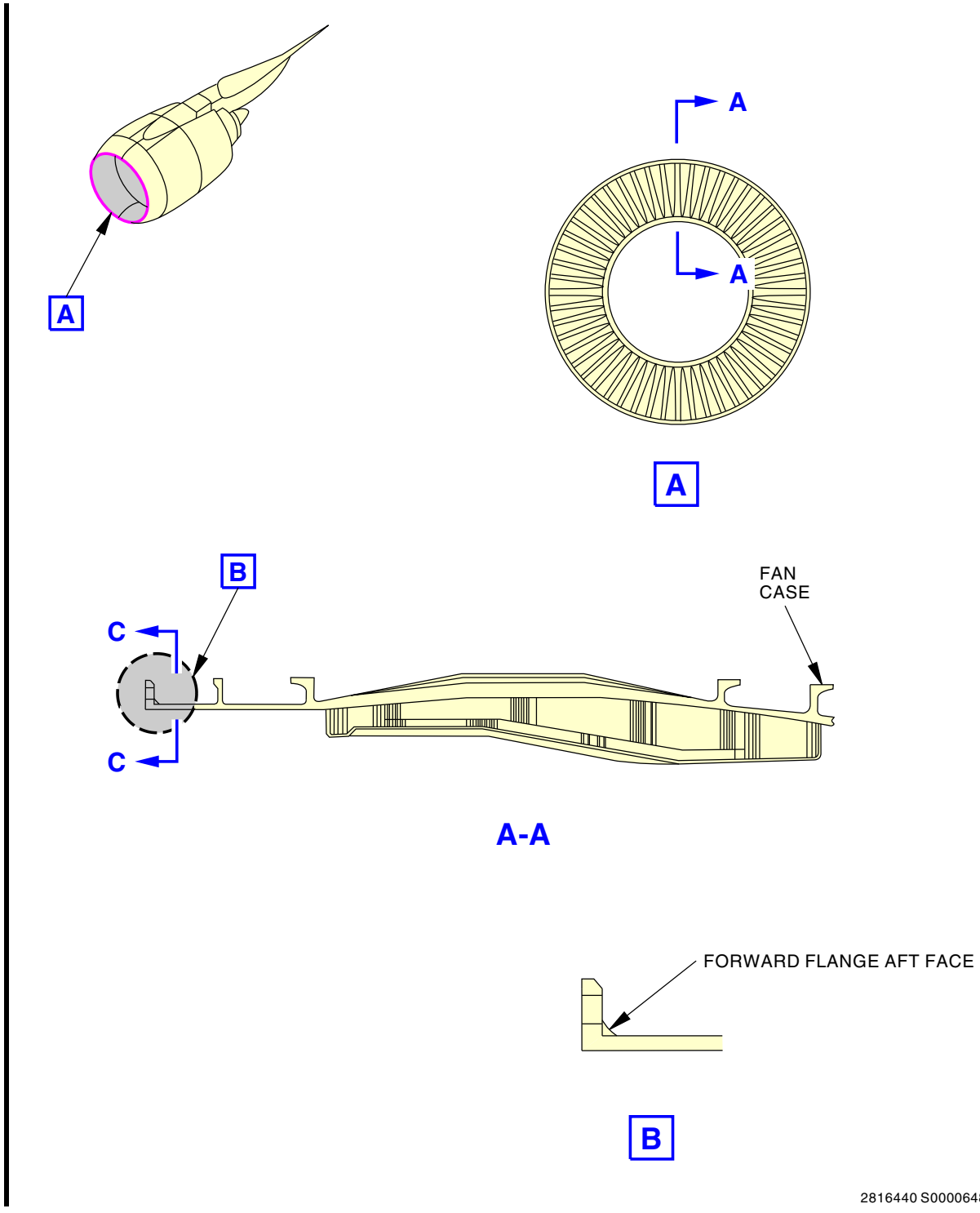
(1) Do this task: Close the Fan Cowl Panel (Selection), TASK 71-11-04-410-814-H00.

(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

END OF TASK

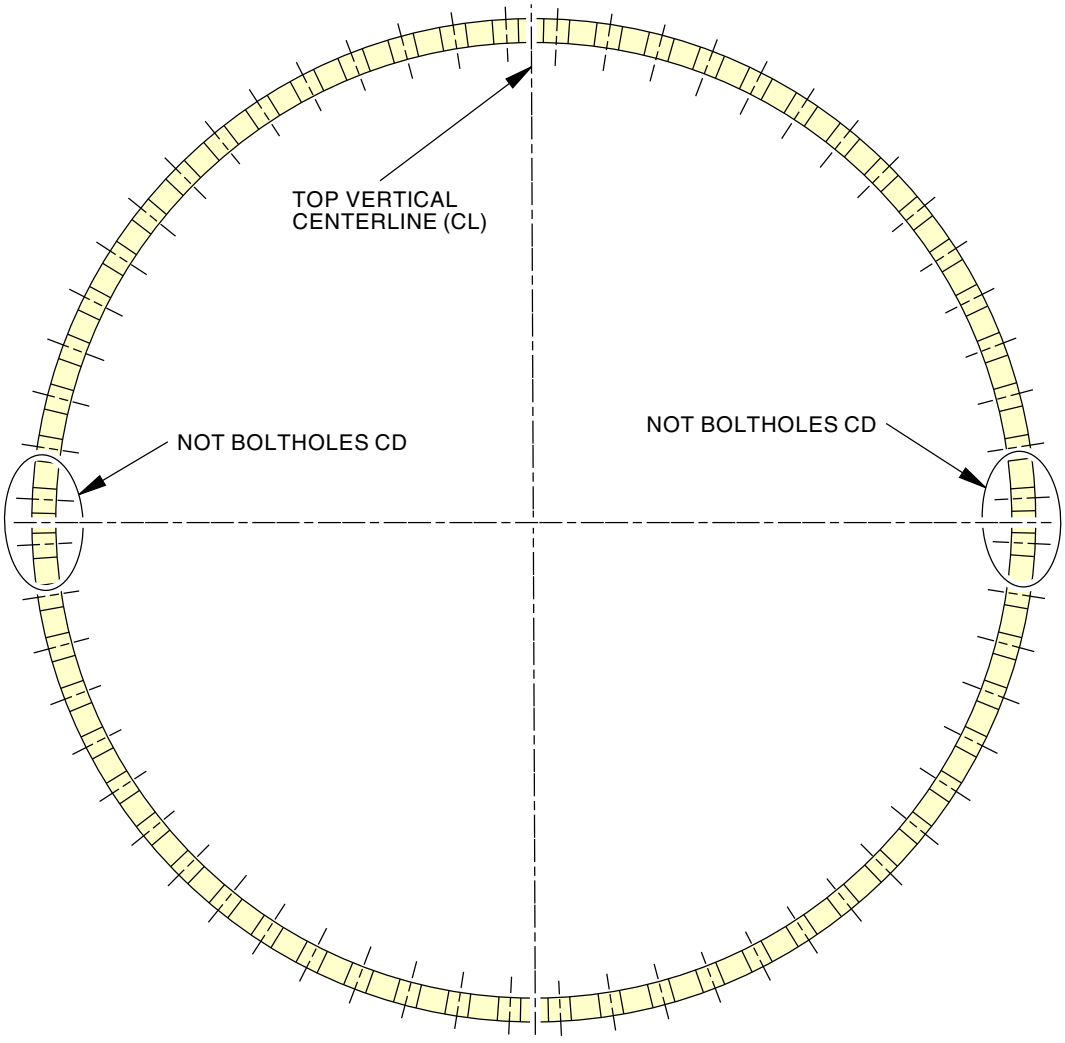
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Forward Fan Containment Case Assembly - Bolthole Identification
Figure 606/72-24-00-990-823-H01 (Sheet 1 of 2)

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

BOLTHOLES CD
0.540 INCH (13.71 mm) MAX OVERSIZE DIA, 60 HOLES ON THE BASIS OF 64 HOLES, EQUALLY SPACED, STARTING AT 2.813˚ CLOCKWISE FROM TOP VERTICAL CL (ALF), MINUS 4 HOLES LOCATED AT 87.188˚, 92.813˚, 267.188˚, AND 272.813˚



C-C

2816448 S0000648924_V1

Forward Fan Containment Case Assembly - Bolthole Identification
Figure 606/72-24-00-990-823-H01 (Sheet 2 of 2)

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

TASK 72-24-00-200-808-H00

5. Fan Trench Filler Inspection

A. General

(1) The task provides the instructions on how to examine the fan trench filler.

(2) The stage one fan trench filler is on the inner side of the fan case.

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
70-43-27-300-801-H00	Paint - Epoxy Polyamide Coating for Composites (P/B 701)
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-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
A00944 [C01-056]	Adhesive - Silicone Elastomer - RTV 108 (translucent)	
G02499 [CP2364]	Filler, Edge Sealing And Void Filling - Scotchweld EC 3524B/A	
G50228	Tape - 3M 436 Vibration Damping Tape (Formerly 3M Y436)	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-24-00-865-013-H00

(1) For the left engine, open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

SUBTASK 72-24-00-865-014-H00

(2) For the right engine, open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-480-003-H00

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(3) Put the protective mat, STD-585 in the lower half of the inlet cowl.

H. Trench Filler Inspection

SUBTASK 72-24-00-210-011-H00

I (1) Examine the trench filler for damage. Refer to figure Figure 607 and Figure 608:

(a) Cracks, nicks, dents, scratches and missing material.

1) All amounts are serviceable if the underlying honeycomb material is not exposed.

2) If honeycomb is exposed, do one of the temporary repair procedures that follow:

NOTE: If GE ESM 72-00-06 REPAIR 09 and ESM 72-00-06 REPAIR 12 are performed, subsequent periodic inspections and Continue-In-Service requirements in the following temporary repairs will not be needed.

a) RTV 108 adhesive, A00944 [C01-056] Repair (Option 1):

<1> All amounts are repairable.

<2> Fill the exposed area with RTV 108 adhesive, A00944 [C01-056] and cover with 3M 436 Tape, G50228.

NOTE: Use the manufacturer's instructions and obey the manufacturer's precautions.

<3> Do the inspection again every 5 cycles.

<4> Do step 2 again if there is deterioration of the temporary repair.

b) Scotchweld EC 3524B/A filler, G02499 [CP2364] Repair (Option 2):

<1> An area up to 144 in^2 (92,903 mm^2) is repairable.

<2> The Continue-In-Service for this repair is 150 cycles.

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

<3> Prepare the Scotchweld EC 3524B/A filler, G02499 [CP2364] for application.

NOTE: Use the manufacturer's instructions and obey the manufacturer's precautions for handling this material.

<4> Fill the exposed area with Scotchweld EC 3524B/A filler, G02499 [CP2364] and make it level with the adjacent trench filler.

<5> Let the repair area cure at least 3 hours.

<6> If cure time is less than 24 hours before flight, do a one-time inspection of the area after 2-10 flight cycles to make sure there is adhesion.

SUBTASK 72-24-00-210-012-H00

(2) Examine the trench filler gap/ply for damage. Refer to figure Figure 607:

NOTE: There are 8 plies for each fan case and each ply covers an axial gap between adjacent trench filler panels. There are 2 types of ply materials: Fiberglass (weave pattern visible) and Polysulfide (no visible weave pattern).

(a) Ply cracks, erosion, separation, missing abradable repair material.

1) All amounts are serviceable if the underlying material (blue and white) is not exposed.

2) All amounts are repairable.

NOTE: GE ESM 72-00-24 REPAIR 03 is the available repair.

SUBTASK 72-24-00-211-001-H00

(3) Examine the hole passage between the fan module trench filler and the forward acoustic liner at the 6:00 o'clock position.

(a) Remove all debris that block the hole.

SUBTASK 72-24-00-210-013-H00

(4) Examine the trench filler top coat surface for visual conditions that are not permitted:

(a) Wrinkling, flaking or discoloration.

1) All amounts are serviceable.

2) All amounts are repairable.

a) Repair (Paint - Epoxy Polyamide Coating for Composites, TASK 70-43-27-300-801-H00).

ARO ALL POST 777-GE100-72-0061 OR POST 777-GE100-72-0397

SUBTASK 72-24-00-211-002-H00

(5) If exposed, examine the forward and aft trench filler edge seals (Refer to: Figure 608): Continue-in-Service (C-I-S) limits for damage or missing pieces is 250 cycles with these conditions.

(a) The cumulative length of damage or missing pieces is less than 12 in. (305 mm) in length.

ARO ALL POST SB 777-GE100-72-0622

SUBTASK 72-24-00-211-003-H00

(6) If exposed, examine the aft trench filler edge seal (Refer to: Figure 608): Continue-in-Service (C-I-S) limits for damage or missing pieces is 250 cycles with these conditions.

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

ARO ALL POST SB 777-GE100-72-0622 (Continued)

(a) The cumulative length of damage or missing pieces is less than 12 in. (305 mm) in length.

ARO ALL

I. Put the Airplane Back to Its Usual Condition.

SUBTASK 72-24-00-080-003-H00

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-24-00-865-015-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

(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 72-24-00-865-016-H00

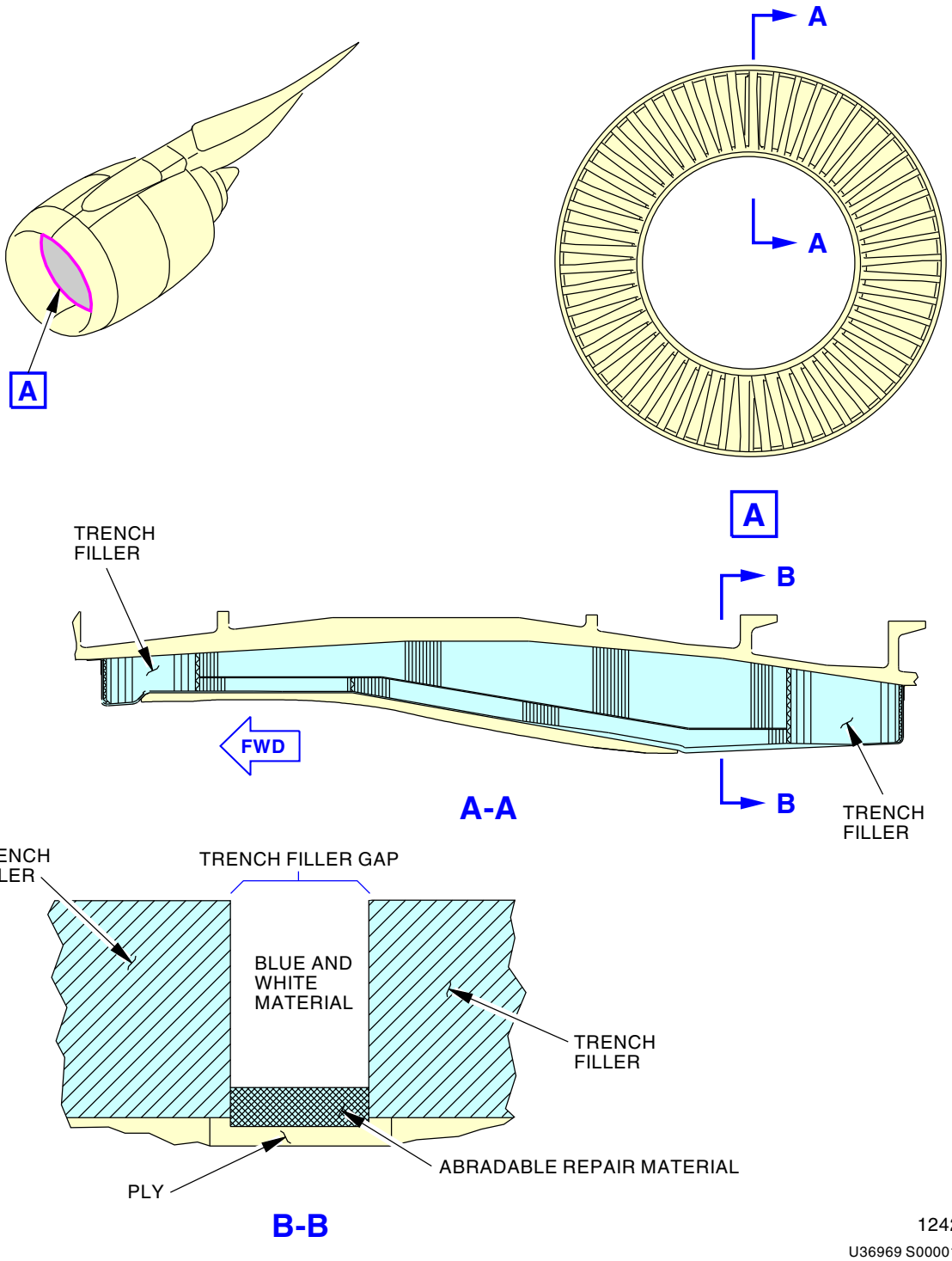
(3) For the left engine, remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW

END OF TASK

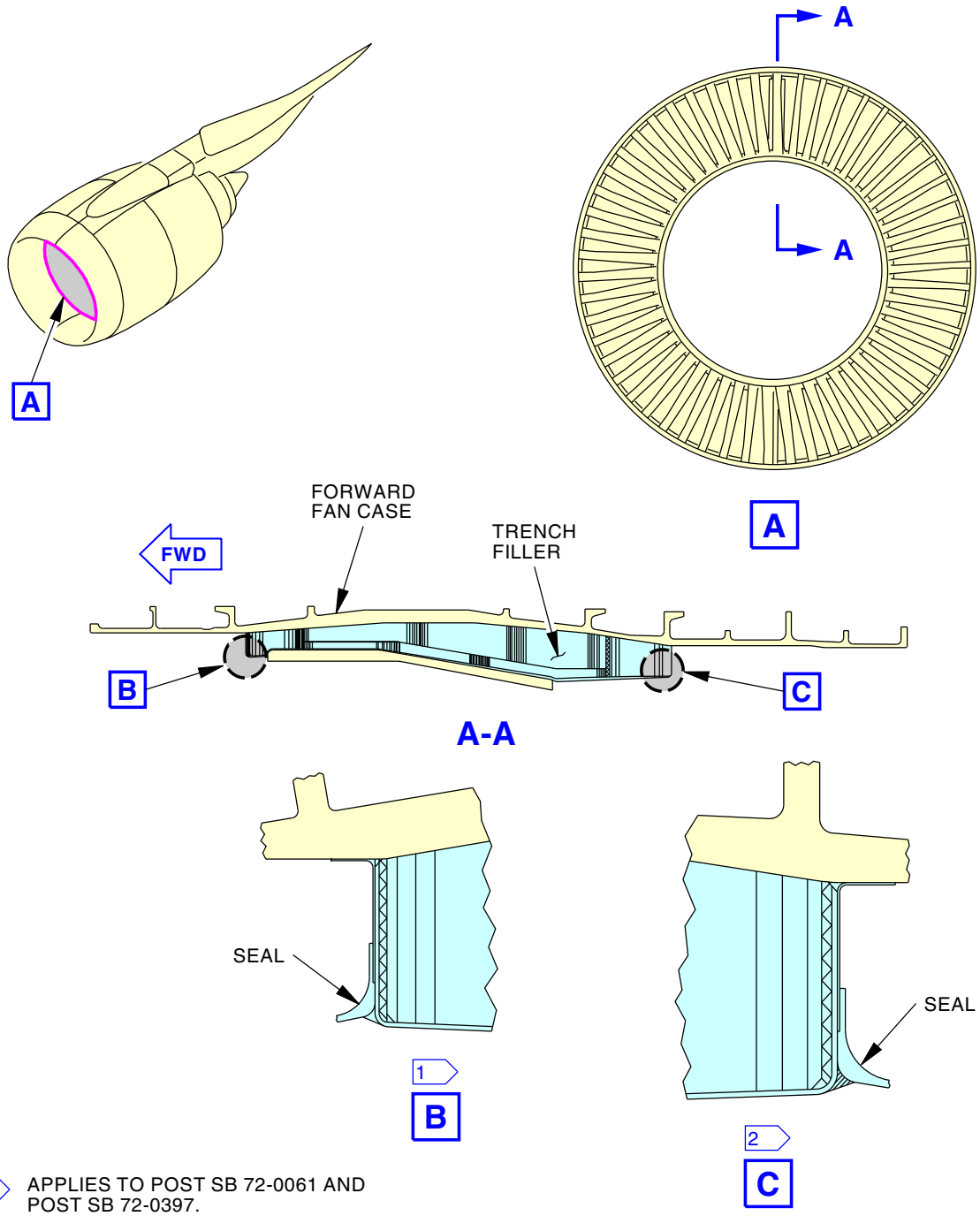
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1242358-00
U36969 S0000193999_V2

Fan Trench Filler Inspection
Figure 607/72-24-00-990-809-H00

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



1 APPLIES TO POST SB 72-0061 AND POST SB 72-0397.

2 APPLIES TO POST SB 72-0061, POST SB 72-0397 AND POST SB 72-0622.

2581503 S0000622165_V1

Fan Trench Filler Edge Seal Inspection
Figure 608/72-24-00-990-822-H00

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

TASK 72-24-00-200-804-H01

6. Fan Outlet Guide Vane (OGV) Inspection

A. General

(1) This task provides the instructions on how to examine the fan Outlet Guide Vanes (OGV's).

(2) The fan OGV's include a quantity of 48 aluminum OGV's, five titanium OGV's installed around the 12:00 o'clock, and one titanium OGV installed at the 6:00 o'clock position, aft as you look forward.

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. Consumable Materials

Reference	Description	Specification
G02329	Tape - Aluminum Foil, Pressure Sensitive - Vibration Damping Tape 434	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-24-00-865-006-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE

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

(Continued)

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-010-003-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

(2) 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. Fan Outlet Guide Vane Inspection

SUBTASK 72-24-00-220-006-H01

(1) Examine the painted, aluminum OGV's as follows:

(a) Cracks are not permitted if it is more than 4 inches in radial direction.

(b) All bulges on the surface of the OGV are permitted.

(c) Nicks and scratches are permitted if they have a smooth contour after high metal has been removed and are less than 0.03 inch (0.76 mm) in depth.

(d) All chipped or missing coatings are permitted.

NOTE: For the Titanium OGV's, use the inspection criteria on the below steps.

SUBTASK 72-24-00-220-007-H01

(2) Examine the uncoated titanium OGV's as follows:

(a) Cracks are not permitted.

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

(b) Dents are permitted if they have a smooth contour and are less than 0.12 inch (3.05 mm) in depth and have a minimum separation of 2.00 inches (50.80 mm).

(c) Nicks and scratches, not on the leading and trailing edges, are permitted if they have a smooth contour after high metal has been removed and are less than 0.01 inch (0.25 mm) in depth.

(d) Nicks and scratches, on the leading and trailing edges are permitted if they have a smooth contour after high metal has been removed and are less than 0.03 inch (0.76 mm) in depth.

(e) Pitting in the concave side coverplate area (Figure 609).

1) Pits with a depth of not more than 0.005 inch are permitted.

2) No sharp edges are permitted.

SUBTASK 72-24-00-200-001-H00

(3) Examine the I.D. of the OGV inner platform.

(a) Missing, loose, or damaged metal cover on I.D of the OGV inner platform is not permitted.

1) Replace the cover with Vibration Damping Tape 434 tape, G02329.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-00-410-002-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.

(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.

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

SUBTASK 72-24-00-865-005-H01

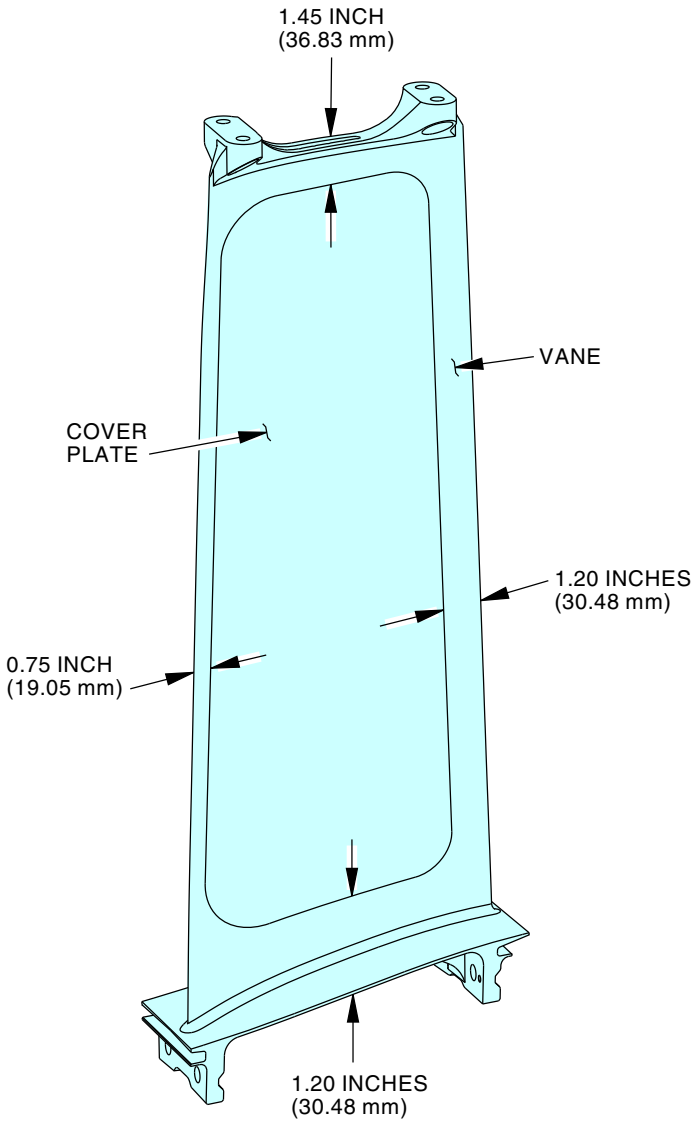
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



NOTE:

DIMENSIONS ARE IN INCHES WITH MILLIMETERS IN PARENTHESES.

5005514-00

2281713 S0000515463_V2

Outlet Guide Vane Inspection
Figure 609/72-24-00-990-818-H00

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

TASK 72-24-00-200-806-H01

7. Fan Stator Pneumatic Seal Inspection

A. General

(1) This task provides the instructions on how to examine the fan stator pneumatic seal.

(2) The fan stator pneumatic seal (referred to as pneumatic seal) is attached to the aft fan stator case assembly.

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)
72-24-00-300-801-H01	Fan Stator Pneumatic Seal Repair (24 hour cure repair) (P/B 801)
72-24-00-300-802-H01	Fan Stator Pneumatic Seal Repair (fast cure repair) (P/B 801)
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. Consumable Materials

Reference	Description	Specification
A00635	Adhesive - RTV 108 Translucent Silicone Rubber RTV Paste, One-part	BAC5010 Type 60 Class A Grade 2 / MIL-A-46106 Type 1

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-24-00-865-010-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-010-005-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

(2) 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. Pneumatic Seal Inspection

SUBTASK 72-24-00-220-010-H01

(1) Examine the pneumatic seal for missing pieces.

(a) It is not permitted to have pieces of silicone rubber missing from the bladder part of the seal.

(b) It is permitted to have pieces of the silicone rubber missing from the pneumatic seal with these conditions:

1) The serrated seal lip can have no more than 3 pieces missing with these conditions.

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

a) The missing pieces are no more than 4.0 inches (101.6 mm) in circumferential length by 0.10 inch (2.54 mm) in radial depth.

b) There is a minimum of 4.0 inches (101.6 mm) between missing pieces.

2) Continue-In-Service (C-I-S) Limits:

a) The (C-I-S) limit for pneumatic seal distress is the first to occur of 50 cycles or 500 hours if:

<1> You enclose the area with RTV 108 adhesive, A00635 to repair the distress or separated material.

<2> You examine the repair at every exposure.

(c) If there is damage on the pneumatic seal and you can get access to the area, repair the pneumatic seal (TASK 72-24-00-300-802-H01 or TASK 72-24-00-300-801-H01).

NOTE: If the damage on the pneumatic seal cannot be repaired, replace the pneumatic seal using GE ESM 72–00–06, SPECIAL PROCEDURES 003.

SUBTASK 72-24-00-220-011-H01

(2) Examine the pneumatic seal for tears, cuts, and holes.

(a) It is not permitted to have tears, cuts or holes in the bladder part of the seal.

(b) It is permitted to have tears, cuts or holes in the silicone rubber with these conditions.

1) The serrated seal lip can have a maximum of 3 tears, cuts or holes in the silicone rubber with these conditions:

a) The tears, cuts or holes are a maximum of 4.0 inches (101.6 mm) in circumferential length by 0.10 inch (2.54 mm) radial depth.

b) There is a minimum of 4.0 inches (101.6 mm) between the tears, cuts or holes.

2) Continue-In-Service (C-I-S) Limits:

a) The C-I-S limit for pneumatic seal distress is the first to occur of 50 cycles or 500 hours if:

<1> You enclose the area with RTV 108 adhesive, A00635 to repair the distress or separated material.

<2> You examine the repair at every exposure.

(c) If there is damage on the pneumatic seal and you can get access to the area, repair the pneumatic seal (TASK 72-24-00-300-802-H01 or TASK 72-24-00-300-801-H01).

NOTE: If the damage on the pneumatic seal cannot be repaired, replace the pneumatic seal using GE ESM 72–00–06, SPECIAL PROCEDURES 003.

SUBTASK 72-24-00-220-012-H01

(3) Examine the pneumatic seal to make sure it is installed in the locating groove.

(a) If the pneumatic seal is not installed in the locating groove, reinstall the seal in its locating groove.

SUBTASK 72-24-00-220-013-H01

(4) Examine the inflatable air seal supply tube, if you can get access, for cuts or tears above the clamp.

(a) If cut or torn, move the clamp and tube to a different position on the metal supply pipe.

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

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-00-410-004-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.

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

SUBTASK 72-24-00-865-009-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

TASK 72-24-00-200-807-H01

8. Fan Stator Case Outlet Guide Vane (OGV) Fairing Inspection

A. General

(1) This task provides the instructions on how to examine the fan stator case outlet guide vanes (OGV) fairings.

(2) The fan stator case OGV fairings (referred to as fairings) are between the OGV's and are attached to the aft fan stator case assembly.

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)
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)
72-24-03-400-801-H01	Fan Case Outlet Guide Vanes (OGV) Fairing 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
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-24-00-865-012-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-010-006-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

(2) Do these tasks in sequence to safely open 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: 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. Fan Stator Case Outlet Guide Vane (OGV) Fairing Inspection

SUBTASK 72-24-00-220-015-H01

(1) Examine the fairings for cracks.

(a) Continue-In-Service (C-I-S) Limits:

1) Replace the fairing in 150 cycles for cracks that are not more than 1 in. (25.4 mm) in length.

2) Replace the fairing in 25 cycles for cracks that are between 1 in. (25.4 mm) - 2 in. (50.8 mm) in length.

NOTE: Refer to limits in step (b) of SUBTASK 72-24-00-220-016-H01 as an option to plan OGV Fairing replacement.

SUBTASK 72-24-00-220-016-H01

(2) Examine the fairings for missing pieces.

(a) It is permitted to have pieces missing from the fairings with these conditions:

1) A maximum of 1/4 of each fairing can be missing if the remaining fairing material is correctly attached by the two screws and any loose material is removed.

2) Replace the fairing in 150 cycles.

(b) Continue-In-Service (C-I-S) Limits:

1) It is permitted to have missing fairing material with these conditions:

a) A maximum area of 15 fairings can be completely missing.

NOTE: If you find damaged or distorted fairings, you can remove them up to the maximum area.

b) You replace the fairing in 150 cycles.

SUBTASK 72-24-00-220-017-H01

(3) Examine the fairings for dents, nicks, and scratches.

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

(a) Dents, nicks and scratches are permitted.

SUBTASK 72-24-00-220-018-H01

(4) Examine the fairings for loose bushings.

(a) It is not permitted to have loose bushings.

1) Replace the bushings.

SUBTASK 72-24-00-220-019-H01

(5) Examine the fairings for loose screws.

(a) Tighten the screws to 80-100 pound-inches (9.1-11.3 Newton-meters).

1) Replace screws if they do not tighten.

SUBTASK 72-24-00-220-020-H01

(6) Examine the fairings for distortion.

(a) Continue-In-Service (C-I-S) Limits for distortion of the fairings between 0.75-1.50 inches (19.00-38.10 mm):

1) It is permitted to have distortion a maximum of 1.50 in. (38.10 mm) inward or outward radially as measured from one of these surfaces:

a) The trailing edge of the aft acoustic panel

b) The OGV flowpath

c) The adjacent fairing flowpath material.

2) Remove the OGV fairing in 50 cycles.

NOTE: Refer to limits in SUBTASK 72-24-00-220-016-H01 (2) (b) as an option to plan OGV fairing replacement.

(b) Continue-In-Service (C-I-S) Limits for distortion of the fairings that is more than 1.50 in. (38.10 mm):

1) It is permitted to have distortion of the fairings that is more than 1.50 in. (38.10 mm) inward or outward radially as measured from one of these surfaces:

a) The trailing edge of the aft acoustic panel

b) The OGV flowpath

c) The adjacent fairing flowpath material.

2) Remove the OGV fairing in 5 cycles.

NOTE: Refer to limits in SUBTASK 72-24-00-220-016-H01 (2) (b) as an option to plan OGV fairing replacement.

SUBTASK 72-24-00-220-026-H01

(7) Examine the OGV fairing for missing sealant between each fairing and the OGVs.

(a) Continue-In-Service (C-I-S) Limits:

1) It is permitted to have missing sealant between the fairing and the OGV surfaces with these conditions:

a) The disbonded or missing sealants is no more than 50 percent of the sealant total length.

b) Replace missing sealant in 150 cycles. Refer to Fan Case Outlet Guide Vanes (OGV) Fairing Installation, TASK 72-24-03-400-801-H01 for sealant replacement instructions.

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

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-00-410-005-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.

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

SUBTASK 72-24-00-865-011-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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

FAN STATOR ASSEMBLY - REPAIRS

1. General

A. This procedure has four tasks:

(1) Fan Case Outer Acoustic Liner Captive Nut of a Captive Nut Assembly Replacement

(2) Fan Case Outer Acoustic Liner Captive Nut Assembly Replacemet

(3) Fan Stator Pneumatic Seal Repair (24 hour cure repair)

(4) Fan Stator Pneumatic Seal Repair (fast cure repair).

TASK 72-24-00-400-801-H01

2. Fan Case Outer Acoustic Liner Captive Nut of a Captive Nut Assembly Replacement

A. General

(1) This task provides a procedure to replace the damaged fan case outer acoustic liner captive nut of a captive nut assembly (referred to as captive nut).

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)
70-43-07-900-801-H01	Chemical Touch Up for Aluminum (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-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
B00679 [C04-035]	Alcohol - Isopropyl	
C00941 [C03-001]	Primer - Zinc Chromate	TT-P-1757, Type 1 or 2, Class C or Class N, AMS 3110 Color Y
C00943 [C03-006]	Coating - Chemical Conversion - Bonderite M-CR 1200S Aero (Formerly Alodine 1200S)	
D50072 [C02-023]	Oil - Engine Lubricating	MIL-PRF-23699
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A
G01659	Swab - Cotton Or Rayon, (Disposable)	

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

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Procedure

SUBTASK 72-24-00-860-013-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-940-001-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-24-00-010-007-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

(3) 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

H. Replace the Damaged Captive Nut

SUBTASK 72-24-00-020-001-H01

(1) Remove the damaged captive nut from the captive nut cage (Figure 801).

(a) Loosen the screw that attaches the outer acoustic liner at that captive nut assembly position. Make sure the screw is completely disengaged from the damaged captive nut.

CAUTION BE CAREFUL NOT TO BEND THE END STOPS ON THE CAPTIVE NUT CAGE. IF YOU BEND THE END STOPS, DAMAGE TO THE FAN CASE CAN OCCUR.

(b) Carefully bend the tangs on the captive nut cage away from the damaged captive nut. Use a screwdriver or an equivalent tool.

(c) Remove the damaged captive nut.

SUBTASK 72-24-00-420-001-H01

(2) Install a new captive nut in the captive nut cage.

(a) Put a new captive nut in the captive nut cage.

(b) Bend the tangs on the captive nut cage over the corners of the new captive nut.

NOTE: Do not bend the tangs too near the captive nut.

1) Make sure that the new nut will move freely between the end stops.

(c) Apply engine lubricating oil, D50072 [C02-023] to the internal threads of the new captive nut.

(d) Attach the captive nut cage to the screw on the outer acoustic liner.

(e) Tighten the screw to 115-125 pound-inches (13.0-14.1 Newton-meters).

(f) After 15 minutes, tighten the screw to 115-125 pound-inches (13.0-14.1 Newton-meters) again.

SUBTASK 72-24-00-110-001-H01

(3) Clean the area of the fan case that you repaired:

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

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Get some cotton wiper, G00034 and alcohol, B00679 [C04-035].

(b) Put alcohol, B00679 [C04-035] on a cotton wiper, G00034 to make the cloth moist.

NOTE: Do not use so much alcohol that it falls from the cloth.

(c) Move the moist cotton wiper, G00034 lightly across the captive nut assembly and the adjacent areas to clean them. When the cotton wiper, G00034 gets dirty, turn the cloth to a clean area before you continue.

(d) Continue to clean the area of the fan case that you have repaired until the moist cotton wiper, G00034 stays clean.

(e) Make a cotton swab, G01659 moist with alcohol, B00679 [C04-035].

(f) Use the moist cotton swab, G01659 to clean the small areas that you cannot get access to with a cotton wiper, G00034.

(g) Dry each area with a dry cotton swab, G01659 or a dry cleaning cotton wiper, G00034.

(h) Let the area dry in the air for a minimum of 15 minutes.

SUBTASK 72-24-00-380-001-H01

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) If there are areas of the fan case where the primer was removed, apply Bonderite M-CR 1200S Aero coating, C00943 [C03-006] to each of the bare aluminum surfaces:

(a) Do this task: Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01.

SUBTASK 72-24-00-370-001-H01

WARNING

DO NOT GET ZINC CHROMATE PRIMER OR EPOXY PAINT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ZINC CHROMATE PRIMER OR EPOXY PAINT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE ZINC CHROMATE PRIMER OR EPOXY PAINT. KEEP ZINC CHROMATE PRIMER OR EPOXY PAINT AWAY FROM SPARKS, FLAME, AND HEAT. ZINC CHROMATE PRIMER AND EPOXY PAINT ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(5) Apply primer, C00941 [C03-001] where you applied the Bonderite M-CR 1200S Aero coating, C00943 [C03-006].

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

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-00-940-002-H01

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the lower half of the inlet cowl.

SUBTASK 72-24-00-410-006-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.

(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.

SUBTASK 72-24-00-860-014-H01

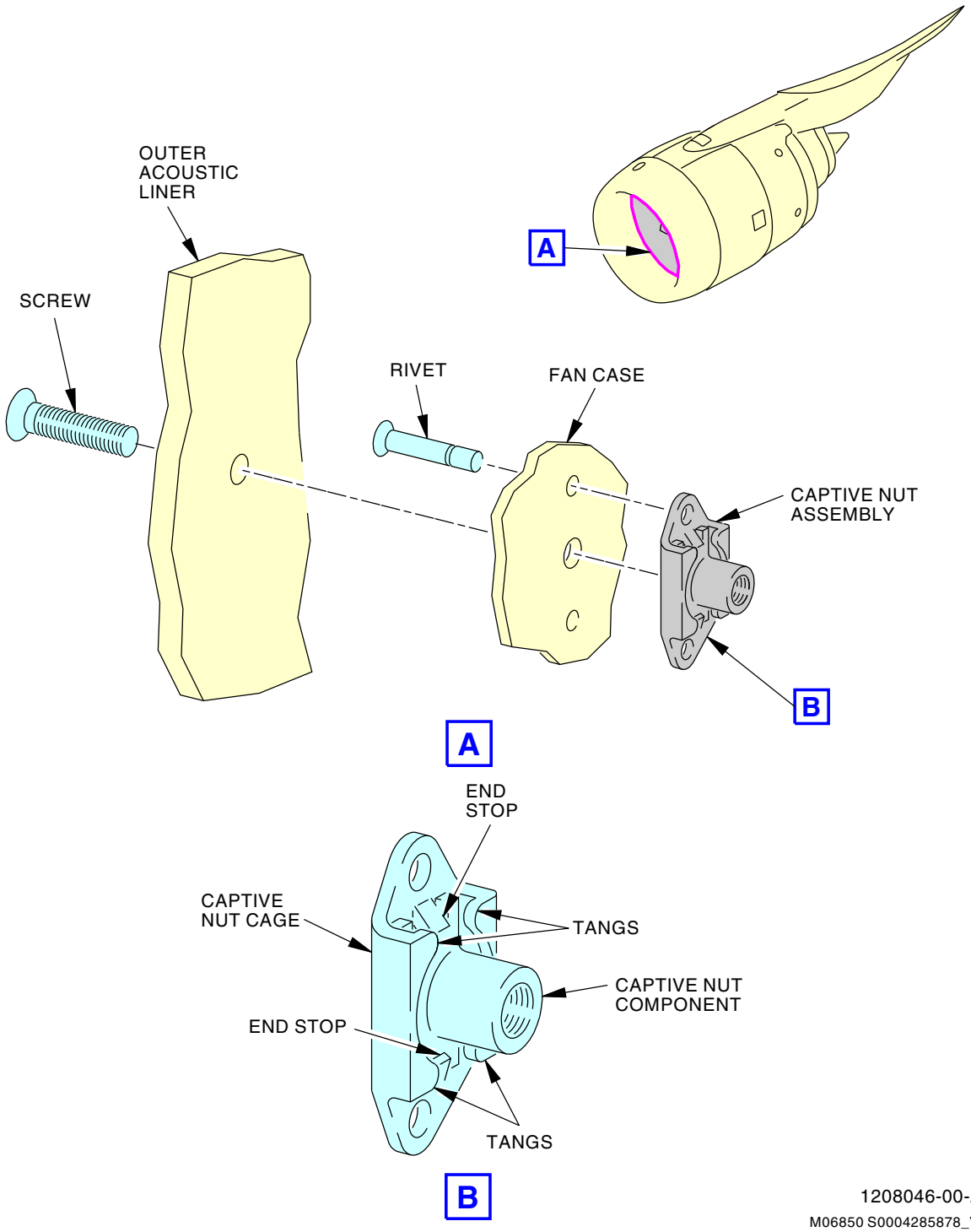
(3) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



Fan Case Outer Acoustic Liner Captive Nut Assembly Repair
Figure 801/72-24-00-990-803-H01

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

TASK 72-24-00-400-802-H01

3. Fan Case Outer Acoustic Liner Captive Nut Assembly Replacement

A. General

(1) This task has two procedures:

(a) Replacement of the fan case outer acoustic liner captive nut assembly (referred to as a captive nut assembly) with a new captive nut assembly.

(b) Replacement of the fan case outer acoustic liner captive nut assembly (referred to as a captive nut assembly) and the related acoustic liner screw with a washer, a bolt, and a standard nut.

(2) The location and the amount of damage tells you which procedure to use.

(3) These are the parts numbers that are necessary to use if replacement is needed.

(a) Captive Nut Assembly.

1) Nutplate MS21060L4.

(b) Rivets

1) Recommended Rivet 1837M69P03 (Cherry P/N CR2672-3-03).

a) Alternative Rivet 9025M79P03 (Cherry P/N CCR264CS-3-03).

b) Standard Rivet NAS 9038MP (Cherry P/N CR3522P-4-03).

c) Oversize Rivet NAS 9311MP (Cherry P/N CR3552P-4-03).

2) Recommended Rivet 1837M69P06 (Cherry P/N CR2672-3-06).

a) Alternative Rivet 9025M79P06 (Cherry P/N CCR264CS-3-06).

b) Standard Rivet NAS 9038MP (Cherry P/N CR3522P-4-06).

c) Oversize Rivet NAS 9311MP (Cherry P/N CR3552P-4-06).

3) Recommended Rivet 1837M69P07 (Cherry P/N CR2672-3-07).

a) Alternative Rivet 9025M79P07 (Cherry P/N CCR264CS-3-07).

b) Standard Rivet NAS 9038MP (Cherry P/N CR3522P-4-07).

c) Oversize Rivet NAS 9311MP (Cherry P/N CR3552P-4-07).

(c) Washers

1) Recommended Washer 133A1624P7.

2) Alternative Washer 133A1624P5.

(d) Nuts

1) Recommended nut J1092P04 - A286, dry film lubricated.

2) First Alternative nut AS3486-10 - A286, dry film lubricated.

3) Second Alternative nut AS3486-10 - A286, silver plated.

4) Third Alternative nut J1212P04 Waspoloy, silver plated.

5) Fourth Alternative nut MS21043-4 - A286, silver plated.

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)

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

(Continued)

Reference	Title
70-11-06-230-801-H01	Fluorescent Penetrant Inspection (P/B 201)
70-43-07-900-801-H01	Chemical Touch Up for Aluminum (P/B 201)
71-00-02-000-811-H00	Power Plant Removal (P/B 401)
71-00-02-400-811-H00	Power Plant 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)
72-24-01-000-801-H01	Fan Stator Case Forward Outer Acoustic Liners Removal (P/B 401)
72-24-01-000-802-H01	Fan Stator Case Aft Outer Acoustic Liners Removal (P/B 401)
72-24-01-400-801-H01	Fan Stator Case Forward Outer Acoustic Liners Installation (P/B 401)
72-24-01-400-802-H01	Fan Stator Case Aft Outer Acoustic Liners 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. Tools/Equipment

Reference	Description
STD-448	Gun - Rivet, Cherry Monel
STD-562	Lens - Magnifying, 10x
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
B00679 [C04-035]	Alcohol - Isopropyl	
C00941 [C03-001]	Primer - Zinc Chromate	TT-P-1757, Type 1 or 2, Class C or Class N, AMS 3110 Color Y
C00943 [C03-006]	Coating - Chemical Conversion - Bonderite M-CR 1200S Aero (Formerly Alodine 1200S)	
D50072 [C02-023]	Oil - Engine Lubricating	MIL-PRF-23699
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)	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Prepare for the Procedure

SUBTASK 72-24-00-860-015-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-940-008-H01

CAUTION PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-24-00-010-008-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

(3) 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

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

(Continued)

Number	Name/Location
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 72-24-00-020-004-H01

(4) Remove the outer acoustic liner that is attached to the damaged captive nut assembly.

(a) Do the applicable task to remove the forward and aft outer acoustic liner.

1) Do this task: Fan Stator Case Forward Outer Acoustic Liners Removal, TASK 72-24-01-000-801-H01.

2) Do this task: Fan Stator Case Aft Outer Acoustic Liners Removal, TASK 72-24-01-000-802-H01.

H. Replace the Damaged Captive Nut Assembly

SUBTASK 72-24-00-330-001-H01

(1) From the outer surface of the forward or aft fan case, remove the attachment rivets and the damaged captive nut assembly:

NOTE: Rivets can be removed from the inner or outer surface of the fan case. Removing the rivets from the outer surface of the fan case is the recommended method. If you do work from the outer surface, there is less risk of damage to the fan case. This step is for removing the rivets from the outer surface of the fan case. The next step is for removing the rivets from the inner surface of the fan case.

(a) Find the diameter of the rivet that you must remove.

(b) Find the applicable drill size for the diameter of the rivet in Table 801.

(c) Remove all burrs from the end of the rivet.

Table 801/72-24-00-993-801-H01 Table 801

RIVET DIAMETER	DRILL DIAMETER FOR THE SHANK OF THE RIVET	DRILL DIAMETER FOR THE COUNTERSUNK HEAD OF THE RIVET
1/16 inch	1/16 inch	3/64 inch
3/32 inch	3/32 inch	1/16 inch
1/8 inch	1/8 inch	3/32 inch
5/32 inch	5/32 inch	1/8 inch

(d) Center-punch the shank of the rivet as near to the center of the shank as possible.

(e) Install the applicable drill size from Table 801 in a drill motor that has a 0.25 inch (6.30 mm) chuck.

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

(f) Drill a hole through the blind head of the rivet. Do not drill more than the length of the blind rivet head.

NOTE: The blind rivet head is the part of the rivet that extends outboard of the captive nut cage.

(g) Get a pin punch that is as near to the diameter of the drilled hole as possible.

(h) Put the pin punch into the drilled hole. Move the punch to one side to break off the extended part of the shank.

(i) Use a pin punch and hammer to force the remaining part of the shank from the rivet hole.

(j) From the outer surface of the forward or aft fan case, remove the other attachment rivets and the other damaged captive nut assembly.

(k) Remove the damaged captive nut assembly.

(l) Remove any debris from the inner surfaces of the fan case.

SUBTASK 72-24-00-330-002-H01

(2) From the inner surface of the forward or aft fan case, remove the attachment rivets and the captive nut assembly as follows:

(a) Find the diameter of the rivet that you must remove.

(b) Find the correct drill size for the rivet in Table 801.

(c) Remove all burrs and identification marks from the head of the rivet.

(d) Center-punch the rivet as near to the center of the head as possible.

(e) Install the applicable drill size from Table 801 in a drill motor that has a 0.25 inch (6.30 mm) chuck.

(f) Drill a hole in the countersunk head of the rivet.

NOTE: Do not drill more than the depth of the countersunk head.

CAUTION

MAKE SURE THAT YOU COUNTERSINK ONLY THE RIVET HEAD. DAMAGE TO THE FAN CASE CAN OCCUR IF YOU REMOVE METAL FROM THE FAN CASE.

(g) Use a 100 degree countersink tool to remove the rivet head.

(h) Use a pin punch and hammer to remove the shank of the rivet.

(i) From the inner surface of the forward or aft fan case, remove the other attachment rivets and the other damaged captive nut assembly.

(j) Remove the damaged captive nut assembly.

(k) Remove any debris from the inner surfaces of the fan case.

I. Examine the Rivet Holes and the Screw Hole

SUBTASK 72-24-00-210-002-H01

(1) Use one of the following three procedures to find the smallest diameter that fully covers the area of outer fan case damage around the screw hole. This diameter identifies the damaged area (Figure 801).

(a) Measure the diameter of the screw hole and the depth of the damage in the area around the hole.

(b) Do a fluorescent penetrant inspection of the fan case areas adjacent to the rivet holes and screw hole (TASK 70-11-06-230-801-H01).

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

(c) Examine the areas of the fan case adjacent to the rivet holes and screw hole for cracks. Use a 10x magnifying lens, STD-562 and a strong white light.

SUBTASK 72-24-00-210-003-H01

(2) Make a decision about how to continue with the repair procedure.

(a) You cannot repair the fan case if:

1) There is a crack in the fan case.

2) The screw hole is in the aft fan case and the damaged area around the hole is in one of these conditions.

a) The area is larger than 0.50 inch (12.70 mm).

b) The fan case thickness in the damaged area is less than 0.09 inch (2.29 mm).

3) The screw hole is in the forward fan case and the damaged area around the hole is in one of these conditions.

a) The area is larger than 1.0 inch (25.4 mm).

b) The fan case thickness in the damaged area is less than 0.08 inch (2.03 mm).

(b) If you cannot repair the fan case, replace the engine. These are the tasks: Power Plant Removal, TASK 71-00-02-000-811-H00 and Power Plant Installation, TASK 71-00-02-400-811-H00.

SUBTASK 72-24-00-210-004-H01

(3) Do the procedure: Install a New Captive Nut Assembly if you find these conditions.

(a) The screw hole is in the aft fan case and the damaged area around the hole shows these conditions.

1) The damaged area diameter is equal to or less than 0.5 inch (12.7 mm).

2) The fan case thickness in the damaged area is equal to or more than 0.09 inch (2.29 mm).

(b) The screw hole is in the forward fan case and the damaged area around the hole shows these conditions.

1) The damaged area diameter is equal to or less than 1.0 inch (25.4 mm).

2) The fan case thickness in the damaged area is equal to or more than 0.08 inch (2.03 mm).

(c) The screw hole diameter is not more than 0.364 inch (9.240 mm).

SUBTASK 72-24-00-210-005-H01

(4) Install a Bolt, Nut and Washer if you find these conditions:

(a) The screw hole is in the aft fan case and the damaged area around the hole shows these conditions.

1) The damaged area diameter is equal to or less than 0.50 inch (12.70 mm).

2) The fan case thickness in the damaged area is equal to or more than 0.09 inch (2.29 mm).

(b) The screw hole is in the forward fan case and the damaged area around the hole shows these conditions.

1) The damaged area diameter is equal to or less than 1.0 inch (25.4 mm).

2) The fan case thickness in the damaged area is equal to or more than 0.08 inch (2.03 mm).

(c) The screw hole diameter is more than 0.364 inch (9.24 mm).

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

J. Install a New Captive Nut Assembly

NOTE: Continue the repair with this procedure if the screw hole diameter is not more than 0.364 inch (9.240 mm).

SUBTASK 72-24-00-210-006-H01

(1) Examine the rivet holes for damage with a 10x magnifying lens, STD-562 and a strong white light. Measure the diameter of the rivet holes.

SUBTASK 72-24-00-330-003-H01

(2) If you find a rivet hole with a diameter of more than 0.102 inch (2.590 mm), increase the diameter for a -4 shank size rivet.

(a) Drill the hole to 0.129-0.132 inch (3.28-3.35 mm) diameter.

(b) If the damage to the edge of the hole was not removed, increase the hole diameter for a -4 oversize shank rivet.

1) Use a drill to make the hole 0.143-0.146 inch (3.63-3.70 mm) diameter.

SUBTASK 72-24-00-330-004-H01

(3) If you find a rivet hole with a diameter of more than 0.146 inch (3.710 mm), continue as follows.

(a) Make a rivet hole location tool for the attachment of the captive nut cage rivets (Figure 802).

(b) From the outer surface of the fan case, repair the damaged rivet hole and adjacent area as follows.

CAUTION DO NOT REMOVE METAL THAT IS BELOW FLUSH WITH THE SURFACE OF THE FAN CASE. IF YOU DO, THE FAN CASE WILL BE WEAK AT THAT LOCATION.

1) Carefully remove the high metal for a maximum distance of 0.10 inch (2.54 mm) from the edge of the damaged hole. Use one of these tools:

a) A pencil grinder with a small diameter burr tool.

b) A piece of 220 grit. Wind the cloth around a pencil or a wooden dowel with a rounded end.

(c) Put the rivet hole location tool in the screw hole. Attach the tool loosely to the fan case with a 0.25 inch (6.35 mm) diameter bolt and nut.

(d) Find and set the positions for the new rivet holes.

1) Turn the location tool until the edges of the new and old rivet holes are a minimum of 0.15 inch (3.80 mm) apart.

2) Tighten the bolt as necessary to prevent movement of the tool while you drill holes in the fan case.

(e) Drill two 0.098-0.102 inch (2.490-2.590 mm) diameter holes through the fan case at the new rivet hole positions. Use the two holes in the location tool to align the drill bit.

(f) Remove the rivet hole location tool.

(g) Countersink the rivet holes with a 100 degree countersink tool so that the rivet heads will be 0.001-0.020 inch (0.030-0.500 mm) below the surface of the fan case.

(h) Deburr the rivet holes. Hold a countersink tool in your hand or in a drill motor and turn the tool slowly.

(i) Make sure that the new rivet holes align correctly with the attachment holes in the captive nut cage.

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

SUBTASK 72-24-00-110-002-H01

(4) Clean the rivet holes, the screw hole, and the adjacent areas that you repaired.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Get some cotton wiper, G00034 and alcohol, B00679 [C04-035] (IPA).

(b) Put alcohol, B00679 [C04-035] on a cleaning cotton wiper, G00034 to make the cloth moist.

NOTE: Do not use so much alcohol that it falls from the cloth.

(c) Move the moist cleaning cotton wiper, G00034 lightly across the fan case holes and the adjacent areas to clean them. When the cleaning cotton wiper, G00034 gets dirty, turn the cloth to a clean area before you continue.

(d) Continue with the steps to clean the areas that you have repaired until the moist cleaning cotton wiper, G00034 stays clean.

(e) Make a cotton swab, G01659 moist with alcohol, B00679 [C04-035] (IPA).

(f) Use the moist cotton swab, G01659 to clean the small areas that you cannot get access to with a cleaning cotton wiper, G00034.

(g) Dry each area with a dry cotton swab, G01659 or a dry cleaning cloth.

(h) Let the area dry in the air for a minimum of 15 minutes.

SUBTASK 72-24-00-370-002-H01

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.

(5) If there are areas of the fan case where the primer was removed, apply Bonderite M-CR 1200S Aero coating, C00943 [C03-006] to each of the bare aluminum surfaces. Apply primer, C00941 [C03-001] after Alodine application.

(a) Do this task: Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01.

SUBTASK 72-24-00-420-002-H01

(6) Install a new captive nut assembly as follows:

(a) Put a captive nut assembly on the outer surface of the fan case. Align the attachment holes in the captive nut cage with the rivet holes.

(b) Measure the thickness of the material that the rivet will grip.

NOTE: The rivet grip lengths that follow are sufficient for the fan case thickness at the captive nut assembly positions.

(c) Get two rivets with the correct diameter and grip length for the rivet hole and the captive nut cage (Table 802).

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

Table 802/72-24-00-993-802-H01 Table 802

GRIP RANGE	RIVET GRIP LENGTH	CAPTIVE NUT CAGE COUNTERSINK HEAD RIVET		COMMERCIALLY AVAILABLE COUNTERSINK HEAD RIVET	
		RECOMMENDED PART NO.	ALTERNATIVE PART NO.	STANDARD PART NO.	OVERSIZE PART NO.
0.126-0.187 inch (3.20-4.75 mm)	-03	1837M69P03 (Cherry P/N CR2672-3-03)	9025M79P03 (Cherry P/N CCR264CS-3-03	NAS 9038MP (Cherry P/N CR3522P-4-03	NAS 9311MP (Cherry P/N CF3552P-4-03)
0.313–0.375 inch (7.96-9.52 mm)	—06	1837M69P06 (Cherry P/N CF2672-3-06	9025M79P06 (Cherry P/N CCR264CS-3-06	NAS 9038MP (Cherry P/N CR3522P-4-06	NAS 9311MP (Cherry P/N CR3552P-4-06
0.376–0.437 inch (9.55-11.10 mm)	—07	1837M69P07 (Cherry P/N CR2672-3-07	9025M79P07 (Cherry P/N CCR264CS-3-07)	NAS 9038MP (Cherry P/N CR3522P-4-07)	NAS 9311MP (Cherry P/N CR3552P-4-07)

WARNING

DO NOT GET ZINC CHROMATE PRIMER OR EPOXY PAINT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ZINC CHROMATE PRIMER OR EPOXY PAINT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE ZINC CHROMATE PRIMER OR EPOXY PAINT. KEEP ZINC CHROMATE PRIMER OR EPOXY PAINT AWAY FROM SPARKS, FLAME, AND HEAT. ZINC CHROMATE PRIMER AND EPOXY PAINT ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(d) Paint the two rivets and the two rivet holes with primer, C00941 [C03-001].

(e) While the primer, C00941 [C03-001] is wet, hold a captive nut assembly in the correct outer surface position. Use the cherry monel rivet gun, STD-448 on the inner surface of the fan case to install the rivets.

(f) Do the step to install a new captive nut assembly, to replace each captive nut assembly where you found these conditions.

1) The screw hole is in the aft fan case and the damaged area around the hole is in one of these conditions:

a) The area is larger than 0.50 inch (12.70 mm).

b) The fan case thickness in the damaged area is less than 0.09 inch (2.29 mm).

2) The screw hole is in the forward fan case and the damaged area around the hole is in one of these conditions:

a) The area is larger than 1.0 inch (25.4 mm).

b) The fan case thickness in the damaged area is less than 0.08 inch (2.03 mm).

3) The screw hole diameter is not more than 0.364 inch (9.240 mm).

4) The damage in the area around the screw hole is less than 0.005 inch (0.130 mm) deep.

SUBTASK 72-24-00-410-007-H01

(7) Do the applicable task to install the forward or aft outer acoustic liner that you removed.

(a) Do this task: Fan Stator Case Forward Outer Acoustic Liners Installation, TASK 72-24-01-400-801-H01.

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

(b) Do this task: Fan Stator Case Aft Outer Acoustic Liners Installation, TASK 72-24-01-400-802-H01.

SUBTASK 72-24-00-860-016-H01

(8) Do the steps in the Put the Airplane Back to Its Usual Condition paragraph.

K. Install a Bolt, Nut, and Washer

SUBTASK 72-24-00-330-005-H01

(1) From the outer surface of the fan case, repair the damaged screw hole and adjacent area as follows (Figure 803):

NOTE: Continue the repair with this procedure if the screw hole is larger than 0.364 inch (9.24mm), but less than 0.50 inch (12.70 mm) for repair to the aft fan case, or less than 1.00 inch (25.4mm) for repair to the forward fan case.

CAUTION DO NOT REMOVE METAL THAT IS BELOW FLUSH WITH THE SURFACE OF THE FAN CASE. IF YOU DO, THE FAN CASE WILL BE WEAK AT THAT LOCATION.

(a) Carefully remove the high metal for a maximum distance of 0.10 inch (2.50 mm) from the edge of the damaged hole. Use one of these tools:

1) A pencil grinder with a small diameter burr tool.

2) A piece of 220 grit abrasive cloth. Wind the cloth around a pencil or a wooden dowel that has a rounded end.

(b) If the damaged hole is not in the aft fan case.

1) Make each burr or sharp inner corner on the edge of the hole smooth. It is not necessary to fully remove an inner corner.

(c) If the damaged hole is in the aft fan case.

1) Drill the hole to the smallest diameter that will remove all of the damaged area. You are not permitted to drill a hole that is larger than 0.50 inch (12.70 mm) in diameter.

SUBTASK 72-24-00-110-003-H01

(2) Clean the rivet holes, the screw hole, and the adjacent areas that you repaired.

WARNING DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Get a clean cotton wiper, G00034 and alcohol, B00679 [C04-035].

(b) Put alcohol, B00679 [C04-035] on a cleaning cloth cotton wiper, G00034 to make the cloth moist.

NOTE: Do not use so much alcohol that it falls from the cloth.

(c) Move the moist cleaning cotton wiper, G00034 lightly across the fan case holes and the adjacent areas to clean them. When the cleaning cotton wiper, G00034 gets dirty, turn the cloth to a clean area before you continue.

(d) Clean the rivet holes, the screw hole and the adjacent areas that you have repaired until the moist cleaning cotton wiper, G00034 stays clean.

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

(e) Make a cotton swab, G01659 moist with alcohol, B00679 [C04-035].

(f) Use the moist cotton swab, G01659 to clean the small areas that you can not get access to with a cleaning cloth.

(g) Dry each area with a dry cotton swab, G01659 or a dry cleaning cotton wiper, G00034.

(h) Let the area dry in the air for a minimum of 15 minutes.

SUBTASK 72-24-00-370-003-H01

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.

(3) If there are areas of the fan case where the primer was removed, apply Bonderite M-CR 1200S Aero coating, C00943 [C03-006] to each of the bare aluminum surfaces.

(a) Do this task: Chemical Touch Up for Aluminum, TASK 70-43-07-900-801-H01.

WARNING

DO NOT GET ZINC CHROMATE PRIMER OR EPOXY PAINT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ZINC CHROMATE PRIMER OR EPOXY PAINT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE ZINC CHROMATE PRIMER OR EPOXY PAINT. KEEP ZINC CHROMATE PRIMER OR EPOXY PAINT AWAY FROM SPARKS, FLAME, AND HEAT. ZINC CHROMATE PRIMER AND EPOXY PAINT ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(b) Apply primer, C00941 [C03-001] where you applied the Bonderite M-CR 1200S Aero coating, C00943 [C03-006].

SUBTASK 72-24-00-220-021-H01

(4) For each screw hole that you repaired, make a decision about the washer to use as follows.

(a) For a screw hole in the aft fan case, use

1) An oversize washer (Figure 803), or

2) Alternative washer 133A1624P5

(b) For a screw hole in the forward fan case with a damaged area of 0.365-0.500 inch (9.270-12.700 mm) in diameter, use

1) An oversize washer (Figure 803), or

2) Recommended washer 133A1624P7, or

3) Alternative washer 133A1624P5

(c) For a screw hole in the forward fan case with a damaged area of 0.5-1.0 inch (12.7-25.4 mm) in diameter, use an oversize washer (Figure 803).

SUBTASK 72-24-00-220-022-H01

(5) Make the correct number of oversize washers (Figure 803) and get the correct number of recommended and alternative washers.

SUBTASK 72-24-00-110-004-H01

(6) Clean the washers as follows:

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

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Get some cotton wiper, G00034 and alcohol, B00679 [C04-035].

(b) Make a cleaning cotton wiper, G00034 moist with the alcohol, B00679 [C04-035].

NOTE: Do not use so much alcohol that it falls from the cloth.

(c) Move the moist cleaning cotton wiper, G00034 lightly to clean the oversize washers and the other types of washers. When the cleaning cotton wiper, G00034 gets dirty, turn the cloth to a clean area.

(d) Clean the washers again until the moist cleaning cotton wiper, G00034 stays clean.

(e) Dry each washer with a dry cleaning cotton wiper, G00034.

(f) Let the washer dry in the air for a minimum of 15 minutes.

SUBTASK 72-24-00-370-004-H01

(7) Apply a finish coat to the washers as follows:

WARNING

DO NOT GET ZINC CHROMATE PRIMER OR EPOXY PAINT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ZINC CHROMATE PRIMER OR EPOXY PAINT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE ZINC CHROMATE PRIMER OR EPOXY PAINT. KEEP ZINC CHROMATE PRIMER OR EPOXY PAINT AWAY FROM SPARKS, FLAME, AND HEAT. ZINC CHROMATE PRIMER AND EPOXY PAINT ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Apply primer, C00941 [C03-001] to the washers.

(b) Hang each washer on an isolated wire until the coating is fully dry.

(c) Use a heat gun that is set at a low temperature to dry the washers if you need to make the drying time shorter.

(d) After the washers are fully dry, put them in a clean plastic bag until you are ready to use them.

SUBTASK 72-24-00-410-008-H01

(8) Do the applicable task to install each forward, or aft outer acoustic liner that you removed.

NOTE: Do not follow the installation procedure for the positions where you found a damaged or missing anchor nut assembly.

(a) Do this task: Fan Stator Case Forward Outer Acoustic Liners Installation, TASK 72-24-01-400-801-H01.

(b) Do this task: Fan Stator Case Aft Outer Acoustic Liners Installation, TASK 72-24-01-400-802-H01.

SUBTASK 72-24-00-420-004-H01

(9) At the positions where you installed a new attachment bolt in an outer acoustic liner, install a nut and washer as follows.

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

(a) Get the correct washer from the clean plastic bag where you put the oversize washers and the other washers that you prepared.

(b) Get one of the new nuts that follow:

NOTE: You must use the MS21043-4 nut at the locations where you will use an oversize washer.

1) Recommended nut J1092P04-A286, dry film lubricated.
2) First alternative nut AS3486-10-A286, dry film lubricated.
3) Second alternative nut AS3486-10-A286, silver plated.
4) Third alternative nut J1212P04-Waspoloy, silver plated.
5) Fourth alternative nut MS21043-4-A286, silver plated.

WARNING

DO NOT GET ZINC CHROMATE PRIMER OR EPOXY PAINT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM ZINC CHROMATE PRIMER OR EPOXY PAINT. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE ZINC CHROMATE PRIMER OR EPOXY PAINT. KEEP ZINC CHROMATE PRIMER OR EPOXY PAINT AWAY FROM SPARKS, FLAME, AND HEAT. ZINC CHROMATE PRIMER AND EPOXY PAINT ARE POISONOUS AND FLAMMABLE SOLVENTS WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) Apply a second coat of primer, C00941 [C03-001] to one face of the correct washer.

(d) While the second coat is wet, put the correct washer on the correct bolt with the wet face to the surface of the fan case.

(e) Apply engine lubricating oil, D50072 [C02-023] to the bolt threads that extend out from the fan case.

(f) While the second coat is wet, install the new nut.

(g) If possible, tighten the new nut to 80-100 pound-inches (9.0-11.3 Newton-meters). If you cannot get access to turn the nut, hold the nut with a spanner wrench and turn the head of the bolt.

(h) After 15 minutes, tighten the nut to 80-100 pound-inches (9.0-11.3 Newton-meters) again if possible.

(i) For any attachment position in the aft row of screws on the aft outer acoustic liner, do as follows:

1) If the threads can damage a cable that is near them, put Scotch Flatback Masking Tape 250, G00270 over the bolt threads and the nut.

L. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-00-940-009-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat from the lower half of the inlet cowl.

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

SUBTASK 72-24-00-410-009-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.

SUBTASK 72-24-00-860-017-H01

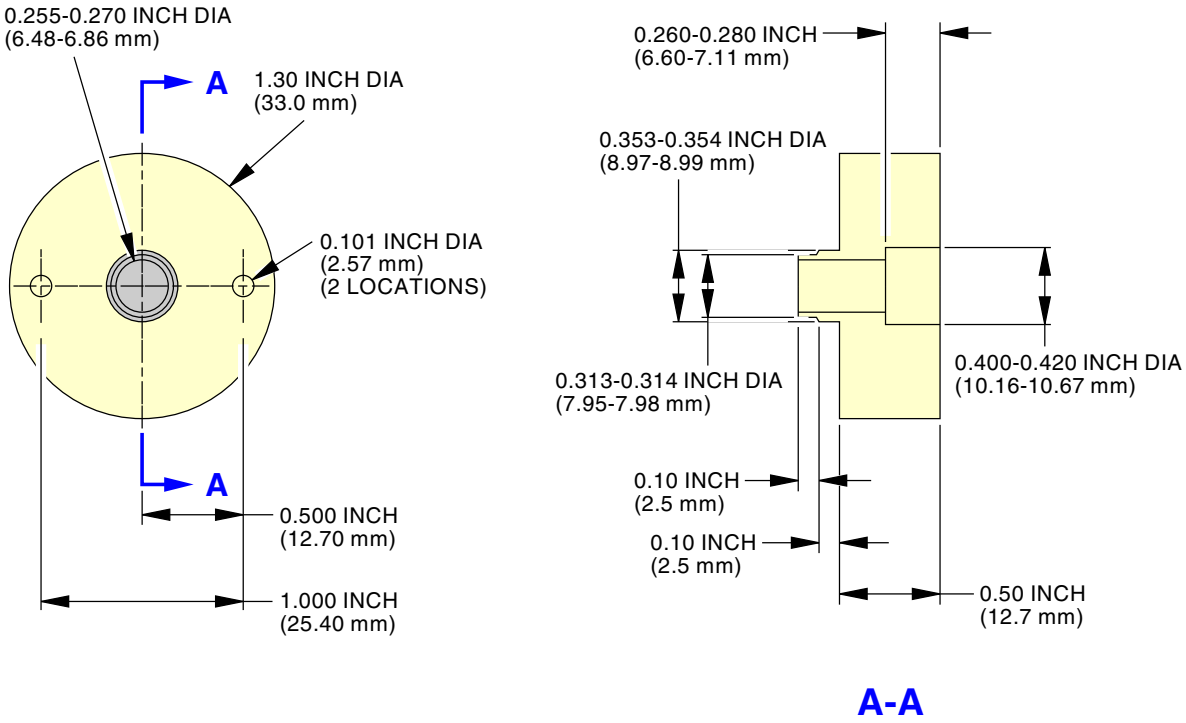
(3) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



MATERIAL:

OIL-HARDENED TOOL STEEL

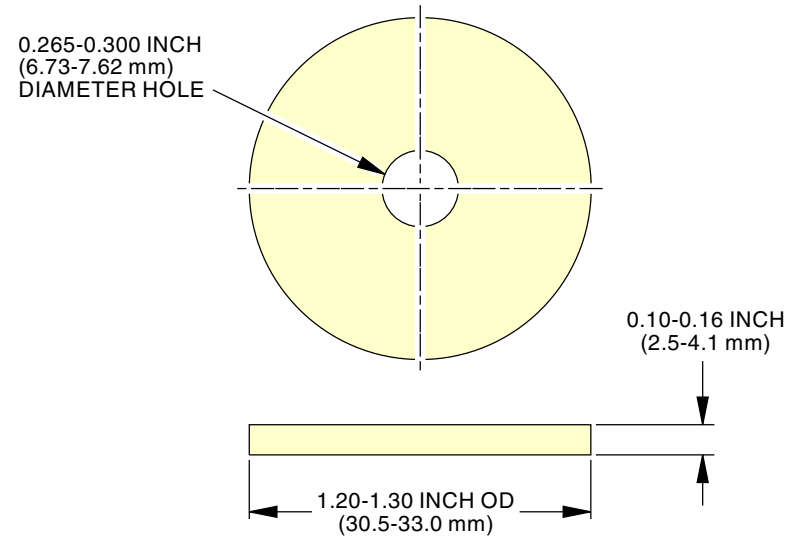
NOTE:

1. BREAK OUTER CORNERS
2. FILLET RADII: 0.00-0.03 INCH (0.0-0.8 mm)

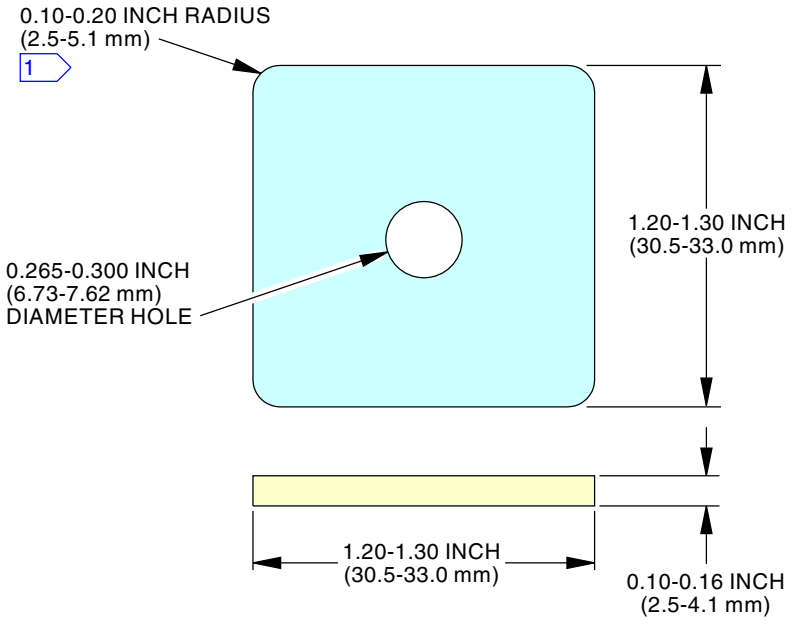
1149964-00-A
M06851 S0004285879_V2

Rivet Hole Location Tool
Figure 802/72-24-00-990-804-H01

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



OVERSIZE WASHER



ALTERNATE OVERSIZE WASHER

MATERIAL:

CORROSION RESISTANT STEEL (CRES)

1 TRUE RADIUS NOT NECESSARY

1142927-00-A

M06852 S0004285880_V2

Oversize Washer
Figure 803/72-24-00-990-805-H01

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

TASK 72-24-00-300-801-H01

4. Fan Stator Pneumatic Seal Repair (24 hour cure repair)

A. General

(1) This task gives instructions for the repair of the inflatable part of a damaged fan stator pneumatic seal (referred to as pneumatic seal). This task is for the areas where access to the bulb seal is possible. You may not be able to repair some areas if accessibility is not possible.

(2) Make sure that you have at least 24 hours for the adhesive to cure after the repair.

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)
72-24-00-200-806-H01	Fan Stator Pneumatic Seal Inspection (P/B 601)
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
SPL-1643	Wrench - Spanner Part #: G25012-8 Supplier: 81205 Opt Part #: C25001-1 Supplier: 81205 Opt Part #: G25012-1 Supplier: 81205 Opt Part #: ST2580-163A Supplier: 81205 Opt Part #: ST2580-334C-1-145 Supplier: 81205 Opt Part #: ST2580-334C-1-185 Supplier: 81205
STD-1418	Blade - Razor

D. Consumable Materials

Reference	Description	Specification
A50008 [C01-122]	Adhesive - Silicone Elastomer, High Strength - RTV 157 (gray)	
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
G02408	Abrasive - Paper, #50 to #400 grit	

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

(Continued)

Reference	Description	Specification
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50031 [C10-108]	Brush - Disposable, Natural Bristle - No. 7237T4 or 7798T2	
G50032 [C10-122]	Cloth - Glass, Style 120, Unsized 120-538	AMS3824A (MIL-Y-1140)
G50033 [C10-133]	Film, Polymer FEP, Unperforated, 0.001 inch (0.03 Mm) Thick	
G50034 [C10-140]	Gloves - Film Latex Or Nylon/Polyethylene, Disposable	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Procedure

SUBTASK 72-24-00-860-018-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-010-009-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

(2) 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

H. Repair the Damaged Fan Stator Pneumatic Seal

SUBTASK 72-24-00-210-007-H01

(1) Examine the pneumatic seal for damage before you do the repair (TASK 72-24-00-200-806-H01) (Figure 804).

SUBTASK 72-24-00-860-019-H01

(2) Prepare the inflatable part of the pneumatic seal for repair.

(a) Remove the inflatable part of the pneumatic seal from its retainer channel in the damaged area.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(b) Clean grease, oil, and dirt off the damaged areas of the pneumatic seal.

1) Put the solvent, B00062 or alcohol, B00130 on a cotton wiper, G00034 and make sure it moist.

NOTE: Do not over soak the cloth.

2) Wipe the cotton wiper, G00034 lightly in one direction across the pneumatic seal.

3) Wipe the pneumatic seal clean with a clean cotton wiper, G00034.

NOTE: Use a new cloth if it is necessary.

4) Do the last wipe with a dry cotton wiper, G00034 before the solvent, B00062 or alcohol, B00130 dries on the pneumatic seal.

5) Let the pneumatic seal dry for a minimum of 15 minutes.

(c) Cut the damaged area on the pneumatic seal (Figure 805).

1) If the trim tool is used (optional), put the seal into the channel part of the trim tool.

NOTE: Contact your local GE representative for the trim tooling information.

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

a) Put the damaged area just out of the trim tool.

b) Assemble the top part of the trim tool into place.

c) Use a sharp razor blade, STD-1418 (or equivalent) to cut the seal apart to make a smooth surface.

d) Use the #50 to #400 grit abrasive paper, G02408 if necessary to smooth the surface flush with the tool and make the bond surface rough.

2) If the trim tool is not used, put the seal on a flat straight surface.

a) Use a sharp razor blade, STD-1418 (or equivalent) to cut the seal apart to make a smooth surface.

b) Use the #50 to #400 grit abrasive paper, G02408 if necessary to make the surface flush and make the bond surface rough.

(d) Do the above steps again at the other end of the damaged area to complete the removal of the damaged length of the pneumatic seal.

SUBTASK 72-24-00-350-001-H01

(3) Measure the length of the damaged seal so that you can prepare the necessary length of the pneumatic seal splice material to repair the seal.

SUBTASK 72-24-00-390-001-H01

(4) If the seal damaged area is removed and it is possible to do a splice between the two cut ends without the splice material, do the steps that follow:

NOTE: Make sure the two ends touch each other without adhesive.

WARNING

DO NOT GET PRIMER AND SEALANT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM PRIMER AND SEALANT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE PRIMER AND SEALANT. KEEP PRIMER AND SEALANT AWAY FROM SPARKS, FLAME, AND HEAT. PRIMER AND SEALANT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Fully wet the fiber cloth, G50032 [C10-122] with SS4004P RTV primer, C00954 and RTV 157 (gray) adhesive, A50008 [C01-122].

1) Put on gloves, G50034 [C10-140].

2) Put the fiber cloth, G50032 [C10-122] flat on clean film, G50033 [C10-133].

3) Use a No. 7237T4 or 7798T2 brush, G50031 [C10-108] that you can discard to apply SS4004P RTV primer, C00954 to the fiber cloth, G50032 [C10-122].

a) Permit the SS4004P RTV primer, C00954 to dry for 15 minutes.

4) If the Teflon squeegee is used (optional), use the Teflon squeegee to apply RTV 157 (gray) adhesive, A50008 [C01-122] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

NOTE: Contact your local GE representative for the Teflon squeegee tooling information.

5) If the Teflon squeegee is not used, apply RTV 157 (gray) adhesive, A50008 [C01-122] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

(b) Assemble the two ends of the seal together.

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

1) Put a double thick piece of Scotch 5490 tape, G50030 [C10-040] inside one end of the seal.

NOTE: Use the 2 inch wide tap and fold back on itself, with the sticky side together to make a double thick piece Teflon tape.

a) Cut two 1.0 x 2.0 inch (25.4 x 50.8 mm) strips out of double thickness length.

b) Let half of the tape extend.

2) Apply a small amount of RTV 157 (gray) adhesive, A50008 [C01-122] over the edges of the two ends of the seal.

3) Hold the seal to make sure the Scotch 5490 tape, G50030 [C10-040] is in place.

a) Move the other end of the seal over the Scotch 5490 tape, G50030 [C10-040] until the two ends are together.

b) Remove the unwanted RTV 157 (gray) adhesive, A50008 [C01-122] from outer surface of seal.

(c) Apply a thin coat of RTV 157 (gray) adhesive, A50008 [C01-122] to the outer surface of the pneumatic seal where the fiber cloth, G50032 [C10-122] will be applied.

(d) Start on one side at the top bead and wind it around to the far edge of the seal's flat bottom to apply the fiber cloth, G50032 [C10-122] to the outer surface of the seal.

(e) Put one piece of the 6.0 x 6.0 inches (152.4 x 152.4 mm) film, G50033 [C10-133] into the retainer at the position of the repair joint.

(f) Push the seal into the retainer with the FEP film between the seal and the retainer.

(g) Wind the fiber cloth, G50032 [C10-122] onto the seal until done.

(h) If the Teflon strip tool is used (optional), fold one edge of the FEP film over the top of the seal and put the Teflon strip into the top of the seal.

NOTE: Contact your local GE representative for the Teflon strip tooling information.

1) Use a clamp to hold the Teflon strips in position.

(i) If the Teflon strip tool is not used, fold one edge of the FEP film over the top of the seal.

(j) Do the same for the other side of the joint.

(k) Cure adhesive for 24 hours at 77 degree F.

(l) Remove the seal repair area from the retainer.

(m) Remove the FEP film from the repair joint.

SUBTASK 72-24-00-390-002-H01

(5) If the seal damaged area that is removed needs to be filled with the splice material, do the steps follows:

(a) Determine the length of the seal splice material for the repair.

1) Measure the length of material needed to splice between the two ends of the pneumatic seal.

NOTE: You should measure the length of the piece removed.

a) If a length of the pneumatic seal splice material is necessary, increase the removed length to 6.0 inches (152.0 mm).

(b) Prepare the pneumatic seal splice material for repair.

1) Cut the seal splice material to form a splice piece.

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

2) If the trim tool is used (optional), put the seal splice material into the channel part of the trim tool.

NOTE: Contact your local GE representative for the Trim tool information.

a) Assemble the top part of the trim tool into place.

3) If the trim tool is not used, put the seal splice material on a flat surface.

4) Use a sharp razor blade, STD-1418 (or equivalent) to cut the seal splice apart to make a smooth surface.

a) Use the #50 to #400 grit abrasive paper, G02408 if necessary to smooth the surface flush with the tool and make the bond surface rough.

5) Measure the length of seal splice material needed.

6) Repeat the method of cutting at the other end of the length necessary.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) Clean the splice length of replacement pneumatic seal material from grease, oil and dirt.

1) Put the solvent, B00062 or alcohol, B00130 on a cotton wiper, G00034and make sure it moist.

NOTE: Do not over soak the cloth.

2) Wipe the cotton wiper, G00034lightly in one direction across the pneumatic seal.

3) Wipe the pneumatic seal clean with a clean cotton wiper, G00034.

NOTE: Use a new cloth if it is necessary.

4) Do the last wipe with a dry cloth before the solvent, B00062 or alcohol, B00130 dries on the pneumatic seal.

5) Let the pneumatic seal dry for a minimum of 15 minutes.

WARNING

DO NOT GET PRIMER AND SEALANT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM PRIMER AND SEALANT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE PRIMER AND SEALANT. KEEP PRIMER AND SEALANT AWAY FROM SPARKS, FLAME, AND HEAT. PRIMER AND SEALANT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(d) Fully wet the fiber cloth, G50032 [C10-122] with SS4004P RTV primer, C00954 and RTV 157 (gray) adhesive, A50008 [C01-122].

1) Put on the gloves, G50034 [C10-140].

2) Put the fiber cloth, G50032 [C10-122] flat on clean film, G50033 [C10-133].

3) Use a No. 7237T4 or 7798T2 brush, G50031 [C10-108] that you can discard to apply SS4004P RTV primer, C00954 to the fiber cloth, G50032 [C10-122].

a) Permit the SS4004P RTV primer, C00954 to dry for 15 minutes.

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

4) If the Teflon squeegee is used (optional), use the Teflon squeegee to apply RTV 157 (gray) adhesive, A50008 [C01-122] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

NOTE: Contact your local GE representative for the Teflon squeegee tooling information.

5) If the Teflon squeegee is not used, apply RTV 157 (gray) adhesive, A50008 [C01-122] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

(e) Assemble the end of the first pneumatic seal and the end of the pneumatic seal splice material together.

1) Put a double thick piece of Scotch 5490 tape, G50030 [C10-040] inside one end of the seal.

NOTE: Use the 2 inch wide tape and fold back on itself, with the sticky side together to make a double thick piece Teflon tape.

a) Cut two 1.0 x 2.0 inch (25.4 x 50.8 mm) strips out of double thickness length.

b) Let half of the tape extend.

2) Apply a small amount of RTV 157 (gray) adhesive, A50008 [C01-122] over the edges of the two ends of the seal.

3) Hold the seal to make sure the Scotch 5490 tape, G50030 [C10-040] is in place.

a) Move the other end of the seal over the Scotch 5490 tape, G50030 [C10-040] until the two ends are together.

b) Remove the unwanted RTV 157 (gray) adhesive, A50008 [C01-122] from outer surface of seal.

(f) Apply a thin coat of RTV 157 (gray) adhesive, A50008 [C01-122] to the outer surface of the pneumatic seal where the fiber cloth, G50032 [C10-122] will be applied.

(g) Start on one side at the top bead and wind it around to the far edge of the seal's flat bottom to apply the fiber cloth, G50032 [C10-122] to the outer surface of the seal and the seal splice material.

(h) Put one piece of the 6.0 x 6.0 inches (152.4 x 152.4 mm) film, G50033 [C10-133] into the retainer at the position of the repair joint.

(i) Push the seal into the retainer with the FEP film between the seal and the retainer.

(j) Wind the fiber cloth, G50032 [C10-122] onto the seal until done.

(k) If the Teflon strip tool is used (optional), fold one edge of the FEP film over the top of the seal and put the Teflon strip into the top of the seal.

NOTE: Contact your local GE representative for the Teflon strip tooling information.

1) Use a clamp to hold the Teflon strips in position.

(l) If the Teflon strip tool is not used, fold one edge of the FEP film over the top of the seal.

(m) Do the above steps for the other end of the seal splice material.

(n) Cure adhesive for 24 hours at 77 degree F.

(o) Remove the repair portion of the seal from the retainer.

(p) Remove the FEP film from the repair joint.

SUBTASK 72-24-00-210-008-H01

(6) Do a inspection on the repair.

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

(a) Do a visual inspection of the repaired area of the pneumatic seal.

1) Make sure the tape is bonded to the tube.

(b) Use the spanner wrench, SPL-1643 to pull the center bead up to make sure the seal will inflate and that the top is not bonded to the bottom.

(c) Install the pneumatic seal back into the retainer.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-00-410-010-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.

SUBTASK 72-24-00-860-020-H01

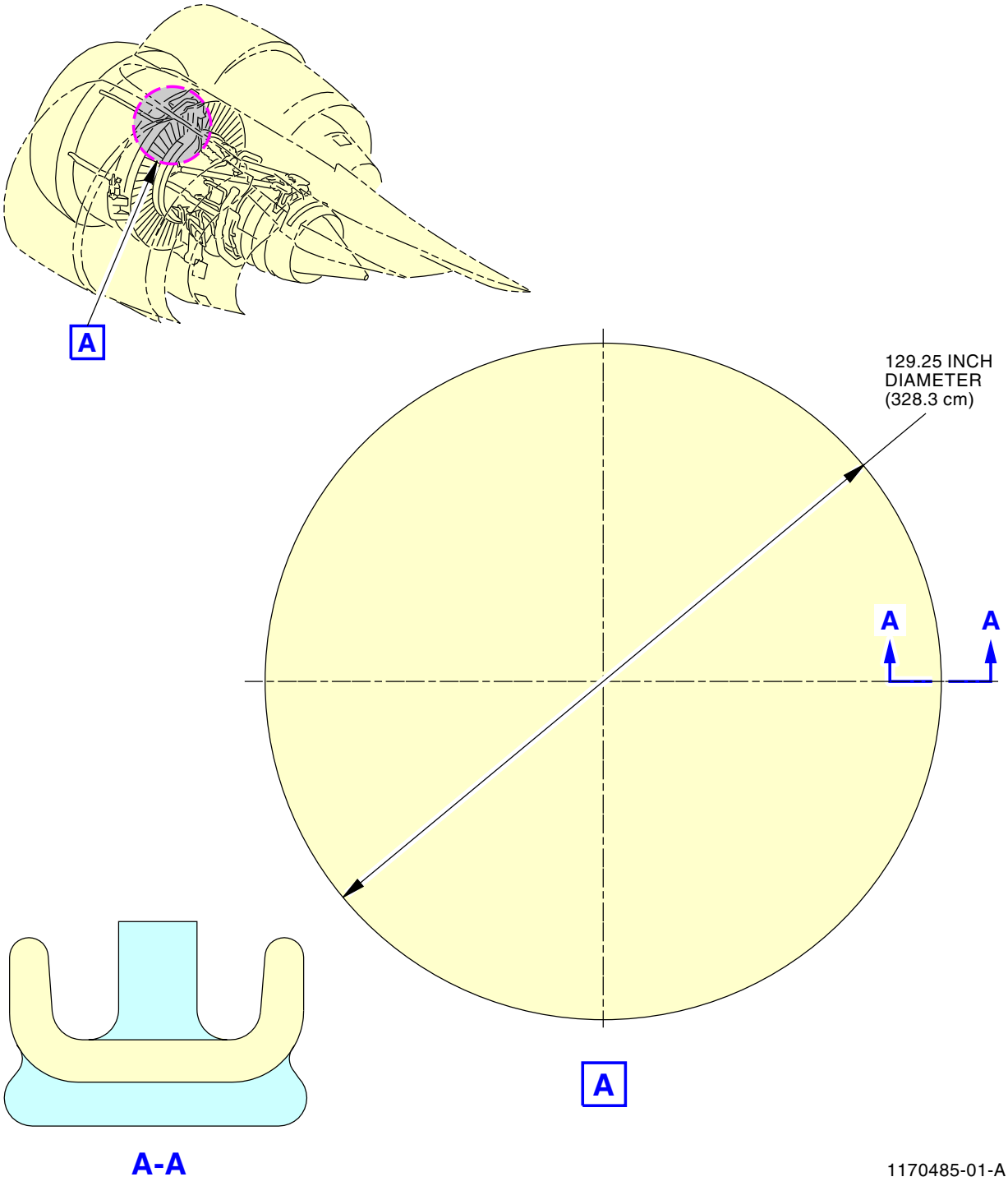
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

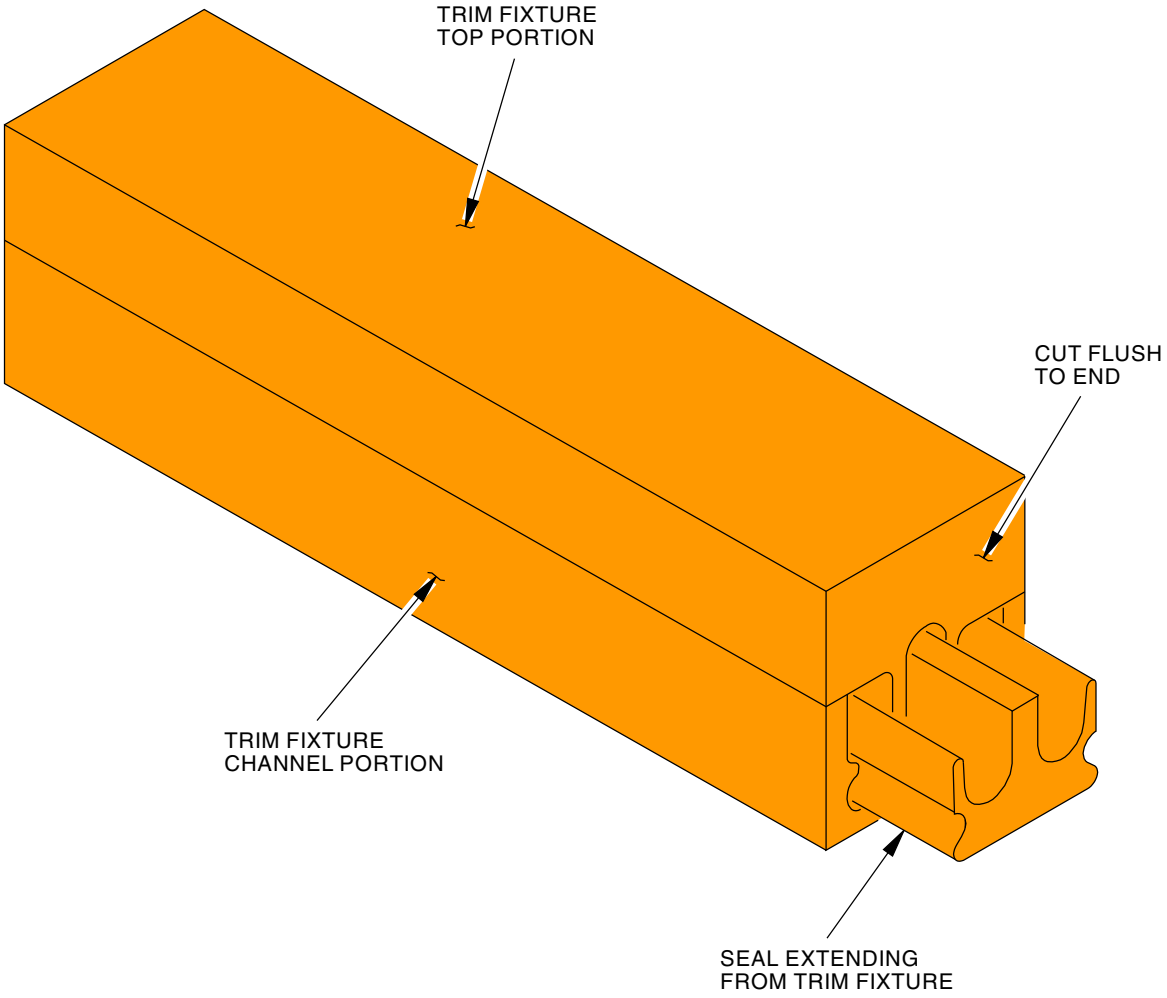
END OF TASK

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



Pneumatic Seal
Figure 804/72-24-00-990-806-H01

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



1170490-00-A
M06854 S0004285882_V2

Seal in Trim Fixture
Figure 805/72-24-00-990-807-H01

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

TASK 72-24-00-300-802-H01

5. Fan Stator Pneumatic Seal Repair (fast cure repair)

A. General

(1) This task gives instructions for the repair of the inflatable part of a damaged fan stator pneumatic seal (referred to as pneumatic seal). This task is for areas where access to the bulb seal is possible. You may not be able to repair some areas if accessibility is not possible.

(2) The cure time necessary for this repair procedure is one hour if you heat the adhesive to 250 degree F (121 degree C). If you do not heat the adhesive, it will take 18 hours for the adhesive to cure.

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)
72-24-00-200-806-H01	Fan Stator Pneumatic Seal Inspection (P/B 601)
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
SPL-1643	Wrench - Spanner Part #: G25012-8 Supplier: 81205 Opt Part #: C25001-1 Supplier: 81205 Opt Part #: G25012-1 Supplier: 81205 Opt Part #: ST2580-163A Supplier: 81205 Opt Part #: ST2580-334C-1-145 Supplier: 81205 Opt Part #: ST2580-334C-1-185 Supplier: 81205
STD-1418	Blade - Razor

D. Consumable Materials

Reference	Description	Specification
A50017 [C01-086]	Compound - Silicone Rubber, 2 Part - RTV 664 (blue)	
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

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

(Continued)

Reference	Description	Specification
G02408	Abrasive - Paper, #50 to #400 grit	
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50031 [C10-108]	Brush - Disposable, Natural Bristle - No. 7237T4 or 7798T2	
G50032 [C10-122]	Cloth - Glass, Style 120, Unsized 120-538	AMS3824A (MIL-Y-1140)
G50033 [C10-133]	Film, Polymer FEP, Unperforated, 0.001 inch (0.03 Mm) Thick	
G50034 [C10-140]	Gloves - Film Latex Or Nylon/Polyethylene, Disposable	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Procedure

SUBTASK 72-24-00-860-021-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-00-010-010-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

(2) 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

H. Repair the Damaged Fan Stator Pneumatic Seal

SUBTASK 72-24-00-210-009-H01

(1) Examine the pneumatic seal for damage before you do the repair (TASK 72-24-00-200-806-H01) (Figure 804).

SUBTASK 72-24-00-860-022-H01

(2) Prepare the inflatable part of the pneumatic seal for repair.

(a) Remove the inflatable part of the pneumatic seal from its retainer channel in the damaged area.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(b) Clean grease, oil, and dirt off the damaged areas of the pneumatic seal.

1) Put the solvent, B00062 or alcohol, B00130 on a cotton wiper, G00034 and make sure it moist.

NOTE: Do not over soak the cloth.

2) Wipe the cotton wiper, G00034 lightly in one direction across the pneumatic seal.

3) Wipe the pneumatic seal clean with a clean cotton wiper, G00034.

NOTE: Use a new cloth if it is necessary.

4) Do the last wipe with a dry cloth cotton wiper, G00034 before the solvent, B00062 or alcohol, B00130 dries on the pneumatic seal.

5) Let the pneumatic seal dry for a minimum of 15 minutes.

(c) Cut the damaged area on the pneumatic seal .

1) If the trim tool is used (optional), put the seal into the channel part of the trim tool.

NOTE: Contact your local GE representative for the trim tooling information.

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

a) Put the damaged area just out of the trim tool.

b) Assemble the top part of the trim tool into place.

c) Use a sharp razor blade, STD-1418 (or equivalent) to cut the seal to make a smooth surface.

d) Use the #50 to #400 grit abrasive paper, G02408 if necessary to smooth the surface flush with the tool and make the bond surface rough.

2) If the trim tool is not used, put the seal on a flat straight surface.

a) Use a sharp razor blade, STD-1418 (or equivalent) to cut the seal apart to make a smooth surface.

b) Use the #50 to #400 grit abrasive paper, G02408 if necessary to make the surface flush and make the bond surface rough.

(d) Do the above steps again at the other end of the damaged area to complete the removal of the damaged length of the pneumatic seal.

SUBTASK 72-24-00-350-002-H01

(3) Measure the length of the damaged seal so that you can prepare the necessary length of the pneumatic seal splice material to repair the seal.

SUBTASK 72-24-00-390-003-H01

(4) If the seal damaged area (is small) is removed and it is possible to do a splice between the two cut ends without the splice material, do the steps follows:

NOTE: Make sure the two ends touch each other without adhesive.

WARNING

DO NOT GET PRIMER AND SEALANT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM PRIMER AND SEALANT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE PRIMER AND SEALANT. KEEP PRIMER AND SEALANT AWAY FROM SPARKS, FLAME, AND HEAT. PRIMER AND SEALANT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(a) Fully wet the fiber cloth, G50032 [C10-122] with SS4004P RTV primer, C00954 and RTV 664 compound, A50017 [C01-086].

1) Put on gloves, G50034 [C10-140].

2) Mix the RTV 664 compound, A50017 [C01-086] components together.

a) Mix each component thoroughly to mix solid to liquid.

b) Mix components, 10 parts A to 1 part B.

NOTE: Pot life of the compound is at least 1 hour at 70 degree F (21 degree C).

3) Put the fiber cloth, G50032 [C10-122] flat on clean film, G50033 [C10-133], unperforated 0.001 inch (0.030 mm) thick..

4) Use a No. 7237T4 or 7798T2 brush, G50031 [C10-108] that you can discard to apply SS4004P RTV primer, C00954 to the fiber cloth, G50032 [C10-122].

a) Permit the SS4004P RTV primer, C00954 to dry for 15 minutes.

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

5) If the Teflon squeegee is used (optional), use the Teflon squeegee to apply RTV 664 compound, A50017 [C01-086] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

NOTE: Contact your local GE representative for the Teflon squeegee tooling information.

6) If the Teflon squeegee is not used, apply RTV 664 compound, A50017 [C01-086] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

(b) Assemble the two ends of the seal together.

1) Put a double thick piece of Scotch 5490 tape, G50030 [C10-040] inside one end of the seal.

NOTE: Use the 2 inch wide tape and fold back on itself, with the sticky side together to make a double thick piece Teflon tape.

a) Cut two 1.0 x 2.0 inch (25.4 x 50.8 mm) strips out of double thickness length.

b) Let half of the tape extend.

2) Apply a small amount of RTV 664 compound, A50017 [C01-086] over the edges of the two ends of the seal.

3) Hold the seal to make sure the Scotch 5490 tape, G50030 [C10-040] is in place.

a) Move the other end of the seal over the Scotch 5490 tape, G50030 [C10-040] until the two ends are together.

b) Remove the unwanted RTV 664 compound, A50017 [C01-086] from outer surface of seal.

(c) Apply a thin coat of RTV 664 compound, A50017 [C01-086] to the outer surface of the pneumatic seal where the fiber cloth, G50032 [C10-122] will be applied.

(d) Start on one side at the top bead and wind it around to the far edge of the seal's flat bottom to apply the fiber cloth, G50032 [C10-122] to the outer surface of the seal.

(e) Put one piece of the 6.0 x 6.0 inches (152.4 x 152.4 mm) film, G50033 [C10-133], unperforated 0.001 inch (0.030 mm) thick into the retainer at the position of the repair joint.

(f) Push the seal into the retainer with the FEP film between the seal and the retainer.

(g) Wind the fiber cloth, G50032 [C10-122] onto the seal until done.

(h) If the Teflon strip tool is used (optional), fold one edge of the FEP film over the top of the seal and put the Teflon strip into the top of the seal.

NOTE: Contact your local GE representative for the Teflon strip tooling information.

1) Use a clamp to hold the Teflon strips in position.

(i) If the Teflon strip tool is not used, fold one edge of the FEP film over the top of the seal.

(j) Do the same for the other side of the joint.

(k) Cure adhesive for 18 hours at 77 degree F (25 degree C) or 2 hours at 150 degree F (66 degree C) or 1 hours at 250 degree F (121 degree C).

NOTE: Use a heat lamp, heat gun, or heat tape to heat the adhesive. Use a thermocouple near the glass ply to measure the seal temperature.

(l) Remove the seal repair area from the retainer.

(m) Remove the FEP film from the repair joint.

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

SUBTASK 72-24-00-390-004-H01

(5) If the seal damaged area that is removed needs to be filled with the splice material, do the steps follows:

(a) Determine the length of the seal splice material for the repair.

1) Measure the length of material needed to splice between the two ends of the pneumatic seal.

NOTE: You should measure the length of the piece removed.

a) If a length of the pneumatic seal splice material is necessary, increase the removed length to 6.0 inches (152.0 mm).

(b) Prepare the pneumatic seal splice material for repair.

1) Cut the seal splice material to form a splice piece.

2) If the trim tool is used (optional), put the seal splice material into the channel part of the trim tool.

NOTE: Contact your local GE representative for the Trim tool information.

a) Assemble the top part of the trim tool into place.

3) If the trim tool is not used, put the seal splice material on a flat surface.

4) Use a sharp razor blade, STD-1418 (or equivalent) to cut the seal splice apart to make a smooth surface.

a) Use the #50 to #400 grit abrasive paper, G02408 if necessary to smooth the surface flush with the tool and make the bond surface rough.

5) Measure the length of seal splice material needed.

6) Repeat the method of cutting at the other end of the length necessary.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(c) Clean the splice length of replacement pneumatic seal material from grease, oil and dirt.

1) Put the solvent, B00062 or alcohol, B00130 on a cotton wiper, G00034 and make sure it moist.

NOTE: Do not over soak the cloth.

2) Wipe the cotton wiper, G00034 lightly in one direction across the pneumatic seal.

3) Wipe the pneumatic seal clean with a clean cotton wiper, G00034.

NOTE: Use a new cloth if it is necessary.

4) Do the last wipe with a dry cotton wiper, G00034 before the solvent, B00062 or alcohol, B00130 dries on the pneumatic seal.

5) Let the pneumatic seal dry for a minimum of 15 minutes.

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

WARNING

DO NOT GET PRIMER AND SEALANT IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM PRIMER AND SEALANT. PUT ON GOGGLES, AND GLOVES WHEN YOU USE PRIMER AND SEALANT. KEEP PRIMER AND SEALANT AWAY FROM SPARKS, FLAME, AND HEAT. PRIMER AND SEALANT IS POISONOUS AND FLAMMABLE, AND CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

(d) Fully wet the fiber cloth, G50032 [C10-122] with SS4004P RTV primer, C00954 and RTV 664 compound, A50017 [C01-086].

1) Put on gloves, G50034 [C10-140].
2) Mix the RTV 664 compound, A50017 [C01-086] components together.
   a) Mix each component thoroughly to mix solid to liquid.
   b) Mix components, 10 parts A to 1 part B.

      NOTE: Pot life of compound is at least 1 hour at 70 degree F (21 degree C).
3) Put the fiber cloth, G50032 [C10-122] flat on clean film, G50033 [C10-133].
4) Use a No. 7237T4 or 7798T2 brush, G50031 [C10-108] that you can discard to apply SS4004P RTV primer, C00954 to the fiber cloth, G50032 [C10-122].
   a) Permit the SS4004P RTV primer, C00954 to dry for 15 minutes.
5) If the Teflon squeegee is used (optional), use the Teflon squeegee to apply RTV 664 compound, A50017 [C01-086] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

   NOTE: Contact your local GE representative for the Teflon squeegee tooling information.
6) If the Teflon squeegee is not used, apply RTV 664 compound, A50017 [C01-086] to the fiber cloth, G50032 [C10-122] and smooth out any air bubbles in the fiber cloth, G50032 [C10-122].

(e) Assemble the the end of the first pneumatic seal and the end of the pneumatic seal splice material together.

1) Put a double thick piece of Scotch 5490 tape, G50030 [C10-040] inside one end of the seal.

   NOTE: Use the 2 inch wide tape and fold back on itself, with the sticky side together to make a double thick piece Teflon tape.
   a) Cut two 1.0 x 2.0 inch (25.4 x 50.8 mm) strips out of double thickness length.
   b) Let half of the tape extend.
2) Apply a small amount of RTV 664 compound, A50017 [C01-086] over the edges of the two ends of the seal.
3) Hold the seal to make sure the Scotch 5490 tape, G50030 [C10-040] is in place.
   a) Move the other end of the seal over the Scotch 5490 tape, G50030 [C10-040] until the two ends are together.
   b) Remove the unwanted RTV 664 compound, A50017 [C01-086] from outer surface of seal.

(f) Apply a thin coat of RTV 664 compound, A50017 [C01-086] to the outer surface of the pneumatic seal where the fiber cloth, G50032 [C10-122] will be applied.

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

(g) Start on one side at the top bead and wind it around to the far edge of the seal's flat bottom to apply the fiber cloth, G50032 [C10-122] to the outer surface of the seal and the seal splice material.

(h) Put one piece of the 6.0 x 6.0 inch (152.4 x 152.4 mm) film, G50033 [C10-133], unperforated 0.001 inch (0.03 mm) thick into the retainer at the position of the repair joint.

(i) Push the seal into the retainer with the FEP film between the seal and the retainer.

(j) Wind the fiber cloth, G50032 [C10-122] onto the seal until done.

(k) If the Teflon strip tool is used (optional), fold one edge of the FEP film over the top of the seal and put the Teflon strip into the top of the seal.

NOTE: Contact your local GE representative for the Teflon strip tooling information.

1) Use a clamp to hold the Teflon strips in position.

(l) If the Teflon strip tool is not used, fold one edge of the FEP film over the top of the seal.

(m) Do the above steps for the other end of the seal splice material.

(n) Cure adhesive for 18 hours at 77 degree F (25 degree C) or 2 hours at 150 degree F (66 degree C) or 1 hours at 250 degree F (121 degree C).

NOTE: Use a heat lamp, heat gun, or heat tape to heat the adhesive. Use a thermocouple near the glass ply to measure the seal temperature.

(o) Remove the repair portion of the seal from the retainer.

(p) Remove the FEP film from the repair joint.

SUBTASK 72-24-00-210-010-H01

(6) Do a inspection on the repair.

(a) Do a visual inspection of the repaired area of the pneumatic seal.

1) Make sure the tape is bonded to the tube.

(b) Use the spanner wrench, SPL-1643 to pull the center bead up to make sure the seal will inflate and that the top is not bonded to the bottom.

(c) Install the pneumatic seal back into the retainer.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-00-410-011-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.

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.

SUBTASK 72-24-00-860-023-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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

FAN STATOR CASE OUTER ACOUSTIC LINERS - REMOVAL/INSTALLATION

1. General

A. This procedure has four tasks:

(1) A removal of the fan stator case forward outer acoustic liners

(2) An installation of the fan stator case forward outer acoustic liners

(3) A removal of the fan stator case aft outer acoustic liners

(4) An installation of the fan stator case aft outer acoustic liners.

TASK 72-24-01-000-801-H01

2. Fan Stator Case Forward Outer Acoustic Liners Removal

A. General

(1) This task is the removal procedure for the forward outer acoustic liners.

(2) The fan stator case forward outer acoustic liners (referred to as liners) are attached to the inside outer surface of the fan stator case.

(3) You can get access to the liners through the inlet of the engine. The removal procedure for each of the liners is the same.

B. 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

C. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

D. Prepare for the Removal

SUBTASK 72-24-01-865-003-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-01-480-001-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to protect the inlet cowl and the engine.

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

E. Fan Stator Case Forward Outer Acoustic Liners Removal

SUBTASK 72-24-01-020-001-H01

(1) Remove the forward outer acoustic liner [2] (Figure 401).

(a) Mark with a marking pen the location of the forward outer acoustic liner to be removed.

(b) Loosen the screws [1] that attach the forward outer acoustic liner [2] to the inner side of the fan stator case [3].

CAUTION DO NOT USE A SCREWDRIVER TO LIFT UP THE ACOUSTIC LINER FROM THE FAN CASE. A SCREWDRIVER CAN CAUSE DAMAGE TO THE LIP OF THE LINER.

CAUTION THE SCREWS ARE NOT CAPTIVE AND CAN FALL OUT WHEN COMPLETELY LOOSENED. DO NOT DROP THE SCREWS INTO THE ENGINE OR DAMAGE TO THE ENGINE COULD OCCUR.

(c) Lift the front edge of the forward outer acoustic liner [2] with your hand.

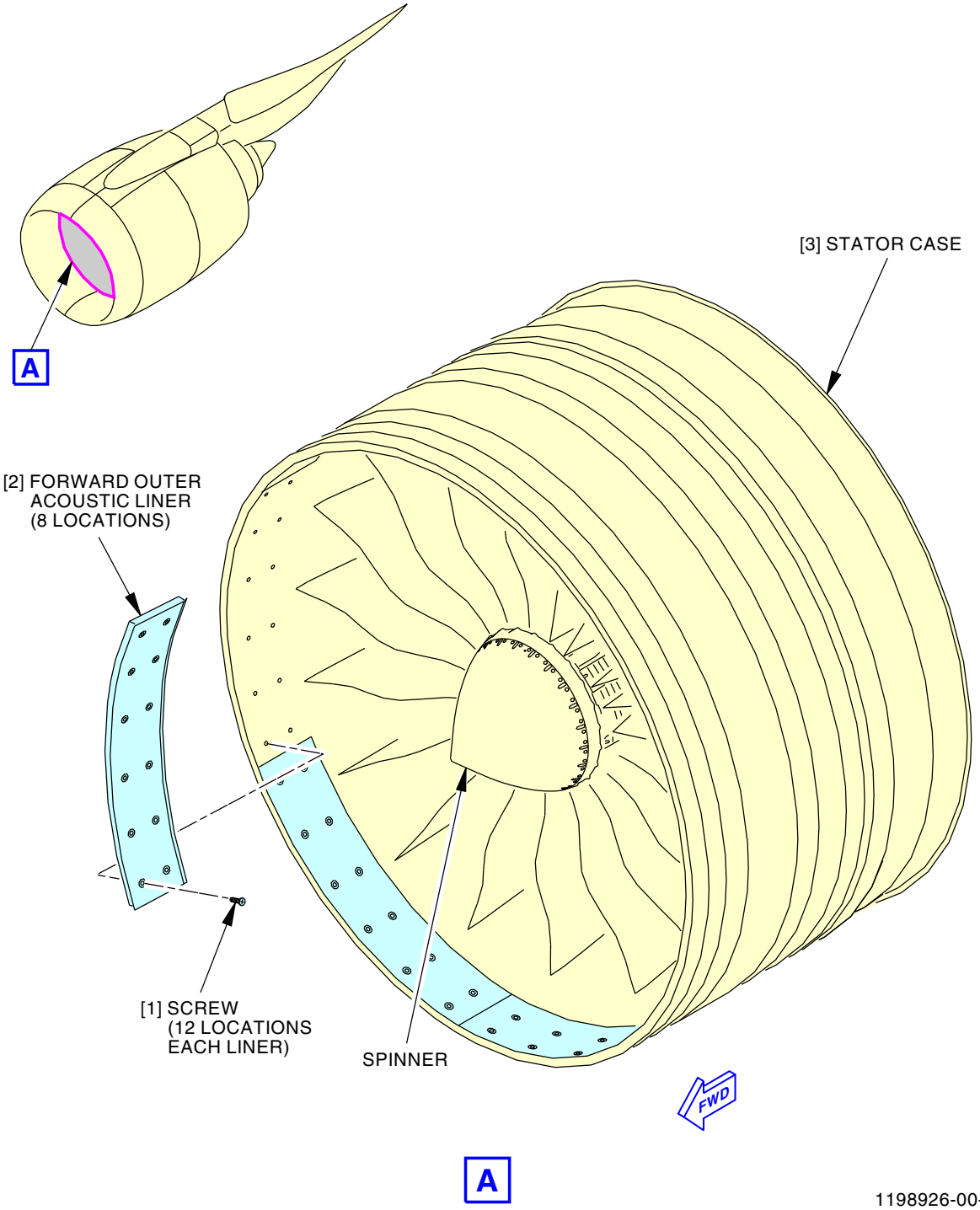
1) Slide the forward outer acoustic liner [2] aft slightly.

(d) Remove the forward outer acoustic liner [2] aft flange (with rubber bumpers) from the front flange circular groove of the fan stator case [3].

(e) Remove the forward outer acoustic liner [2].

END OF TASK

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



Fan Stator Case Forward Outer Acoustic Liners Installation
Figure 401/72-24-01-990-801-H01

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

TASK 72-24-01-400-801-H01

3. Fan Stator Case Forward Outer Acoustic Liners Installation

A. General

(1) This task is the installation procedure for the fan stator case forward outer acoustic liners (referred to as the liners). The installation procedure for each of the liners is the same.

B. References

Reference	Title
70-51-00-910-801-H01	Instruction for Torque (P/B 201)

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

D. Consumable Materials

Reference	Description	Specification
B00130	Alcohol - Isopropyl	TT-I-735
D50072 [C02-023]	Oil - Engine Lubricating	MIL-PRF-23699
G02448 [C05-003]	Marker - Pens	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
2	Forward outer acoustic liner	72-24-00-11-015	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

G. Fan Stator Case Forward Outer Acoustic Liners Installation

SUBTASK 72-24-01-420-001-H01

(1) Install the forward outer acoustic liner [2] (Figure 401):

(a) Clean the threads of the screws and nutplates with isopropyl alcohol, B00130, before applying lubricant.

(b) If nutplates are used again, do the “Torque Check for the Re-Use of Self Locking Nuts” procedure (TASK 70-51-00-910-801-H01 (Thread size = 1/4 and Threads/Inch = 28)).

(c) Apply engine lubricating oil, D50072 [C02-023] to the threads of the screws [1].

CAUTION MAKE SURE THE LINER, STATOR CASE, AND NUTPLATE HOLES ALIGN. IF THEY DO NOT, DAMAGE TO THE FAN CASE CAN OCCUR WHEN YOU TIGHTEN THE SCREWS.

(d) Install the forward outer acoustic liner [2] with the aft flange (and rubber bumpers) in the forward flange circular groove of the fan stator case [3] with screws [1].

1) Tip one end of the forward outer acoustic liner [2] to the open slot and slide the forward outer acoustic liner [2] in position.

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

CAUTION

MAKE SURE ALL SCREW LOCATIONS ARE AT THE CORRECT TORQUE. LOOSE SCREWS CAN DAMAGE THE FAN BLADES WHEN THE ENGINE IS RUN.

(e) Tighten the screws [1] in the forward outer acoustic liner [2] to 115-125 pound-inches (13.0-14.1 Newton-meters) in the sequence that follows:

NOTE: Forward outer acoustic liners have two rows of screws. When you tighten the screws, you always start with the forward row and alternate to the aft row, and work from the center of the liner to the ends.

1) To make sure that all locations are tight, it is recommended to mark a line on the bushing flange at each location as you tighten the screws the first time. As you tighten the screws the second time, make a mark (line) on the screw head that connects it to the line marked after you do tighten the screws the first time. Refer to Figure 402.

a) Use a marker, G02448 [C05-003] (white recommended).

NOTE: Other methods to make sure you tightened the screws correctly are acceptable.

NOTE: You can remove marks you made before to prevent confusion.

NOTE: The mark can be used as a future reference to identify the direction to turn the screw.

2) Tighten the two forward row screws [1] located in the center of the forward outer acoustic liner [2].

3) Tighten the two aft row screws [1] located in the center of the forward outer acoustic liner [2].

4) Tighten the two adjacent forward row screws [1] that are on the two sides of the center screws on the forward outer acoustic liner [2].

5) Tighten the two adjacent aft row screws [1] that are on the two sides of the center screws on the forward outer acoustic liner [2].

6) Tighten the two forward row outermost screws [1] located on each end of the forward outer acoustic liner [2].

7) Tighten the two aft row outermost screws [1] located on each end of the forward outer acoustic liner [2].

(f) After 15 minutes, tighten the captive screws [1] again in the same sequence to 115-125 pound-inches (13.0-14.1 Newton-meters).

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-01-080-001-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the inlet cowl.

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

SUBTASK 72-24-01-865-004-H01

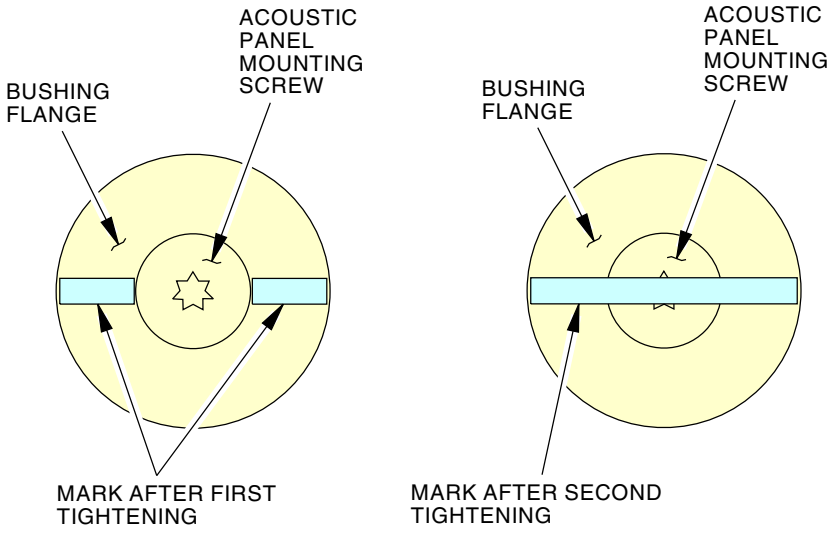
(2) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



2814695 S0000648795_V1

Fwd Acoustic Liner Stripe Marking
Figure 402/72-24-01-990-809-H01

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

TASK 72-24-01-000-802-H01

4. Fan Stator Case Aft Outer Acoustic Liners Removal

A. General

(1) This task is the removal procedure for the fan stator case aft outer acoustic liners.

(2) The fan stator case aft outer acoustic liners (referred to as the liners) are attached to the inside outer surface of the fan stator case. Access is through the inlet of the engine.

(3) You must remove some of the fan blades to access the liners. The removal procedure for each of the liners is the same.

B. References

Reference	Title
72-21-01-000-801-H01	Fan Rotor Spinner Removal (P/B 401)
72-21-02-020-801-H01	Fan Blades Removal (Selection) (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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

E. Prepare for the removal.

SUBTASK 72-24-01-865-001-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-01-480-002-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to protect the inlet cowl and the engine.

SUBTASK 72-24-01-020-002-H01

(3) Do this task:Fan Rotor Spinner Removal, TASK 72-21-01-000-801-H01.

SUBTASK 72-24-01-010-001-H01

(4) Remove the fan blades as it is necessary. To remove the blades, do this task:Fan Blades Removal (Selection), TASK 72-21-02-020-801-H01.

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

F. Fan Stator Case Aft Outer Acoustic Liners Removal

SUBTASK 72-24-01-020-003-H01

(1) Remove the aft outer acoustic liner [21] and aft outer acoustic liner [23] (Figure 403).

CAUTION

ACOUSTIC PANEL STRUCTURES ARE COMPRISED OF SOLID BACK SKIN WITH AN ALUMINUM HONEYCOMB CORE ATTACHED TO A FACE SHEET OF AN ALUMINUM PERFORATED PLATE COVERED WITH A WOVEN STAINLESS STEEL WIRE CLOTH. ANY DAMAGE TO ACOUSTIC SKIN WHICH CAUSES PARTICLES OF STAINLESS STEEL TO PENETRATE ADHESIVE AND PERFORATE ALUMINUM SKIN WILL CAUSE RAPID DISSIMILAR METAL REACTION WHICH WILL SPREAD TO THE SURROUNDING AREA.

CAUTION

THE SCREWS ARE NOT CAPTIVE AND CAN FALL OUT WHEN COMPLETELY LOOSENED. DO NOT DROP THE SCREWS INTO THE ENGINE OR DAMAGE TO THE ENGINE COULD OCCUR.

(a) Loosen the screws [24] and screws [25] that attach the aft outer acoustic liner [21] and aft outer acoustic liner [23] to the inner side of the fan stator case [3].

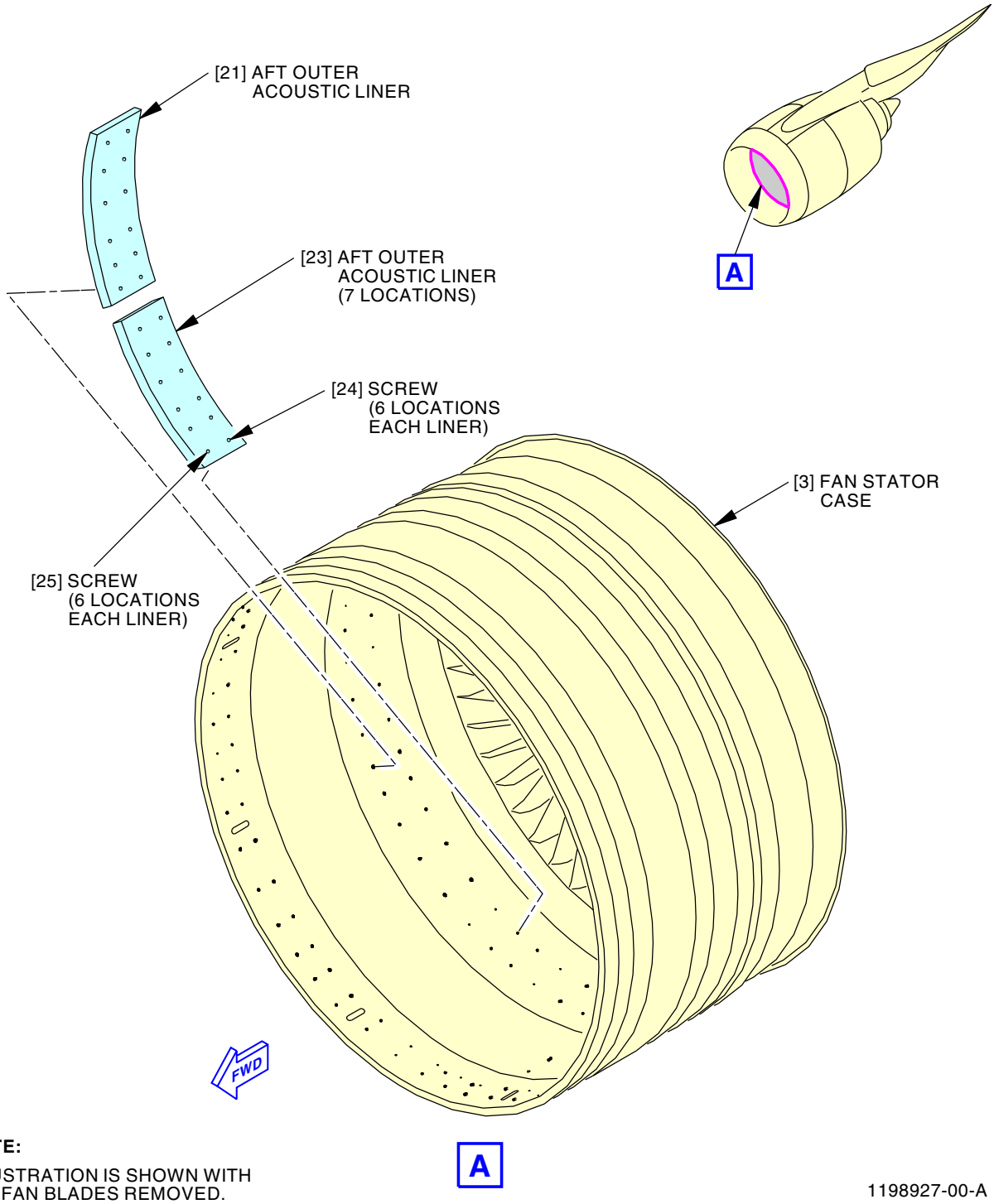
(b) Remove the screws [24] and screws [25].

(c) Lift the forward and rear edge of the aft outer acoustic liner [21] and aft outer acoustic liner [23] with your hands.

(d) Remove the aft outer acoustic liner [21] and aft outer acoustic liner [23] from the fan stator case [3].

——— END OF TASK ———

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



NOTE:

ILLUSTRATION IS SHOWN WITH ALL FAN BLADES REMOVED.

1198927-00-A
M06861 S0004285885_V3

Fan Stator Case Aft Outer Acoustic Liner Installation
Figure 403/72-24-01-990-803-H01

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

TASK 72-24-01-400-802-H01

5. Fan Stator Case Aft Outer Acoustic Liners Installation

A. General

(1) This task is the installation procedure for the fan stator case aft outer acoustic liners. The installation procedure for each of the liners is the same.

B. References

Reference	Title
72-21-01-400-801-H01	Fan Rotor Spinner Installation (P/B 401)
72-21-02-400-801-H01	Fan Blades Installation (Selection) (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

D. Consumable Materials

Reference	Description	Specification
A01083 [C01-176]	Sealant - Silicone Elastomer - RTV 133 (black)	
A50119	Adhesive - Silicone Rubber - RTV 103 (Black)	MIL-A-46106
B00130	Alcohol - Isopropyl	TT-I-735
C00954	Primer - Adhesive Bonding - SS4004P RTV	BAC5010 PSD 6-168 Type 74
D50072 [C02-023]	Oil - Engine Lubricating	MIL-PRF-23699
G02350 [C10-012]	Tape - High Temperature Masking	

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
21	Aft outer acoustic liner	72-24-00-11-025	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

G. Fan Stator Case Aft Outer Acoustic Liners Installation

SUBTASK 72-24-01-420-002-H01

(1) Install the aft outer acoustic liner [21] and aft outer acoustic liner [23] (Figure 403):

(a) Apply engine lubricating oil, D50072 [C02-023] to the threads of the screws [24] and screws [25].

(b) Install the aft outer acoustic liner [21] and aft outer acoustic liner [23] into the fan stator case [3] with the screws [24] and screws [25].

NOTE: Aft outer acoustic liners have two rows of screws. When you tighten these screws, always start with the forward row and alternate to the aft row from the center screw to the ends.

(c) Tighten the screws [24] and screws [25] in the aft outer acoustic liner [21] and aft outer acoustic liner [23] to 115 in-lb (13 N·m) to 125 in-lb (14.1 N·m) in the sequence that follows:

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

1) Tighten the two forward row screws [25] that are located at the center of the arc length of the aft outer acoustic liner [21] and aft outer acoustic liner [23].
2) Tighten the two aft screws [24] that are located at the center of the arc length of the aft outer acoustic liner [21] and aft outer acoustic liner [23].
3) Tighten the two adjacent forward row screws [25] that are on the two sides of the center screws on the aft outer acoustic liner [21] and aft outer acoustic liner [23].
4) Tighten the two adjacent aft row screws [24] that are on the two sides of the center screws on the aft outer acoustic liner [21] and aft outer acoustic liner [23].
5) Tighten the two forward row outermost screws [25] located on each end of the aft outer acoustic liner [21] and aft outer acoustic liner [23].
6) Tighten the two aft row outermost screws [24] located on each end of the aft outer acoustic liner [21] and aft outer acoustic liner [23].

(d) After fifteen minutes, tighten the screws [24] and screws [25] again in the same sequence to 115 in-lb (13 N·m) to 125 in-lb (14.1 N·m).

(e) Apply RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119 to the gaps between the Outlet Guide Vane(s) (OGV) fairings and the aft outer acoustic panel in or less than 120 cycles from the time of installation of acoustic panel.

WARNING DO NOT GET ISOPROPYL ALCOHOL (IPA) IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM IPA. PUT ON GOGGLES, AND GLOVES WHEN YOU USE IPA. KEEP IPA AWAY FROM SPARKS, FLAME, AND HEAT. IPA IS POISONOUS AND FLAMMABLE. IT CAN CAUSE INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT.

1) Clean all surfaces around the OGV gaps with alcohol, B00130.

   NOTE: Make sure all tools are clean before you apply the sealant.

2) Apply the SS4004P RTV primer, C00954 to all surfaces where you will apply the RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119.
3) Apply RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119 to the gaps between the OGV and the OGV fairings.
   a) If necessary, use tape, G02350 [C10-012] and a caulking gun when you apply the RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119.
4) Make sure all areas of the RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119 are smooth after it is applied.

   NOTE: All changes in contour must be smooth. No irregular surfaces are permitted on the RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119.

5) Let the RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119 cure for 24 hours.

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

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-080-002-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(1) Remove the protective mat, STD-585 from the inlet cowl.

SUBTASK 72-24-01-865-002-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-01-410-001-H01

(3) Install the fan blades that you removed. To install the blades, do this task: Fan Blades Installation (Selection), TASK 72-21-02-400-801-H01.

SUBTASK 72-24-01-420-003-H01

(4) Do this task:Fan Rotor Spinner Installation, TASK 72-21-01-400-801-H01.

END OF TASK

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

FAN STATOR CASE OUTER ACOUSTIC LINERS - INSPECTIONS/CHECK

1. General

A. This procedure has two tasks:

(1) An inspection of the fan stator case forward outer acoustic liner

(2) An inspection of the fan stator case aft outer acoustic liner.

TASK 72-24-01-200-801-H01

2. Fan Stator Case Forward Outer Acoustic Liner Inspection

(Figure 601 and Figure 602)

A. General

(1) This task gives the instructions for the visual inspection of the fan stator case forward outer acoustic liners.

B. References

Reference	Title
72-24-01-000-801-H01	Fan Stator Case Forward Outer Acoustic Liners Removal (P/B 401)
72-24-01-400-801-H01	Fan Stator Case Forward Outer Acoustic Liners 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

D. Consumable Materials

Reference	Description	Specification
A00944 [C01-056]	Adhesive - Silicone Elastomer - RTV 108 (translucent)	
A50031	Sealant - Dow Corning 732 Multi-Purpose Sealant	MIL-A-46106
A50119	Adhesive - Silicone Rubber - RTV 103 (Black)	MIL-A-46106
G02329	Tape - Aluminum Foil, Pressure Sensitive - Vibration Damping Tape 434	
G02448 [C05-003]	Marker - Pens	
G50247 [C10-021]	Tape - Plastic	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

F. Prepare for the Inspection

SUBTASK 72-24-01-865-005-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-01-480-003-H01

CAUTION

PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-24-01-210-001-H01

(3) You must replace the fan stator case forward outer acoustic liners for all damage that is more than the limits unless other instructions are given.

(a) Replace the fan stator case forward outer acoustic liner. To replace the fan stator case forward outer acoustic liner, do these tasks: Fan Stator Case Forward Outer Acoustic Liners Removal, TASK 72-24-01-000-801-H01 and , Fan Stator Case Forward Outer Acoustic Liners Installation, TASK 72-24-01-400-801-H01.

NOTE: SUBTASK 72-24-01-210-001-H01 is applicable only for Pre SB 72-0622 fan stators.

G. Fan Stator Case Forward Outer Acoustic Panel Inspection

ARO ALL PRE SB 777-GE100-72-0622; NEW FAN CASE P/N 2082M29G06 WHICH REPLACES 2082M29G05

SUBTASK 72-24-01-220-001-H01

NOTE: In Post SB 72-0622 fan case forward acoustic liners are replaced by axially extended trenchfiller, refer to SUBTASK 72-24-01-210-004-H00.

(1) Do a check of the fan stator case forward outer acoustic liners (Figure 601 and Figure 603).

(a) Cracks and missing face sheet material.

1) Crack and missing face sheet material are permitted in these conditions.

a) No cracks or missing face sheet material measures more than 0.25 inch (6.30 mm) in length.

b) No cracks or missing face sheet material is closer than 0.50 inch (12.70 mm) to an adjacent crack or missing face sheet material.

c) The total area of all cracks and missing face sheet material is less than 0.1 percent of the total area of the face sheet material.

(b) Paint that is missing

1) There is no limit to the amount of missing paint.

(c) Shallow nicks and scratches

1) There is no limit to the amount of shallow nicks and scratches.

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

ARO ALL PRE SB 777-GE100-72-0622; NEW FAN CASE P/N 2082M29G06 WHICH REPLACES 2082M29G05 (Continued)

(d) Dents

1) Dents are permitted in these conditions.

a) There are no dents more than 0.10 inch (2.54 mm) in depth.

b) There are no more than three dents on a liner.

(e) Fan stator case forward outer acoustic liners Continue-in-Service (C-I-S) limits for cracks and missing face sheet material

1) The C-I-S limit for cracks and missing face sheet material is 10 cycles or 50 hours with these conditions.

a) No damage area measures more than 0.50 inch (12.70 mm) in depth or 4.0 inches (102.0 mm) in any direction.

b) The total area of all missing face sheet material is less than 4.0 sq-in (26.0 sq-cm).

c) There are no more than two damaged areas on a liner.

2) Cover the damage area with two layers of Vibration Damping Tape 434 tape, G02329 and seal the edges with RTV 108 adhesive, A00944 [C01-056].

3) Do a check of the damage area in the C-I-S period to make sure that the damage did not become larger.

(f) Tears and cuts

1) Tears and cuts are not permitted. See the Continue-In-Service Limits (C-I-S).

(g) Fan stator case forward outer acoustic liners C-I-S Limits for tears and cuts

1) The C-I-S Limit for tears and cuts is 10 cycles or 50 hours with these conditions.

a) The maximum area that is missing is not more than 4.0 sq-in (25.8 sq-cm).

b) The maximum depth is not more than 0.50 inch (12.70 mm).

c) There must not be more than two damaged areas in a liner.

d) The maximum length is not more than 4.0 inches (102.0 mm).

2) Cover the damaged area with two layers of Vibration Damping Tape 434 tape, G02329 and seal the edges with RTV 108 adhesive, A00944 [C01-056]/RTV 103 adhesive, A50119/Dow Corning 732 multi-purpose sealant, A50031. Make sure that the second layer of damping tape is aligned 90 degrees to the first layer.

3) Do a check of the damaged area in the C-I-S period to make sure that the damage did not become larger.

(h) Delamination and disbond

1) Delamination and disbond are not permitted.

a) Do a tap test to identify disbond or delamination as follows:

NOTE: A Steel rod or equivalent can be used for the tap test. The rod must have rounded ends (Figure 605).

NOTE: Recommended tap spacing is 1 inch (25.4 mm).

<1> Tap the face-sheet of the liner segments lightly with a steel rod and listen to the sound.

<a> If you hear a solid click, there is no disbond or delamination.

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

ARO ALL PRE SB 777-GE100-72-0622; NEW FAN CASE P/N 2082M29G06 WHICH REPLACES 2082M29G05 (Continued)

<b> If you do not hear a solid click there is a disbond or delamination.

<c> If you are unsure, contact an experienced person.

(i) Bushing flange

1) Loose bushing or movement under hand-pressure.

a) Not serviceable

b) The C-I-S is 10 cycles, if adjacent facesheet is not cracked or damaged.

c) Tighten all 12 screws in panel to 115-125 pound-inches (13.0-14.1 Newton-meters).

2) Examine the position of the screw head inside each bushing.

a) If a screw head appears deeper or off-center compared to the other screw/bushing locations, remove the screw and do an inspection of the bushing counterbore for cracks.

b) No cracks are permitted in the bushing counterbore.

c) The C-I-S is 50 cycles, if adjacent facesheet is not cracked or damaged.

d) Tighten all 12 screws in the panel to 115-125 pound-inches (13.0-14.1 Newton-meters).

3) Flange missing material

a) It is permitted to have not more than 1/3 of the flange area missing at a location.

b) The C-I-S is 50 cycles for any amount of missing flange material, if adjacent facesheet and the bushing counterbore is not cracked or damaged.

c) Tighten all 12 screws in the panel to 115-125 pound-inches (13.0-14.1 Newton-meters).

(j) Do an inspection of the torque of the retention screws at each bushing location.

NOTE: There are 96 screws (eight panels and 12 screws for each panel).

1) If you can see the outer surfaces of the fan case, find the anchor nuts that attach the loose screws to the aft fan case.

a) Do a visual check of the anchor nuts and the rivets that attach the anchor nut assembly for looseness or damage.

<1> If you find looseness or damage, remove the related panel and do an inspection of the back side of the panel (refer to step G.(2)).

CAUTION

TIGHTEN ALL 96 LOCATIONS EVEN IF A STRIPE MARK IS ALIGNED ACROSS A BUSHING FLANGE AND SCREW. LOOSE SCREWS CAN DAMAGE THE FAN BLADES WHEN THE ENGINE IS RUN.

2) Tighten the screws to 115-125 pound-inches (13.0-14.1 Newton-meters).

NOTE: Start at the screw located near the center of the panel and move toward each end of the panel.

NOTE: To make sure all locations are tight, use a tightening verification method such as marking with marker, G02448 [C05-003] or plastic tape, G50247 [C10-021].

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

ARO ALL PRE SB 777-GE100-72-0622; NEW FAN CASE P/N 2082M29G06 WHICH REPLACES 2082M29G05 (Continued)

3) If the retention screw turned less than ¼ turn, no more inspection is necessary.

4) If the retention screw turned more than ¼ turn, remove the panel and do an inspection of the back side of the panel (refer to step G.(2).

5) It is recommended to make a single stripe mark across each bushing flange and screw head with a marker, G02448 [C05-003] (white recommended) (Figure 606).

NOTE: Other marks must be removed to prevent confusion.

NOTE: The mark can be used as a future reference to identify screw rotation.

(k) Axial edge seals

1) Disbonded (loose), torn, missing, or cut material on the seal is permitted with these conditions.

a) The disbonded (loose), torn, or cut material on the seal must be removed (cut) from the seal.

b) The total disbonded (loose), torn, missing, or cut seal material for the engine set (of eight panels) must not be more than 50 percent of the total seal area for the engine set.

c) Up to 100 percent of the seal on a panel can be disbonded (loose), torn, missing, or cut.

2) Fan stator case forward outer acoustic liner Continue-in-Service (C-I-S) limits for disbonded (loose), torn, or cut material on the axial edge seal is 50 cycles or 250 hours with these conditions.

a) The disbonded (loose), torn, or cut material on the seal must be removed (cut) from the seal.

b) The total disbonded (loose), torn, missing, or cut seal material for the engine set (of eight panels) must not be more than 60 percent of the total seal area for the engine set.

c) Up to 100 percent of the seal on a panel can be disbonded (loose), torn, missing, or cut.

SUBTASK 72-24-01-210-003-H01

(2) If the panel is not installed or the panel is removed from the fan stator case, do an inspection of the back side of the panel (Figure 602).

(a) Bushing and sleeve condition

1) Cracking at the bushing-to-sleeve joint.

a) Not serviceable

b) The C-I-S is 50 cycles.

2) Cracking or disbond at the sleeve-to-backsheet joint.

a) Not serviceable

b) The C-I-S is 50 cycles.

3) Movement, under hand-pressure, of the bushing.

a) Not serviceable

b) The C-I-S is 10 cycles, if the sleeve and backsheet are not damaged or disbonded.

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

ARO ALL PRE SB 777-GE100-72-0622; NEW FAN CASE P/N 2082M29G06 WHICH REPLACES 2082M29G05 (Continued)

4) A condition you can see on the surface of the backsheet, adjacent to each sleeve.
   a) If you see a tan or brown color (looks like an accumulation of dust) within 0.3 inch (7.6 mm) of the sleeve, do an inspection of the bushing and sleeve condition again in 300 cycles.
5) Bushing is not taller than the sleeve on the back sheet (Figure 602 (Sheet 2) and Figure 602 (Sheet 3)).
   a) Not serviceable
   b) The C-I-S is 50 cycles.

(b) Cracks and missing material on the backsheet.
1) Not serviceable.

(c) Water accumulation inside the panel.
1) There is not an available inspection method for water that you think is inside a panel.
2) If you hear the sound of water when you move the panel by hand, do an inspection of the bushing and sleeve condition again in 300 cycles.

ARO ALL POST SB 777-GE100-72-0622; NEW FAN CASE P/N 2082M29G06 WHICH REPLACES 2082M29G05

SUBTASK 72-24-01-210-004-H00

(3) Do a check of the fan stator case forward region of trenchfiller (Figure 604). Do an inspection, refer to SUBTASK 72-24-00-210-011-H00.

ARO ALL

SUBTASK 72-24-01-080-003-H01

CAUTION

MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(4) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-24-01-865-006-H01

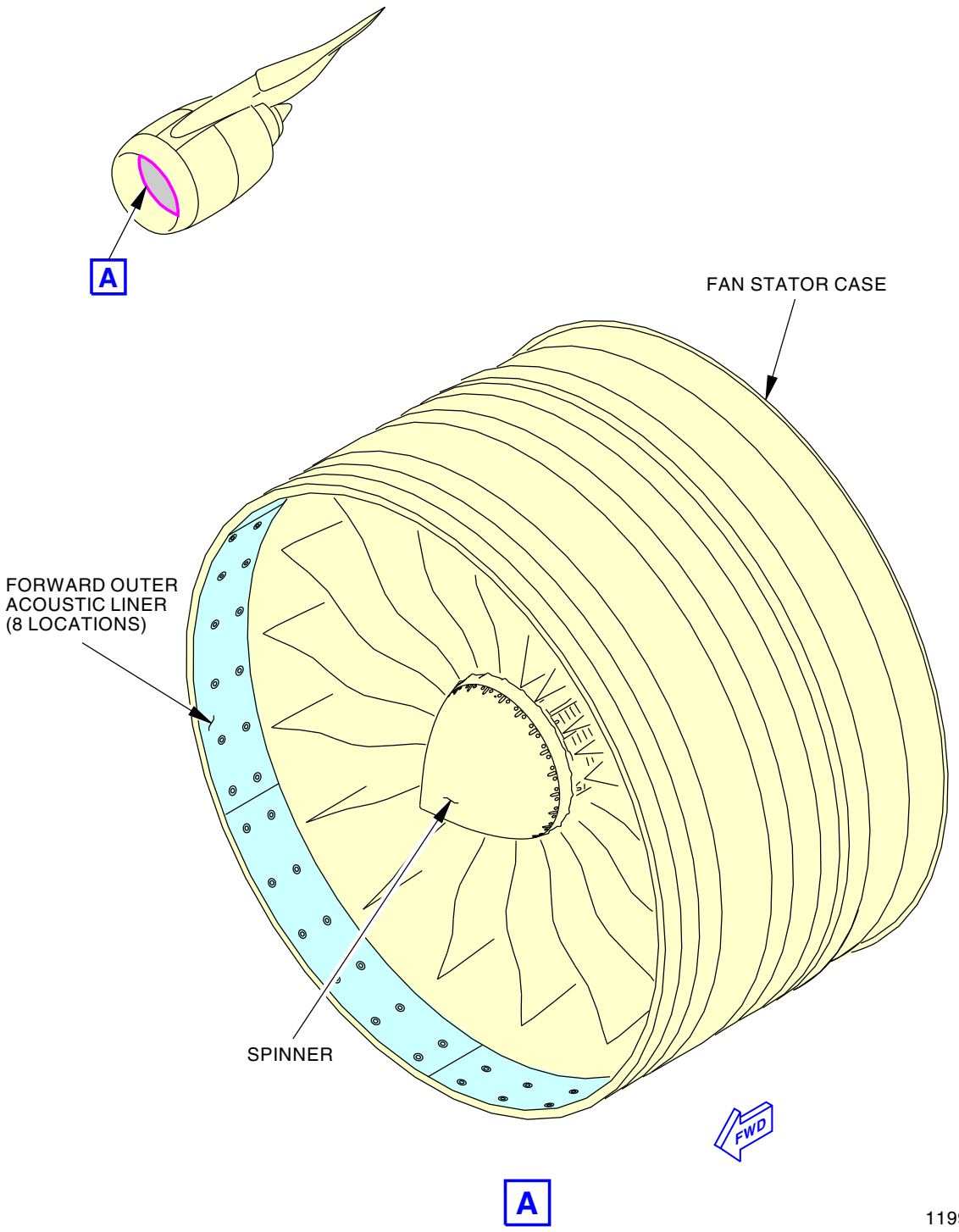
(5) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

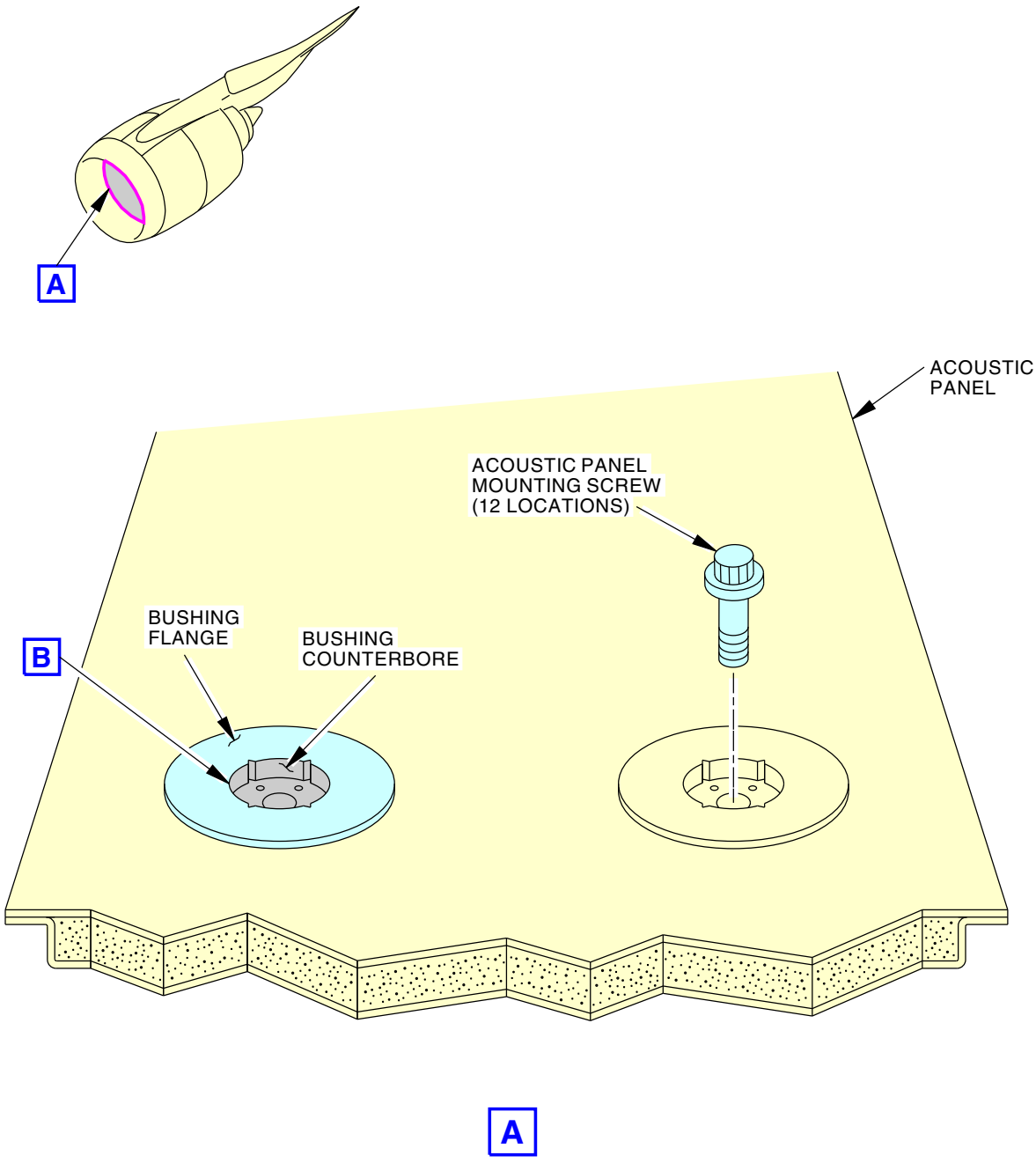
END OF TASK

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



Fan Stator Case Forward Outer Acoustic Liner Inspection
Figure 601/72-24-01-990-804-H01

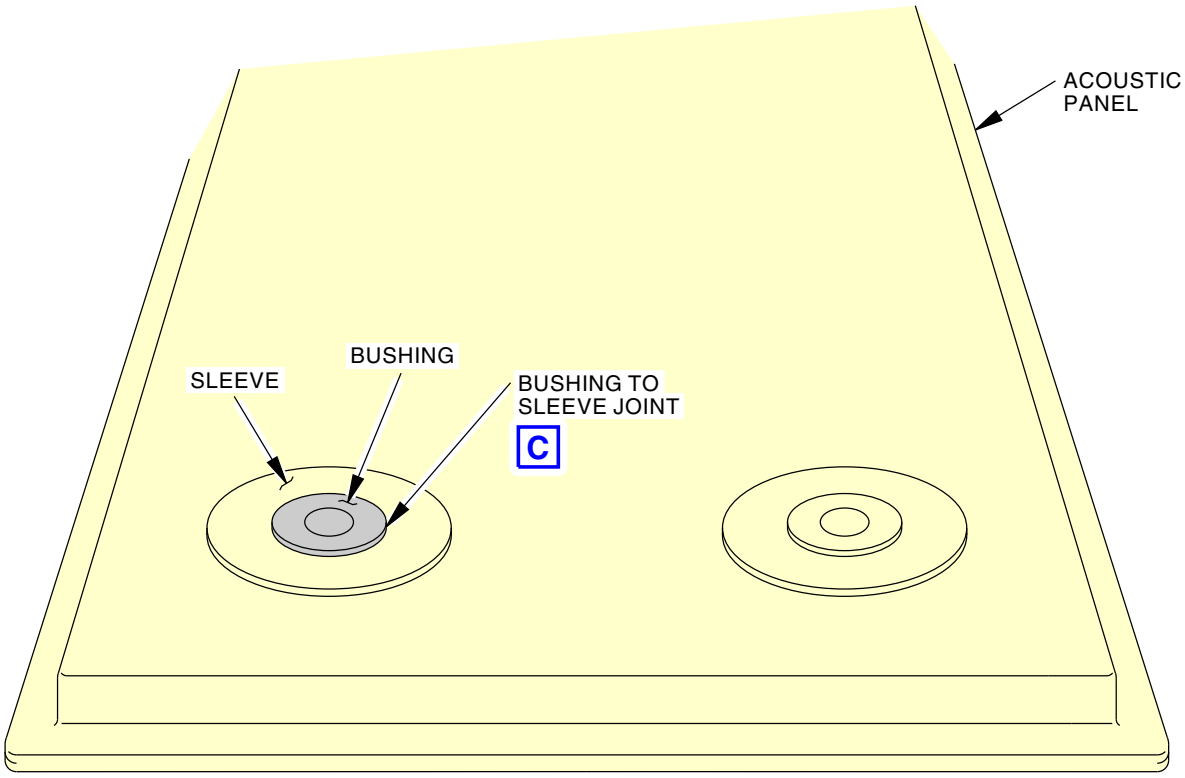
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1359239-00
2142696 S0000465410_V2

Forward Acoustic Panel Bushing Inspection
Figure 602/72-24-01-990-806-H01 (Sheet 1 of 3)

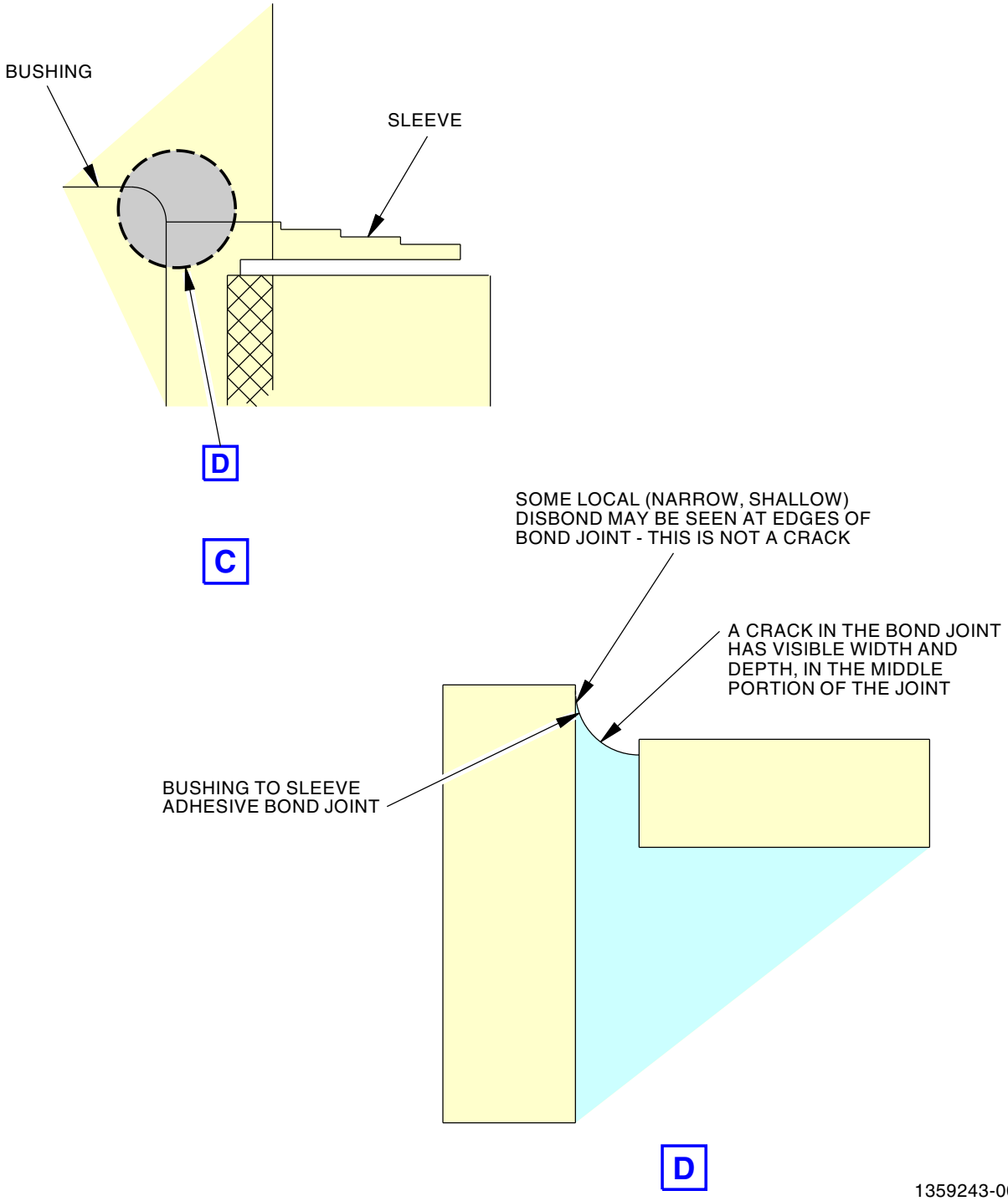
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1359242-00
2143326 S0000465411_V2

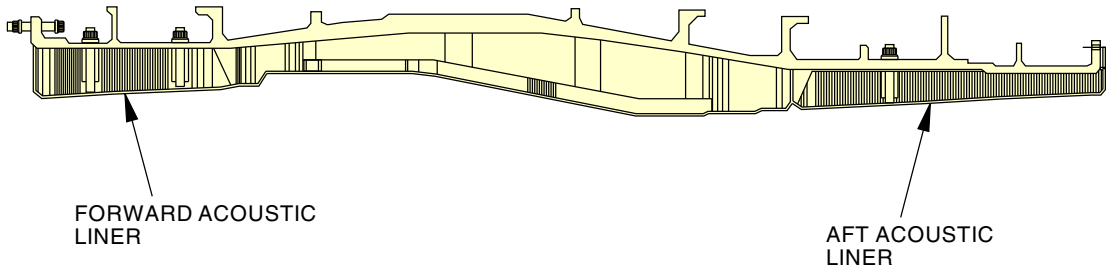
Forward Acoustic Panel Bushing Inspection
Figure 602/72-24-01-990-806-H01 (Sheet 2 of 3)

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



Forward Acoustic Panel Bushing Inspection
Figure 602/72-24-01-990-806-H01 (Sheet 3 of 3)

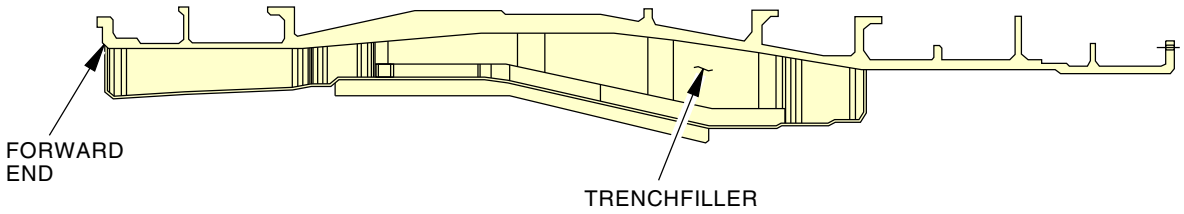
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5029323-00
2504208 S0000589044_V1

Fan Stator With Bolted Forward Acoustic Liners
Figure 603/72-24-01-990-807-H00

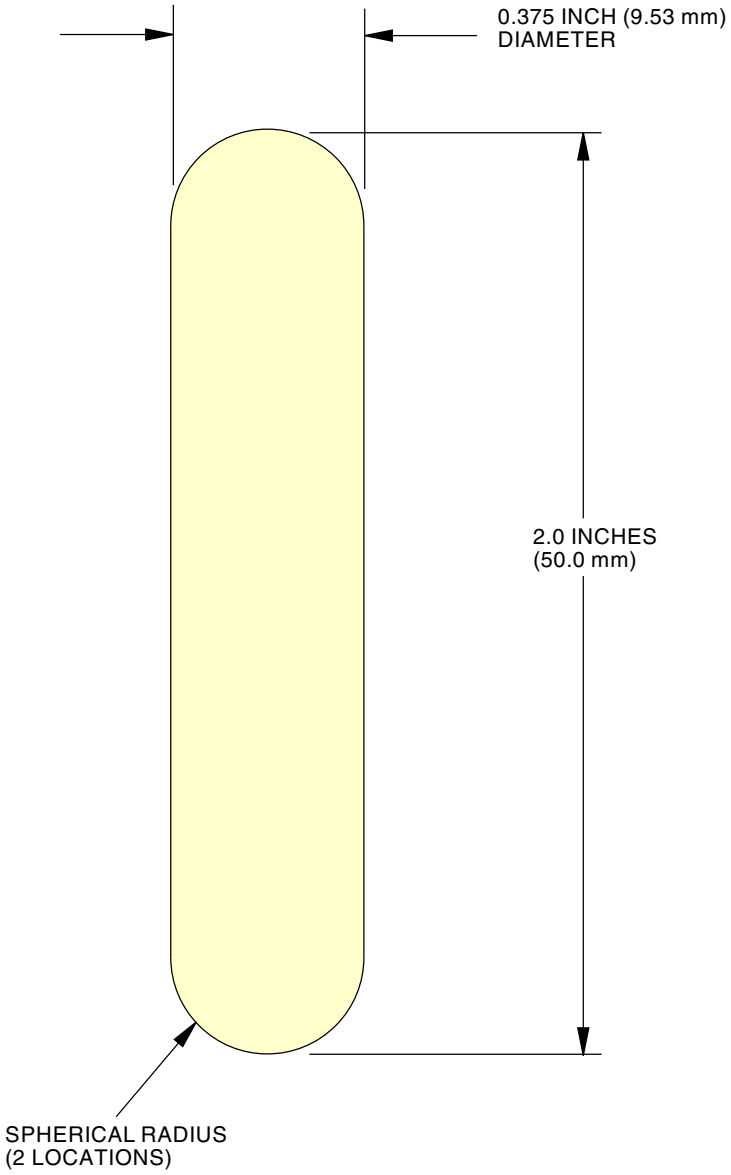
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5029323-00
2504214 S0000589045_V1

Fan Stator With Axially Extended Trenchfiller
Figure 604/72-24-01-990-808-H00

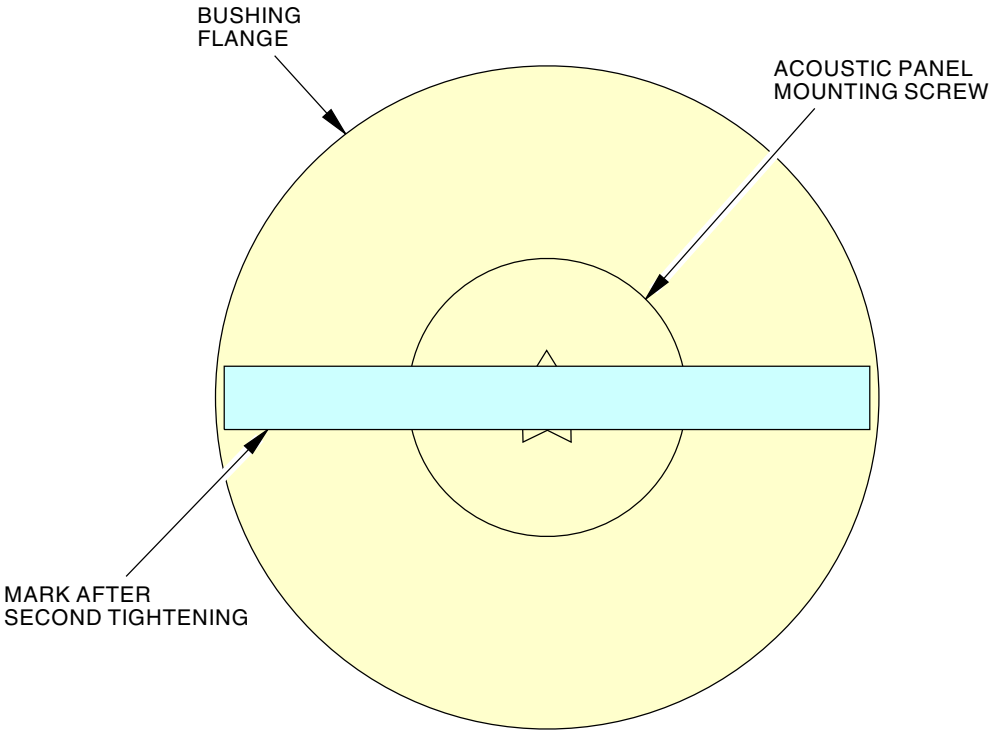
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5049866-00
2816053 S0000649013_V1

Steel Rod
Figure 605/72-24-01-990-810-H00

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



5049867-00
2816055 S0000649016_V1

Forward Acoustic Liner Single Stripe mark
Figure 606/72-24-01-990-811-H00

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

TASK 72-24-01-200-802-H01

3. Fan Stator Case Aft Outer Acoustic Liner Inspection

(Figure 607)

A. General

(1) This task gives the instructions for the inspection of the fan stator case aft outer acoustic liners.

(2) To visually check the fan stator case aft outer acoustic liners, you must do these steps:

(a) Do the deactivation of the thrust reverser and the LE slats.

(b) Open the fan cowl panels and thrust reversers.

(c) Do a visual check of the fan stator case aft outer acoustic liners for damage.

(d) Close the fan cowl panels and thrust reverser.

(e) Do the activation of the thrust reverser and LE slats.

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)
72-24-01-000-802-H01	Fan Stator Case Aft Outer Acoustic Liners Removal (P/B 401)
72-24-01-400-802-H01	Fan Stator Case Aft Outer Acoustic Liners 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. 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

D. Consumable Materials

Reference	Description	Specification
A00944 [C01-056]	Adhesive - Silicone Elastomer - RTV 108 (translucent)	
A50031	Sealant - Dow Corning 732 Multi-Purpose Sealant	MIL-A-46106
A50119	Adhesive - Silicone Rubber - RTV 103 (Black)	MIL-A-46106
G02329	Tape - Aluminum Foil, Pressure Sensitive - Vibration Damping Tape 434	
G02408	Abrasive - Paper, #50 to #400 grit	

E. Location Zones

Zone	Area
411	Engine, Left

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

(Continued)

Zone	Area
421	Engine, Right

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 Inspection

SUBTASK 72-24-01-865-007-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-01-480-004-H01

CAUTION PUT THE PROTECTIVE MAT IN THE INLET COWL. THIS WILL PREVENT DAMAGE TO THE INLET COWL OR ENGINE BY TOOLS, PARTS, OR UNWANTED MATERIALS THAT FALL ON THE INLET COWL SURFACE.

(2) Put the protective mat, STD-585 in the lower half of the inlet cowl to prevent damage to the inlet cowl and the engine.

SUBTASK 72-24-01-010-002-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

(3) 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 72-24-01-210-002-H01

(4) You must replace the fan stator case aft outer acoustic liners for all damage that is more than the limits unless other instructions are given.

(a) To replace the fan stator case aft outer acoustic liner, do these tasks: Fan Stator Case Aft Outer Acoustic Liners Removal, TASK 72-24-01-000-802-H01 and Fan Stator Case Aft Outer Acoustic Liners Installation, TASK 72-24-01-400-802-H01.

H. Fan Stator Case Aft Outer Acoustic Panel Inspection

SUBTASK 72-24-01-220-002-H01

(1) Do a visual check of the fan stator case aft outer acoustic liners as follows:

(a) Cracks and missing face sheet material

1) Cracks and missing face sheet material are permitted in these conditions.

a) No crack or missing face sheet material which measures more than 0.25 inch (6.30 mm) in length.

b) No crack or missing face sheet material that is closer than 0.50 inch (12.70 mm) to an adjacent crack or missing face sheet material.

c) The total area of all cracks and missing face sheet material is less than 0.1 percent of the total area of the face sheet material.

2) Cracks and missing face sheet material are permitted in the non-perforated area of the liner in these conditions.

a) No cracks or damage area measures more than 0.090 inch (2.290 mm) in depth or 6.0 inches (152.0 mm) in any direction.

b) The total area of all cracks and missing face sheet material is less than 20.0 sq-in (129.0 sq-cm).

c) The are no more than two damaged areas on a liner.

d) Do a visual check of the edges of the face sheet material and the areas that are adjacent to each damaged area for delamination. If you find delamination, see C-I-S limits.

3) If the fan stator case aft outer acoustic liner is in the above limits, repair the damage areas as follows:

a) Remove all loose fibers.

b) Sand the stepped edges to a smooth tapered finish with #50 to #400 grit abrasive paper, G02408.

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

c) Seal the damaged area with RTV 108 adhesive, A00944 [C01-056].

(b) Paint that is missing

1) Permitted.

(c) Shallow nicks and scratches

1) Permitted.

(d) Dents

NOTE: Dents are the result of impact damage and can be identified by sharp edges and a damaged surface.

1) Up to three dents that have depths that are not more than 0.10 inch (2.54 mm) are permitted on a liner.

(e) Depressions

NOTE: Depressions are the result of a manufacturing process and can be identified as having a smooth contour with an undamaged surface.

1) All depressions are permitted if they are not more 0.020 inch (.058 mm) in depth.

(f) Fan case stator aft outer acoustic liners C-I-S limits for cracks and missing face sheet material

1) The C-I-S limit for cracks and missing face sheet material is 20 cycles or 50 hours with these conditions.

a) No damage area measures more than 1.0 inch (25.4 mm) in depth or 6.0 inches (152.0 mm) in any direction.

b) The total area of all missing face sheet material is less than 10.0 sq-in (65.0 sq-cm).

c) There are no more than two damaged areas on a liner.

d) Do a visual check of the edges of the face sheet material and the edges that are adjacent to each damaged area for delamination.

NOTE: Use the coin tap test or equivalent for the examination. If you find any delamination, see the C-I-S limits for delamination.

2) The C-I-S limit for cracks and missing face sheet material is 1 cycle with these conditions.

a) No damage area measures more than 1.75 in. (44.4 mm) in depth or 7.5 in. (190.5 mm) in any direction.

b) The total area of all missing face sheet material is less than 50.0 sq-in (322.6 sq-cm).

c) There are no more than three damaged areas on a liner.

d) Do a visual check of the edges of the face sheet material and the edges that are adjacent to each damaged area for delamination.

NOTE: Use the coin tap test or equivalent for the examination. If you find any delamination, see the C-I-S limits for delamination.

e) Make sure that all the bolts of acoustic panel are tightened. Refer to SUBTASK H72-24-01-420-002-H01.

f) Make sure that there is no looseness at bushing locations.

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

3) Cover the damaged area with two layers of Vibration Damping Tape 434 tape, G02329 and seal the edges with RTV 108 adhesive, A00944 [C01-056]/RTV 103 adhesive, A50119/Dow Corning 732 multi-purpose sealant, A50031. Make sure that the second layer of damping tape is aligned 90 degrees to first layer.

4) Do a visual check of the damage area in the C-I-S period to make sure that the damage did not become larger.

(g) Tears and cuts

1) Tears and cuts are not permitted.

2) See the Continue-In-Service Limits (C-I-S).

(h) The C-I-S limit for tears and cuts is 20 cycles or 50 hours with these conditions.

1) The maximum depth is no more than 0.50 inch (12.70 mm).

2) There must not be more than two damaged areas in a liner.

3) The maximum length is no more than 4.0 inches (102.0 mm).

4) Cover the damaged area with two layers of Vibration Damping Tape 434 tape, G02329 and seal the edges with a bead of RTV 108 adhesive, A00944 [C01-056].

5) Do a visual check of the damaged area in the C-I-S period to make sure that the damage did not become larger.

(i) Delamination of the face sheet material of the aft acoustic liner

1) Delamination is not permitted. Refer to the Continue-In-Service limits.

2) The C-I-S limits for delamination of face sheet materials is 20 cycles or 50 hours with these conditions.

a) The maximum area that is delaminated is not more than 10.0 sq-in (64.5 sq-cm).

b) There must not be more than two damaged areas in a liner.

c) The maximum length is no more than 6.0 inches (152.0 mm).

d) Cover the damaged area with two layers of Vibration Damping Tape 434 tape, G02329 and seal the edges with a bead of RTV 108 adhesive, A00944 [C01-056].

e) Examine the damaged area in the C-I-S period to make sure that the damage did not become larger.

(j) Chipped bushing flange

1) It is permitted to have not more than 1/3 of the flange area missing at a location.

(k) Loose retention screws

1) Find the captive nuts that attach the loose screws to the aft fan case.

a) Do a visual check of the captive nuts and nutplate rivets for looseness.

2) Loosen by an additional quarter turn, any screws found with loose captive nuts.

3) If only one screw is loose in the same liner, tighten that screw to 115-125 pound-inches (13.0-14.1 Newton-meters).

4) If more than one screw is loose in the same liner, tighten the screws to 115-125 pound-inches (13.0-14.1 Newton-meters) in the sequence that follows:

NOTE: The aft outer acoustic liners have two parallel rows of screws. When you tighten the liner screws, always tighten both rows at the same time starting with the forward and alternating with the aft row.

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

a) Tighten the center screws in the forward row of the liner.

b) Tighten the center screws in the aft row of the liner.

c) Tighten the screws that are adjacent to the center screws in the forward row.

d) Tighten the screws that are adjacent to the center screws in the aft row.

e) Tighten the screws near the ends of the liner in the forward row.

f) Tighten the screws near the ends of the liner in the aft row.

5) After 15 minutes, tighten the screws again in the same sequence to 115-125 pound-inch (13.0-14.1 Newton-meters).

(l) Axial edge seals

1) Disbonded (loose), torn, missing, or cut material on the seal is permitted with these conditions.

a) The disbonded (loose), torn, or cut material on the seal must be removed (cut) from the seal.

b) The total disbonded (loose), torn, missing, or cut seal material for the engine set (of eight panels) must not be more than 50 percent of the total seal area for the engine set.

c) Up to 100 percent of the seal on a panel can be disbonded (loose), torn, missing, or cut.

(m) Fan stator case aft outer acoustic liner Continue-in Service (C-I-S) limits for the axial edge seal

1) The C-I-S limit for disbonded (loose), torn, missing, or cut material on the seal is 50 cycles or 250 hours with these conditions.

a) The disbonded (loose), torn, or cut material on the seal must be removed (cut) from the seal.

b) The total disbonded (loose), torn, or cut seal material for the engine set (of eight panels) must not be more than 60 percent of the total seal area for the engine set.

c) Up to 100 percent of the seal on a panel can be disbonded (loose), torn, missing or cut.

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-24-01-440-001-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

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.

SUBTASK 72-24-01-080-004-H01

CAUTION MAKE SURE THERE ARE NO TOOLS, PARTS, OR OTHER UNWANTED MATERIAL IN THE INLET COWL. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE ENGINE.

(2) Remove the protective mat, STD-585 from the lower half of the engine inlet cowl.

SUBTASK 72-24-01-865-008-H01

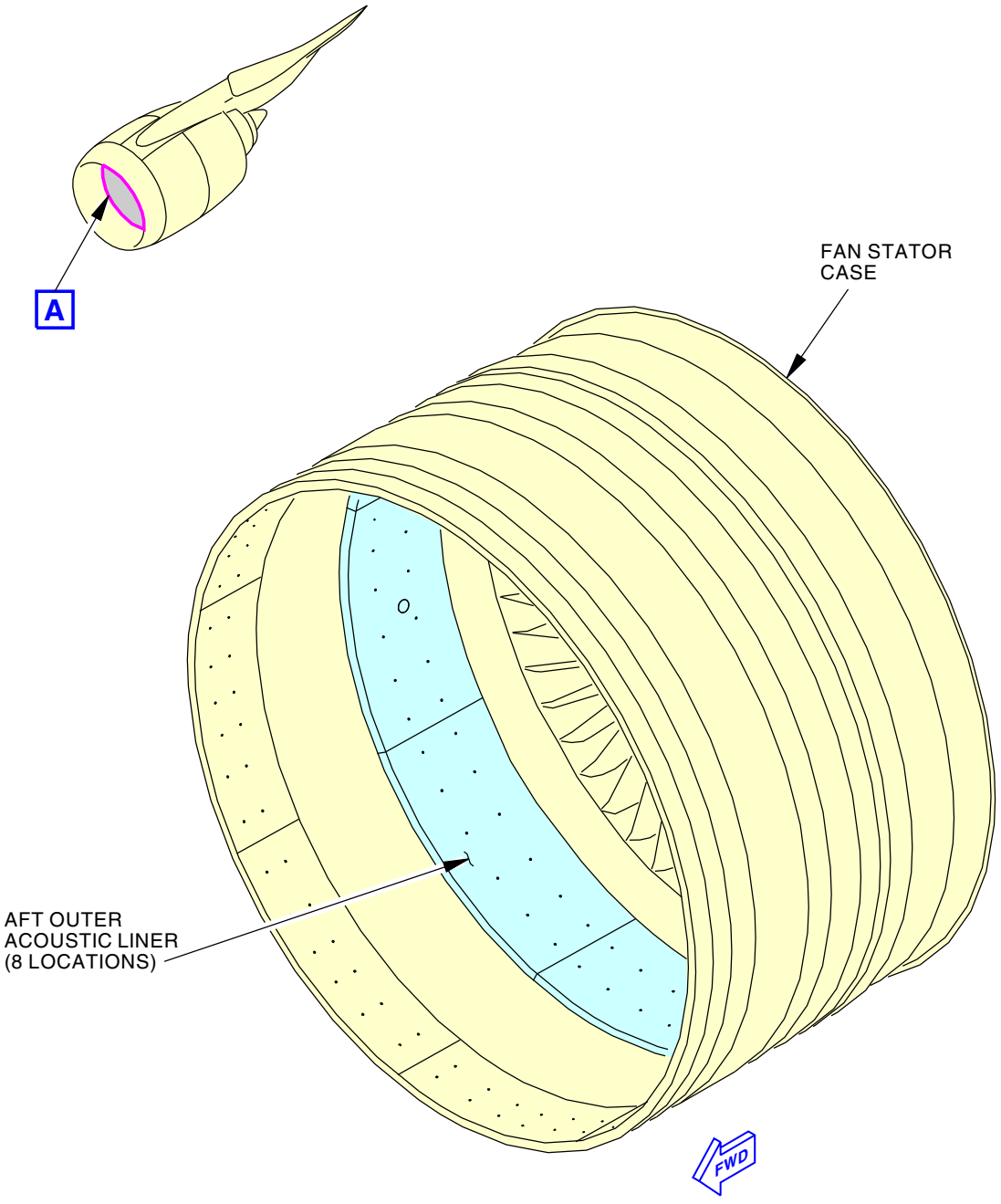
(3) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

END OF TASK

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



NOTE:

ILLUSTRATION IS SHOWN WITH ALL FAN BLADES REMOVED.

1199414-00-A
M64055 S0004285877_V3

Fan Stator Case Aft Outer Acoustic Liner Inspection
Figure 607/72-24-01-990-805-H01

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

FAN CASE OUTLET GUIDE VANES (OGV) FAIRING - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) A removal of the fan case outlet guide vanes (OGV) fairing

(2) An installation of the fan case outlet guide vanes (OGV) fairing.

TASK 72-24-03-000-801-H01

2. Fan Case Outlet Guide Vanes (OGV) Fairing Removal

(Figure 401 and Figure 402)

A. General

(1) This task is the removal procedure for the fan case outlet guide vanes (OGV) fairing.

(2) The fan case outlet guide vanes (OGV) fairing is referred to as OGV fairing which is located on the aft fan case.

(3) You must open the thrust reversers to get access to the OGV fairings.

(4) Each engine has 54 OGV fairing assemblies. The removal procedure for each of the OGV fairings is the same.

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)
72-24-01-000-802-H01	Fan Stator Case Aft Outer Acoustic Liners Removal (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)

C. Consumable Materials

Reference	Description	Specification
A01083 [C01-176]	Sealant - Silicone Elastomer - RTV 133 (black)	
B00130	Alcohol - Isopropyl	TT-I-735
G00034	Cotton Wiper - Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)	BMS15-5 Class A

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

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

F. Prepare for the Removal

SUBTASK 72-24-03-860-003-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-03-010-006-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

(2) 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. Outlet Guide Vanes (OGV) Fairing Removal

SUBTASK 72-24-03-010-002-H01

(1) Get access to the applicable OGV fairings from the back side of the fan case.

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

SUBTASK 72-24-03-150-001-H01

CAUTION

WHEN YOU CUT THE CAULKING BETWEEN THE OGVS AND THE OGV FAIRING ASSEMBLIES, DO NOT TOUCH THE OGVS OR THE OGV FAIRINGS. IF YOU DO, YOU COULD SCRATCH OR SCORE THE OGV OR OGV FAIRING SURFACES.

(2) Cut through the RTV 133 (black) sealant, A01083 [C01-176] on the two sides of each OGV fairing assembly [1], at the gaps between the OGVs and the OGV fairing assembly [1].

SUBTASK 72-24-03-020-001-H01

(3) Remove the forward screw [3] and aft screw [2], that attach the OGV fairing assembly [1] to the aft fan case.

SUBTASK 72-24-03-020-002-H01

(4) Remove the OGV fairing assembly [1].

SUBTASK 72-24-03-010-003-H01

(5) If access to the OGV fairing is blocked by the aft outer acoustic panel, loosen the aft outer acoustic panel (TASK 72-24-01-000-802-H01).

SUBTASK 72-24-03-020-003-H01

WARNING

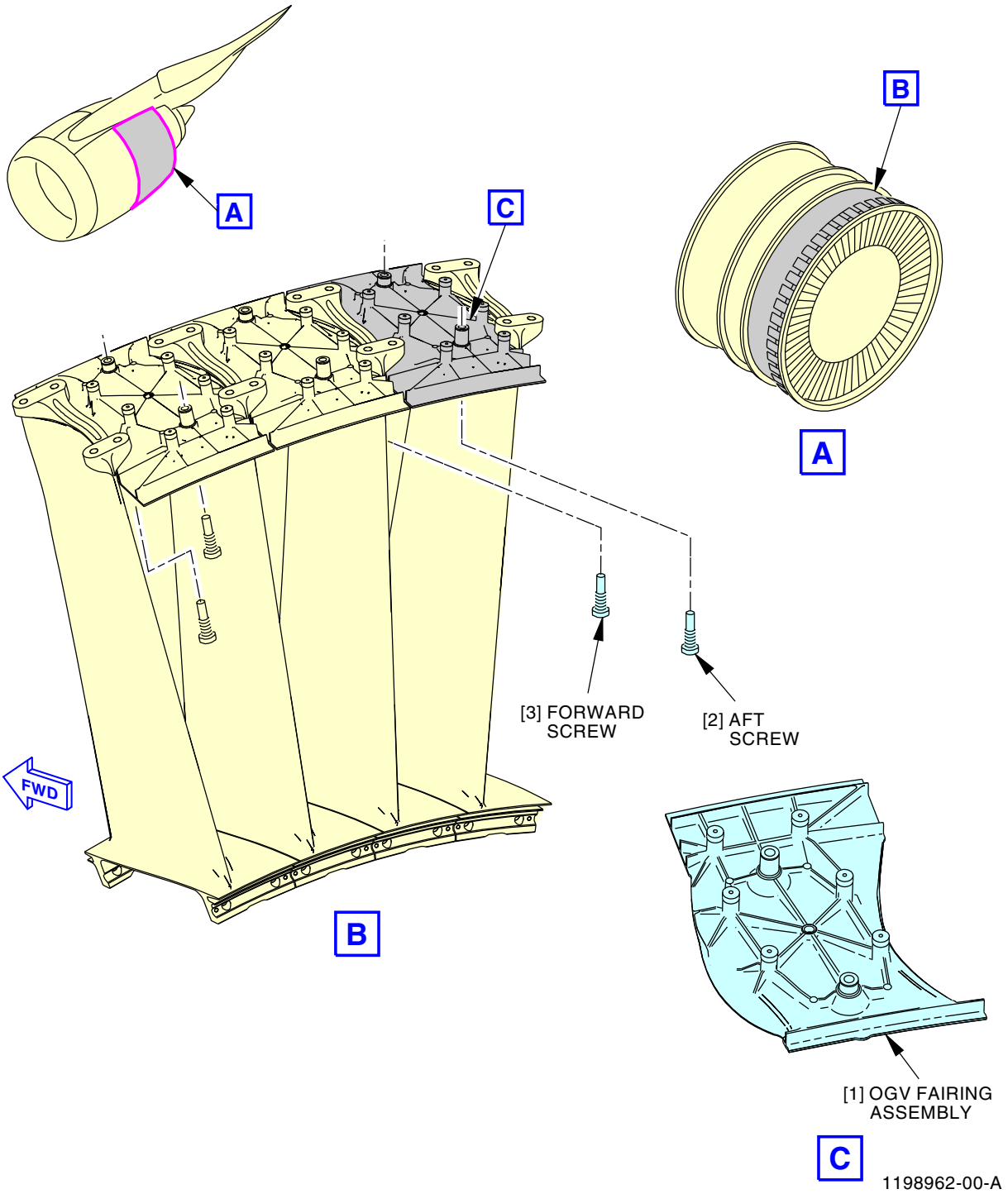
DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(6) Remove the remaining old RTV 133 (black) sealant, A01083 [C01-176] with alcohol, B00130 and a clean cotton wiper, G00034 from the OGVs where the OGV fairing has been removed.

NOTE: Make sure that all surfaces on the OGVs which are to be in contact with the new OGV fairing are clean.

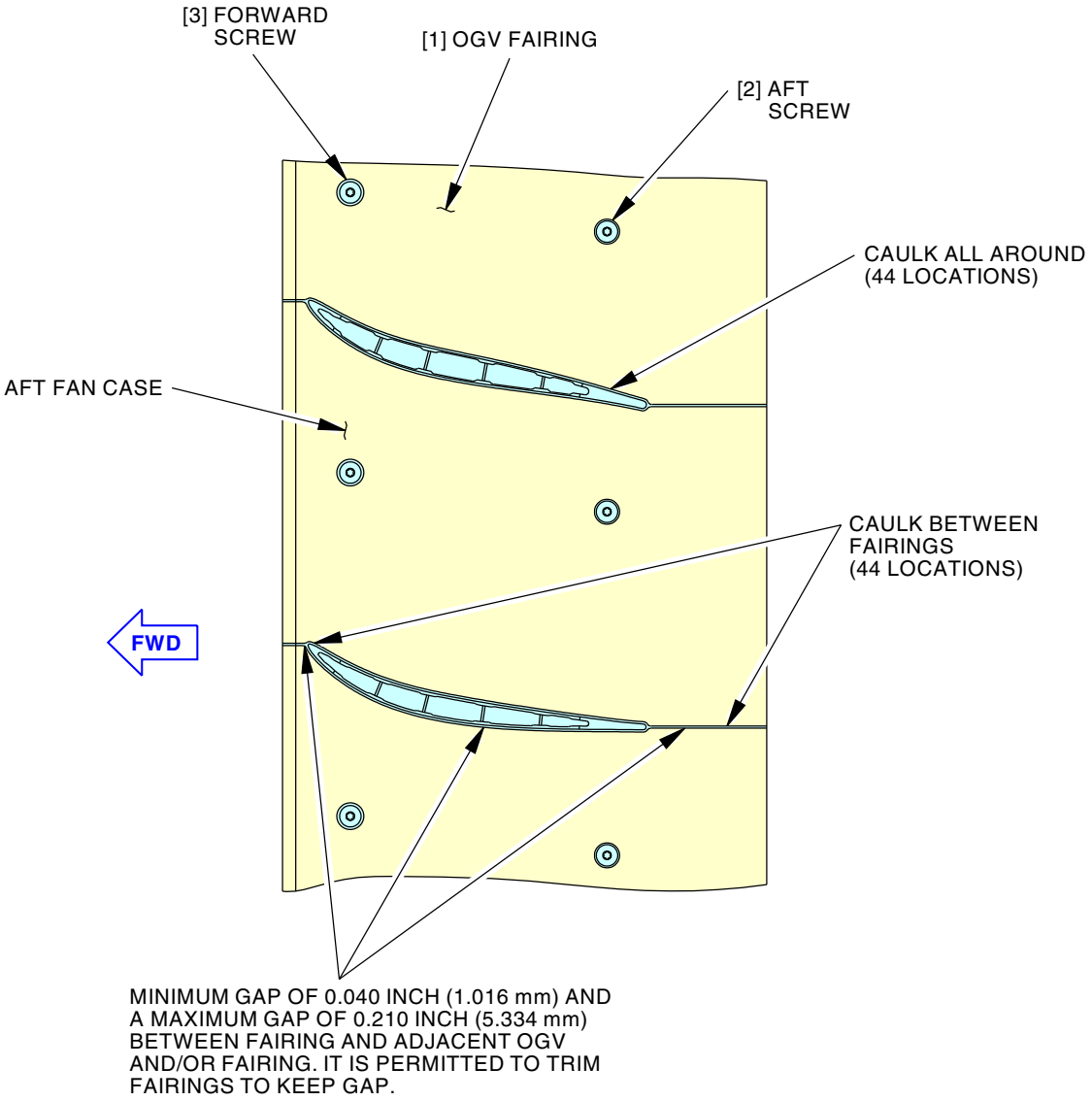
END OF TASK

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



Fan Case OGV Fairing Installation
Figure 401/72-24-03-990-801-H01

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



1198963-00-A
M06864 S0004285887_V4

RTV Caulk Application to Gaps Around OGVs and OGV Fairings
Figure 402/72-24-03-990-802-H02

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

TASK 72-24-03-400-801-H01

3. Fan Case Outlet Guide Vanes (OGV) Fairing Installation

A. General

(1) This task gives the instructions to install the fan case Outlet Guide Vane(s) (OGV) (referred to as OGV fairings).

(2) You must open the thrust reversers to get access to the OGV fairings.

(3) Alternative procedures for the application of primer and sealant are given.

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)
72-24-01-400-802-H01	Fan Stator Case Aft Outer Acoustic Liners Installation (P/B 401)
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
A01083 [C01-176]	Sealant - Silicone Elastomer - RTV 133 (black)	
A50119	Adhesive - Silicone Rubber - RTV 103 (Black)	MIL-A-46106
A50496 [C01-218]	Adhesive System - Two part, Grey Silicone (GE Spec. A15F37B1)	C01-218
B00130	Alcohol - Isopropyl	TT-I-735
C00941 [C03-001]	Primer - Zinc Chromate	TT-P-1757, Type 1 or 2, Class C or Class N, AMS 3110 Color Y
C00954	Primer - Adhesive Bonding - SS4004P RTV	BAC5010 PSD 6-168 Type 74
C50366 [C01-217]	Primer - Slicone (GE Spec. A15F37A1)	C01-217
D50072 [C02-023]	Oil - Engine Lubricating	MIL-PRF-23699
G02329	Tape - Aluminum Foil, Pressure Sensitive - Vibration Damping Tape 434	
G02348 [C10-010]	Pad - Abrasive - Scotch-Brite 7447	
G02350 [C10-012]	Tape - High Temperature Masking	
G50030 [C10-040]	Tape -Teflon, Scotch Brand 5490, Teflon 1 x 0.002 in. thick	
G50031 [C10-108]	Brush - Disposable, Natural Bristle - No. 7237T4 or 7798T2	
G50035 [C10-182]	Cloth - Cleaning For Aircraft Structural	SAE-AMS 3819, BMS 15-5

D. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	OGV fairing assembly	72-24-03-02-015	ARO ALL
		72-24-03-02-020	ARO ALL
		72-24-03-02-025	ARO ALL
		72-24-03-02-030	ARO ALL

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

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
1 (cont.)		72-24-03-02-035	ARO ALL
		72-24-03-02-040	ARO ALL
		72-24-03-02-045	ARO ALL
		72-24-03-02-050	ARO ALL
		72-24-03-02-055	ARO ALL
		72-24-03-02-060	ARO ALL
		72-24-03-02-065	ARO ALL
		72-24-03-02-070	ARO ALL
		72-24-03-02-075	ARO ALL
		72-24-03-02-080	ARO ALL
		72-24-03-02-085	ARO ALL
		72-24-03-02-090	ARO ALL
		72-24-03-02-095	ARO ALL
		72-24-03-02-100	ARO ALL
		72-24-03-02-105	ARO ALL
		72-24-03-02-110	ARO ALL
		72-24-03-02-115	ARO ALL
		72-24-03-02-120	ARO ALL
		72-24-03-02-125	ARO ALL
		72-24-03-02-130	ARO ALL
		72-24-03-02-135	ARO ALL

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Fan Case Outlet Guide Vanes (OGV) Fairing Installation

SUBTASK 72-24-03-860-005-H00

(1) Make sure that these circuit breakers are open:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-24-03-010-004-H01

(2) Get access to the applicable OGV from the back side of the fan case.

SUBTASK 72-24-03-820-001-H00

(3) Trim the OGV fairings to make sure there is a minimum gap of 0.040 in. (1.016 mm) to 0.210 in. (5.334 mm) between fairing and adjacent OGV and/or fairing. Refer to Figure 402.

SUBTASK 72-24-03-110-001-H01

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(4) Remove all the old RTV (black or gray sealant) and clean the surfaces as follows:

(a) Peel the old RTV with a plastic scraper or use an abrasive Scotch-Brite 7447 pad, G02348 [C10-010]

(b) Clean all surfaces around the OGV clearances with a clean cloth, G50035 [C10-182]moist with isopropyl alcohol, B00130 as follows:

1) Clean a minimum of 1.0 in. (25.4 mm) on the two sides of the area where you will apply the RTV.

2) Let the alcohol fully dry.

SUBTASK 72-24-03-110-002-H01

(5) Apply primer, C00941 [C03-001] to the hardware and holes that follow (Figure 401):

(a) The shank and bearing surfaces of the aft screw [2] and forward screw [3].

(b) The inside mating surface of the screw holes.

NOTE: The screws must be installed while they are wet with primer.

SUBTASK 72-24-03-110-003-H01

(6) Apply engine lubricating oil, D50072 [C02-023] to the threads of the aft screw [2] and forward screw [3].

SUBTASK 72-24-03-420-001-H01

(7) Attach the OGV fairing assembly [1] to the aft fan case with the aft screw [2] and forward screw [3].

SUBTASK 72-24-03-420-002-H01

(8) Tighten the aft screw [2] and forward screw [3] to 80 in-lb (9.0 N·m) - 100 in-lb (11.3 N·m).

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

SUBTASK 72-24-03-110-004-H01

(9) Apply RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119 to the gaps between the OGV fairings and the OGV.(Figure 401,Figure 402):

NOTE: RTV 133 (black) sealant, A01083 [C01-176] or RTV 103 adhesive, A50119 will be commonly referred as RTV in below steps. Below steps are applicable for both RTVs.

NOTE: An alternative procedure for the application of primer and sealant is available below.

WARNING

DO NOT GET ISOPROPYL ALCOHOL IN YOUR MOUTH, EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE ISOPROPYL ALCOHOL. KEEP THE ISOPROPYL ALCOHOL AWAY FROM SPARKS, FLAME, AND HEAT. ISOPROPYL ALCOHOL IS POISONOUS AND FLAMMABLE, WHICH CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Clean all surfaces around the OGV gaps with alcohol, B00130.

1) Trim the fairings to make sure that the minimum clearance is 0.04 in. (1.02 mm) to 0.210 in. (5.334 mm) between the fairing and the adjacent OGV and/or fairing.

NOTE: Make sure all tools are clean before you apply the sealant.

(b) Apply the SS4004P RTV primer, C00954 to all surfaces where the RTV sealant will be applied.

(c) Apply RTV to the gaps between the OGV and the OGV fairings. If necessary, use tape, G02350 [C10-012] and a caulking gun when you apply the RTV.

(d) Make sure all areas of the RTV are smooth after it is applied. All changes in contour must be smooth. No irregular surfaces are permitted on the RTV sealant.

(e) Let the RTV sealant cure for 24 hours.

SUBTASK 72-24-03-410-003-H00

WARNING

REFER TO THE PRODUCT LABEL AND THE MANUFACTURER'S (MATERIAL) SAFETY DATA SHEET (SDS) FOR INSTRUCTIONS ON THE HAZARDS, STORAGE, SAFE HANDLING AND PROPER USE OF THESE PRODUCTS.

(10) Apply sealant, A50496 [C01-218] to the gaps between the OGV fairings and the OGV(Figure 401,Figure 402):

NOTE: The steps that follow are an alternative to the procedure above for the application of primer and sealant.

(a) Clean all surfaces around the OGV gaps with alcohol, B00130.

1) Trim the fairings to make sure that the minimum clearance is 0.04 in. (1.02 mm) to 0.210 in. (5.334 mm) between the fairing and the adjacent OGV and/or fairing.

NOTE: Make sure all tools are clean before you apply the sealant.

(b) Apply primer, C50366 [C01-217] to all surfaces where you will apply the RTV as follows:

1) Use a clean natural-bristle brush No. 7237T4 or 7798T2 brush, G50031 [C10-108] or a clean cloth, G50035 [C10-182] to apply primer.

2) Apply an equal, thin coat and make sure that you have full primer coverage.

NOTE: RTV bead will extend on surfaces a minimum of 0.25 in. (6.4 mm) wide adjacent to each gap that must be sealed.

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

CAUTION MAKE SURE THAT YOU KEEP THE SURFACE CLEAN OF DIRT OR CONTAMINATION WHILE THE RTV DRIES. IF YOU DO NOT, YOU CAN DECREASE THE ADHESIVE QUALITIES OF THE RTV.

3) Let the primer to dry a minimum 30 minutes at room temperature.

NOTE: Moisture is necessary for the primer to cure correctly. If relative humidity is below five percent, you must apply a method of locally increasing humidity around the primer area.

4) If you do not apply RTV on the primed surfaces within 24 hours, do the cleaning procedure task and apply primer, C50366 [C01-217] again.

(c) Apply sealant, A50496 [C01-218] to the gaps between the OGV and OGV fairings.

1) Make sure that all tools are clean before you use them.

CAUTION DO NOT USE RUBBER OR LATEX GLOVES. REFER TO THE MANUFACTURER'S INSTRUCTIONS FOR OTHER MATERIALS THAT PREVENT CURING. CURING IS PREVENTED IF CONTAMINATED WITH LATEX OR RUBBER.

2) Use clean nitrile or vinyl gloves.

3) Use Scotch 5490 tape, G50030 [C10-040] or Vibration Damping Tape 434 tape, G02329 to apply masking when you apply the sealant.

4) Attach the mix tip to the side-by-side sealant cartridge and cut tip opening to the correct size for the gaps.

5) For each new mix tip used, squeeze out the first 0.5 in. (13 mm) or more sealant and discard it.

6) Apply sealant to fill the gaps between the OGV fairings and OGV and extend it a minimum of 0.2 in. (5 mm) on each surface from the edge of the gap that you will fill, and do as follows:

a) At the mating parts (OGV to OGV fairing), create a smooth fillet radius transition.

b) Make sure the sealant is worked or smoothed into the gaps to prevent voids.

7) Make sure that all areas of sealant are smooth after application. Steps at tape lines are permitted.

(d) Cure the sealant as follows:

NOTE: An alternative procedure to cure the sealant is available below.

1) Cure the sealant with heat. Refer to SAE ARP 5144, Heat Application for Thermosetting Resin Curing, and do as follows:

WARNING USE THERMAL GLOVES WHEN YOU MOVE OR TOUCH HOT OR COLD PARTS. HOT OR COLD PARTS CAN CAUSE INJURY.

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

(WARNING PRECEDES)

CAUTION LIMIT THE HEATED AREA TO THE RTV SEALANT AND THE ENGINE HARDWARE IMMEDIATELY ADJACENT TO THE RTV SEALANT. THIS PREVENTS DAMAGE TO ADJACENT ENGINE HARDWARE. IF NOT, YOU CAN CAUSE DAMAGE.

a) Use a heating device (examples: a heat gun or lamp).

b) Attach a minimum of one thermocouple to the metal OGV and a minimum of one thermocouple to the OGV fairing adjacent to the sealant.

c) Choose one option below:

<1> Keep the area at a temperature of 150°F (66°C) to 170°F (77°C) for a minimum of 90 minutes.

<2> Keep the area at a temperature of 175°F (79°C) to 200°F (93°C) for a minimum of 75 minutes.

(e) Cure the sealant as follows:

NOTE: The steps that follow are an alternative to the procedure above to cure the sealant.

1) Cure the sealant at a room temperature of 70°F (21°C) to 130°F (54°C) for a minimum of 6 hours. If the temperature is below 70°F (21°C), then up to 24 hours to cure the sealant can be necessary.

(f) After the sealant and adjacent hardware become cool, touch the sealant to make sure that it is cured (hardened and not tacky). If it is not cured, then refer to the previous steps and find if the RTV needs to be removed and re-applied.

SUBTASK 72-24-03-410-001-H01

(11) If the aft outer acoustic panel was loosened, tighten the panel Fan Stator Case Aft Outer Acoustic Liners Installation, TASK 72-24-01-400-802-H01.

NOTE: Recommended that you permit the sealant to cure. Then do an inspection of the applied sealant before you torque the aft outer acoustic panel.

NOTE: Make sure that the screws that attach the aft outer acoustic panels to the fan case are torqued again after 15 minutes.

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-24-03-410-002-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.

(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

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.

SUBTASK 72-24-03-860-004-H01

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

——— END OF TASK ———

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

HIGH PRESSURE COMPRESSOR SECTION (HPC) - INSPECTION/CHECK

1. General

A. This procedure has one task.

(1) Inspection of the high pressure compressor (HPC) section.

TASK 72-30-00-200-801-H01

2. High Pressure Compressor Section (HPC) Inspection

A. General

(1) This task gives the limits and the type of damage to look for when you examine the high pressure compressor section (HPC).

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)
72-00-00-100-801-H01	Engine Gas Path Cleaning (Juniper Wash Cart Method) (P/B 701)
72-00-00-290-803-H01	High Pressure Compressor Section Rotor Inspection (P/B 601)
72-23-00-220-801-H01	Fan Hub Frame Forward Inner Cowl Support V-groove Inspection (P/B 601)
72-30-00-960-801-H00	Stages 1-3 VSV Actuating Ring and Rudders Lever Arm Pin Bushing(s) Repair (Replacement) (P/B 801)
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. Consumable Materials

Reference	Description	Specification
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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

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
425AL	Left Thrust Reverser, Right Engine
426AR	Right Thrust Reverser, Right Engine

F. Prepare for the High Pressure Compressor Inspection (HPC)

SUBTASK 72-30-00-010-001-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. High Pressure Compressor Section Inspection

SUBTASK 72-30-00-220-001-H01

(1) Examine the high pressure compressor (HPC) case for cracks:

(a) Cracks in the case skin

1) None permitted.

(b) Cracks in the ribs

1) Cracks that go into the case skin are not permitted.

2) There is no limit if the cracks do not go into the case skin.

3) Remove the high metal from cracks that do not go into the case skin.

a) Blend smooth with no burrs or sharp edges

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

b) The depth of the blends must not go below the case skin.

(c) Cracks in horizontal and circumferential flanges that go out from the bolt holes.

1) A maximum of one bolt hole with a crack in it for each flange is permitted.

2) Continue-In-Service Limits - 25 flight cycles or 150 hours. Use the first limit to occur.

(d) Cracks in horizontal and circumferential flanges that are between the bolt hole and the case skin.

1) Not permitted.

2) Continue-In-Service Limits - 10 flight cycles or 60 hours. Use the first limit to occur.

(e) Cracks in the stage 4 and 7 bleed ports.

1) Not permitted.

2) Stage 4 bleed port Continue-In-Service Limits - 5 flight cycles or 30 hours. Use the first limit to occur.

3) Stage 7 bleed port Continue-In-Service Limits - 5 flight cycles or 30 hours. Use the first limit to occur.

SUBTASK 72-30-00-220-002-H01

(2) Examine the HPC case for nicks, gouges, scratches, pits, and scores:

(a) Nicks, gouges, scratches, pits, and scores in the case skin

1) High metal must be removed.

2) No sharp edges permitted

3) For each 4.0 square-inches (26.0 square-cm); one is permitted if it is less than 1.0 inch (25.4 mm) long and 0.01 inch (0.25 mm) deep.

4) Continue-In-Service Limits - 10 flight cycles or 60 hours. Use the first limit to occur.

(b) Nicks, gouges, scratches, pits, and scores in the flanges and ribs

1) High metal must be removed.

2) There is no limit to the number permitted if they are less than 0.5 inch (12.7 mm) in length and 0.03 inch (0.76 mm) in depth.

3) Minimum separation must be 2.0 inches (50.8 mm).

4) Continue-In-Service Limits - 10 flight cycles or 60 hours. Use the first limit to occur.

(c) Dents in the Stage 4 Bleed port of the HPC case

1) High metal must be removed.

2) No sharp edges permitted

3) Permitted up to six dents total of 0.25 inch (6.35 mm) in depth, and have a minimum radius at the bottom of the dent of 0.20 inch (5.08 mm).

4) Minimum separation must be 2.0 inches (50.8 mm) if none are within 0.75 inch (19.05 mm) from any weld.

5) Continue-In-Service Limits - 10 flight cycles or 60 hours. Use the first limit to occur.

SUBTASK 72-30-00-220-003-H01

(3) Examine the HPC case for broken bolts:

(a) Bolts and nuts that are loose, broken, or missing.

1) None permitted.

2) Apply a light coat of Acheson GP460 compound, D50043 [C02-058] on a new bolt.

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

3) Replace the loose, broken, or missing bolt and nut with a new bolt and nut.

4) Replace all bolts and nuts in the two horizontal flanges when more than 3 bolts or nuts are broken or loose on a flange.

SUBTASK 72-30-00-220-004-H01

(4) Examine the inlet guide vane (IGV) and variable stator vane (VSV) stage one thru stage 3 actuation rings:

(a) Cracks in the side walls of the actuation rings

1) None permitted.

2) Continue-In-Service Limits - Cracks to 0.20 inch (5.08 mm) long on either side of the nut center line can continue in service for 5 flight cycles or 30 hours. Use the first limit to occur.

(b) Cracks in other areas of the actuation rings

1) None permitted.

(c) Twisted or bent actuation rings

1) None permitted.

(d) Actuation rings that show separation or are broken.

1) None permitted

SUBTASK 72-30-00-210-001-H01

(5) Do a visual inspection of all visible VSV guide pads for: Refer to Figure 601.

NOTE: This inspection is limited to only visible and accessible guide pads. It is not necessary to remove any engine hardware to get access and do this inspection.

NOTE: Inspect the VSV guide pads [4] and the IGV guide pads at the same time. Refer to TASK 72-23-00-220-801-H01.

(a) Loose nuts [6]:

1) Not permitted.

2) If loose nuts [6] found, remove the nuts [6].

a) Use 9C1700 tool to unscrew the adjusting screw [7] of the affected guide pad [4] so that the affected guide pad [4] is against the actuating ring [8].

b) Apply Acheson GP460 compound, D50043 [C02-058] to the threads and washer surface of the nut [6].

NOTE: Use a minimum quantity of lubricant necessary for assembly. After assembly, remove unwanted lubricant with a clean cloth.

c) Install the nuts [6] and tighten the nuts [6] to 59 in-lb (6.7 N·m) - 65 in-lb (7.3 N·m).

3) Refer to the Continue-In-Service Limits below.

(b) Missing friction pads [5]:

1) None permitted.

2) Refer to the Continue-In-Service Limits below.

(c) Excessive clearance between the HPC forward cases and the friction surface of the guide pads [4]:

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

1) Any amount if not more than 0.040 in. (1.0 mm).

NOTE: Use a 0.040 in. (1.0 mm) thick feeler gage to check the clearance between the HPC case and the friction surface of the guide pad [4].

2) Refer to the Continue-In-Service Limits below.

(d) Guide pad [4] looseness:

1) None permitted.

2) Refer to the Continue-In-Service Limits below.

(e) Missing guide pad [4]:

1) Not permitted.

2) Refer to the Continue-In-Service Limits below.

(f) Continue-In-Service (CIS) limits. Conditions that are more than the above limits are permitted to continue in service for 150 flight cycles with these conditions:

1) The total number of VSV guide pads [4] found out of the above limits is not more than:

a) Four (4) on stage 1 VSV actuating rings [1]

b) Six (6) on stage 2 VSV actuating rings [2]

c) One (1) on stage 3 VSV actuating rings [3].

NOTE: If the total number of VSV guide pads [4] found out of limits is more than the above limits and/or the IGV guide pads limits, remove the engine immediately. Refer to TASK 72-23-00-220-801-H01 for the IGV guide pads CIS.

2) In the next 50 flight cycles or less, do a borescope inspection of the HPC stage 3, 5 and 8 blades for damage, where damage is serviceable. Refer to High Pressure Compressor Section Rotor Inspection, TASK 72-00-00-290-803-H01.

NOTE: You can alleviate the borescope inspection of the HPC stage 3, 5 and 8 blades if you do a borescope inspection of the HPC stage 3, 5 and 8 blades in or less than 50 flight cycles before the guide pad inspection.

NOTE: It is not necessary to do the borescope inspection BSI of the HPC stages 3, 5 and 8 blades for damage when you do the Continue-In-Service again.

3) Do a water wash again at a 300 flight cycle interval while you use this CIS limit. Refer to the Engine Gas Path Cleaning (Juniper Wash Cart Method), TASK 72-00-00-100-801-H01.

4) It is permitted to do the Continue-In-Service again. Before the Revenue in-service, do an inspection of the guide pads again. Refer to Subtask 72–30–00–210–001–H01.

SUBTASK 72-30-00-210-002-H01

(6) Examine the lever arm bushings on the lever arms with mirror, flashlight or borescope (no dimensional restriction) in order to see the maximum number of bushings:

(a) Damaged or broken lever arm bushings with no metal-to-metal contact

1) Permitted.

(b) Bushings that are missing or lever arm bushings with metal-to-metal contact

1) If the number of missing bushings on all stages (1, 2, 3) is less than (3, 15, 15), replace all missing bushings within 1500 hours (TASK 72-30-00-960-801-H00).

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

2) If the number of missing bushings on any stage (1, 2, 3) is equal to (3 or 15, or 15), replace all missing bushings within 500 hours (TASK 72-30-00-960-801-H00).

3) If the number of missing bushings on all stages (1, 2, 3) is more than (3 or 15, or 15), replace all missing bushings within 75 hours or 5 flight cycles whichever come first (TASK 72-30-00-960-801-H00).

SUBTASK 72-30-00-220-005-H01

(7) Examine the lever arms:

(a) Bent, broken, or cracked lever arm(s)

1) None permitted.

2) Remove the engine.

3) Replace the HPC rotor blades 2 stages aft and one stage forward of the defective lever arm.

4) Replace the damaged lever arm.

(b) Specific wear on the edge of the outer lever arm face only for number 6 stage 2 and number 6 stage 3 for the left and right engine side, lower case. Refer to Figure 602.

1) Any amount, if the radius is not touched.

(c) Specific wear on the edge of the inner lever arm face only for number 5 stage 2 and number 5 stage 3 for the left and right engine side, lower case. Refer to Figure 602.

1) Any amount, if the radius is not touched.

(d) Specific wear on the outer/inner face on all others lever arm edges, upper and lower case.

1) Not permitted.

SUBTASK 72-30-00-220-006-H01

(8) Examine the connector links:

(a) Connector link that is broken or cracked on one side of the engine.

1) Permitted if the connector link is replaced.

2) Continue-In-Service Limits - 5 flight cycles 30 hours. Use the first limit to occur.

(b) Connector link that is broken or cracked on two sides of the engine.

1) None permitted.

SUBTASK 72-30-00-220-007-H01

(9) Examine the VSV actuation shaft:

(a) Cracks in the clevis

1) None permitted.

2) Continue-In-Service Limits - One crack in the VSV actuation shaft clevis up to 0.20 inch (5.08 mm) long can continue in service for 5 flight cycles or 30 hours. Use the first limit to occur.

(b) Cracks in the other areas of the VSV actuation shaft

1) None permitted.

2) Continue-In-Service Limits - Cracks in other areas of the VSV actuation shaft up to 0.40 inch (10.16 mm) long can continue in service for 10 flight cycles or 60 hours. Use the first limit to occur.

(c) Nicks, dents, scratches, and scores:

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

1) High metal must be removed.
2) Nicks, dents, scratches, and scores are permitted if they are less 0.08 inch (2.03 mm) deep after high metal removal. There is no limit to length.
3) Continue-In-Service Limits - 25 flight cycles or 150 hours. Use the first limit to occur.

SUBTASK 72-30-00-220-008-H01

(10) Examine the turnbuckles:
(a) Cracks
1) None permitted.
(b) Nicks, dents, scratches, and scores
1) High metal must be removed.
2) Nicks, dents, scratches, and scores are permitted if they are less than 0.20 inch (5.08 mm) long and 0.08 inch (2.03 mm) deep after removal of high metal. There is no limit to length.
3) Continue-In-Service Limits - 5 flight cycles or 30 hours. Use the first limit to occur.

SUBTASK 72-30-00-220-009-H01

(11) Examine the spherical bearings:
(a) Looseness of the ball in the race.
1) The maximum radial movement is permitted to 0.01 inch (0.25 mm).
(b) The race is out of the lever:
1) None permitted.

SUBTASK 72-30-00-220-010-H01

(12) Examine the VSV actuation shaft brackets and accessory gearbox brackets:
(a) Cracks in the brackets
1) None permitted.
2) Continue-In-Service Limits - One crack in the VSV actuation shaft and the accessory gearbox brackets that is less than 0.08 inch (2.03 mm) long can continue in service for 5 flight cycles or 30 hours. Use the first limit to occur.
(b) Nicks, dents, scratches, and scores
1) High metal must be removed.
2) Nicks, dents, scratches, and scores are permitted if they are no more than 1.0 inch (25.4 mm) long and 0.08 inch (2.03 mm) deep after removal of high metal.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-30-00-410-001-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.

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:

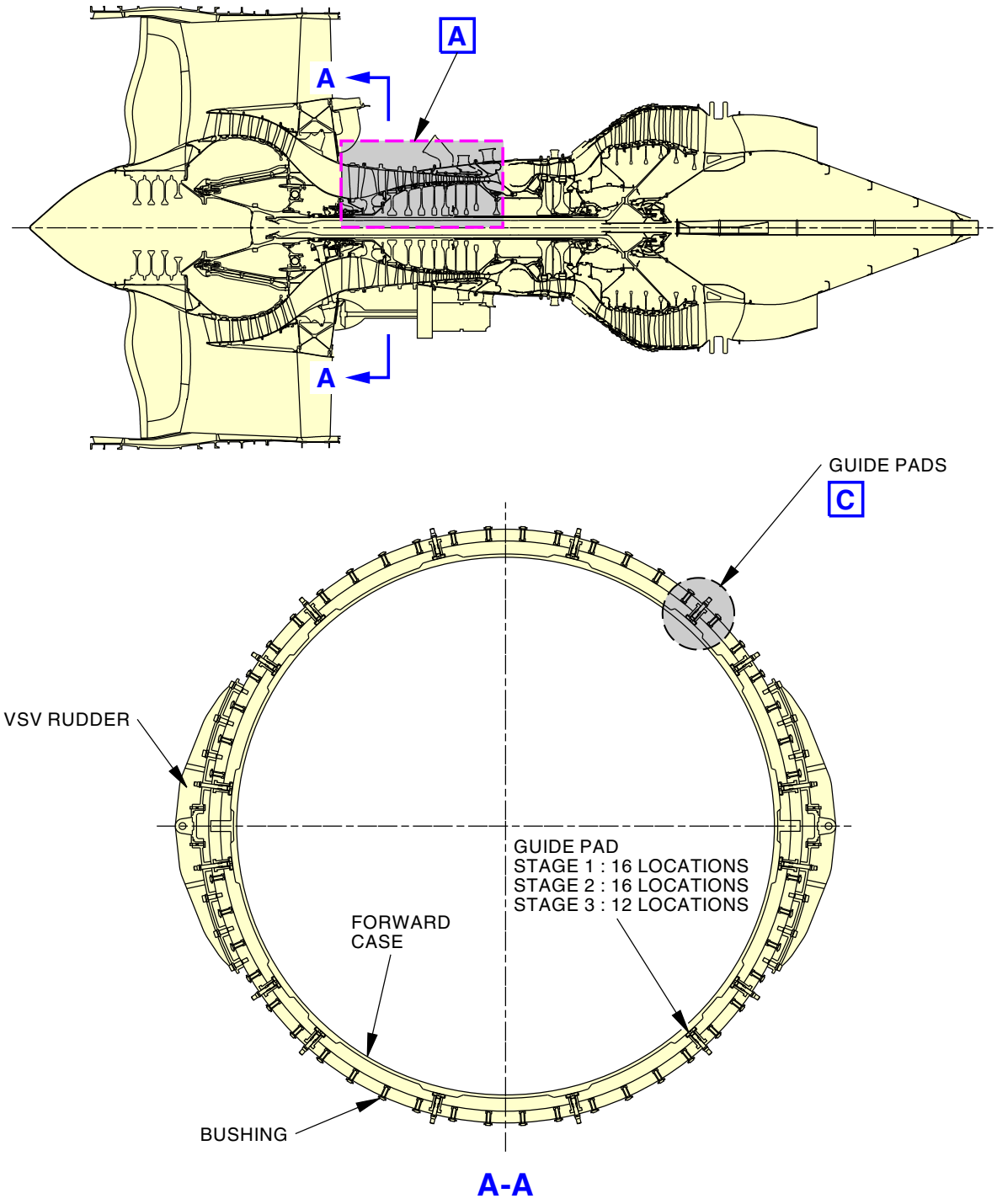
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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.

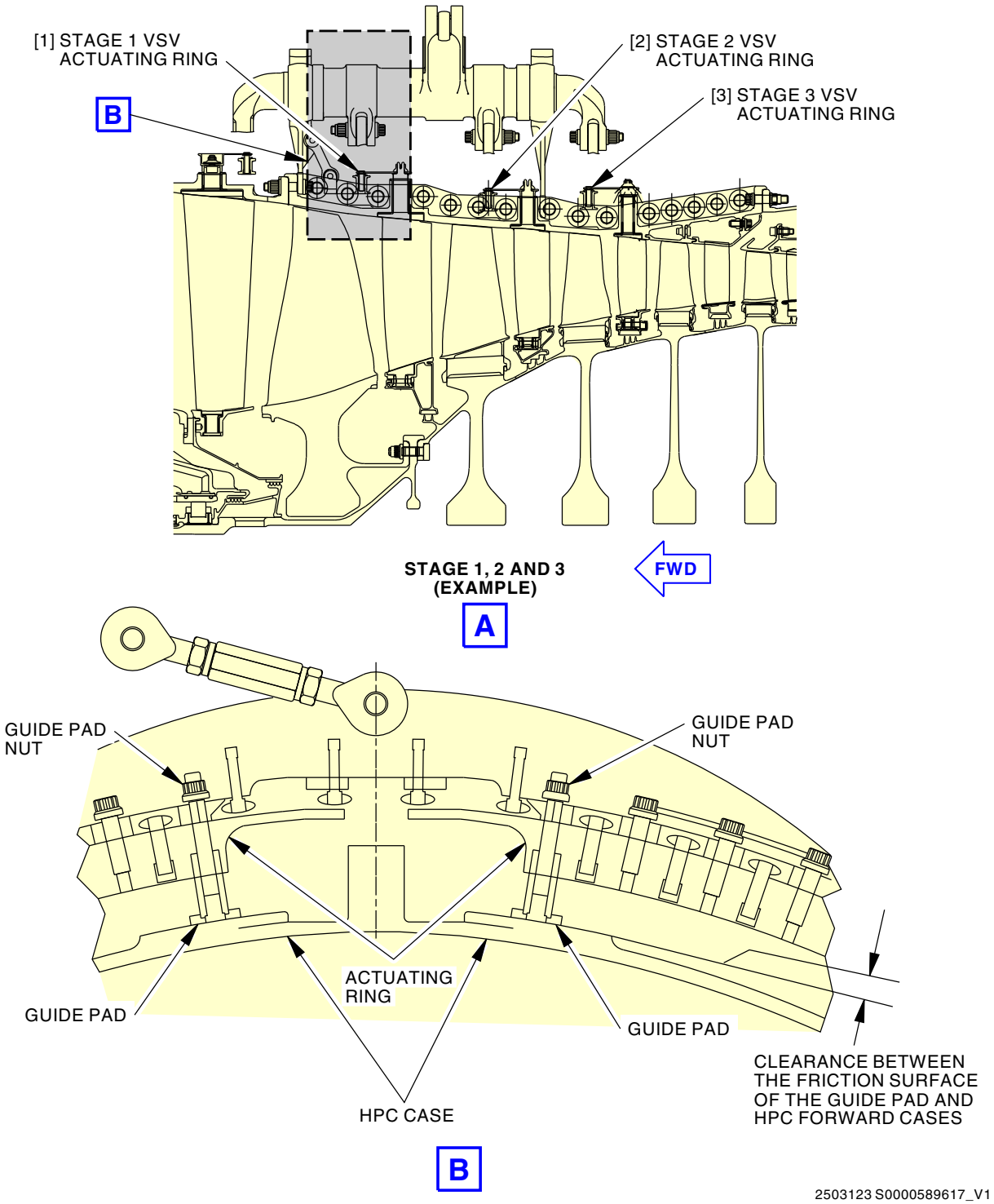
——— END OF TASK ———

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



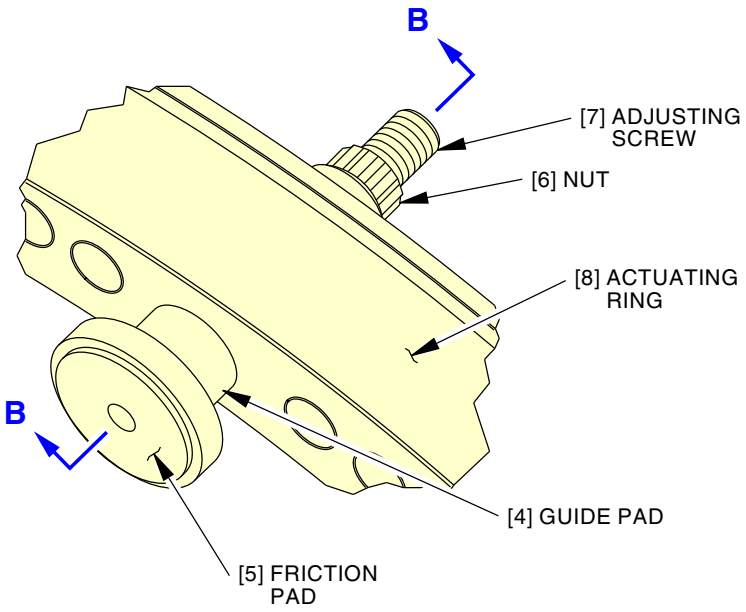
VSV Actuating Ring Guide Pads Inspection
Figure 601/72-30-00-990-822-H00 (Sheet 1 of 4)

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



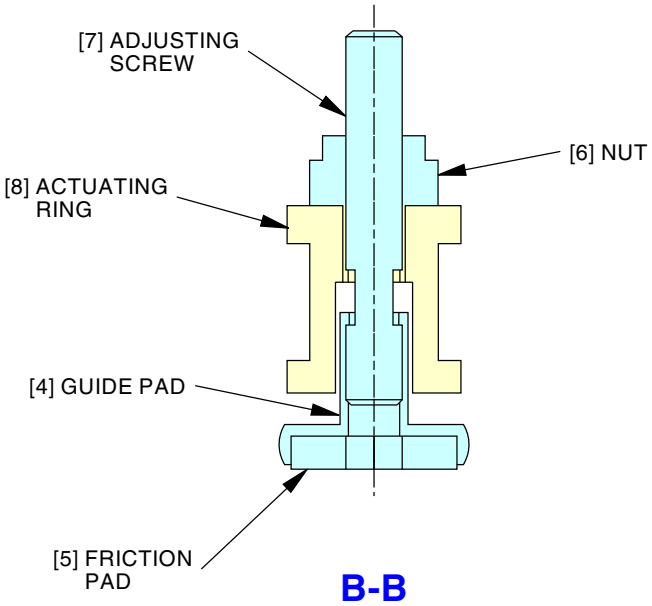
VSV Actuating Ring Guide Pads Inspection
Figure 601/72-30-00-990-822-H00 (Sheet 2 of 4)

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



GUIDE PADS (EXAMPLE)

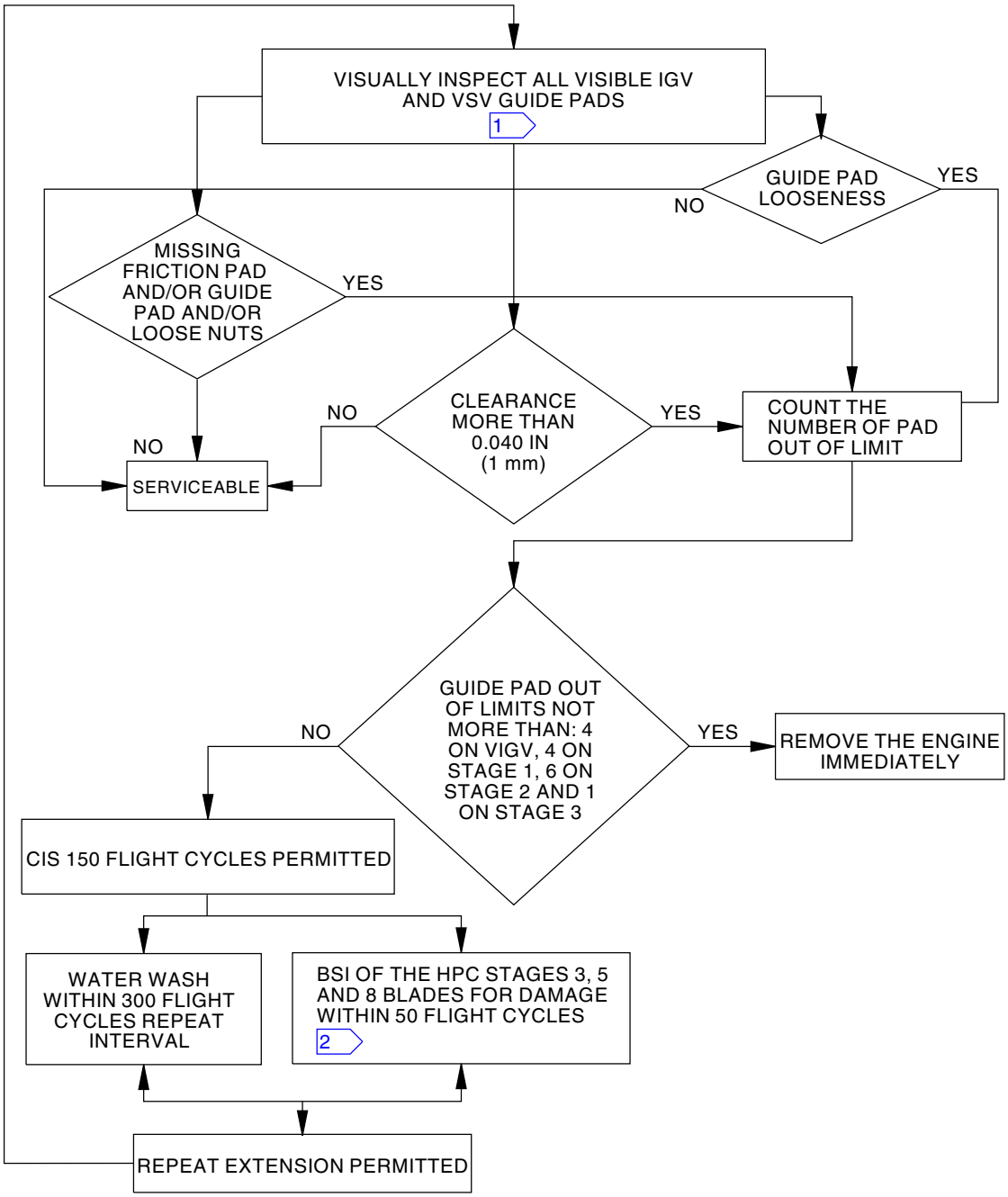
C



2503124 S0000587543_V1

VSV Actuating Ring Guide Pads Inspection
Figure 601/72-30-00-990-822-H00 (Sheet 3 of 4)

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



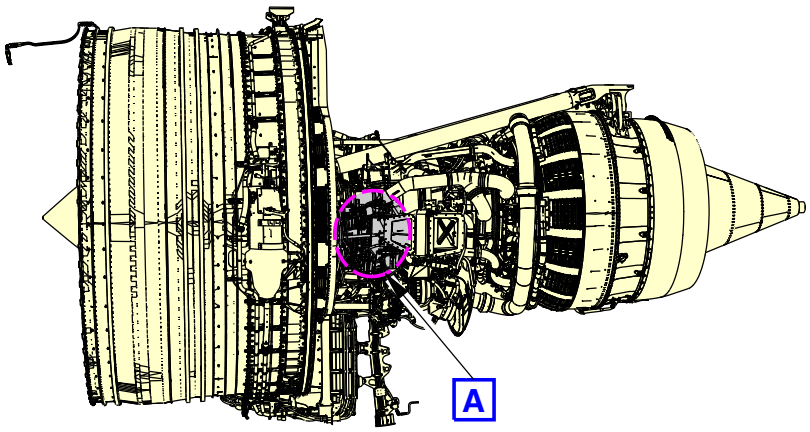
1 INSPECT CONCURRENTLY THE VSV GUIDE PADS AND THE IGV GUIDE PADS. REFER TO TASK 72-23-00-220-801-H01

2 BORESCOPE INSPECTION BSI OF THE HPC STAGES 3, 5 AND 8 BLADES FOR DAMAGE IS NOT REQUIRED WHEN YOU REPEAT CONTINUE IN-SERVICE

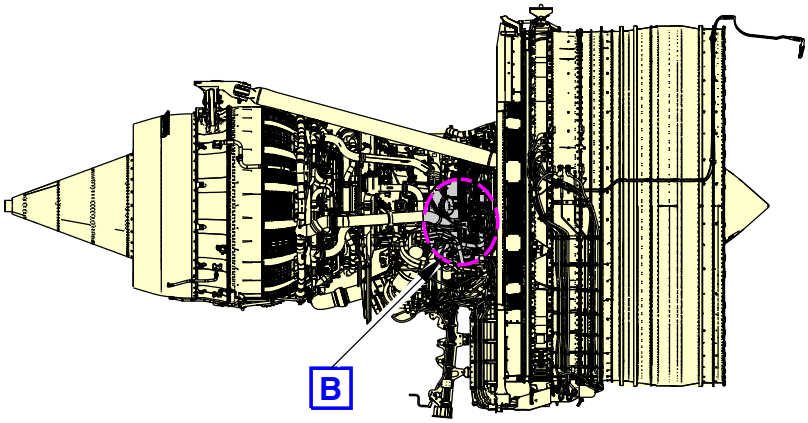
2503125 S0000588077_V1

VSV Actuating Ring Guide Pads Inspection
Figure 601/72-30-00-990-822-H00 (Sheet 4 of 4)

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



LEFT SIDE ENGINE

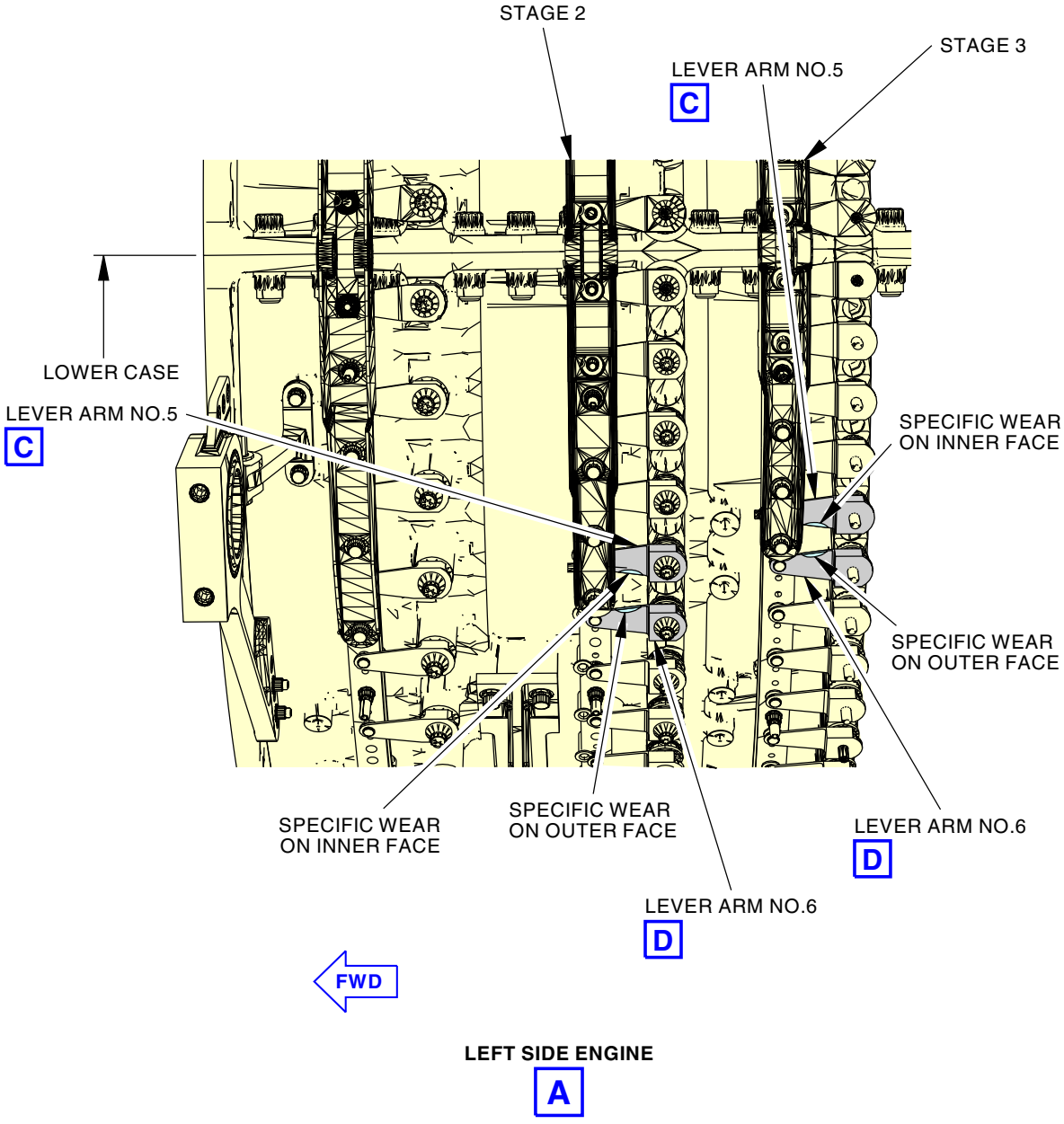


RIGHT SIDE ENGINE

5036264-00
2570064 S0000616191_V1

Lever Arm Inspection
Figure 602/72-30-00-990-845-H00 (Sheet 1 of 4)

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

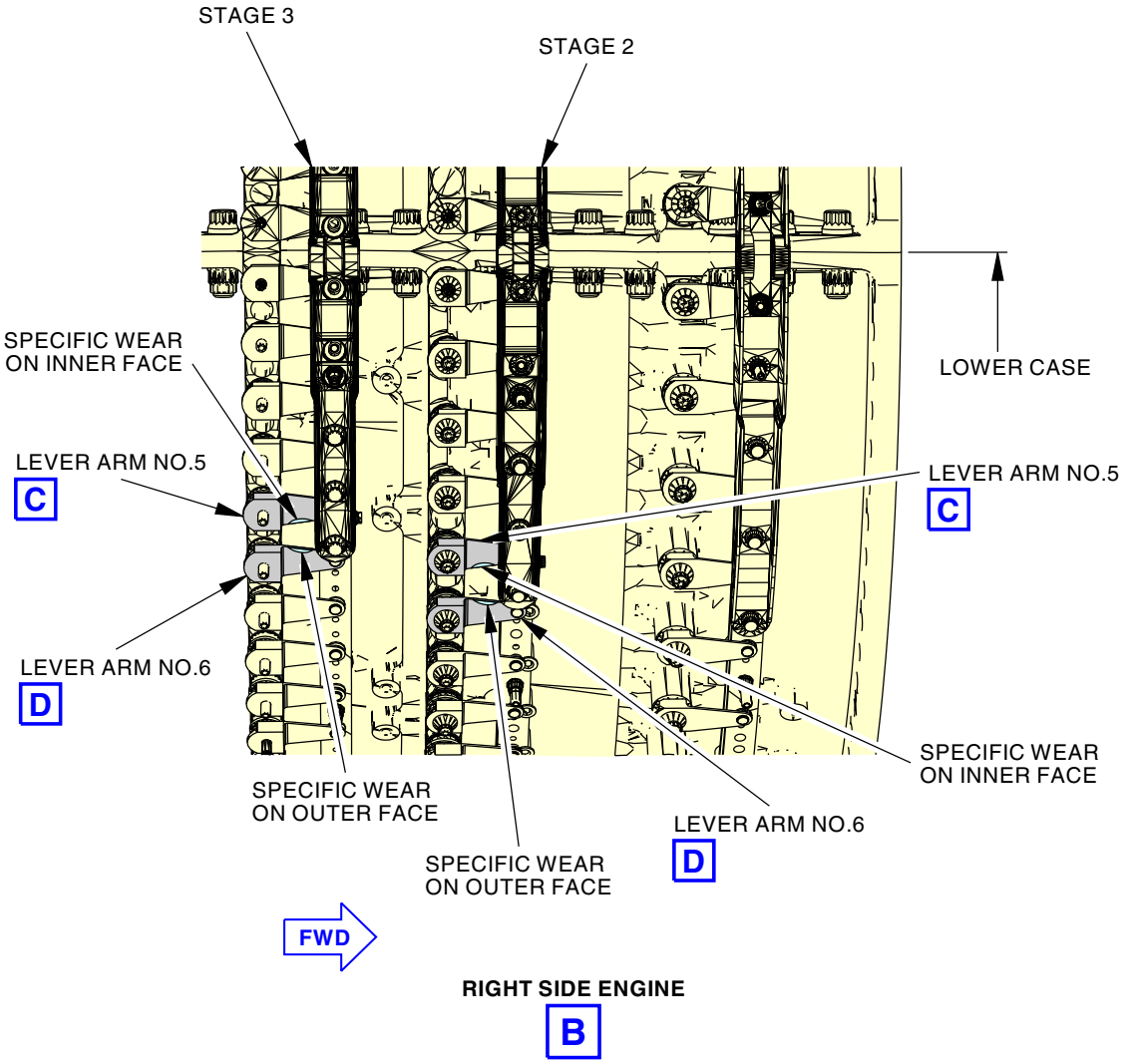


5036265-00

2569630 S0000616192_V1

Lever Arm Inspection
Figure 602/72-30-00-990-845-H00 (Sheet 2 of 4)

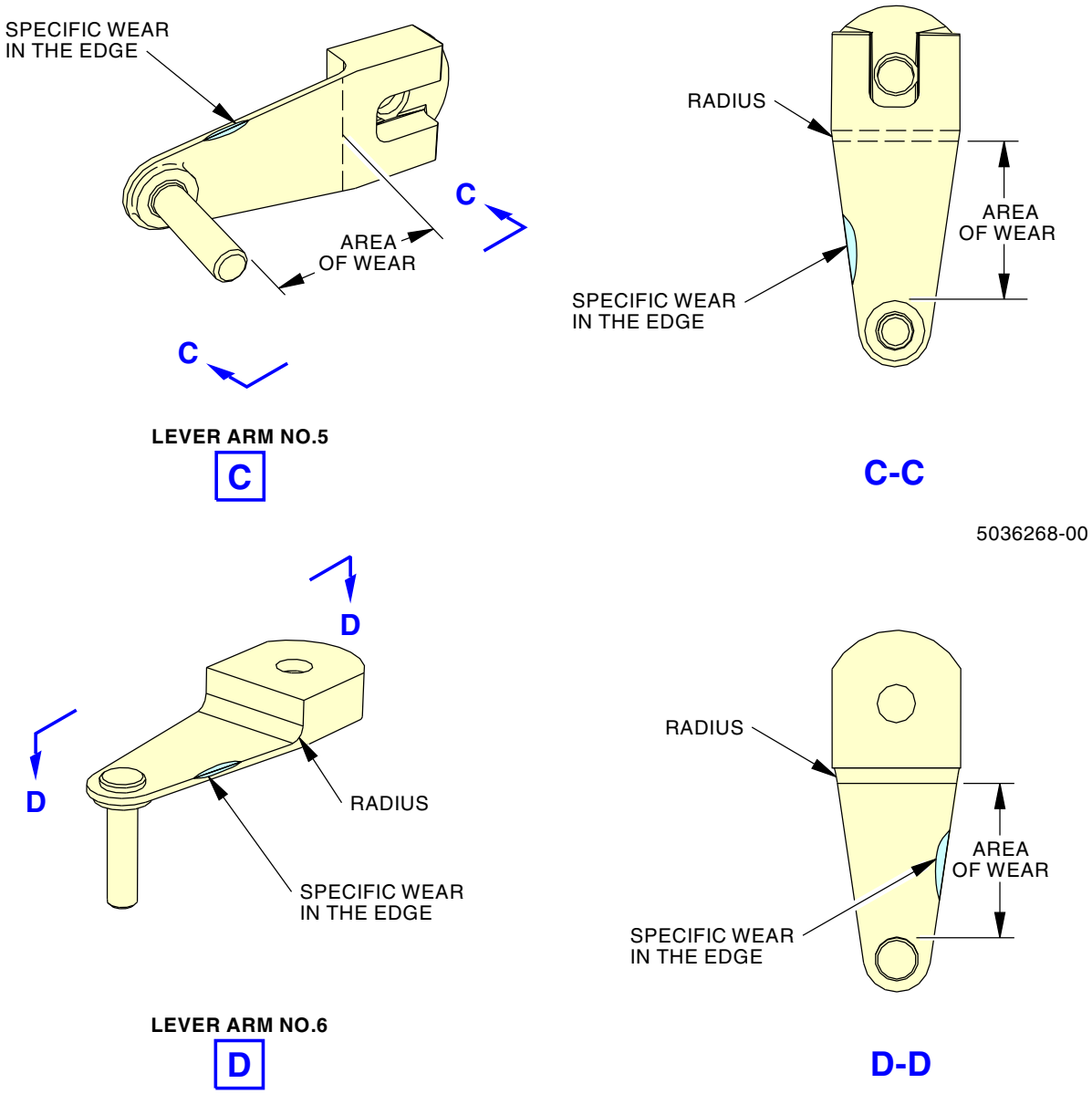
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5036266-00
2569616 S0000616193_V1

Lever Arm Inspection
Figure 602/72-30-00-990-845-H00 (Sheet 3 of 4)

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



Lever Arm Inspection
Figure 602/72-30-00-990-845-H00 (Sheet 4 of 4)

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

HIGH PRESSURE COMPRESSOR SECTION (HPC) - REPAIRS

1. General

A. This procedure has these tasks:

(1) Stage 2-8 HPC Rotor Blades Repair (with the Borescope Blending Tool)

(2) Stages 1-3 VSV Actuating Ring and Rudders Lever Arm Pin Bushing(s) Repair (Replacement)

(3) VSV Torsion Bar Repair (Replacement)

(4) VSV Turnbuckles Repair (Replacement).

TASK 72-30-00-300-802-H00

2. Stage 2-8 HPC Rotor Blades Repair (with the Borescope Blending Tool)

(Figure 801, Figure 802, Figure 803, Figure 804, Figure 805, Figure 806, Figure 807, and Figure 808)

A. General

(1) This task provides the instructions on how to do the borescope blend repair of damaged areas on stage 2-8 HPC rotor blades.

(2) Make sure that the mechanic has the fan blade repair training to do this task.

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)
71-00-02-000-811-H00	Power Plant Removal (P/B 401)
71-00-02-400-811-H00	Power Plant 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)
72-00-00-290-803-H01	High Pressure Compressor Section Rotor Inspection (P/B 601)
72-00-00-820-801-H01	Zero-Index of the HPC Rotor (P/B 201)
72-00-00-980-801-H01	Manual Motoring of the HPC Rotor (P/B 201)
72-00-00-980-802-H01	Electrical Motoring of the HPC Rotor (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-534	Kit - Borescope, Blending HPC Rotor Blades Part #: 5.08236.001 Supplier: 50958
COM-571	Light - Source, Borescope Part #: 9C1303P01 Supplier: 06083 Part #: 9C1303P02 Supplier: 06083

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

(Continued)

Reference	Description
COM-2290	Kit - Borescope, Blending Stage 2-9 HPC Rotor Blades (except for Stages 5 & 6) Part #: 5.10046.001 Supplier: 50958
SPL-142	Fiberscope - Right Angle Part #: 9C1301P01 Supplier: 06083 Part #: 9C1301P03 Supplier: 06083
SPL-988	Video System - Borescope, PAL Output, 220/240 VAC, 50 Hz Part #: 9C1304P02 Supplier: 06083 Part #: 9C1304P06 Supplier: 06083 Part #: 9C1304P12 Supplier: 06083
SPL-2332	Borescope Blend Tool Part #: 5.08136.001 Supplier: 50958

D. Consumable Materials

Reference	Description	Specification
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

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Blend Repair Limits

NOTE: These blend repair limits keep the rotor in balance.

SUBTASK 72-30-00-320-004-H00

(1) Blend repair limits for stage 2-4 rotor blades.

(a) You are not permitted to blend repair more than seven blades of the 2nd stage HPC blades.

(b) You are not permitted to blend repair more than:

- Sixteen blades of the 3rd stage HPC rotor blades when the depth finding is within [0 in. (0.00 mm) to 0.06 in. (1.5 mm)] in area B and/or C.
- Six blades of the 3rd stage HPC rotor blades when the depth finding is within [0.06 in. (1.5 mm) to 0.12 in. (3.05 mm)] in area C.
- One blade of the 3rd stage HPC rotor blades when the depth finding is within [0.12 in.

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

(3.05 mm) to 0.157 in. (4.0 mm)] in area C.

(c) You are not permitted to blend repair more than:

- Twenty-two blades of the 4th stage HPC rotor blades when the depth finding is within [0 in. (0.00 mm) to 0.06 in. (1.5 mm)] in area B.
- Six blades of the 4th stage HPC rotor blades when the depth finding is within [0.06 in. (1.5 mm) to 0.12 in. (3.05 mm)] in area B.
- One blade of the 4th stage HPC rotor blades when the depth finding is within [0.12 in. (3.05 mm) to 0.157 in. (4.0 mm)] in area B.

(d) You can blend repair cracks, nicks, dents, and separations only in areas where blend repairs are permitted.

NOTE: Figures below give the dimensions of the areas where blend repairs are permitted.

(e) You are not permitted to blend repair in the root radius area.

(f) Tool marks (with no depth) from the blend repair are permitted on the HPC case lands and on the airfoil surfaces.

(g) If the damaged area is not in the repairable limits, replace the engine (TASK 71-00-02-000-811-H00 and TASK 71-00-02-400-811-H00).

SUBTASK 72-30-00-320-005-H00

(2) Blend repair limits for stage 5-8 rotor blades.

(a) You are permitted to do one blend per blade for stage 5-8 rotor blades.

(b) You are permitted to blend repair a maximum of 20 blades for the stage 5 leading edge as follows:

1) Above 0.6 inch (15.24 mm) from the platform, you can blend a maximum of eight blades to a depth (dimension A) of 0.16 inch (4.06 mm).
2) From above the root radius area to 0.6 inch (15.24 mm) from the platform, you can blend to a depth (dimension A) of 0.06 inch (1.52 mm).
3) Blend to a 4:1 length-to-depth ratio and smooth transition to the leading edge.
4) Blend repair is not permitted in the root radius area.

(c) You are permitted to do blend repair a maximum of four blades for a stage 5 tip corner missing material.

(d) You are permitted to blend repair a maximum of 14 blades for the stage 6 leading edge as follows:

1) Above 0.49 inch (12.45 mm) from the platform, you can blend to a maximum depth (dimension A) of 0.160 inch (4.06 mm).
2) From above the root radius area to 0.49 inch (12.45 mm) from the platform, you can blend to a maximum depth (dimension A) of 0.050 inch (1.27 mm).
3) A maximum of one blade for stage 6 can be blended to a maximum depth (dimension A) of 0.160 inch (4.06 mm) where permitted.
4) A maximum of four blades for stage 6 can be blended to a maximum depth (dimension A) of 0.120 inch (3.05 mm) where permitted.
5) A maximum of fourteen blades for stage 6 can be blended to a maximum depth (dimension A) of 0.050 inch (1.27 mm) where permitted.
6) The total number of stage 6 blades blended must not exceed fourteen.

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

7) Blend to a 4:1 length-to-depth ratio and smooth transition to the leading edge.

8) Blend repair is not permitted in the root radius area.

(e) You are permitted to blend repair a maximum of 14 blades for the stage 7 leading edge as follows:

1) Above 0.41 inch (10.42 mm) from the platform, you can blend to a maximum depth (dimension A) of 0.12 inch (3.05 mm).

2) From above the root radius area to 0.41 inch (10.42 mm) from the platform, you can blend to a maximum depth (dimension A) of 0.06 inch (1.53 mm).

3) A maximum of one blade for stage 7 can be blended to a maximum depth (dimension A) of 0.12 inch (3.05 mm) where permitted.

4) A maximum of four blades for stage 7 can be blended to a maximum depth (dimension A) of 0.10 inch (2.54 mm) where permitted.

5) A maximum of fourteen blades for stage 7 can be blended to a maximum depth (dimension A) of 0.04 inch (1.02 mm) where permitted.

6) The total number of stage 7 blades blended must not exceed fourteen.

7) Blend to a 4:1 length-to-depth ratio and smooth transition to the leading edge.

8) Blend repair is not permitted in the root radius area.

(f) You are permitted to blend repair a maximum of 14 blades for the stage 8 leading edge as follows:

1) Above 0.35 inch (8.89 mm) from the platform, you can blend to a maximum depth (dimension A) of 0.120 inch (3.05 mm).

2) From above the root radius area to 0.35 inch (8.89 mm) from the platform, you can blend to a maximum depth (dimension A) of 0.060 inch (1.53 mm).

3) A maximum of one blade for stage 8 can be blended to a maximum depth (dimension A) of 0.120 inch (3.05 mm) where permitted.

4) A maximum of four blades for stage 8 can be blended to a maximum depth (dimension A) of 0.060 inch (1.53 mm) where permitted.

5) A maximum of fourteen blades for stage 8 can be blended to a maximum depth (dimension A) of 0.025 inch (0.64 mm) where permitted.

6) The total number of stage 8 blades blended must not exceed fourteen.

7) Blend to a 4:1 length-to-depth ratio and smooth transition to the leading edge.

8) Blend repair is not permitted in the root radius area.

(g) You can do blend repairs of cracks, nicks, dents, and separations only in areas where blend repairs are permitted.

NOTE: The figures in this task give the dimensions of the areas where blend repairs are permitted.

(h) You are not permitted to do a blend repair in the root radius area.

(i) Tool marks (with no depth) from the blend repair are permitted on the HPC case lands and on the airfoil surfaces.

(j) If the damaged area is not in the repairable limits, replace the engine (TASK 71-00-02-000-811-H00 and TASK 71-00-02-400-811-H00).

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

H. Prepare for the Repair

SUBTASK 72-30-00-865-003-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-30-00-010-007-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

(2) 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 72-30-00-320-006-H00

(3) Assemble the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290, borescope video system, SPL-988, borescope light source, COM-571, and right angle fiberscope, SPL-142.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

SUBTASK 72-30-00-010-005-H00

(4) Install the manual motoring tool or the electrical motoring tool (TASK 72-00-00-980-802-H01 or TASK 72-00-00-980-801-H01).

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

I. Borescope Blend Repair Procedure

SUBTASK 72-30-00-010-006-H00

(1) Remove the borescope plugs from ports C through J.

SUBTASK 72-30-00-869-003-H00

(2) Put a tag on each borescope plug to identify the stage from which it was removed.

SUBTASK 72-30-00-320-007-H00

(3) Do this task: Zero-Index of the HPC Rotor, TASK 72-00-00-820-801-H01.

SUBTASK 72-30-00-320-008-H00

(4) Look at the damaged areas on each rotor blade that was found to be unserviceable during the borescope inspection.

(a) Put the drive shaft head in the 90° position.

NOTE: Make sure that you install blending tool tip with the drive shaft head in the 90 degree position. If you do not, the drive belt will disengage.

(b) Install the measuring grid tip.

(c) Tighten the lock screw.

(d) Put the drive shaft head in the 0° position.

(e) Put the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290, into the compressor through the applicable borescope access port.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(f) Turn on the borescope light source, COM-571.

(g) Monitor the borescope image of the measuring grid tip while you do this step:

1) Move the measuring grid tip from the 0°-90° position.

(h) Monitor the borescope image of the measuring grid tip while you do these steps:

1) Position the measuring grid tip near each damaged area on the blade.

2) Use the grid tip to find the dimensions of the damage that follow:

a) The maximum depth of the damaged area

b) The maximum width of the damaged area

c) The maximum length of the damaged area

d) The location of the edges of the damages area from the nearest edge of the rotor blade.

3) Record the dimensions of the damage that you find.

(i) For each damaged area on the blade, do this step to find if a blend repair to that area is permitted.

1) Compare the data for the location of each damaged area to the blend repair limits.

2) For each damaged area that you are permitted to repair, find minimum blend repair length.

a) Calculate the minimum blend repair length at 8 x Dimension A (the maximum depth of the damage) (Figure 801 and Figure 802).

b) For stage 5 leading edge, calculate the minimum blend repair at 4 x Dimension A (the maximum depth of the damage) (Figure 801).

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

c) Center blend the damaged area in the repair.

3) Put the drive shaft head in the 0° position.

4) Remove the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290, from the access port.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

5) Put the drive shaft head in the 90° position and do these steps:

NOTE: Make sure that you install blending tool tip with the drive shaft head in the 90 degree position. If you do not, the drive belt will disengage.

a) Loosen the lock screw.

b) Remove the measuring grid tip.

SUBTASK 72-30-00-320-009-H00

(5) For each damaged area that you are permitted to repair, do the blend repair as follows:

(a) Get the applicable grinding tip for the size of the damaged area and the stage of the HPC blade.

(b) Put the drive shaft head in the 90° position and do these steps:

NOTE: Make sure that you install blending tool tip with the drive shaft head in the 90 degree position. If you do not, the drive belt will disengage.

1) Install the grinding tip.

2) Tighten the lock screw.

CAUTION

MAKE SURE THAT THE DIRECTION OF THE GRINDING TIP TURNS IN THE CLOCKWISE (CW) DIRECTION. A GRINDING TIP THAT TURNS IN THE COUNTERCLOCKWISE (CCW) DIRECTION CAN LOOSEN AND SEPARATE FROM THE DRIVE SHAFT HEAD DURING OPERATION. DAMAGE TO THE ENGINE CAN OCCUR.

(c) With the grinding tip in the 90° position, turn the tip so it points away from you while you do this step:

1) Briefly turn on the motor.

2) Make sure that the tip turns in a clockwise (CW) direction.

NOTE: During operation, a tip that turns in the clockwise (CW) direction will be tightened by the force of operation.

a) If the tip turns in a counterclockwise (CCW) direction, examine the belt for a twisted installation.

(d) Put the drive shaft head in the 0° position.

(e) Put the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290, into the compressor through the applicable borescope access port.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(f) Monitor the borescope image of the grinding tip while you put the grinding tip near the damaged area.

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

(g) With the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290, motor off, put the grinding tip in the location of the damaged area to find the minimum blend area as follows:

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

1) Use the grinding tip to make a mark on the blade at the center of the maximum damage length.

2) Use the grinding tip to make a mark on each side of the center mark at four times the maximum depth of the damage.

a) The area between the two marks will be the minimum blend length of the repair.

b) When Dimension B (the area between the end of the blend repair area and the rotor blade tip) is less than 0.10 inch (2.54 mm), use the grinding tip to remove the Dimension B shadowed area.

c) When Dimension C (the area between two blend repairs) is equal to or less than two times Dimension A, use the grinding tip to remove the Dimension C shadowed area.

(h) Move the tip of the grind tip to simulate the movement that is needed to begin the blend repair across the minimum blend repair length.

NOTE: Do not turn the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 motor on during this operation.

(i) When the operator is familiar with the required movements of the grinding tip and the borescope view is centered and clear, turn the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 motor on.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(j) Carefully start to apply pressure to the damaged area and begin to blend the damage.

NOTE: Start your initial blend movements slowly and apply only light pressure to the damaged area.

(k) When the blend movements feel correct, increase the speed and pressure of the grinding tip to the damage.

NOTE: If you apply too much pressure, the drive belt will not turn the grinding tip. To continue grinding, lift the tip slightly from the damaged area.

(l) When you complete the blend repair, blend a contour onto the edge of the blade to remove any sharp edges.

NOTE: This will keep the blade profile as near to the original profile as possible for maximum airfoil efficiency.

(m) Turn the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 motor off.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(n) Put the drive shaft head in the 0° position.

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

(o) Remove the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 from the access port.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(p) Put the drive shaft head in the 90° position and do these steps:

NOTE: Make sure that you remove the blending tool tip with the drive shaft head in the 90 degree position. If you do not, the drive belt will disengage.

1) Loosen the lock screw.

2) Remove the grinding tip.

(q) Install the polishing tip on the drive shaft head.

NOTE: Make sure that you remove the blending tool tip with the drive shaft head in the 90 degree position. If you do not, the drive belt will disengage.

(r) Tighten the lock screw.

(s) Put the drive shaft head in the 0° position.

(t) Install the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 into the applicable access port.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(u) Turn the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 motor on.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(v) Polish the surface of the area repaired with the polishing tip.

(w) Turn off the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 motor.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

(x) Put the drive shaft head in the 0° position.

(y) Remove the blending HPC rotor blades borescope kit, COM-534, or borescope blend tool, SPL-2332, or blending stage 2-9 HPC rotor blades borescope kit, COM-2290 from the access port.

NOTE: The blending stage 2-9 HPC rotor blades borescope kit, COM-2290 can be used for HPC rotor blades blending stage 2-9 except for stage 5 and 6.

SUBTASK 72-30-00-320-010-H00

(6) Examine the blended areas of the HPC blades (TASK 72-00-00-290-803-H01).

(a) Make sure that you remove all the rotor damage.

SUBTASK 72-30-00-869-004-H00

(7) Turn off the borescope light source, COM-571.

(a) Keep the borescope light source, COM-571 blower on until the lamp and the case are sufficiently cool.

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

SUBTASK 72-30-00-410-005-H00

(8) Install the borescope plugs C through G as follows:

(a) Remove the tags from borescope plugs C through G.

(b) Put the Acheson GP460 compound, D50043 [C02-058] on the borescope plug.

(c) Install the borescope plug in the borescope port.

(d) Tighten the plugs to 84.6-93.5 pound-inches (9.6-10.6 Newton-meters).

SUBTASK 72-30-00-410-006-H00

(9) Install the borescope plugs H and J as follows:

(a) Remove the tags from borescope plugs H and J.

(b) Put the Acheson GP460 compound, D50043 [C02-058] on the borescope plugs.

(c) Install the plugs in the correct ports.

(d) Tighten the plugs to 84.6-93.5 pound-inches (9.6-10.6 Newton-meters) until seated.

(e) Loosen the plugs.

(f) Tighten the plugs to 27.7-28.4 pound-inches (2.9-3.2 Newton-meters).

(g) Put the Acheson GP460 compound, D50043 [C02-058] on the borescope caps H and J.

(h) Install the caps on borescope plugs H and J as follows:

1) Compress the spring in the cap to engage the cap threads with the extension case.

2) Tighten the caps to 84.6-93.5 pound-inches (9.6-10.6 Newton-meters).

J. Put the Airplane Back to Its Usual Condition.

SUBTASK 72-30-00-010-008-H00

(1) Remove the manual motoring tool or the electrical motoring tool (TASK 72-00-00-980-801-H01 or TASK 72-00-00-980-802-H01).

SUBTASK 72-30-00-865-004-H00

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

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-30-00-410-007-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.

(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

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

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

1) Close these access panels:

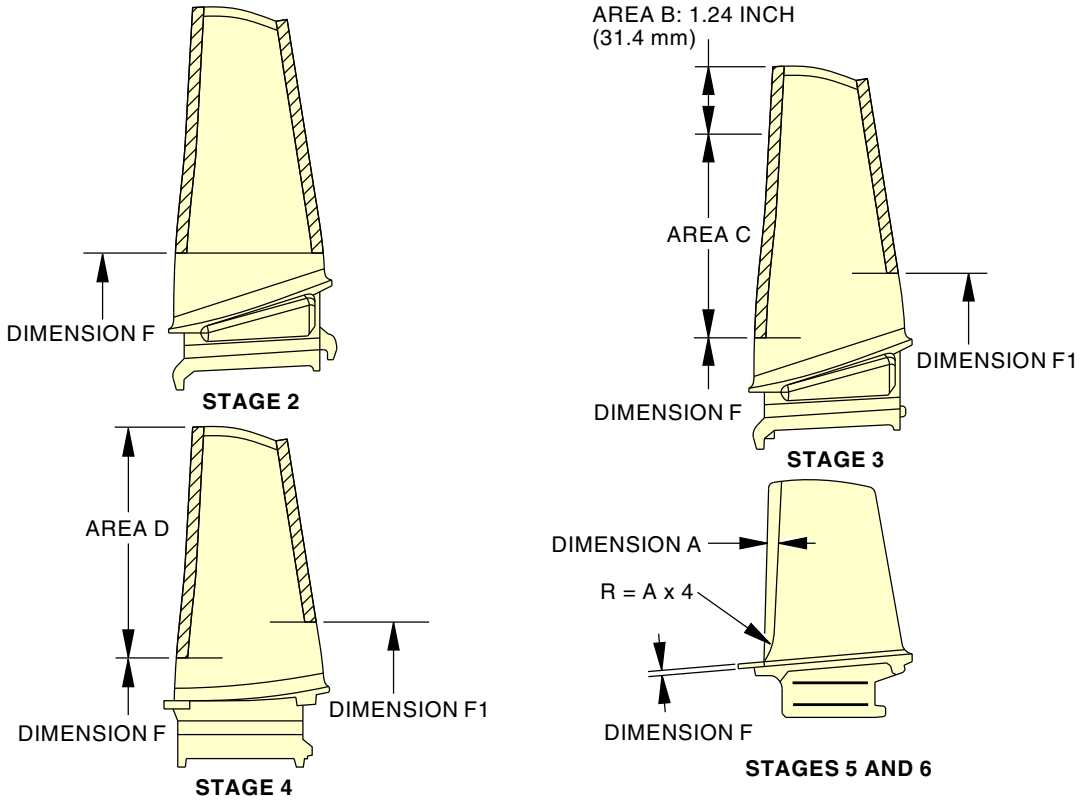
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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



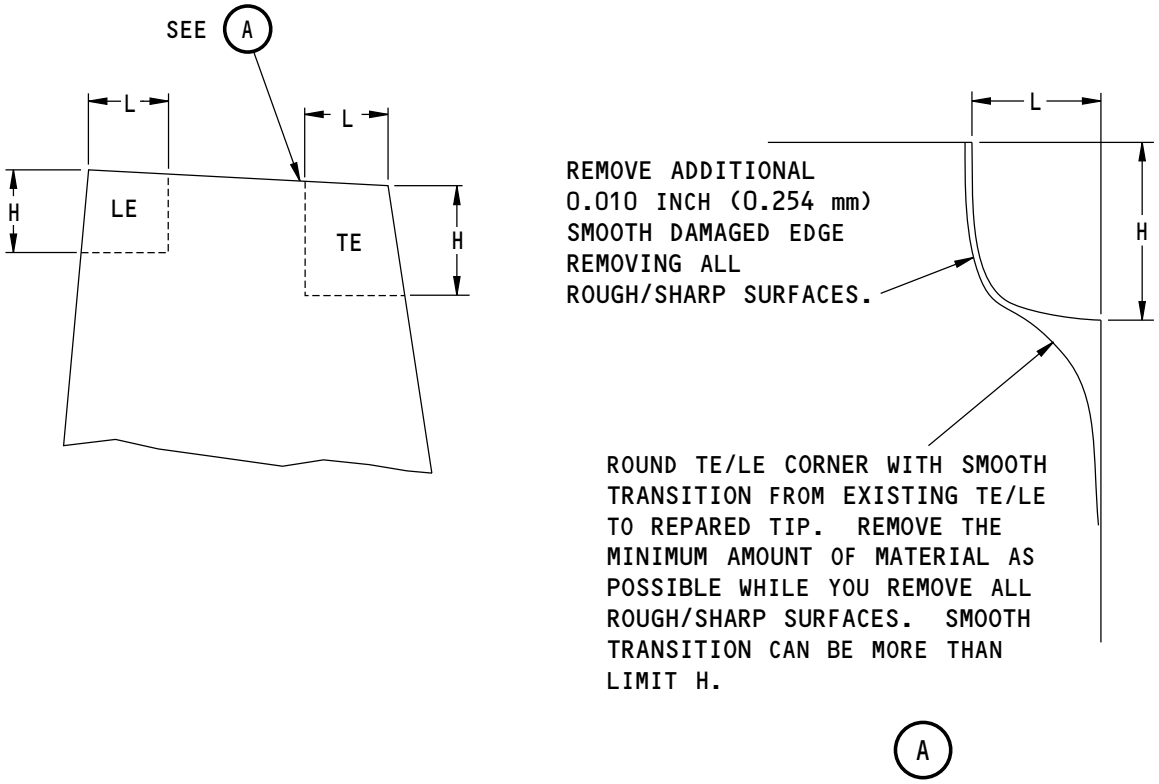
STAGE	DIMENSION A BLEND REPAIR PERMITTED	DIMENSION F BLEND REPAIR NOT PERMITTED
2	0.06 INCH (1.5 mm)	1.90 INCHES (48.3 mm)
3 L/E	AREA B : 0.06 INCH (1.5 mm) AREA C : 0.157 INCH (4.0 mm)	0.4 INCH (10.0 mm)
3 T/E	0.06 INCH (1.5 mm)	1.40 INCHES (35.6 mm)
4 L/E	AREA D : 0.157 INCH (4.0 mm)	0.256 INCH (6.5 mm)
4 T/E	0.09 INCH (2.4 mm)	1.10 INCHES (27.9 mm)
5	0.16 INCH (4.1 mm) ABOVE 0.60 INCH (15.2 mm) FROM THE PLATFORM 0.06 INCH (1.5 mm) WITHIN 0.60 INCH (15.2 mm) FROM THE PLATFORM	BLEND REPAIR NOT PERMITTED TO EXTEND INTO THE ROOT RADIUS AREA 0.145 INCH (3.69 mm)
6	0.16 INCH (4.1 mm) ABOVE 0.49 INCH (12.45 mm) FROM THE PLATFORM 0.05 INCH (1.27 mm) WITHIN 0.49 INCH (12.45 mm) FROM THE PLATFORM	BLEND REPAIR NOT PERMITTED TO EXTEND INTO THE ROOT RADIUS AREA 0.135 INCH (3.43 mm)

DIMENSION A

1243796-00
M06785 S0004285817_V8

HPC Stage 2-6 Blade Repair Limits
Figure 801/72-30-00-990-809-H00 (Sheet 1 of 3)

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



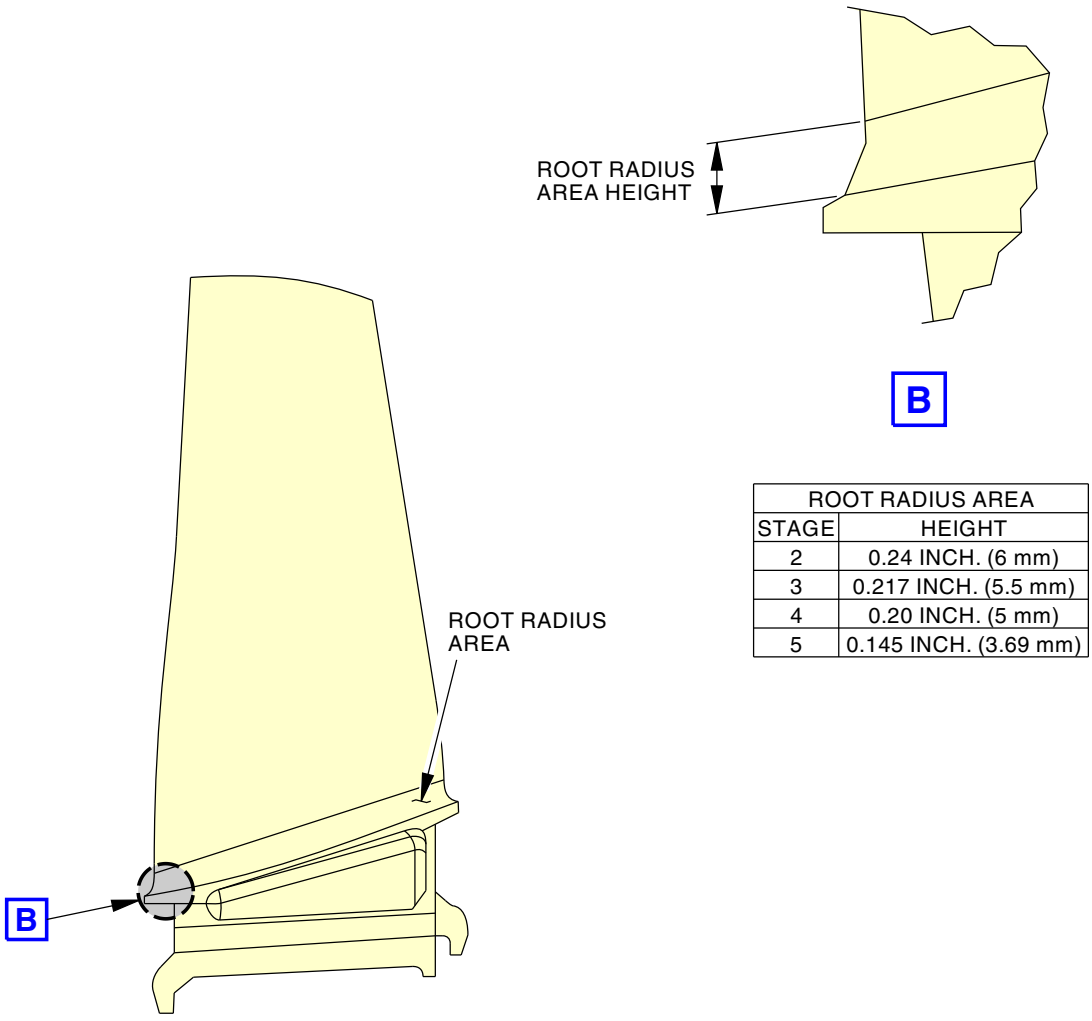
LEADING AND TRAILING TIP CORNER AREA DEFINITION		
STAGE 5	L	H
LE BLEND LIMIT	0.50 INCH (12.7 mm)	0.50 INCH (12.7 mm)
TE BLEND LIMIT	0.61 INCH (15.494 mm)	0.70 INCH (17.78 mm)
LE AND TE SERVICEABLE LIMIT	0.25 INCH (6.35 mm)	0.25 INCH (6.35 mm)

STAGE 5 LEADING OR TRAILING EDGE
TIP CORNER MISSING AND BLEND REPAIR

1290141-00
1930430 S0000364579_V2

HPC Stage 2-6 Blade Repair Limits
Figure 801/72-30-00-990-809-H00 (Sheet 2 of 3)

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



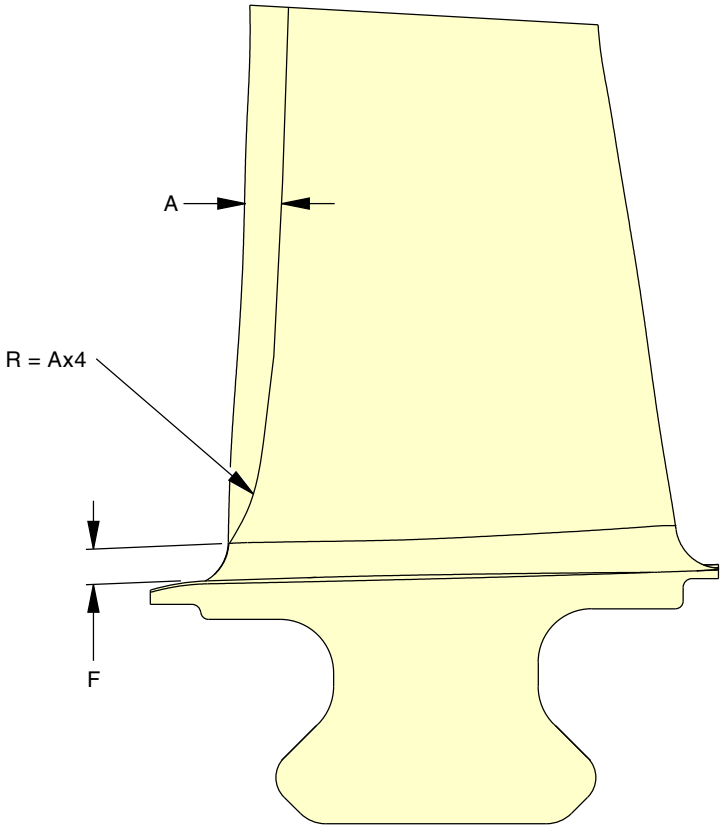
ROOT RADIUS AREA	
STAGE	HEIGHT
2	0.24 INCH. (6 mm)
3	0.217 INCH. (5.5 mm)
4	0.20 INCH. (5 mm)
5	0.145 INCH. (3.69 mm)

STAGE 2 BLADE SHOWN

5035902-00
2569372 S0000616023_V1

HPC Stage 2-6 Blade Repair Limits
Figure 801/72-30-00-990-809-H00 (Sheet 3 of 3)

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



STAGE 7 AND 8

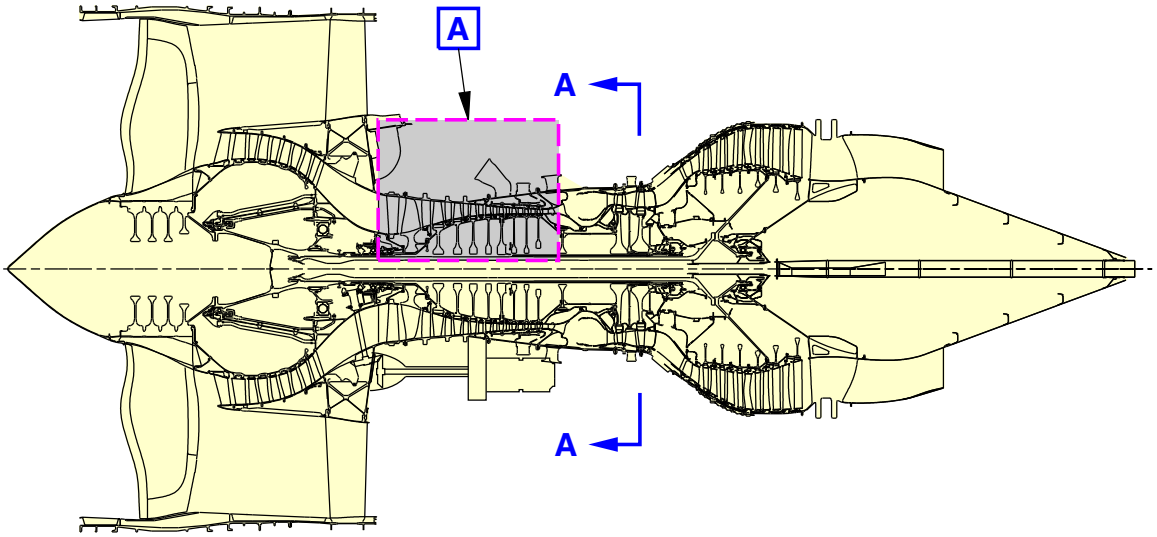
STAGE	DIMENSION A BLEND REPAIR PERMITTED	DIMENSION F BLEND REPAIR NOT PERMITTED
7	0.12 INCH (3.05 mm) ABOVE 0.41 INCH (10.42 mm) FROM THE PLATFORM 0.06 INCH (1.53 mm) WITHIN 0.41 INCH (10.42 mm) FROM THE PLATFORM	BLEND REPAIR NOT PERMITTED TO EXTEND INTO THE ROOT RADIUS AREA 0.135 INCH (3.43 mm)
8	0.12 INCH (3.05 mm) ABOVE 0.35 INCH (8.89 mm) FROM THE PLATFORM 0.06 INCH (1.53 mm) WITHIN 0.35 INCH (8.89 mm) FROM THE PLATFORM	BLEND REPAIR NOT PERMITTED TO EXTEND INTO THE ROOT RADIUS AREA 0.105 INCH (2.67 mm)

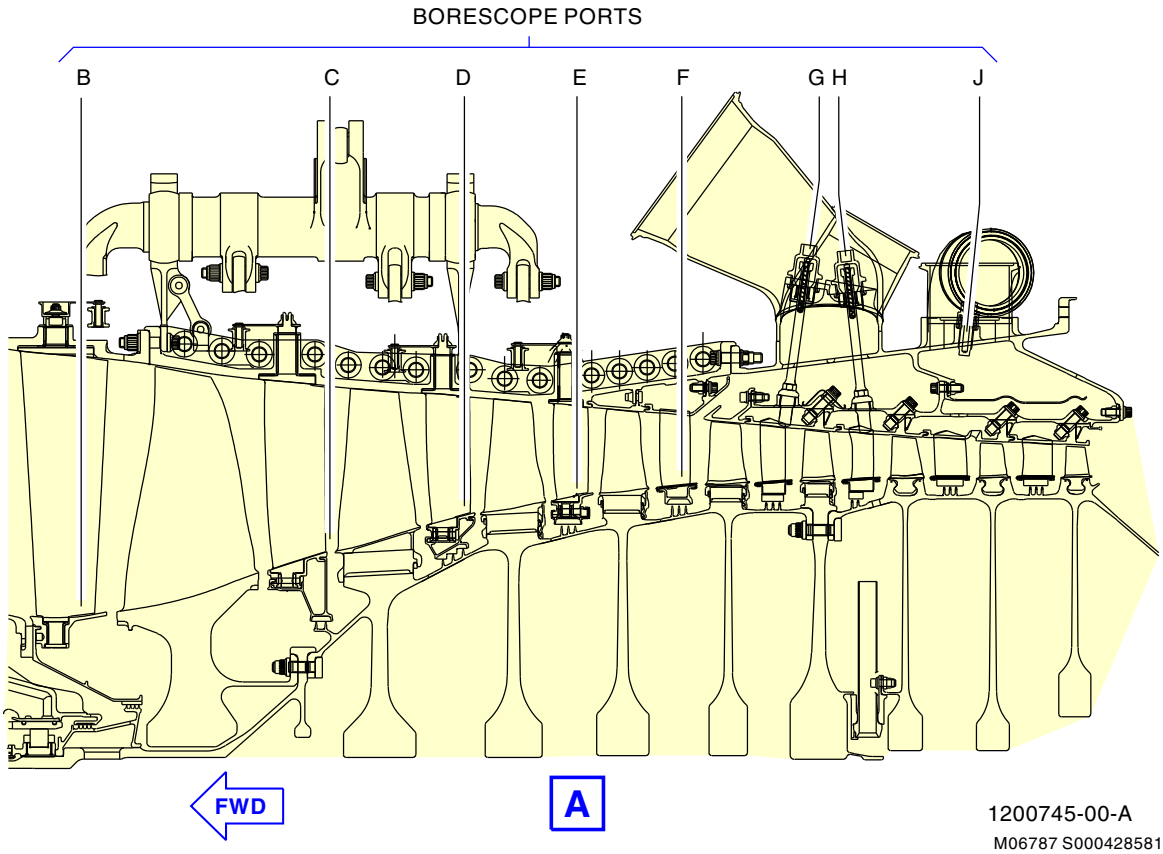
1200752-02-A

M06786 S0004285818_V5

HPC Stage 7 and 8 Blade Repair Limits
Figure 802/72-30-00-990-810-H00

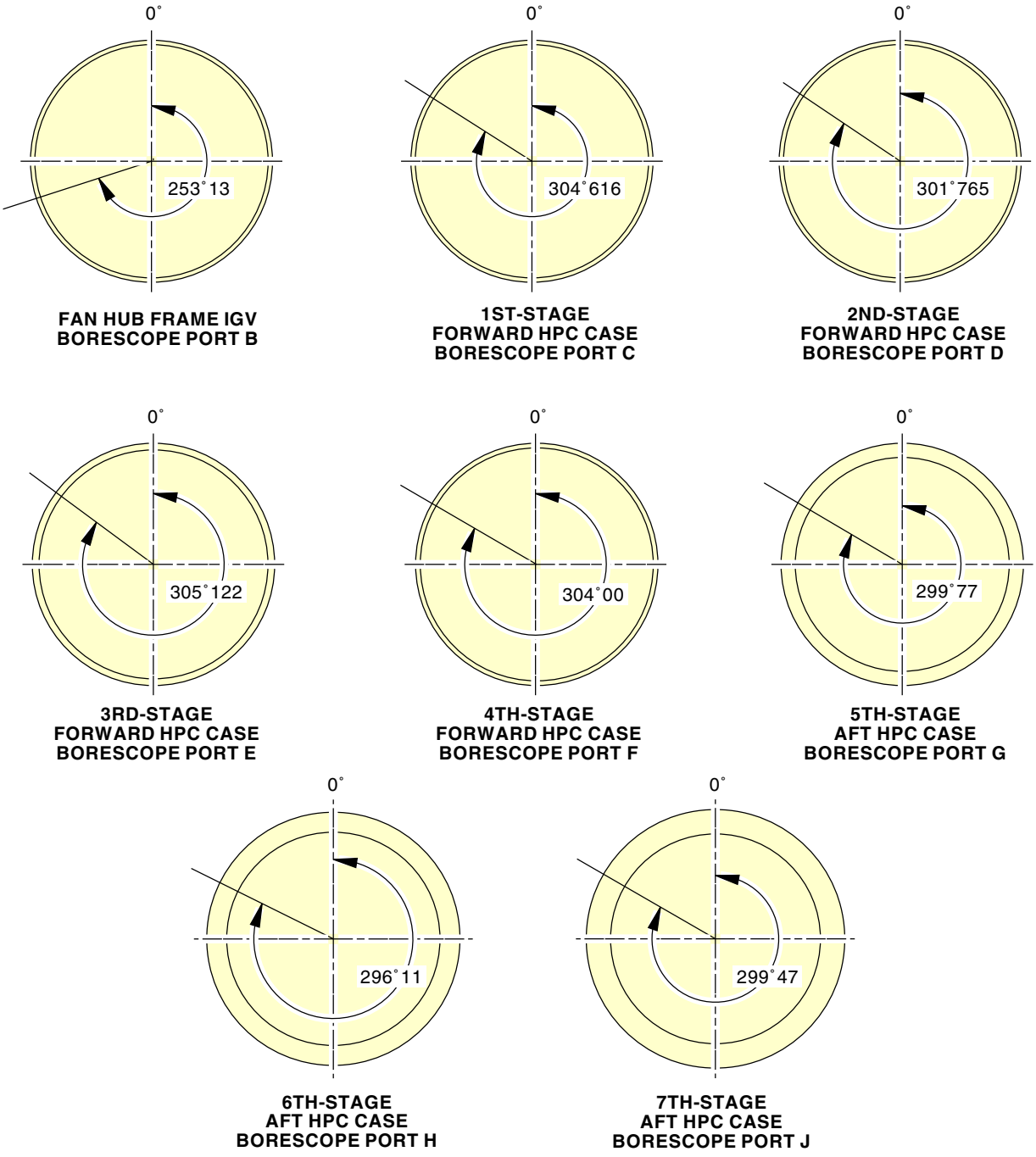
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details





HPC Borescope Port Locations
Figure 803/72-30-00-990-811-H00 (Sheet 1 of 2)

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



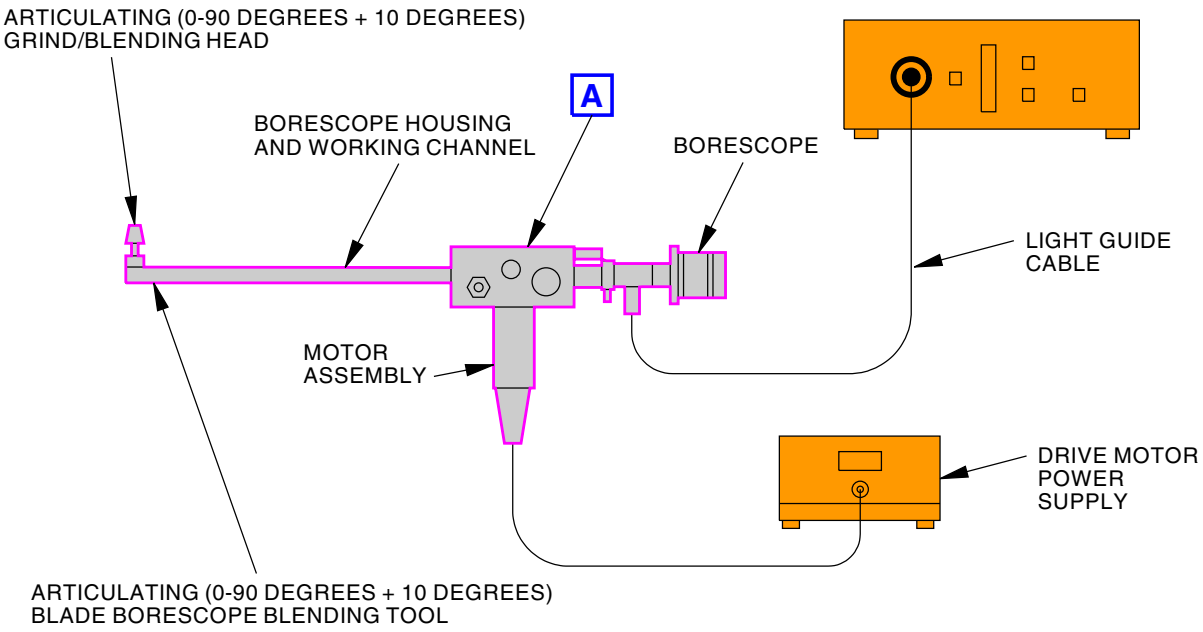
(VIEW IN THE FORWARD DIRECTION)

A-A

1200746-00-A
M06788 S0004285820_V3

HPC Borescope Port Locations
Figure 803/72-30-00-990-811-H00 (Sheet 2 of 2)

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

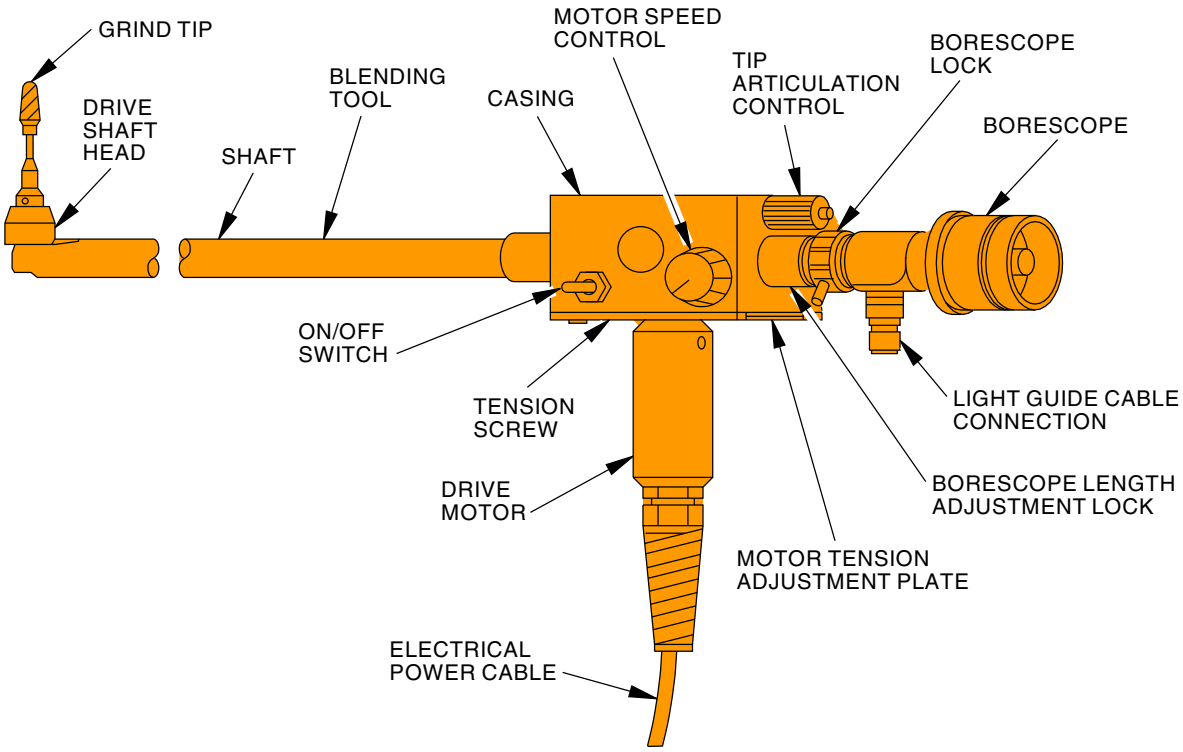


1132825-00-A

M06790 S0004285822_V2

HPC Blade Borescope Blending Tool
Figure 804/72-30-00-990-812-H00 (Sheet 1 of 2)

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

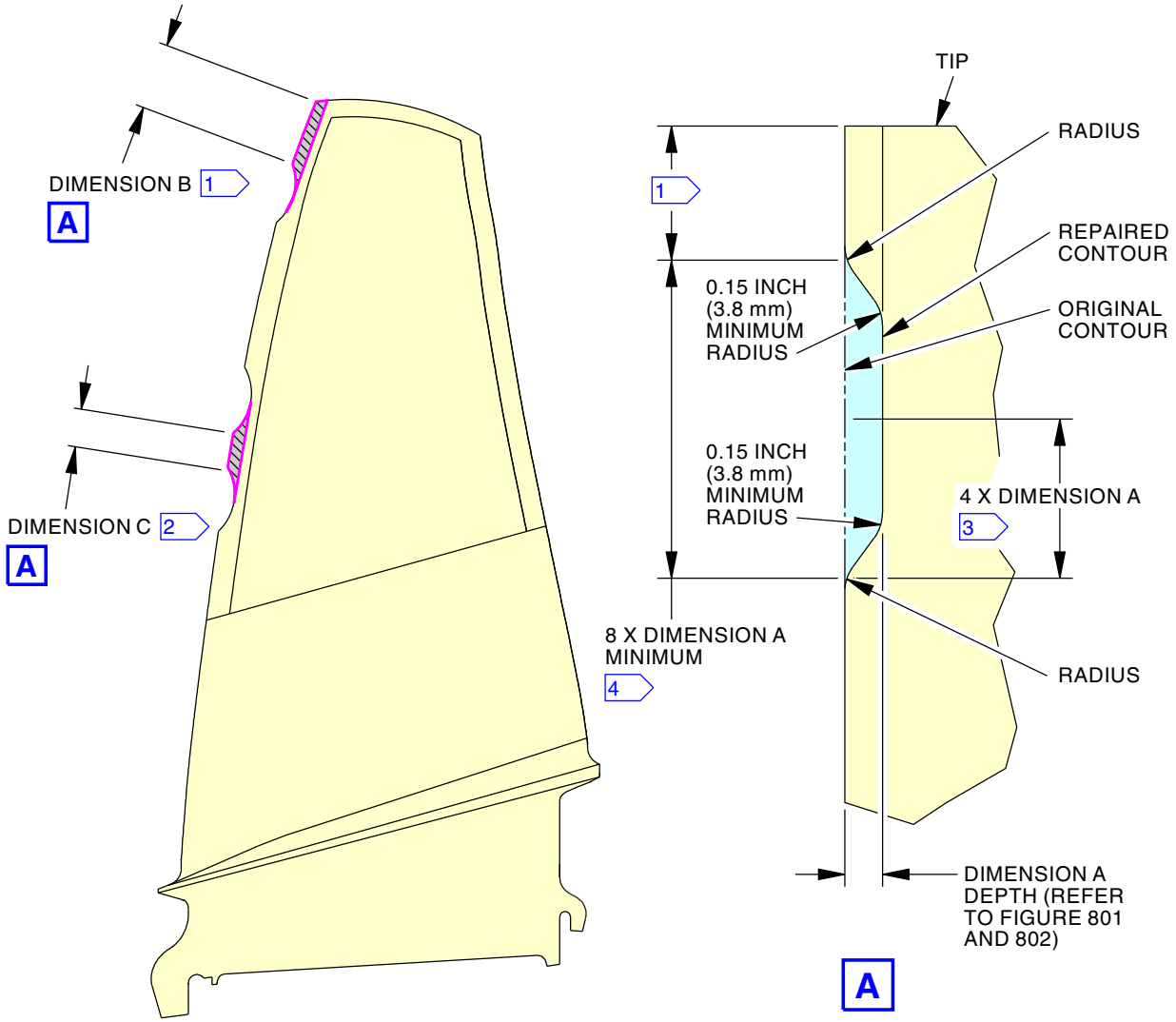


1132826-00-A

M06791 S0004285823_V2

HPC Blade Borescope Blending Tool
Figure 804/72-30-00-990-812-H00 (Sheet 2 of 2)

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



1 WHEN DIMENSION B (THE AREA BETWEEN THE END OF A BLEND REPAIR AND THE ROTOR BLADE TIP) IS LESS THAN 0.100 INCH (2.54 mm), REMOVE THE DIMENSION B SHADOWED AREA.

2 WHEN DIMENSION C (THE AREA BETWEEN TWO BLEND REPAIRS) IS LESS THAN 2 X DIMENSION A, REMOVE DIMENSION C SHADOWED AREA.

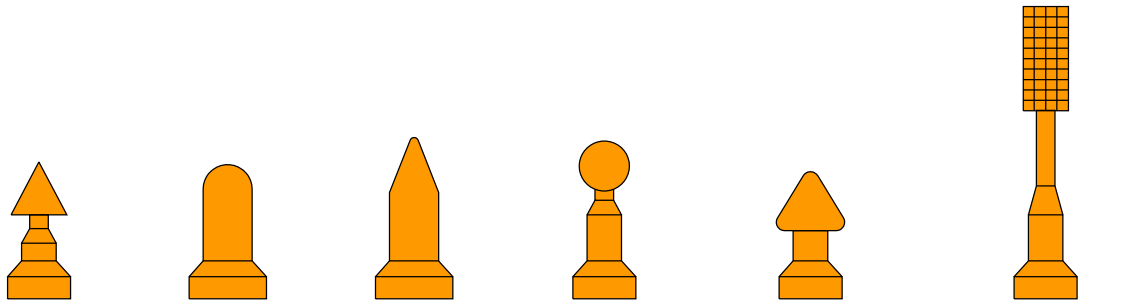
3 2 X DIMENSION A FOR STAGES 5-8 LEADING EDGE.

4 4 X DIMENSION A MINIMUM FOR STAGES 5-8 LEADING EDGE.

1248617-00-A
M06792 S0004285824_V8

Blend Area Minimum Length
Figure 805/72-30-00-990-813-H00

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



STAGE	LENGTH 1	FORM 2: DIAMOND CONICAL CUTTER	FORM 6: DIAMOND CUTTER	FORM 7: DIAMOND CONICAL CUTTER	FORM 9: POLISHING BALL	FORM 10: DIAMOND CONICAL CUTTER	MEASURING GRID TIP
2	0.60 INCH (15 mm)		X	X	X		X
3, 4	0.84 INCH (21 mm)	X			X	X	X
5	0.44 INCH (11 mm)		X	X	X		X
6-8	0.52 INCH (13 mm)		X	X	X		X

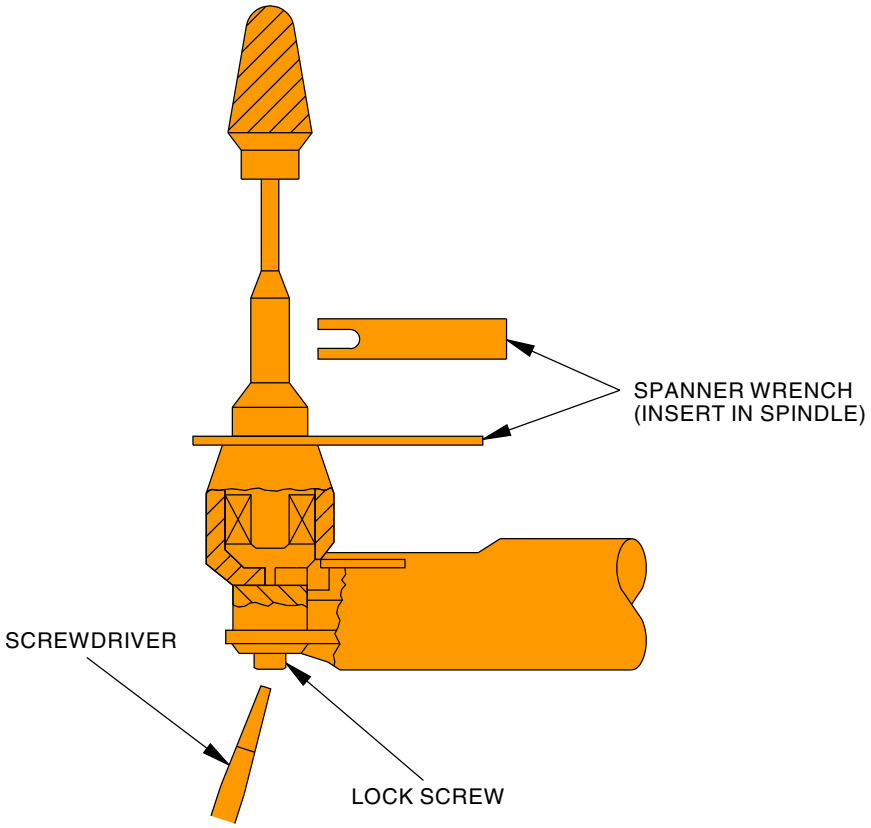
1 DISTANCE FROM THE BOTTOM OF THE SOCKET TO THE TOP OF THE TOOL TIP

1200809-00-A

M06793 S0004285825_V2

Borescope Blending Tool Tips Selection
Figure 806/72-30-00-990-814-H00

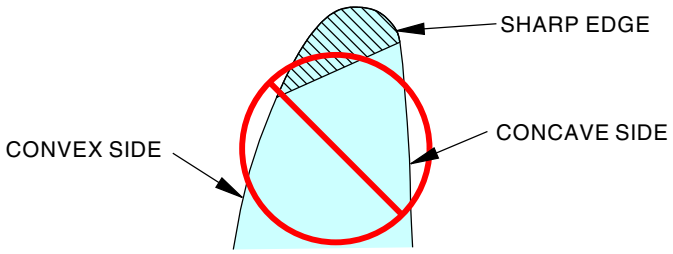
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



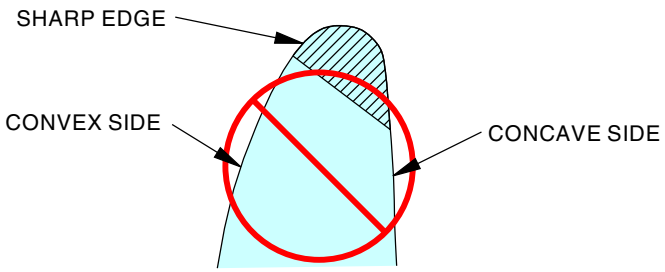
1144364-00-A
M06794 S0004285826_V2

Borescope Blending Tool Tip Installation
Figure 807/72-30-00-990-815-H00

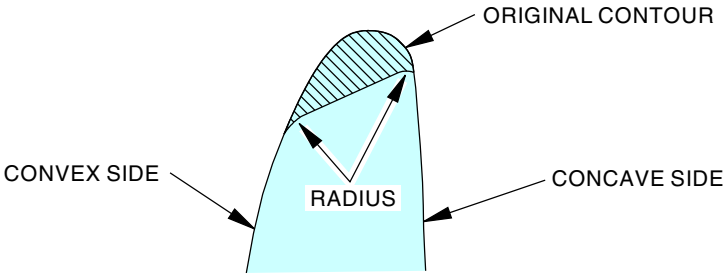
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



NOT A SATISFACTORY BLEND REPAIR



NOT A SATISFACTORY BLEND REPAIR



A SATISFACTORY BLEND REPAIR

1144365-00-A
M06795 S0004285827_V2

2-8 HPC Rotor Blade Tip Satisfactory Profile
Figure 808/72-30-00-990-816-H00

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

TASK 72-30-00-960-801-H00

3. Stages 1-3 VSV Actuating Ring and Rudders Lever Arm Pin Bushing(s) Repair (Replacement)

(Figure 809, Figure 810, Figure 811, Figure 812, and Figure 813)

A. General

(1) This task provides the instructions on how to repair and replace the VSV actuating ring and rudder lever arm pin bushings for stages 1-3.

(2) Lever arm pin bushings are anti-wear devices that are located between the actuating rings or the VSV rudders and the VSV lever arm pins. For stages 1-3 the lever arm pin bushings are on the outer diameter of the actuating rings, except for the pin bushings which are in the rudders inner diameter

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)
71-00-00-700-804-H01	Test No. 5 - Idle Leak Check (P/B 501)
71-00-00-700-813-H01	Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test) (P/B 501)
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
SPL-13701	Pusher/Puller Set - Install/Remove, Actuating Ring Bushings Part #: 9C1591G02 Supplier: 06083
SPL-13704	Wrench - Adapter Part #: 9C1700G02 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D50087 [C02-069]	Lubricant	
D50281 [C02-018]	Oil - Penetrating	
G51113 [C10-143]	Kit - Safety Cable Assembly	

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Prepare for the Repair

SUBTASK 72-30-00-910-001-H00

(1) Do these steps to make sure the fuel control valve and the spar valve stay in the closed position:

(a) Make sure that the FUEL CONTROL switch is in the CUTOFF position.

1) Install a DO-NOT-OPERATE tag on the FUEL CONTROL switch.

(b) Push the STAT switch on the display select panel of the glareshield (P55).

1) Make sure you do not see the applicable ENG FUEL VALVE L(R) or FUEL SPAR VALVE L(R) status messages.

(c) For the applicable engines, open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
A	5	C28001	L ENGINE FUEL SPAR VALVE
A	19	C28002	R ENGINE FUEL SPAR VALVE
B	4	C76601	L ENG FUEL VALVE
B	19	C76600	R ENG FUEL VALVE

SUBTASK 72-30-00-010-009-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

(2) 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

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

(Continued)

Number	Name/Location
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. Replacement of Lever Arm Pin Bushing on the Stages 1-3 VSV actuating Rings

SUBTASK 72-30-00-960-001-H00

(1) Replace the damaged or missing actuating ring bushings as follows (Figure 809 and Figure 810):

(a) Apply penetrating oil, D50281 [C02-018] on the thread and the nut.

(b) Remove the nut [13] on the VSV trunnion.

(c) Remove the lever arm [11].

(d) Remove and discard the pin bushing [8] that has damage with the pusher/puller set, SPL-13701.

SUBTASK 72-30-00-210-006-H00

(2) Examine the bushing area that has damage for debris entrapment.

(a) Remove debris that you find.

SUBTASK 72-30-00-420-016-H00

CAUTION

DO NOT USE A MALLET TO INSTALL THE LEVER ARM BUSHING. IF YOU DO, YOU WILL CAUSE DAMAGE TO THE BUSHING.

(3) Use hand force or the pusher/puller set, SPL-13701 and install the new lever arm pin bushing [8].

(a) Insert the bushing bulb fully into the recess.

SUBTASK 72-30-00-420-001-H00

CAUTION

MAKE SURE THAT YOU FULLY ENGAGE THE PIN OF THE LEVER ARM IN THE ACTUATING RING OR RUDDER. IF YOU DO NOT, DAMAGE TO THE ENGINE CAN OCCUR.

(4) Install the lever arm [11] with the pin in the actuating ring and on the VSV trunnion.

SUBTASK 72-30-00-640-001-H00

(5) Lightly coat the threads of the VSV with lubricant, D50087 [C02-069].

ARO ALL PRE SB 777-GE90-72-0076

SUBTASK 72-30-00-420-002-H00

(6) Install the nut [13]and tighten it as follows:

(a) Install the nut and at same time measure and record the self-locking torque.

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

ARO ALL PRE SB 777-GE90-72-0076 (Continued)

1) For stage 1 and 2, tighten the nut to 162-178 pound-inches (18.3-20.1 Newton-meters) plus the self-locking torque.
2) For stage 3, tighten the nut to 68-74 pound-inches (7.7-8.4 Newton-meters) plus the self-locking torque.

ARO ALL POST SB 777-GE90-72-0076

SUBTASK 72-30-00-420-003-H00

(7) Install the nut [13] and tighten it as follows:
   (a) Install the nut and at same time measure and record the self-locking torque.
      1) For stage 1, tighten the nut to 159-177 pound-inches (18-20 Newton-meters) plus the self-locking torque.
      2) For stage 2 and 3, tighten the nut to 84-93 pound-inches (9.5-10.5 Newton-meters) plus the self-locking torque.

ARO ALL

I. Replacement of Lever Arm Pin Bushing Under the Stages 1-3 VSV Rudders

SUBTASK 72-30-00-970-001-H00

(1) Measure and record the clearance between the actuating rings, under the rudder, with the gage block and shims (Figure 812).

SUBTASK 72-30-00-020-001-H00

(2) Disconnect the turnbuckle from the rudder.

NOTE: Make sure that you do not change the adjustment of the VSV system.

SUBTASK 72-30-00-020-002-H00

(3) Disconnect the turnbuckle from the rudder.

SUBTASK 72-30-00-020-003-H00

(4) Remove the rudder from the actuating ring halves as follows:
   (a) Remove the rudder guide pads nuts.

   NOTE: Use the adapter wrench, SPL-13704 to remove the guide pad adjusting screws nut without turning the adjusting screws (Refer to Figure 813) .

   (b) Remove the rudder attaching bolts.

SUBTASK 72-30-00-640-002-H00

(5) For actuating ring bushing, remove the lever arm as follows:
   (a) Apply penetrating oil, D50281 [C02-018] on the thread and the nut.
   (b) Remove the nut [13] on the VSV trunnion.
   (c) Remove the lever arm [11].

SUBTASK 72-30-00-960-002-H00

(6) Use pusher/puller set, SPL-13701 pusher and replace the pin bushing [8] that is missing or has damage.
   (a) Discard the bushing that has damage.

SUBTASK 72-30-00-210-007-H00

(7) Examine the bushing area that has damage for debris entrapment.
   (a) Remove debris that you find.

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

SUBTASK 72-30-00-420-004-H00

(8) Install the new pin bushing [8] as follows:

CAUTION

DO NOT USE A MALLET TO INSTALL THE LEVER ARM BUSHING. IF YOU DO, YOU WILL CAUSE DAMAGE TO THE BUSHING.

(a) Use only hand force or the pusher/puller set, SPL-13701.

(b) Insert the bushing bulb fully into the recess.

SUBTASK 72-30-00-420-005-H00

CAUTION

MAKE SURE THAT YOU FULLY ENGAGE THE PIN OF THE LEVER ARM IN THE ACTUATING RING OR RUDDER. IF YOU DO NOT, DAMAGE TO THE ENGINE CAN OCCUR.

(9) If removed, install the lever arm [11] with the pin in the stage 1-3 actuation ring [9] and on the VSV trunnion.

SUBTASK 72-30-00-640-003-H00

(10) Lightly coat the threads of the VSV with lubricant, D50087 [C02-069].

ARO ALL PRE SB 777-GE90-72-0076

SUBTASK 72-30-00-420-006-H00

(11) Install the nut [13] and tighten it as follows:

(a) Install the nut and at same time measure and record the self-locking torque.

1) For stages 1 and 2, tighten the nut to 162-178 pound-inches (18.3-20.1 Newton-meters) plus the self-locking torque.

2) For stage 3, tighten the nut to 68-74 pound-inches (7.7-8.4 Newton-meters) plus the self-locking torque.

ARO ALL POST SB 777-GE90-72-0076

SUBTASK 72-30-00-420-007-H00

(12) Install the nut [13] and tighten it as follows:

(a) Install the nut and at same time measure and record the self-locking torque.

1) For stage 1, tighten the nut to 159-177 pound-inches (18-20 Newton-meters) plus the self-locking torque.

2) For stages 2 and 3, tighten the nut to 84-93 pound-inches (9.5-10.5 Newton-meters) plus the self-locking torque.

ARO ALL

SUBTASK 72-30-00-420-008-H00

CAUTION

MAKE SURE THAT YOU FULLY ENGAGE THE PIN OF THE LEVER ARM IN THE ACTUATING RING OR RUDDER. IF YOU DO NOT, DAMAGE TO THE ENGINE CAN OCCUR.

(13) Install the rudder with the pin of the lever arms in the rudder.

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

SUBTASK 72-30-00-640-004-H00

(14) Lightly coat the threads of the rudder attachment bolts and of the pad adjusting screws with lubricant, D50087 [C02-069].

SUBTASK 72-30-00-420-009-H00

(15) Install the rudder attaching bolts and tighten with your hand.

NOTE: Do not change the adjustment of the VSV system. If during removal and installation, you or another person remove the VSV actuating ring or you or another person modify the guide pad adjustment, you must do the VSV rigging.

SUBTASK 72-30-00-420-010-H00

(16) Install the guide pad adjusting screw nuts and tighten with your hand.

NOTE: Use the adapter wrench, SPL-13704 to install and tighten the guide pad adjusting screws nuts but not turn the adjusting screws (Refer to Figure 813).

SUBTASK 72-30-00-970-002-H00

(17) Measure the clearance between the actuating rings, under the rudder, with the gage block and shims.

(a) Make sure that each clearance is the same as the original clearance that you measured in this task.

(b) If the clearance is different, loosen and adjust the parts to get the correct clearance.

SUBTASK 72-30-00-420-011-H00

(18) Tighten the rudder attaching bolts to 109-120 pound-inches (12.3- 13.6 Newton-meters).

NOTE: Do not change the adjustment of the VSV system. If during removal and installation, you or another person remove the VSV actuating ring or you or another person modify the guide pad adjustment, you must do the VSV rigging.

SUBTASK 72-30-00-420-012-H00

(19) Tighten the guide pad adjusting screws nuts to 59-65 pound-inches (6.7-7.3 Newton-meters).

SUBTASK 72-30-00-420-013-H00

(20) Connect the turnbuckle to the rudder with the bolts and nuts.

(a) Tighten the turnbuckle to 546-603 pound-inches (61.7-68.1 Newton-meters).

SUBTASK 72-30-00-420-014-H00

(21) Install safety cable assembly kit, G51113 [C10-143] on the rudder bolts.

SUBTASK 72-30-00-420-015-H00

(22) Install safety cable assembly kit, G51113 [C10-143] on the turnbuckle bolt.

J. Put the Airplane Back to Its Usual Condition

SUBTASK 72-30-00-410-008-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.

(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.

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.

SUBTASK 72-30-00-840-001-H00

(2) Do these steps to put the fuel control valve and the spar valve to the serviceable condition:

(a) Make sure that the FUEL CONTROL switch is in the CUTOFF position.

(b) For the applicable engine, remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
A	5	C28001	L ENGINE FUEL SPAR VALVE
A	19	C28002	R ENGINE FUEL SPAR VALVE
B	4	C76601	L ENG FUEL VALVE
B	19	C76600	R ENG FUEL VALVE

K. Stages 1-3 VSV Actuating Ring and Rudders Lever Arm Pin Bushing(s) Repair (Replacement) Test

SUBTASK 72-30-00-700-001-H00

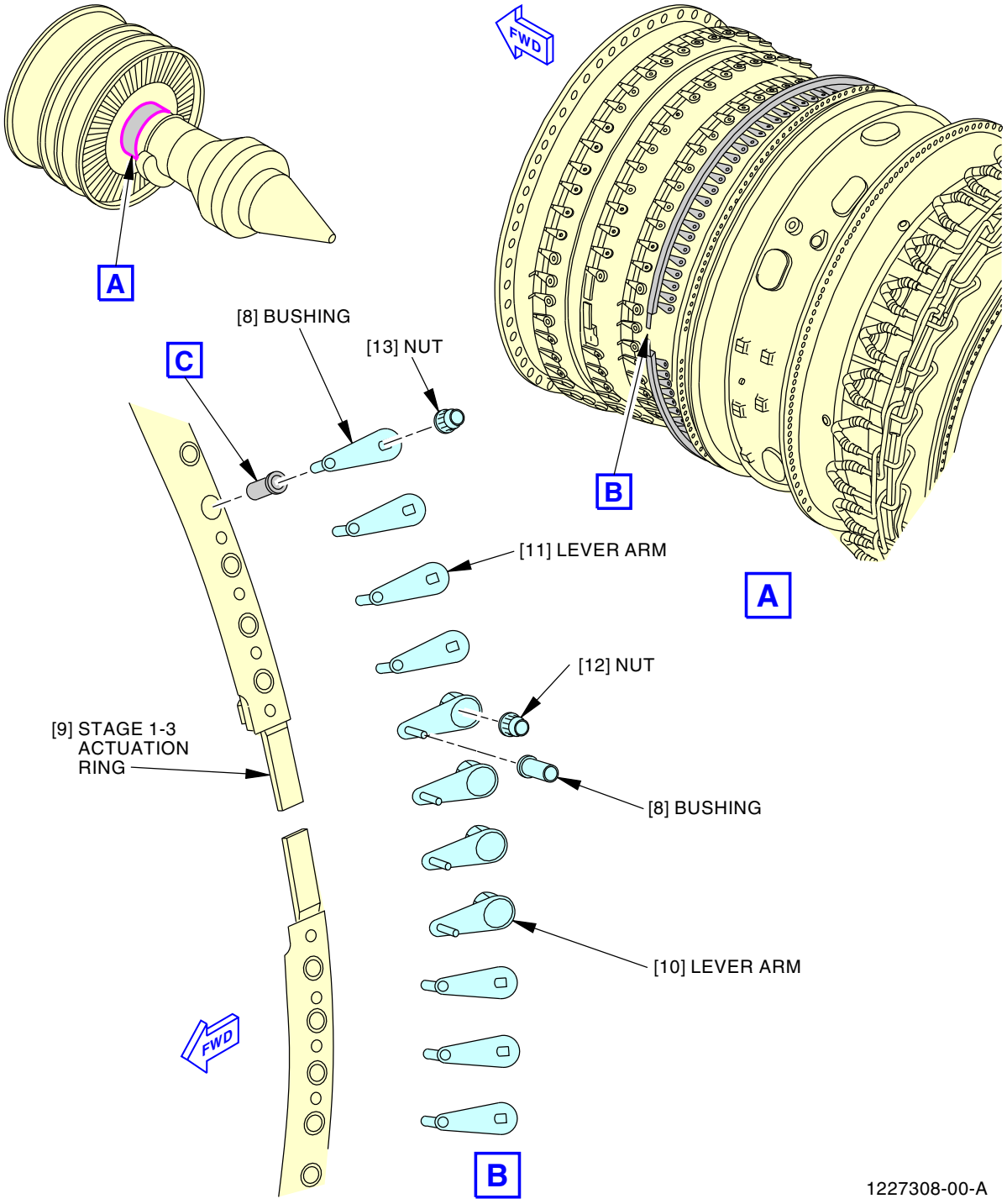
(1) Do his task: Test No. 5 - Idle Leak Check, TASK 71-00-00-700-804-H01.

SUBTASK 72-30-00-700-002-H00

(2) Do his task: Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test), TASK 71-00-00-700-813-H01.

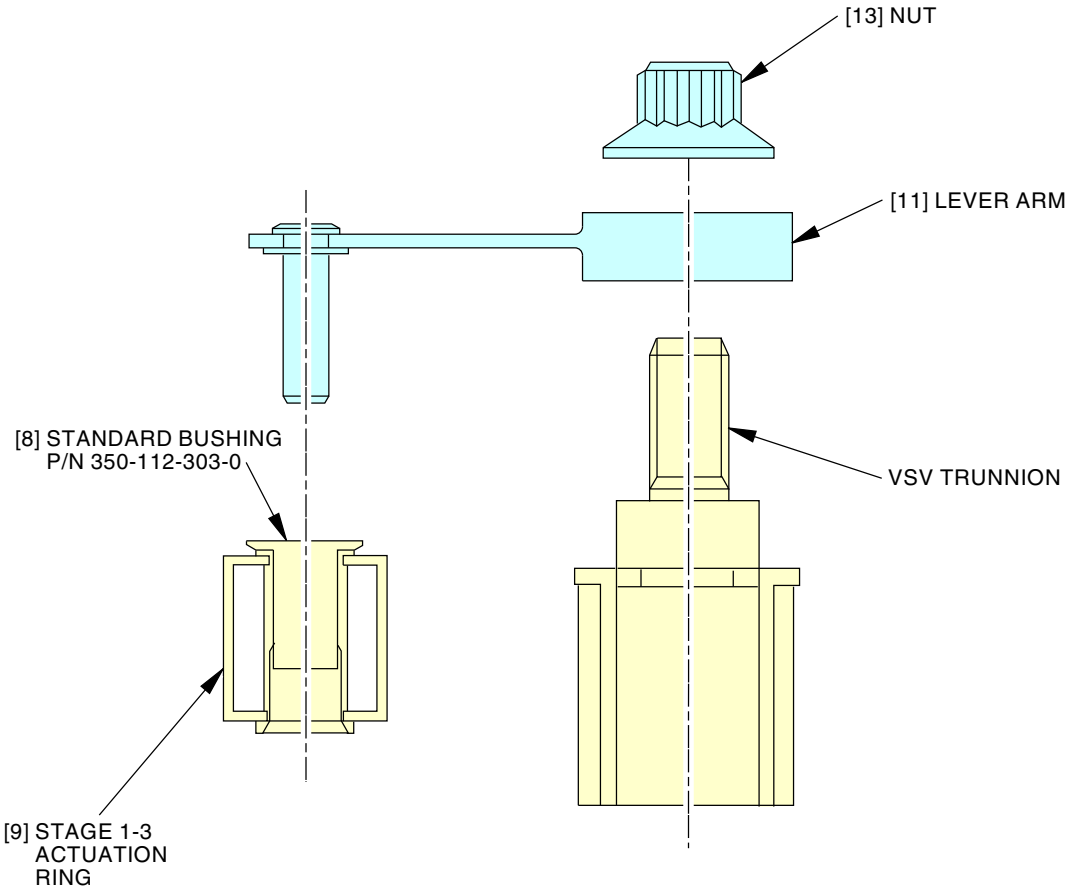
——— END OF TASK ———

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



Stage 1-3 Lever Arm Pin Bushing Repair
Figure 809/72-30-00-990-817-H00 (Sheet 1 of 2)

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



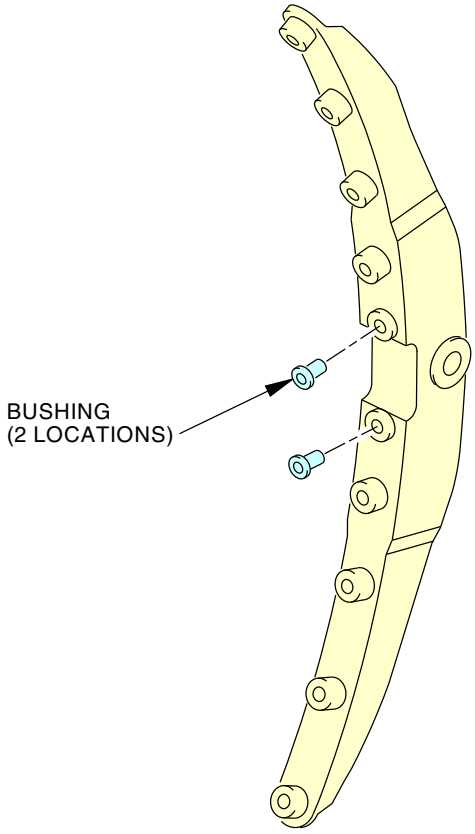
C

1227309-00-A

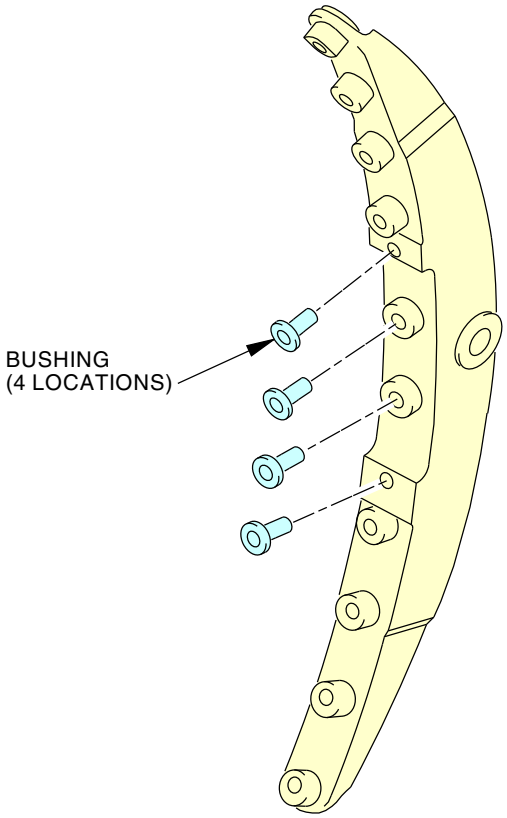
D33686 S0000151176_V3

Stage 1-3 Lever Arm Pin Bushing Repair
Figure 809/72-30-00-990-817-H00 (Sheet 2 of 2)

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



**STAGE 1 RUDDER
(LEFT AND RIGHT SIDES)
(EXAMPLE)**



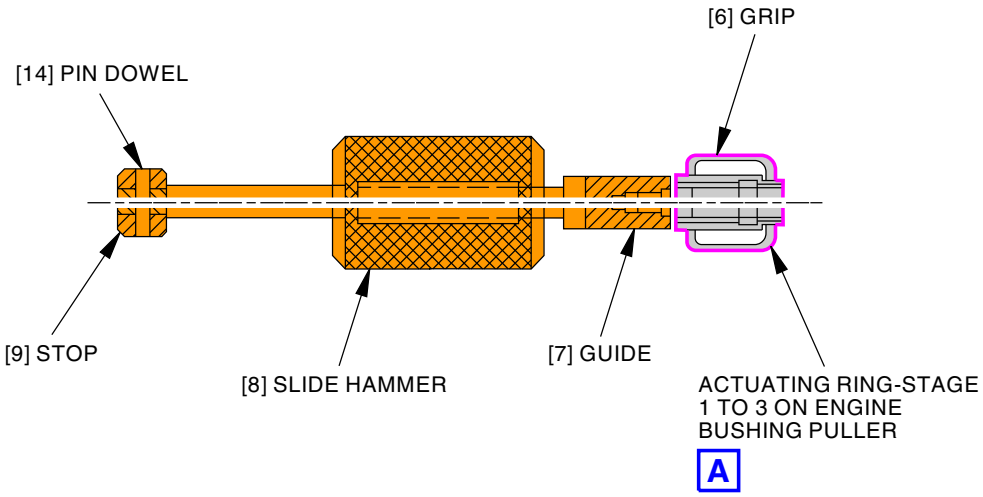
**STAGES 2 AND 3 RUDDER
(LEFT AND RIGHT SIDES)
(EXAMPLE)**

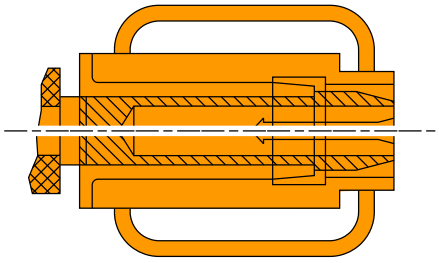
1203092-00-A

2142575 S0000464446_V2

**Stages 1-3 Rudders Lever Arm Pin Bushing Repair
Figure 810/72-30-00-990-818-H00**

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





ACTUATING RING-STAGE 1 TO 3 ON ENGINE BUSHING PULLER

A

NOTE:

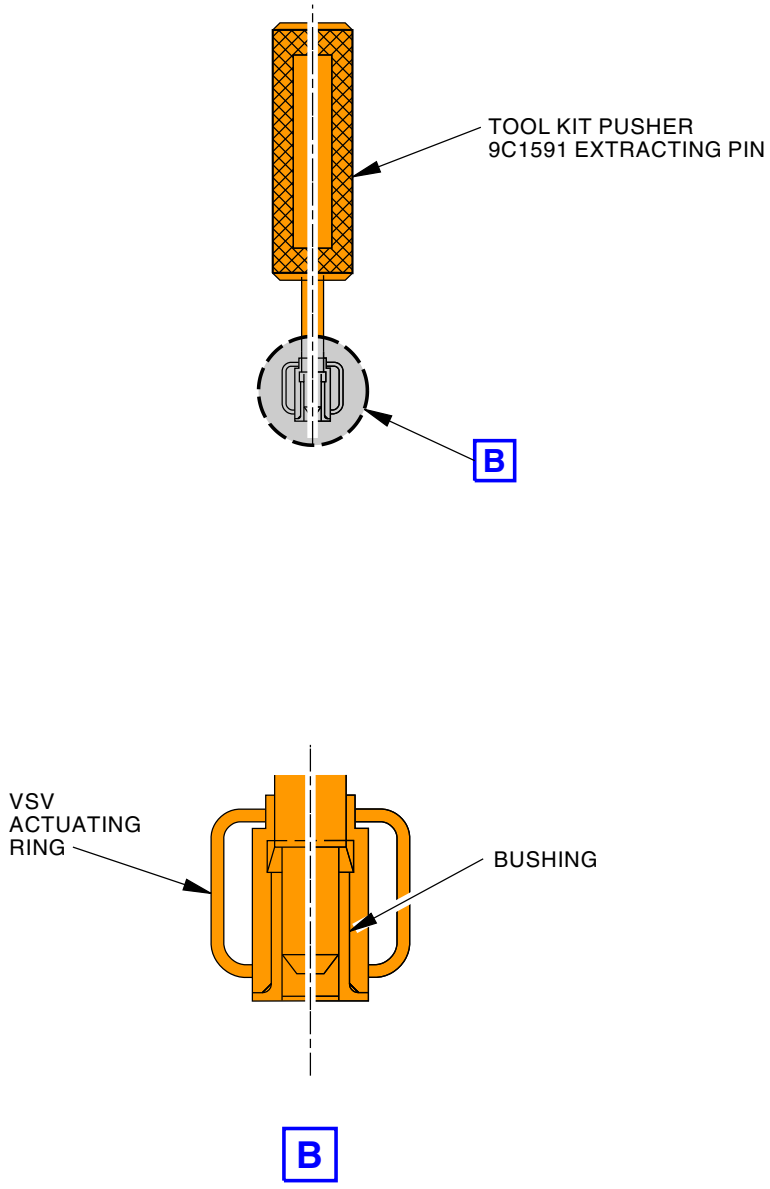
ITEM NUMBERS AGREE WITH ITEM NUMBERS OF TOOL, 9C1591.

1291948-00

2142620 S0000464449_V2

Stages 1-3 Rudders Lever Arm Bushing Pusher Tool
Figure 811/72-30-00-990-821-H00 (Sheet 1 of 3)

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

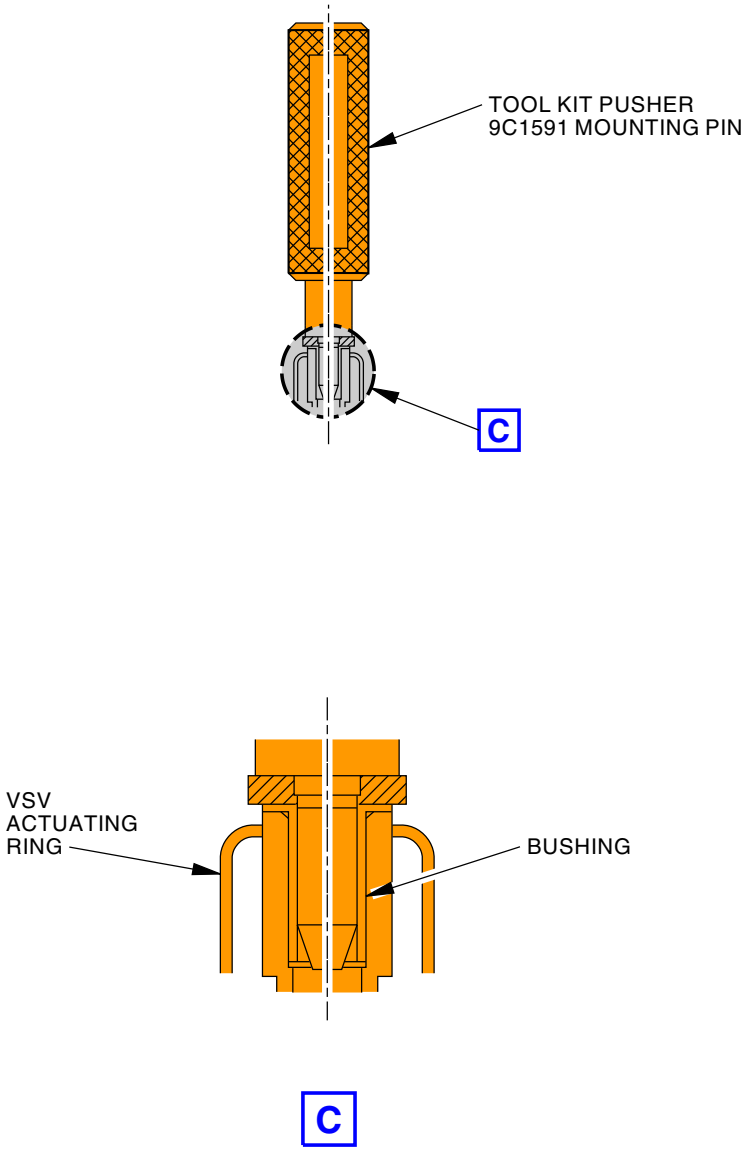


1159578-00

2142673 S0000464450_V2

Stages 1-3 Rudders Lever Arm Bushing Pusher Tool
Figure 811/72-30-00-990-821-H00 (Sheet 2 of 3)

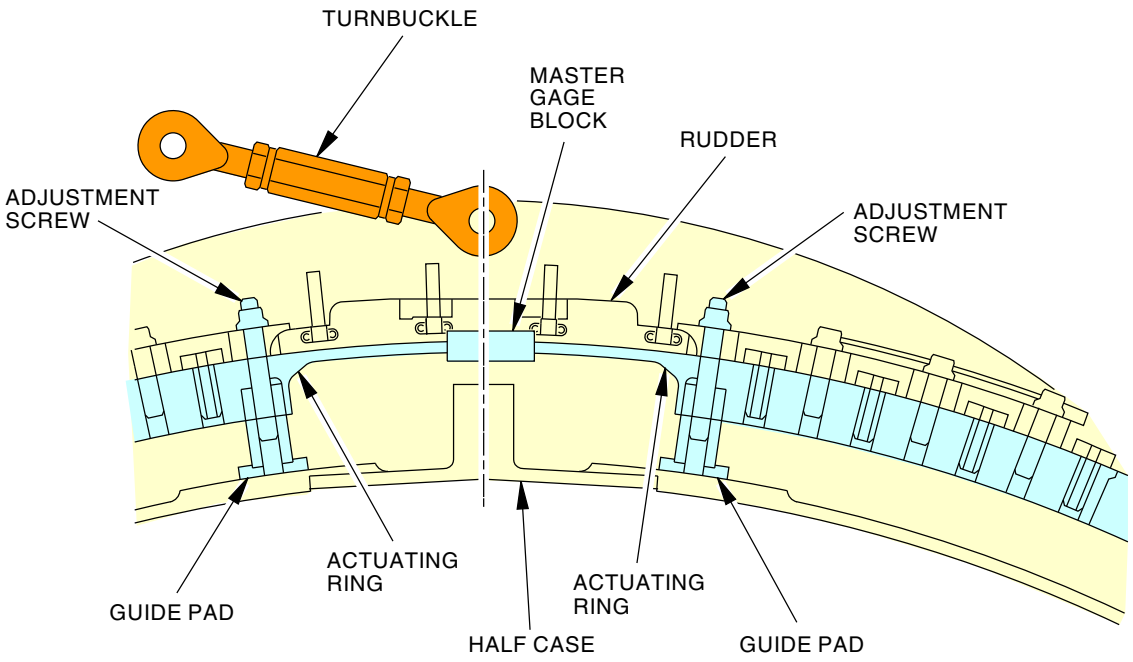
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1159579-00
2142705 S0000464451_V2

Stages 1-3 Rudders Lever Arm Bushing Pusher Tool
Figure 811/72-30-00-990-821-H00 (Sheet 3 of 3)

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



1213247-02
2142834 S0000464452_V2

Stages 1-3 Actuating Ring Clearance Measurement
Figure 812/72-30-00-990-819-H00 (Sheet 1 of 2)

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

VSV SYSTEM CLEARANCES RECORDS

STAGE 1	
CLEARANCE BETWEEN THE END OF HALF RING	
LEFT SIDE CLEARANCE (9 O'CLOCK ALF)	RIGHT SIDE CLEARANCE (3 O'CLOCK ALF)

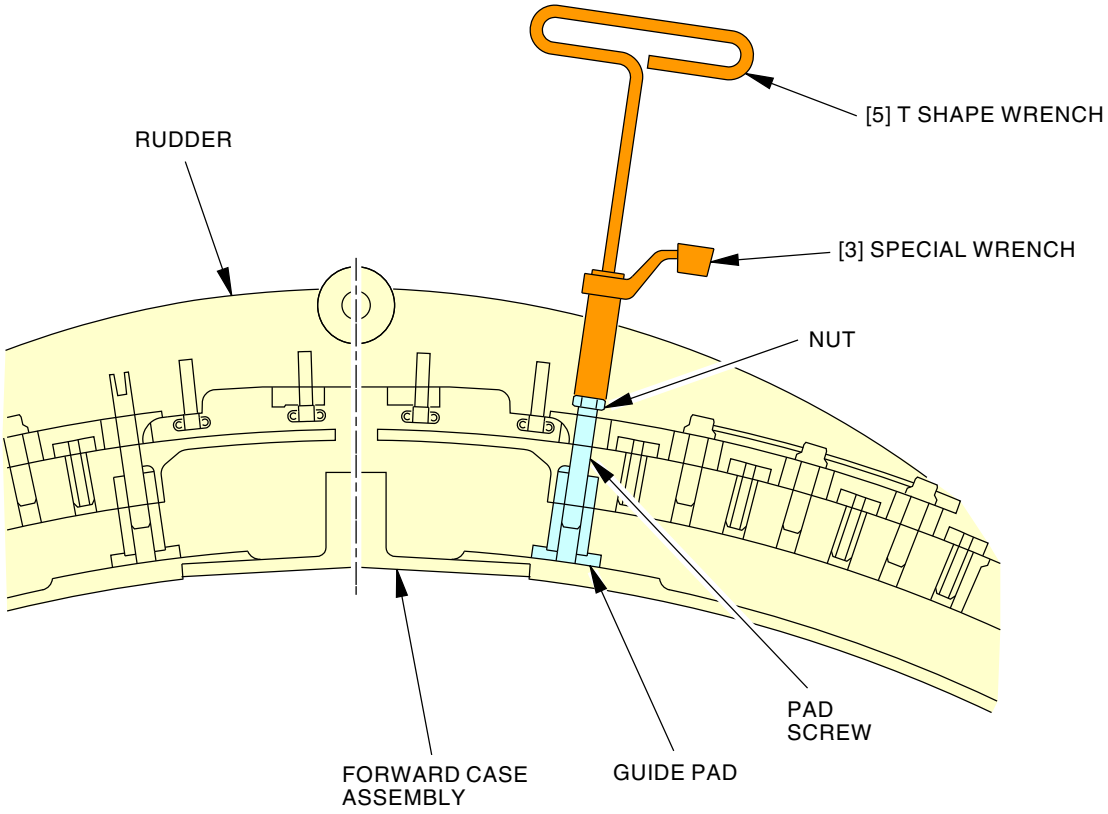
STAGE 2	
CLEARANCE BETWEEN THE END OF HALF RING	
LEFT SIDE CLEARANCE (9 O'CLOCK ALF)	RIGHT SIDE CLEARANCE (3 O'CLOCK ALF)

STAGE 3	
CLEARANCE BETWEEN THE END OF HALF RING	
LEFT SIDE CLEARANCE (9 O'CLOCK ALF)	RIGHT SIDE CLEARANCE (3 O'CLOCK ALF)

2142896 S0000464453_V1

Stages 1-3 Actuating Ring Clearance Measurement
Figure 812/72-30-00-990-819-H00 (Sheet 2 of 2)

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



(EXAMPLE)

NOTE:

ITEM NUMBERS AGREE WITH ITEM NUMBERS OF TOOL, 9C1700G02.

1213247-01

2142872 S0000464454_V2

Stages 1-3 Rudders Guide Pad Nuts Installation
Figure 813/72-30-00-990-820-H00

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

TASK 72-30-00-960-802-H00

4. VSV Torsion Bar Repair (Replacement)

(Figure 814, Figure 815)

A. General

(1) This task provides the instructions on how to replace a right side and/or a left side VSV torsion bar.

(2) Do not replace the two torsion bars at the same time. Do the full replacement of the first torsion bar before you start the replacement of the other one.

(3) VSV torsion bars are the parts that transmit the movement of the VSV actuators to the IGV and VSV turnbuckles or links.

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)
71-00-00-700-804-H01	Test No. 5 - Idle Leak Check (P/B 501)
71-00-00-700-813-H01	Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test) (P/B 501)
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)
72-30-00-200-801-H01	High Pressure Compressor Section (HPC) Inspection (P/B 601)
75-31-02-000-802-H01	Left Variable Stator Vane (VSV) Actuator Removal (P/B 401)
75-31-02-000-803-H01	Right Variable Stator Vane (VSV) Actuator Removal (P/B 401)
75-31-02-400-802-H01	Left Variable Stator Vane (VSV) Actuator Installation (P/B 401)
75-31-02-400-803-H01	Right Variable Stator Vane (VSV) Actuator 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. Consumable Materials

Reference	Description	Specification
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

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Prepare for the Repair

SUBTASK 72-30-00-860-004-H00

(1) Do these steps to make sure the fuel control valve and the spar valve stay in the closed position:

(a) Make sure that the FUEL CONTROL switch is in the CUTOFF position.

1) Install a DO-NOT-OPERATE tag on the FUEL CONTROL switch.

(b) Push the STAT switch on the display select panel of the glareshield (P55).

1) Make sure you do not see the applicable ENG FUEL VALVE L(R) or FUEL SPAR VALVE L(R) status messages.

(c) For the applicable engines, open these circuit breakers and install safety tags:

Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
A	5	C28001	L ENGINE FUEL SPAR VALVE
A	19	C28002	R ENGINE FUEL SPAR VALVE
B	4	C76601	L ENG FUEL VALVE
B	19	C76600	R ENG FUEL VALVE

SUBTASK 72-30-00-010-012-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

(2) 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

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

(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. VSV Torsion Bar Repair (Replacement)

SUBTASK 72-30-00-010-013-H00

(1) Remove the necessary hardware to get access to the VSV torsion bar [47] to repair (replace) as follows:

(a) Remove the HP/IP manifold [3] from the core engine right side. Refer to Right Variable Stator Vane (VSV) Actuator Removal, TASK 75-31-02-000-803-H01.

(b) Disconnect the right VSV head drain tube [16] and rod drain tube [17] from the right VSV actuator [19]. Refer to Right Variable Stator Vane (VSV) Actuator Removal, TASK 75-31-02-000-803-H01.

(c) Disconnect the left VSV head drain tube [22] and rod drain tube [23] from the left VSV actuator [24]. Refer to Left Variable Stator Vane (VSV) Actuator Removal, TASK 75-31-02-000-802-H01.

(d) Remove the VSCF oil in tube/hose [43] at the left side aft support [40] at the 7:30 to 8:45 o'clock position as follows:

1) Disconnect the electrical cable [27] from the oil temperature sensor [28] on the VSCF oil in tube/hose [43].

2) Loosen and disconnect the B-nut on the oil tube/hose [44] that is attached to the top end of the VSCF oil in tube/hose [43].

3) Loosen and disconnect the B-nut on the back-up generator [29].

4) Remove the nuts [33], the bolts [35] and the loop clamps [34] that attach the oil tube to bracket [36], support bracket [42], support bracket [37] and the aft support [40].

5) Remove the oil tube/hose [44] from the engine.

6) Install protective covers/plugs on the oil tube/hose [44], on the oil tube/hose openings and on the back-up generator [29] nipple.

(e) Remove the oil cooler out oil tube/hose [31] at the left side aft support [40] at the 7:30 to 8:45 o'clock position as follows:

1) Loosen and disconnect the B-nuts on each end of the oil tube/hose [32] that attach to the oil cooler out oil tube/hose [31] and to the oil cooler on the fan hub frame.

2) Remove the nuts [33], the bolts [35], and the loop clamps [34] that attach the oil tube to the bracket [36], support bracket [37], support bracket [37], support bracket [38], and the aft support [40].

3) Remove the oil cooler out oil tube/hose [31].

4) Install protective covers/plugs on the oil tube/hose [32], the oil cooler out oil tube/hose [31], and the oil cooler openings.

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

SUBTASK 72-30-00-010-014-H00

(2) Disconnect the stage 1 turnbuckle [52], stage 2 turnbuckle [51], stage 3 turnbuckle [50], and the VSV actuator [45] from the VSV torsion bar [47] as follows:

NOTE: Replacement procedure is the same for the right and left torsion bar.

NOTE: SB 72-0265 replaces VSV turnbuckles by links.

(a) Remove the three bolts [49] and the three nuts [53] from the stage 1 turnbuckle [52], stage 2 turnbuckle [51], and stage 3 turnbuckle [50].

(b) Remove the nut [48] and the bolt [46] that attaches the VSV torsion bar [47] to the VSV actuator [45].

SUBTASK 72-30-00-010-015-H00

(3) Disconnect the turnbuckle [55] from the VSV torsion bar [47] as follows:

(a) Remove the nut [56] and the bolt [54].

SUBTASK 72-30-00-010-016-H00

(4) Remove the retaining ring [59] and the spacer [58] from the forward end of the forward support [57].

SUBTASK 72-30-00-020-004-H00

(5) Remove the VSV torsion bar [47], aft support [40], and the aft stiffener [62] assembly from the forward case assembly [61] as follows:

(a) Remove the three nuts [60] and the three bolts [63] from the aft support [40].

(b) Remove the three nuts [60] and the three bolts [63] from the aft stiffener [62].

(c) Disengage the VSV torsion bar [47] from the forward support [57] and remove the VSV torsion bar [47], the aft support [40], and the aft stiffener [62] assembly from the forward case assembly [61].

SUBTASK 72-30-00-020-005-H00

(6) Remove the VSV torsion bar [47] from the aft support [40] and the aft stiffener [62] assembly.

SUBTASK 72-30-00-210-008-H00

(7) Examine the spherical bearing located in the aft support [40] you removed. (High Pressure Compressor Section (HPC) Inspection, TASK 72-30-00-200-801-H01).

SUBTASK 72-30-00-960-003-H00

(8) If the aft support [40] is not serviceable, replace with a new aft support [40].

SUBTASK 72-30-00-420-017-H00

(9) Install the new VSV torsion bar [47] in the aft support [40] and the aft stiffener [62] assembly.

SUBTASK 72-30-00-420-018-H00

(10) Install the VSV torsion bar [47] and the aft support [40] and the aft stiffener [62] assembly on the forward case assembly [61] as follows:

(a) Lightly coat the threads and the pressure face of the six bolts [63] with Acheson GP460 compound, D50043 [C02-058].

(b) Install the VSV torsion bar [47] in the forward support [57].

(c) Install the VSV torsion bar [47], the aft support [40] and the aft stiffener [62] assembly on the forward face of the compressor stage 2 VSV ring flange.

(d) Install and hand tighten the six bolts [63] and the nuts [60] that attach the aft support [40] and the aft stiffener [62] to the forward face of the compressor stage 2 VSV ring flange.

(e) Tighten the six nuts [60] to 228 in-lb (25.8 N·m)-252 in-lb (28.5 N·m).

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

SUBTASK 72-30-00-410-010-H00

(11) Install the spacer [58] and the retaining ring [59] in the groove of the forward bearing of the torsion bar forward support [57].

SUBTASK 72-30-00-410-011-H00

(12) Connect the turnbuckle [55] to the VSV torsion bar [47] as follows:

(a) Apply a thin layer of Acheson GP460 compound, D50043 [C02-058] to the thread and the pressure face of the bolt [54].

(b) Install the bolt [54] and the nut [56].

(c) Tighten the nut [56] to 560 in-lb (63.3 N·m)-620 in-lb (70.1 N·m).

SUBTASK 72-30-00-410-012-H00

(13) Connect the stage 1 turnbuckle [52], the stage 2 turnbuckle [51], and the stage 3 turnbuckle [50] to the VSV torsion bar [47] corresponding yokes as follows:

(a) Apply a thin layer of Acheson GP460 compound, D50043 [C02-058] to the thread and pressure face of the three bolts [49].

(b) Install the bolts [49] and the nuts [53] that attach the stage 1 turnbuckle [52] to the VSV torsion bar [47]. Make sure the bolt head is on the rear side.

(c) Tighten the nut [53] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

(d) Install the bolt [49] and the nut [53] that attach the stage 2 turnbuckle [51] to the VSV torsion bar [47]. Make sure the bolt head is on the forward side.

(e) Tighten the nut [53] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

(f) Install the bolt [49] and the nut [53] that attach the stage 3 turnbuckle [50] to the VSV torsion bar [47]. Make sure the bolt head is on the rear side.

(g) Tighten the nut [53] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

SUBTASK 72-30-00-410-013-H00

(14) Connect the VSV actuator [45] to the VSV torsion bar [47] as follows:

(a) Apply a thin layer of Acheson GP460 compound, D50043 [C02-058] to the thread and pressure face of the bolt [46].

(b) Install the bolt [46] and the nut [48] that attach the VSV actuator [45] to the VSV torsion bar [47]. Make sure the bolt head is on the forward side.

(c) Tighten the nut [48] to 840 in-lb (94.9 N·m)-929 in-lb (105.0 N·m).

SUBTASK 72-30-00-410-014-H00

(15) Install the hardware you removed to get access to the VSV torsion bar [47] as follows:

(a) Install the oil cooler out oil tube/hose [31] on the left side as follows:

1) Put the oil cooler out oil tube/hose [31] on the VSV torsion bar [47] left side aft support [40] at the 7:30 to 8:45 o'clock position.

2) Connect the B-nut of the oil tube that attaches to the oil tube/hose. Tighten the B-nut hand-tight.

3) Connect the B-nut of the oil tube/hose [32] that attaches to the heat exchanger [39]. Tighten the B-nut hand-tight.

4) Install the loop clamps [34] with bolts [35] and nuts [33] to attach the oil cooler out oil tube/hose [31] to the bracket [36], the support bracket [42], support bracket [37], support bracket [38], and the aft support [40]. Tighten the nuts [33] hand-tight.

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

CAUTION USE TWO WRENCHES TO TIGHTEN THE NUT. IF YOU DO NOT DO THE TWO WRENCH PROCEDURE, TOO MUCH TORQUE WILL MOVE TO THE TUBE. THIS CAN CAUSE DAMAGE TO THE TUBE.

5) Make sure the oil cooler out oil tube/hose [31] is not under strain and torque the two B-nuts to 39 in-lb (4.4 N·m)-45 in-lb (5.1 N·m).

6) Torque the loop clamps nuts [33] or bolts [35] to 55 in-lb (6.2 N·m)-70 in-lb (7.9 N·m).

(b) Install the VSCF oil in tube/hose [43] as follows:

1) Put the VSCF oil in tube/hose [43] next to the oil cooler out oil tube/hose [31] on the VSV torsion bar [47] left side aft support [40] at the 7:30 to 8:45 o'clock position.

2) Connect the B-nut of the oil tube that attaches to the oil tube/hose. Tighten the B-nut hand-tight.

3) Connect the B-nut of the oil tube/hose [44] that attaches to the backup generator nipple. Tighten the B-nut hand-tight.

4) Install the loop clamps [34] with the bolts [35], and nuts [33] to attach the VSCF oil in tube/hose [43] to the support bracket [42] and the aft support [40]. Tighten the nuts [33] and bolts [35] hand-tight.

CAUTION USE TWO WRENCHES TO TIGHTEN THE NUT. IF YOU DO NOT DO THE TWO WRENCH PROCEDURE, TOO MUCH TORQUE WILL MOVE TO THE TUBE. THIS CAN CAUSE DAMAGE TO THE TUBE.

5) Make sure the VSCF oil in tube/hose [43] is not under strain and torque the B-nuts connection on the VSCF oil in tube/hose [43] and the back-up generator [29] to 450 in-lb (51 N·m)-550 in-lb (62 N·m).

6) Torque the loop clamps [34] or the bolts [35] to 55 in-lb (6.2 N·m)-70 in-lb (7.9 N·m).

7) Connect the electrical cable [27] to the oil temperature sensor [28] on the VSCF oil in tube/hose [43].

(c) Connect the right VSV actuator [19] to the head drain tube [16] and the rod drain tube [17]. Refer to Right Variable Stator Vane (VSV) Actuator Installation, TASK 75-31-02-400-803-H01.

(d) Connect the left VSV actuator [24] to the head drain tube [22] and the rod drain tube [23]. Refer to Left Variable Stator Vane (VSV) Actuator Installation, TASK 75-31-02-400-802-H01.

(e) Install the HP/IP manifold [3] to the core engine right side. Refer to Right Variable Stator Vane (VSV) Actuator Removal, TASK 75-31-02-000-803-H01.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-30-00-860-005-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.

(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.

SUBTASK 72-30-00-860-006-H00

(2) Do these steps to put the fuel control valve and the spar valve to the serviceable condition:

(a) Make sure that the FUEL CONTROL switch is in the CUTOFF position.

(b)

For the applicable engine, remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
A	5	C28001	L ENGINE FUEL SPAR VALVE
A	19	C28002	R ENGINE FUEL SPAR VALVE
B	4	C76601	L ENG FUEL VALVE
B	19	C76600	R ENG FUEL VALVE

I. VSV Torsion Bar Repair (Replacement) Test

SUBTASK 72-30-00-700-005-H00

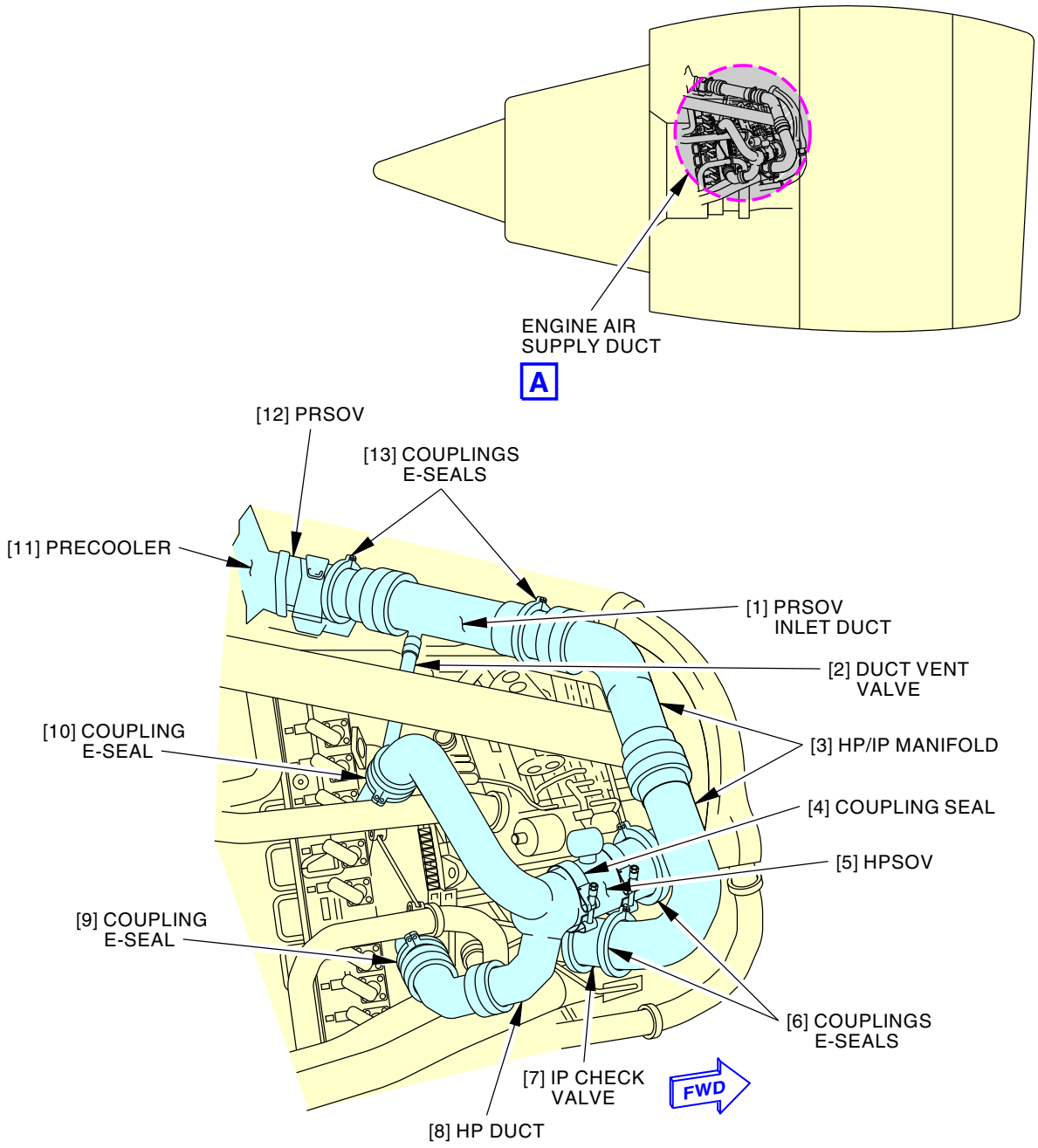
(1) Do this task: Test No. 5 - Idle Leak Check, TASK 71-00-00-700-804-H01.

SUBTASK 72-30-00-700-006-H00

(2) Do this task: Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test), TASK 71-00-00-700-813-H01.

——— END OF TASK ———

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



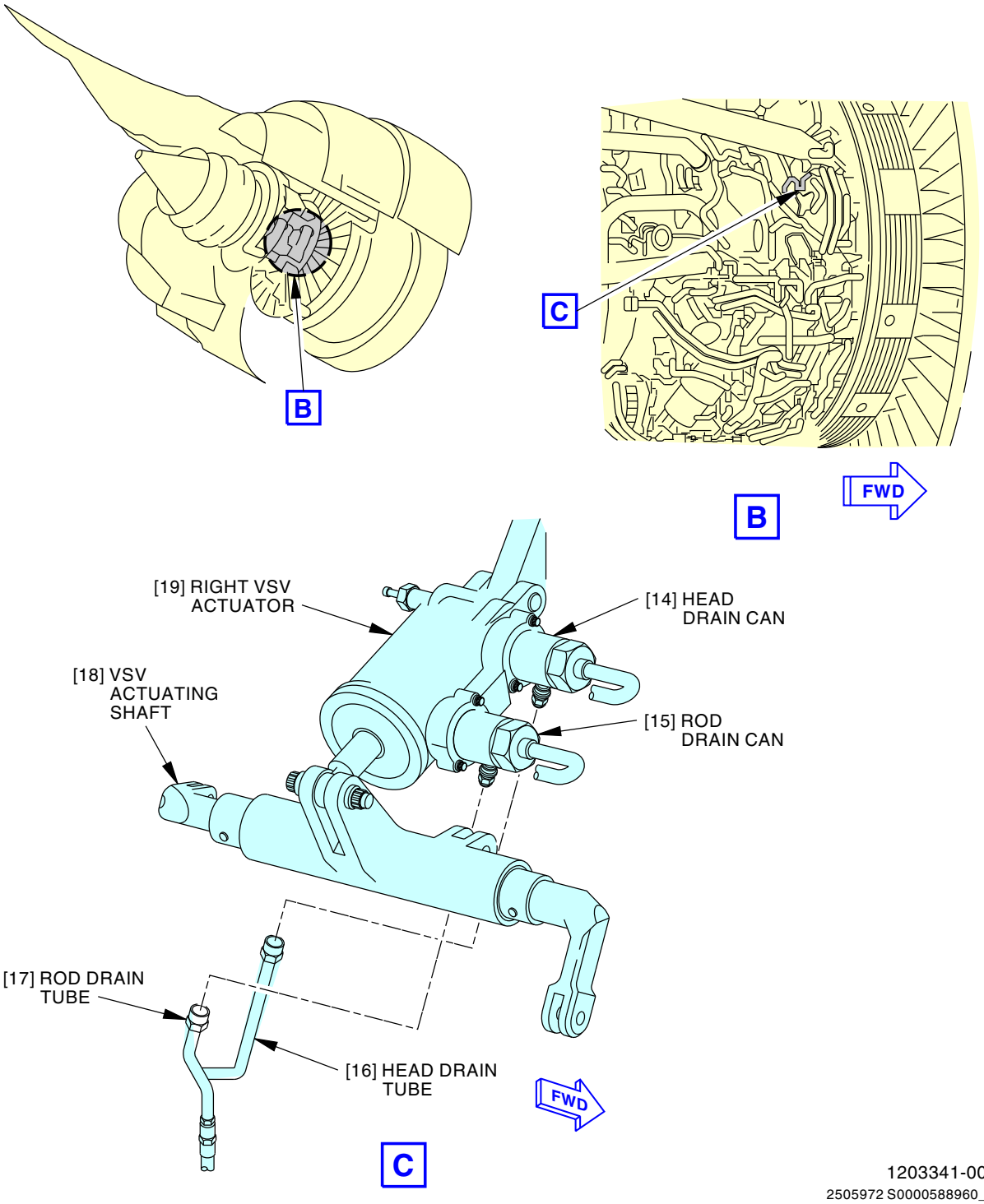
ENGINE AIR SUPPLY DUCT

A

5028752-00
2505957 S0000588959_V1

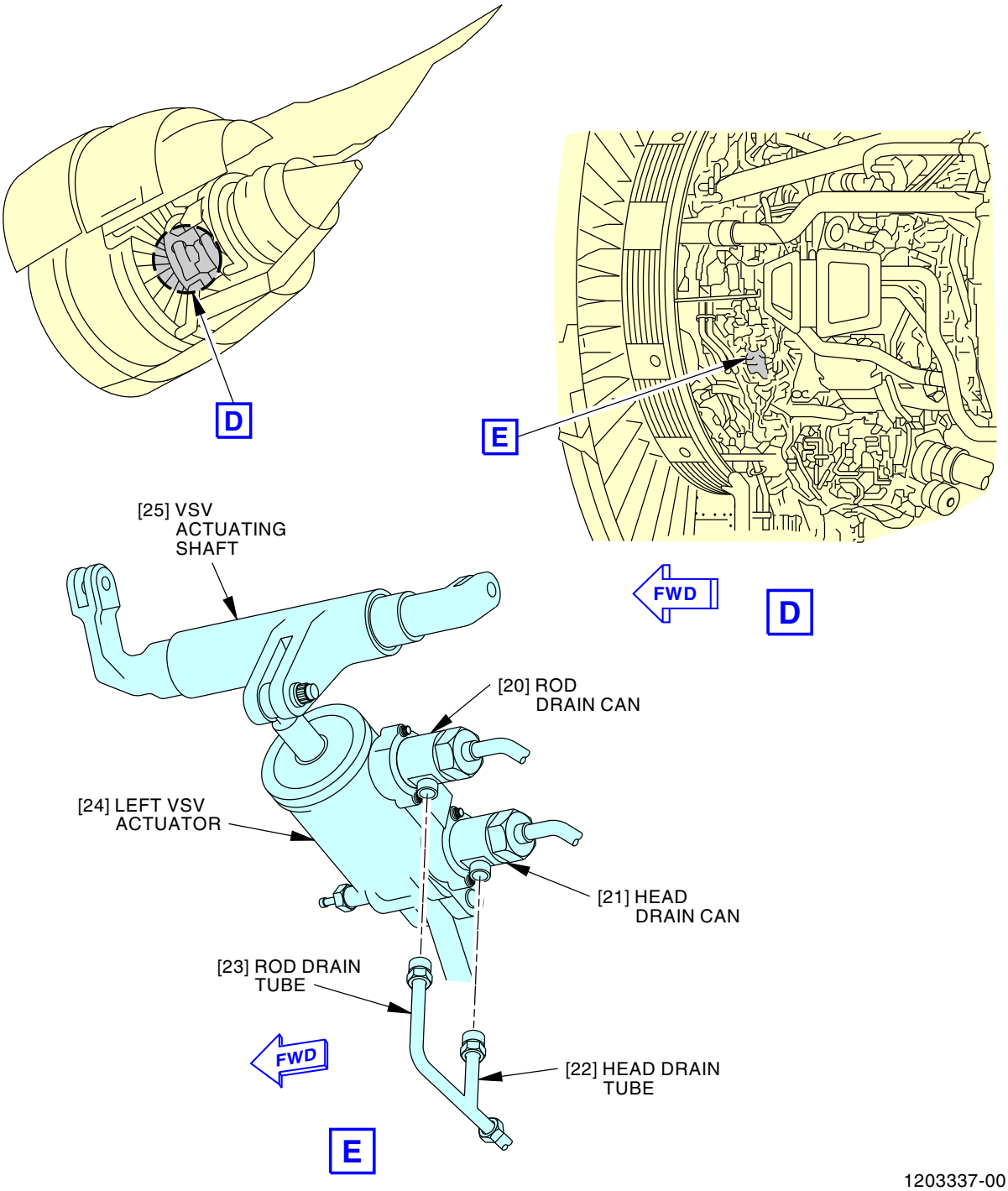
Accessing the VSV Torsion Bar Repair
Figure 814/72-30-00-990-827-H00 (Sheet 1 of 5)

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



Accessing the VSV Torsion Bar Repair
Figure 814/72-30-00-990-827-H00 (Sheet 2 of 5)

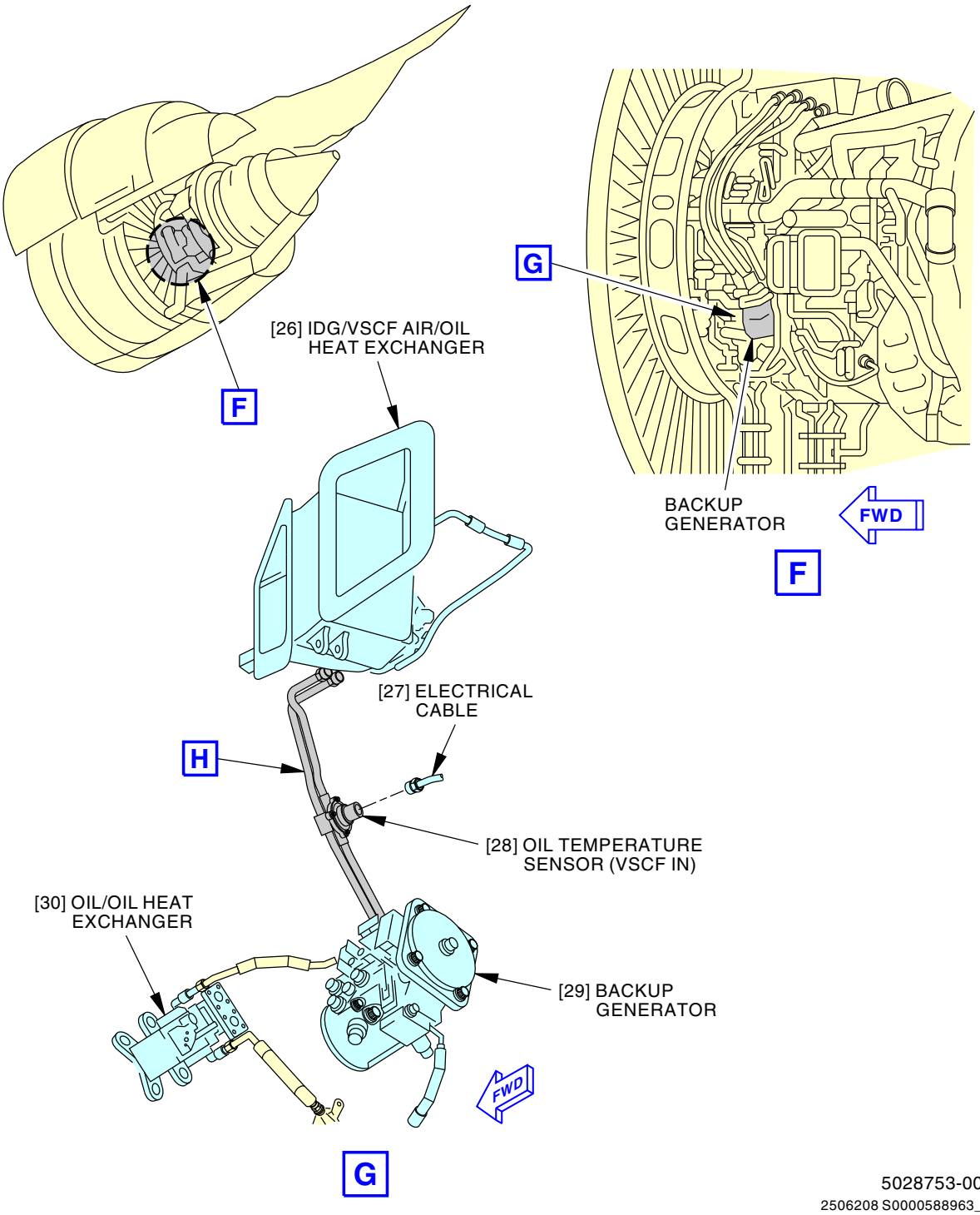
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1203337-00
2505979 S0000588962_V1

Accessing the VSV Torsion Bar Repair
Figure 814/72-30-00-990-827-H00 (Sheet 3 of 5)

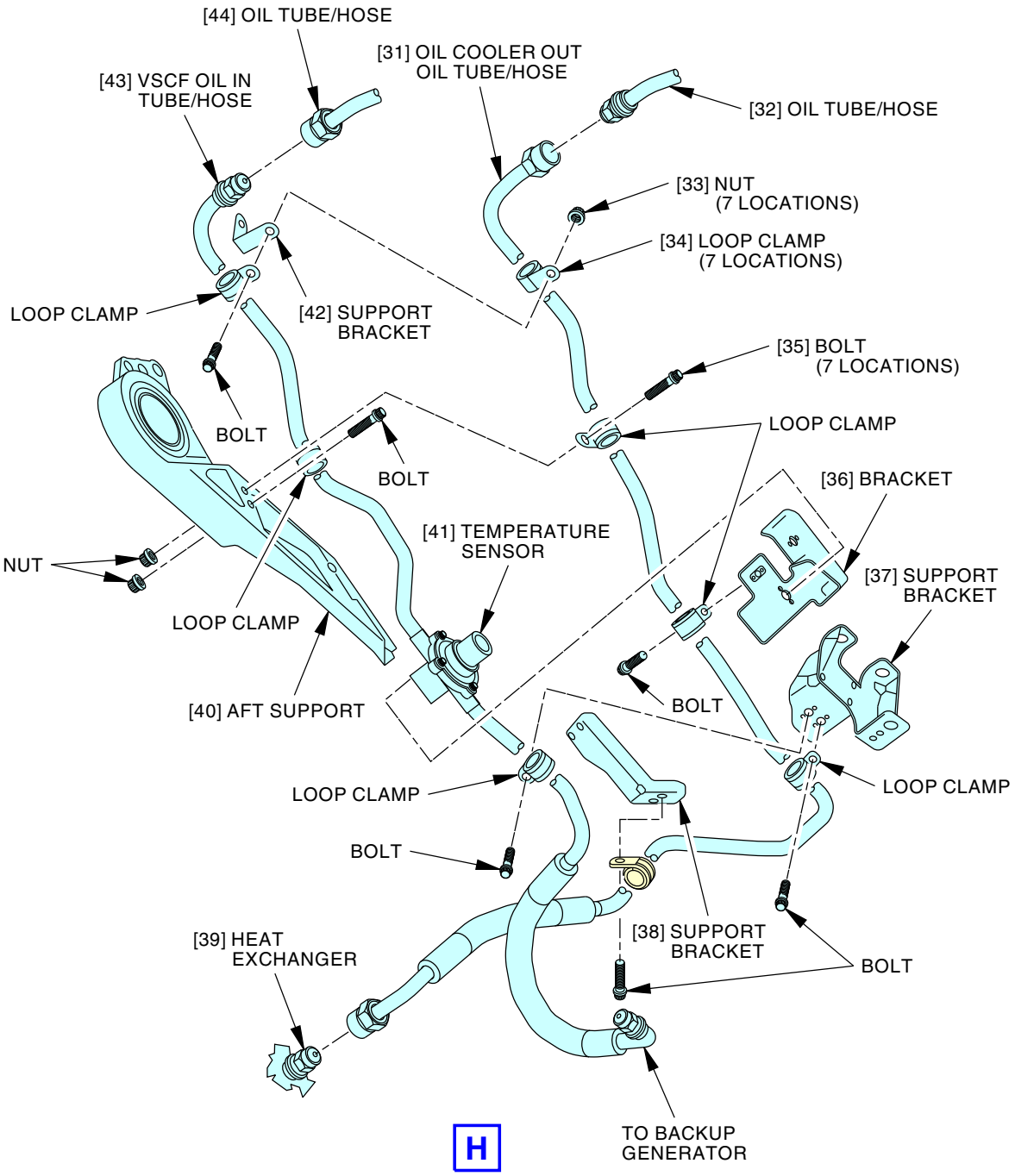
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5028753-00
2506208 S0000588963_V1

Accessing the VSV Torsion Bar Repair
Figure 814/72-30-00-990-827-H00 (Sheet 4 of 5)

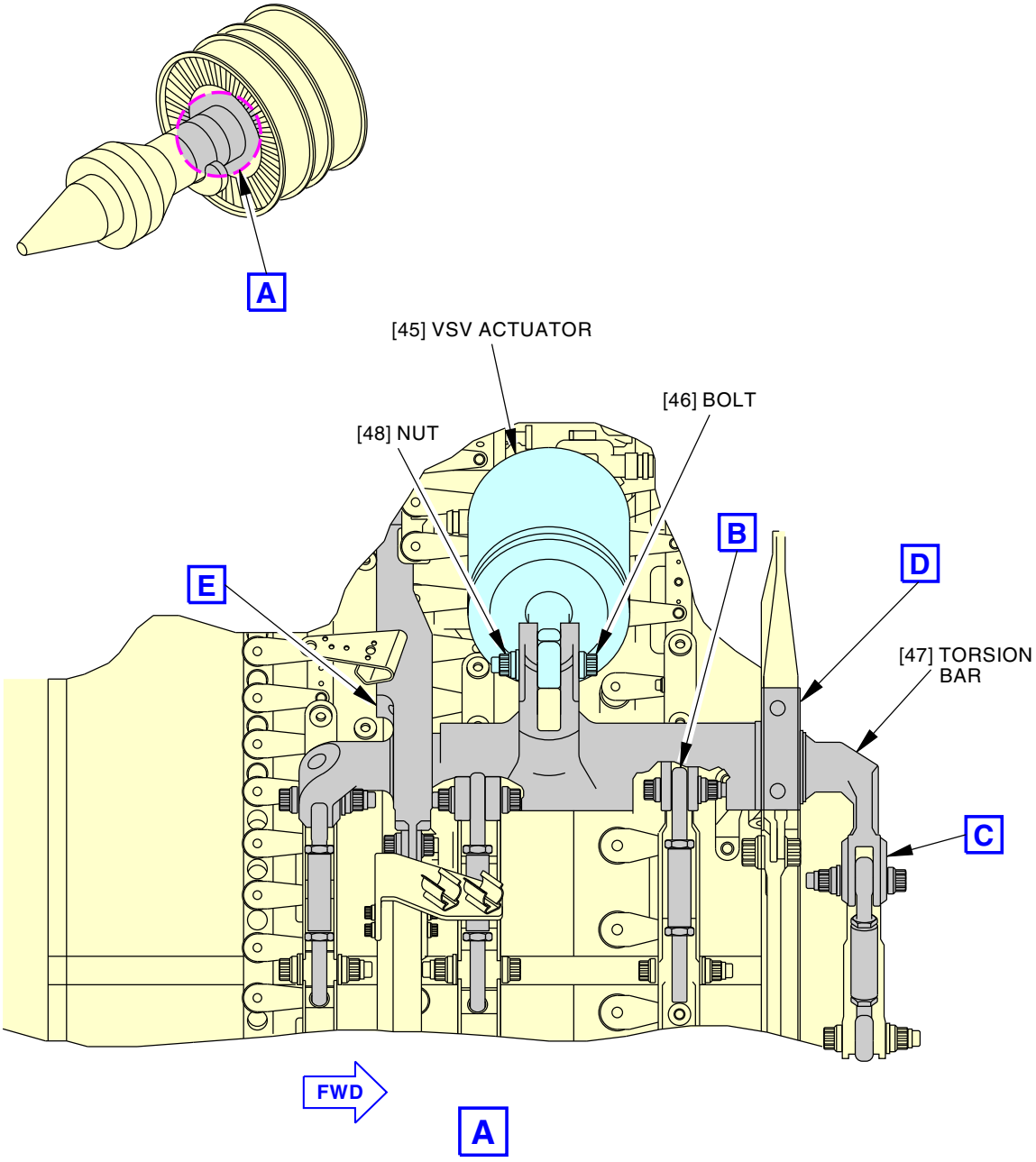
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1211788-00
2506239 S0000588964_V1

Accessing the VSV Torsion Bar Repair
Figure 814/72-30-00-990-827-H00 (Sheet 5 of 5)

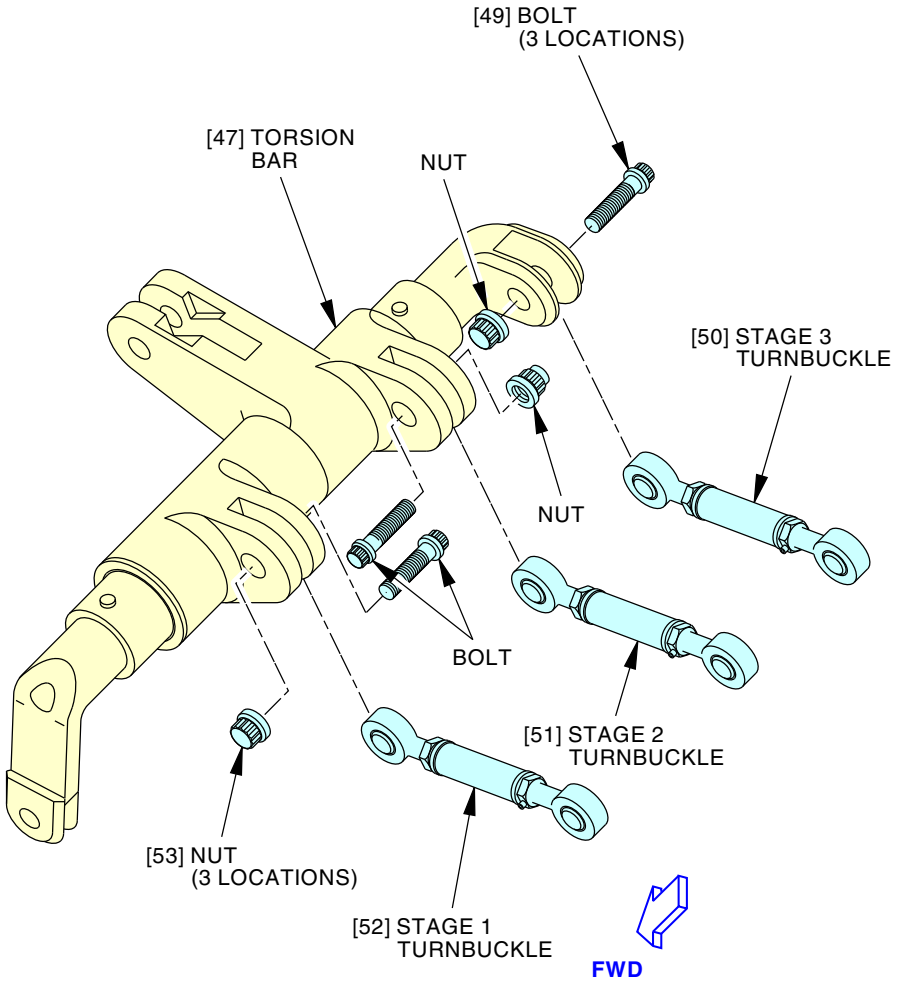
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213279-01
2506294 S0000588965_V1

VSV Torsion Bar Repair
Figure 815/72-30-00-990-828-H00 (Sheet 1 of 5)

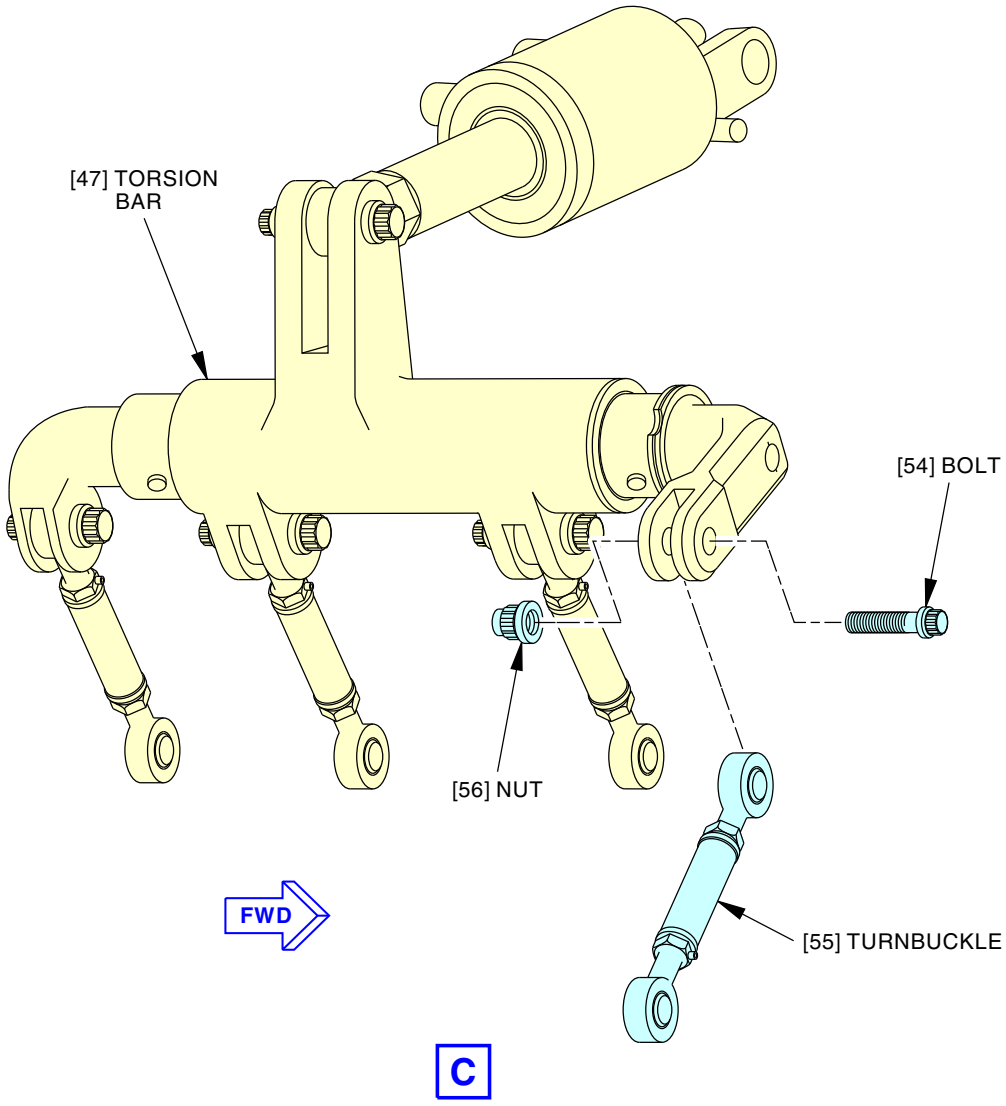
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213236-02
2506298 S0000588966_V1

VSV Torsion Bar Repair
Figure 815/72-30-00-990-828-H00 (Sheet 2 of 5)

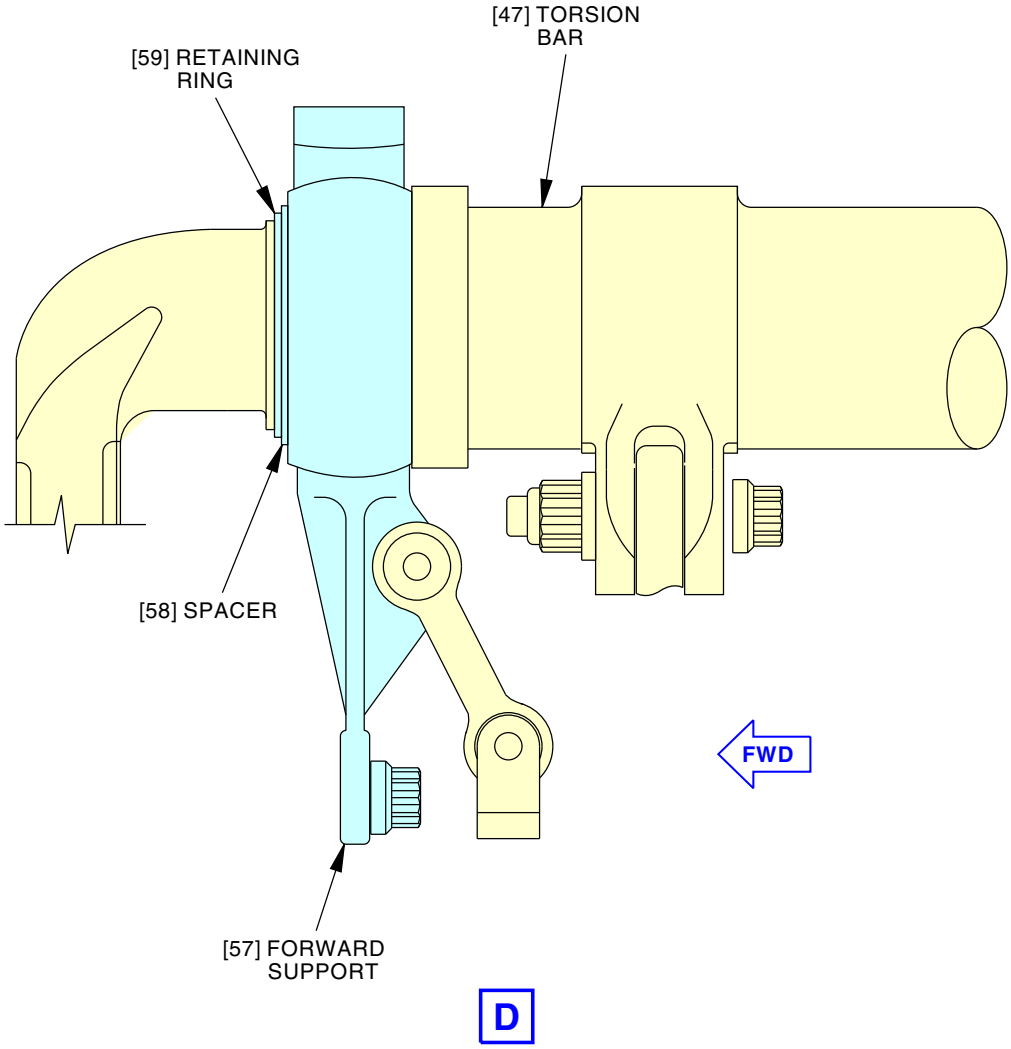
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5028754-00
2506674 S0000588967_V1

VSV Torsion Bar Repair
Figure 815/72-30-00-990-828-H00 (Sheet 3 of 5)

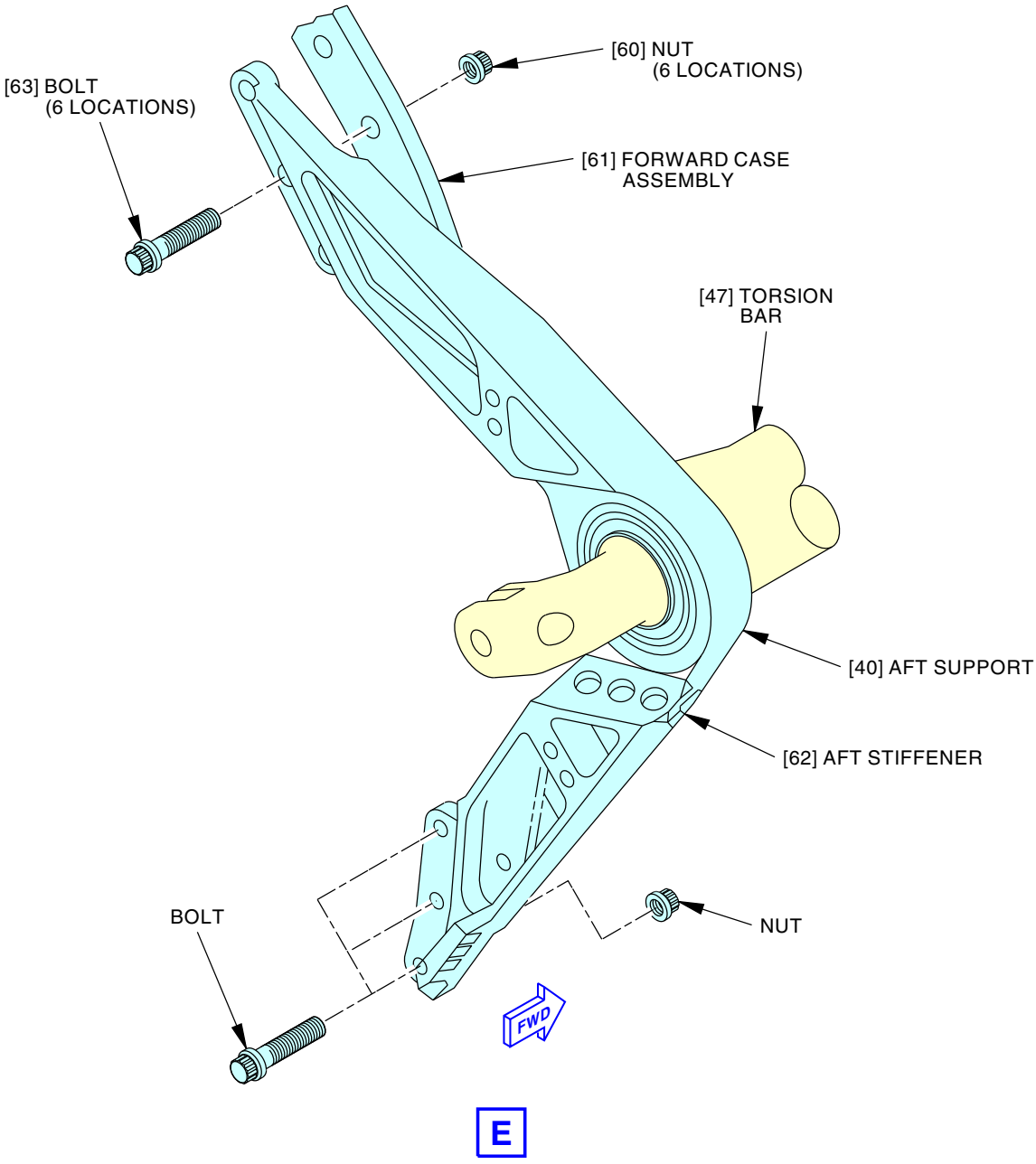
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213272-01
2506679 S0000588968_V1

VSV Torsion Bar Repair
Figure 815/72-30-00-990-828-H00 (Sheet 4 of 5)

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



5028755-00
2506642 S0000588969_V1

VSV Torsion Bar Repair
Figure 815/72-30-00-990-828-H00 (Sheet 5 of 5)

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

TASK 72-30-00-300-803-H00

5. VSV Turnbuckles Repair (Replacement)

Figure 816, Figure 817, Figure 818, Figure 819

A. General

(1) This task is the procedure to replace right side and/or left side Variable Stator Vane (VSV) turnbuckles.

(2) The VSV turnbuckles are the parts which transmit the movement of the VSV actuators and VSV torsion bar to the Inlet Guide Vane (IGV) and VSV actuating rings.

(3) Do not use this procedure to replace an IGV turnbuckle. IGV turnbuckle length is adjusted during engine assembly.

(4) Replace the turnbuckles one by one.

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)
71-00-00-700-804-H01	Test No. 5 - Idle Leak Check (P/B 501)
71-00-00-700-813-H01	Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test) (P/B 501)
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)
72-30-00-200-801-H01	High Pressure Compressor Section (HPC) Inspection (P/B 601)
75-31-00-700-801-H01	Variable Stator Vane (VSV) Operation (Alternate) (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-14911	Check Tool - Turnbuckle, Stages 1 to 3 and IGV Part #: 9C2309G01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
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
G50650 [C10-071]	Wire - Safety, 0.020 or 0.032 inch (0.508 or 0.813 mm) Diameter	SAE AS5685, AMS 5687, AMS 5689, AMS 5690

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

E. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Repair

SUBTASK 72-30-00-860-001-H00

(1) Do these steps to make sure the fuel control valve and the spar valve stay in the closed position:

(a) Make sure that the FUEL CONTROL switch is in the CUTOFF position.

1) Install a DO-NOT-OPERATE tag on the FUEL CONTROL switch.

(b) Push the STAT switch on the display select panel of the glareshield (P55).

1) Make sure you do not see the applicable ENG FUEL VALVE L(R) or FUEL SPAR VALVE L(R) status messages.

(c) For the applicable engines, open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
A	5	C28001	L ENGINE FUEL SPAR VALVE
A	19	C28002	R ENGINE FUEL SPAR VALVE
B	4	C76601	L ENG FUEL VALVE
B	19	C76600	R ENG FUEL VALVE

SUBTASK 72-30-00-010-010-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

(2) 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

H. VSV Turnbuckles Repair (Replacement)

SUBTASK 72-30-00-860-002-H00

(1) Put the VSV actuators [51] in the closed position (VSV actuator rod extended). Refer to Variable Stator Vane (VSV) Operation (Alternate), TASK 75-31-00-700-801-H01.

SUBTASK 72-30-00-010-011-H00

(2) Remove the stage 1 turnbuckle or link [40], or the stage 2 turnbuckle or link [41], or the stage 3 turnbuckle or link [42], to repair (replace) as follows:

(a) Remove the bolt [43] and the nut [44] from the VSV stage 1 rudder [45], or the stage 2 rudder [46], or the stage 3 rudder [47] Figure 816.

(b) Remove the bolt [49] and the nut [48] from the VSV torsion bar [50] that correspond Figure 817.

NOTE: Replace the turnbuckles or links one by one.

NOTE: SB 72-0265 replaces turnbuckles by links.

SUBTASK 72-30-00-820-001-H00

(3) Measure the new turnbuckle for correct length as follows:

(a) Do an inspection of the turnbuckle ball bearings. Refer to TASK 72-30-00-200-801-H01.

(b) Install the applicable master rod [12], [13], [14], or [15] on the yokes [5], [11] of the check tool, COM-14911 turnbuckle setting gage.

NOTE: There is a different master rod for each different turnbuckle stage.

(c) Install one pin [10] through the holes in the yoke [11] and master rod [12], [13], [14], or [15].

(d) Loosen the knurled nut [8].

(e) Move the sliding block [4] and install one pin [10] through the holes in the yoke [5] and master rod [12], [13], [14], or [15].

(f) Install the jig pin [6] in the applicable hole in the sliding block [4].

NOTE: There is a different hole in the sliding block for each different turnbuckle stage.

(g) Hand-tighten the knurled nut [8].

(h) Put the turnbuckle [40], [41], [42] on the check tool, COM-14911 turnbuckle setting gage that you adjusted for the applicable turnbuckle [40], [41], [42] (Figure 818).

NOTE: The stage number is on the turnbuckle body and on the check tool, COM-14911 turnbuckle setting gage.

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

(i) If the pins [10] go into spherical bearing bores of the turnbuckle [40], [41], [42] freely, the turnbuckle [40], [41], [42] is set to the correct length.

(4) If the turnbuckle [40], [41], [42] does not fit on the setting gage, adjust the turnbuckle [40], [41], [42] to the nominal length, using the following steps.

SUBTASK 72-30-00-820-002-H00

(5) Adjust the new turnbuckle [40], [41], [42] to the nominal length (Figure 819).

(a) Remove the safety wire or safety cable.

(b) Loosen the lock nuts [62].

(c) Put the turnbuckle [40], [41], [42] on the check tool, COM-14911 turnbuckle setting gage.

SUBTASK 72-30-00-820-003-H00

(6) Turn the body of the turnbuckle [40], [41], [42] until the pins [10] go into the spherical bearing bores and can move freely.

SUBTASK 72-30-00-820-004-H00

(7) Check that the spherical bearing ends have a sufficient number of threads engaged in the turnbuckle [40], [41], [42] body.

(8) Use a length of safety wire, G50650 [C10-071]. Try to put the safety wire through the witness holes.

(9) If the safety wire will not go through the witness holes, the turnbuckle [40], [41], [42] is correctly adjusted. Finish the assembly of the turnbuckle [40], [41], [42].

(a) Put the lock washers [61] in position so that the safety wire lugs are perpendicular to the safety wire holes in the lock nuts [62] (Figure 819)

(10) If the safety wire goes through the witness holes, there are not sufficient threads engaged in the turnbuckle [40], [41], [42] body. Adjust the turnbuckle [40], [41], [42] as follows:

(a) Remove the turnbuckle [40], [41], [42] from the setting gage.

(b) Tighten the spherical bearing end until the safety wire will not pass through the witness hole. Then loosen the other spherical bearing end by an equal number of turns.

(c) Put the turnbuckle [40], [41], [42] on the check tool, COM-14911 turnbuckle setting gage.

1) Turn the body of the turnbuckle [40], [41], [42] until the pins [10] go into the spherical bearing bores and can move freely.

SUBTASK 72-30-00-820-005-H00

CAUTION

MAKE SURE AT LEAST ONE OF THE LOCK WASHER SAFETY WIRE LUGS DOES NOT CATCH ON THE VSV OR IGV ACTUATING RING RUDDER. DAMAGE TO THE TURNBUCKLE OR ACTUATING RING RUDDER WILL OCCUR IF YOU DO NOT INSTALL THE LOCK WASHER CORRECTLY.

(11) Put the lock washers [61] in position so that the safety wire lugs are perpendicular to the safety wire holes in the lock nuts [62] (Figure 819).

(12) Torque the lock nut [62] to 59 in-lb (6.7 N·m)-65 in-lb (7.3 N·m).

(13) Use safety wire, G50650 [C10-071] safety wire or safety cable to safety the lock nut [62] to the lock washer [61] safety wire lug (Figure 819).

SUBTASK 72-30-00-400-001-H00

(14) Install the new stage 1 turnbuckle or link [40], or the new stage 2 turnbuckle or link [41], or the new stage 3 turnbuckle or link [42], to the rudder which agree as follows:

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

(a) Lightly coat the threads of the bolts [43] with lubricant, Acheson GP460 compound, D50043 [C02-058].

(b) Install the bolt [43] and the nut [44] that attach the stage 1 turnbuckle [40] to the stage 1 rudder [45]. Make sure the bolt head is on the rear side.

(c) Tighten the nut [44] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

(d) Install the bolt [43] and the nut [44] that attach the stage 2 turnbuckle [41] to the stage 2 rudder [46]. Make sure the bolt head is on the forward side.

(e) Tighten the nut [44] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

(f) Install the bolt [43] and the nut [44] that attach the stage 3 turnbuckle [42] to the stage 3 rudder [47]. Make sure the bolt head is on the rear side.

(g) Tighten the nut [44] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

SUBTASK 72-30-00-400-002-H00

(15) Connect the stage 1 turnbuckle [40], the stage 2 turnbuckle [41] and the stage 3 turnbuckle [42], to the VSV torsion bar [50] related yokes as follows:

(a) Lightly coat the threads of the bolts [49] with lubricant, Acheson GP460 compound, D50043 [C02-058].

(b) Install the bolt [49] and the nut [48] that attach the stage 1 turnbuckle [45] to the VSV torsion bar [50]. Make sure the bolt head is on the rear side.

(c) Tighten the nut [48] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

(d) Install the bolt [49] and the nut [48] that attach the stage 2 turnbuckle [46] to the VSV torsion bar [50]. Make sure the bolt head is on the forward side.

(e) Tighten the nut [48] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

(f) Install the bolt [49] and the nut [48] that attach the stage 3 turnbuckle [47] to the VSV torsion bar [50]. Make sure the bolt head is on the rear side.

(g) Tighten the nut [48] to 543 in-lb (61.4 N·m)-603 in-lb (68.1 N·m).

I. Put the Airplane Back to Its Usual Condition

SUBTASK 72-30-00-410-009-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.

(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

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

SUBTASK 72-30-00-860-003-H00

(2) Do these steps to put the fuel control valve and the spar valve to the serviceable condition:

(a) Make sure that the FUEL CONTROL switch is in the CUTOFF position.

(b) For the applicable engine, remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
A	5	C28001	L ENGINE FUEL SPAR VALVE
A	19	C28002	R ENGINE FUEL SPAR VALVE
B	4	C76601	L ENG FUEL VALVE
B	19	C76600	R ENG FUEL VALVE

J. VSV Turnbuckle Repair (Replacement) Test

SUBTASK 72-30-00-700-003-H00

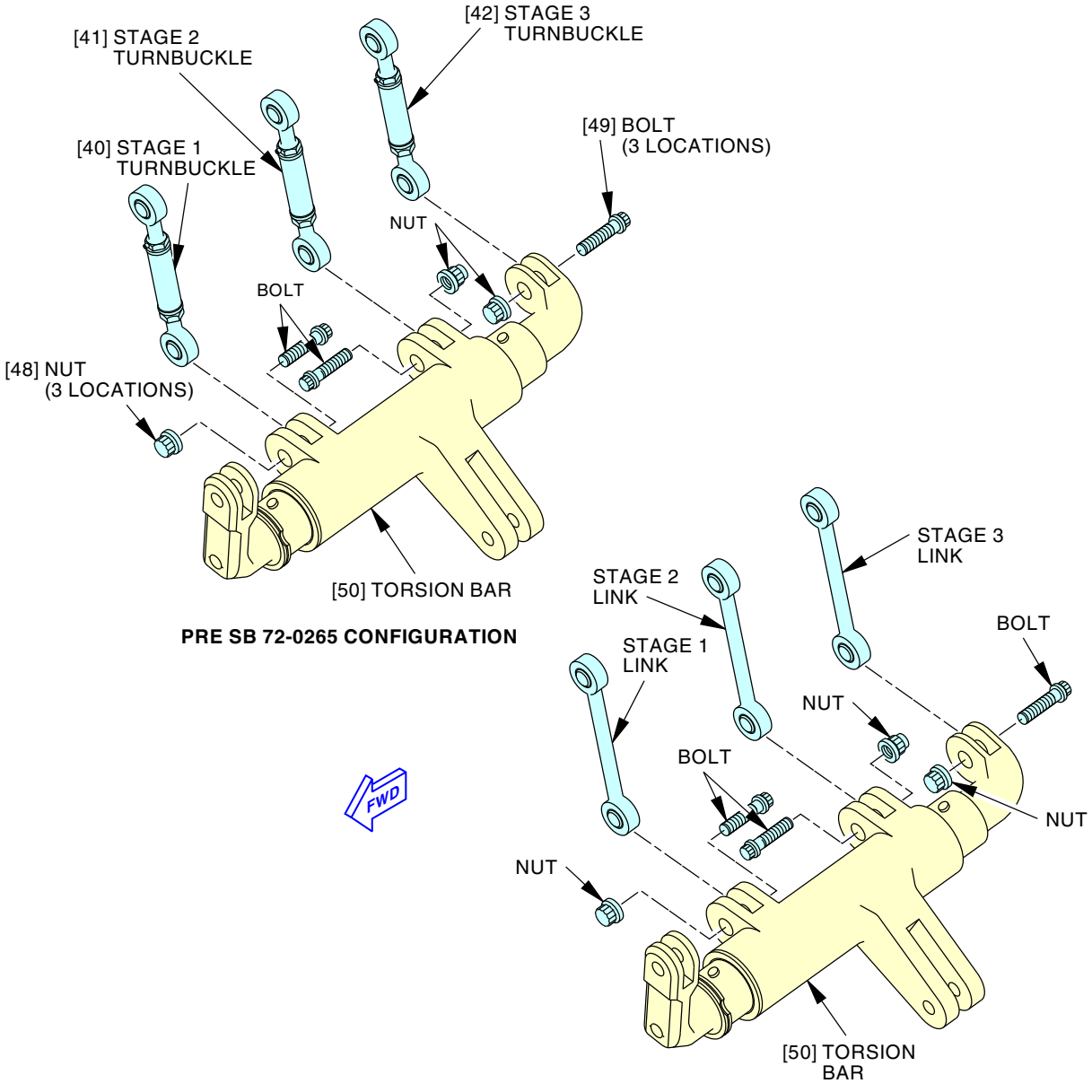
(1) Do this task: Test No. 5 - Idle Leak Check, TASK 71-00-00-700-804-H01

SUBTASK 72-30-00-700-004-H00

(2) Do this task: Test No. 14 - Engine Fuel Driven Actuator Test (MAT Initiated Test), TASK 71-00-00-700-813-H01

——— END OF TASK ———

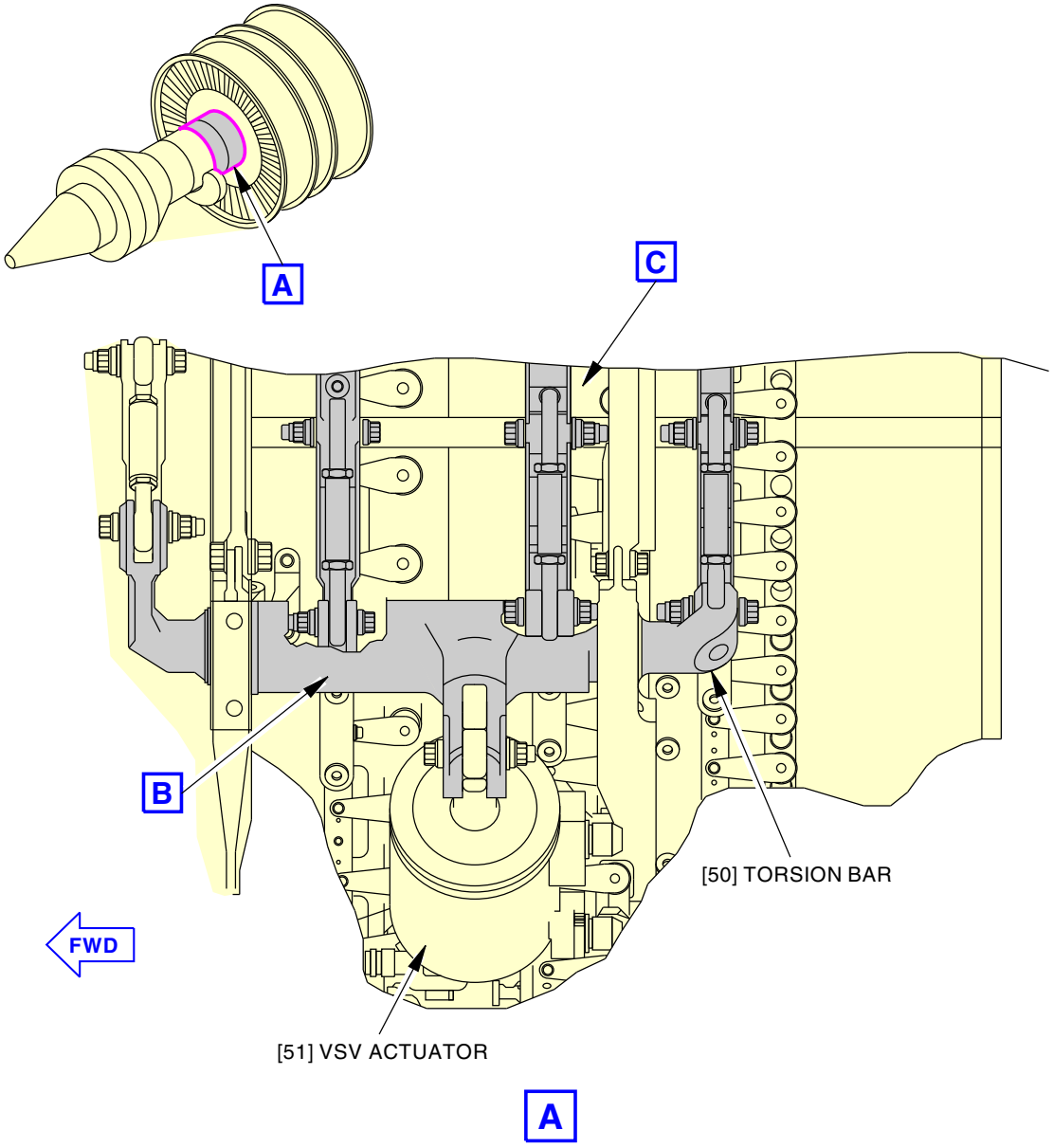
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1273759-00
2507196 S0000590135_V1

VSV Turnbuckles Repair
Figure 816/72-30-00-990-823-H00

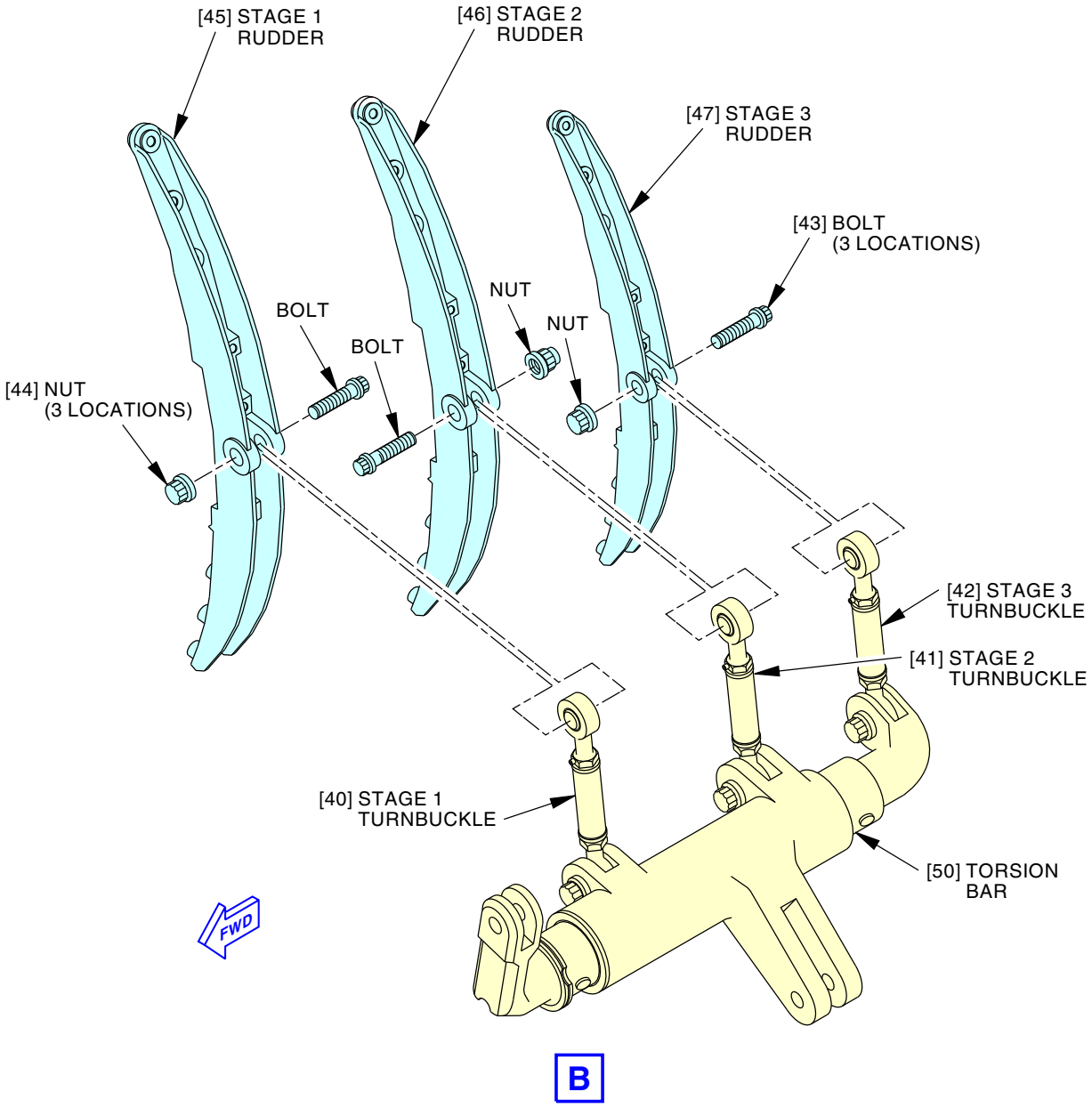
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213907-00
2507320 S0000590136_V1

VSV Turnbuckles Repair
Figure 817/72-30-00-990-824-H00 (Sheet 1 of 3)

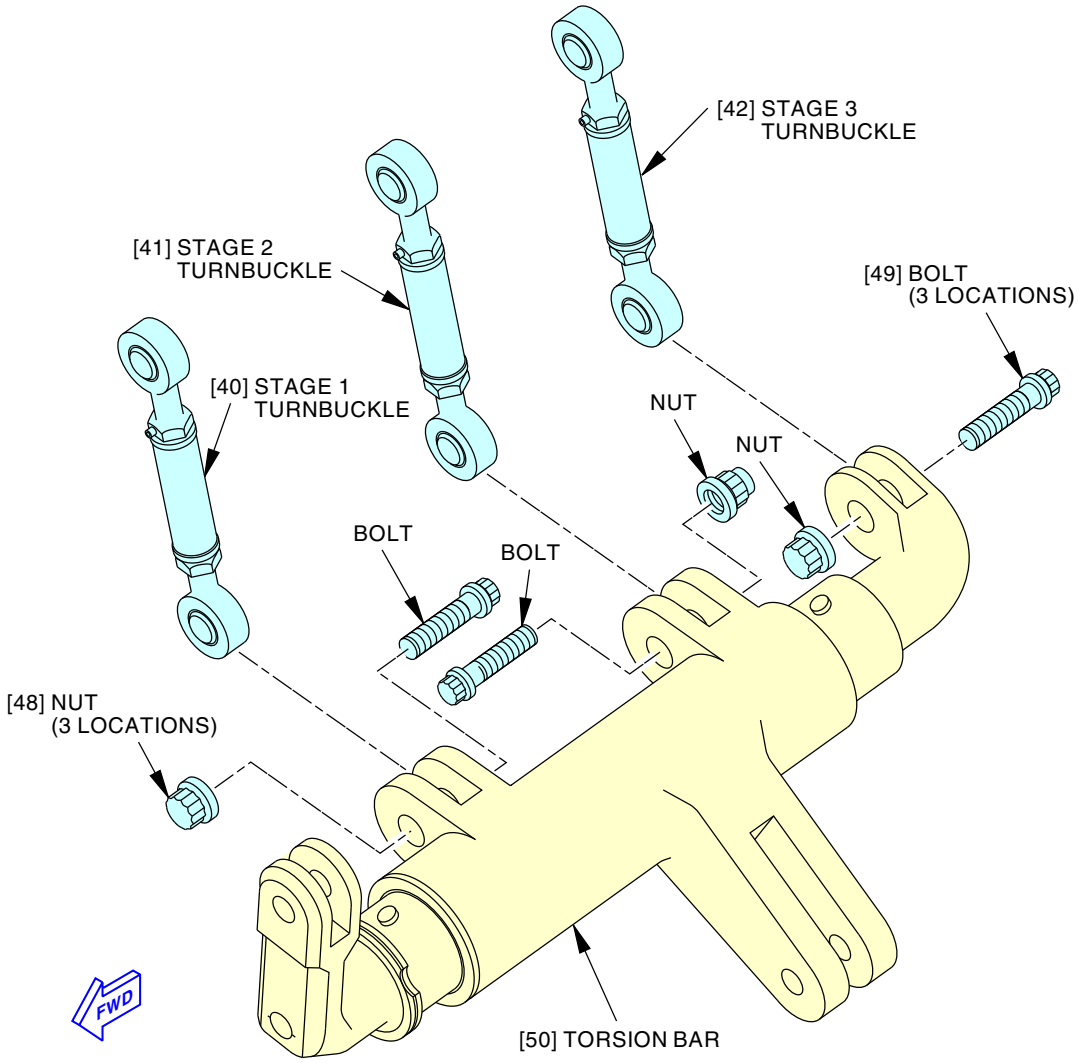
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213908-00
2507316 S0000590138_V1

VSV Turnbuckles Repair
Figure 817/72-30-00-990-824-H00 (Sheet 2 of 3)

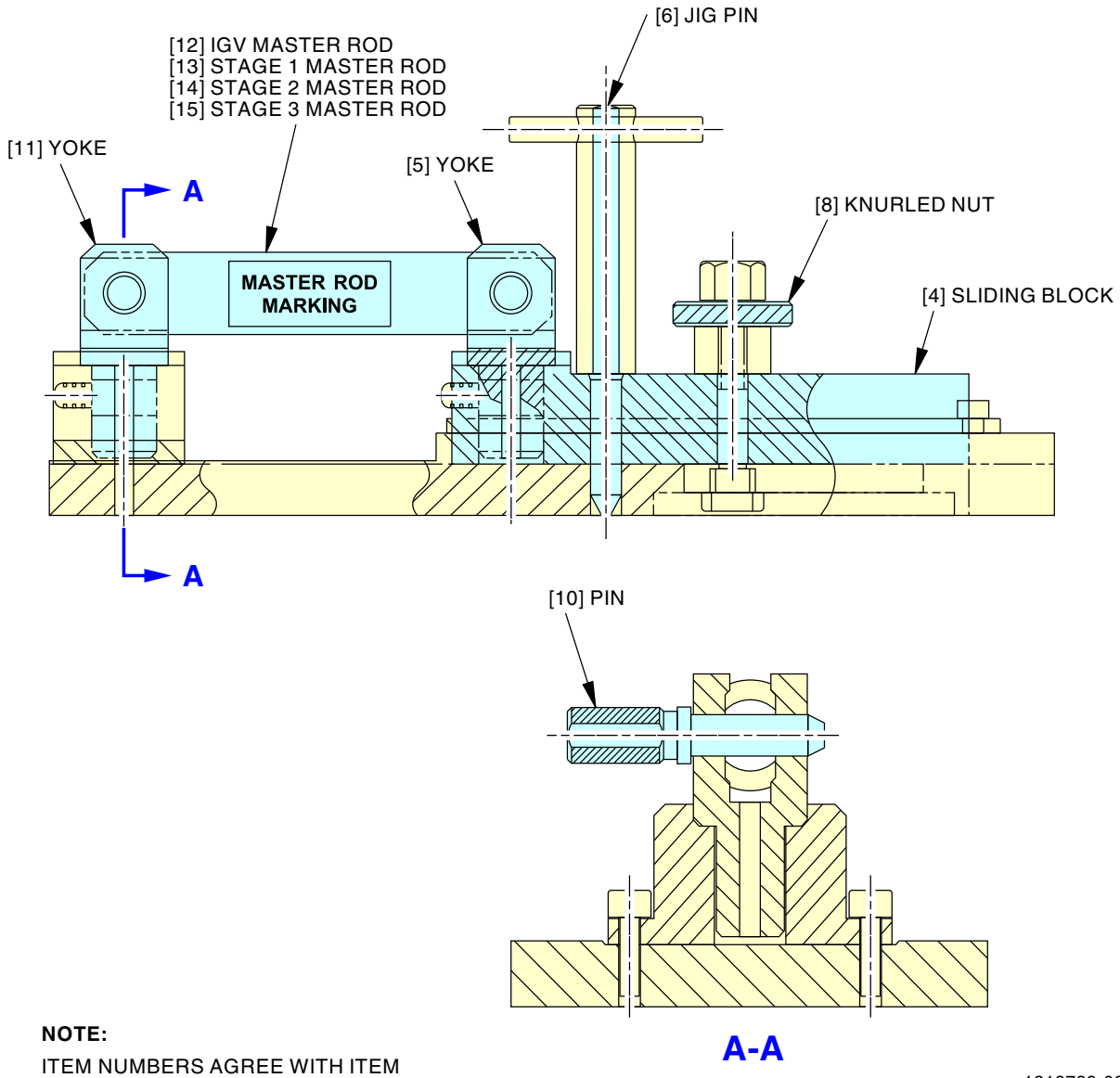
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213235-01
2507465 S0000590140_V1

VSV Turnbuckles Repair
Figure 817/72-30-00-990-824-H00 (Sheet 3 of 3)

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



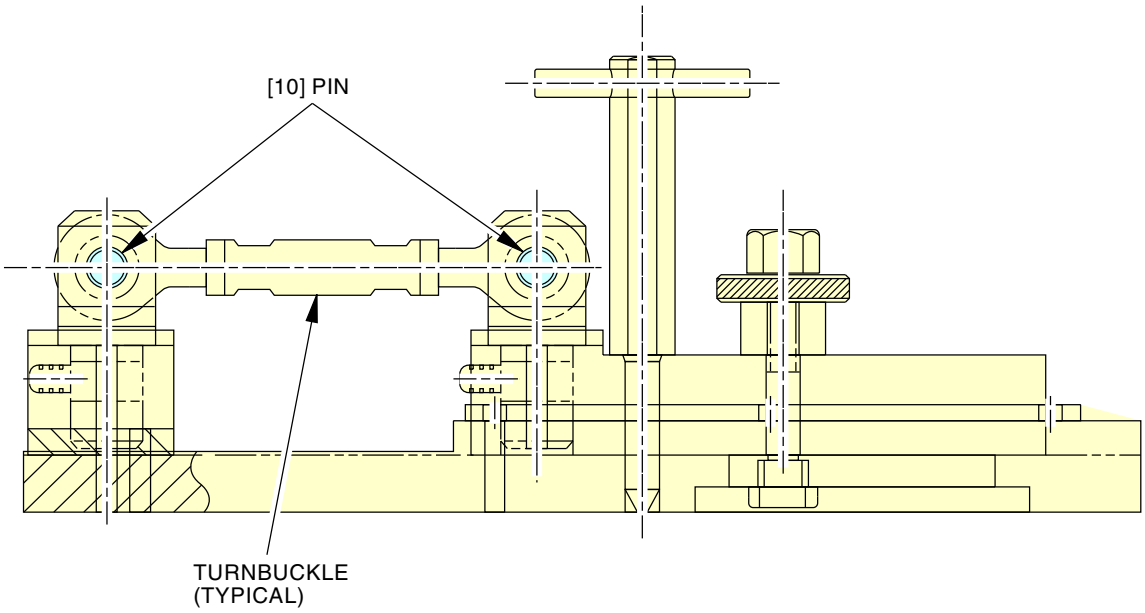
NOTE:

ITEM NUMBERS AGREE WITH ITEM NUMBERS OF TOOL, 9C2309.

1218729-00
2507296 S0000590143_V1

VSV Turnbuckles Repair
Figure 818/72-30-00-990-825-H00 (Sheet 1 of 2)

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



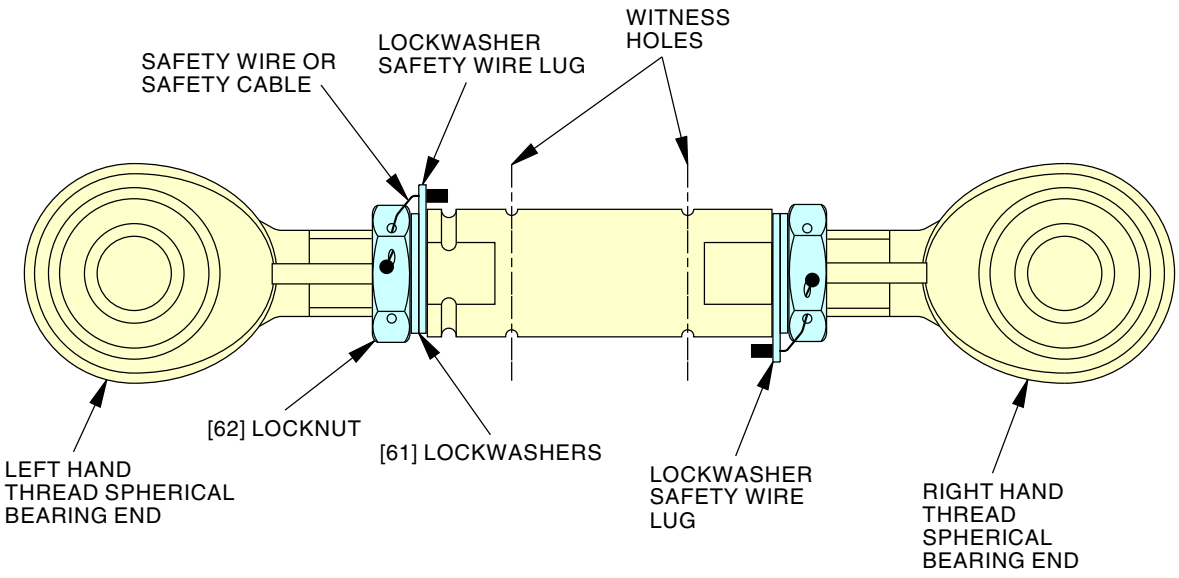
NOTE:

ITEM NUMBERS AGREE WITH ITEM NUMBERS OF TOOL, 9C2309.

1218946-00
2507224 S0000590144_V1

VSV Turnbuckles Repair
Figure 818/72-30-00-990-825-H00 (Sheet 2 of 2)

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



1218730-00
2507241 S0000590145_V1

VSV Turnbuckles Repair
Figure 819/72-30-00-990-826-H00

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

COMBUSTION SECTION - INSPECTION/CHECK

1. General

A. This procedure has one tasks.

(1) Combustion Diffuser Inspection.

TASK 72-40-00-200-801-H01

2. Combustion Diffuser Inspection

(Figure 601)

A. General

(1) This task provides the instructions on how to examine the combustion diffuser.

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)
72-00-00-290-804-H01	Combustion Section and High Pressure Turbine Section Stage One Nozzle Leading Edge Inspection (P/B 601)
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
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-40-00-010-001-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

F. Combustion Diffuser Inspection

SUBTASK 72-40-00-220-001-H01

(1) Examine the combustion diffuser forward and aft flanges:

(a) Bolt hole radial cracks:

1) None permitted.

(b) Bolt hole wear:

1) Wear is permitted if the bolt head fully covers the damage.

2) Damage at two non-adjacent bolt hole locations is permitted.

(c) Nicks, scores, and scratches:

1) Remove the high metal.

2) Damage that remains after high metal removal is permitted if the depth is less than 0.03 inch (0.76 mm).

3) Damage must not be spread over more than 75 percent of the flange seal surface.

4) Damage must not go into or under the bolt head.

SUBTASK 72-40-00-220-002-H01

(2) Examine the combustion diffuser outer case:

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

(a) Cracks in the parent metal:

1) None permitted.

(b) Thread damage on bosses when bosses are open for other maintenance:

1) Chase the threads.

2) Only one full thread can be gone.

(c) Discoloration:

1) Discoloration is permitted only if the metal is not crazed.

2) Do a borescope inspection of the combustor diffuser and the combustor when there are hot spots, and bulges in the outer case (TASK 72-00-00-290-804-H01).

(d) Corrosion:

1) Corrosion is permitted if 75 percent of the outer case thickness or 0.15 inch (3.8 mm) remains.

SUBTASK 72-40-00-220-003-H01

(3) Examine the combustor diffuser pads when you will remove line replaceable units for other maintenance:

(a) Nicks, scores and scratches:

1) Remove the high metal.

2) Damage that remains after high metal removal is permitted if the depth is less than 0.03 inch (0.76 mm).

3) Damage must not be more than 50 percent of the seal surface.

(b) Thread damage:

1) Chase the threads.

2) Damage to only one full thread is permitted.

SUBTASK 72-40-00-220-004-H01

(4) Examine the combustor diffuser borescope ports when you remove the plugs for other maintenance.

(a) Damaged threads:

1) Damage to only one full thread is permitted.

G. Put the Airplane Back to Its Usual Condition

SUBTASK 72-40-00-410-001-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

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

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

1) Close these access panels:

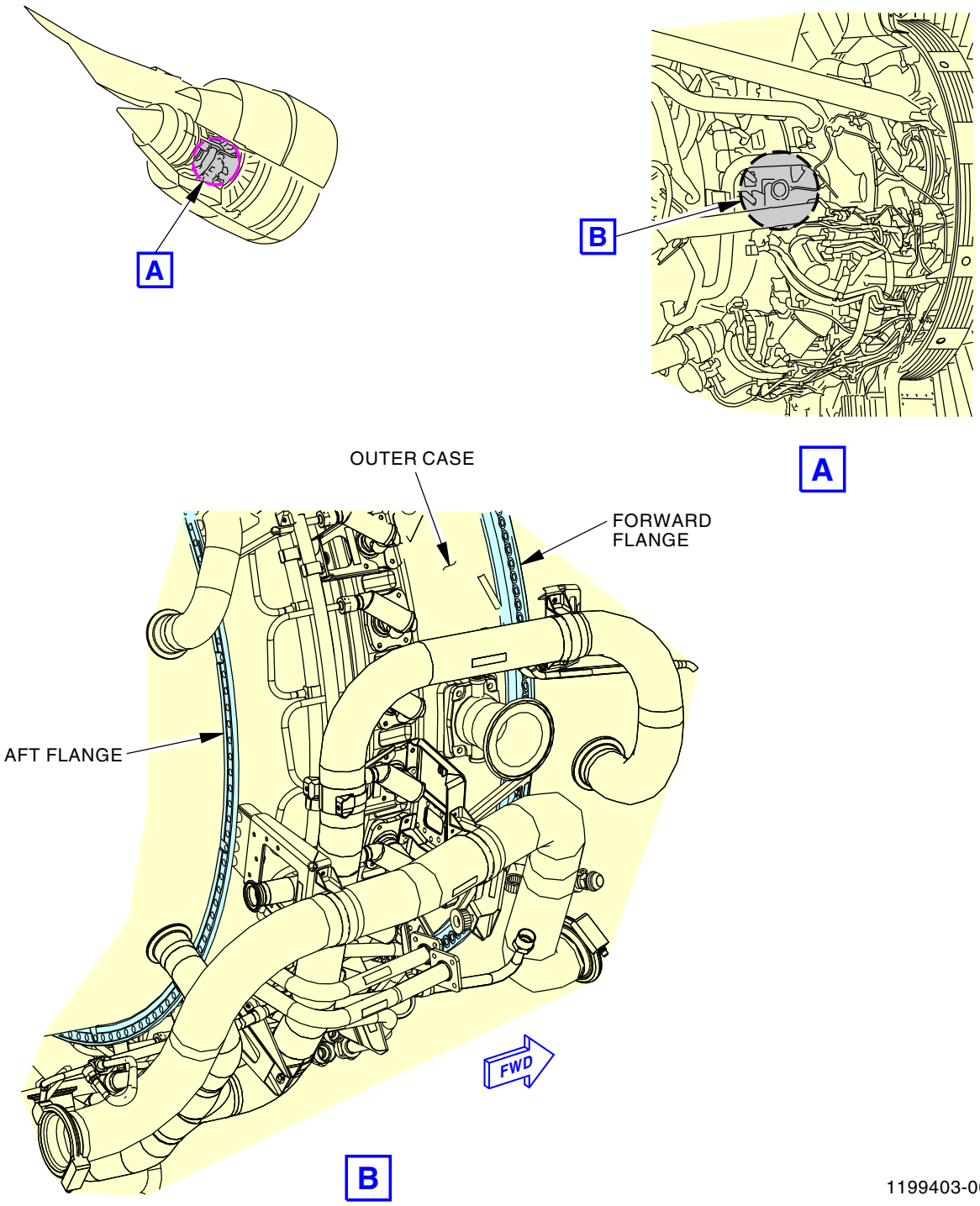
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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



Combustion Section Inspection
Figure 601/72-40-00-990-801-H01

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

COMBUSTOR DIFFUSER NOZZLE - INSPECTION/CHECK

1. General

A. This procedure has one task:

(1) Combustor Diffuser Nozzle Inspection

TASK 72-40-01-200-801-H00

2. Combustor Diffuser Nozzle Inspection

(Figure 601 and Figure 602)

A. General

(1) This procedure provides the instructions to evaluate for serviceability, find and remove the debris or material if it is found fragmented in the Combustor-Diffuser-Nozzle (CDN).

B. References

Reference	Title
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
36-11-01-000-806-004	Engine Duct Removal (P/B 401)
36-11-01-400-806-004	Engine Duct Installation (P/B 401)
36-11-07-000-808-004	HPSOV Removal (P/B 401)
36-11-07-400-808-004	HPSOV Installation (P/B 401)
71-00-00-700-801-H01	Test No. 1 - Pneumatic Leak Test (P/B 501)
71-00-00-700-822-H00	Test No. 21 - High-Power Leak Check (P/B 501)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
72-00-00-290-801-H01	Borescope Inspection Preparation (P/B 601)
72-00-00-290-804-H01	Combustion Section and High Pressure Turbine Section Stage One Nozzle Leading Edge Inspection (P/B 601)
72-00-00-290-805-H01	High Pressure Turbine Section Stage One Nozzle (Except the Leading Edge) and Stage 1 Shroud Inspection (P/B 601)
73-11-05-000-801-H01	Fuel Nozzle Removal (P/B 401)
73-11-05-400-801-H01	Fuel Nozzle Installation (P/B 401)
73-21-62-000-801-H01	Bleed Bias Flow (P3B) Sensor Removal (P/B 401)
73-21-62-400-801-H01	Bleed Bias Flow (P3B) Sensor Installation (P/B 401)
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
D50003 [C02-061]	Compound - Antiseize - Milk of Magnesia (unflavored)	
D50017 [C02-071]	Compound - Antiseize And Lubricating - Pure Nickel Special Grade	GE Spec D6Y28C1 or A50TF198
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

D. Location Zones

Zone	Area
411	Engine, Left

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

(Continued)

Zone	Area
421	Engine, Right

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 Inspection

SUBTASK 72-40-01-940-001-H00

(1) Prepare for use borescope inspection (BSI) equipment with these capabilities:

(a) borescope inspection (BSI) equipment must be able to get digital photographs in case further evaluation is necessary.

(b) The minimum length of the flexscope cable is to be 9.8 ft. (3 m).

NOTE: The recommended borescope inspection (BSI) equipment is a flexscope with unwanted material extraction capability. However, separate tools with a flexscope accompanied by a separate flexible extraction tool can be used.

(c) At minimum, a side-view tip with far focus will be necessary to accomplish the inspection.

SUBTASK 72-40-01-840-001-H00

(2) Do this task:Borescope Inspection Preparation, TASK 72-00-00-290-801-H01.

SUBTASK 72-40-01-010-001-H00

(3) Remove the HP duct from the engine (TASK 36-11-01-000-806-004).

NOTE: It is not necessary to remove the HP/IP manifold and Pressure Regulating Shutoff Valve (PRSOV) inlet duct to do the inspection.

SUBTASK 72-40-01-010-002-H00

(4) Remove the borescope covers on the aft skirt as follows:

NOTE: The aft skirt panels are given position numbers in a counterclockwise (CCW) sequence when you look at them from the front of the engine. The right aft skirt panel is at the 8:00 o'clock position and the left aft skirt panel is at the 5:00-6:00 o'clock position. The borescope N cover is at the top of aft right skirt panel. The borescope P cover is at the top of the left aft skirt panel.

(a) Remove the bolts that attach borescope port M and L covers to the right and left aft skirt panels.

NOTE: To get better access the ECS ports and move the borescope inspection (BSI) equipment, it may be necessary to remove the bleed bias sensor (TASK 73-21-62-000-801-H01).

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

G. Combustor Diffuser Nozzle Inspection

SUBTASK 72-40-01-290-001-H00

(1) Do a borescope inspection to calculate the condition of the HPT stage 1 hanger cooling hole blockage.

NOTE: The steps that follow estimate the serviceability of the engine that have loose debris or loose material.

(a) Make a copy of the HPT Stage 1 Shroud Hanger Hole and Stage 1 Nozzle Map (Figure 602).

(b) Remove borescope plug from HPT stage 1 borescope inspection (BSI) port Q (TASK 72-00-00-290-805-H01).

(c) Put the flexscope into the borescope port, and direct it aft immediately after you put it in.

NOTE: Do not enter the HPT stage 1 nozzle.

(d) Move the flexscope around the HPT stage 1 hanger cavity to do an inspection for blockage of the HPT Stage 1 Hanger cooling holes.

1) Make a mark on a copy of this map of the conditions you see.

NOTE: Make sure that you save this map in case it is needed for future reference or disposition.

(e) Calculate the number of cooling holes affected and make a record of the amount of unwanted material in each cooling hole.

1) To calculate effective blocked HPT Stage 1 Hanger cooling holes, divide the number of “partially blocked” holes divided by 2, and then add the number of “blocked” holes.

Example:

A = Effective Blocked Hanger Cooling Holes.

B = Number of Partially Blocked Hanger Cooling Holes

C = Number of Blocked Hanger Cooling Holes

A = (B/2) + C

2) Take pictures of each hole location that shows unwanted material.

NOTE: You can use the pictures for future reference or disposition.

(f) If it is necessary, you can dispatch the engine after you compare the results of the inspection to the blocked shroud hanger feeder holes.

ARO ALL PRE SB 777-GE100-72-0348

SUBTASK 72-40-01-200-001-H00

(2) For the engines with these HPT Stage 1 Shrouds; Apply the blocked shroud hanger feeder hole limits criteria that follows:

(a) For cooling hole blockage that are more than 6 effective blocked cooling holes:

1) Examine the HPT stage 1 shrouds.

NOTE: Refer to GE90-100 S/B 72-0401 inspection method/limits.

2) Remove the loose debris (i.e. debris that is not stuck) from all CDN cavities (included the combustion chamber) in or less than 10 cycles (Subtask H72-40-01-160-001-H00 below).

(b) For cooling hole blockage that is less than or equal to 6 effective blocked cooling holes:

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

ARO ALL PRE SB 777-GE100-72-0348 (Continued)

1) Examine the HPT stage 1 shrouds.

NOTE: Refer to GE90-100 S/B 72-0401 inspection method/limits.

2) Remove the loose debris (i.e. debris that is not stuck) from all CDN cavities (included the combustion chamber) in or less than 50 cycles (Subtask H72-40-01-160-001-H00 below).

(c) After you remove the loose debris or loose material, do a borescope inspection and map the cooling holes blockage.

(d) Calculate the condition of the HPT stage 1 hanger cooling hole blockage.

1) If the cooling hole blockage is greater than 6 effective blocked cooling holes, contact the local GE representative for recommendation and serviceability.

NOTE: Make sure that you provide the data (map of blockage and photos of the cooling holes).

2) If the cooling hole blockage is greater than 4 but less than or equal to 6 effective blocked cooling holes, do the inspections that follow at 150 cycle intervals:

a) Do the steps in the task for the inspection of the HPT stage 1 shroud hanger cavity for blocked cooling holes.

b) Examine the HPT stage 1 shrouds.

NOTE: Refer to GE90-100 S/B 72-0401 inspection method/limits.

3) If the cooling hole blockage is less than or equal to 4 effective blocked cooling holes, do the inspections that follow at 250 cycle intervals:

a) Do the borescope inspection (BSI) steps in the task to do the inspection of the HPT stage 1 shroud hanger cavity for blocked cooling holes.

b) Examine the HPT stage 1 shrouds.

NOTE: Refer to GE90-100 S/B 72-0401 inspection method/limits.

ARO ALL POST SB 777-GE100-72-0348 AND POST SB 777-GE100-72-0363

SUBTASK 72-40-01-200-002-H00

(3) For the engines with these HPT Stage 1 Shrouds; Apply the blocked shroud hanger feeder holes criteria that follows:

(a) For cooling hole blockage that is more than 8 effective blocked cooling holes:

1) Examine the HPT stage 1 shrouds (TASK 72-00-00-290-805-H01).

NOTE: Refer to GE90 SB 72-0528 and GE90 SB 72–0588 for the inspection methods.

2) Remove the loose material from all CDN cavities (including the combustion chamber) in or less than 100 cycles (Subtask H72-40-01-160-001-H00 below).

3) Contact the local GE representative for recommendation and serviceability.

NOTE: Make sure that you provide the data of the HPT stage 1 shroud hanger hole and stage 1 nozzle map along with borescope inspection (BSI) photos of the HPT stage 1 shroud holes and the areas of the unwanted material.

(b) For cooling hole blockage less than or equal to 8 effective blocked cooling holes:

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

ARO ALL POST SB 777-GE100-72-0348 AND POST SB 777-GE100-72-0363 (Continued)

1) Examine the HPT stage 1 shrouds, (High Pressure Turbine Section Stage One Nozzle (Except the Leading Edge) and Stage 1 Shroud Inspection, TASK 72-00-00-290-805-H01).

NOTE: Refer to GE90 SB 72-0528 and GE90 SB 72–0588 for the inspection methods.

2) In or less than 500 cycles, remove loose material from all CDN cavities (including the combustion chamber), (SUBTASK H72-40-01-160-001-H00 below).

3) In or less than 250 cycles, remove loose material, do the steps to do a borescope inspection to calculate the condition of the HPT stage 1 hanger cooling hole blockage.

a) If the cooling hole blockage is more than 8 effective blocked cooling holes, contact the local GE representative again for recommendation and serviceability.

NOTE: Make sure that you provide the data (map of blockage and photos of the cooling holes).

b) If the cooling hole blockage is less than or equal to 8 effective blocked cooling holes, do the borescope inspections that follow one time at the next/scheduled hot section:

<1> Do the borescope inspection (BSI) steps in the task to calculate the condition of the HPT stage 1 hanger cooling hole blockage.

<2> Examine the HPT stage 1 shrouds, (High Pressure Turbine Section Stage One Nozzle (Except the Leading Edge) and Stage 1 Shroud Inspection, TASK 72-00-00-290-805-H01).

NOTE: Refer to GE90 SB 72-0528 and GE90 SB 72–0588 for the inspection methods.

(c) After you remove the loose material, do one more inspection and map the cooling holes blockage.

(d) Calculate the condition of the HPT stage 1 hanger cooling hole blockage.

1) If the cooling hole blockage is more than 8 effective blocked cooling holes, contact the local GE representative again for recommendation and serviceability.

NOTE: Make sure that you provide the data (map of blockage and photos of the cooling holes).

2) If the cooling hole blockage is less than or equal to 8 effective blocked cooling holes, do the borescope inspections that follow one time at the next/scheduled hot section:

a) Do the borescope inspection (BSI) steps in the task to calculate the condition of the HPT stage 1 hanger cooling hole blockage.

b) Examine the HPT stage 1 shrouds (TASK 72-00-00-290-805-H01).

NOTE: Refer to GE90 SB 72-0528 and GE90 SB 72–0588 for the inspection methods.

ARO ALL

SUBTASK 72-40-01-160-001-H00

(4) Do the steps that follow to remove the materials in these areas: stage 1 hanger and nozzles, combustor case, combustion chamber, fuel nozzle/diffuser, and stage 9 OGV leaf.

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

(a) Remove loose material from the stage 1 hanger area and stage 1 nozzles/area as follows:

NOTE: Loose material are pieces that you can move or remove. If you cannot remove a piece of material, consider the material as not loose and accept it as is.

1) Remove borescope plug from HPT stage 1 borescope inspection (BSI) port Q.

2) Put the flexscope into borescope port, and move it aft immediately after you put it in.

NOTE: Do not enter the flexscope into the HPT stage 1 nozzle.

3) Move the flexscope around the cavity area (full 360 degrees around engine) immediately outside of the stage 1 nozzles and remove all loose unwanted material with the applicable extraction tool.

NOTE: Most unwanted material will be at the bottom portions of the cavity/engine.

a) Remove as much as possible all unwanted material with the applicable extraction tool from the HPT stage 1 hanger cooling holes.

NOTE: Document all unwanted materials that you cannot remove on the copy of HPT Stage 1 Shroud Hanger Hole and Stage 1 Nozzle Map. Contact your local GE representative for recommendation and serviceability.

b) Remove as much as possible all loose unwanted materials with the applicable extraction tool that you see in the stage 1 nozzle cavities.

NOTE: Document for future reference all unwanted materials that you cannot remove. Do this on the copy of HPT Stage 1 Shroud Hanger Hole and Nozzle Map. Also, photograph the material as part of the documentation. Contact your local GE representative for recommendation and serviceability.

c) Make sure that you document by photograph all unwanted materials that you find at other places in the cavity and cannot remove.

NOTE: Unwanted materials that cannot be moved from its position with tooling because it is stuck is considered not loose.

(b) Remove loose material from the inside of the combustor case as follows:

1) Remove the borescope plug from the port L, M, N, or P on the combustor case.

NOTE: Remove the plug that is most convenient and that will allow the inspector to easily move as much as possible the flexscope and extraction tooling and remove loose material.

2) Put the flexscope into borescope port, and move it to the side immediately after it goes through the combustor case to keep it out of the combustion chamber.

NOTE: Do not enter the flexscope into the combustion chamber to do this step

3) Move the flexscope around to the bottom 1/3 of the combustor case cavity and do a full inspection of all accessible areas/cavities.

NOTE: Most unwanted material will be at the bottom portions of the cavity/engine.

a) Make sure that you document by photographs for future reference all unwanted materials that you find and cannot remove.

NOTE: Unwanted materials that cannot be moved from its position with tooling because it is stuck is considered not loose.

(c) Remove loose material from the combustion chamber as follows:

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

1) Put the flexscope into the borescope port and enter the combustion chamber.
2) Move the flexscope inside the combustion chamber to do an inspection of the cavity (360 degrees around) and locate and remove all loose material with the applicable extraction tool.
   a) Make sure that you document by photographs for future reference all unwanted materials that you find and cannot remove.
      NOTE: Unwanted materials that cannot be moved from its position with tooling because it is stuck is considered not loose.
   b) Material stuck in the combustion chamber is serviceable if the combustion chamber is serviceable (TASK 72-00-00-290-804-H01).

(d) Remove loose material from inside the fuel nozzle/diffuser area as follows:
1) Remove at least one fuel nozzle to get access to the fuel nozzle/diffuser area/cavities (TASK 73-11-05-000-801-H01).
2) Put the flexscope/extraction tooling through the fuel nozzle port of the combustion case.
3) Move the flexscope around all of the area (full 360 degrees around) to do a full inspection of all accessible cavities.
   NOTE: You can find unwanted materials in many locations of the fuel nozzle/diffuser area. Make sure that you do a thorough inspection.
4) Remove all loose material with the applicable extraction tool.
   a) Make sure that you document by photographs for future reference all unwanted materials that you find and cannot remove.
      NOTE: Unwanted materials that cannot be moved from its position with tooling because it is stuck is considered not loose.
5) Install the fuel nozzle that you removed (TASK 73-11-05-400-801-H01).
   NOTE: Completing the above task will require a post installation check. Do this task:Test No. 21 - High-Power Leak Check, TASK 71-00-00-700-822-H00.

(e) Remove loose material from within the stage 9 OGV leaf seal area as follows:
1) Get access via the ECS ducts.
2) Put the flexscope/extraction tooling through the ECS port.
3) Move the flexscope around all of the area (full 360 degrees around) to do a full inspection of all accessible cavities.
4) Remove all loose material with the applicable extraction tool.
   NOTE: Unwanted material can be found in many locations in this area. The majority of loose material will be at the bottom or 6:00 o'clock area.
   a) Make sure that you document by photographs for future reference all unwanted materials that you find and cannot remove.
      NOTE: Unwanted materials that cannot be moved from its position with tooling because it is stuck is considered not loose.

SUBTASK 72-40-01-200-003-H00

(5) If material had entered downstream in to the bleed system, do this task: HPSOV Removal, TASK 36-11-07-000-808-004 and HPSOV Installation, TASK 36-11-07-400-808-004.

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

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-40-01-410-001-H00

(1) Install the borescope plugs as follows:

(a) Put Acheson GP460 compound, D50043 [C02-058] or pure nickel special compound, D50017 [C02-071] or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the combustor borescope plug threads.

(b) Install the borescope plugs in the combustor ports L, M, N (if the engine is equipped with this port) and P, if it was (they were) removed.

NOTE: Borescope plugs L, M, N (if the engine is equipped with this port) and P are interchangeable.

(c) Install the borescope plug in the HPT port P.

1) Tighten the plugs to 190.0 - 210.0 pound-inches (21.5 - 23.7 Newton-meters).

(d) If you removed the HPT section borescope port Q, put Acheson GP460 compound, D50043 [C02-058] or pure nickel special compound, D50017 [C02-071] or Milk of Magnesia (unflavored) compound, D50003 [C02-061] on the thread.

(e) Install the borescope plug in the HPT port Q.

1) Tighten the plug to 190.0 - 210.0 pound-inches (21.5 - 23.7 Newton-meters).

(f) Make sure that you install all borescope plugs and tighten them to the values specified.

SUBTASK 72-40-01-410-005-H00

(2) Attach the borescope covers to the aft skirt with the bolts.

NOTE: The aft skirt panels are given position numbers in a counterclockwise (CCW) sequence when you look at them from the front of the engine. The right skirt panel is at the 8:00 o'clock position and left skirt panel is at the 5:00 - 6:00 o'clock position. The borescope N cover is at the top of the right skirt panel. The borescope P cover is at the top of the left skirt panel.

(a) Tighten the bolts to 100.0 - 120.0 pound-inches (12.4 - 13.6 Newton-meters).

SUBTASK 72-40-01-410-002-H00

(3) If it is necessary, install the HP duct on the ECS ports (TASK 36-11-01-400-806-004).

SUBTASK 72-40-01-410-003-H00

(4) If it is necessary, install the bleed bias sensor (TASK 73-21-62-400-801-H01).

NOTE: Completing the above task will require a post installation check. Do this task:Test No. 1 - Pneumatic Leak Test, TASK 71-00-00-700-801-H01.

SUBTASK 72-40-01-410-004-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.

(5) 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

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

(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 72-40-01-860-001-H00

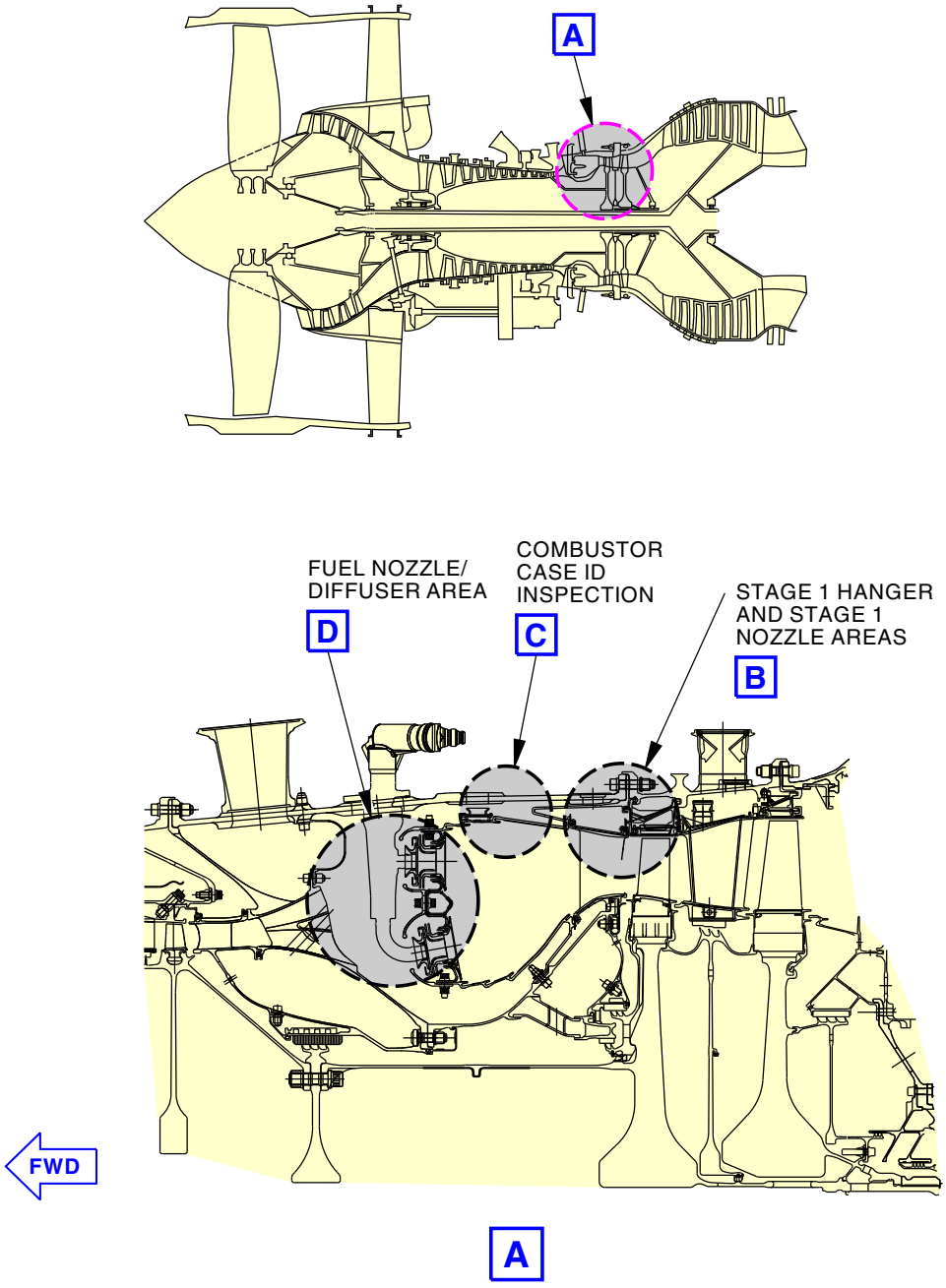
(6) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

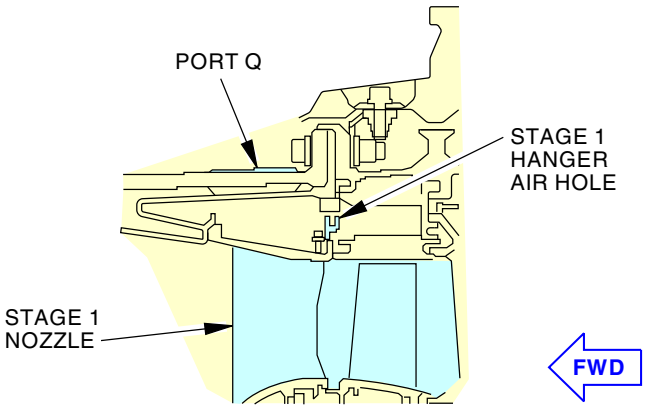
——— END OF TASK ———

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



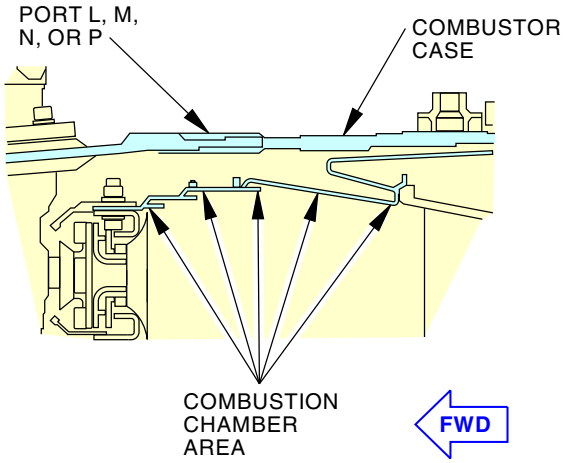
Combustor Diffuser Nozzle Inspection
Figure 601/72-40-01-990-801-H00 (Sheet 1 of 3)

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



STAGE 1 HANGER AND STAGE 1 NOZZLE AREAS

B



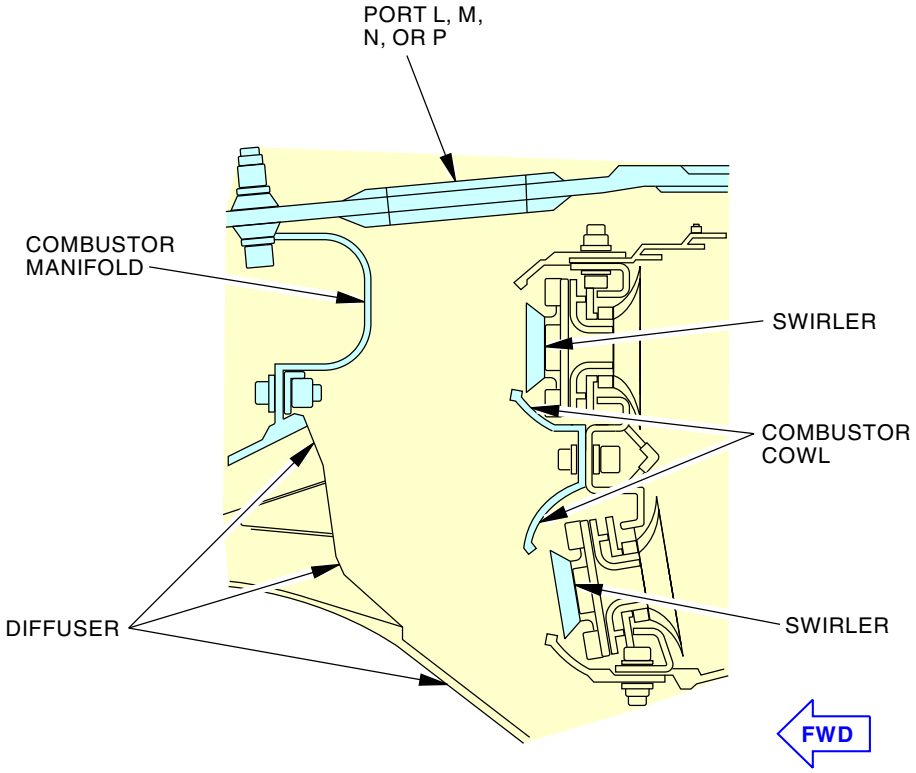
COMBUSTOR CASE ID INSPECTION

C

1364164-00
2178545 S0000480939_V2

Combustor Diffuser Nozzle Inspection
Figure 601/72-40-01-990-801-H00 (Sheet 2 of 3)

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



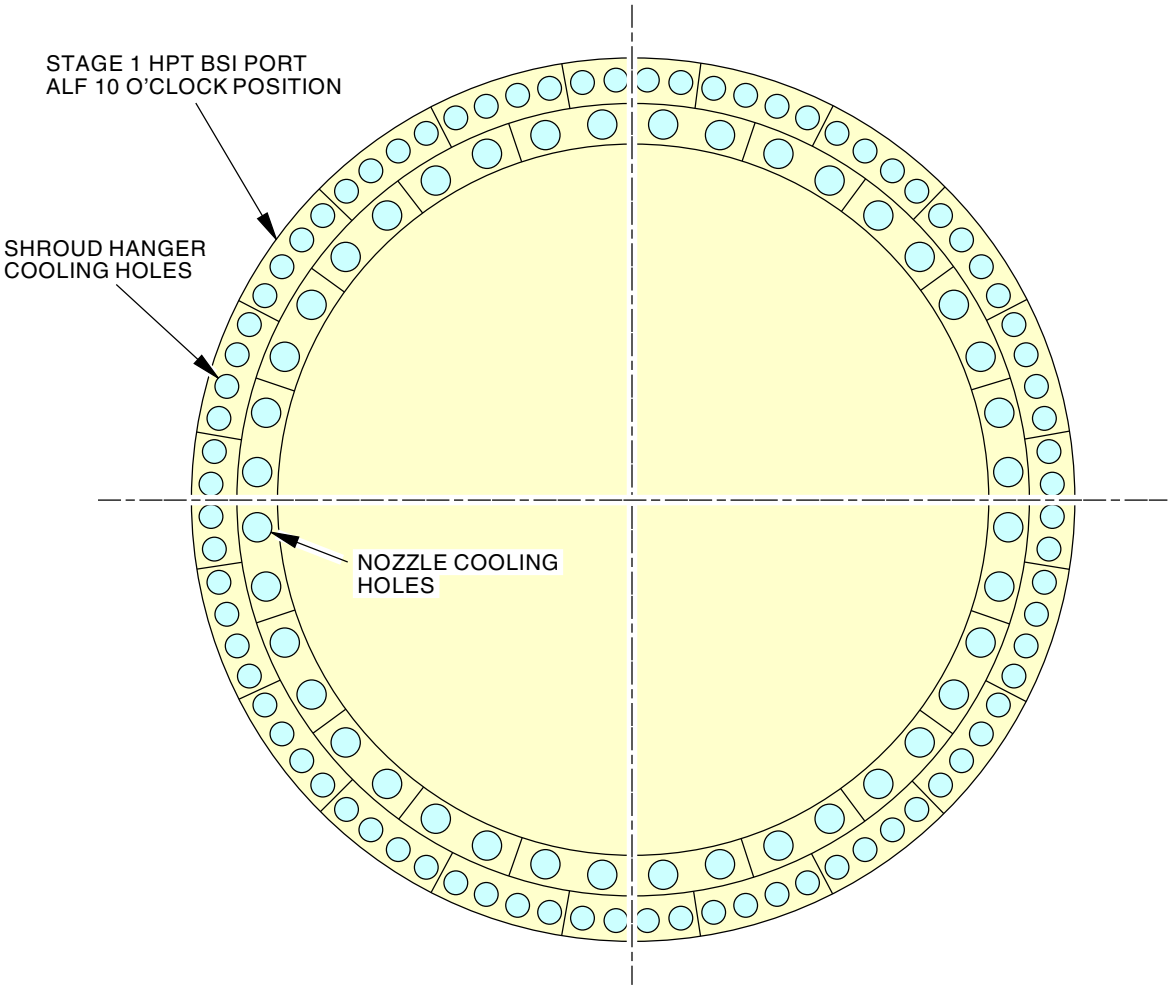
FUEL NOZZLE/DIFFUSER AREA

D

1364165-00
2178557 S0000480971_V2

Combustor Diffuser Nozzle Inspection
Figure 601/72-40-01-990-801-H00 (Sheet 3 of 3)

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



LEGEND:

- CLEAR
- BLOCKED (GREATER THAN 50% OF THE HOLE OPENING)
- PARTIALLY BLOCKED (LESS THAN 50% OF THE HOLE OPENING)

1364166-00
2178560 S0000480972_V2

HPT Stage 1 Shroud Hanger Hole and Nozzle Inspection
Figure 602/72-40-01-990-802-H00

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

COMBUSTION SKIRT PANELS - REMOVAL/INSTALLATION

1. General

A. This procedure has six tasks:

(1) Left combustion skirt panel removal

(2) Left combustion skirt panel Installation

(3) Center combustion skirt panel removal

(4) Center combustion skirt panel Installation

(5) Right combustion skirt panel removal

(6) Right combustion skirt panel Installation.

TASK 72-41-01-000-801-H01

2. Left Combustion Skirt Panel Removal

(Figure 401)

A. General

(1) This task provides the instructions to remove the left combustion skirt panel.

(2) You must open the left and right thrust reversers to get access to the left combustion skirt panel.

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
411	Engine, Left
421	Engine, Right

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 Procedure

SUBTASK 72-41-01-010-001-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

F. Left Combustion Skirt Panel Removal

SUBTASK 72-41-01-020-001-H01

(1) Remove the left combustion skirt panel [1] as follows:

NOTE: When you look from the rear of the engine the left combustion skirt panel is at the 6:30 o'clock engine position.

(a) Remove the rubber gasket [8] on the forward side of the left combustion skirt panel [1]:

1) Remove the ten bolts [7].

(b) Disconnect the support bracket [14] from the support bracket [16] on the aft side of the left combustion skirt panel [1]:

1) Remove the two bolts [13].

(c) Disconnect the IDG tube-hose clamp [6] on the forward side of the center combustion skirt panel [4]:

1) Remove the bolt [5] that attaches the IDG tube-hose clamp [6] to the center combustion skirt panel [4] and the left combustion skirt panel [1].

(d) Remove the four bolts [15] (aft side) that attach the stub bracket [10] to the stub bracket [9].

(e) Remove the stub bracket [10] on the aft side of the left combustion skirt panel [1]:

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

1) Remove the three bolts [11] that attach the stub bracket [10] to the left combustion skirt panel [1] and the starter duct panel.

2) Remove the bolt [12] that attaches the stub bracket [10] to the center combustion skirt panel [4].

a) Remove the stub bracket [10].

(f) Remove the seven bolts [3] that attach the center combustion skirt panel [4] to the left combustion skirt panel [1].

NOTE: Three bolts are on the forward side and the other four bolts are on the aft side.

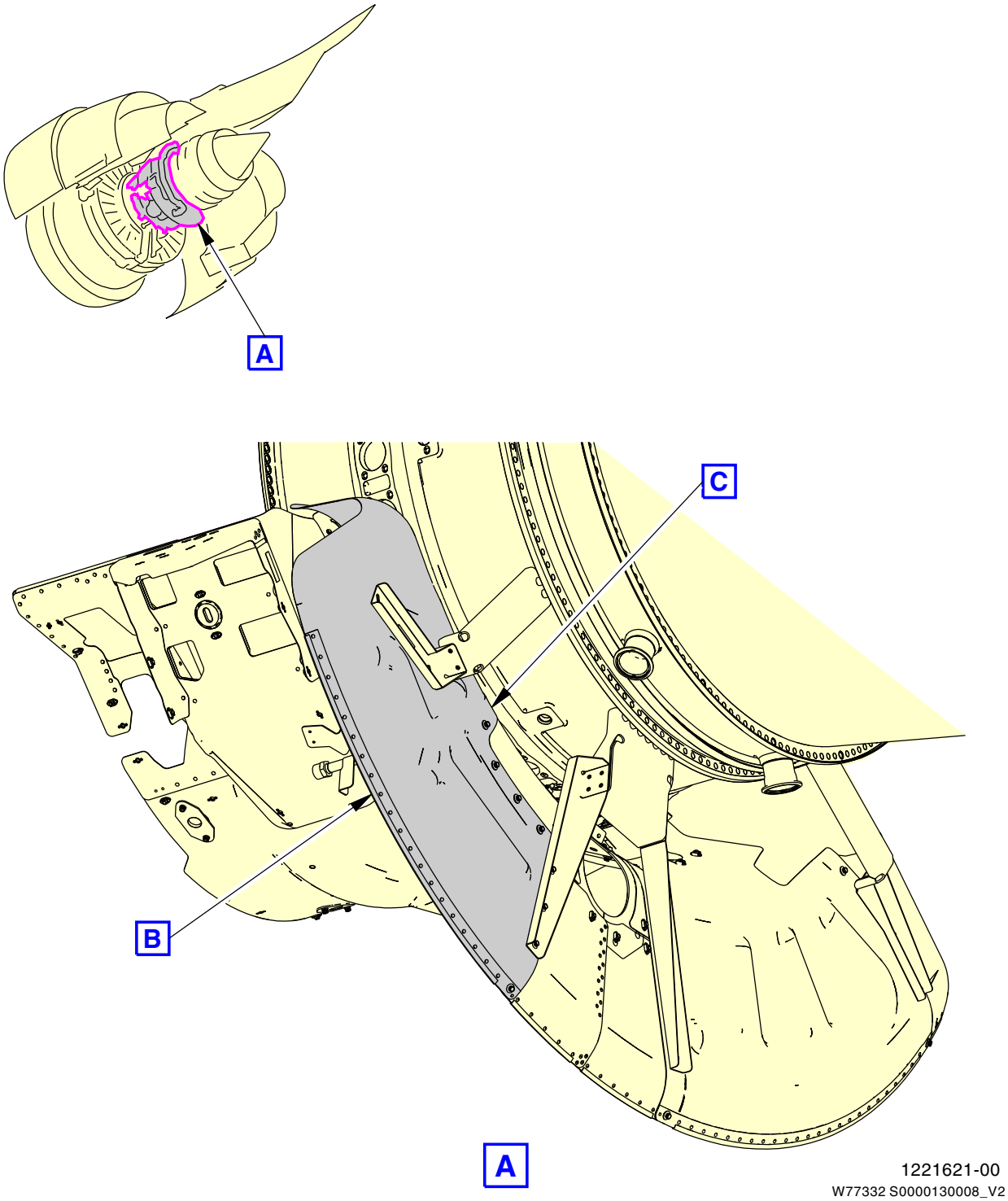
(g) Remove the two bolts [2] that attach the left combustion skirt panel [1] to the heat shield main body.

NOTE: These bolts are on the forward side of the left combustion skirt panel [1].

1) Remove the left combustion skirt panel [1]

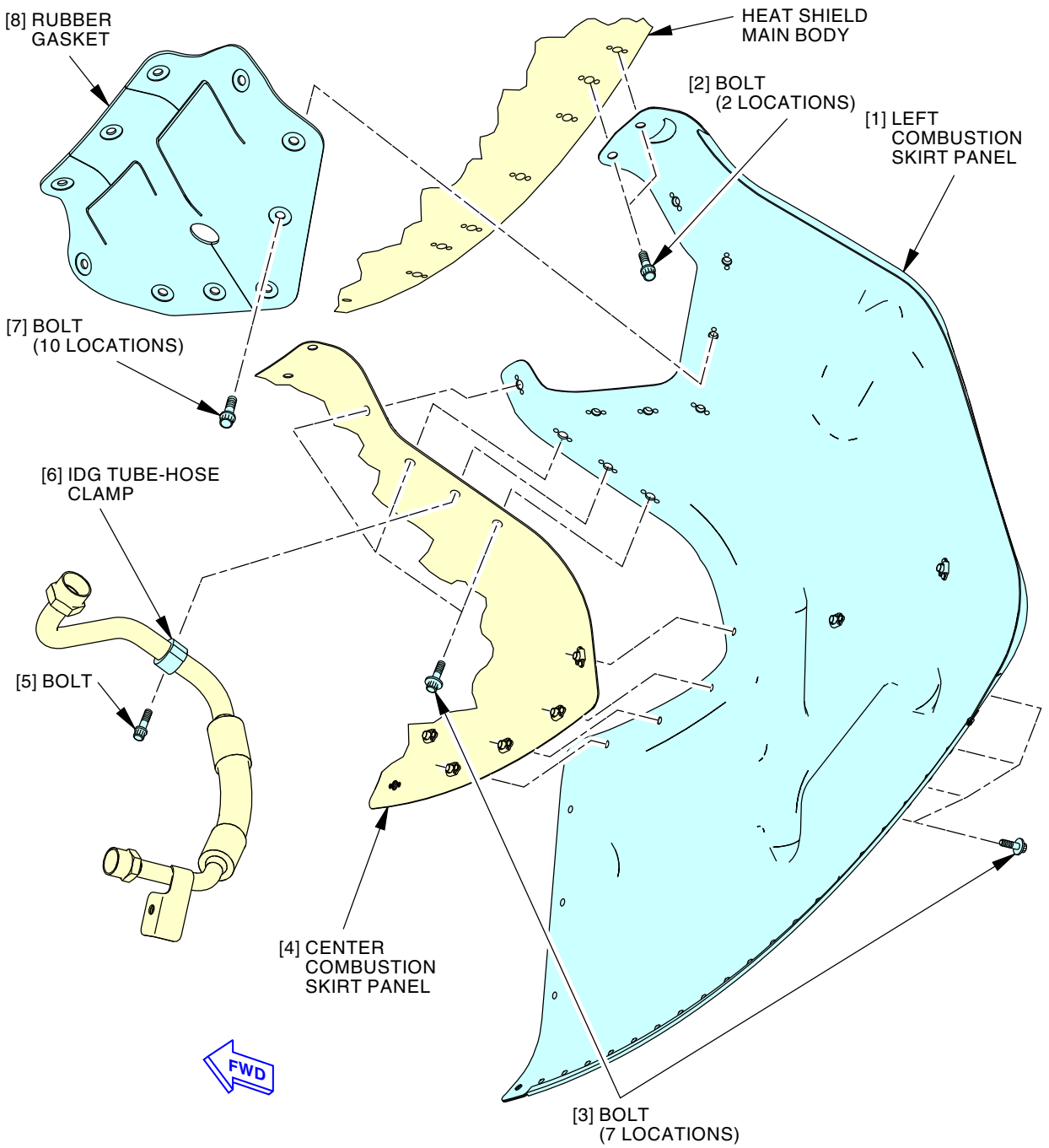
END OF TASK

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



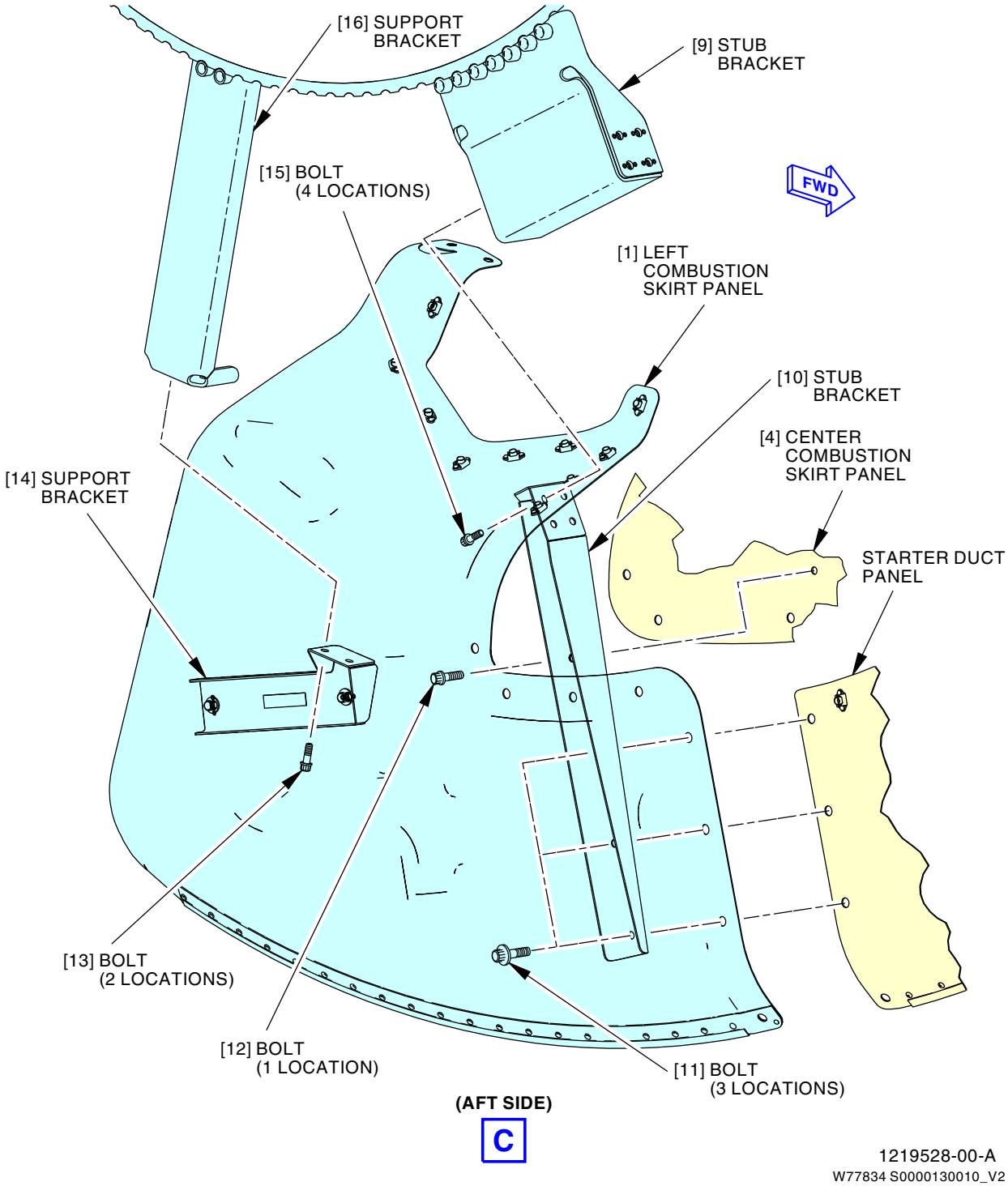
Left Combustion Skirt Panel Installation
Figure 401/72-41-01-990-801-H01 (Sheet 1 of 3)

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



Left Combustion Skirt Panel Installation
Figure 401/72-41-01-990-801-H01 (Sheet 2 of 3)

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



Left Combustion Skirt Panel Installation
Figure 401/72-41-01-990-801-H01 (Sheet 3 of 3)

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

TASK 72-41-01-400-801-H01

3. Left Combustion Skirt Panel Installation

(Figure 401)

A. General

(1) This task provides the installation instructions for the left combustion skirt panel.

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. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Left combustion skirt panel	72-00-51-45-412	ARO ALL

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Left Combustion Skirt Panel Installation

SUBTASK 72-41-01-420-001-H01

(1) Install the left combustion skirt panel [1] as follows:

NOTE: When you look from the rear of the engine the left combustion skirt panel is at the 6:30 o'clock engine position.

(a) Align the left combustion skirt panel [1] with the heat shield main body.

(b) Install the two bolts [2] that attach the left combustion skirt panel [1] to the heat shield main body.

1) Hand tighten the bolts [2].

(c) Install the seven bolts [3] that attach the center combustion skirt panel [4] to the left combustion skirt panel [1].

NOTE: Three bolts are on the forward side and the other four bolts are on the aft side.

NOTE: Make sure you do not install the bolt [5] that attaches the IDG tube hose [6] or the bolts [11] that attach the stub bracket [10] yet.

1) Hand tighten the bolts [3].

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

(d) Install the stub bracket [10] on the aft side of the left combustion skirt panel [1].

1) Align the stub bracket [10] with the left combustion skirt panel [1].

a) Install the three bolts [11] that attach the stub bracket [10] to the left combustion skirt panel [1] and the starter duct panel.

2) Install the bolt [12] that attaches the stub bracket [10] to the center combustion skirt panel [4].

3) Hand tighten the bolts [11] and the bolt [12].

(e) Connect the IDG tube-hose clamp [6] on the forward side of the center combustion skirt panel [4].

1) Install the bolt [5] that attaches the IDG tube-hose clamp [6] to the center combustion skirt panel [4] and the left combustion skirt panel [1].

2) Hand tighten the bolt [5].

(f) Tighten the bolts [2], the bolts [3], the bolts [11], the bolt [5] and the bolt [12] to 110-120 pound inches (12.4-13.6 Newton-meters).

(g) Connect the support bracket [14] from the support bracket [16] on the aft side of the left combustion skirt panel [1] with the two bolts [13]:

1) Tighten the two bolts [13] to 110-120 pound-inches (12.4-13.6 Newton-meters).

(h) Install the rubber gasket [8] on the forward side of the left combustion skirt panel [1] with the ten bolts [7]:

1) Tighten the ten bolts [7] to 110-120 pound-inches (12.4-13.6 Newton-meters).

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-41-01-410-001-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

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 ———

TASK 72-41-01-000-802-H01

4. Center Combustion Skirt Panel Removal

(Figure 402)

A. General

(1) this task provides the instructions to remove the center combustion skirt panel.

(2) You must open the right and left thrust reverser to get access to remove the center combustion skirt panel.

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
411	Engine, Left
421	Engine, Right

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 Center Skirt Panel Removal

SUBTASK 72-41-01-010-002-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.

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

F. Center Combustor Skirt Panel Removal

SUBTASK 72-41-01-020-002-H01

(1) Remove the center combustion skirt panel [4] as follows :

NOTE: When you look from the rear of the engine the center combustion skirt panel is at the 5:00 o'clock engine position.

(a) Remove the rubber gasket [28] on the forward side of the center combustion skirt panel [4]:

1) Remove the four bolts [26].

(b) Remove the rubber gasket [25] on the forward side of the center combustion skirt panel [4]]:

1) Remove the seven bolts [24].

(c) Remove the rubber gasket [22] on the forward side of the center combustion skirt panel [4]:

1) Remove the nine bolts [23].

(d) Remove bolt [12] that attaches stub bracket [10] to the center combustion skirt panel [4] (aft side).

(e) Remove one bolt [30] that attaches stub bracket [29] to the center combustion skirt panel [4] (aft side).

(f) Disconnect the IDG tube-hose clamp [6] on the forward side of the center combustion skirt panel [4]:

1) Remove the bolt [5] that attaches the IDG tube-hose clamp [6] to the center combustion skirt panel [4] and the left combustion skirt panel [1].

(g) Remove the four bolts [3] (forward side) that attach the center combustion skirt panel [4] to the left combustion skirt panel [1] and right combustion skirt panel [21].

NOTE: On the forward side, three bolts [3] install the center combustion skirt panel [4] to the left combustion skirt panel [1] and one bolt [3] installs the center combustion skirt panel [4] to the right combustion skirt panel [21].

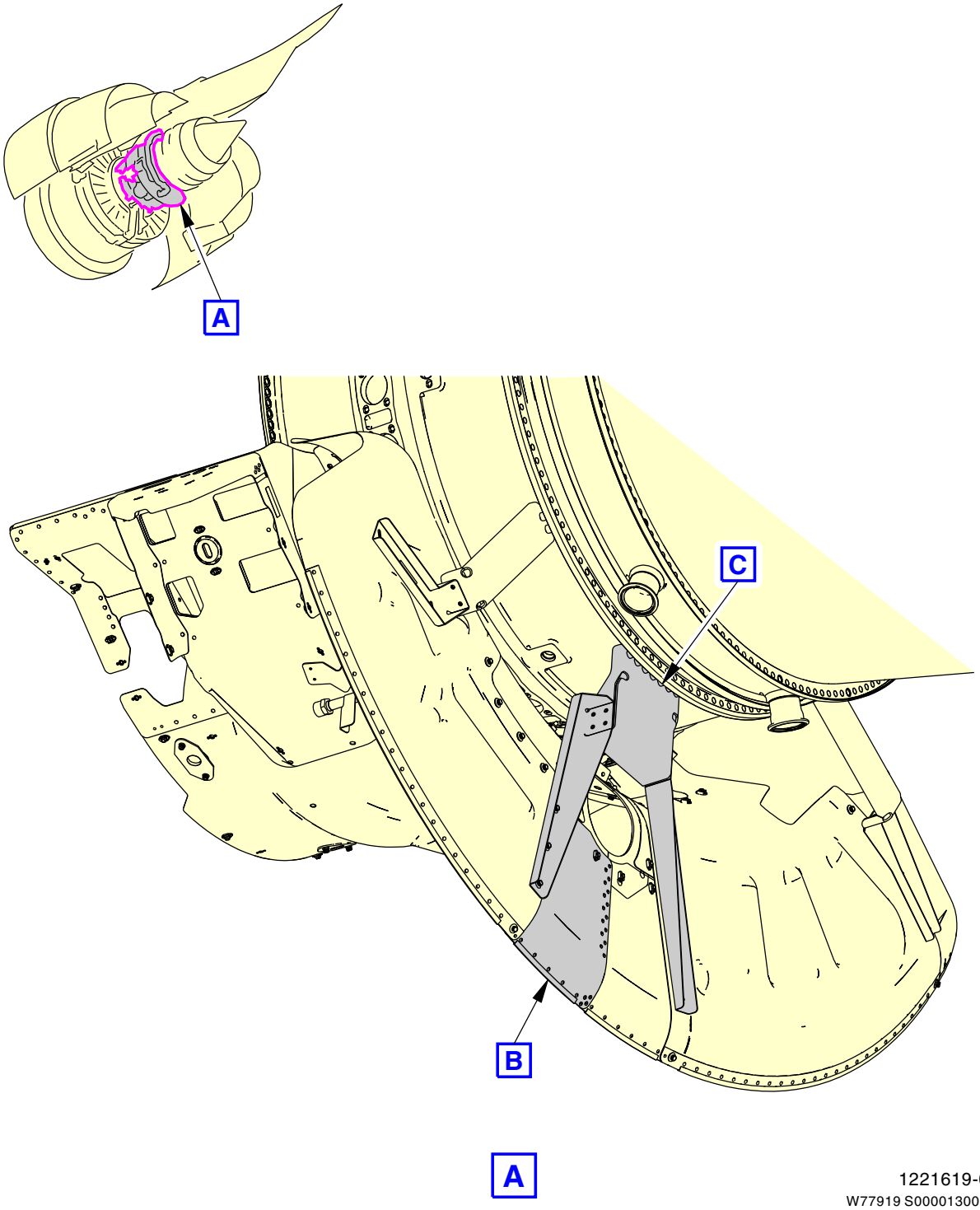
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(h) Remove the four bolts [3] (aft side) that attach the left combustion skirt panel [1] to the center combustion skirt panel [4].

(i) Remove the five bolts [27] (forward side) that attach the heat shield main body to the center combustion skirt panel [4] and remove the center combustion skirt panel [4].

——— END OF TASK ———

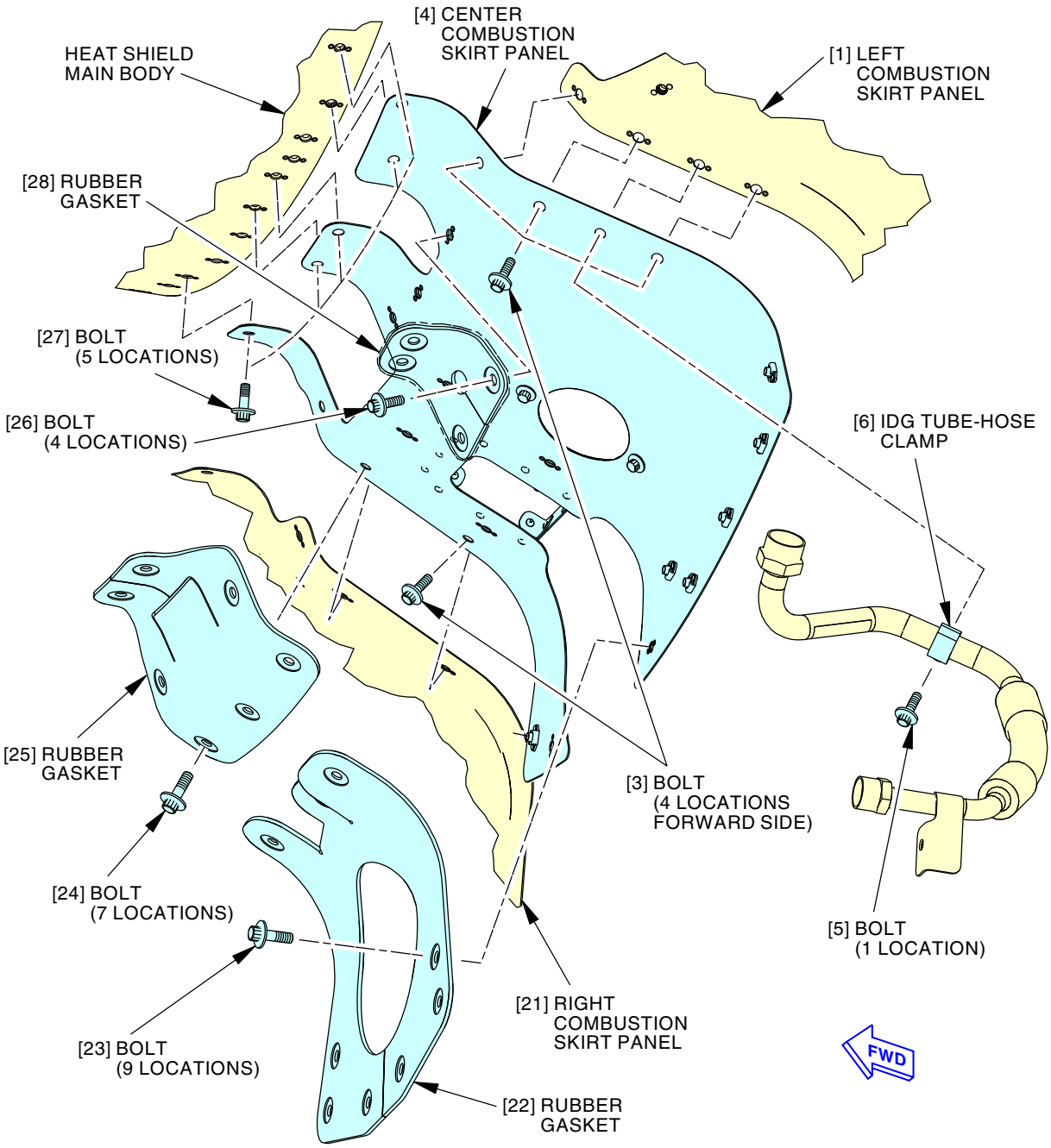
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1221619-00-A
W77919 S0000130012_V2

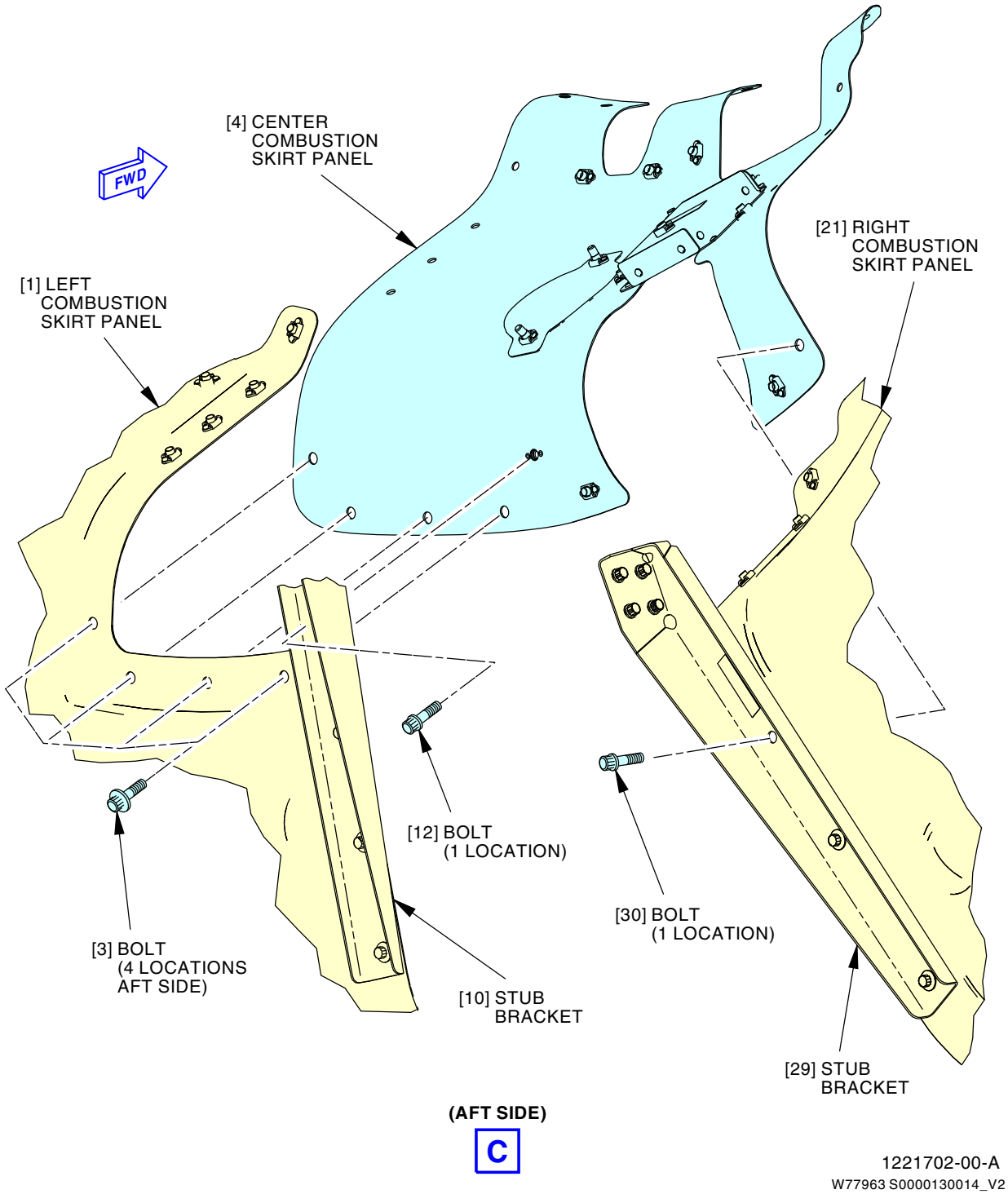
Center Combustion Skirt Panel Installation
Figure 402/72-41-01-990-802-H01 (Sheet 1 of 3)

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



Center Combustion Skirt Panel Installation
Figure 402/72-41-01-990-802-H01 (Sheet 2 of 3)

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



Center Combustion Skirt Panel Installation
Figure 402/72-41-01-990-802-H01 (Sheet 3 of 3)

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

TASK 72-41-01-400-802-H01

5. Center Combustion Skirt Panel Installation

(Figure 402)

A. General

(1) This task provides the instructions to install the center combustion skirt panel.

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. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
4	Center combustion skirt panel	72-00-51-45-418	ARO ALL

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Center Combustion Skirt Panel Installation

SUBTASK 72-41-01-420-002-H01

(1) Install the center combustion skirt panel [4] as follows:

NOTE: When you look from the rear of the engine the center combustion skirt panel is at the 5:00 o'clock engine position.

(a) Align the center combustion skirt panel [4] with the heat shield main body

(b) Install the five bolts [27] (forward side) that attach the heat shield main body to the center combustion skirt panel [4].

1) Hand tighten the bolts [27].

(c) Install the four bolts [3] (aft side) that attach the left combustion skirt panel [1] to the center combustion skirt panel [4].

1) Hand tighten the bolts [3].

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

(d) Install the four bolts [3] (forward side) that attach the center combustion skirt panel [4] to the left combustion skirt panel [1] and right combustion skirt panel [21].

NOTE: On the forward side, three bolts [3] install the center combustion skirt panel [4] to the left combustion skirt panel [1] and one bolt [3] installs the center combustion skirt panel [4] to the right combustion skirt panel [21].

NOTE: Make sure you do not install bolt [5] that attaches the IDG tube hose [6] yet.

1) Hand tighten the bolts [3].

(e) Connect the IDG tube-hose clamp [6] on the forward side of the center combustion skirt panel [4]:

1) Install the bolt [5] that attaches the IDG tube-hose clamp [6] to the center combustion skirt panel [4] and the left combustion skirt panel [1].

2) Hand tighten the bolt [5].

(f) Install the bolt [30] that attaches stub bracket [29] to the center combustion skirt panel [4] (aft side).

1) Hand tighten the bolt [30].

(g) Install the bolt [12] that attaches stub bracket [10] to the center combustion skirt panel [4] (aft side).

1) Hand tighten the bolt [12].

(h) Tighten the bolts [27], the bolts [3], the bolt [5], the bolt [12] and the bolt [30] to 110-120 pound-inches (12.4-13.6 Newton-meters).

(i) Install the rubber gasket [22] on the forward side of the center combustion skirt panel [4] with the nine bolts [23]:

1) Tighten the bolts [23] to 110-120 pound-inches (12.4-13.6 Newton-meters).

(j) Install the rubber gasket [25] on the forward side of the center combustion skirt panel [4] with the bolts [24]:

1) Tighten the bolts [24] to 110-120 pound-inches (12.4-13.6 Newton-meters).

(k) Install the rubber gasket [28] on the forward side of the center combustion skirt panel [4] with the four bolts [26]:

1) Tighten the bolts [26] to 110-120 pound-inches (12.4-13.6 Newton-meters).

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-41-01-410-002-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.

(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

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

(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 72-41-01-000-803-H01

6. Right Combustion Skirt Panel Removal

(Figure 403)

A. General

(1) This task provides the instructions to remove the right combustion skirt panel.

(2) You must open the right and left thrust reverser to get access to remove the right combustion skirt panel.

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
411	Engine, Left
421	Engine, Right

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

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

E. Prepare for the right combustion skirt panel removal

SUBTASK 72-41-01-010-003-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

F. Right Combustion Skirt Panel Removal

SUBTASK 72-41-01-020-003-H01

(1) Remove the right combustion skirt panel [21] as follows:

NOTE: When you look from the rear of the engine the right combustion skirt panel is at the 4:00 o'clock position.

(a) Remove the rubber gasket [43] on the forward side of the right combustion skirt panel [21].

1) Remove the eight bolts [44].

(b) Disconnect the support bracket [47] from the support bracket [45] on the aft side of the right combustion skirt panel [21]:

1) Remove the two bolts [46].

(c) Remove the four bolts [48] that attach the stub bracket [29] to the stub bracket [9] on the aft side of the right combustion skirt panel [21].

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

1) Remove the stub bracket [29] on the aft side of the right combustion skirt panel [21].
   a) Remove the three bolts [30] that attach the stub bracket [29] to the starter duct panel and the right combustion skirt panel [21].
   b) Remove the stub bracket [29].

(d) Remove the four bolts [42] that attach the right combustion skirt panel [21] to the center combustion skirt panel [4].

NOTE: Three bolts are on the forward side and the other bolt is on the aft side.

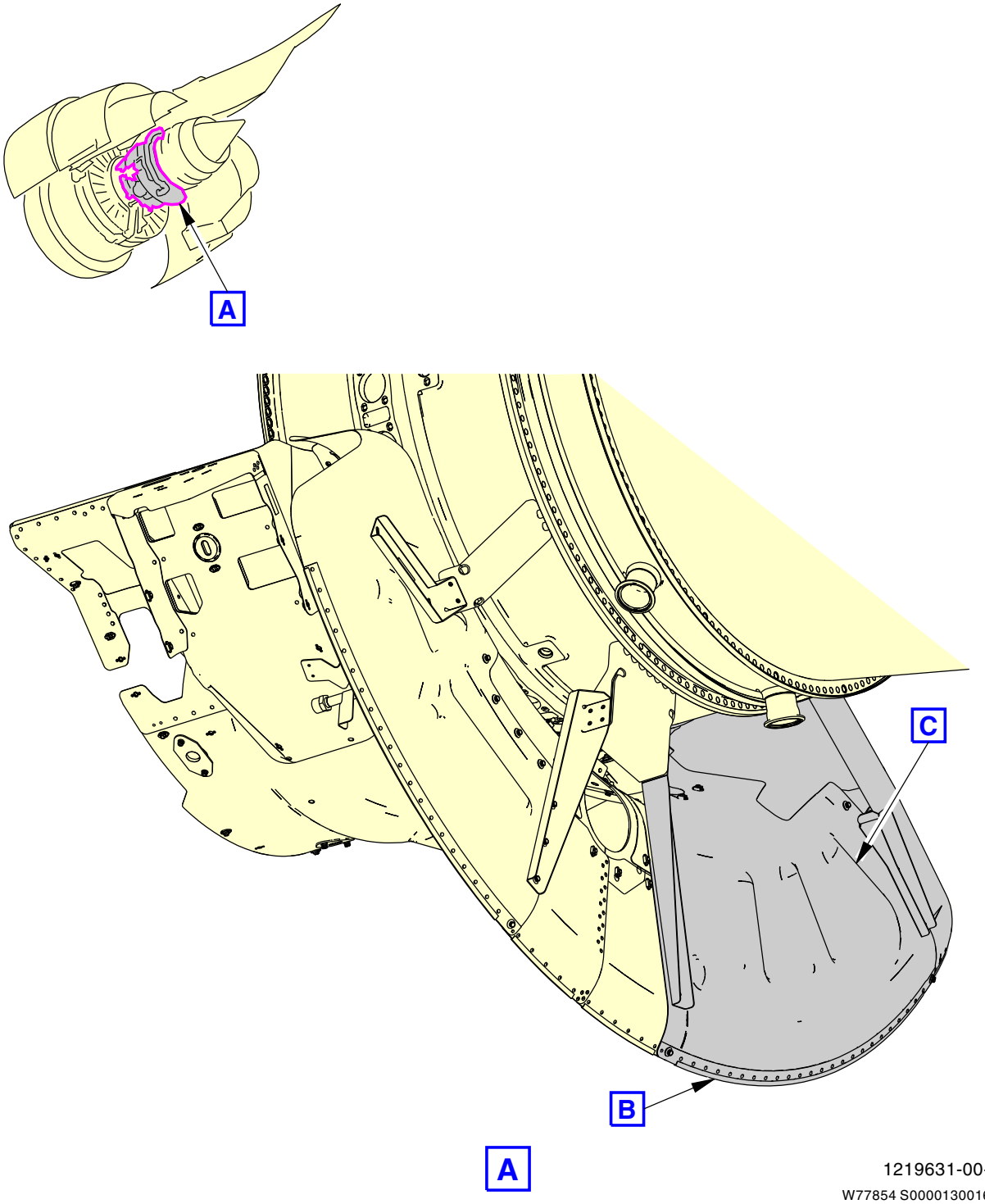
(e) Remove the five bolts [41] that attach the right combustion skirt panel [21] to the heat shield main body.

NOTE: These bolts are on the forward side of the right combustion skirt panel [21].

1) Remove the right combustion skirt panel [21].

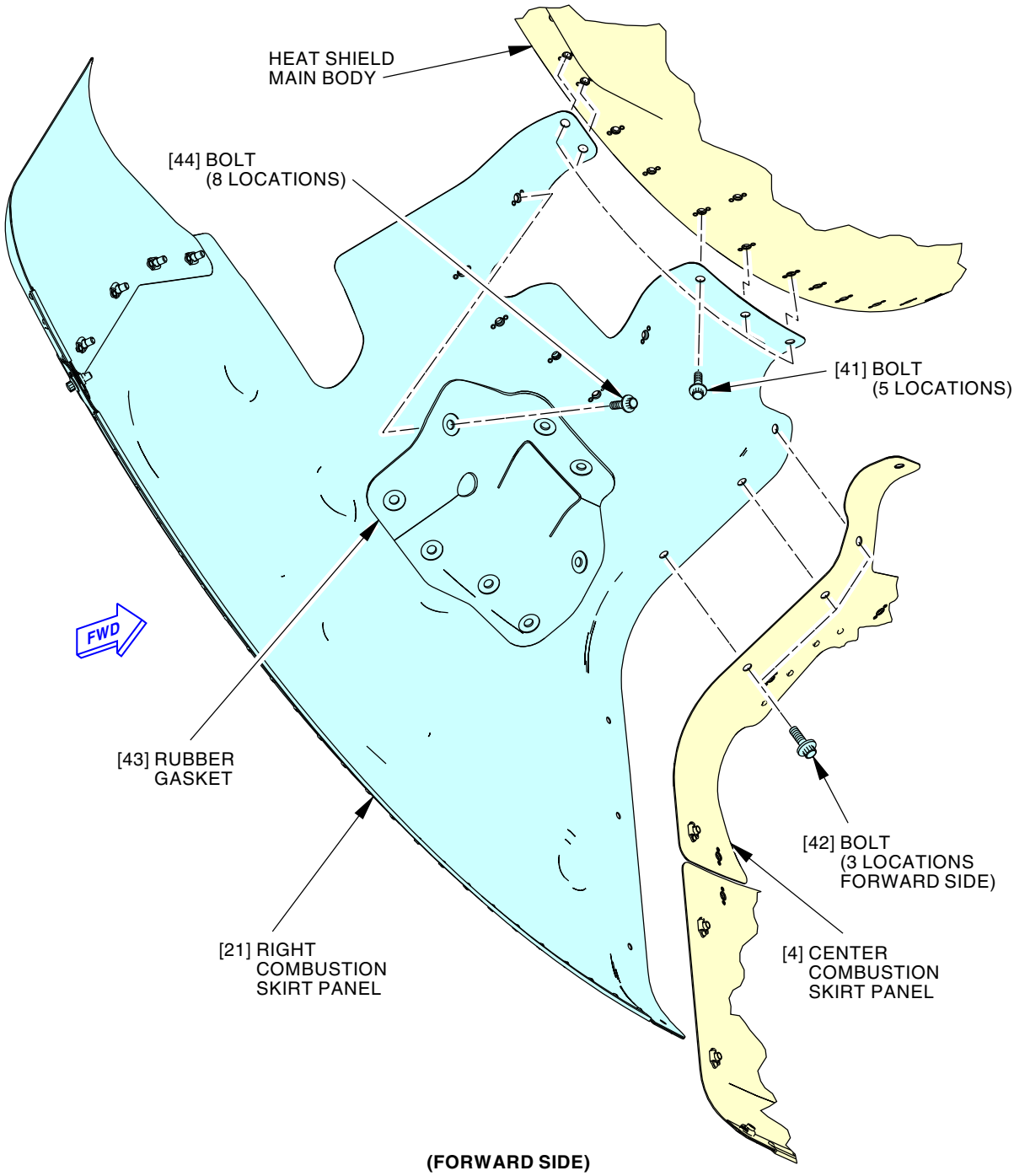
——— END OF TASK ———

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



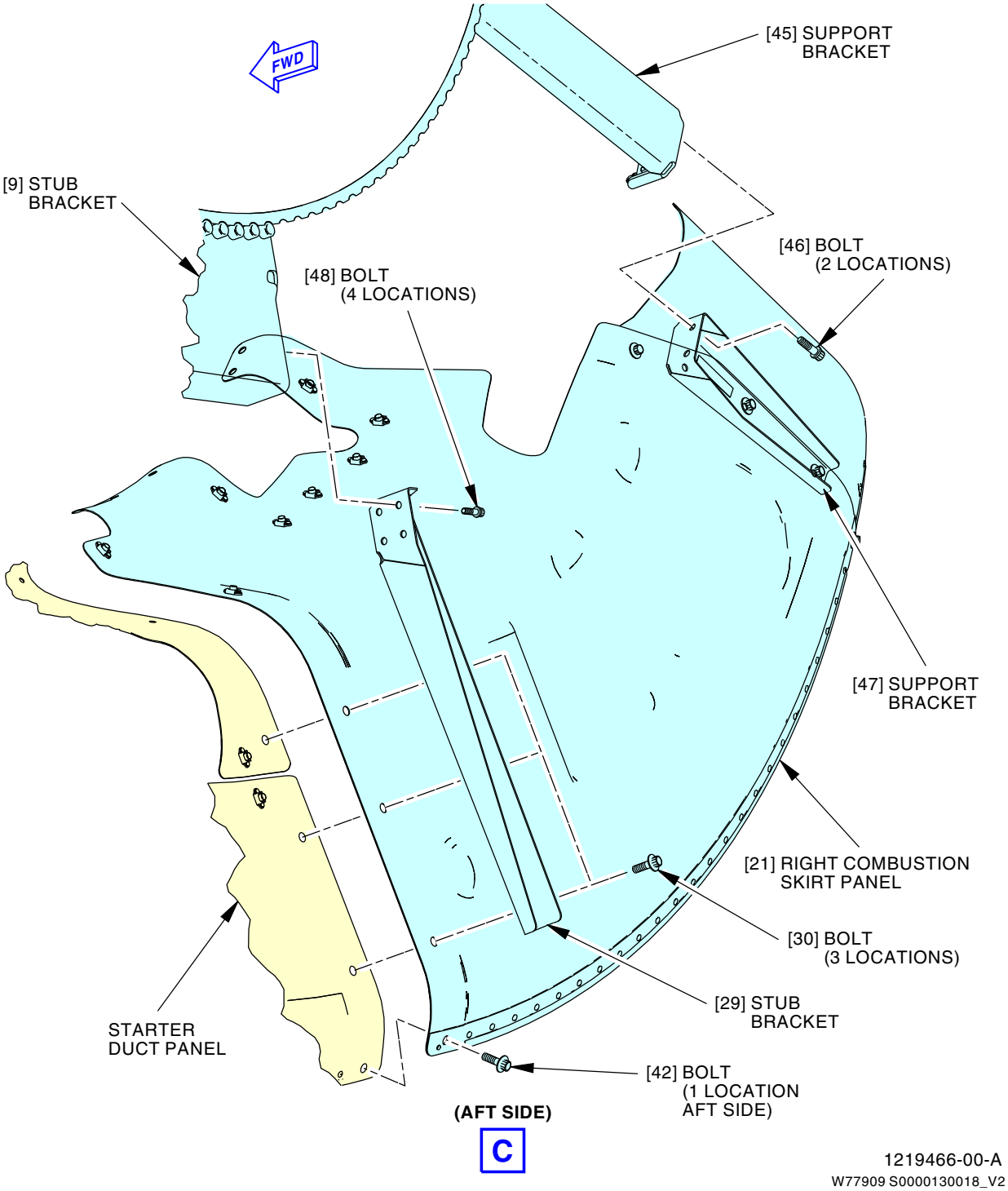
Right Combustion Skirt Panel Installation
Figure 403/72-41-01-990-803-H01 (Sheet 1 of 3)

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



Right Combustion Skirt Panel Installation
Figure 403/72-41-01-990-803-H01 (Sheet 2 of 3)

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



Right Combustion Skirt Panel Installation
Figure 403/72-41-01-990-803-H01 (Sheet 3 of 3)

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

TASK 72-41-01-400-803-H01

7. Right Combustion Skirt Panel Installation

(Figure 403)

A. General

(1) This task provides the instructions to install the right combustion skirt panel.

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. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
21	Right combustion skirt panel	72-00-51-45-432	ARO ALL

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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. Right Combustion Skirt Panel Installation

SUBTASK 72-41-01-420-003-H01

(1) Install the right combustion skirt panel [21] as follows:

NOTE: When you look from the rear of the engine the right combustion skirt panel is at the 4:00 o'clock engine position.

(a) Align the right combustion skirt panel [21] with the heat shield main body.

(b) Install the five bolts [41] that attach the right combustion skirt panel [21] with the heat shield main body.

1) Hand tighten the bolts [41].

(c) Install the four bolts [42] that attach the right combustion skirt panel [21] to the center combustion skirt panel [4].

NOTE: Three bolts are on the forward side and the other bolt is on the aft side.

NOTE: Do not install the three bolts [30] yet.

1) Hand tighten the bolts [42].

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

(d) Install the stub bracket [29] on the aft side of the right combustion skirt panel [21]:

1) Install the three bolts [30] that attach the stub bracket [29] to the starter duct panel and the center combustion skirt panel [4].

2) Install the four bolts [48] that attach the stub bracket [29] to the stub bracket [9] on the aft side of the right combustion skirt panel [21].

3) Hand tighten the bolts [30] and the bolts [48].

(e) Connect the support bracket [47] to the support bracket [45] on the aft side of the right combustion skirt panel [21] with the two bolts [46].

1) Hand tighten the bolts [46].

(f) Tighten the bolts [41], the bolts [42], the bolts [30], the bolts [48] and the bolts [46] to 110-120 pound-inches (12.4-13.6 Newton-meters).

(g) Install the rubber gasket [43] on the forward side of the right combustion skirt panel [21] with the eight bolts [44]:

1) Tighten the bolts [44] to 110-120 pound-inches (12.4-13.6 Newton-meters).

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-41-01-410-003-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.

(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

TURBINE SECTION - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has three tasks:

(1) An inspection of the turbine section

(2) An inspection of the turbine rear frame and aft engine mount lugs

(3) An inspection of the aft turbine rear frame cavity.

(4) These inspections are limited to external areas of the turbine section.

TASK 72-50-00-200-801-H01

2. Turbine Section Inspection

A. General

(1) This task is the inspection procedure for the turbine section.

(2) To examine the turbine section, you must do these steps:

(a) Do the deactivation of the thrust reverser and the LE slats.

(b) Open the fan cowl panels and thrust reversers.

(c) Examine the High Pressure Turbine (HPT) case for damage.

(d) Examine the Turbine Center Frame (TCF) for damage.

(e) Examine the Low Pressure Turbine (LPT) case for damage.

(f) Examine the Turbine Rear Frame (TRF) for damage.

(g) Close the fan cowl panels and the thrust reversers.

(h) Do the activation of the thrust reverser and the LE slats.

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)
70-11-06-230-801-H01	Fluorescent Penetrant Inspection (P/B 201)
71-00-02-000-811-H00	Power Plant Removal (P/B 401)
71-00-02-400-811-H00	Power Plant 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)
72-50-01-300-801-H01	Turbine Rear Frame Repair (P/B 801)
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
411	Engine, Left

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

(Continued)

Zone	Area
421	Engine, Right

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 Inspection

SUBTASK 72-50-00-010-003-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.

(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. Turbine Section Inspection

SUBTASK 72-50-00-020-001-H01

(1) Replace the engine for all damage that is more than the limits unless you are given other instructions. These are the tasks: Power Plant Removal, TASK 71-00-02-000-811-H00 and Power Plant Installation, TASK 71-00-02-400-811-H00.

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

SUBTASK 72-50-00-230-001-H01

(2) If you find a possible crack in the turbine section, use spot fluorescent penetrant inspection to make sure it is a crack (TASK 70-11-06-230-801-H01).

SUBTASK 72-50-00-220-001-H01

(3) Examine the HPT case:

(a) Cracks that go from the bolt hole to the edge of the forward flange

1) No cracks are permitted.

(b) Cracks that go from the bolt hole to the edge of the aft flange

1) No cracks are permitted.

(c) Nicks, scores, and scratches in the flanges

1) Remove the high metal.

2) Damage is permitted after high metal removal if the depth is less than 0.01 inch (0.25 mm).

3) The damage must not go into or below the bolt head.

(d) Bulges and dents in the forward or aft flanges

1) Bulges and dents in the forward or aft flanges are not permitted.

(e) Cracks in the HPT case

1) Cracks in the HPT case are not permitted.

(f) Nicks or scratches in the HPT case

1) Remove the high metal.

2) Damage is permitted after high metal removal when the depth is less than 0.01 inch (0.25 mm).

(g) Dents in the case

1) Dents with a smooth contour to 0.125 inch (3.18 mm) in depth are permitted.

(h) Cracks in the cooling air ports

1) Cracks in the cooling air ports are not permitted.

SUBTASK 72-50-00-220-002-H01

(4) Examine the TCF:

(a) Cracks in the flange bolt holes are permitted with these conditions:

1) There is no more than one crack for each hole that goes radially out.

2) There is a minimum separation of four holes between a bolt hole with a radial crack in it.

3) The cracks extend from the edge of a bolt hole out to the edge of the flange.

(b) Transverse cracks that are not more than 0.25 inch (6.35 mm) long are permitted if:

1) There is no less than 0.5 inch (12.7 mm) minimum separation between cracks.

2) They do not go into the flange or casing structure metal.

(c) Cracks in the casing structure (other than the flange bolt holes or the welds) are permitted if:

1) The cracks are not more than 0.06 inch (1.50 mm) long with a 0.5 inch (12.7 mm) minimum separation.

(d) Nicks and gouges are permitted with these conditions:

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

1) They are not more than 1.0 inch (25.4 mm) long.
2) They are not more than 0.04 inch (1.02 mm) in depth.
3) The parent metal is not reduced to less than 75 percent of the original thickness.
4) There is no less than 1.0 inch (25.4 mm) separation between the nicks an gouges.

(e) Dents

1) Dents with a smooth contour that are not more than 0.25 inch (6.35 mm) in depth are permitted.

(f) Loose or missing rivets:

1) Any amount of loose or missing rivets is permitted.
2) No cracks in rivet holes permitted.

SUBTASK 72-50-00-210-001-H01

(5) Examine the LPT/TCF for broken or missing attachment bolts.

(a) No broken or missing attachment bolts are permitted.

SUBTASK 72-50-00-220-003-H01

(6) Examine the LPT case:

(a) Cracks that extend between flange bolt holes

1) Cracks that extend between flange bolt holes are not permitted.

(b) Cracks that extend from the bolt holes out to the edge of the flange

1) Only two cracks are permitted on the flange bolt holes and they cannot be in adjacent holes.

(c) Cracks in other areas of the flange

1) Cracks in other areas of the flange are not permitted.

(d) Nicks, scores, and scratches are permitted with these conditions:

1) They are not more than 0.5 inch (12.7 mm) long.
2) They are not more than 0.01 inch (0.25 mm) in depth after the removal of high metal.
3) There is no less than 1.0 inch (25.4 mm) separation between the nicks, scores, and scratches.

(e) Cracks in the casing structure

1) Cracks in the casing structure are not permitted.

(f) Cracks in the boss pads of the casing body

1) Only five cracks are permitted if they are not more than 1.0 inch (25.4 mm) long.

(g) Nicks and scratches in the casing structure

1) Nicks and scratches that are not more than 0.01 inch (0.25 mm) in depth after removal of high metal are permitted.

(h) Dents in the casing structure

1) Dents with a smooth contour that are not more than 0.125 inch (3.180 mm) in depth are permitted.

SUBTASK 72-50-00-220-004-H01

(7) Examine the TRF:

(a) Cracks at flange bolt holes

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

1) Only one for each hole is radially out with a minimum separation of four holes.
2) There is a minimum separation of four bolt holes between a bolt hole with a radial crack in it.
3) Cracks can extend from edge of the bolt hole to edge of the flange.

(b) Cracks in the TRF struts or hub (other than flange bolt holes or welds)

1) Cracks that are not more than 0.06 inch (1.50 mm) long with 0.5 inch (12.7 mm) minimum separation are permitted.

(c) Cracks next to the ground handling mounts

1) Cracks next to the ground handling mounts are not permitted.

(d) Cracks next to the ground handling mounts and struts 1, 2, 3, 13, and 14

NOTE: Strut number 1 is at top center, under the center mount lug. The struts are numbered 1 through 14 in a clockwise direction, as viewed from aft of the TRF, looking forward.

1) Cracks next to the ground handling mounts and struts 1, 2, 3, 13, and 14 are not permitted.

(e) Nicks and scores are permitted with these conditions:

1) They are not more than 1.0 inch (25.4 mm) long.
2) They are not more than up to 0.04 inch (1.02 mm) in depth.
3) The parent metal is not reduced to less than 75 percent of the original thickness.
4) There is no less than 1.0 inch (25.4 mm) separation between the nicks scores.

(f) Dents

1) Dents with smooth contour that are not more than 0.25 inch (6.35 mm) in depth are permitted.

(g) Cracks in the TRF outer surfaces, from the 2:00 to 10:00 o'clock position (struts 4 thru 12 but not the engine mount area)

1) Cracks that are less than 6.0 inches (152.4 mm) in length are permitted.
2) Cracks that are more than 2.0 inches (50.8 mm) from a flange are permitted.
3) Cracks that are 0.75-2.0 inches (19.1-50.8 mm) from a flange and not parallel to the flange are permitted as follows:
   a) The crack has apparently increased in length in the direction of an adjacent flange.
   b) It is very possible the crack will continue to go in the direction of the adjacent flange.
   c) Examine the crack for a stop-drill repair. If the crack has been previously repaired, it can not be repaired again by this procedure but you can permit the crack length to continue to increase in length to the limits as shown in the above. If this is the first time the crack has been seen, you must stop drill the ends of the crack (TASK 72-50-01-300-801-H01).
4) Cracks that are 0.75-2.0 inch (19.1-50.8 mm) from the flange and parallel to the flange are permitted as follows:
   a) The crack has apparently increased in length in a direction that is parallel to an adjacent flange.

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

b) It is very possible the crack will continue to go in the direction that is parallel to a flange.

c) Cracks that are less than 0.75 inches (19.10 mm) from a flange are not permitted.

5) Cracks that are more than 6.0 inches (152.4 mm) in length are permitted as follows:

a) Each cracks is not more than 16.0 inches (406.4 mm) in length.

b) Cracks are adjacent to only two struts maximum.

c) Cracks are not more than 0.05 inch (1.30 mm) in width.

d) If the open width of the crack is more than 0.01 inch (0.30 mm), the total length of all open cracks can not be more than 12.0 inches (304.8 mm).

e) Examine the crack for a stop-drill repair. If the crack has been previously repaired, it can not be repaired again by this procedure but you can permit the crack length to continue to increase in length to the limits as shown in the above. If this is the first time the crack has been seen, you must stop drill the ends of the crack (TASK 72-50-01-300-801-H01).

SUBTASK 72-50-00-410-003-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.

(8) 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

TASK 72-50-00-220-801-H01

3. Turbine Rear Frame (TRF) Aft Engine Mount Lugs (Scheduled Maintenance Requirements) Inspection

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task is the scheduled maintenance inspection procedure for the turbine rear frame (TRF) aft engine mount lugs (referred to as the aft mount lugs).

(2) Aft mount lugs areas are the right link mount lug, the fail-safe link mount lug, and the left link mount lug.

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)
70-11-06-230-801-H01	Fluorescent Penetrant Inspection (P/B 201)
71-00-02-000-811-H00	Power Plant Removal (P/B 401)
71-00-02-400-811-H00	Power Plant 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)
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-117	Borescope - Flexible, 0.24 in. (6mm) Diameter Part #: EVEREST XL PRO VIDEOPROBE Supplier: 06083 Part #: IV9000N Supplier: 32212 Part #: XLG3 VIDEOPROBE Supplier: 06083 Opt Part #: IV7650A-2 Supplier: 32212 Opt Part #: IV8635 Supplier: 32212
COM-2291	Light - Source, borescope (blending) Part #: 9C1303P04 Supplier: 06083
STD-10719	Borescope - Rigid (Meets General Electric Standard Practices Manual Specification such as: model R857ELSV60)

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Inspection

SUBTASK 72-50-00-010-006-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 72-50-00-480-001-H00

(2) Assemble the flexible borescope, COM-117 or rigid borescope, STD-10719, and the borescope light source (blending), COM-2291.

NOTE: You can use the rigid borescope, STD-10719 for the engine is off-wing as an optional.

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

G. Aft Engine Mount Lugs Inspection

SUBTASK 72-50-00-211-001-H00

(1) Do a detailed visual examination of the aft mount lugs (Figure 601)

NOTE: Use a flashlight and an inspection mirror for places which are hard to see.

NOTE: Areas of of the aft mount lugs are the right link mount lug, the fail-safe link mount lug, and the left link mount lug.

(a) Use the flexible borescope, COM-117 or rigid borescope, STD-10719 to view the aft mount lugs.

1) Turn the borescope light source (blending), COM-2291 on.

2) Put the flexible borescope, COM-117or rigid borescope, STD-10719 in position to examine the lugs.

(b) Cracks that go radially out of the aft mount lug bolt holes to the edge of the lug.

1) If you think that there is a crack, use the spot fluorescent penetrant inspection to confirm the damage (TASK 70-11-06-230-801-H01).

2) Cracks are not permitted.

(c) Cracks that go out of the aft mount lug bolt holes and into the TRF casing structure.

1) If you think that there is a crack, use the spot fluorescent penetrant inspection to confirm the damage (TASK 70-11-06-230-801-H01).

2) Cracks are not permitted.

(d) Nicks, scores, and scratches are permitted with these conditions:

1) They are not more than 0.5 inch (12.7 mm) long.

2) They are not more than 0.01 inch (0.25 mm) in depth after removal of high metal.

3) There is no less than 1.0 inch (25.4 mm) separation between the nicks, scores, and scratches.

SUBTASK 72-50-00-960-001-H00

(2) Replace the engine for all the damage that is more than the limits above, unless you are given other instructions (TASK 71-00-02-000-811-H00 and TASK 71-00-02-400-811-H00).

NOTE: Contact your local GE Representative for further assistance.

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-50-00-080-001-H00

(1) Remove the flexible borescope, COM-117 or rigid borescope, STD-10719, and the borescope light source (blending), COM-2291 from the engine.

SUBTASK 72-50-00-410-004-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.

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:

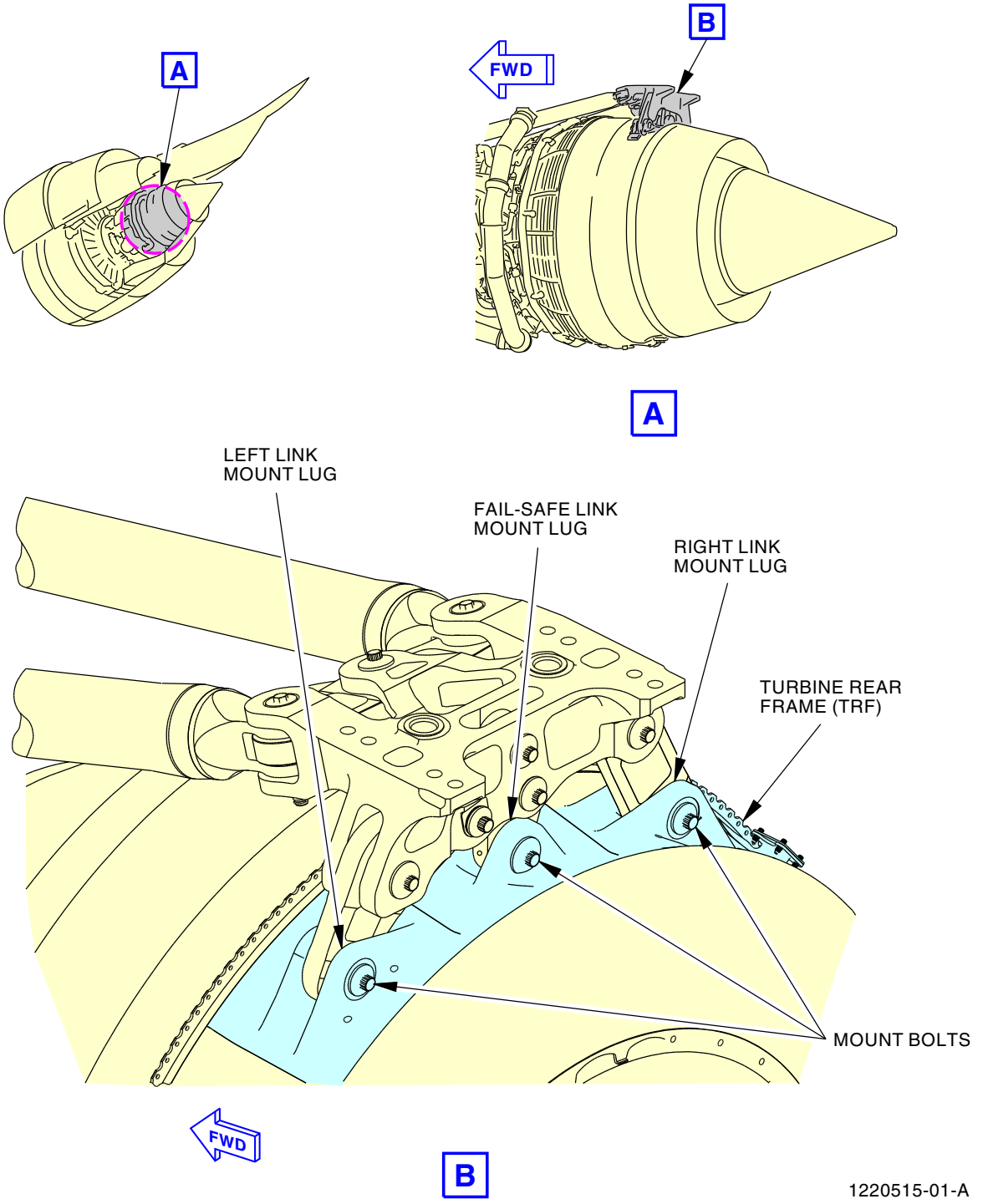
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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 Rear Frame (TRF) Aft Engine Mount Lug Inspection
Figure 601/72-50-00-990-801-H01

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

TASK 72-50-00-200-802-H00

4. Aft TRF Cavity Inspection

A. General

(1) Examine the surface of the hardware in the aft cavity of the TRF for oil leakage, wetting and coking.

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)
71-00-00-800-802-H01	Engine Operation Limits (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)
78-11-02-000-801-H01	Aft Centerbody Removal (P/B 401)
78-11-02-400-801-H01	Aft Centerbody 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. 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

D. Aft TRF Cavity Inspection

SUBTASK 72-50-00-010-005-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.

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 72-50-00-210-002-H00

(2) Examine the surface of the hardware in the aft cavity of the TRF for oil leakage, wetting and coking:

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

(b) Examine the surface inside the TRF cavity between the aft sump cover and the aft face of the TRF for oil leakage and wetting, (area to be examined includes the aft sump cover and the area spanning down and aft to the aft TRF surface between 4:00 to 8:00 o'clock):

1) Any amount of oil wetting is acceptable, if:

a) Oil consumption does not exceed the recommended maximum limit (TASK 71-00-00-800-802-H01).

b) Oil does not drip from the TRF.

2) If oil leakage or wetting is found, find the source of leakage and correct the cause of the oil leakage.

(c) Examine the surface inside the TRF cavity between the aft sump cover and the aft face of the TRF for oil coking (area to be examined includes the aft sump cover and the area spanning down and aft to the aft TRF surface between 4:00 to 8:00 o'clock):

1) Any amount of oil coking is acceptable, if:

a) Oil consumption does not exceed the recommended maximum limit (TASK 71-00-00-800-802-H01).

b) Oil does not drip from the TRF.

2) If oil coking is found, find the source of coking and correct the cause of the oil coking.

(d) Examine the air/oil service tubes in the aft cavity of the TRF for missing or damaged ring-seal(s) at TRF hub interface (Figure 602).

NOTE: Locations to be examined include the eductor air tube (strut No. 3), vent drain tube (strut No. 6), oil supply tube (strut No. 7), and scavenge tube (strut No. 9). Use white light to aid the inspection.

NOTE: Strut number 1 is at top center, under the center mount lug. The struts are numbered 1 through 14 in a clockwise direction, as viewed from aft of the TRF, looking forward.

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

1) Do an inspection for missing, exposed or damaged metal ring-seal(s) of eductor air tube (strut No. 3), vent drain tube (strut No. 6), oil supply tube (strut No. 7), and scavenge tube (strut No. 9).

a) Missing or damaged ring-seals are acceptable and must be replaced upon the next shop visit.

NOTE: If you find damaged ring-seal(s), remove the exposed ring-seal material.

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

SUBTASK 72-50-00-410-005-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.

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:

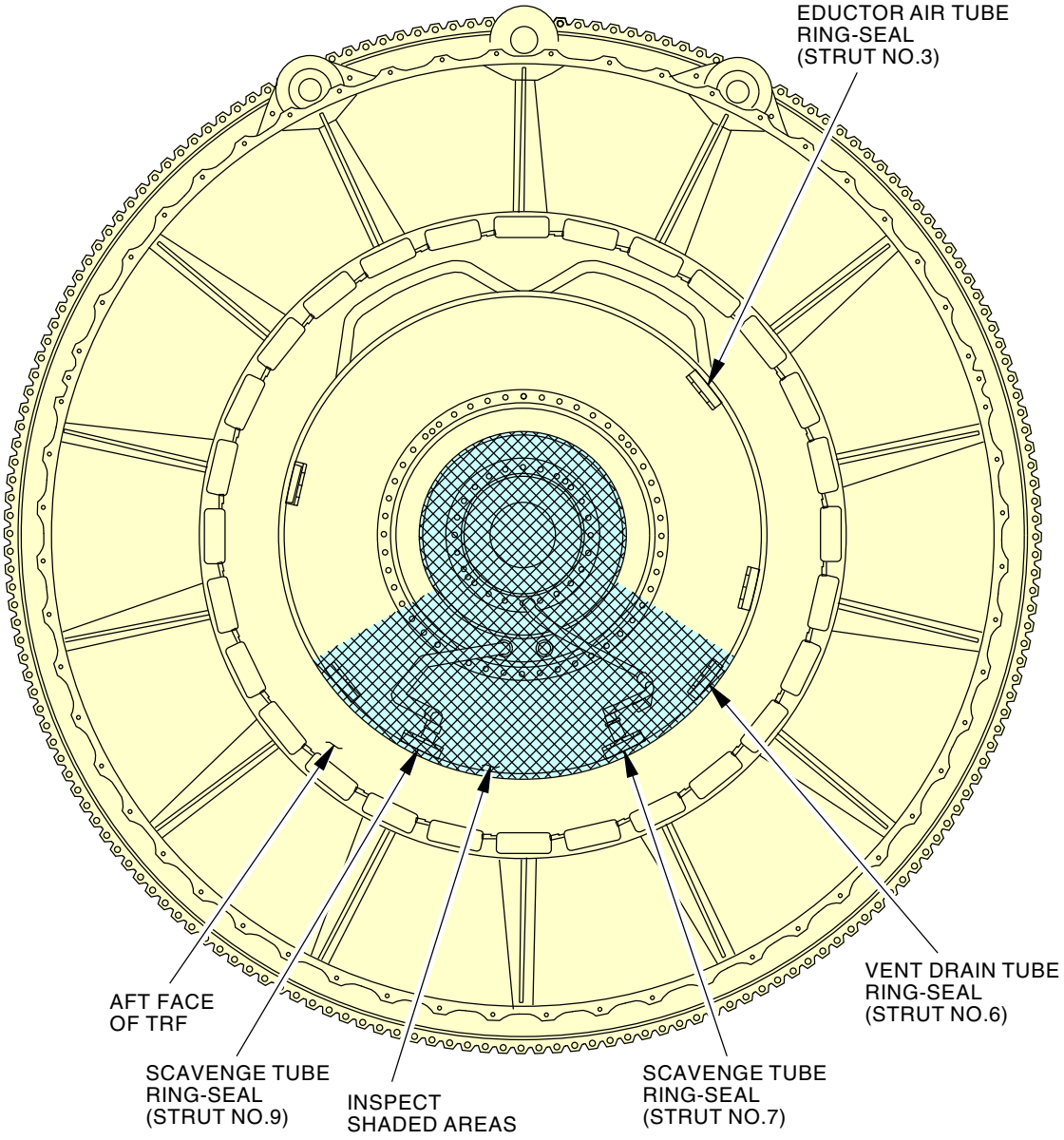
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

(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



1235712-00-A
D57469 S0000159509_V2

Aft TRF Cavity Inspection
Figure 602/72-50-00-990-802-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TURBINE REAR FRAME - REPAIRS

1. General

A. This procedure has one task:

(1) Turbine Rear Frame Repair.

TASK 72-50-01-300-801-H01

2. Turbine Rear Frame Repair

A. General

(1) This procedure is a repair of the turbine rear frame.

(2) The applicable thrust reverser must be opened to get access the applicable side of the turbine rear frame.

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)
70-11-06-230-801-H01	Fluorescent Penetrant Inspection (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. Consumable Materials

Reference	Description	Specification
G02422 [C10-043]	Wheel - Rubberized Abrasive - Cratex 8-C	

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Repair

SUBTASK 72-50-01-010-001-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

G. Turbine Rear Frame Repair

SUBTASK 72-50-01-230-001-H01

(1) Fluorescent penetrant examine the outer diameter and inner diameter of the case skin to find the ends of the cracks to be repaired (TASK 70-11-06-230-801-H01).

SUBTASK 72-50-01-300-001-H01

(2) Stop drill the ends of the cracks with a 0.116-0.136 inch (2.945-3.454 mm) diameter drill.

NOTE: The edge of the hole should be at the ends of the crack.

SUBTASK 72-50-01-300-002-H01

(3) Radius the two ends of the stop drill holes. The size of the radius should be 0.020 inch (0.508 mm) minimum.

SUBTASK 72-50-01-350-001-H01

(4) Use a Cratex 8-C wheel, G02422 [C10-043], to polish the inner diameter of the stop drill holes and the edges that were radiused until they are smooth and shiny.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

H. Put the Airplane Back to its Usual Condition

SUBTASK 72-50-01-410-001-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

ACCESSORY DRIVES - INSPECTION/CHECK

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure has two tasks.

(1) An inspection of the accessory gearbox (AGB) and transfer gearbox (TGB)

(2) An inspection of accessory gearbox (AGB) mount features and links.

TASK 72-60-00-200-801-H01

2. Accessory Gearbox and Transfer Gearbox Inspection

(Figure 601 and Figure 602)

A. General

(1) This task gives the type of damage to look for if you examine the accessory gearbox and transfer gearbox. The limits for the damage is also given in this task.

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)
70-00-04-000-801-H01	Seal (Preformed Packing and O-Ring) Removal (P/B 201)
70-00-04-400-801-H01	Seal (Preformed Packing and O-Ring) Installation (P/B 201)
70-11-06-230-801-H01	Fluorescent Penetrant Inspection (P/B 201)
70-48-16-000-801-H00	Rosan Studs Removal (P/B 201)
70-48-16-400-802-H01	Rosan Studs Installation (P/B 201)
70-48-19-000-801-H01	Rosan Ring Locked Insert Removal (P/B 201)
70-48-19-400-801-H01	Rosan Ring Locked Insert Installation (P/B 201)
70-51-00-910-801-H01	Instruction for Torque (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. 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

D. Prepare for the Accessory Gearbox And Transfer Gearbox Inspection

SUBTASK 72-60-00-010-001-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

E. Accessory Gearbox And Transfer Gearbox Inspection

SUBTASK 72-60-00-230-001-H01

(1) If you find a possible crack in the accessory gearbox housing, fuel adapter, or transfer gearbox, use spot fluorescent penetrant inspection to make sure it is a crack (TASK 70-11-06-230-801-H01).

SUBTASK 72-60-00-210-001-H01

(2) Examine the accessory gearbox housing and the fuel adapter.

(a) Cracks

1) Cracks are not permitted.

(b) Nicks, dents or scratches are permitted with this condition.

1) The damage is not more than 0.035 inch (0.890 mm) in depth.

SUBTASK 72-60-00-210-002-H01

(3) Examine the electrical harness connectors.

(a) Damage

1) Damage is not permitted.

SUBTASK 72-60-00-210-003-H01

(4) Examine the electrical harness, tube and hose brackets.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Loose or missing

1) Not permitted.

SUBTASK 72-60-00-210-004-H01

(5) Examine the clamps.

(a) Loose, broken, or missing

1) Loose, broken, or missing clamps are not permitted.

SUBTASK 72-60-00-210-005-H01

(6) Examine the AGB housing fluid adapter inserts (Rosan).

(a) Insert lockrings that are loose or missing

1) Insert lockrings that are loose or missing are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

(b) Leaks from the fluid adapters

1) Leaks from the fluid adapters are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01)

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

(c) Inserts that are loose or missing.

1) Inserts that are loose or missing are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

SUBTASK 72-60-00-210-006-H01

(7) Examine the AGB housing studs (Rosan) and the fuel adapter studs (Rosan).

(a) Studs (Rosan) that are loose or missing

1) A single loose or missing AGB housing and fuel adapter stud (Rosan) is permitted for 100 cycles.

2) Multiple loose or missing AGB housing studs and fuel adapter studs (Rosan) are not permitted. Replace the studs (TASK 70-48-16-000-801-H00 and TASK 70-48-16-400-802-H01).

(b) Damaged threads

1) Repair the threads with a file.

a) Damaged threads are permitted if there is less than one half of one full thread damaged after the file is used.

b) If there is more than one half of one full thread damaged after the file is used, replace the studs (TASK 70-48-16-000-801-H00 and TASK 70-48-16-400-802-H01).

SUBTASK 72-60-00-210-007-H01

(8) Examine the AGB housing threaded inserts (Rosan).

(a) Insert lockrings that are loose or missing

1) Insert lockrings that are loose or missing are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

(b) Inserts that are loose or missing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Inserts that are loose or missing are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

(c) Inserts with damaged threads

1) Inserts with damaged threads are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

SUBTASK 72-60-00-220-001-H01

(9) Examine the tubes and hoses.

(a) Chafing or wear is permitted with this condition.

1) The damage is less than 0.005 inch (0.130 mm) in depth.

(b) Dents

1) Dents are permitted if the depth of the dent is not more than 10 percent of the tube outside diameter.

2) Nicks or scratches

a) Nicks or scratches are permitted when the damage is less than 0.025 inch (0.640 mm) in depth.

SUBTASK 72-60-00-220-002-H01

(10) Examine the fire sleeve section of the hoses.

(a) Missing rubber material is permitted with this condition.

1) The missing rubber material is less than 0.15 square-inch (96.70 square-mm) and the parent braid does not show through.

(b) Cracks are not permitted.

SUBTASK 72-60-00-220-003-H01

(11) Examine the horizontal drive shaft housing.

(a) Nicks or dents

1) Permitted if the damage is less than 0.025 inch (0.640 mm) in depth.

SUBTASK 72-60-00-220-004-H01

(12) Examine heatshield assembly.

(a) Cracks, delamination, or holes

1) Cracks, delamination, or holes are not permitted.

(b) Nut plate rivets that are loose or missing

1) Nut plate rivets that are loose or missing are not permitted.

(c) Nut plates that are loose or missing

1) Nut plates that are loose or missing are not permitted.

SUBTASK 72-60-00-210-008-H01

(13) Examine the AGB oil supply hose B-nut.

(a) Leakage

1) Tighten the B-nut at the accessory gearbox (TASK 70-51-00-910-801-H01).

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-60-00-210-009-H01

(14) Examine the oil scavenge tube to accessory gearbox connection.

(a) Leakage

1) Leakage is not permitted. Replace the gasket seal (TASK 70-00-04-000-801-H01 and TASK 70-00-04-400-801-H01).

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

(b) Loose bolts

1) Tighten the bolts to 115-130 pound-inches (13.0-14.7 Newton-meters).

SUBTASK 72-60-00-210-010-H01

(15) Examine the AGB drive pad drain tube B-nuts.

(a) Loose B-nuts

1) Tighten the B-nut at the accessory gearbox (TASK 70-51-00-910-801-H01).

SUBTASK 72-60-00-210-012-H01

(16) Examine the AGB housing link lugs.

(a) Cracks

1) Cracks are not permitted.

(b) Oil Staining

1) Staining is permitted.

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

SUBTASK 72-60-00-210-013-H01

(17) Examine the AGB to engine core mount brackets.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts and nuts that are loose or missing

1) Bolts and nuts that are loose or missing are not permitted.

SUBTASK 72-60-00-210-014-H01

(18) Examine the fan hub frame axial and lateral link brackets.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts that are loose or missing

1) Bolts that are loose or missing are not permitted.

SUBTASK 72-60-00-210-015-H01

(19) Examine the axial and lateral links at the AGB forward face and the fan hub frame.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts and nuts that are loose or missing

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Bolts and nuts that are loose or missing are not permitted.

(c) Spherical bearings that can not move

1) Spherical bearings that can not move are not permitted.

SUBTASK 72-60-00-210-016-H01

(20) Examine the AGB to engine core links.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts and nuts that are loose or missing

1) Bolts and nuts that are loose or missing are not permitted.

(c) Loose axial and vertical links

1) Loose axial and vertical links are not permitted.

(d) Bushing that is missing

1) A missing bushing is not permitted.

SUBTASK 72-60-00-210-017-H01

(21) Examine the TGB housing.

(a) Cracks

1) Cracks are not permitted.

(b) Nicks, dents or scratches

1) Nicks, dents or scratches are permitted with this condition.

a) The damage is not more than 0.035 inch (0.890 mm) in depth.

SUBTASK 72-60-00-210-018-H01

(22) Examine the TGB fluid adapter inserts (Rosan).

(a) Insert lockrings that are loose or missing

1) Insert lockrings that are loose or missing are not permitted.

2) Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

(b) Leaks from the fluid adapters

1) Leaks from the fluid adapters are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

(c) Inserts that are loose or missing

1) Inserts that are loose or missing are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

SUBTASK 72-60-00-210-019-H01

(23) Examine the TGB housing studs (Rosan).

(a) Studs that are loose or missing.

1) Studs that are loose or missing are not permitted. Replace the studs (TASK 70-48-16-000-801-H00 and TASK 70-48-16-400-802-H01).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(b) Damaged threads

1) Repair the threads with a file.

a) Damaged threads are permitted if there is less than one half of one full thread damaged after the file is used.

b) If there is more than one half of one full thread damaged after the file is used, replace the studs (TASK 70-48-16-000-801-H00 and TASK 70-48-16-400-802-H01).

SUBTASK 72-60-00-210-020-H01

(24) Examine the TGB housing threaded inserts (Rosan).

(a) Insert lockrings that are loose or missing

1) Insert lockrings that are loose or missing are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

(b) Inserts that are loose or missing

1) Inserts that are loose or missing are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

(c) Inserts with damaged threads.

1) Inserts with damaged threads are not permitted. Replace the inserts (TASK 70-48-19-000-801-H01 and TASK 70-48-19-400-801-H01).

SUBTASK 72-60-00-210-021-H01

(25) Examine the oil supply hose and tube to TGB B-nuts.

(a) Leakage

1) Tighten the hose and tube B-nuts at the accessory gearbox (TASK 70-51-00-910-801-H01).

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

SUBTASK 72-60-00-210-022-H01

(26) Examine the oil scavenge tube to TGB connection.

(a) Leakage

1) Leakage is not permitted. Replace the gasket seal (TASK 70-00-04-000-801-H01 and TASK 70-00-04-400-801-H01).

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

(b) Loose bolts

1) Tighten the bolts to 115-130 pound-inches (13.0-14.7 Newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

F. Put the Airplane Back to its Usual Condition

SUBTASK 72-60-00-410-001-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:

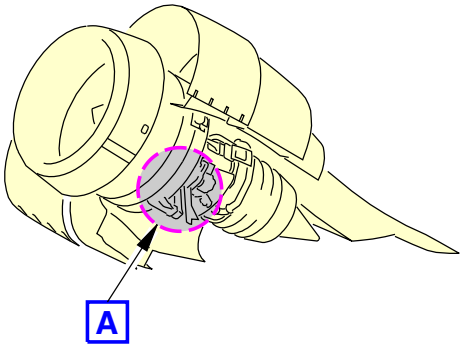
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

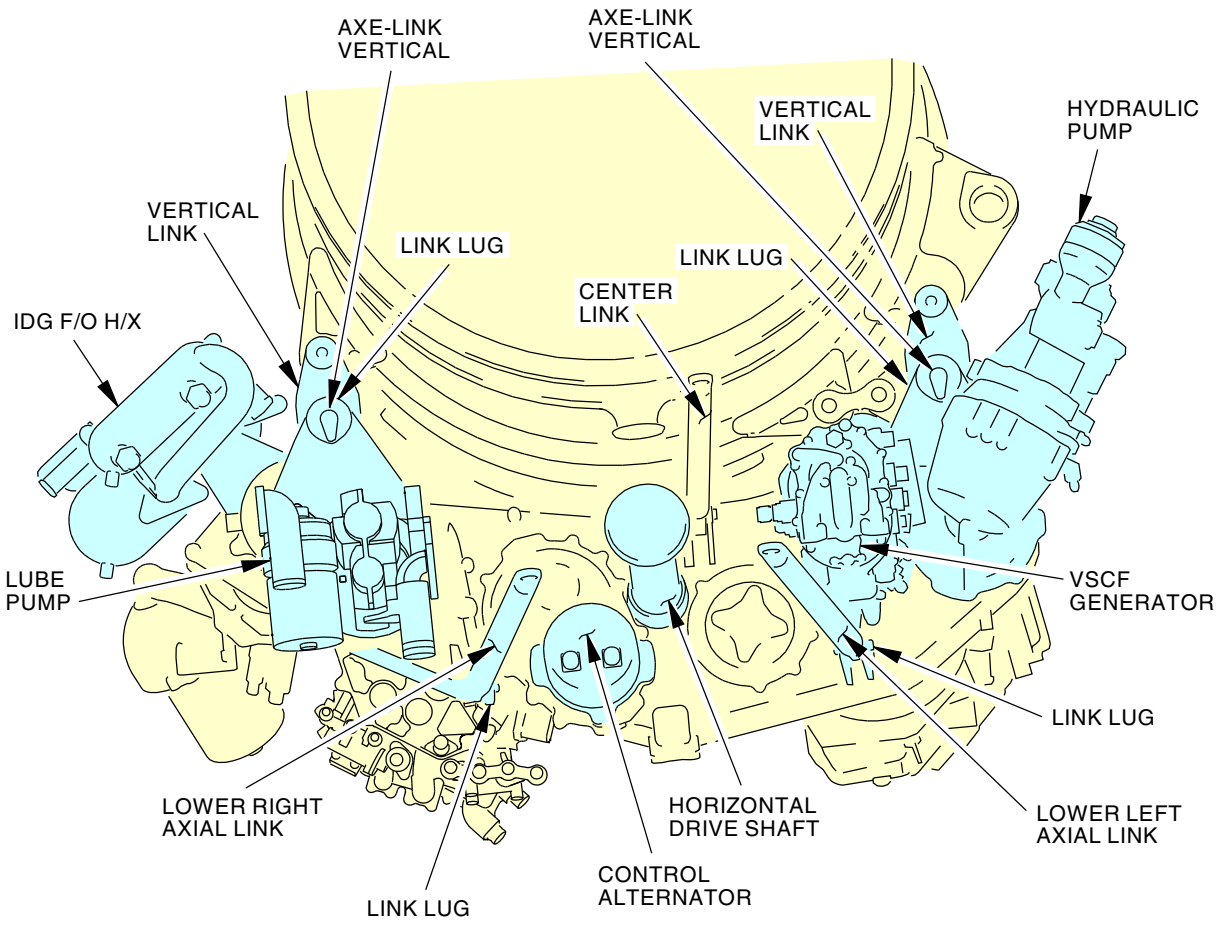
(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(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





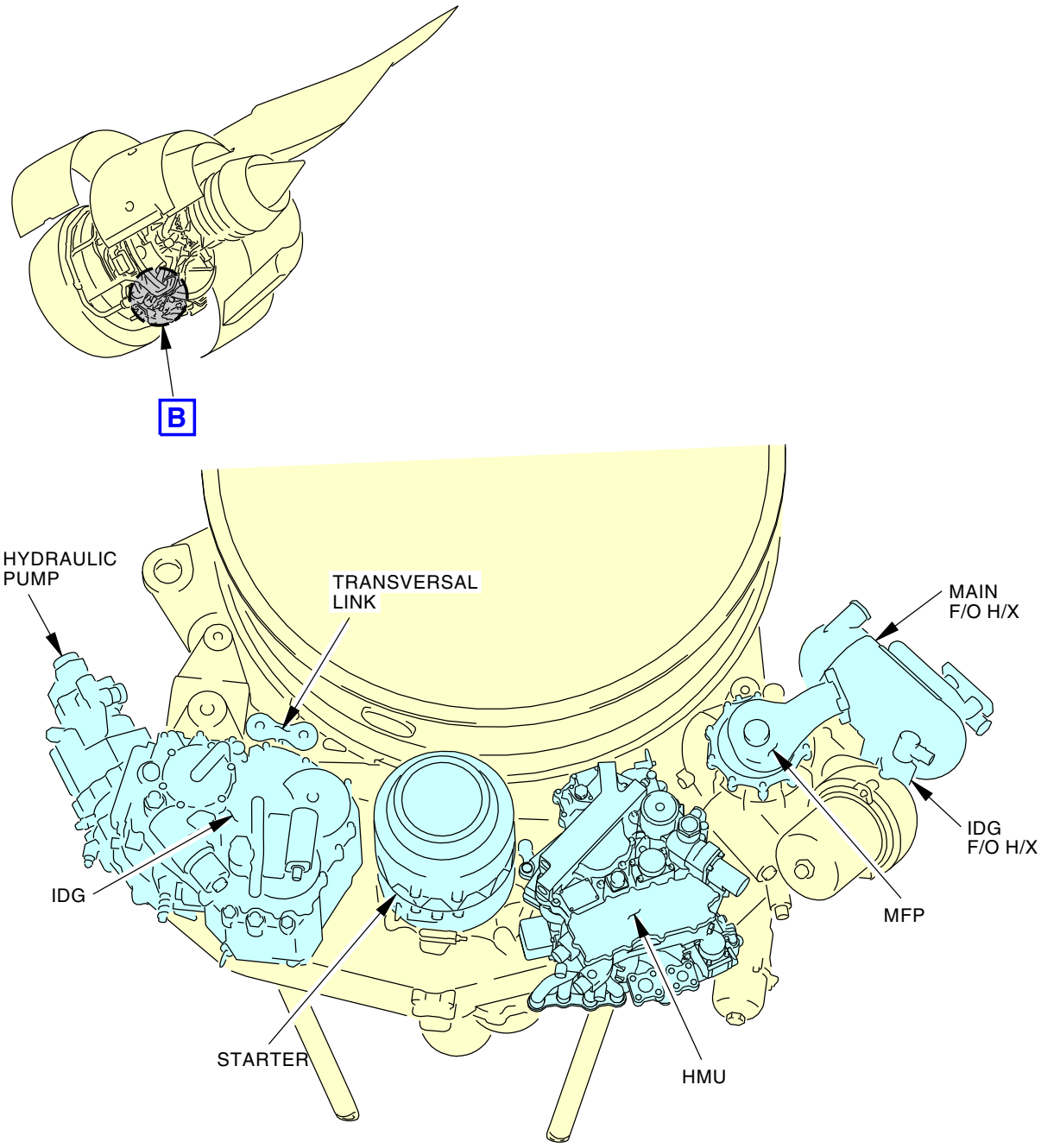
(VIEW IN THE AFT DIRECTION)

A

M06870 S0004285893_V3

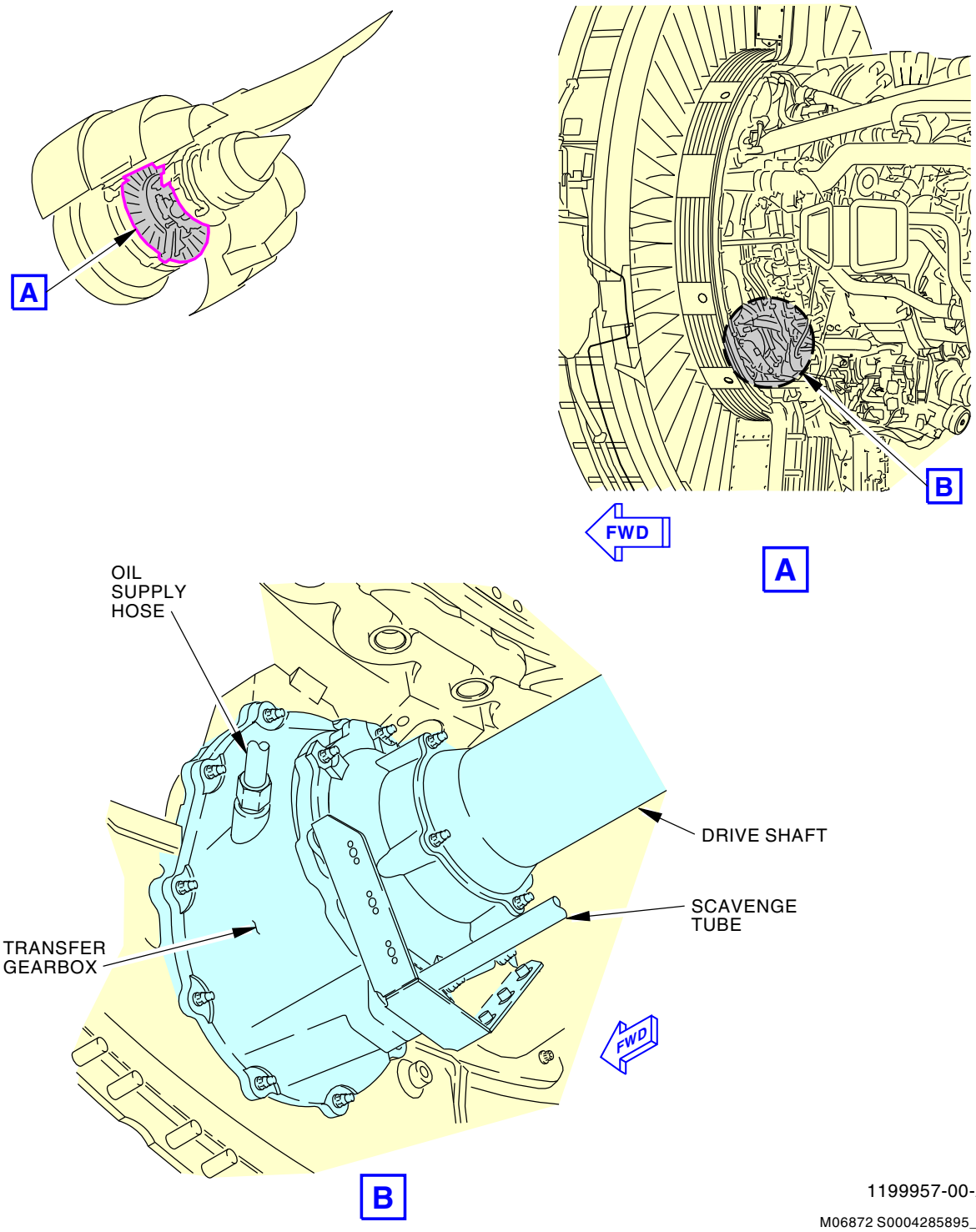
Accessory Gearbox Inspection
Figure 601/72-60-00-990-801-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Accessory Gearbox Inspection
Figure 601/72-60-00-990-801-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Transfer Gearbox Inspection
Figure 602/72-60-00-990-802-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 72-60-00-200-802-H01

3. Accessory Gearbox Mount Features and Links (Scheduled Maintenance Requirement) Inspection

(Figure 603)

NOTE: This procedure is a scheduled maintenance task.

A. General

(1) This task gives the type of damage to look for when you examine the accessory gearbox mount features and links. The limits for the damage is also given in this task.

(2) This task is for scheduled maintenance use only.

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
411	Engine, Left
421	Engine, Right

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 Accessory Gearbox Mount Features And Links Inspection

SUBTASK 72-60-00-010-002-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.

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. Accessory Gearbox Mount Features And Links Inspection

SUBTASK 72-60-00-210-023-H01

(1) Examine the AGB housing link lugs (Figure 603).

(a) Cracks

1) Cracks are not permitted.

(b) Oil Staining

1) Staining is permitted.

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

SUBTASK 72-60-00-210-028-H00

(2) Examine the AGB vertical links and axe-link vertical (Figure 603).

(a) Oil Staining

1) Staining is permitted.

NOTE: Staining is typical on the AGB and TGB area. Staining does not mean there is leakage and is specified as a discoloration caused by baking residue of oil or grease on the surface after high temperature operation. Staining is an acceptable condition.

SUBTASK 72-60-00-210-024-H01

(3) Examine the AGB to engine core mount brackets.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts and nuts that are loose or missing

1) Bolts and nuts that are loose or missing are not permitted.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-60-00-210-025-H01

(4) Examine the fan hub frame axial link brackets.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts that are loose or missing

1) Bolts that are loose or missing are not permitted.

SUBTASK 72-60-00-210-026-H01

(5) Examine the axial links at the AGB forward face and the fan hub frame.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts and nuts that are loose or missing

1) Bolts and nuts that are loose or missing are not permitted.

(c) Spherical bearings that cannot move

1) Spherical bearings that cannot move are not permitted.

SUBTASK 72-60-00-210-027-H01

(6) Examine the AGB to engine core links.

(a) Cracks

1) Cracks are not permitted.

(b) Bolts and nuts that are loose or missing

1) Bolts and nuts that are loose or missing are not permitted.

(c) Loose transversal and vertical links

1) Loose transversal and vertical links are not permitted.

(d) Bushing that is missing

1) A missing bushing is not permitted.

G. Put the Airplane Back to its Usual Condition

SUBTASK 72-60-00-410-002-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.

(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.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Close these access panels:

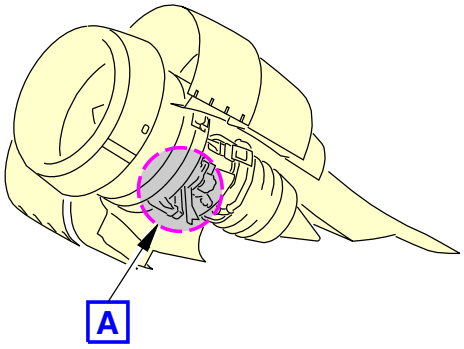
Number	Name/Location
413AL	Left Fan Cowl Panel, Left Engine
414AR	Right Fan Cowl Panel, Left Engine
423AL	Left Fan Cowl Panel, Right Engine
424AR	Right Fan Cowl Panel, Right Engine

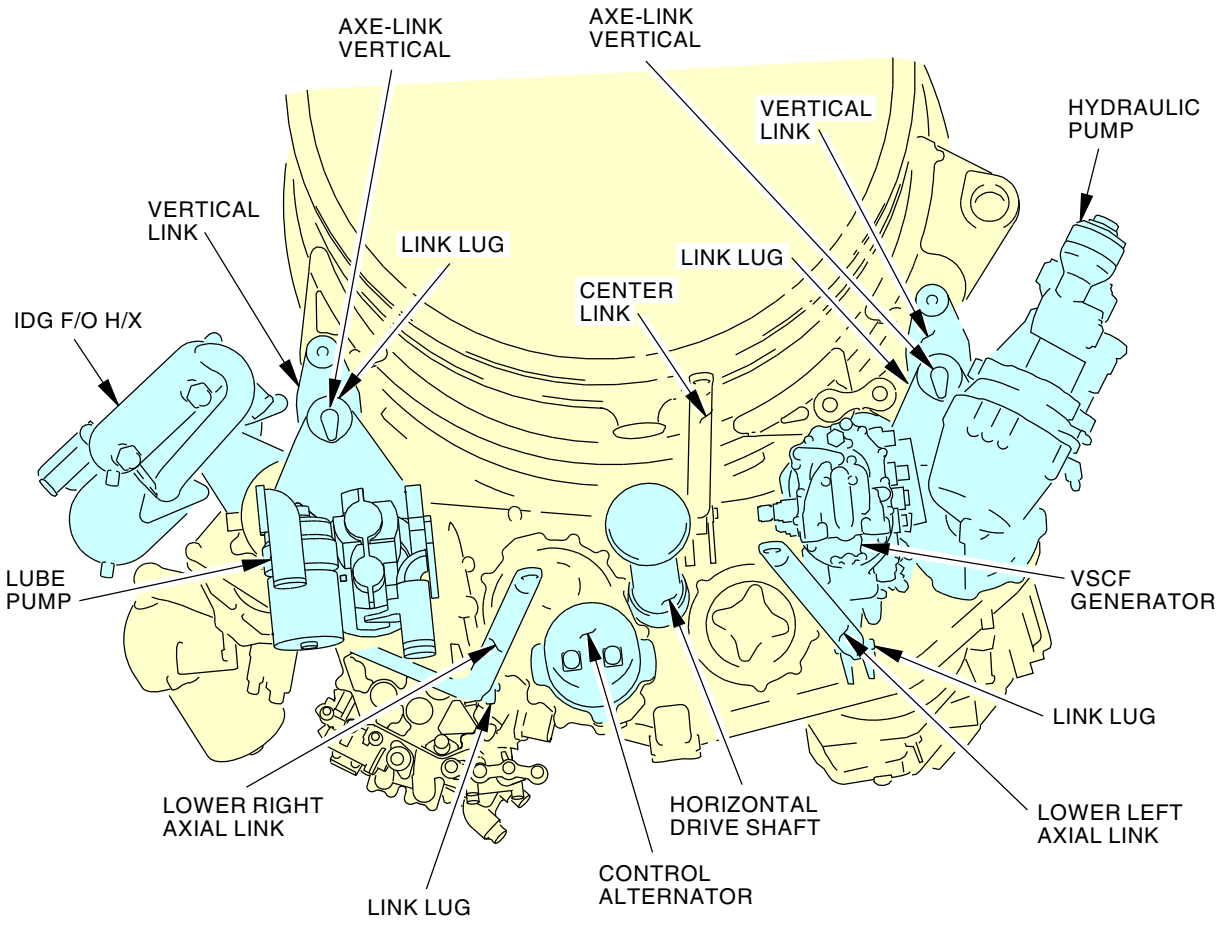
(c) Do this task: Thrust Reverser Activation After Ground Maintenance, TASK 78-31-00-440-805-H00.

(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





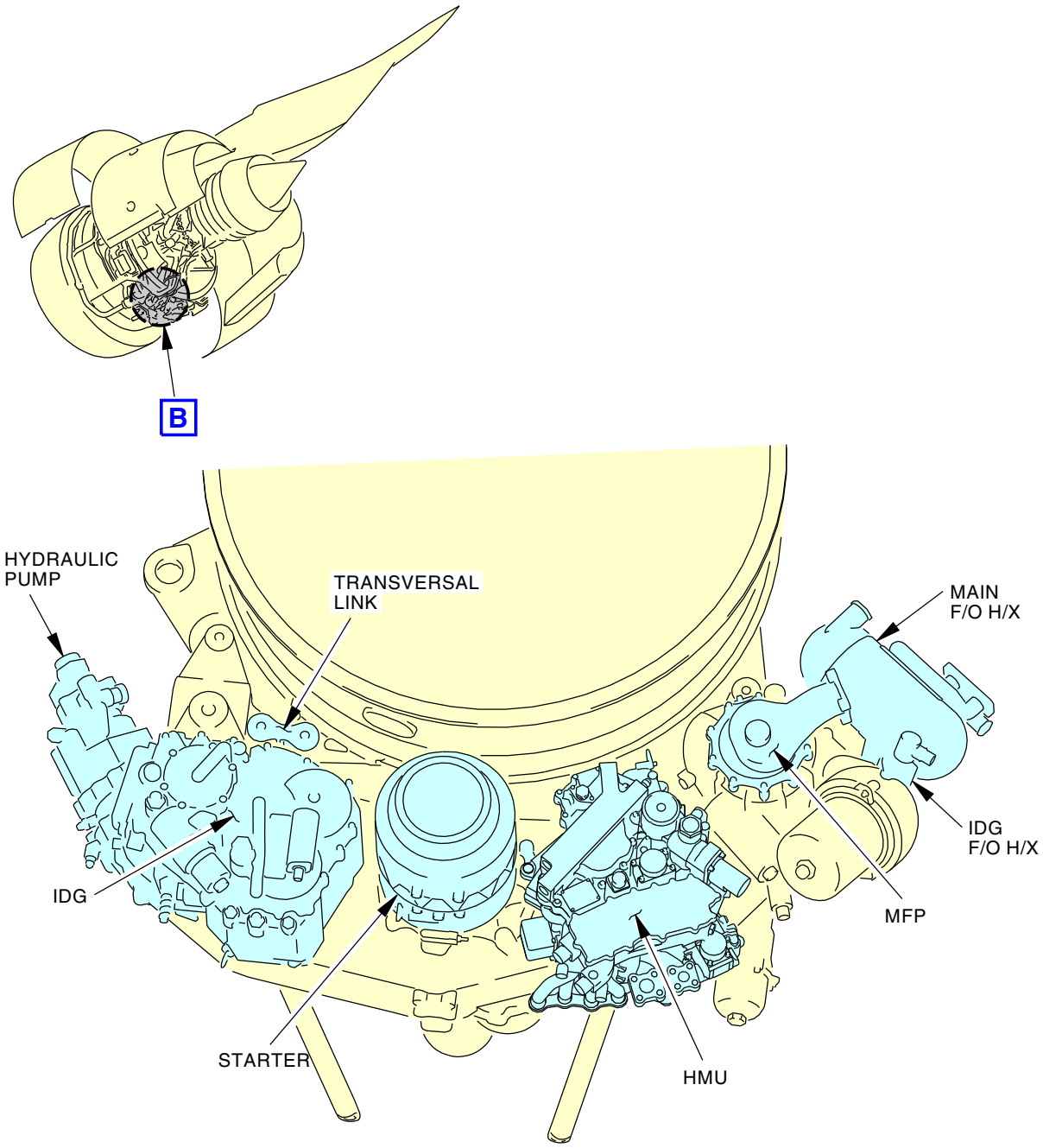
(VIEW IN THE AFT DIRECTION)

A

M06870 S0004285893_V3

Accessory Gearbox Inspection
Figure 603/72-60-00-990-803-H01 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(VIEW IN THE FORWARD DIRECTION)

B

1199956-01-A
M97246 S0004285894_V3

Accessory Gearbox Inspection
Figure 603/72-60-00-990-803-H01 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TRANSFER GEARBOX - REMOVAL/INSTALLATION

1. General

A. This procedure has two tasks:

(1) Transfer Gearbox Removal

(2) Transfer Gearbox Installation.

TASK 72-62-01-000-801-H00

2. Transfer Gearbox Removal

(Figure 401, Figure 402, Figure 403, and Figure 404)

A. General

(1) This task provides the instructions on how to remove the transfer gearbox.

(2) The transfer gearbox is referred to as the TGB.

(3) The TGB is attached to the Fan Hub Frame at 6:00 o'clock position.

(4) Make sure that you follow the product label and the manufacturer's (material) safety data sheet for instructions on the hazards, storage, safe handling and proper use of this product.

B. References

Reference	Title
12-22-01-610-805-002	Engine Oil Change (P/B 301)
24-22-00-860-806	Remove Electrical Power (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)
71-00-05-000-801-H01	Fan Stator Module to Engine Removal (P/B 401)
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)
80-11-01-000-801-H01	Engine Starter Removal (P/B 401)
80-11-02-000-801-H01	Starter Air Valve Removal (P/B 401)

C. Tools/Equipment

Reference	Description
STD-664	Pliers - Teflon-jawed (or Equivalent Soft-Jawed)

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 72-62-01-010-001-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 72-62-01-860-004-H00

(2) Remove the electrical power (TASK 24-22-00-860-806).

F. Transfer Gearbox Removal

SUBTASK 72-62-01-610-001-H00

(1) Drain the oil tank (TASK 12-22-01-610-805-002).

SUBTASK 72-62-01-020-001-H00

(2) Remove the drain and service module assembly as follow:

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(CAUTION PRECEDES)

CAUTION

USE TEFLON-JAWED PLIERS TO LOOSEN ELECTRICAL CONNECTORS. DO NOT USE METAL-JAWED PLIERS. DAMAGE TO THE ELECTRICAL CONNECTORS COULD OCCUR.

(a) Use teflon-jawed pliers, STD-664 to disconnect the electrical connectors from the receptacles at the support brackets (6:00 and 7:00 o'clock positions) of the fan stator module.

1) Remove the electrical harnesses W723, W727, W739, W721, and W737 from the spring clips on the right side of the lower bifurcation assembly and fan bracket spring clips.

2) Remove the electrical harnesses W729, W722, W724, W728, and W738 from the spring clips on the left side of the lower bifurcation assembly and fan bracket spring clips.

3) Remove the lower bifurcation assembly from the engine (TASK 71-00-05-000-801-H01).

SUBTASK 72-62-01-020-002-H00

(3) Remove the scavenge oil tube [3] from the 6:00 o'clock position of the TGB [6].

NOTE: Gasket seals are considered reusable if there is no damage.

(a) Remove the four bolts [1] and gasket [2].

(b) Disconnect the scavenge oil tube [3] B-nut from the oil tube.

SUBTASK 72-62-01-020-003-H00

(4) Remove the starter air valve (TASK 80-11-02-000-801-H01).

SUBTASK 72-62-01-020-004-H00

(5) Remove the starter (TASK 80-11-01-000-801-H01).

SUBTASK 72-62-01-020-005-H00

(6) Remove the horizontal driveshaft [11] from the TGB [6] and the AGB, as follows:

(a) Remove the four nuts [8] and the retaining ring [7] from the TGB [6].

NOTE: If necessary, use a strap wrench or equivalent to loosen the horizontal shaft protector [9] from the AGB and the TGB [6].

(b) Slide the horizontal shaft protector [9] aft into the AGB to show the horizontal driveshaft [11].

(c) Loosen and slide the horizontal driveshaft [11] aft into the AGB and remove it through the starter pad.

(d) Remove and discard preformed packing [12] and the preformed packing [10] from the horizontal shaft protector [9].

SUBTASK 72-62-01-020-006-H00

CAUTION

MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(CAUTION PRECEDES)

CAUTION USE TEFLON-JAWED PLIERS TO LOOSEN ELECTRICAL CONNECTORS. DO NOT USE METAL-JAWED PLIERS. DAMAGE TO THE ELECTRICAL CONNECTORS COULD OCCUR.

(7) Use teflon-jawed pliers, STD-664 to disconnect the two electrical connectors from the control alternator.

SUBTASK 72-62-01-020-007-H00

(8) Remove the starter gearshaft [16] from the AGB as follows:

(a) Remove the eight bolts [20] and the washers [19] that attach the starter housing [13] to the AGB.

(b) Remove the starter housing [13] with the starter gearshaft [16] from the AGB.

(c) Remove and discard the preformed packing [18].

(d) Remove the nuts [15] that attach the roller bearing outer race [14] to the AGB.

(e) Remove the roller bearing outer race [14].

NOTE: Keep the outer race for reassembly.

SUBTASK 72-62-01-860-001-H00

(9) Move the horizontal shaft protector [9] as far aft as it will travel through the opening of the AGB.

SUBTASK 72-62-01-010-002-H00

(10) For the surrounding drain tubes, disconnect the restraining “P” clamps to allow movement of the drain tubes out of the way.

SUBTASK 72-62-01-020-008-H00

(11) Remove the horizontal bevel gearshaft [30] and the horizontal support assembly [31] from the TGB [6] housing, as follows:

(a) Remove the eight nuts [25] and washers [26] that attach the horizontal support assembly [31] and bracket assembly [32] to the TGB [6] housing.

(b) Install three jackscrews in the threaded holes of the horizontal support assembly [31].

(c) Turn each jackscrew one-quarter turn at a time until the horizontal support assembly [31] disengages from the TGB [6] housing.

(d) Remove the horizontal bevel gearshaft [30], the horizontal support assembly [31], and the bracket assembly [32] from the TGB [6] housing and place on clean work surface.

1) Remove and discard the preformed packing [27].

(e) Remove the jacking screws from the horizontal support assembly [31].

SUBTASK 72-62-01-020-009-H00

(12) Remove the four bolts [38] and the gasket [39] that attach the A-sump oil scavenge tube [37] to the sump scavenge port at the 5:30 o’clock position on the fan hub frame.

NOTE: Gasket seals are considered reusable if there is no damage.

(a) Leave the other end of the tube connected to the AGB.

SUBTASK 72-62-01-020-010-H00

(13) Disconnect the lube tube [4] from the fitting at the 9:00 o’clock position from the TGB [6].

SUBTASK 72-62-01-020-011-H00

(14) Disconnect the oil hose [5] from the fitting at the 1:00 o’clock position from the TGB [6].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-62-01-020-012-H00

(15) Remove the TGB [6] from the fan hub frame (FHF), as follows:

(a) Remove the four nuts [45], the washers [46], and the bolts [47] that attach the TGB [6] to the FHF at the 10:00, 11:00, 1:00, and 2:00 o'clock positions.

(b) Remove the six remaining bolts [49] and the washers [48] that attach the TGB [6] to the FHF.

(c) Use a locally manufactured tool to hold the radial drive shaft [50] in place and lower the TGB [6] casing to disengage it from the radial drive shaft [50].

(d) Remove and discard the preformed packing [51] from the spigot [52] on the upper end of the TGB [6].

NOTE: It is possible to remove the TGB [6] and is not required to remove the horizontal gearshaft assembly. However, it is required to remove additional hardware items. It has been demonstrated that TGB [6] removal with this process is possible, but requires greater dexterity. The procedure for this method is as follows:

1) Disconnect the remaining end from the lube unit to remove the A-sump oil scavenge tube [37].

NOTE: Gasket seals are considered reusable if there is no damage.

a) Remove the bolts [36], the gasket [35], and the A-sump oil scavenge tube [37].

2) Remove the bolts [54], the gasket [53] from the hose oil tube [55].

NOTE: Gasket seals are considered reusable if there is no damage.

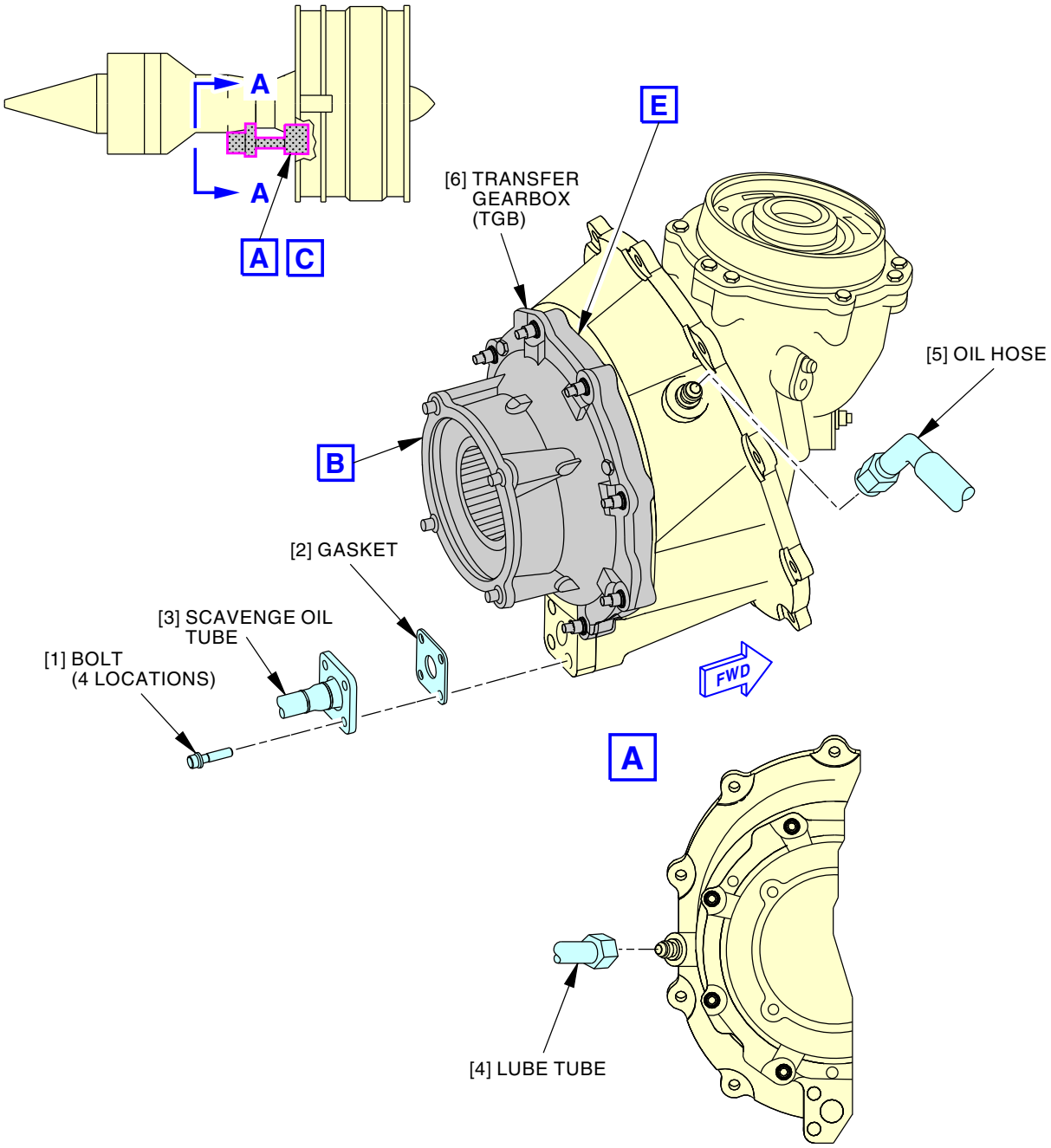
a) Remove the hose oil tube [55].

3) To easily get access, it is optional to remove the lower right hand side air duct [71] (Figure 402).

a) Remove the two nuts [72] and the bolts [73] that secure the air duct [71] to the engine.

——— END OF TASK ———

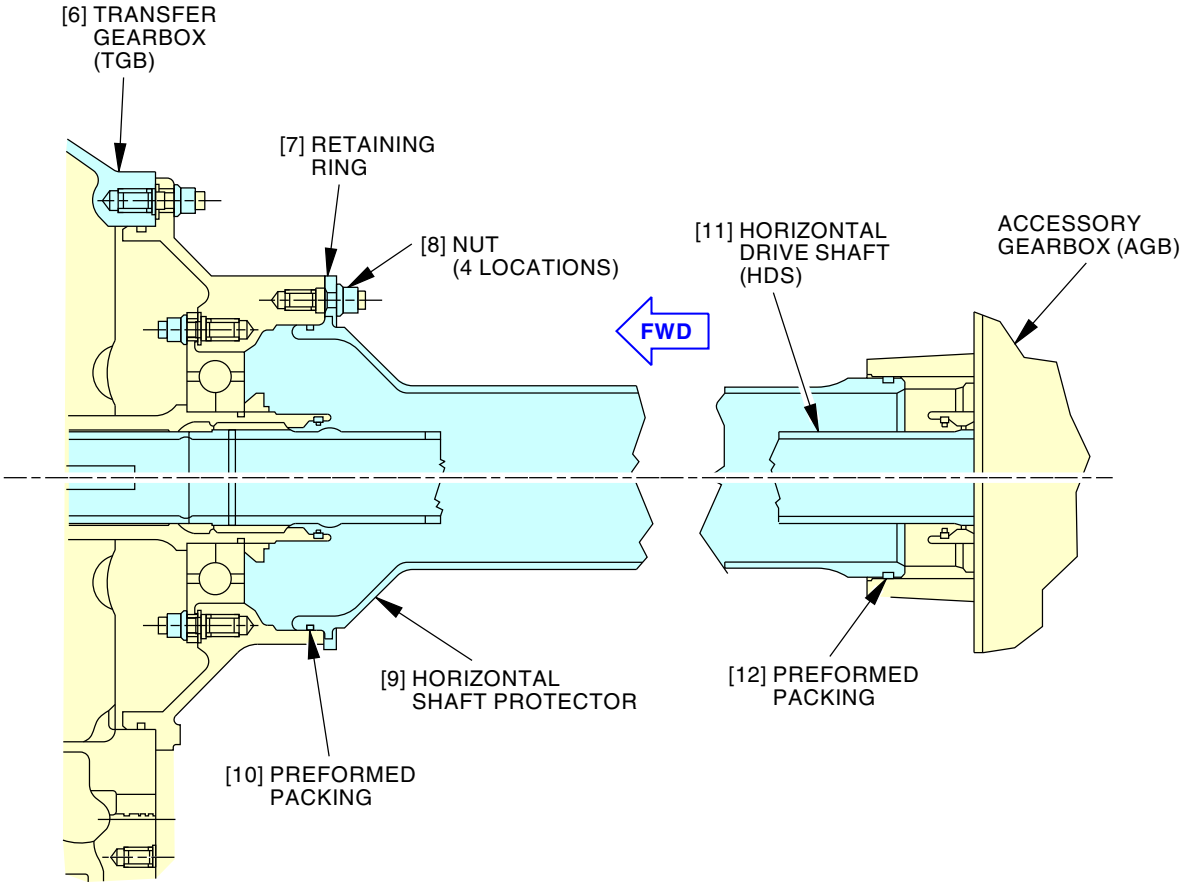
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5005150-00
2277902 S0000514179_V2

Transfer Gearbox Installation
Figure 401/72-62-01-990-801-H00 (Sheet 1 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



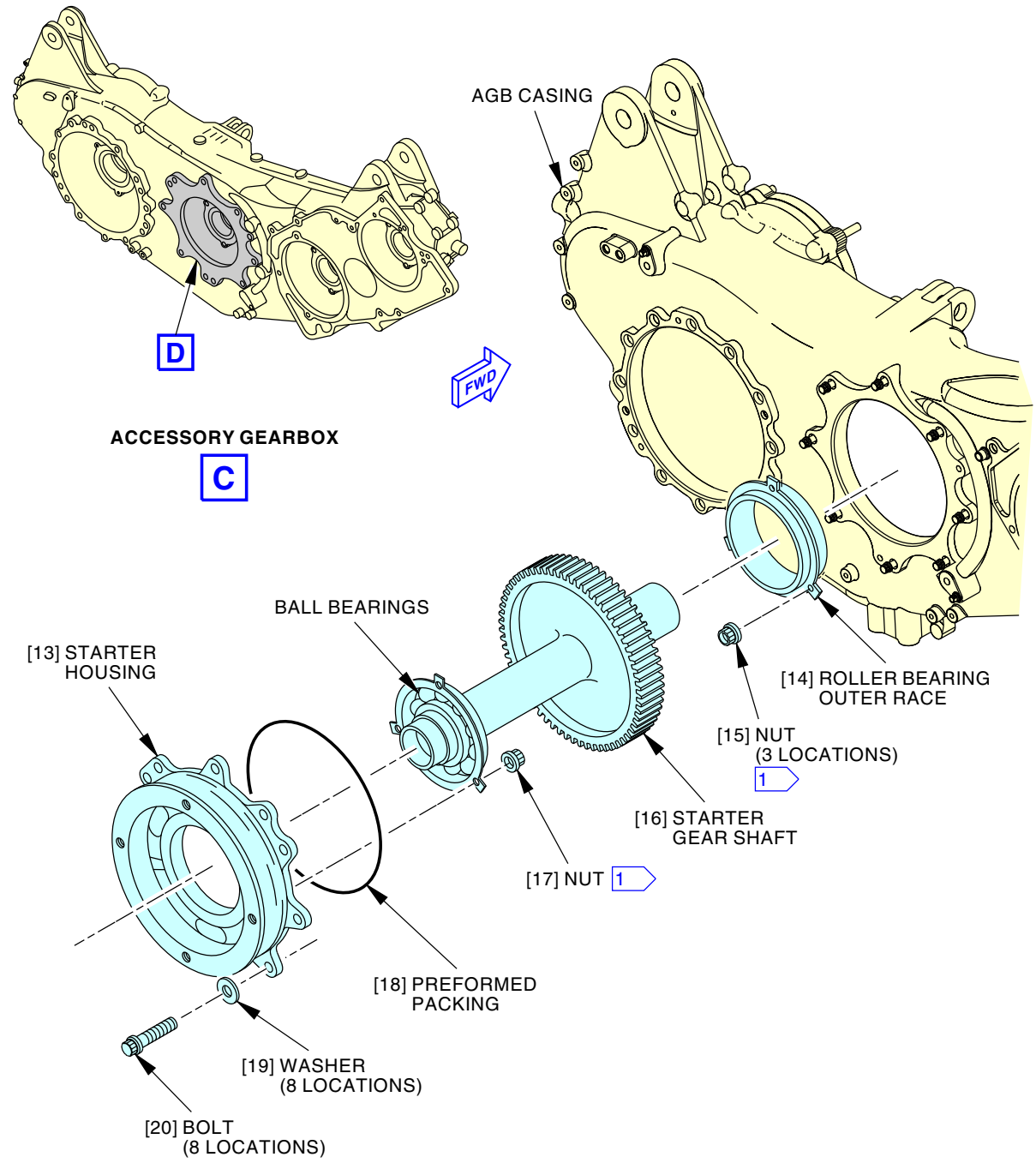
HDS PROTECTOR AND HDS

A-A

5005151-00
2277954 S0000514180_V2

Transfer Gearbox Installation
Figure 401/72-62-01-990-801-H00 (Sheet 2 of 7)

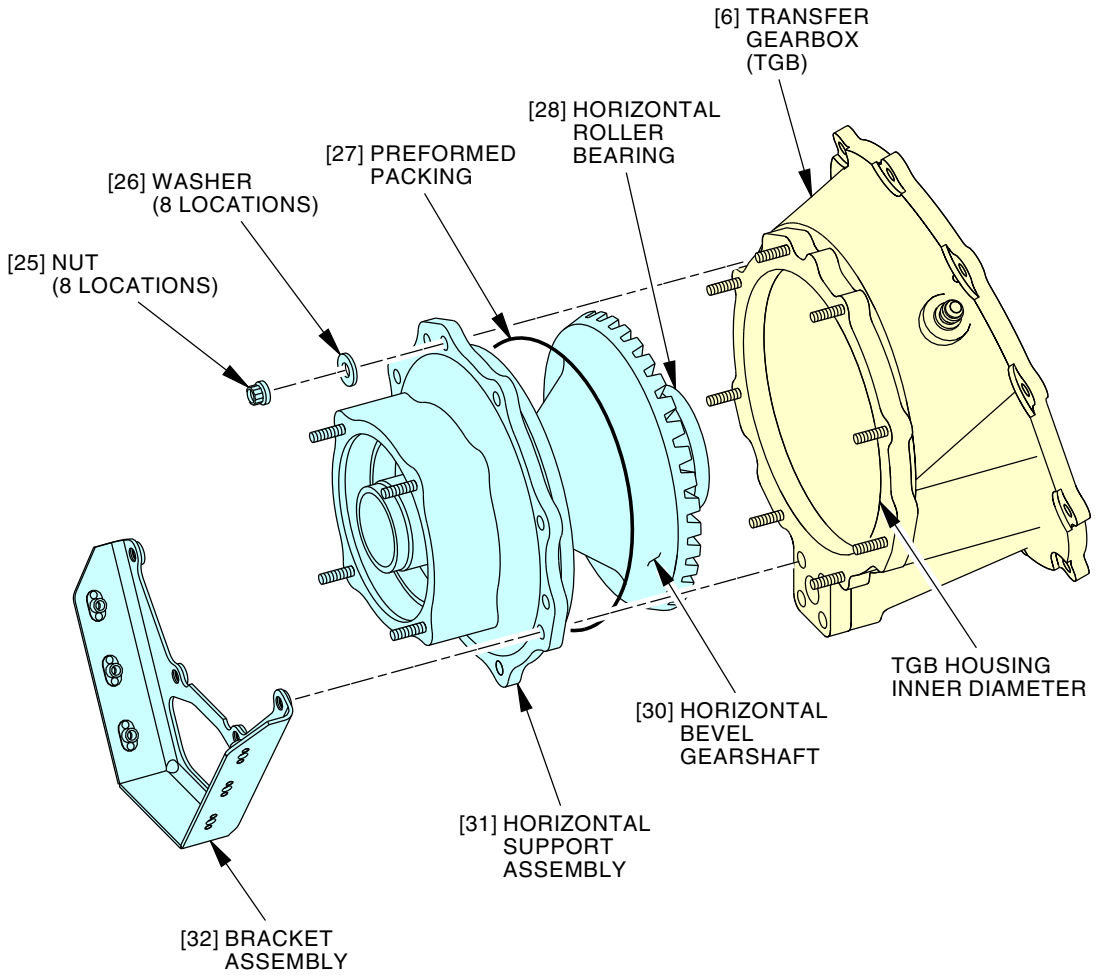
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5005152-00
2277956 S0000514181_V2

Transfer Gearbox Installation
Figure 401/72-62-01-990-801-H00 (Sheet 3 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



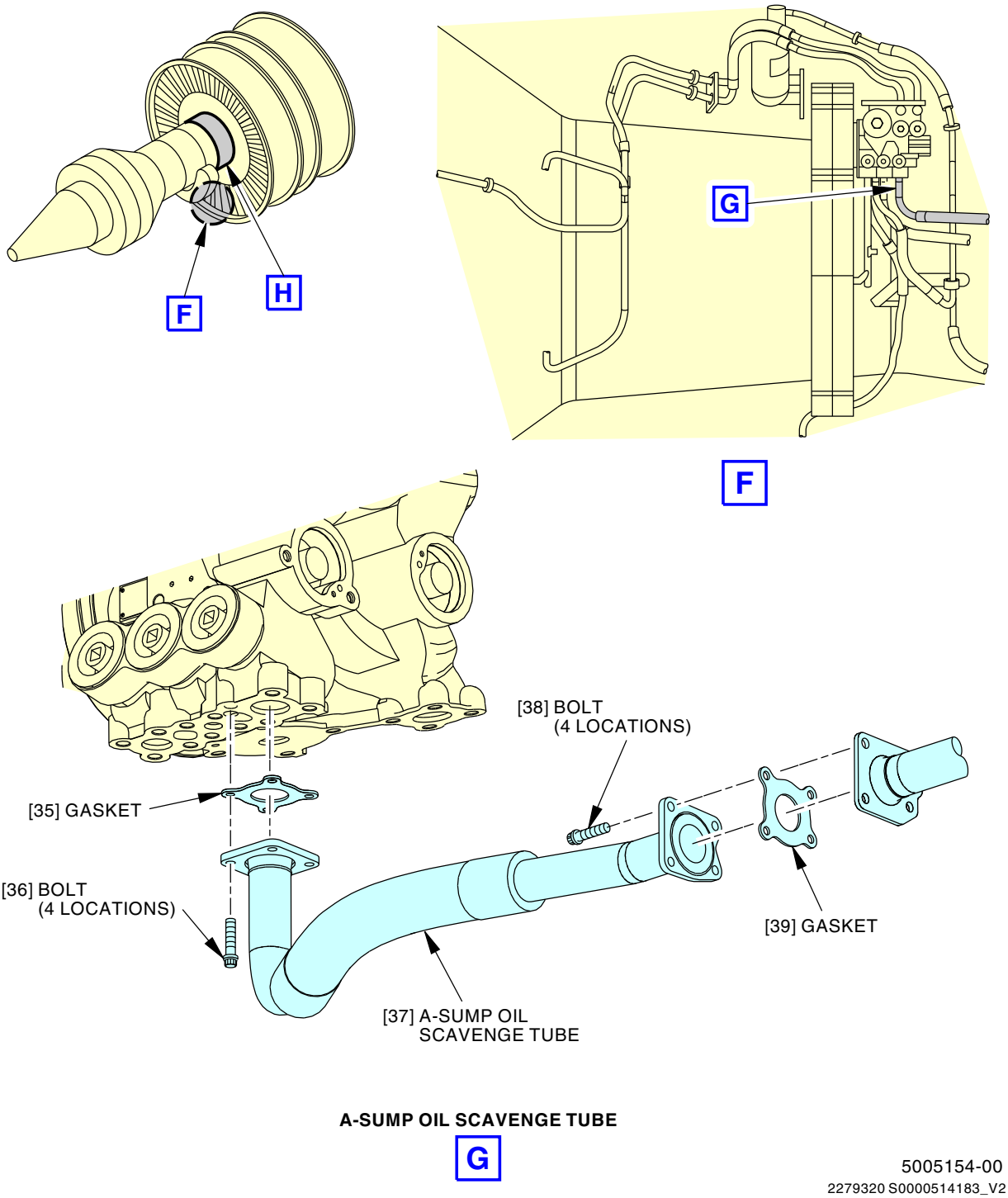
TGB HORIZONTAL BEVEL GEARSHAFT

E

5005153-00
2278995 S0000514182_V2

Transfer Gearbox Installation
Figure 401/72-62-01-990-801-H00 (Sheet 4 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



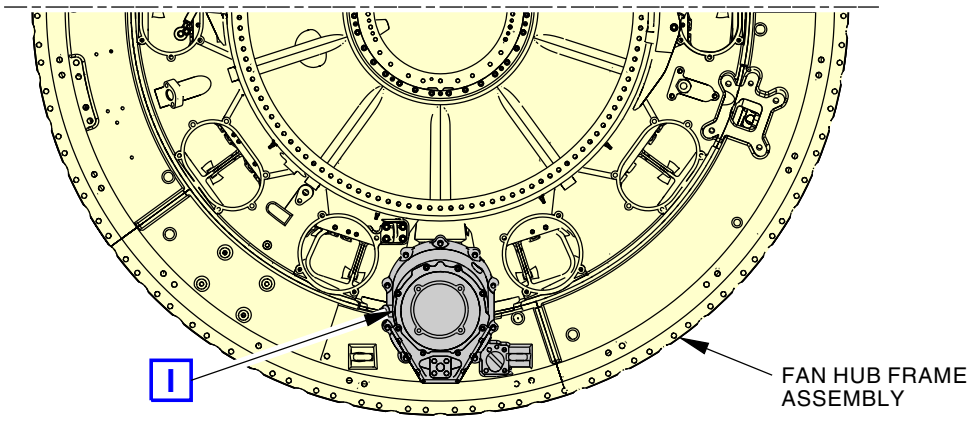
A-SUMP OIL SCAVENGE TUBE

G

5005154-00
2279320 S0000514183_V2

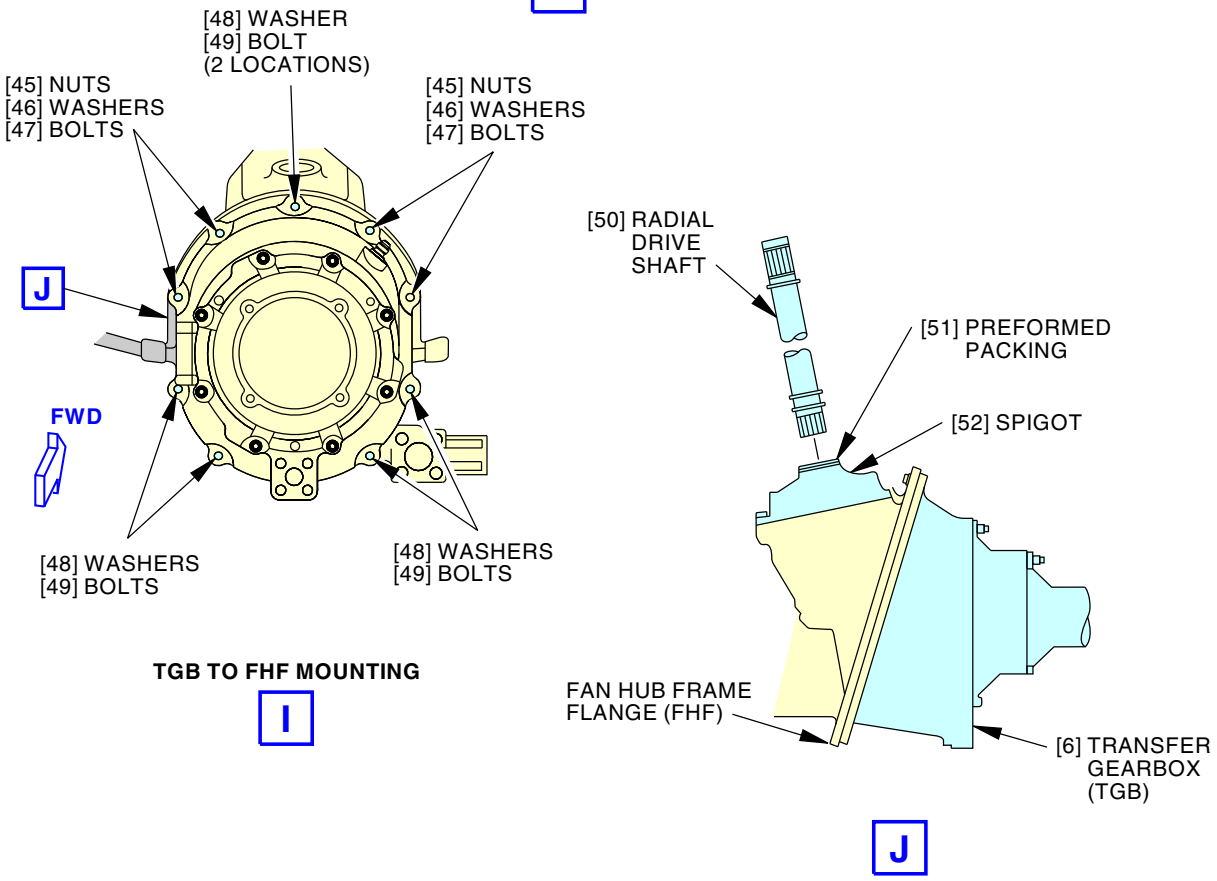
Transfer Gearbox Installation
Figure 401/72-62-01-990-801-H00 (Sheet 5 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



(VIEW IN THE FORWARD DIRECTION)

H



TGB TO FHF MOUNTING

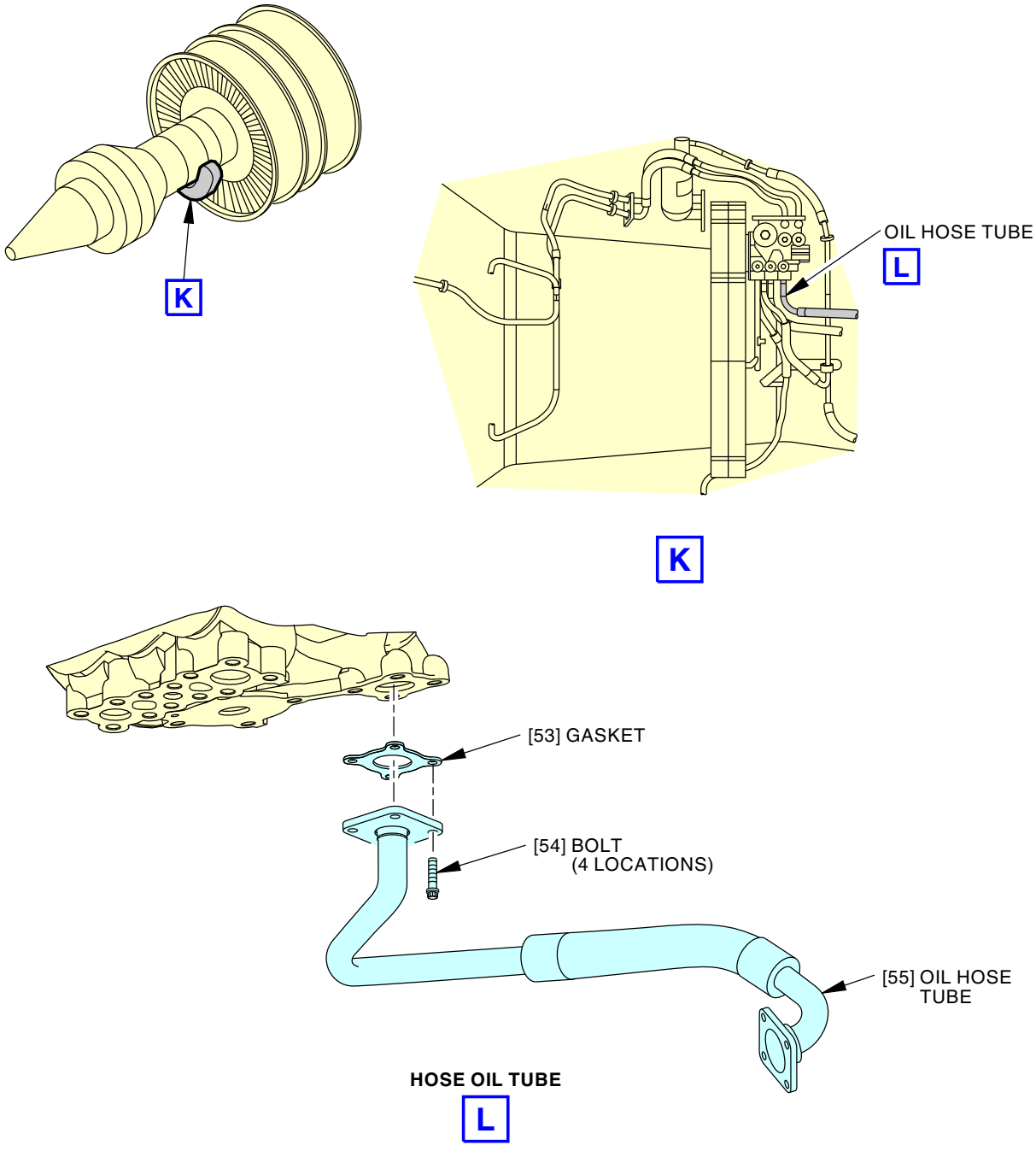
I

J

5005155-00
2279715 S0000514184_V2

Transfer Gearbox Installation
Figure 401/72-62-01-990-801-H00 (Sheet 6 of 7)

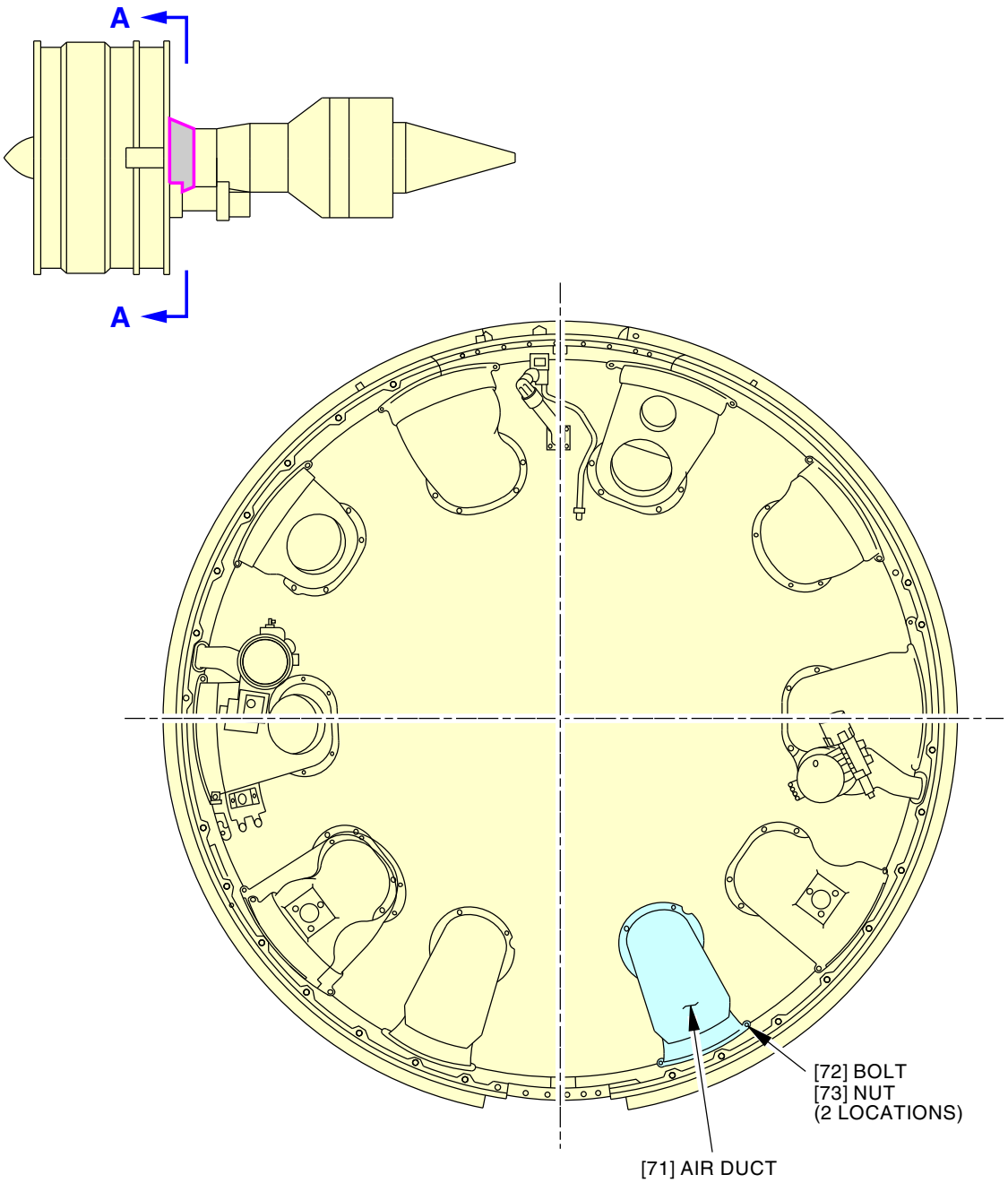
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5005158-00
2279911 S0000514185_V3

Transfer Gearbox Installation
Figure 401/72-62-01-990-801-H00 (Sheet 7 of 7)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



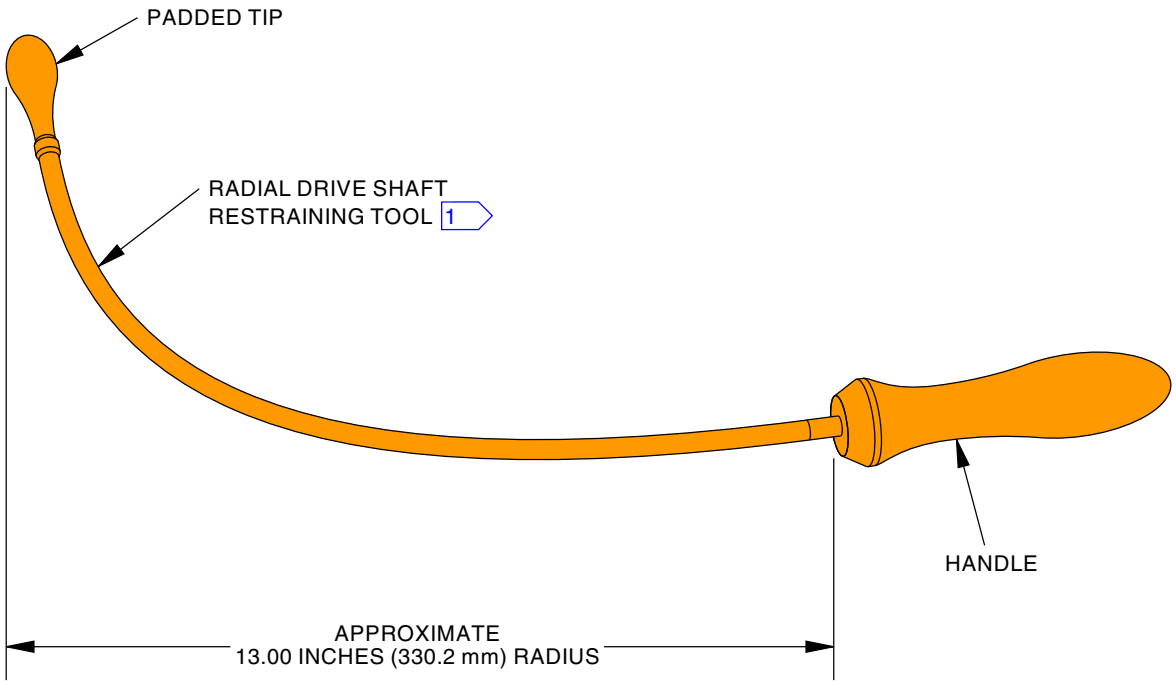
(VIEW IN THE FORWARD DIRECTION)

A-A

5005159-00
2279835 S0000514238_V2

Air Duct Installation
Figure 402/72-62-01-990-802-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

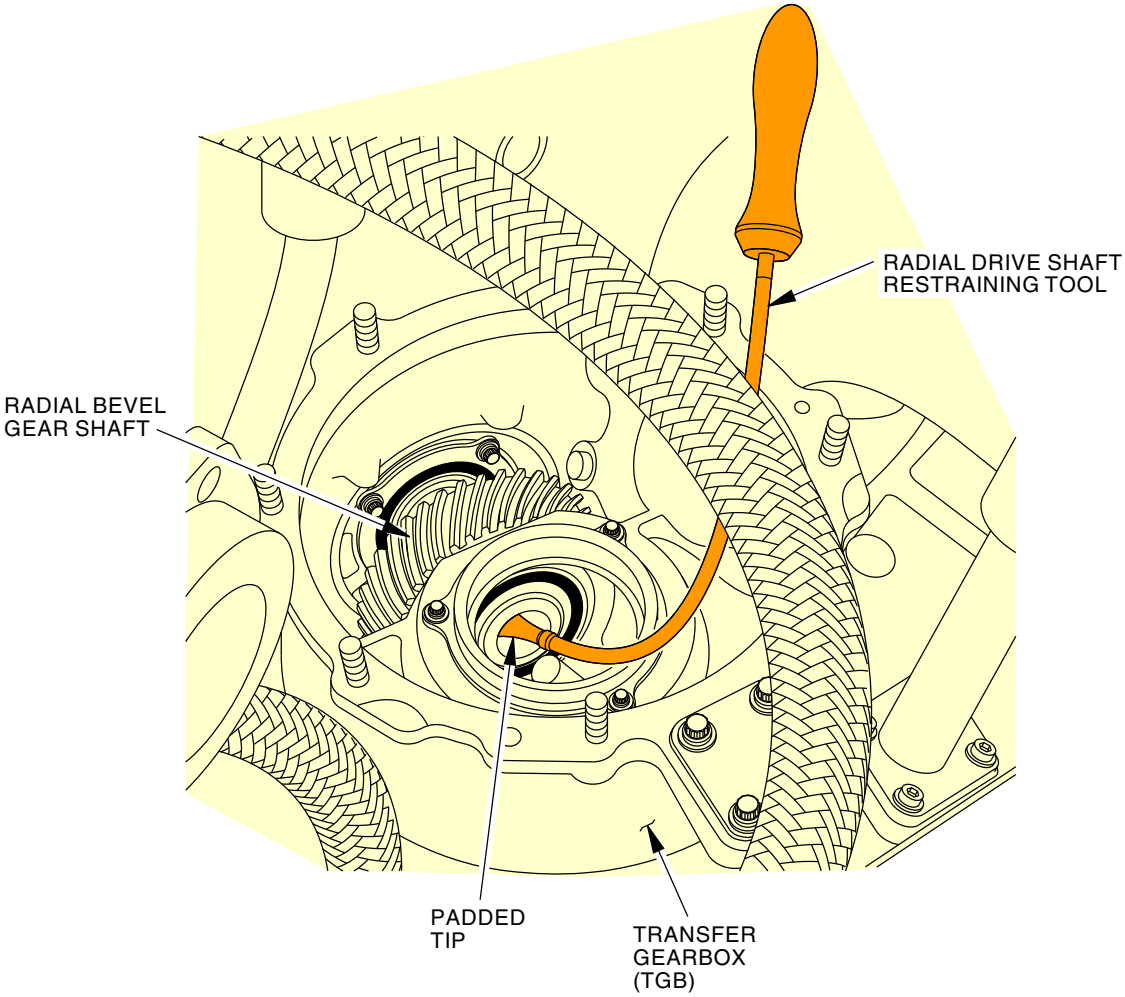


1 TOOL IS A BENT 0.25 INCH DIA. (6.3 mm) STEEL ROD WITH PLASTIC SLEEVE AND ENLARGED TIP TO PUSH AGAINST VERTICAL SHAFT.

5005156-00
2279937 S0000514244_V2

Radial Drive Shaft Restraining Tool Installation
Figure 403/72-62-01-990-803-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

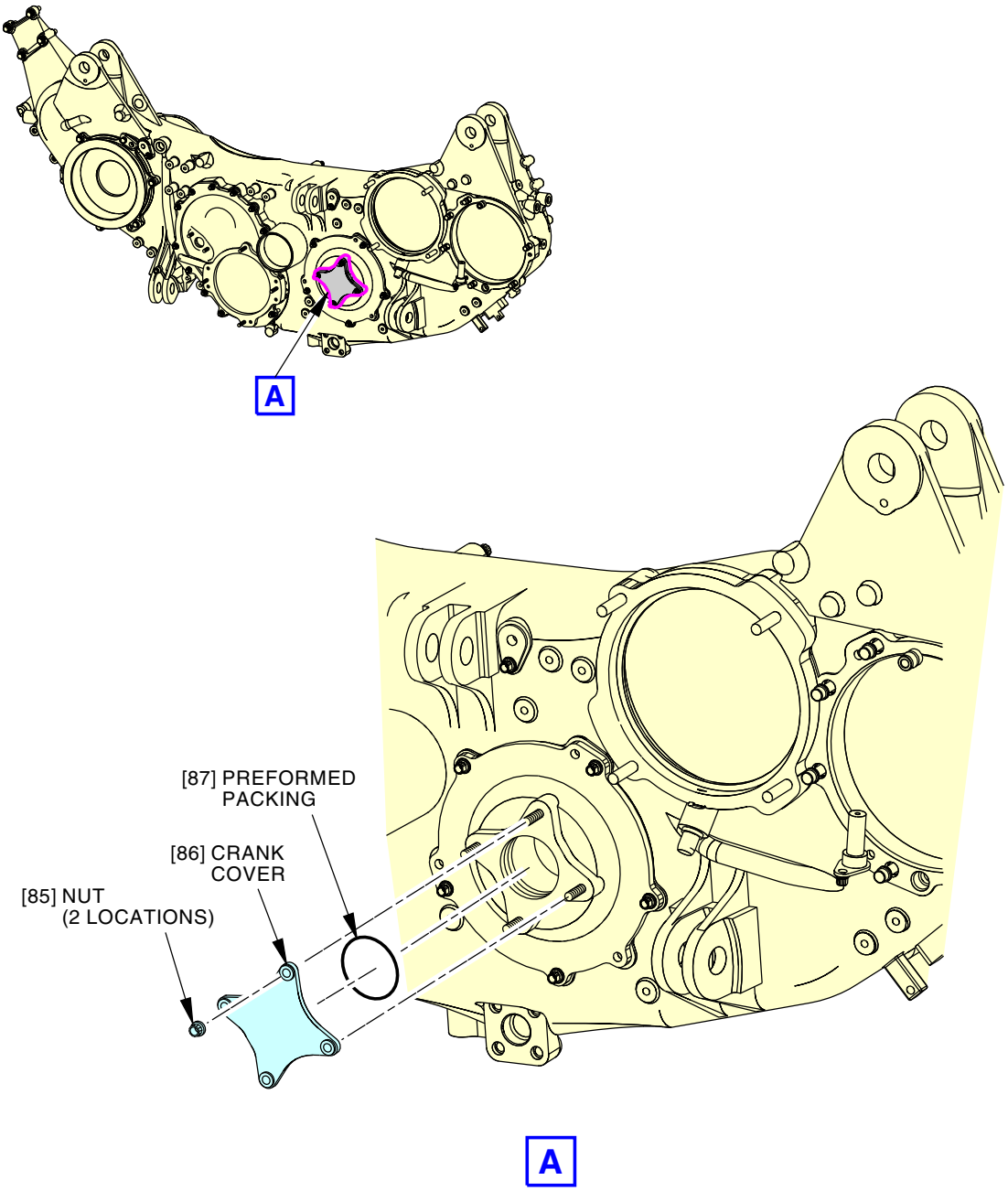


5005157-00

2279960 S0000514245_V2

Radial Drive Shaft Restraining Tool Installation
Figure 403/72-62-01-990-803-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



5005160-00
2280558 S0000514277_V2

AGB Crank Cover Installation
Figure 404/72-62-01-990-804-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 72-62-01-400-801-H00

3. Transfer Gearbox Installation

(Figure 401, Figure 402, Figure 403, and Figure 404)

A. General

(1) This task provides the instructions on how to install the transfer gearbox.

(2) The transfer gearbox is referred to as the TGB.

(3) The TGB [6] is attached to the Fan Hub Frame at 6:00 o'clock position.

(4) Make sure that you follow the product label and the manufacturer's (material) safety data sheet for instructions on the hazards, storage, safe handling and proper use of this product.

B. References

Reference	Title
12-13-01-130-803-002	Engine Oil Replenishing (P/B 301)
12-22-01-610-806-002	Flush the Oil Tank (P/B 301)
24-22-00-860-805	Supply Electrical Power (P/B 201)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
71-00-05-400-801-H01	Fan Stator Module to Engine Installation (P/B 401)
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)
79-00-00-200-804-H01	Engine Oil System (DMS) (Scheduled Maintenance Task) Inspection (P/B 601)
79-00-00-200-805-H01	Engine Oil System (Lube and Scavenge Pump Screens and Magnetic Plugs) Inspection (P/B 601)
80-11-01-400-801-H01	Engine Starter Installation (P/B 401)
80-11-02-400-801-H01	Starter Air Valve Installation (P/B 401)

C. Tools/Equipment

Reference	Description
STD-664	Pliers - Teflon-jawed (or Equivalent Soft-Jawed)
STD-1011	Wrench - Torque, 0 to 100 ft-lbs (0 to 135.58 N·m)
STD-3906	Mallet - Rubber
STD-6554	Gun - Heat

D. Consumable Materials

Reference	Description	Specification
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
D50072 [C02-023]	Oil - Engine Lubricating	MIL-PRF-23699
D50271 [C02-033]	Lubricant - Petrolatum, Soft	VV-P-236

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
2	Gasket	79-21-51-32-105	ARO ALL
6	TGB	72-23-00-01-030	ARO ALL

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
10	Preformed packing	80-11-01-01B-050	ARO ALL
12	Preformed packing	80-11-01-01B-035	ARO ALL
18	Preformed packing	72-64-01-04-130	ARO ALL
27	Preformed packing	72-62-51-08-045	ARO ALL
		72-64-01-04-130	ARO ALL
35	Gasket	79-21-51-31-110	ARO ALL
		79-21-51-32-095	ARO ALL
39	Gasket	79-21-51-31-110	ARO ALL
		79-21-51-32-100	ARO ALL
51	Preformed packing	72-62-51-08-030	ARO ALL
		72-64-01-02-045	ARO ALL
53	Gasket	79-21-51-32-095	ARO ALL
87	Preformed packing	72-64-01-02-045	ARO ALL

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. Transfer Gearbox Installation

SUBTASK 72-62-01-420-003-H00

(1) Install the TGB [6] housing on the fan hub frame (FHF) as follows:

(a) Apply a thin layer of engine lubricating oil, D50072 [C02-023] to the preformed packing [51] and lead-in chamfers on the spigot [52].

(b) Install the preformed packing [51] to the upper end groove on the spigot [52].

(c) Lift the TGB [6] to engage the radial drive shaft [50].

1) Turn the TGB [6] radial bevel gearshaft to engage the splines of the bevel gearshaft with the radial drive shaft [50].

(d) Attach the TGB [6] to the fan hub frame assembly as follows:

1) Apply a thin layer of Acheson GP460 compound, D50043 [C02-058] to the threads and friction surfaces of the bolts [47] and the bolts [49].

2) Install the six washers [48] on the bolts [49] through the flange of the TGB [6] and into the fan hub frame assembly at the 12:00, 4:00, 5:00, 6:00, 7:00, and 8:00 o'clock positions, aft looking forward.

a) Tighten the bolts [49] to 220-270 pound-inches (24.9-30.5 Newton-meters).

3) Install the four nuts [45], the washers [46], and the bolts [47] that attach the TGB [6] to the FHF at the 10:00, 11:00, 1:00, and 2:00 o'clock positions.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

a) Tighten the nuts [45] to 230-260 pound-inches (26.0-29.4 Newton-meters).

SUBTASK 72-62-01-420-005-H00

(2) Install the horizontal bevel gearshaft [30] and the horizontal support assembly [31] on the TGB [6] housing as follows:

(a) Apply a thin layer of engine lubricating oil, D50072 [C02-023] to the preformed packing [27] and install in the groove on the horizontal support assembly [31].

(b) Align the mounting holes of the horizontal support assembly [31] with the threaded studs in the TGB [6] housing.

(c) Make sure that the horizontal roller bearing [28] inner race engages in the horizontal roller bearing outer race in the TGB [6] housing.

(d) Make sure that the horizontal bevel gearshaft [30] gear teeth engage with the radial gearshaft gear teeth.

NOTE: If it is necessary, turn the horizontal bevel gearshaft [30] slightly to engage the gear teeth.

(e) Make sure that the preformed packing [27] on the horizontal support assembly [31] is correctly installed in the TGB [6] housing.

(f) Push the horizontal bevel gearshaft [30] and the horizontal support assembly [31] tight against the TGB [6] housing.

(g) Apply a thin layer of Acheson GP460 compound, D50043 [C02-058] on the threads of the studs.

NOTE: A pressure check is not required after the assembly.

1) Install the four washers [26] and the nuts [25] to the top four studs to secure the horizontal bevel gearshaft [30] and the horizontal support assembly [31] to the TGB [6] housing.

2) Tighten the nuts [25] to 55-70 pound-inches (6.2-7.9 Newton-meters).

(h) Install the bracket assembly [32] on the bottom four studs of the horizontal support assembly [31].

1) Apply a thin layer of Acheson GP460 compound, D50043 [C02-058] on the threads of the studs.

2) Install the four washers [26] and the nuts [25] on the bottom four studs of the horizontal support assembly [31].

3) Tighten the nuts [25] to 55-70 pound-inches (6.2- 7.9 Newton-meters).

NOTE: A pressure check is not required after the assembly.

SUBTASK 72-62-01-420-006-H00

(3) Prepare the horizontal shaft protector [9] for installation as follows:

(a) Apply the engine lubricating oil, D50072 [C02-023] to the new preformed packing [12] and the preformed packing [10].

(b) Apply the engine lubricating oil, D50072 [C02-023] to the lead-in chamfer of the horizontal shaft protector [9].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

INSTALLATION OF THE PREFORMED PACKING INTO THE AFT PREFORMED PACKING GROOVE CAN LEAD TO OIL LEAKS IN THE SPINNER CAVITY. DAMAGE TO THE ENGINE CAN OCCUR.

(c) Install the preformed packing [10] on the forward end of the horizontal shaft protector [9].

NOTE: Make sure that the preformed packing is not twisted, so that it fits in the groove correctly. If this is not done, it will increase the chances of inadvertent damage and possible oil leakage.

(d) Install the preformed packing [12] on the aft end of the horizontal shaft protector [9].

NOTE: Make sure that the preformed packing is not twisted, so that it fits in the groove correctly. If this is not done, it will increase the chances of inadvertent damage and possible oil leakage.

(e) Move the horizontal shaft protector [9] through the Accessory Gear Box (AGB) and connect loosely to the TGB [6].

SUBTASK 72-62-01-420-007-H00

(4) Install the roller bearing outer race [14] in the AGB casing as follows:

WARNING

YOU MUST WEAR THE APPLICABLE PROTECTIVE GLOVES WHEN YOU USE A HOT AIR GUN. THE PARTS OF A HOT AIR GUN GET HOT. IF YOU DO NOT OBEY THIS WARNING, AN INJURY CAN OCCUR.

(a) If it is necessary, apply heat, with a heat gun, STD-6554, to the AGB casing, where the roller bearing outer race [14] for the starter gearshaft [16] is installed.

NOTE: Do not increase the temperature over 150 F (65 C) degrees.

(b) Align the bolt holes in the roller bearing outer race [14] with the studs in the AGB casing.

(c) Install the roller bearing outer race [14] in the AGB casing.

(d) Apply the engine lubricating oil, D50072 [C02-023] to the threads of studs in the AGB casing.

(e) Attach the roller bearing outer race [14] to the AGB casing with the nuts [15].

1) Tighten the nuts [15] to 55-70 pound-inches (6.2-7.9 Newton-meters).

SUBTASK 72-62-01-420-008-H00

(5) Install the starter gearshaft [16] assembly and the starter housing [13] on the AGB casing as follows:

(a) Pack the bearing that mates to the roller bearing outer race [14] with soft petrolatum, D50271 [C02-033] to make sure rollers are held radially inward against inner race during gear re-installation.

(b) Apply the engine lubricating oil, D50072 [C02-023] to a new preformed packing [18].

1) Install the new preformed packing [18] in the starter housing [13].

(c) Apply the engine lubricating oil, D50072 [C02-023] in the roller bearing outer race [14] in the AGB casing.

(d) Align the boltholes in the starter housing [13] with the boltholes in the AGB casing.

NOTE: Make sure that you install the inner race of the bearing in the outer race correctly. You can turn the AGB as you re-install the gear to reduce the potential for damage.

1) Install the starter gearshaft [16] and the starter housing [13] onto the AGB casing.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(e) Make sure the gears turn without resistance.

(f) Apply the engine lubricating oil, D50072 [C02-023] to the bolts [20] threads.

1) Attach the starter housing [13] to the AGB casing with the eight bolts [20] and the washers [19].

2) Tighten the bolts [20] to 100-130 pound-inches (11.3-14.7 Newton-meters).

SUBTASK 72-62-01-420-009-H00

(6) Install the horizontal driveshaft [11] on the TGB [6] as follows:

(a) If it is removed, make sure that the spirolox is installed in the internal diameter (ID) groove at the forward end of the horizontal driveshaft [11].

(b) Move the horizontal driveshaft [11] forward to the edge of the horizontal bevel gearshaft [30].

(c) Align the splines of the horizontal driveshaft [11] with the splines of the horizontal bevel gearshaft [30].

(d) If the splines do not align, turn the AGB gears as follows:

1) Remove the four nuts [85] from the crank cover [86] on the forward side of the AGB.

a) Remove the crank cover [86].

b) Discard the preformed packing [87].

2) Use a 1/2-inch drive ratchet and extension to turn the AGB shaft.

a) Align the splines of the horizontal shaft with the splines of the horizontal bevel gearshaft [30].

(e) Use your hand to move the horizontal driveshaft [11] forward into the horizontal bevel gearshaft [30] as far as possible.

(f) Make sure that the horizontal driveshaft [11] is fully installed as follows:

1) Put a nylon drift through the starter pad on the aft side of the AGB until the nylon drift touches the aft side of the horizontal driveshaft [11].

2) Use a rubber mallet, STD-3906 to hit the nylon drift with a firm steady blow to fully install the horizontal driveshaft [11] in the horizontal bevel gearshaft [30].

(g) Make sure that the AGB, TGB [6], inlet gearbox (IGB), and core are free to turn, as follows:

1) Use a 1/2-inch drive extension and a torque wrench, STD-1011 and turn the AGB shaft in a counterclockwise direction (aft looking forward) for two turns minimum.

2) Make sure that the force necessary to turn the AGB shaft is no more than 50 lb-ft (68 Newton-meters).

3) While you turn the AGB shaft, listen for any unusual sound.

(h) If you removed the crank cover [86], install the crank cover [86] on the AGB as follows:

1) Install the new preformed packing [87] on the crank cover [86].

2) Install the crank cover [86] with the nuts [85].

a) Tighten the nuts [85] to 55-70 pound-inches (6.2-7.9 Newton-meters).

(i) Attach the horizontal shaft protector [9] to the transfer gearbox with the retaining ring [7] and the nuts [8].

1) Tighten the nuts [8] to 110-120 pound-inches (12.4-13.6 Newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-62-01-420-010-H00

(7) Install the scavenge oil tube [3] on the TGB [6] port at the 6:00 o'clock position as follows:

(a) Install the gasket [2] on the port.

(b) Install the scavenge oil tube [3] and secure with the four bolts [1].

(c) Tighten the bolts [1] to 109-127 pound-inches (12.3-14.3 Newton-meters).

SUBTASK 72-62-01-420-025-H00

(8) Connect the lube tube [4] to the fitting at the 9:00 o'clock position on the TGB [6].

(a) Tighten the lube tube [4] B-nut to 265-305 pound-inches (29.9-34.5 Newton-meters).

SUBTASK 72-62-01-420-026-H00

(9) Connect the oil hose [5] to the fitting at the 1:00 o'clock position on the TGB [6].

(a) Tighten the oil hose [5] B-nut to 265-305 pound-inches (29.9-34.5 Newton-meters).

SUBTASK 72-62-01-610-002-H00

(10) Make sure the starter is filled with oil (TASK 80-11-01-400-801-H01).

SUBTASK 72-62-01-420-011-H00

(11) Install the starter (TASK 80-11-01-400-801-H01).

SUBTASK 72-62-01-420-012-H00

(12) Install the starter air valve (TASK 80-11-02-400-801-H01).

SUBTASK 72-62-01-420-013-H00

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR AND RECEPTACLE ARE CLEAN WHEN YOU CONNECT THEM. DIRTY CONNECTORS CAN CAUSE DAMAGE TO EQUIPMENT.

CAUTION USE TEFLON-JAWED PLIERS TO TIGHTEN THE ELECTRICAL CONNECTORS. DO NOT USE METAL-JAWED PLIERS. DAMAGE TO THE ELECTRICAL CONNECTORS COULD OCCUR.

(13) Connect the electrical connectors to the starter air valve and the control alternator.

SUBTASK 72-62-01-420-014-H00

(14) Install the drain and service module assembly as follow:

(a) Install the lower bifurcation assembly (TASK 71-00-05-400-801-H01).

(b) Do a high pressure leak check on the PS3 tube (TASK 71-00-05-400-801-H01).

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR AND RECEPTACLE ARE CLEAN WHEN YOU CONNECT THEM. DIRTY CONNECTORS CAN CAUSE DAMAGE TO EQUIPMENT.

CAUTION USE TEFLON-JAWED PLIERS TO TIGHTEN THE ELECTRICAL CONNECTORS. DO NOT USE METAL-JAWED PLIERS. DAMAGE TO THE ELECTRICAL CONNECTORS COULD OCCUR.

(c) Use the teflon-jawed pliers, STD-664 to connect the electrical connectors to the receptacles at the support bracket (7:00 o'clock position) of the fan stator module.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Install the electrical harnesses W737, W723, W727, W739, and W721 in the spring clips on the right side of the lower bifurcation assembly.
2) Install the electrical harnesses W722, W738, W724, W728, and W729 in the spring clips on the left side of the lower bifurcation assembly.
3) Use the teflon-jawed pliers, STD-664 to connect the electrical connectors to the receptacles at the support bracket (6:00 o'clock position) of the fan stator module.

SUBTASK 72-62-01-420-019-H00

(15) If the TGB [6] was replaced as an unit with additional hardware removed in the removal task, re-install the removed hardware (where appropriate) as follows:

(a) If the air duct [71] is removed, install the air duct [71] on the fan hub frame as follows (Figure 402):

1) Find the pads on the aft side of the fan hub frame near the 5:15 and 6:45 o'clock positions.
2) At each location, put the flange of an air duct, with the large opening outboard, on the two studs on the outboard side of the pad and install the nuts.

NOTE: Lubrication of the stud threads with Acheson GP460 compound, D50043 [C02-058] before installation of the air duct is optional, bolts are not lubricated

3) Install two bolts [73] through the flange.
4) Tighten the bolts [73] and the nuts [72] to 109-127 pound-inches (12.3-14.3 Newton-meters).

(b) Install the forward A-sump oil scavenge tube [37], on the left side of the lube pump and on the fan hub frame as follows:

1) Apply a thin layer of engine lubricating oil, D50072 [C02-023] to the seal surfaces of the gasket [35].
2) Align the gasket [35] and the flange of the A-sump oil scavenge tube [37] on the open port at the 5:30 o'clock position on the fan hub frame.
3) Attach the gasket [35] and the A-sump oil scavenge tube [37] to the fan hub frame with the bolts [36].
   a) Hand tighten the bolts [36].
4) Apply a thin layer of engine lubricating oil, D50072 [C02-023] to the seal surfaces of the gasket [39].
5) Align the gasket [39] and the flange (on the elbow end) of the A-sump oil scavenge tube [37] on forward port on the left side of the lube pump.
6) Attach the gasket [39] and the A-sump oil scavenge tube [37] to the lube pump port with the four bolts [38].
   a) Tighten the bolts [38].
7) Tighten the bolts [36] and the bolts [38] at the A-sump oil scavenge tube [37] flanges to 109-127 pound-inches (12.3-14.3 Newton-meters).

(c) Service the oil tank (TASK 12-13-01-130-803-002).

(d) Install the hose oil tube [55] on the lube unit as follows:

1) Use the gasket [53] and the bolts [54].
2) Tighten the bolts [54] to 109-127 pound-inches (12.3-14.3 Newton-meters).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-62-01-420-027-H00

(16) If the surrounding drain tubes restraining “P” clamps are disconnected, connect the restraining “P” clamps.

SUBTASK 72-62-01-170-001-H00

(17) If the TGB [6] was replaced because of unwanted material found in the DMS/MCD, then Flush the Oil Tank (TASK 12-22-01-610-806-002).

NOTE: This task will remove any unwanted material from the removed TGB [6]. This will also prevent unwanted material collected by the DMS or MCD being transferred to the replacement TGB [6].

H. Put the Airplane Back to Its Usual Condition

SUBTASK 72-62-01-860-002-H00

(1) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-62-01-410-001-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

(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.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-62-01-860-003-H00

(3) Supply the electrical power (TASK 24-22-00-860-805).

I. Transfer Gearbox Test

SUBTASK 72-62-01-710-001-H00

(1) Do the test(s) listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

SUBTASK 72-62-01-210-001-H00

(2) After 2-10 flight cycles. do a one-time check of the DMS sensor and Lube and Scavenge Pump Screens and Magnetic Plugs for debris.

(a) Do this task: Engine Oil System (DMS) (Scheduled Maintenance Task) Inspection, TASK 79-00-00-200-804-H01.

(b) Do this task: Engine Oil System (Lube and Scavenge Pump Screens and Magnetic Plugs) Inspection, TASK 79-00-00-200-805-H01.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ACCESSORY GEARBOX SEAL - REMOVAL/INSTALLATION

1. General

A. This procedure contains two tasks:

(1) A removal of the hydromechanical unit (HMU), main fuel pump (MFP), engine driven pump (EDP), integrated drive generator (IDG), and backup generator (BUG) seals and mating rings.

(2) An installation of the HMU, MFP, EDP, IDG, and BUG seals.

TASK 72-64-01-020-801-H01

2. Accessory Gearbox Sealol Face Seal Removal

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406 and Figure 407)

A. General

(1) This task is to remove the applicable Accessory Gear Box (AGB) sealol face seals and mating rings.

(a) You must open the thrust reverser to access the AGB.

B. References

Reference	Title
24-11-01-000-801-001	IDG Removal (P/B 401)
24-25-01-000-804-001	Backup Generator 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)
29-11-05-000-801-002	Engine-Driven Pump (EDP) Removal (P/B 401)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
73-11-01-000-801-H01	Main Fuel Pump Removal (P/B 401)
73-21-14-000-801-H01	Hydromechanical Unit Removal (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)

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-314	Extractor - Mating Ring (9486M86G01 part of 9C1927G01) Part #: 9C1927G01 Supplier: 06083
SPL-315	Extractor - Mating Ring (9486M87G01 part of kit 9C1928G01 or 9C1928G02) Part #: 9C1928G01 Supplier: 06083 Part #: 9C1928G02 Supplier: 06083
SPL-316	Extractor - Mating Ring (9486M88G01 part of kit 9C1929G01) Part #: 9C1929G01 Supplier: 06083
SPL-317	Extractor - Seal (9485M75G01 part of kit 9C1927G01) Part #: 9C1927G01 Supplier: 06083

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description
SPL-318	Extractor - Seal (9485M76G01 part of kit 9C1928G01 or 9C1928G02) Part #: 9C1928G01 Supplier: 06083 Part #: 9C1928G02 Supplier: 06083
SPL-319	Extractor - Seal (9485M77G01 part of kit 9C1929G01) Part #: 9C1929G01 Supplier: 06083
SPL-14848	Extractor - Mating Ring (9486M88G02, part of kit 9C1929G02) Part #: 9C1929G02 Supplier: 06083
SPL-16237	Extractor - Mating Ring (9486M87G02 part of kit 9C1928G02) Part #: 9C1928G02 Supplier: 06083

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 72-64-01-865-002-H01

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-64-01-010-002-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

(2) 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

G. Accessory Gearbox Sealol Face Seal Removal

NOTE: You must remove the carbon seal and its mating ring at the same time.

SUBTASK 72-64-01-020-001-H01

(1) Remove the Hydro-Mechanical Unit (HMU) sealol face seal [1] and the mating ring [3].

(a) Do this task: Hydromechanical Unit Removal, TASK 73-21-14-000-801-H01.

(b) Remove the bolts [6] and washers [5] from the HMU sealol face seal [1] housing.

(c) Put the seal extractor, SPL-317 on the HMU sealol face seal [1] housing.

1) Put the centering ring part of the seal extractor, SPL-317 on the lip of the sealol face seal [1] housing.

2) Move the slide hammer part of the seal extractor, SPL-317 forward and aft to remove the sealol face seal [1] housing.

(d) Remove and discard the preformed packing [2] from the sealol face seal [1] housing.

(e) Put the sealol face seal [1] housing in a protective cover.

(f) Put the mating ring extractor, SPL-314 on the mating ring [3].

1) Put the centering ring part of the mating ring extractor, SPL-314 on the lip of the mating ring [3].

2) Move the slide hammer part of the mating ring extractor, SPL-314 forward and aft to remove the mating ring [3].

(g) Remove and discard the preformed packing [4] from the mating ring [3].

(h) Put the mating ring [3] in a protective cover.

(i) Install protective covers in the fuel ports in the fuel adapter and in the AGB drive.

SUBTASK 72-64-01-020-002-H01

(2) Remove the MFP sealol face seal [21] and the mating ring [23].

(a) Do this task: Main Fuel Pump Removal, TASK 73-11-01-000-801-H01.

(b) Remove the bolts [26] and washers [25] from the MFP sealol face seal [21] housing.

(c) Put the seal extractor, SPL-317 on the MFP sealol face seal [21] housing.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Put the centering ring part of the seal extractor, SPL-317 on the lip of the sealol face seal [21] housing.
2) Move the slide hammer part of the seal extractor, SPL-317 forward and aft to remove the sealol face seal [21] housing.

(d) Remove and discard the preformed packing [22] from the sealol face seal [21] housing.

(e) Put the sealol face seal [21] housing in a protective cover.

(f) Put the mating ring extractor, SPL-314 on the mating ring [23].
1) Put the centering ring part of the mating ring extractor, SPL-314 on the lip of the mating ring [23].
2) Move the slide hammer part of the mating ring extractor, SPL-314 forward and aft to remove the mating ring [23].

(g) Remove and discard the preformed packing [24] from the mating ring [23].

(h) Put the mating ring [23] in a protective cover.

(i) Install protective covers in the fuel ports in the fuel adapter and in the AGB drive.

SUBTASK 72-64-01-020-003-H01

(3) Remove the Engine Driven Pump (EDP) sealol face seal [41] and the mating ring [43].

(a) Do this task: Engine-Driven Pump (EDP) Removal, TASK 29-11-05-000-801-002.

(b) Remove the bolts [46] and washers [45] from the EDP sealol face seal [41] housing.

(c) Put the seal extractor, SPL-317 on the EDP sealol face seal [41] housing.
1) Put the centering ring part of the seal extractor, SPL-317 on the lip of the sealol face seal [41].
2) Move the slide hammer part of the seal extractor, SPL-317 forward and aft to remove the sealol face seal [41] housing.

(d) Remove and discard the preformed packing [42] from the sealol face seal [41] housing.

(e) Put the sealol face seal [41] housing in a protective cover.

(f) Put the mating ring extractor, SPL-316 on the mating ring [43].
1) Put the centering ring part of the mating ring extractor, SPL-316 on the lip of the mating ring [43].
2) Move the slide hammer part of the mating ring extractor, SPL-316 forward and aft to remove the mating ring [43].

(g) Remove and discard the preformed packing [44] from the mating ring [43].

(h) Put the mating ring [43] in a protective cover.

(i) Install a protective cover in the AGB drive.

SUBTASK 72-64-01-020-004-H01

(4) Remove the Integrated Drive Generator (IDG) sealol face seal [61] and the mating ring [63].

NOTE: The Pre and Post SB 72-0741 mating rings are different in outer diameter. Different extractor tools are necessary to remove the mating ring. The carbon seal extractor tool stays the same.

NOTE: The Pre SB 72-0741 IDG carbon seal housing is yellow in color and the mating ring has a flat surface. The Post SB 72-0741 IDG carbon seal housing is black in color and the mating ring has lift-off grooves on the surface.

NOTE: If it is necessary to replace the Pre and Post SB 72-0741 carbon seal and mating ring, they must be replaced as a set.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(a) Do this task: IDG Removal, TASK 24-11-01-000-801-001.

(b) Remove the bolts [66] and washers [65] from the IDG sealol face seal [61] housing.

(c) Put the seal extractor, SPL-318 on the IDG sealol face seal [61] housing.

1) Put the centering ring part of the seal extractor, SPL-318 on the lip of the sealol face seal [61] housing.

2) Move the slide hammer part of the seal extractor, SPL-318 forward and aft to remove the sealol face seal [61] housing.

(d) Remove and discard the preformed packing [62] from the sealol face seal [61] housing.

(e) Put the sealol face seal [61] housing in a protective cover.

ARO ALL PRE SB 777-GE100-72-0741

(f) Put the mating ring extractor, SPL-315 on the mating ring [63].

1) Put the centering ring part of the mating ring extractor, SPL-315 on the lip of the mating ring [63].

2) Move the slide hammer part of the mating ring extractor, SPL-315 forward and aft to remove the mating ring [63].

ARO ALL POST SB 777-GE100-72-0741

(g) Put the mating ring extractor, SPL-16237 on the mating ring [63].

1) Put the centering ring part of the mating ring extractor, SPL-16237 on the lip of the mating ring [63].

2) Move the slide hammer part of the mating ring extractor, SPL-16237 forward and aft to remove the mating ring [63].

ARO ALL

(h) Remove and discard the preformed packing [64] from the mating ring [63].

(i) Put the mating ring [63] in a protective cover.

(j) Install a protective cover in the AGB drive.

SUBTASK 72-64-01-020-005-H01

(5) Remove the backup generator (BUG) sealol face seal [81] and the mating ring [83].

NOTE: The Pre and Post SB 72-0694 mating rings are different in outer diameter. Different extractor tools are necessary to remove the mating ring. The carbon seal extractor tool stays the same.

NOTE: The Pre SB 72-0694 BUG carbon seal housing is yellow in color and the mating ring has a flat surface. The Post SB 72-0694 BUG carbon seal housing is black in color and the mating ring has lift-off grooves on the surface.

NOTE: If it is necessary to replace the Pre and Post SB 72-0694 carbon seal and mating ring, they must be replaced as a set.

(a) Do this task: Backup Generator Removal, TASK 24-25-01-000-804-001.

(b) Remove the bolts [86] and washers [85] from the BUG sealol face seal [81] housing.

(c) Put the seal extractor, SPL-319 on the BUG sealol face seal [81] housing.

1) Put the centering ring part of the seal extractor, SPL-319 on the lip of the sealol face seal [81] housing.

2) Move the slide hammer part of the seal extractor, SPL-319 forward and aft to remove the sealol face seal [81] housing.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Remove and discard the preformed packing [82] from the sealol face seal [81] housing.

(e) Put the sealol face seal [81] housing in a protective cover.

ARO ALL PRE SB 777-GE100-72-0694

(f) Put the mating ring extractor, SPL-316 on the mating ring [83].

1) Put the centering ring part of the mating ring extractor, SPL-316 on the lip of the mating ring [83].

2) Move the slide hammer part of the mating ring extractor, SPL-316 forward and aft to remove the mating ring [83].

ARO ALL POST SB 777-GE100-72-0694

(g) Put the mating ring extractor, SPL-14848 on the mating ring.

1) Put the centering ring part of the mating ring extractor, SPL-14848 on the lip of the mating ring [83].

2) Move the slide hammer part of the mating ring extractor, SPL-14848 forward and aft to remove the mating ring [83].

ARO ALL

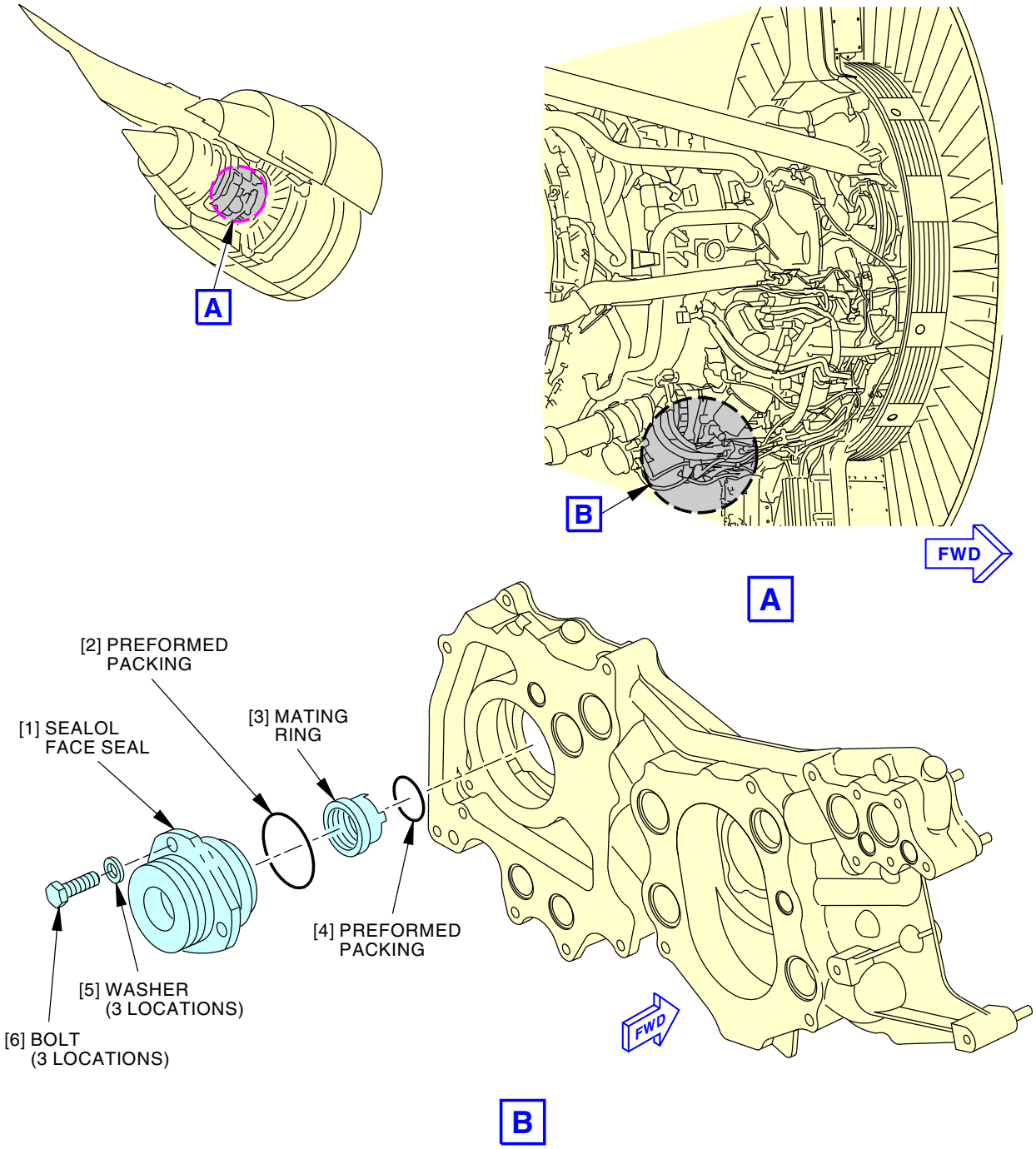
(h) Remove and discard the preformed packing [84] from the mating ring [83].

(i) Put the mating ring [83] in a protective cover.

(j) Install a protective cover in the AGB drive.

——— END OF TASK ———

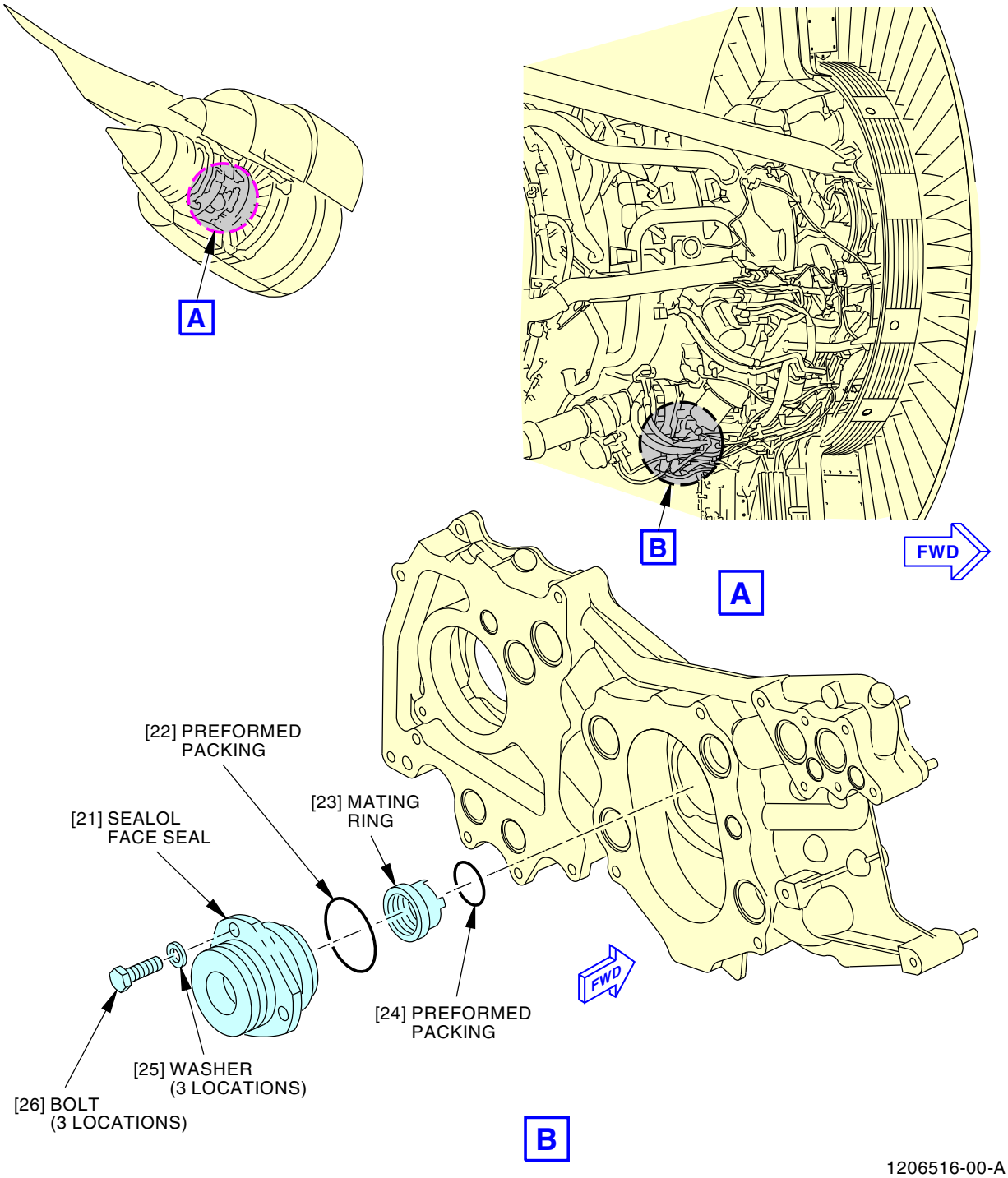
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1206515-00-A
M06873 S0004285896_V2

HMU Sealol Face Seal Installation
Figure 401/72-64-01-990-801-H01

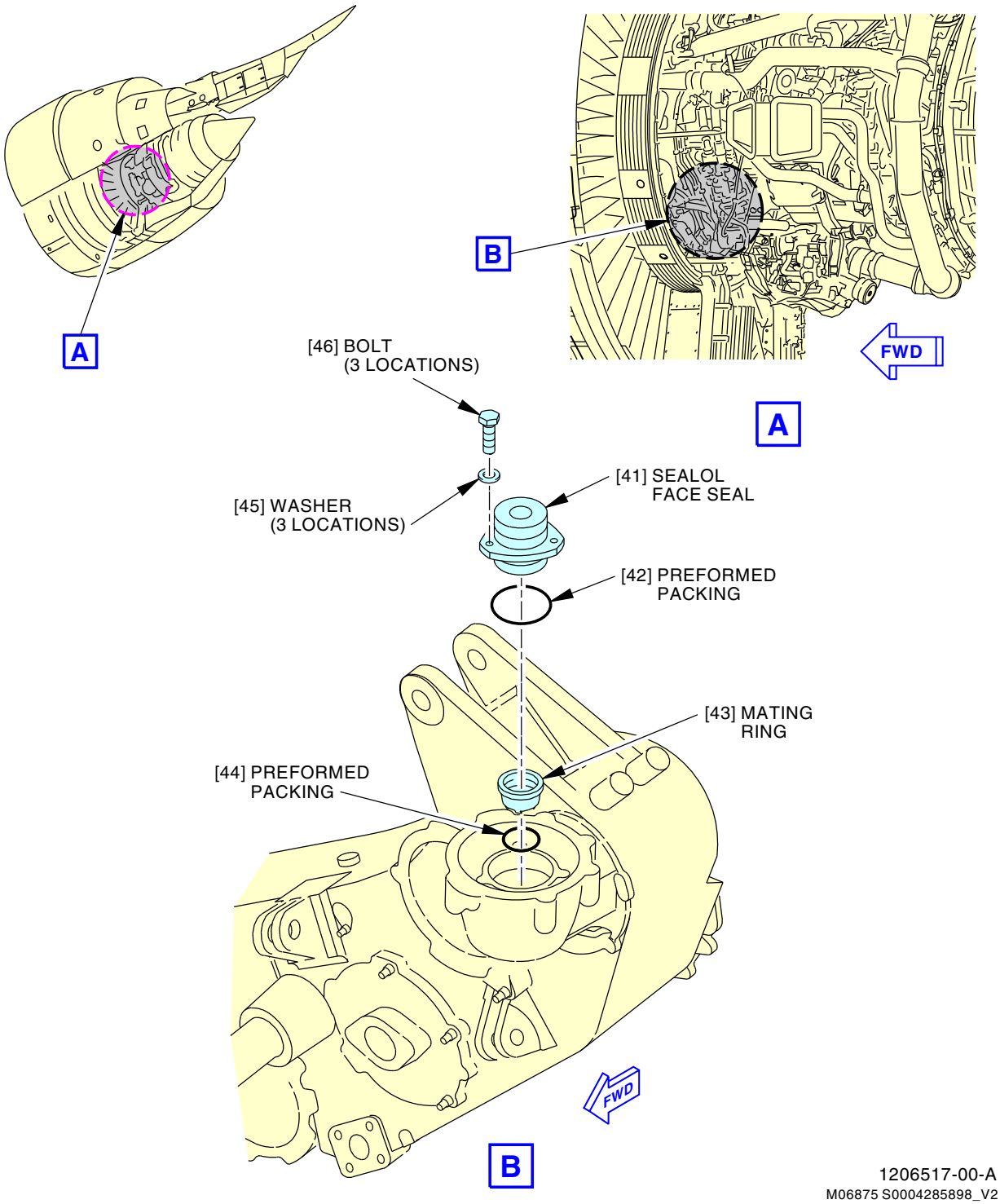
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1206516-00-A
M06874 S0004285897_V2

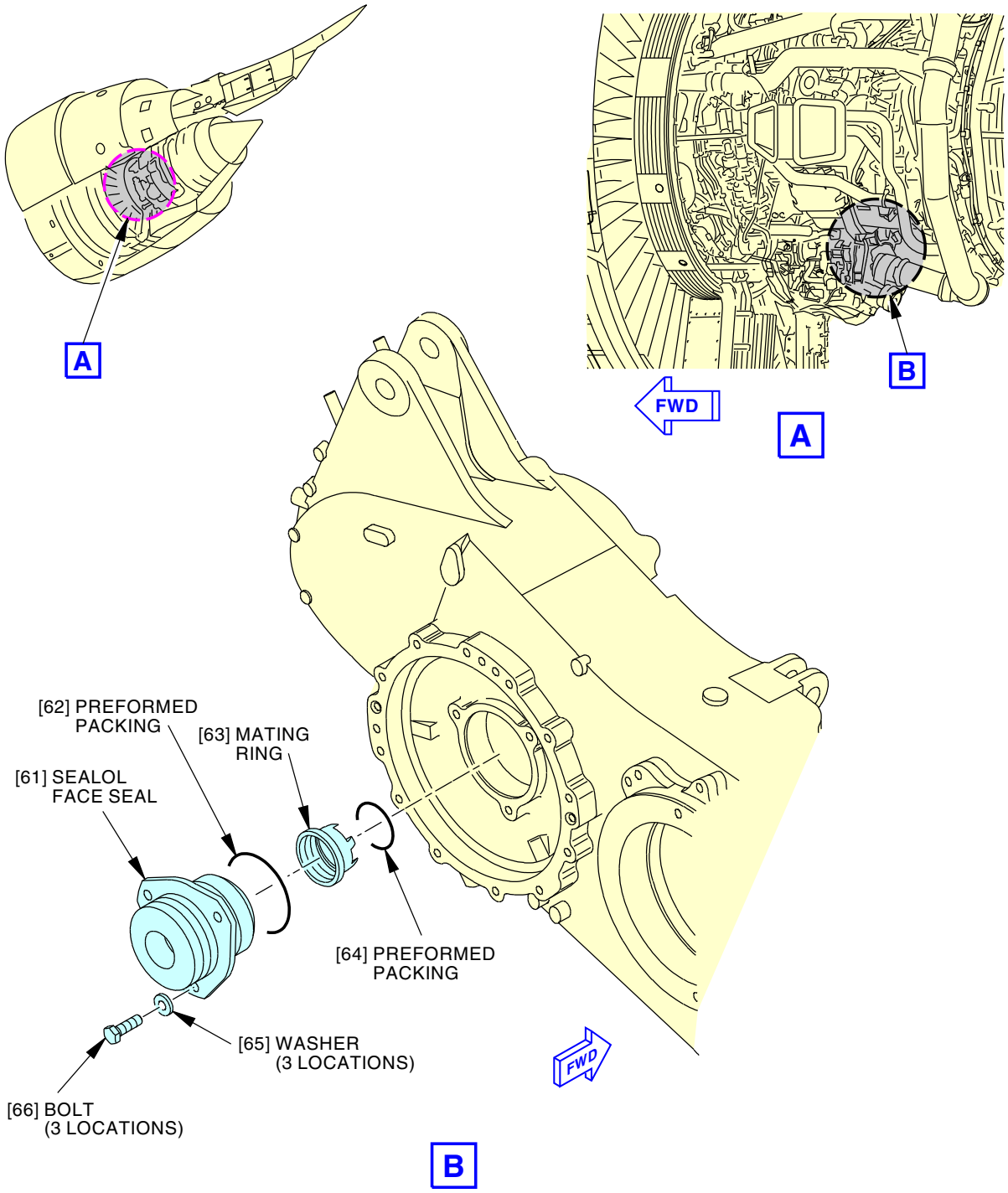
MFP Sealol Face Seal Installation
Figure 402/72-64-01-990-806-H01

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



EDP Sealol Face Seal Installation
Figure 403/72-64-01-990-807-H01

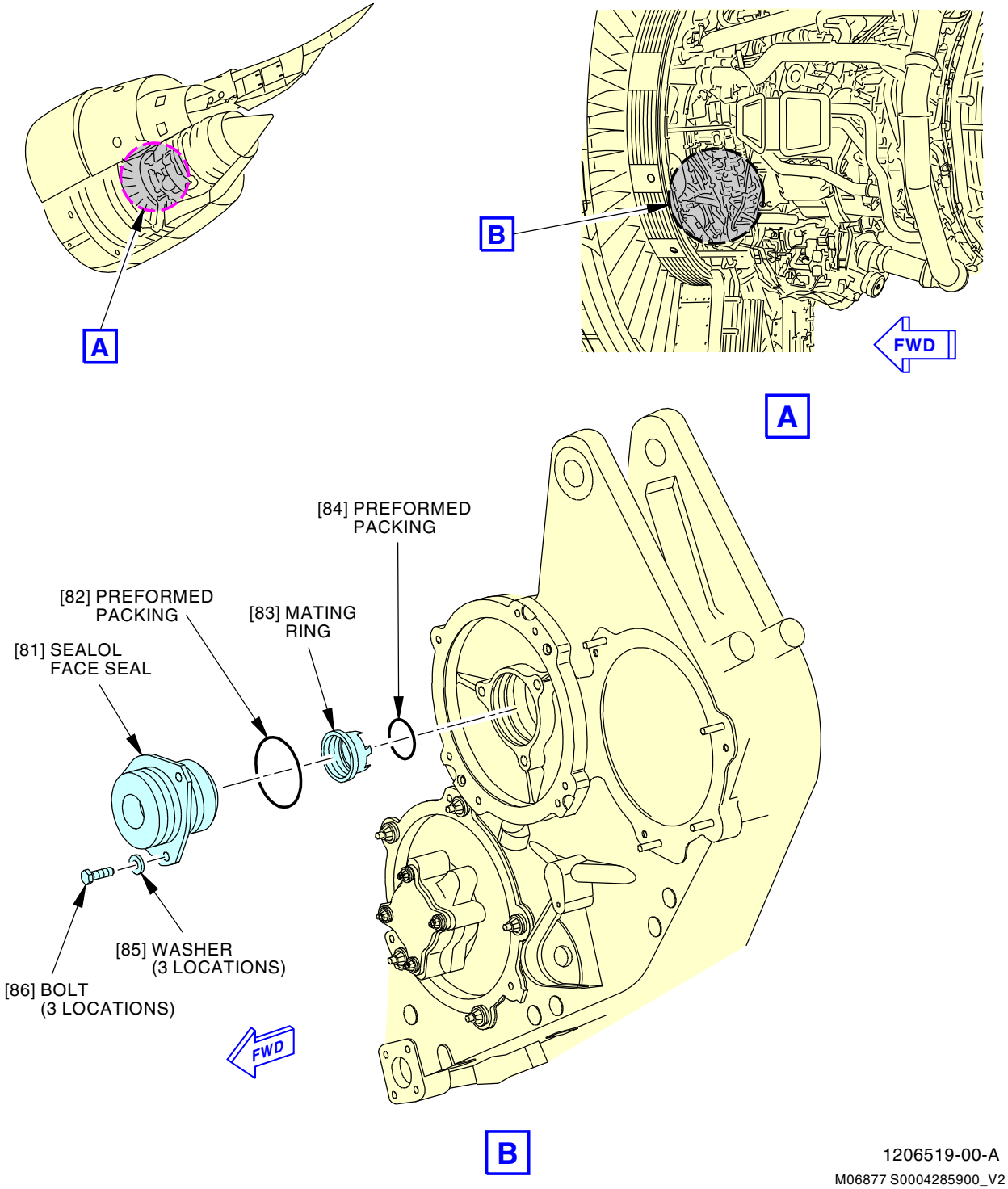
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1206518-00-A
M06876 S0004285899_V2

IDG Sealol Face Seal Installation
Figure 404/72-64-01-990-808-H01

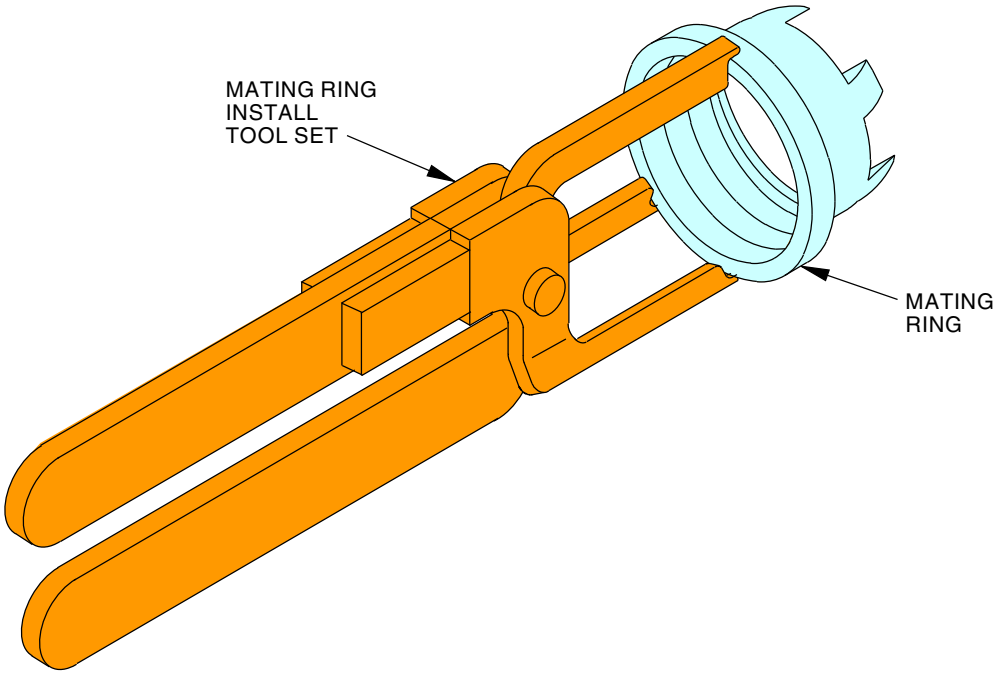
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1206519-00-A
M06877 S0004285900_V2

BUG Sealol Face Seal Installation
Figure 405/72-64-01-990-809-H01

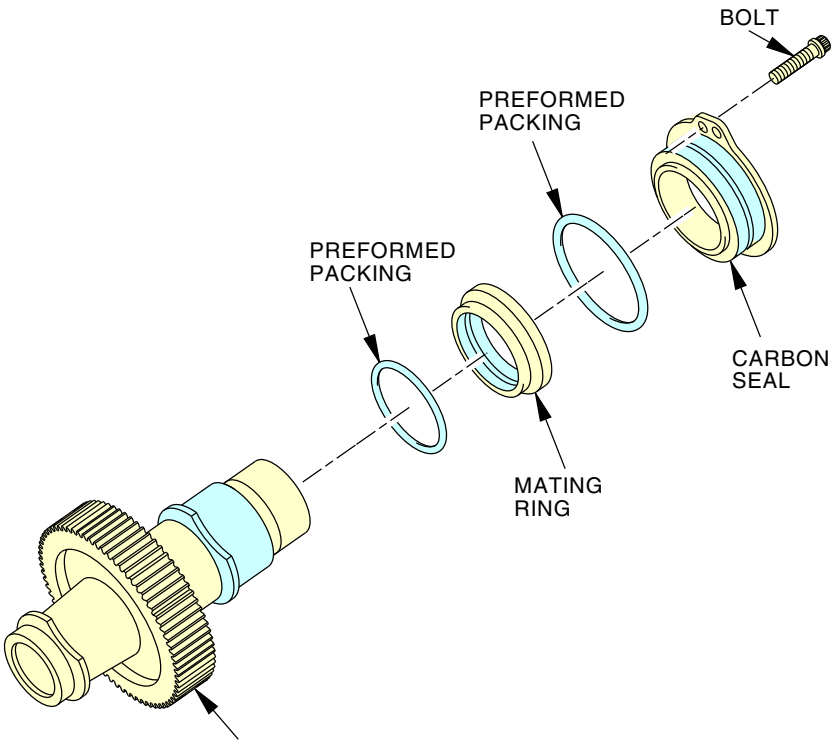
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1209213-00
W60594 S0000126776_V2

Mating Ring Installation
Figure 406/72-64-01-990-810-H01

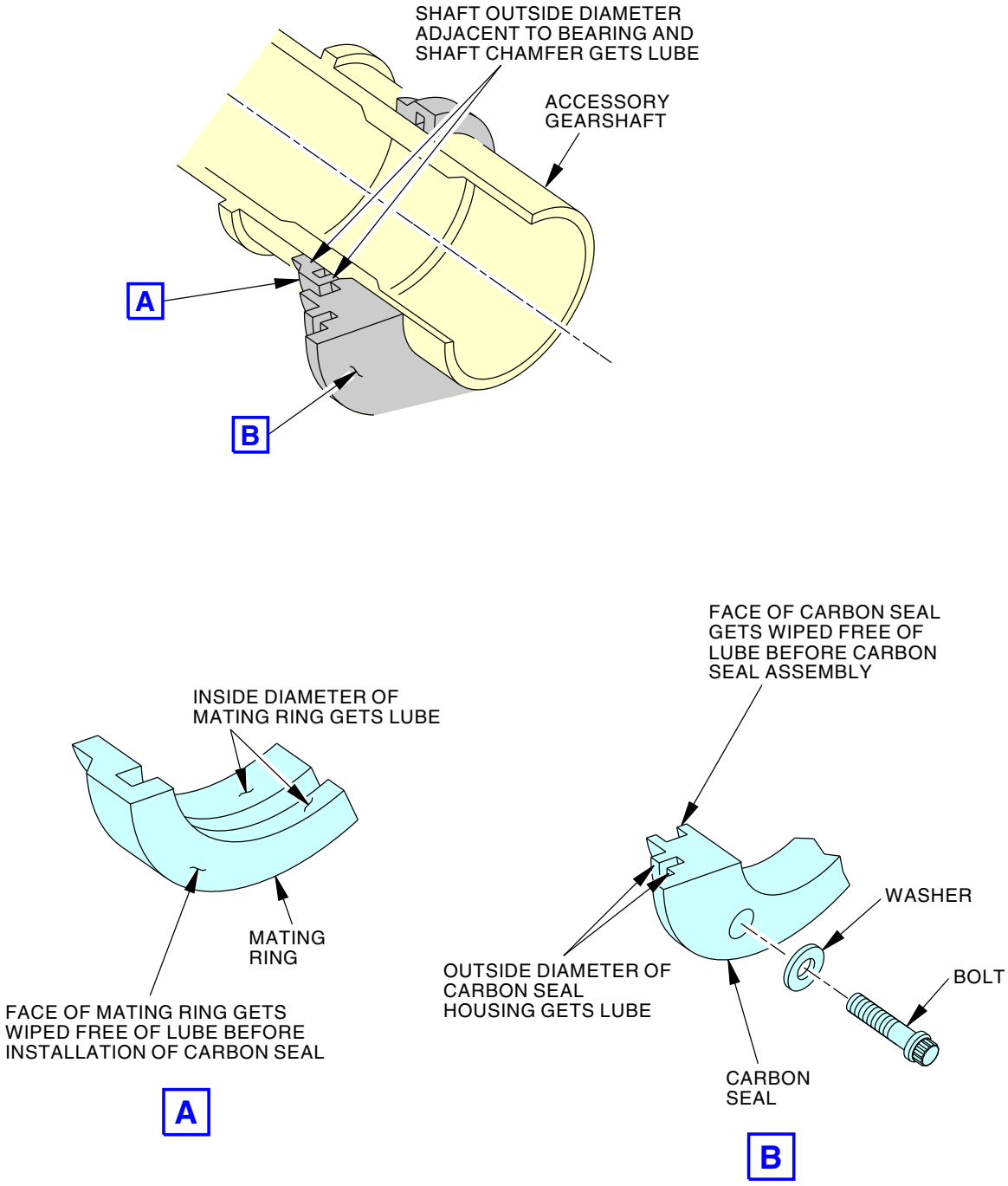
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2548089 S0000604273_V1

Carbon Seal Installation
Figure 407/72-64-01-990-811-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Carbon Seal Installation
Figure 407/72-64-01-990-811-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 72-64-01-420-801-H01

3. Accessory Gearbox Sealol Face Seal Installation

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406 and Figure 407)

A. General

(1) This task installs the applicable Accessory Gear Box (AGB) sealol face seals and mating rings.

(2) After a seal replacement, you must do the applicable tests in the Power Plant Test Reference Table.

B. References

Reference	Title
24-11-01-400-801-001	IDG Installation (P/B 401)
24-25-01-400-804-001	Backup Generator Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
29-11-05-400-801-002	Engine-Driven Pump (EDP) Installation (P/B 401)
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
73-11-01-400-801-H01	Main Fuel Pump Installation (P/B 401)
73-21-14-400-801-H01	Hydromechanical Unit Installation (P/B 401)
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-4126	Tool Set - Installation, Accessory Gearbox Mating Ring Part #: 9C1369G01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D00068	Oil - Aircraft Turbine Engine, Synthetic Base	MIL-PRF-23699 Class STD (Standard)

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	Sealol face seal	72-64-01-05-010	ARO ALL
2	Preformed packing	72-64-01-05-020	ARO ALL
3	Mating ring	72-64-01-05-025	ARO ALL
4	Preformed packing	72-64-01-05-030	ARO ALL
21	Sealol face seal	72-64-01-05-045	ARO ALL
22	Preformed packing	72-64-01-05-050	ARO ALL
23	Mating ring	72-64-01-05-055	ARO ALL
24	Preformed packing	72-64-01-05-060	ARO ALL
41	Sealol face seal	72-64-01-01-030	ARO ALL
42	Preformed packing	72-64-01-01-035	ARO ALL
43	Mating ring	72-64-01-01-040	ARO ALL

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

AMM Item	Description	AIPC Reference	AIPC Effectivity
44	Preformed packing	72-64-01-01-045	ARO ALL
61	Sealol face seal	72-64-01-04-025	ARO ALL
62	Preformed packing	72-64-01-04-030	ARO ALL
63	Mating ring	72-64-01-04-045	ARO ALL
64	Preformed packing	72-64-01-04-035	ARO ALL
81	Sealol face seal	72-64-01-02-025	ARO ALL
82	Preformed packing	72-64-01-02-030	ARO ALL
83	Mating ring	72-64-01-02-060	ARO ALL
84	Preformed packing	72-64-01-02-035	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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

H. Accessory Gearbox Sealol Face Seal Installation

CAUTION MATING SURFACES OF THE CARBON SEAL AND THE MATING RING MUST BE CLEAN AND DRY BEFORE ASSEMBLY. ASSEMBLY FLUID, OIL OR UNWANTED MATERIAL ON THESE MATING SURFACES CAN COKE DURING SEAL RUN-IN AND CAUSE OIL LEAKS.

NOTE: Refer to Figure 407 for surfaces to be lubricated before assembly.

SUBTASK 72-64-01-420-001-H01

NOTE: When you replace an AGB carbon seal (face seal), you must also replace the mating ring. You can use a mixture of new or repaired carbon seals (face seal) and mating rings.

(1) Install the new or repaired Hydro-Mechanical Unit (HMU) sealol face seal [1] and the new or repaired mating ring [3].

(a) Remove the protective covers from the fuel ports in the fuel adapter and the AGB drive.

(b) Remove the mating ring [3] from the protective cover.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

WARNING DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(c) Apply clean oil, D00068 on a new preformed packing [4].

(d) Put the preformed packing [4] in the mating ring [3].

(e) Install the mating ring [3] on the HMU gearshaft.

CAUTION APPLY LIGHT HAND PRESSURE WHEN YOU USE THE INSTALLATION TOOL TO ASSEMBLE THE MATING RING ON THE GEARSHAFT. HIGH HAND PRESSURE CAN TWIST THE MATING RING AND CAUSE SEAL LEAKAGE.

1) Use the correct tool from the tool set, SPL-4126.

2) Use a small mirror to make sure the mating ring [3] is full installed against the HMU gearshaft.

3) Use a small mirror to make sure the lugs of the mating ring [3] are fully installed in the slots of the HMU gearshaft.

(f) Remove the sealol face seal [1] housing from the protective cover.

(g) Apply clean oil, D00068 on a new preformed packing [2].

(h) Put the preformed packing [2] in the sealol face seal [1].

(i) Align the bolt holes in the sealol face seal [1] housing with the bolt holes in the AGB.

CAUTION DO NOT FORCE THE SEALOL FACE SEAL INTO THE GEARBOX DRIVE. DAMAGE TO THE SEALOL FACE SEAL WILL OCCUR.

CAUTION BE CAREFUL WITH THE PREFORMED PACKING WHEN YOU INSTALL THE CARBON SEAL ASSEMBLY. THE PACKING IS EASILY CUT AND TURNED OUT OF POSITION DURING INSTALLATION.

(j) Install the sealol face seal [1] housing on the HMU gearshaft.

1) Make sure the flange of the face seal is fully seated against the AGB. Do not use the bolts [6] to fully seat the face seal against the AGB.

(k) Apply a light coat of oil, D00068 on the HMU seal housing bolts [6].

(l) Install the three bolts [6] and washers [5] that attach sealol face seal [1] housing to the AGB.

CAUTION ASSEMBLE THE CARBON SEAL HOUSING BY AN EVEN APPLICATION OR TORQUE OF THE BOLTS IN A CRISS-CROSS PATTERN TO PULL THE CARBON SEAL HOUSING EQUALLY INTO THE AGB. IF YOU PUSH THE ASSEMBLY IN BY HAND, YOU CAN CRACK OR CHIP THE CARBON AND CAUSE OIL LEAKS.

1) Tighten the bolts [6] to 40 in-lb (4.5 N·m) to 60 in-lb (6.8 N·m).

(m) Do this task: Hydromechanical Unit Installation, TASK 73-21-14-400-801-H01.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-64-01-420-002-H01

(2) Install the MFP new or repaired sealol face seal [21] and the new or repaired mating ring [23].

(a) Remove the protective covers from the fuel ports in the fuel adapter and the AGB drive.

(b) Remove the mating ring [23] from the protective cover.

WARNING DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(c) Apply clean oil, D00068 on a new preformed packing [24].

(d) Put the preformed packing [24] in the mating ring [23].

(e) Install the mating ring [23] on the MFP gearshaft.

CAUTION APPLY LIGHT HAND PRESSURE WHEN YOU USE THE INSTALLATION TOOL TO ASSEMBLE THE MATING RING ON THE GEARSHAFT. HIGH HAND PRESSURE CAN TWIST THE MATING RING AND CAUSE SEAL LEAKAGE.

1) Use the correct tool from the tool set, SPL-4126.

2) Use a small mirror to make sure the mating ring [23] is fully installed against the MFP gearshaft.

3) Use a small mirror to make sure the lugs of the mating ring [23] are fully installed on the slots of the MFP gearshaft.

(f) Remove the sealol face seal [21] housing from the protective cover.

(g) Apply clean oil, D00068 on a new preformed packing [22].

(h) Put the preformed packing [22] in the seal sealol face seal [21] housing.

(i) Align the bolt holes in the sealol face seal [21] housing with the bolt holes in the AGB.

CAUTION DO NOT FORCE THE SEALOL FACE SEAL INTO THE GEARBOX DRIVE. DAMAGE TO THE SEALOL FACE SEAL WILL OCCUR.

CAUTION BE CAREFUL WITH THE PREFORMED PACKING WHEN YOU INSTALL THE CARBON SEAL ASSEMBLY. THE PACKING IS EASILY CUT AND TURNED OUT OF POSITION DURING INSTALLATION.

(j) Install the sealol face seal [21] housing on the MFP gearshaft.

1) Make sure the flange of the face seal is fully seated against the AGB. Do not use the bolts [26] to fully seat the face seal against the AGB.

(k) Apply a light coat of clean oil, D00068 on the MFP seal housing bolts [26].

(l) Install the three bolts [26] and washers [25] that attach sealol face seal [21] housing to the AGB.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

ASSEMBLE THE CARBON SEAL HOUSING BY AN EVEN APPLICATION OR TORQUE OF THE BOLTS IN A CRISS-CROSS PATTERN TO PULL THE CARBON SEAL HOUSING EQUALLY INTO THE AGB. IF YOU PUSH THE ASSEMBLY IN BY HAND, YOU CAN CRACK OR CHIP THE CARBON AND CAUSE OIL LEAKS.

1) Tighten the bolts [26] to 40 in-lb (4.5 N·m) to 60 in-lb (6.8 N·m).

(m) Do this task: Main Fuel Pump Installation, TASK 73-11-01-400-801-H01.

SUBTASK 72-64-01-420-003-H01

(3) Install the new or repaired Engine Driven Pump (EDP) sealol face seal [41] and the new or repaired mating ring [43].

(a) Remove the protective cover from the AGB drive.

(b) Remove the mating ring [43] from the protective cover.

WARNING

DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(c) Apply clean oil, D00068 on a new preformed packing [44].

(d) Put the preformed packing [44] in the mating ring [43].

(e) Install the mating ring [43] on the EDP gearshaft.

CAUTION

APPLY LIGHT HAND PRESSURE WHEN YOU USE THE INSTALLATION TOOL TO ASSEMBLE THE MATING RING ON THE GEARSHAFT. HIGH HAND PRESSURE CAN TWIST THE MATING RING AND CAUSE SEAL LEAKAGE.

1) Use the correct tool from the tool set, SPL-4126.

2) Use a small mirror to make sure the mating ring [43] is fully installed against the EDP gearshaft.

3) Use a small mirror to make sure the lugs of the mating ring [43] are fully installed in the slots of the EDP gearshaft.

(f) Remove the sealol face seal [41] housing from the protective cover.

(g) Apply clean oil, D00068 on a new preformed packing [42].

(h) Put the preformed packing [42] in the sealol face seal [41] housing.

(i) Align the bolt holes in the sealol face seal [41] housing with the bolt holes in the AGB.

CAUTION

DO NOT FORCE THE SEALOL FACE SEAL INTO THE GEARBOX DRIVE. DAMAGE TO THE SEALOL FACE SEAL WILL OCCUR.

CAUTION

BE CAREFUL WITH THE PREFORMED PACKING WHEN YOU INSTALL THE CARBON SEAL ASSEMBLY. THE PACKING IS EASILY CUT AND TURNED OUT OF POSITION DURING INSTALLATION.

(j) Install the sealol face seal [41] housing on the EDP gearshaft.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Make sure the flange of the face seal is fully seated against the AGB. Do not use the bolts [46] to fully seat the face seal against the AGB.

(k) Apply a light coat of oil, D00068 on the EDP seal housing bolts [46].

(l) Install the three bolts [46] and washers [45] that attach sealol face seal [41] housing to the AGB.

CAUTION ASSEMBLE THE CARBON SEAL HOUSING BY AN EVEN APPLICATION OR TORQUE OF THE BOLTS IN A CRISS-CROSS PATTERN TO PULL THE CARBON SEAL HOUSING EQUALLY INTO THE AGB. IF YOU PUSH THE ASSEMBLY IN BY HAND, YOU CAN CRACK OR CHIP THE CARBON AND CAUSE OIL LEAKS.

1) Tighten the bolts [46] to 40 in-lb (4.5 N·m) to 60 in-lb (6.8 N·m).

(m) Do this task: Engine-Driven Pump (EDP) Installation, TASK 29-11-05-400-801-002.

SUBTASK 72-64-01-420-004-H01

(4) Install the new or repaired Integrated Drive Generator (IDG) sealol face seal [61] and the new or repaired mating ring [63].

NOTE: The Pre SB 72-0741 IDG carbon seal housing is yellow in color and the mating ring has a flat surface. The Post SB 72-0741 IDG carbon seal housing is black in color and the mating ring has lift-off grooves on the surface.

NOTE: If it is necessary to replace the Pre and Post SB 72-0741 carbon seal and mating ring, they must be replaced as a set.

(a) Remove the protective cover from the AGB drive.

(b) Remove the mating ring [63] from the protective cover.

WARNING DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(c) Apply clean oil, D00068 on a new preformed packing [64].

(d) Put the preformed packing [64] in the mating ring [63].

(e) Install the mating ring [63] on the IDG gearshaft.

CAUTION APPLY LIGHT HAND PRESSURE WHEN YOU USE THE INSTALLATION TOOL TO ASSEMBLE THE MATING RING ON THE GEARSHAFT. HIGH HAND PRESSURE CAN TWIST THE MATING RING AND CAUSE SEAL LEAKAGE.

1) Use the correct tool from the tool set, SPL-4126.

2) Use a small mirror to make sure the mating ring [63] is fully installed against the IDG gearshaft.

3) Use a small mirror to make sure the lugs of the mating ring [63] are fully installed in the slots of the IDG gearshaft.

(f) Remove the sealol face seal [61] housing from the protective cover.

(g) Apply clean oil, D00068 on a new preformed packing [62].

(h) Put the preformed packing [62] in the sealol face seal [61] housing.

(i) Align the bolt holes in the sealol face seal [61] housing with the bolt holes in the AGB.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION DO NOT FORCE THE SEALOL FACE SEAL INTO THE GEARBOX DRIVE. DAMAGE TO THE SEALOL FACE SEAL WILL OCCUR.

CAUTION BE CAREFUL WITH THE PREFORMED PACKING WHEN YOU INSTALL THE CARBON SEAL ASSEMBLY. THE PACKING IS EASILY CUT AND TURNED OUT OF POSITION DURING INSTALLATION.

(j) Install the sealol face seal [61] housing on the IDG gearshaft.

1) Make sure the flange of the face seal is fully seated against the AGB. Do not use the bolts [66] to fully seat the face seal against the AGB.

(k) Apply a light coat of oil, D00068 on the IDG seal housing bolts [66].

(l) Install the three bolts [66] and washers [65] that attach sealol face seal [61] housing to the AGB.

CAUTION ASSEMBLE THE CARBON SEAL HOUSING BY AN EVEN APPLICATION OR TORQUE OF THE BOLTS IN A CRISS-CROSS PATTERN TO PULL THE CARBON SEAL HOUSING EQUALLY INTO THE AGB. IF YOU PUSH THE ASSEMBLY IN BY HAND, YOU CAN CRACK OR CHIP THE CARBON AND CAUSE OIL LEAKS.

1) Tighten the bolts [66] to 40 in-lb (4.5 N·m) to 60 in-lb (6.8 N·m).

(m) Do this task:IDG Installation, TASK 24-11-01-400-801-001.

SUBTASK 72-64-01-420-005-H01

(5) Install the new or repaired backup generator (BUG) sealol face seal [81] and the new or repaired mating ring [83].

NOTE: The Pre SB 72-0694 BUG carbon seal housing is yellow in color and the mating ring has a flat surface. The Post SB 72-0694 BUG carbon seal housing is black in color and the mating ring has lift-off grooves on the surface.

NOTE: If it is necessary to replace the Pre and Post SB 72-0694 carbon seal and mating ring, they must be replaced as a set.

(a) Remove the protective cover from the AGB drive.

(b) Remove the mating ring [83] from the protective cover.

WARNING DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(c) Apply clean oil, D00068 on a new preformed packing [84].

(d) Put the preformed packing [84] in the mating ring [83].

(e) Install the mating ring [83] on the BUG gearshaft.

CAUTION APPLY LIGHT HAND PRESSURE WHEN YOU USE THE INSTALLATION TOOL TO ASSEMBLE THE MATING RING ON THE GEARSHAFT. HIGH HAND PRESSURE CAN TWIST THE MATING RING AND CAUSE SEAL LEAKAGE.

1) Use the correct tool from the tool set, SPL-4126.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

2) Use a small mirror to make sure the mating ring [83] is fully installed against the BUG gearshaft.

3) Use a small mirror to make sure the lugs of the mating ring [83] are fully installed in the slots of the BUG gearshaft.

(f) Remove the sealol face seal [81] housing from the protective cover.

(g) Apply clean oil, D00068 on a new preformed packing [82].

(h) Put the preformed packing [82] in the sealol face seal [81] housing.

(i) Align the bolt holes in the sealol face seal [81] housing with the bolt holes in the AGB.

CAUTION

DO NOT FORCE THE SEALOL FACE SEAL INTO THE GEARBOX DRIVE. DAMAGE TO THE SEALOL FACE SEAL WILL OCCUR.

CAUTION

BE CAREFUL WITH THE PREFORMED PACKING WHEN YOU INSTALL THE CARBON SEAL ASSEMBLY. THE PACKING IS EASILY CUT AND TURNED OUT OF POSITION DURING INSTALLATION.

(j) Install the sealol face seal [81] housing on the BUG gearshaft.

1) Make sure the flange of the face seal is fully seated against the AGB. Do not use the bolts to fully seat the face seal against the AGB.

(k) Apply a light coat of oil, D00068 on the BUG seal housing bolts [86].

(l) Install the three bolts [86] and washers [85] that attach seal housing to the AGB.

CAUTION

ASSEMBLE THE CARBON SEAL HOUSING BY AN EVEN APPLICATION OR TORQUE OF THE BOLTS IN A CRISS-CROSS PATTERN TO PULL THE CARBON SEAL HOUSING EQUALLY INTO THE AGB. IF YOU PUSH THE ASSEMBLY IN BY HAND, YOU CAN CRACK OR CHIP THE CARBON AND CAUSE OIL LEAKS.

1) Tighten the bolts [86] to 40 in-lb (4.5 N·m) to 60 in-lb (6.8 N·m).

(m) Do this task: Backup Generator Installation, TASK 24-25-01-400-804-001.

I. Put the Airplane Back to its Usual Condition

SUBTASK 72-64-01-865-001-H01

(1) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-64-01-410-001-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.

(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.

J. AGB Sealol Face Seal Installation Test

SUBTASK 72-64-01-710-001-H01

(1) Do the tests listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ACCESSORY GEARBOX - REMOVAL/INSTALLATION

1. General

A. This procedure contains two tasks:

(1) A removal of the accessory gearbox

(2) An installation of the accessory gearbox.

TASK 72-64-02-000-801-H00

2. Accessory Gearbox Removal

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406, Figure 407, Figure 408, Figure 409, Figure 410, Figure 411, Figure 412, Figure 413, Figure 414, Figure 415, Figure 416, Figure 417, Figure 418, Figure 419, Figure 420, Figure 421, Figure 422, Figure 423, Figure 424, Figure 425, Figure 426)

A. General

(1) This task gives instructions to remove the Accessory Gearbox (AGB) from an on-wing engine.

(2) The AGB is mounted under the high pressure compressor, at the 6:00 o'clock position.

(3) Read this procedure and become familiar with the instructions and special tool usage before you remove the AGB from the engine.

B. References

Reference	Title
12-22-01-610-805-002	Engine Oil Change (P/B 301)
24-11-01-000-801-001	IDG Removal (P/B 401)
24-22-00-860-806	Remove Electrical Power (P/B 201)
24-25-01-000-804-001	Backup Generator 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)
29-11-05-000-801-002	Engine-Driven Pump (EDP) Removal (P/B 401)
71-00-05-000-801-H01	Fan Stator Module to Engine Removal (P/B 401)
71-11-04-010-814-H00	Open the Fan Cowl Panel (Selection) (P/B 201)
73-21-08-000-801-H01	Control Alternator (Stator) Removal (P/B 401)
73-21-09-000-801-H00	Control Alternator Rotor Removal (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)
80-11-01-000-801-H01	Engine Starter 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-15695	Fixture - Raise/Lower, Accessory Gearbox Module Part #: 9C1385G02 Supplier: 06083
SPL-15696	Removal Tool - Clamp Assembly, Horizontal Drive Shaft Part #: 9C3133G01 Supplier: 06083

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(Continued)

Reference	Description
SPL-15697	Bracket Set - Support/Lift, Accessory Gearbox Module Part #: 9C1229G02 Supplier: 06083
SPL-15778	HDS Cover Removal Tool Part #: 9C3134G02 Supplier: 06083
SPL-15780	AGB Install/Remove Fixture Part #: 9C1172G03 Supplier: 06083
SPL-15781	AGB Raise/Lower Fixture Part #: 9C1385G01 Supplier: 06083

D. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

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 Accessory Gearbox Removal

SUBTASK 72-64-02-860-001-H00

(1) Open these circuit breakers and install safety tags:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-64-02-010-001-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

(2) 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 72-64-02-860-002-H00

(3) Remove the electrical power (TASK 24-22-00-860-806).

G. Accessory Gearbox Removal

SUBTASK 72-64-02-020-001-H00

(1) Remove the AGB accessories that follow before the AGB removal:

NOTE: These accessories are heavy and removal of these accessories before the AGB removal will decrease the weight of the AGB module.

(a) Remove the Integrated Drive Generator (IDG) (TASK 24-11-01-000-801-001).

(b) Remove the Backup Generator (BUG) (TASK 24-25-01-000-804-001).

(c) Remove the Engine-Driven Pump (EDP) (TASK 29-11-05-000-801-002).

(d) Remove the starter (TASK 80-11-01-000-801-H01).

SUBTASK 72-64-02-680-001-H00

(2) Drain the oil tank before you disconnect any oil tubes (TASK 12-22-01-610-805-002).

SUBTASK 72-64-02-020-003-H00

(3) Disconnect the W723 harness [210] and the W724 harness [213] as follows (Figure 421 and Figure 422):

CAUTION MAKE SURE THAT THE ELECTRICAL CONNECTOR IS CLEAN BEFORE YOU DISCONNECT IT. DIRTY ELECTRICAL CONNECTORS CAN CAUSE INDICATION PROBLEMS.

CAUTION USE TEFLON-JAWED PLIERS TO LOOSEN ELECTRICAL CONNECTORS. DO NOT USE METAL-JAWED PLIERS. DAMAGE TO THE ELECTRICAL CONNECTORS COULD OCCUR.

(a) Disconnect the connector P72305 from the channel A receptacle on the Hydromechanical Unit (HMU) [4].

(b) Disconnect the connector P72405 from the channel B receptacle on the HMU [4].

(c) Disconnect the connector P72303 from channel A on the N2 speed sensor [211] located next to the control alternator [268].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Disconnect the connector P72403 from channel B on the N2 speed sensor [211].

(e) Disconnect the connector P72304 from the fuel flow transmitter [212].

(f) Disconnect the connector P72406 from the starter air valve [2] on the starter air duct.

(g) Install protective covers on the connectors.

(h) Remove the W723 harness [210] and W724 harness [213] from the attached clamps on the AGB [1].

SUBTASK 72-64-02-020-004-H00

(4) Disconnect the W727 harness [214] and the W728 harness [215] as follows (Figure 423):

(a) Disconnect the connector P72702 attached to channel A on the control alternator [268].

(b) Disconnect the connector P72802 attached to channel B on the control alternator [268].

(c) Install protective covers on the connectors.

SUBTASK 72-64-02-020-023-H00

CAUTION

PROTECT THE ALTERNATOR AFTER REMOVAL WITH A RUBBER, BUBBLE WRAP OR CARDBOARD WRAP. KEEP THE ALTERNATOR STATOR IN A CONTAINER TO KEEP IT SECURED AND STATIONARY AND KEEP IT FROM MOVING.

(5) Remove the control alternator [268] from the AGB [1] as follows (Figure 423):

(a) Remove the control alternator [268] stator (TASK 73-21-08-000-801-H01).

(b) Remove the control alternator [268] rotor (TASK 73-21-09-000-801-H00).

SUBTASK 72-64-02-020-006-H00

(6) Disconnect the W729 harness [217] and the W738 harness [196] from the system components as follows:

(a) Disconnect the connector P72904 from the pressure sensor [218] on the left side of the starter air valve [2] (Figure 422).

1) Install a protective cover on the connector.

(b) Disconnect the connector P72903 from the pressure sensor [220] on the VSCF oil cooler [49] (Figure 424).

1) Install a protective cover on the connector.

(c) Disconnect the connector P73805 from the temperature sensor [197] on the oil tube/hose [198] (Figure 419).

1) Install a protective cover on the connector.

ARO ALL POST SB 777-GE90-72-0573

(d) Remove the nut [209], bolt [208], clamp [205] and clamp [207] that attach the connector P73806 branch to the oil tube/hose [198].

ARO ALL

(e) Disconnect the connector P73806 from the temperature sensor [199] on the IDG in oil tube/hose [200].

1) Install a protective cover on the connector.

(f) Disconnect the connector P73803 from the temperature sensor [201] on the VSCF out oil tube/hose [202] (Figure 420).

1) Install a protective cover on the connector.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(g) Disconnect the connector P73808 from the temperature sensor [203] on the VSCF in oil tube/hose [204].

1) Install a protective cover on the connector.

SUBTASK 72-64-02-020-007-H00

(7) Disconnect the W739 harness [192] from the system components as follows (Figure 418):

(a) Disconnect the connector P73902 from the fuel filter sensor [194].

(b) Disconnect the connector P73905 from the oil pressure sensor [193] on the lube/scavenge pump [10].

(c) Disconnect the connector P73904 from the fuel manifold pressure sensor [195] on the HMU [4].

(d) Install protective covers on the connectors.

SUBTASK 72-64-02-020-021-H00

(8) Disconnect the fuel and oil system drain hose/tubes from the drain manifold [191] as follows (Figure 417):

(a) Disconnect the HMU drain hose/tube [183] from the right side drain manifold fitting.

(b) Disconnect the MFP drain hose/tube [184] from the right side drain manifold fitting.

(c) Disconnect the HPT ACC valve drain hose/tube [185] from the right side drain manifold fitting.

(d) Disconnect the VBV/VSV drain hose/tube [186] from the right side drain manifold fitting.

(e) Disconnect the VSCF drain hose/tube [187] from the left side drain manifold fitting.

(f) Disconnect the hydraulic pump pad drain hose/tube [188] from the left side drain manifold fitting.

(g) Disconnect the hydraulic pump drain hose/tube [189] from the left side drain manifold fitting.

(h) Disconnect the IDG drain hose/tube [190] from the left side drain manifold fitting.

SUBTASK 72-64-02-020-008-H00

(9) Remove the lower bifurcation assembly from the engine (TASK 71-00-05-000-801-H01) (Figure 417).

SUBTASK 72-64-02-020-009-H00

(10) Disconnect the starter air duct [180] as follows (Figure 416):

(a) Loosen and remove the coupling clamp [181] from the starter air duct [180].

(b) Remove and discard the metal seal ring [182].

SUBTASK 72-64-02-020-010-H00

(11) Disconnect the HMU fuel manifold [170], fuel manifold [171], fuel manifold [172], fuel manifold [173], fuel tube/hose [168] and fuel tube/hose [169] as follows (Figure 415):

(a) Loosen and remove the bolts [174] and bolts [176] from the fuel tube/hose [168] and fuel tube/hose [169] at the HMU [4].

(b) Remove the gasket [175] and gasket [177] from the HMU [4]. Discard the gasket [175] and gasket [177].

(c) Remove the shields [179] and shields [178] from the fuel tube/hose [168], fuel tube/hose [169], fuel manifold [170] and fuel manifold [172].

(d) Loosen and disconnect the fuel tube/hose [168] from the fuel manifold [170] and fuel manifold [171].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Remove the fuel tube/hose [168].

(e) Loosen and disconnect the fuel tube/hose [169] from the fuel manifold [172] and fuel manifold [173].

1) Remove the fuel tube/hose [169].

SUBTASK 72-64-02-020-011-H00

(12) Remove the fuel drain manifold [157] from the propulsor assembly as follows (Figure 413):

(a) Disconnect the B-nuts on the fuel drain manifold [157] from the drain can [138] and drain can [139] at the HPT ACC valve [137].

(b) Disconnect the B-nut on the lower end of the fuel drain manifold [157] from the fuel drain tube [158].

(c) Remove the bolts [161] and clamps [162] that attach the fuel drain manifold [157] to the bracket assembly [160] and the bracket [159] at the 8:30 o'clock position.

(d) Remove the fuel drain manifold [157].

SUBTASK 72-64-02-020-012-H00

(13) Remove the Start Bleed Valve (SBV) fuel tube/hose [135] and HPT valve fuel tube/hose [136] as follows (Figure 412 and Figure 413):

(a) Remove the SBV fuel tube/hose [135] and HPT valve fuel tube/hose [136] from the HPT ACC valve [137] as follows:

1) Remove the bolts [153] and bolts [152] from the drain can [138] and drain can [139].

2) Move the drain can [138] and drain can [139] back on the HPT valve fuel tube/hose [136] and SBV fuel tube/hose [135].

3) Loosen and remove the B-nuts of the SBV fuel tube/hose [135] and HPT valve fuel tube/hose [136] from the fittings on the HPT ACC valve [137].

(b) Remove the SBV fuel tube/hose [135] and HPT valve fuel tube/hose [136] with the drain can [138] and drain can [139] installed, from the left side of the core assembly as follows:

1) Disconnect the B-nut of the SBV fuel tube/hose [135] from the HPT fuel tube [146] on the AGB [1].

2) Disconnect the B-nut of the HPT valve fuel tube/hose [136] from the HPT valve fuel tube [154] on the AGB [1].

3) Remove the bolts [151] and clamps [150] that attach the SBV fuel tube/hose [135] to the support bracket [147], support bracket [148] and support bracket [149].

4) Remove the bolts [156] and clamps [155] that attach the HPT valve fuel tube/hose [136] to the support bracket [147], support bracket [148] and support bracket [149].

5) Remove the SBV fuel tube/hose [135] and HPT valve fuel tube/hose [136] from the core assembly.

(c) Remove the drain can [138] and drain can [139] from the HPT valve fuel tube/hose [136] and SBV fuel tube/hose [135] as follows:

1) Remove the preformed packing [141] and preformed packing [144] from the grooves in the mounting surface of the drain can [139] and drain can [138].

2) Move the drain can [138] and drain can [139] back on the HPT valve fuel tube/hose [136] and SBV fuel tube/hose [135].

3) Remove the preformed packing [142] and preformed packing [145] from the outer grooves of the SBV fuel tube/hose [135] and HPT valve fuel tube/hose [136].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

4) Remove the retaining ring [140] and retaining ring [143] from the inner grooves of the drain can [139] and drain can [138].

5) Remove the drain can [138] and drain can [139] from the HPT valve fuel tube/hose [136] and SBV fuel tube/hose [135].

SUBTASK 72-64-02-020-013-H00

(14) Remove the bracket [163] and bracket assembly [164] from the AGB [1] at the 8:00 o'clock position as follows (Figure 414):

(a) Remove the bolts [165], bolts [166] and bolt [167] that attach the bracket [163] and bracket assembly [164] to the AGB [1].

(b) Remove the bracket [163] and bracket assembly [164].

SUBTASK 72-64-02-020-014-H00

(15) Disconnect the VBV rod supply tube/hose [117], VBV head supply tube/hose [120], VSV rod supply fuel tube/hose [123] and VSV head supply fuel tube/hose [125] as follows (Figure 411):

NOTE: The SB 72-0583 replaces the VSV rod fuel tube/hose and the VBV head fuel tube/hose with a set of a fuel tube and a fuel hose, where the fuel tube is attached to the HMU and the fuel hose is attached to the supply fuel tube/hose.

(a) Remove the bolts [132] and clamps [133] that attach the VSV head fuel tube/hose [124] and VSV rod fuel tube/hose [121] or VSV rod fuel tube [131] to the fuel support bracket [134].

NOTE: The VSV rod fuel tube/hose [121] or VSV rod fuel tube [131] is on the outboard side of the fuel support bracket [134]. The VSV head fuel tube/hose [124] is on the inboard side of the fuel support bracket [134].

(b) Remove the bolts [129] and the clamps [130] that attach the VBV rod fuel tube/hose [116] and VBV head fuel tube/hose [118] or VBV head fuel tube [126] to the fuel assembly bracket [128].

(c) Disconnect the VSV rod fuel tube/hose [121] or VSV rod fuel hose [122] from the VSV rod supply fuel tube/hose [123] at the 6:00 o'clock position.

(d) Disconnect the VSV head fuel tube/hose [124] from the VSV head supply fuel tube/hose [125] at the 6:00 o'clock position.

(e) Disconnect the VBV rod fuel tube/hose [116] from the VBV rod supply tube/hose [117] at the 6:00 o'clock position.

(f) Disconnect the VBV head fuel tube/hose [118] or VBV head fuel hose [119] from the VBV head supply tube/hose [120] at the 6:00 o'clock position.

SUBTASK 72-64-02-020-015-H00

(16) Disconnect the AGB lubrication system hoses and tubes as follows (Figure 409):

(a) Remove the bolts [105] that attach the gasket [106] and forward sump oil scavenge tube [102] to the sump scavenge port on the fan frame.

1) Keep the removed parts.

(b) Remove the bolts [103] that attach the gasket [104] and forward sump oil scavenge tube [102] to the lower inner left port on the lube/scavenge pump [10].

1) Keep the removed parts.

(c) Remove the bolts [96] and gasket [97] that attach the Transfer Gearbox (TGB) scavenge tube [95] to the pad 47 on the TGB [38].

(d) Disconnect the TGB scavenge tube [95] from the end of the oil tube/hose [98].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

1) Remove the TGB scavenge tube [95].

(e) Remove the bolts [234] and gasket [233] that attach the oil tube/hose [98] to the lube/scavenge pump [10].

1) Keep the removed parts.

(f) Disconnect the oil tube/hose [98] from the lower center port on the left side of the lube/scavenge pump [10].

(g) Remove the nuts [80], bolts [81] and gasket [82] that attach the oil scavenge tube [76] to the No. 4 bearing scavenge manifold [79].

1) Keep the removed parts.

(h) Disconnect the oil scavenge tube [76] from the No. 4 bearing scavenge manifold [79].

(i) Remove the bolts [77] and gasket [78] that attach the oil scavenge tube [76] to the upper left port on the lube/scavenge pump [10].

1) Keep the removed parts.

(j) Remove the bolts [84] and clamps [85] that attach the oil scavenge tube [76] to the support bracket [83] and lube/servo fuel/oil cooler [7].

(k) Remove the bolts [100] and gasket [101] that attach the oil tube [99] to the center port on the lube/scavenge pump [10].

1) Keep the removed parts.

(l) Remove the bolts [87] and gasket [88] that attach the oil tube [86] to the aft right port on the lube/scavenge pump [10].

1) Keep the removed parts.

(m) Remove the nuts [90], bolts [91] and gasket [92] that attach the oil tube [86] to the No. 5 bearing oil tube [89].

1) Keep the removed parts.

(n) Remove the bolts [93] and clamps [94] that attach the oil tube [86] to the support bracket [83] and lube/servo fuel/oil cooler [7].

(o) Disconnect the AGB oil supply hose [75] from the oil tube [68].

(p) Disconnect the forward sump tube [74] from the oil tube [68] and the fan frame.

(q) Remove the bolts [69] and gasket [71] that attach the oil tube [68] to the support bracket [70] and VSCF oil cooler [49].

1) Keep the removed parts.

(r) Remove the bolts [72] and clamps [73] that attach the oil tube [68] to the bracket assembly [53], bracket assembly [54] and bracket assembly [55].

(s) Remove the bolts [57] and clamps [56] that attach the heat exchanger oil tube [50] to the bracket assembly [53], bracket assembly [54] and bracket assembly [55].

(t) Remove the bolts [52] and gasket [51] that attach the heat exchanger oil tube [50] to the left outboard flange face of the VSCF oil cooler [49].

1) Keep the removed parts.

(u) Remove the nuts [66], bolts [67] and gasket [65] that attach the oil tube [58] to the oil tube [50].

1) Keep the removed parts.

(v) Remove the bolt [63] and clamp [64] that attach the oil tube [58] to the bracket [62].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(w) Remove the bolts [61] and gasket [60] that attach the oil tube [58] to the lube/servo fuel/oil cooler [7].

1) Keep the removed parts.

(x) Remove the bolts [112] and gasket [113] that attach the oil tube/hose [111] to the anti-leak valve [107].

1) Keep the removed parts.

(y) Remove the bolts [108], washers [109] and gasket [110] that attach the anti-leak valve [107] to the upper inner left port on the lube/scavenge pump [10].

1) Keep the removed parts.

(z) Disconnect the IDG fuel/oil tube and hose [114] and IDG fuel/oil tube and hose [115] from the IDG fuel/oil cooler [9] (Figure 410).

SUBTASK 72-64-02-020-022-H00

(17) Remove the starter air valve [2] as follows (Figure 408):

(a) Loosen and remove the coupling [48] from the starter air valve [2].

(b) Remove the metal seal ring [47] on the aft side of the starter [3].

(c) Remove the starter air valve [2].

SUBTASK 72-64-02-020-016-H00

(18) Remove the horizontal shaft [16] from the TGB [38] and AGB [1] as follows (Figure 407):

WARNING THE STARTER IS VERY HEAVY. MAKE SURE THAT YOU CORRECTLY SUPPORT THE STARTER BEFORE YOU LOOSEN THE COUPLING CLAMP. IF YOU DO NOT, INJURY TO PERSONS CAN OCCUR.

CAUTION AFTER YOU REMOVE THE HORIZONTAL DRIVE SHAFT, MAKE SURE THAT YOU PUT THE COVERS ON ALL THE OPENINGS OF THE AGB AND TGB MODULE. IF NOT, IT CAN CAUSE CONTAMINATION IN THE AGB, THE TGB, AND DAMAGE TO THE BEARINGS.

(a) If not removed before, remove the starter [3] from the AGB [1] (TASK 80-11-01-000-801-H01).

(b) Disconnect the horizontal shaft protector [11] from the TGB [38] as follows:

1) Remove the nuts [15] that attach the retaining ring [14] to the TGB [38].

2) Install the HDS cover removal tool, SPL-15778 on the horizontal shaft protector [11] as follows (Figure 425):

a) Install the upper clamp (item 3) and lower clamp (item 2) on the horizontal shaft protector [11].

b) Attach the upper clamp (item 3) and lower clamp (item 2) together with the bolts (item 8) and winged nuts (item 9).

<1> Tighten the winged nuts (item 9) with your hand.

3) Use a mallet and a drift to tap the HDS cover removal tool, SPL-15778 aft to disengage the horizontal shaft protector [11] from the TGB [38].

4) Remove the HDS cover removal tool, SPL-15778 from the horizontal shaft protector [11].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

5) Slide the horizontal shaft protector [11] aft into the AGB [1] to get access to the horizontal shaft [16].

(c) Remove the horizontal shaft [16] from the TGB [38] and the AGB [1] as follows:

1) Install the HDS removal tool, SPL-15696 on the horizontal shaft [16] as follows (Figure 426):

a) Install the upper clamp (item 3) and lower clamp (item 2) on the horizontal shaft [16].

b) Attach the upper clamp (item 3) and lower clamp (item 2) together with the bolts (item 8) and winged nuts (item 9).

<1> Tighten the winged nuts (item 9) with your hand.

c) Use a mallet and a drift to tap the HDS removal tool, SPL-15696 aft to disengage the horizontal shaft [16] from the TGB horizontal bevel gearshaft [37].

d) Remove the HDS removal tool, SPL-15696 from the horizontal shaft [16].

(d) Slide the horizontal shaft [16] aft into the AGB [1] and remove it through starter mounting pad on the AGB [1].

(e) Cover all the openings of the AGB [1] and TGB [38].

1) Make sure no contamination enters the AGB [1] and TGB [38] to prevent bearing contamination.

SUBTASK 72-64-02-020-017-H00

(19) Disconnect the AGB bonding jumper [35] as follows (Figure 406):

(a) Remove the bolt [36] that attaches the bonding jumper [35] to the AGB [1].

1) Keep the removed parts.

SUBTASK 72-64-02-480-001-H00

(20) Assemble the AGB bracket set, SPL-15697, the AGB Install/Remove Fixture, SPL-15780 and the AGB raise/lower fixture, SPL-15695 or the AGB Raise/Lower Fixture, SPL-15781 to the AGB [1] as follows (Figure 403):

NOTE: For on-wing AGB replacement, the AGB raise/lower fixture, SPL-15695 or the AGB Raise/Lower Fixture, SPL-15781 will not reach up to the AGB. Use a sufficient height flat platform or adjustable platform on which you can keep the AGB stand to reach up to the AGB. The platform must be stable. You must keep a sufficient work area for the AGB movement.

NOTE: The engines are installed on the aircraft at approximately six degrees dihedral to the ground. If necessary, you can adjust the AGB fixture height/angle for correct attachment of the fixture to the AGB.

(a) Install the AGB Install/Remove Fixture, SPL-15780 on the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781.

(b) Keep the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781 on the platform.

NOTE: Make sure that the platform height is approximately 2.5 ft (76.2 cm) to 3 ft (91.4 cm) and the platform can take weight up to 3200 lb (1451.5 kg).

(c) Install the right bracket (item 21) of the bracket set, SPL-15697 to the AGB [1] with the washers (item 16) and cap screws (item 22).

1) Tighten the cap screws (item 22).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(d) Install the right adapter (item 20) to the AGB Install/Remove Fixture, SPL-15780.

(e) Align the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781 under the AGB [1].

1) Set the floor jack to stabilize.

(f) Lift the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781 to the AGB [1] with the unit hand pump.

(g) Tightly attach the right bracket (item 21) to the right adapter (item 20) with the washers (item 16) and cap screws (item 18).

(h) Install the washers (item 5) and screws (item 11) of the AGB Install/Remove Fixture, SPL-15780 at the 6:00 o'clock position on the AGB [1].

1) Tighten the screws (item 11).

SUBTASK 72-64-02-020-018-H00

WARNING MAKE SURE THAT YOU CORRECTLY HOLD THE AGB BY THE INSTALL/REMOVE FIXTURE, 9C1172G03, BEFORE YOU REMOVE THE AGB MOUNT BOLTS. IF YOU DO NOT, INJURY CAN OCCUR.

(21) Disconnect the left vertical link [20] and right vertical link [21] as follows (Figure 404):

(a) Remove the nut [23] and washer [22] that attach the bolt [17] at the right vertical link [21].

1) Keep the removed parts.

(b) Remove the nut [23] and washer [22] that attach the bolt [17] at the left vertical link [20].

1) Keep the removed parts.

(c) Remove the nut [23] and washer [22] that attach the bolt [18] at the left horizontal link [19].

1) Keep the removed parts.

SUBTASK 72-64-02-020-019-H00

(22) Remove the axial center link [29] and lateral side links [30] as follows (Figure 405):

(a) Remove the nut [32], washer [31] and bolt [27] that attach the left lateral side link [30] to the clevis on the AGB [1].

1) Keep the removed parts.

(b) Remove the nut [32], washer [31] and bolt [28] that attach the left lateral side link [30] to the clevis on the fan case.

1) Keep the removed parts.

(c) Do the step (a) and step (b) again to remove the right lateral side link [30].

(d) Remove the nut [32], washer [31] and bolt [27] that attach the axial center link [29] to the clevis on the AGB [1].

1) Keep the removed parts.

(e) Remove the nut [32], washer [31] and bolt [27] that attach the axial center link [29] to the clevis on the fan case.

1) Keep the removed parts.

SUBTASK 72-64-02-020-020-H00

(23) Lower and remove the AGB [1] from the main engine as follows:

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

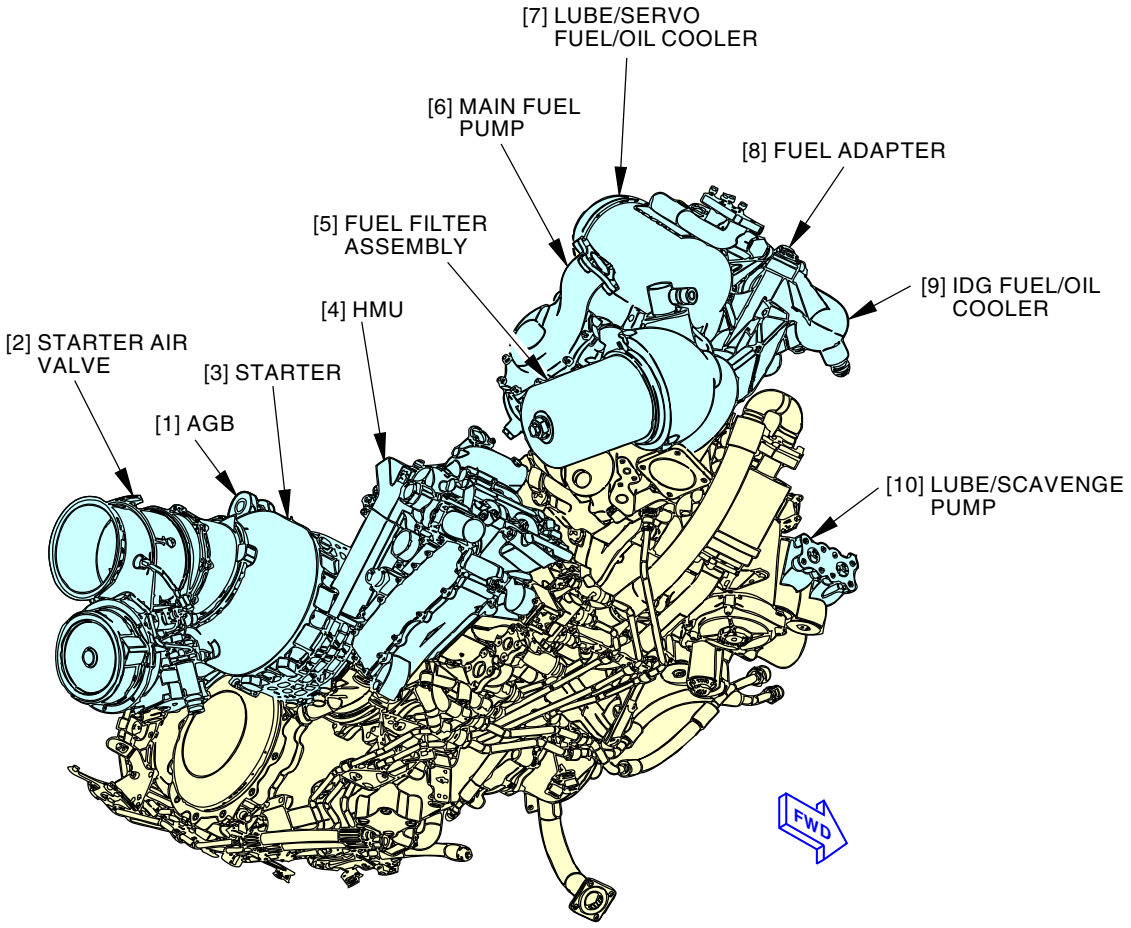
MAKE SURE THAT YOU REMOVE ALL AGB CONNECTIONS TO THE ENGINE BEFORE YOU LOWER THE AGB. MAKE SURE THAT THE AGB IS CLEAR OF OTHER ENGINE PARTS BEFORE YOU SLOWLY LOWER IT. IF YOU DO NOT, DAMAGE CAN OCCUR.

(a) Lower the AGB [1] from the main engine with the hydraulic release valve at the hydraulic pump on the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781.

(b) Remove the AGB [1] from under the main engine.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

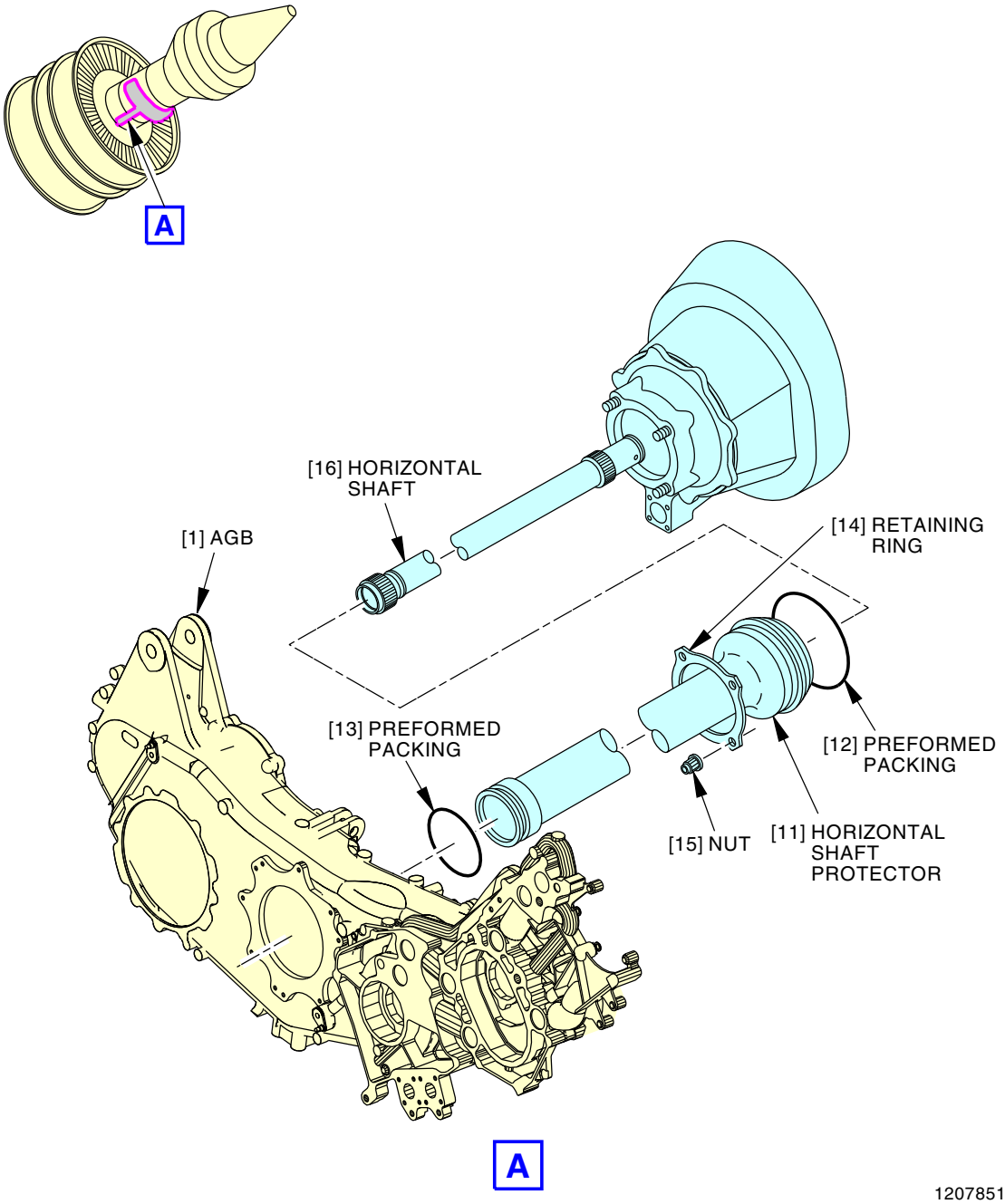


1207839-01

2804757 S0000633089_V1

Accessory Gearbox Module Assembly
Figure 401/72-64-02-990-801-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

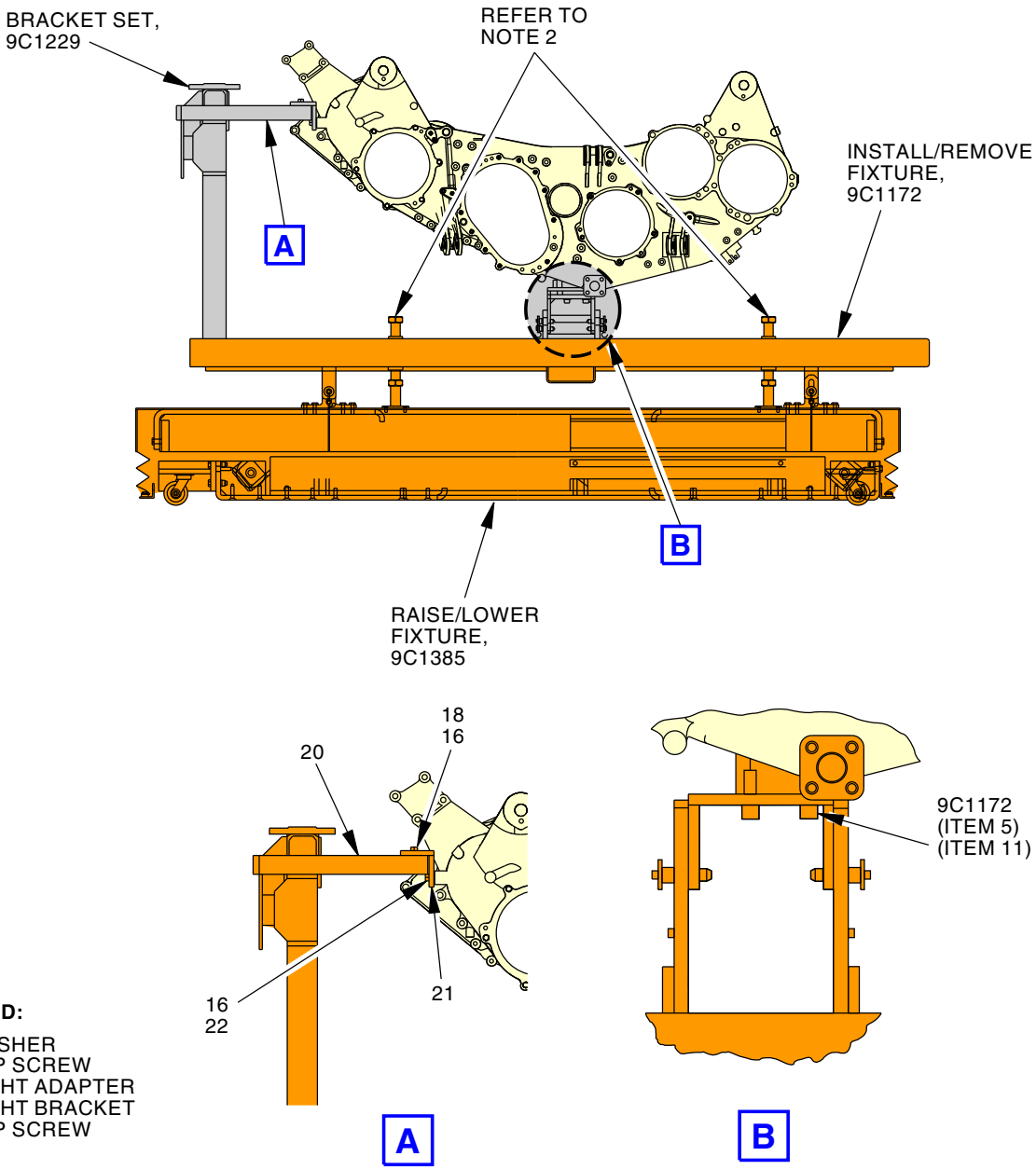


1207851-02

2804755 S0000633090_V1

Installation of the Shaft Protector
Figure 402/72-64-02-990-802-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEGEND:

16. WASHER
18. CAP SCREW
20. RIGHT ADAPTER
21. RIGHT BRACKET
22. CAP SCREW

NOTES:

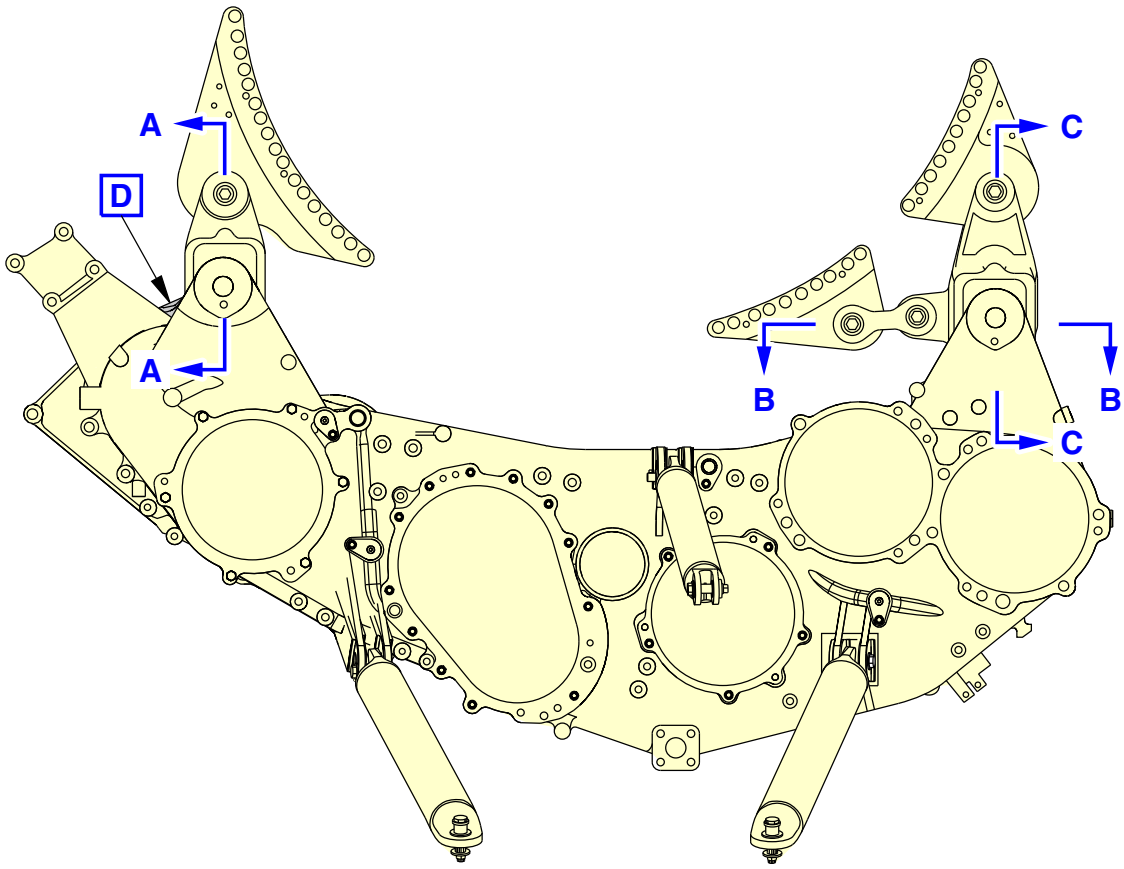
1.ITEM NUMBERS IN THIS SHEET CORRESPOND WITH ITEMS OF TOOL 9C1229, UNLESS SPECIFIED.

2.THERE ARE FOUR JACK SCREWS ON THE TOOL. AS THE ENGINES ARE INSTALLED ON THE AIRCRAFT AT APPROXIMATELY SIX DEGREES DIHEDRAL TO THE GROUND, IF NECESSARY YOU CAN ADJUST AGB FIXTURE HEIGHT/ANGLE FOR CORRECT ATTACHMENT OF THE FIXTURE TO AGB WITH HELP OF THESE JACK SCREWS.

1207840-01
2804754 S0000633091_V1

Assembly of the Bracket Set, 9C1229, the Install/Remove Fixture, 9C1172, and the Raise/Lower Fixture, 9C1385
Figure 403/72-64-02-990-803-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



FORWARD LOOKING AFT

NOTE:

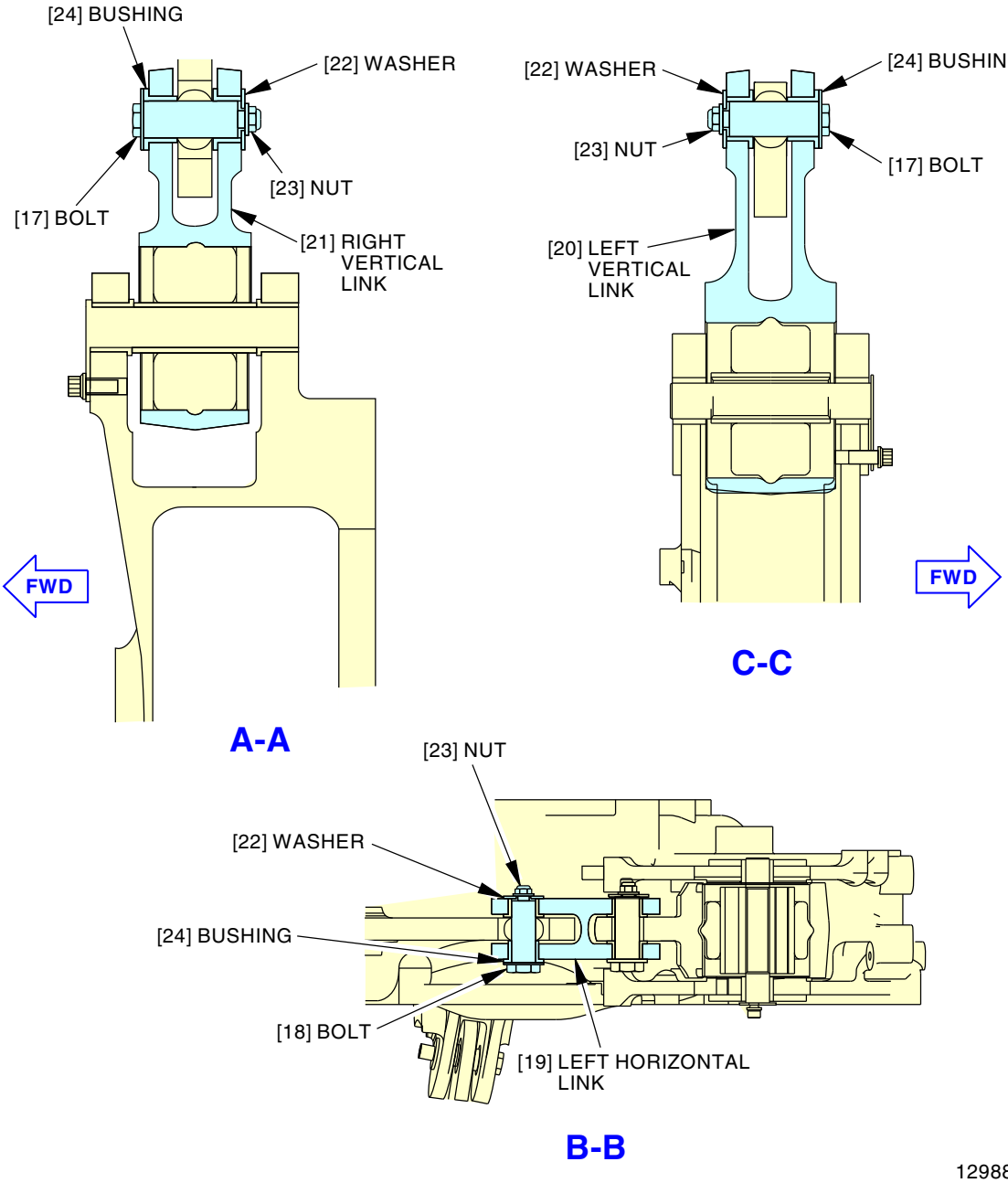
SOME ITEMS NOT SHOWN FOR CLARITY.

1207841-02

2804753 S0000633092_V1

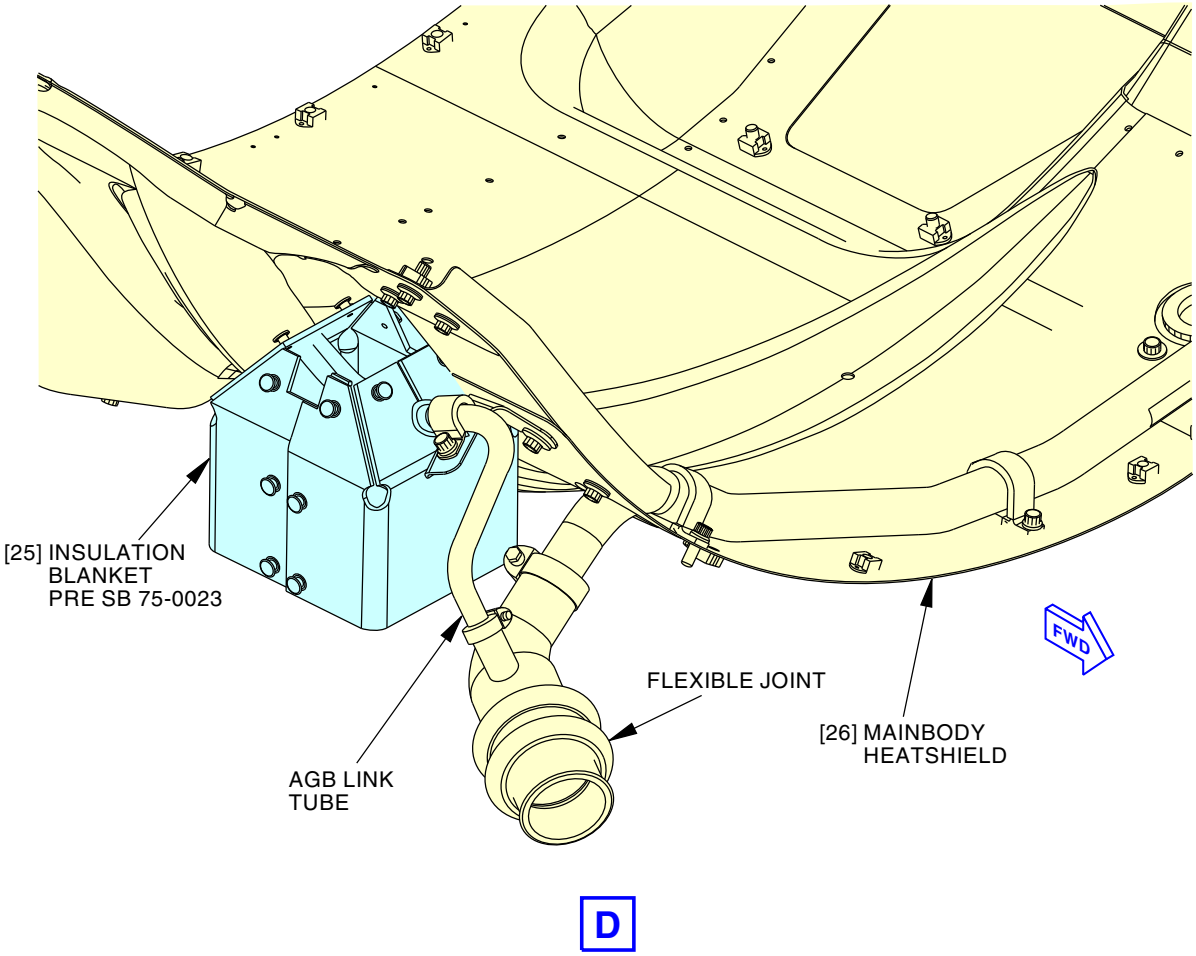
Insulation Blanket and AGB Vertical Links Installation
Figure 404/72-64-02-990-804-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Insulation Blanket and AGB Vertical Links Installation
Figure 404/72-64-02-990-804-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

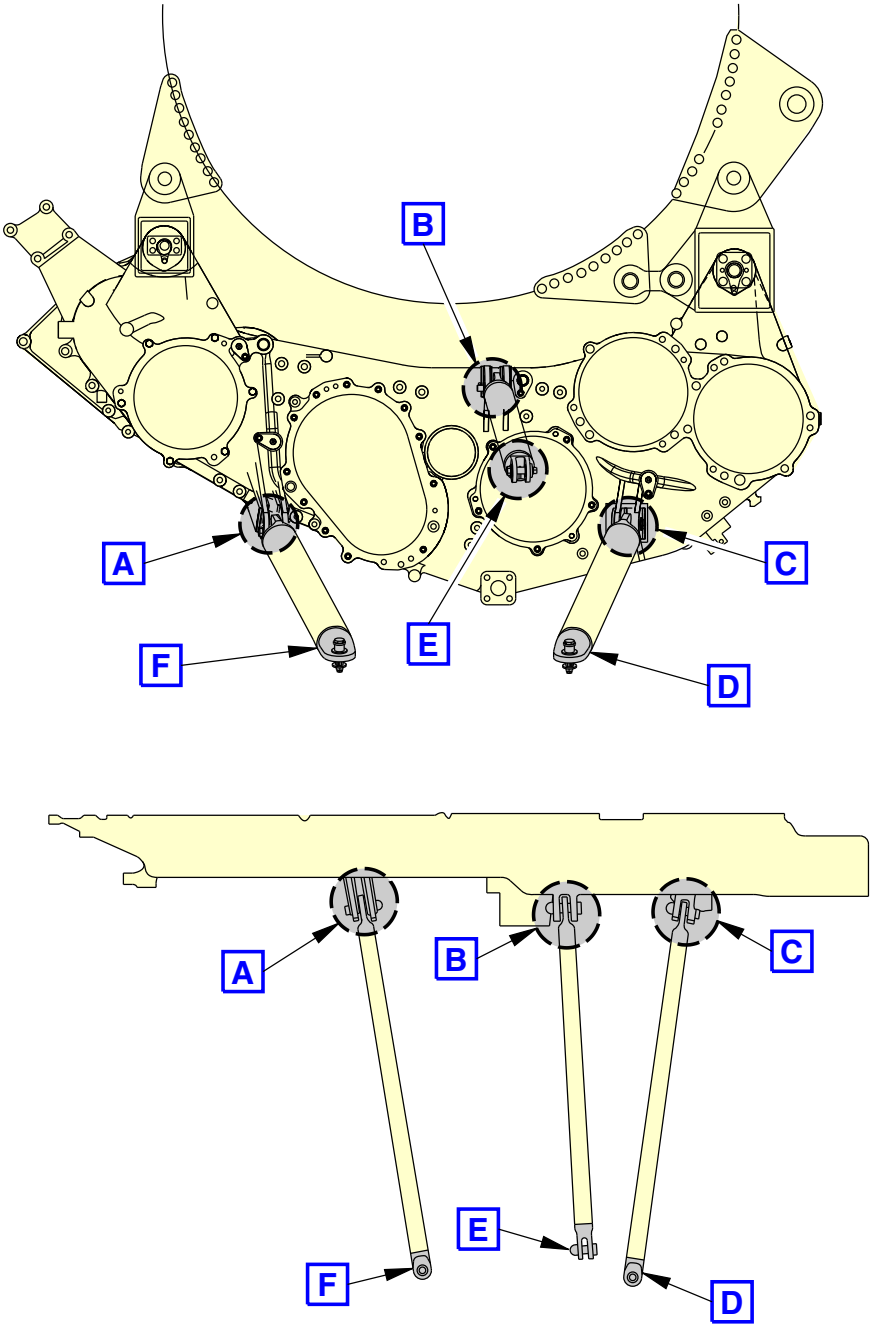


1245982-02

2804751 S0000633094_V1

Insulation Blanket and AGB Vertical Links Installation
Figure 404/72-64-02-990-804-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

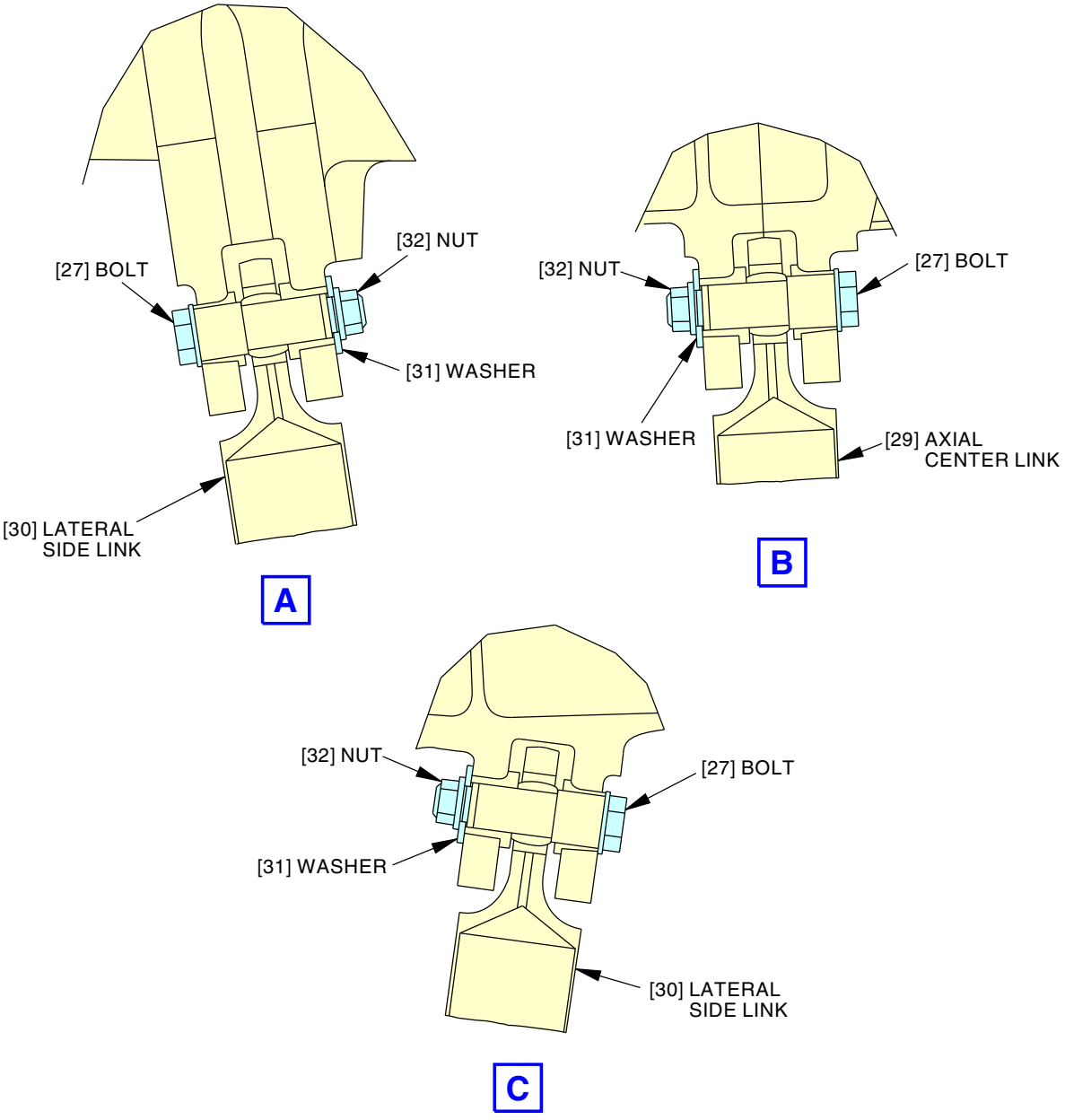


1207843-01

2804690 S0000633095_V1

AGB Horizontal Links Installation
Figure 405/72-64-02-990-805-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

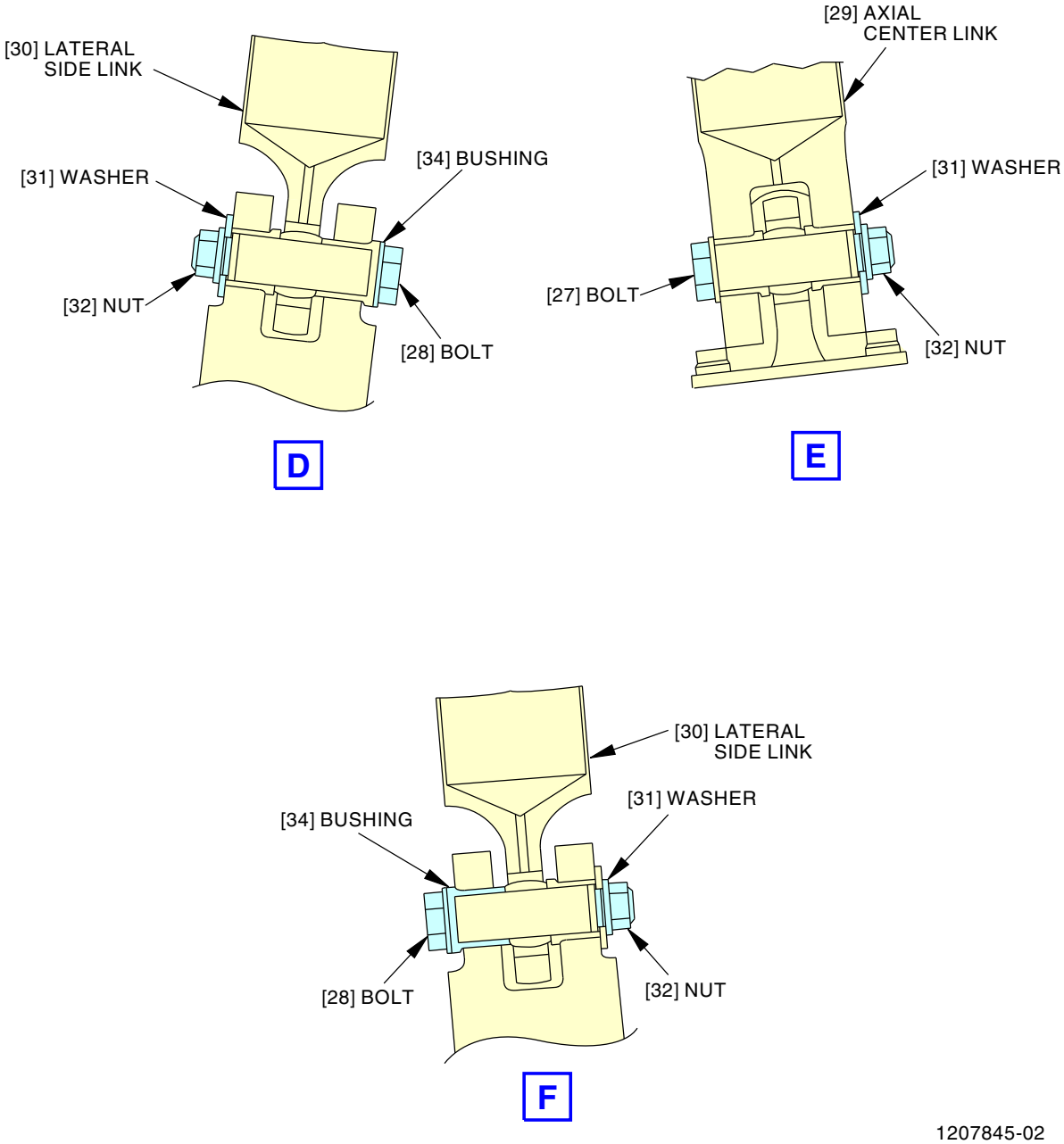


1207844-02

2804689 S0000633096_V1

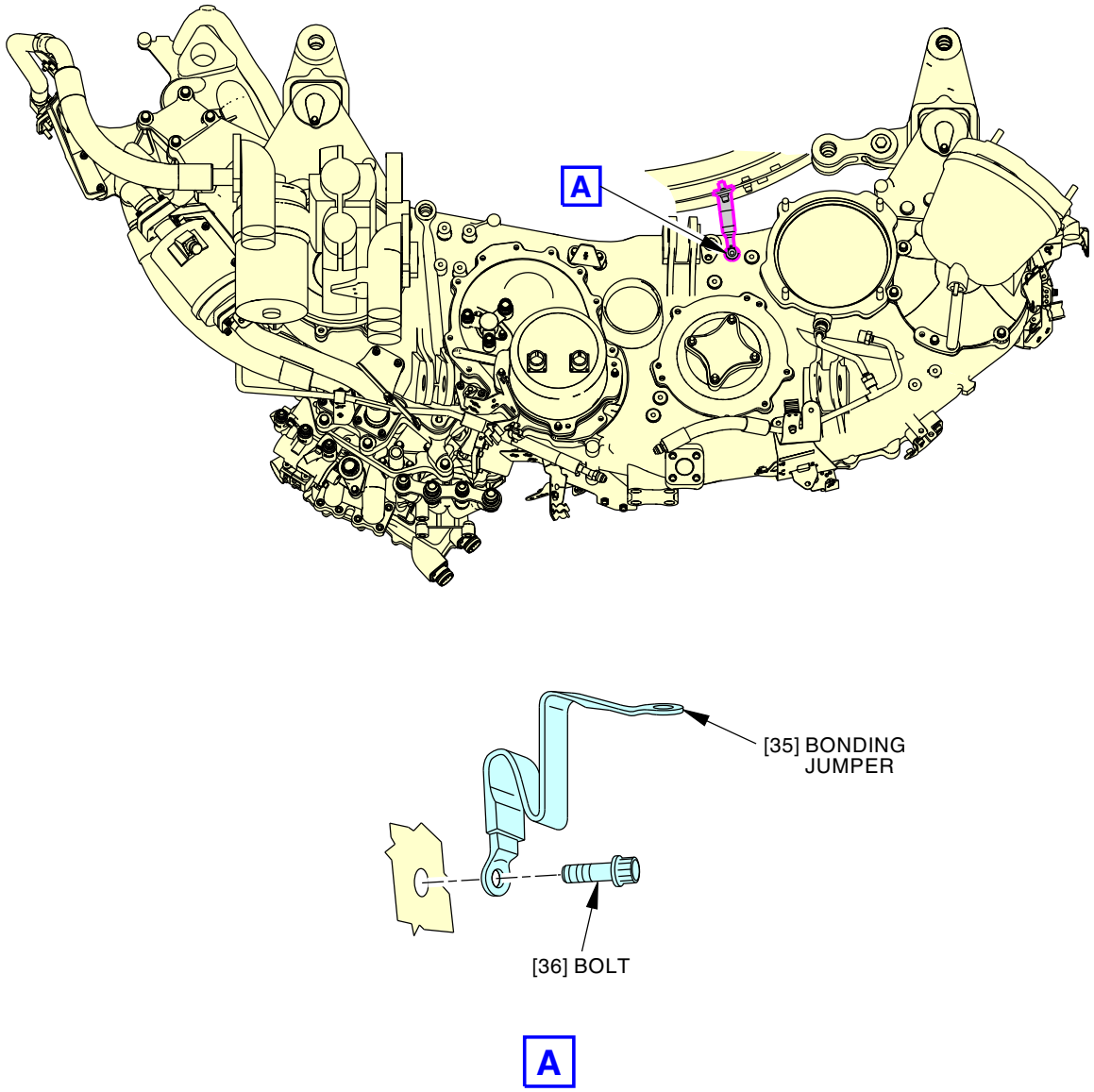
AGB Horizontal Links Installation
Figure 405/72-64-02-990-805-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



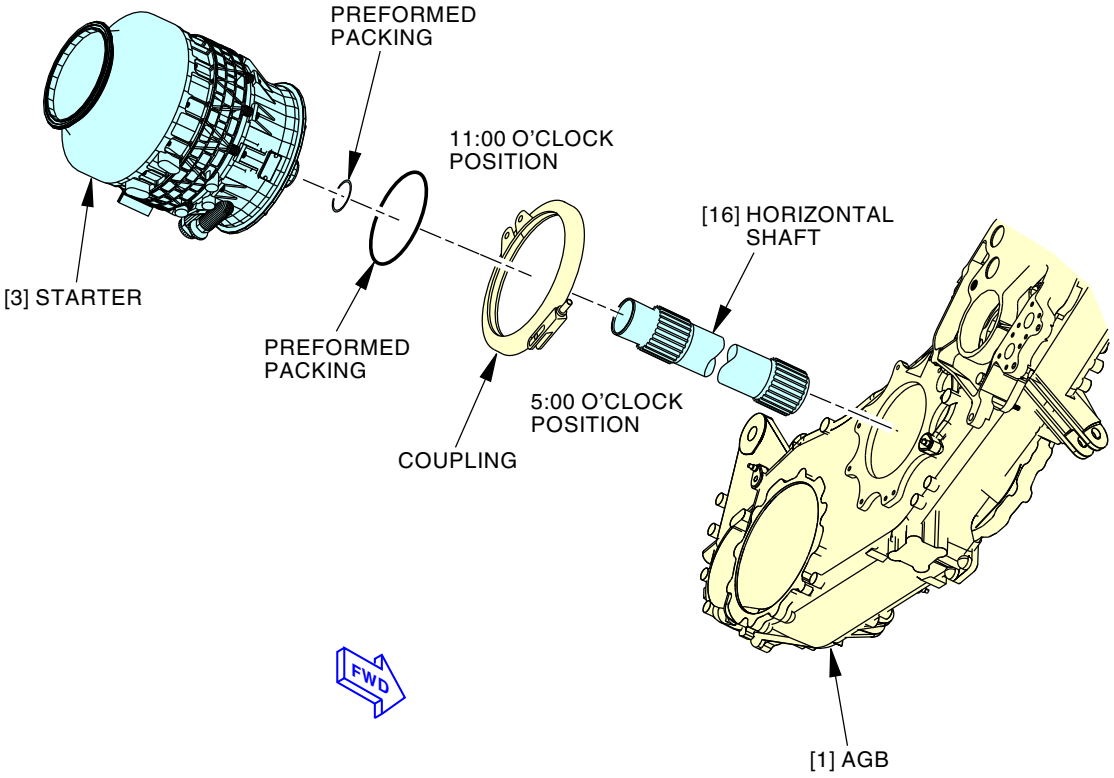
AGB Horizontal Links Installation
Figure 405/72-64-02-990-805-H00 (Sheet 3 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



AGB Bonding Jumper Installation
Figure 406/72-64-02-990-806-H00

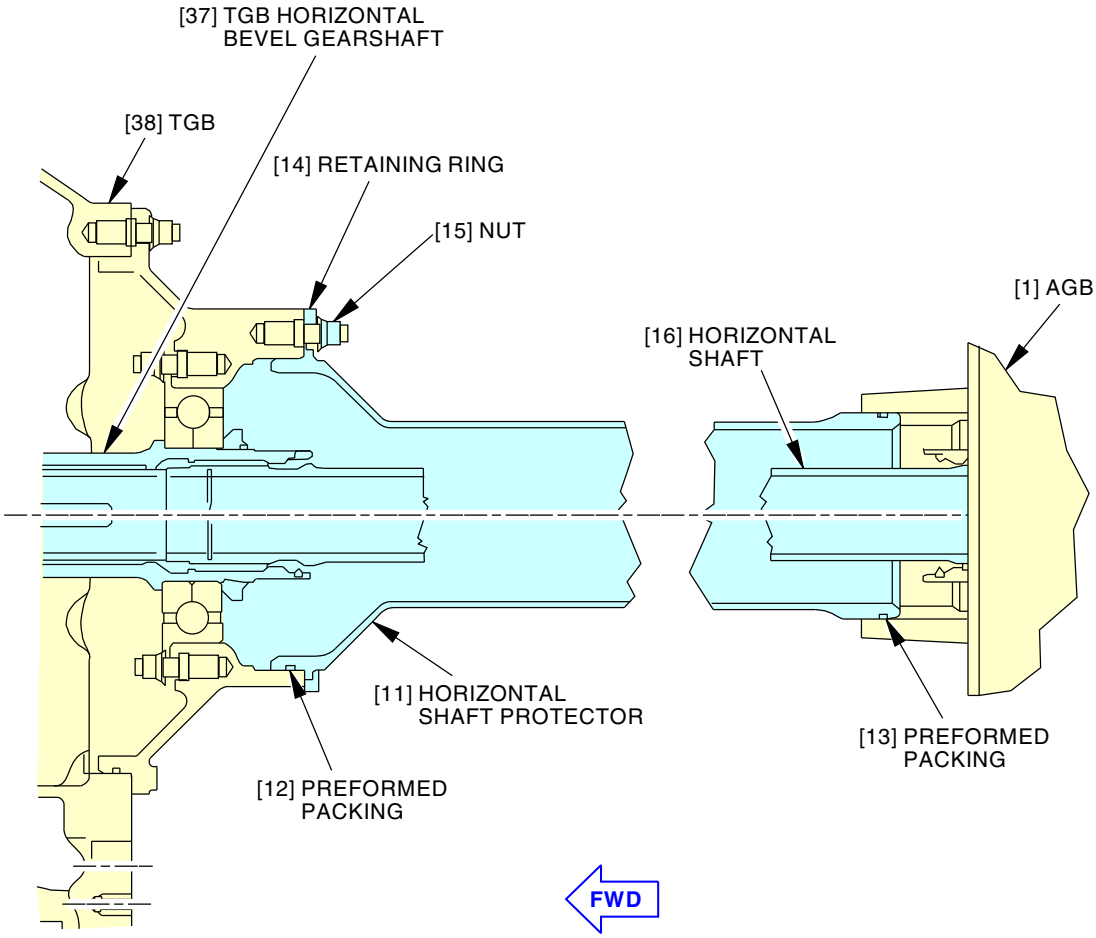
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213032-02
2804686 S0000633099_V1

Horizontal Shaft Installation
Figure 407/72-64-02-990-807-H00 (Sheet 1 of 3)

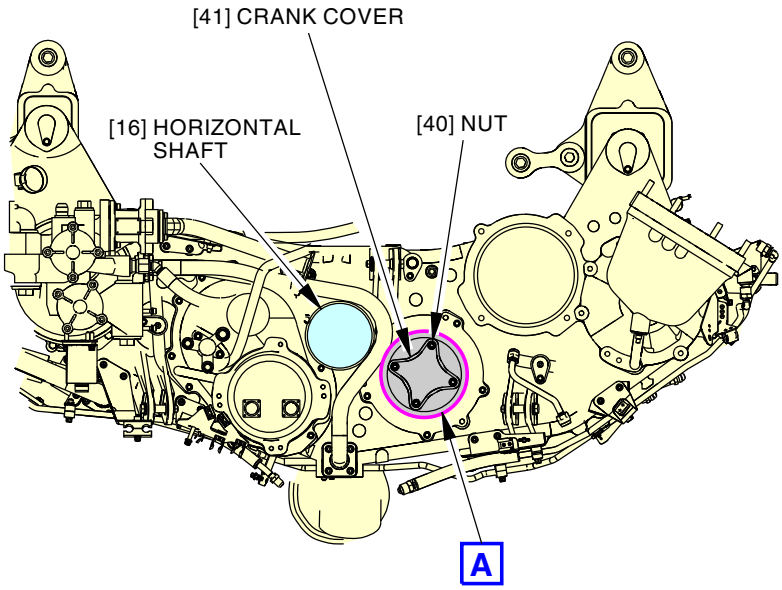
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



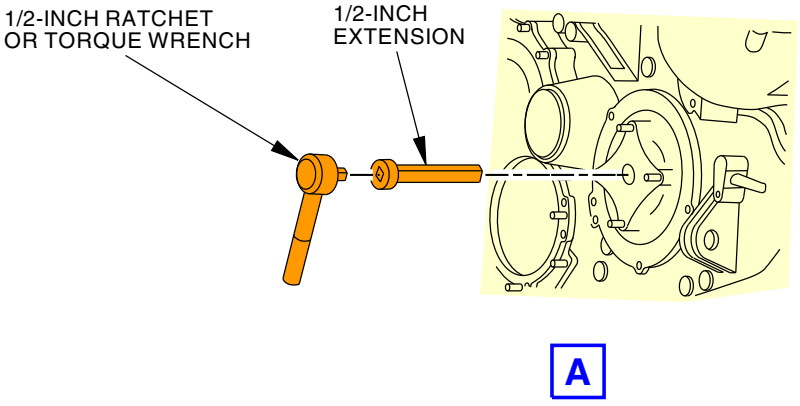
1213033-03
2804685 S0000633102_V1

Horizontal Shaft Installation
Figure 407/72-64-02-990-807-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



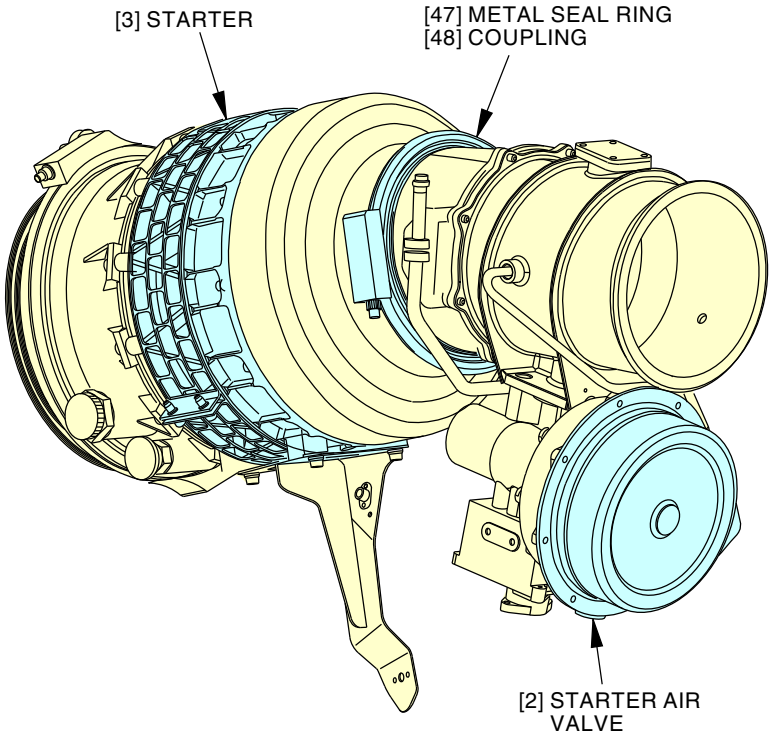
ACCESSORY GEARBOX
FORWARD LOOKING AFT



1207849-02
2804684 S0000633103_V1

Horizontal Shaft Installation
Figure 407/72-64-02-990-807-H00 (Sheet 3 of 3)

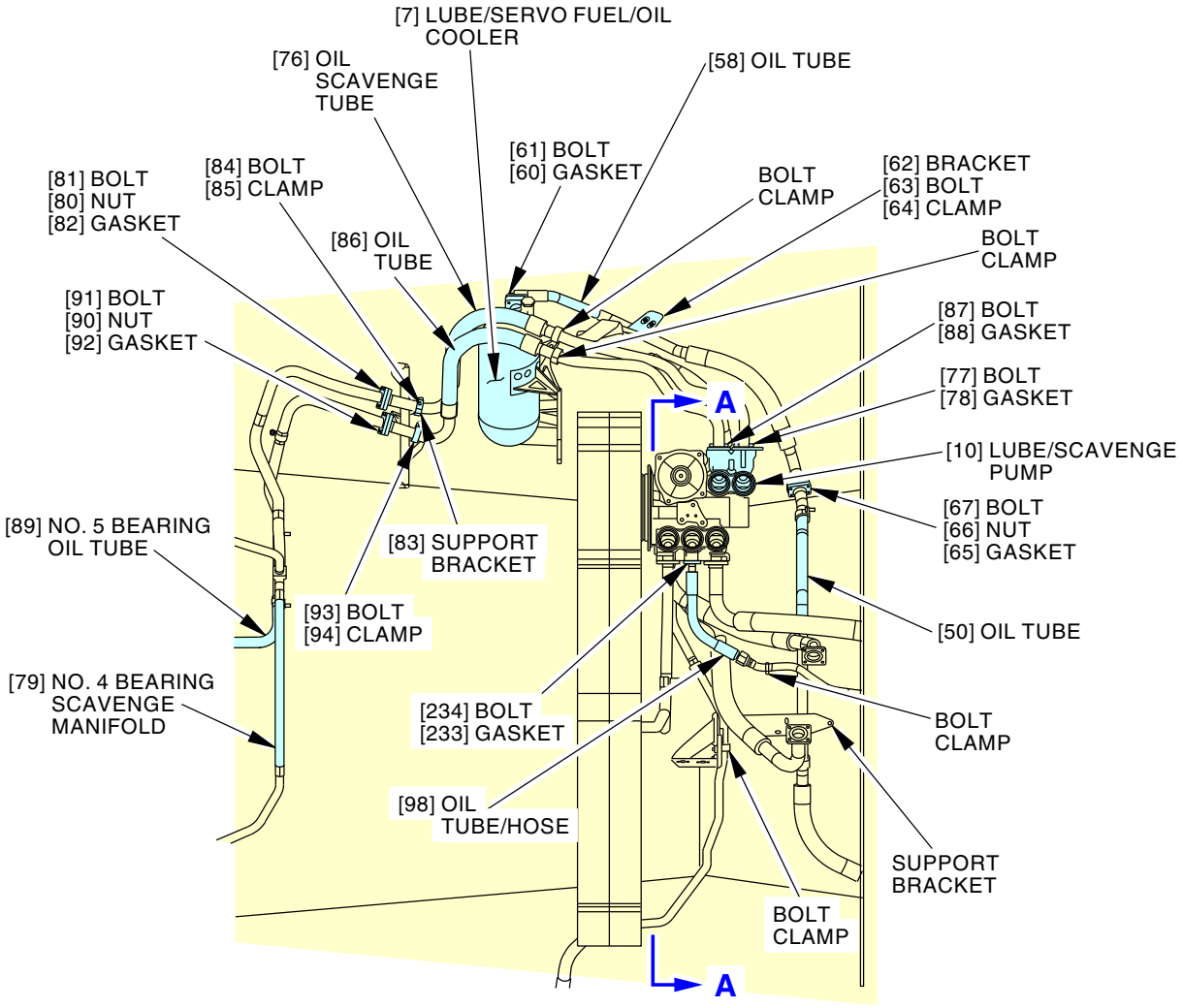
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207852-02
2804683 S0000633104_V1

Installation of the Starter Air Valve on the Starter
Figure 408/72-64-02-990-808-H00

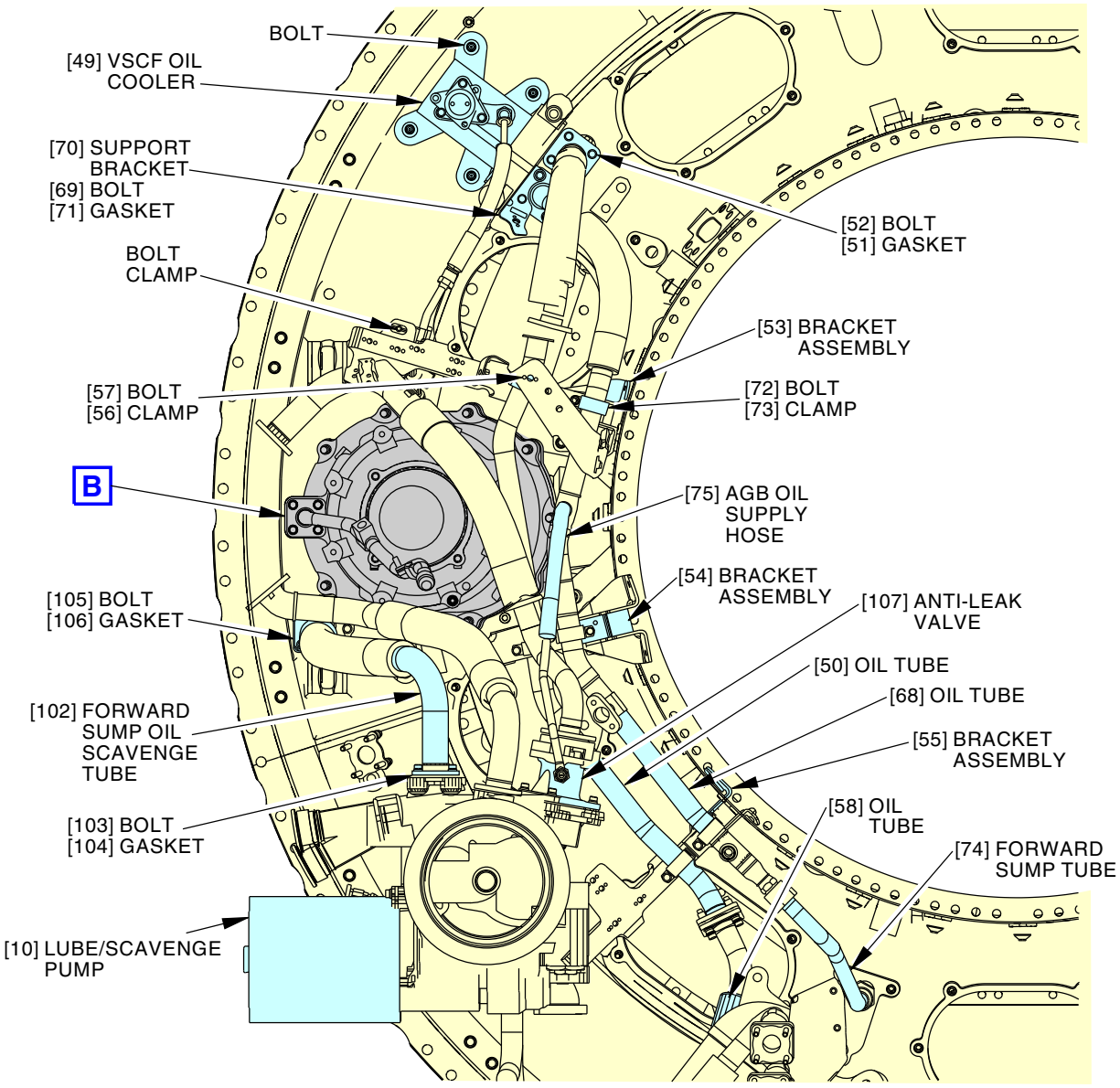
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207854-02
2804682 S0000633105_V1

Lubrication System Tube/Hoses Installation
Figure 409/72-64-02-990-809-H00 (Sheet 1 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

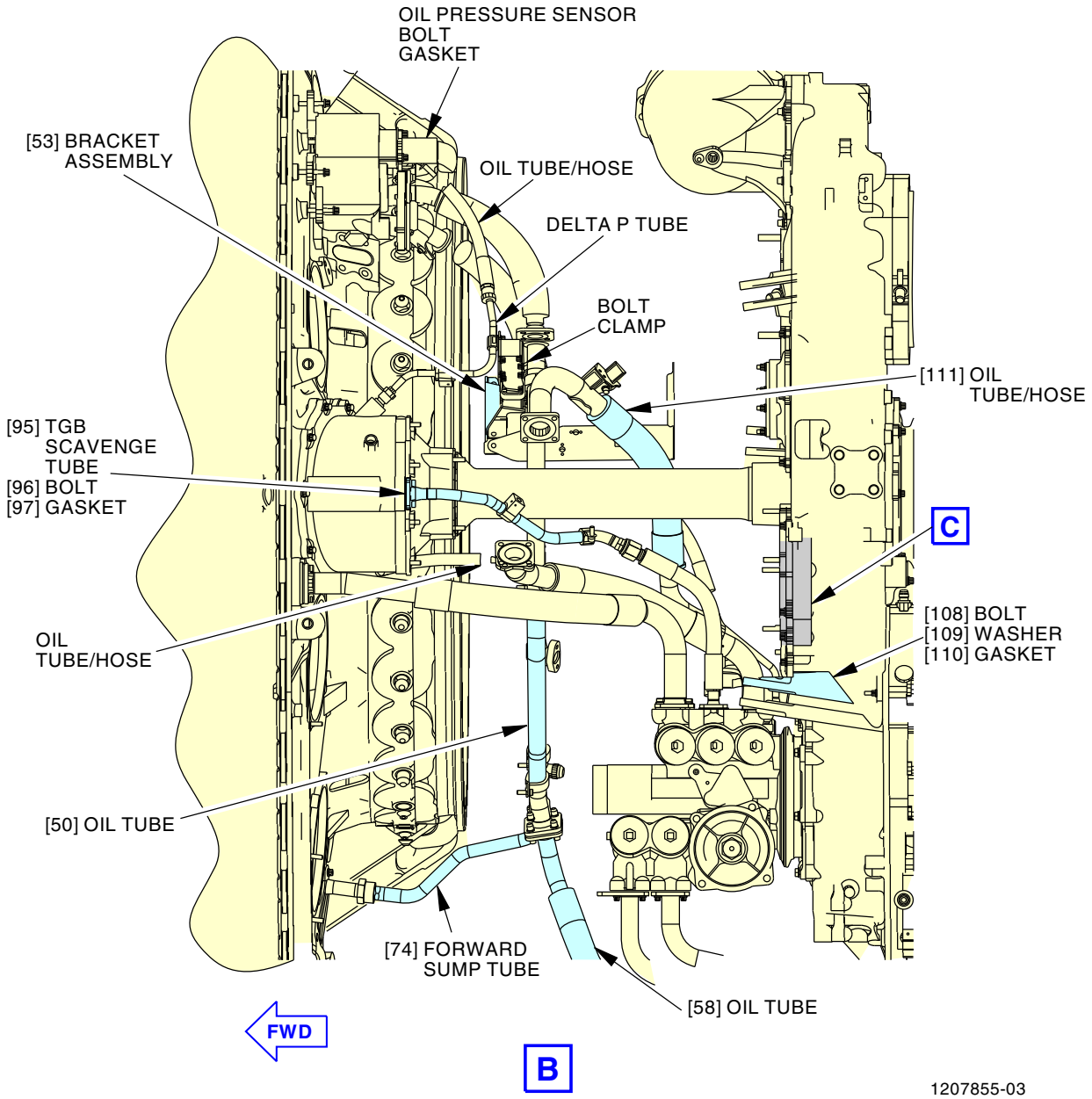


A-A

1207853-02
2804681 S0000633106_V1

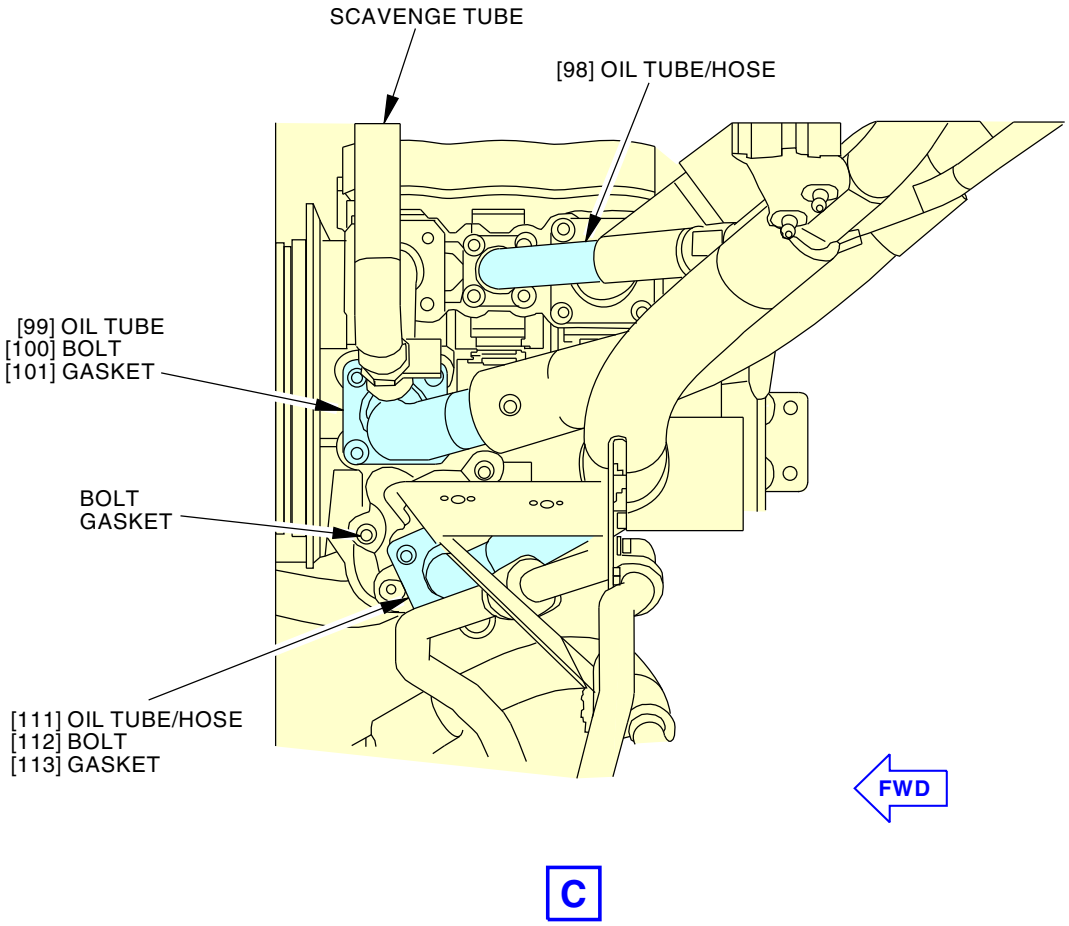
Lubrication System Tube/Hoses Installation
Figure 409/72-64-02-990-809-H00 (Sheet 2 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Lubrication System Tube/Hoses Installation
Figure 409/72-64-02-990-809-H00 (Sheet 3 of 4)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

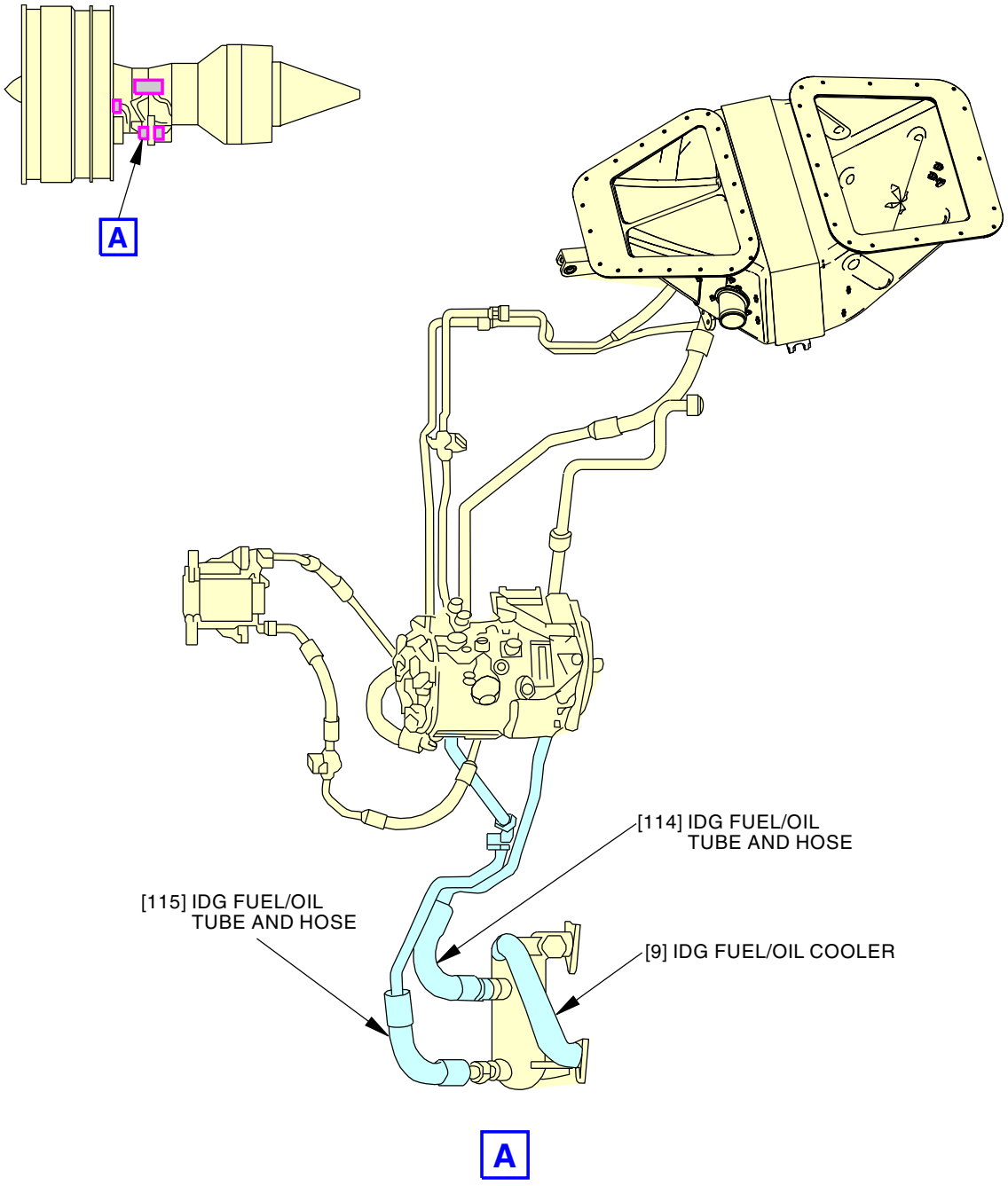


1211127-03

2805046 S0000633108_V1

Lubrication System Tube/Hoses Installation
Figure 409/72-64-02-990-809-H00 (Sheet 4 of 4)

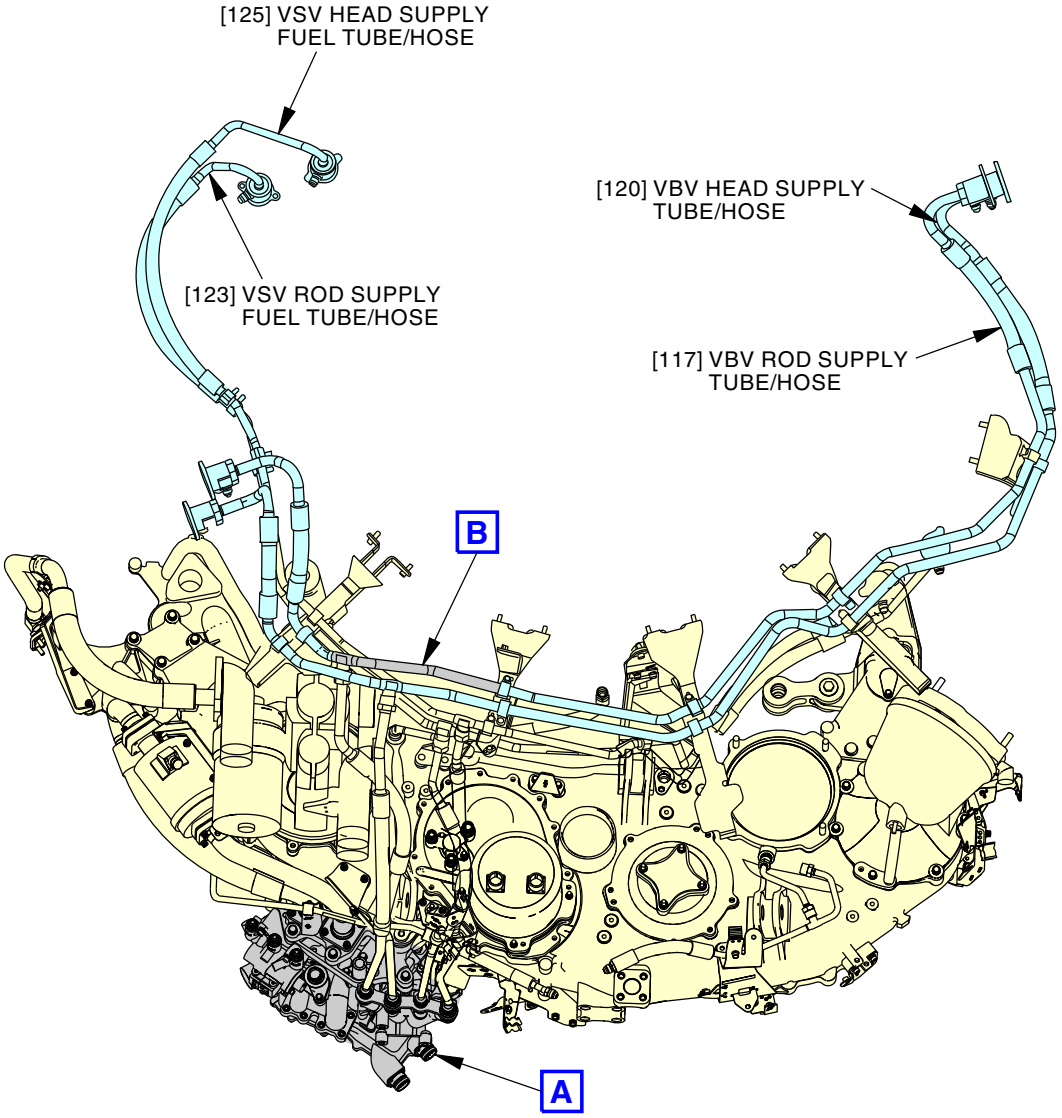
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207856-02
2805087 S0000633109_V1

IDG Fuel/Oil Tube and Hoses Installation
Figure 410/72-64-02-990-810-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

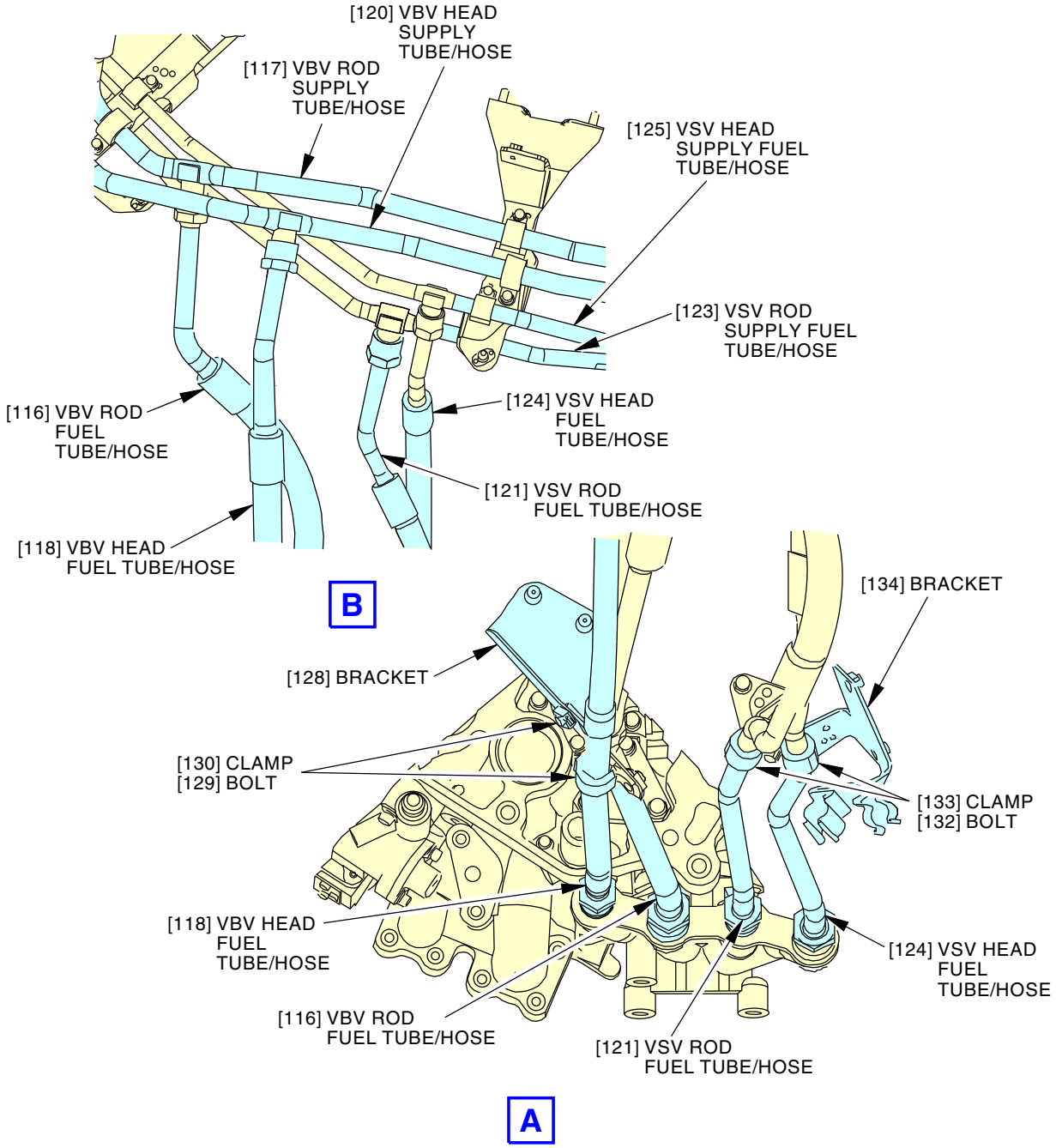


FORWARD LOOKING AFT

1207857-03
2804679 S0000633110_V1

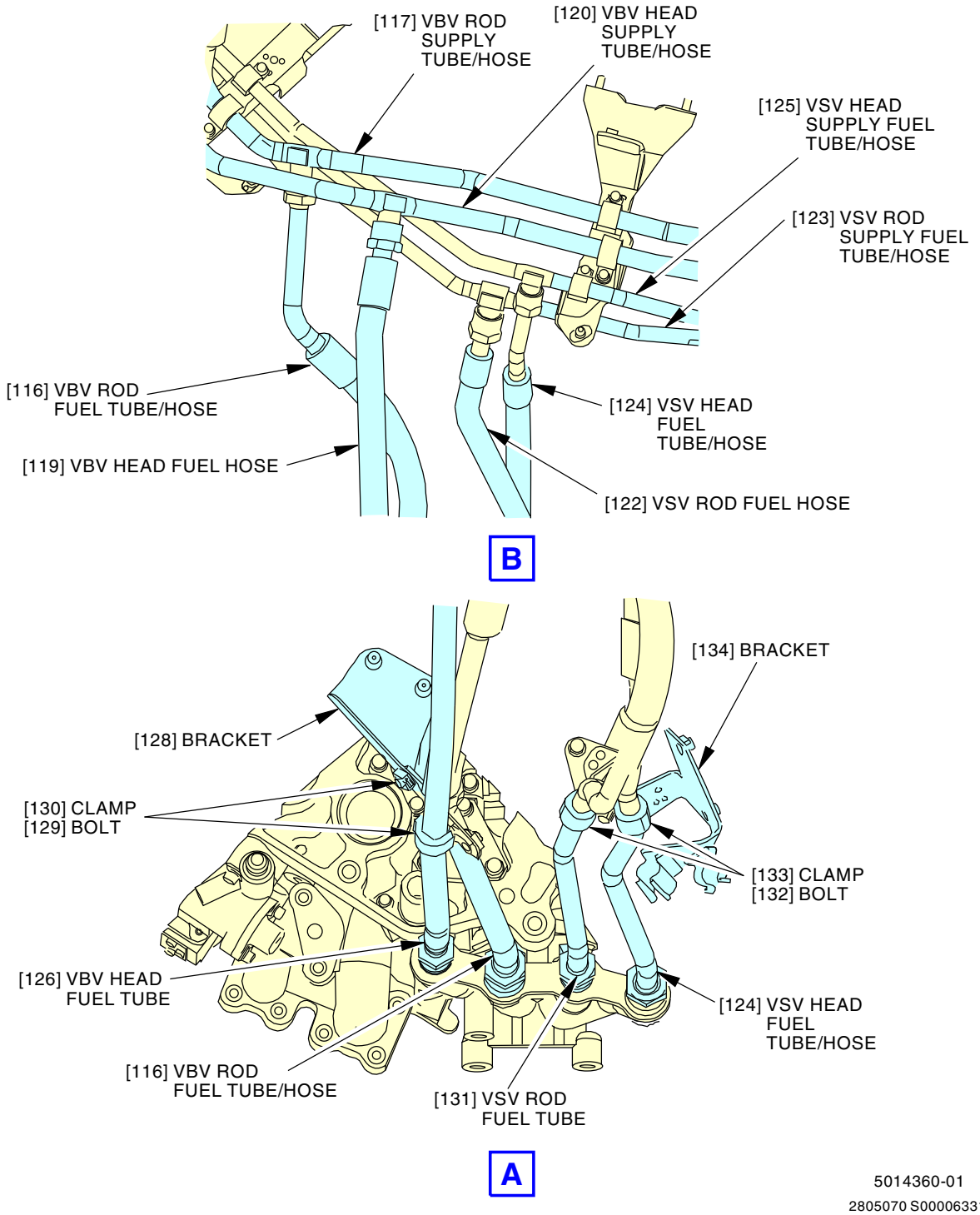
VBV and VSV Actuator Tube and Hoses Installation
Figure 411/72-64-02-990-811-H00 (Sheet 1 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



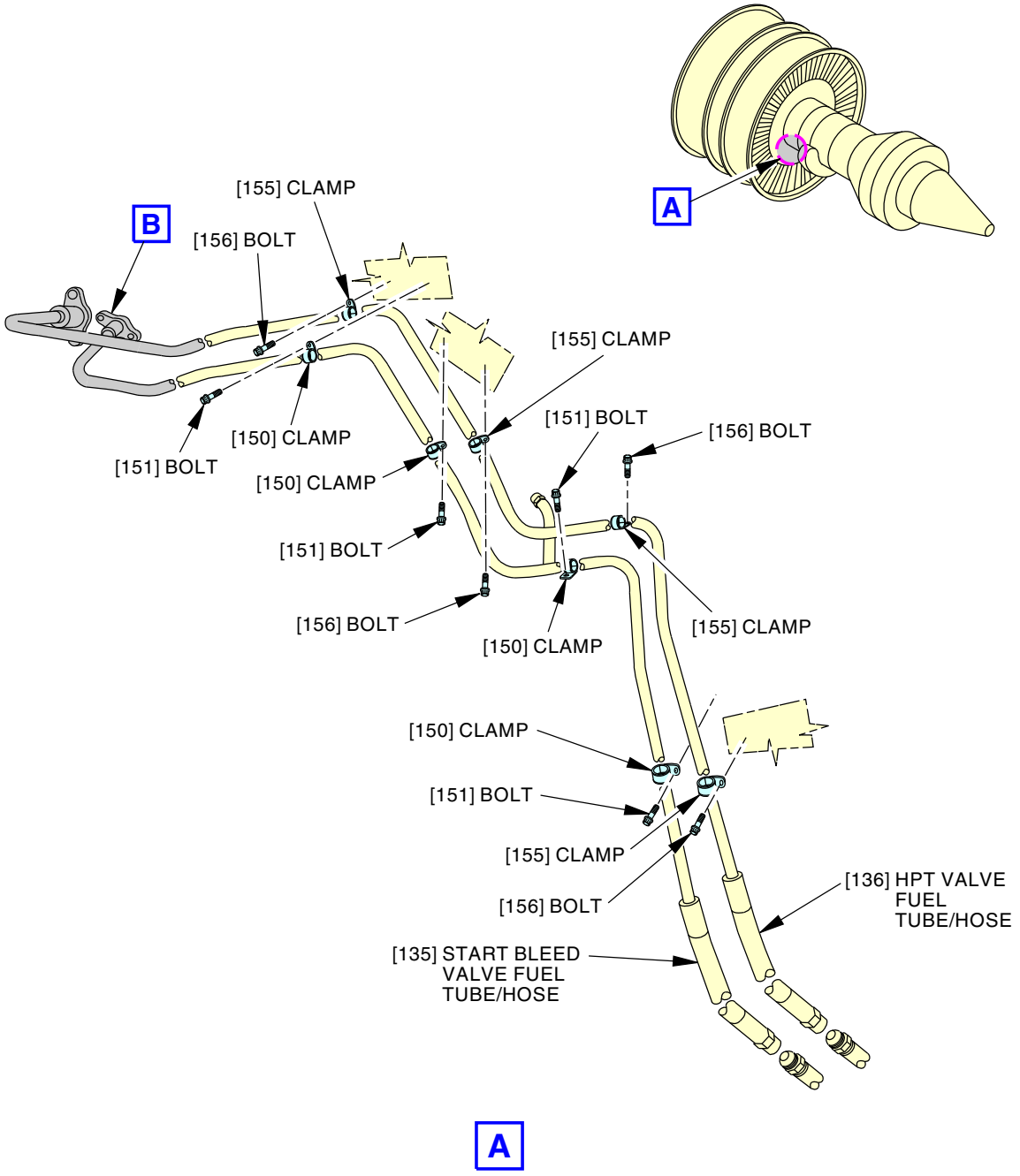
VBV and VSV Actuator Tube and Hoses Installation
Figure 411/72-64-02-990-811-H00 (Sheet 2 of 3)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



VBV and VSV Actuator Tube and Hoses Installation
Figure 411/72-64-02-990-811-H00 (Sheet 3 of 3)

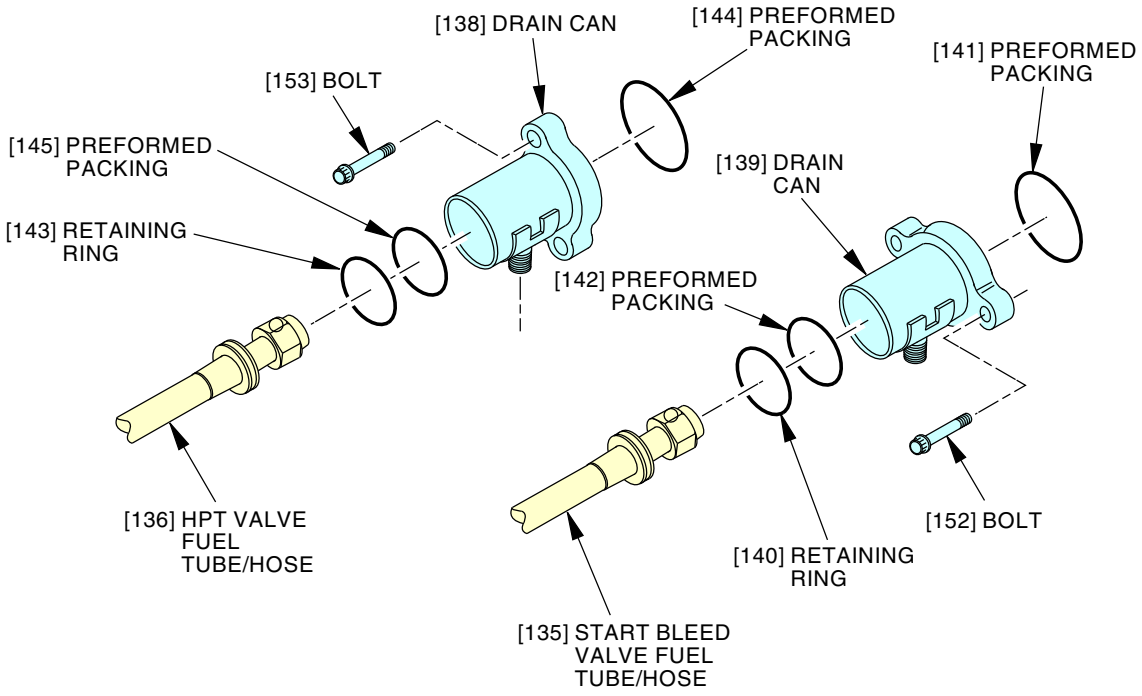
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207863-02
2804678 S0000633113_V1

HPT ACC Valve, Start Transient Bleed Valve Fuel Tube/Hoses and Drain Tubes Installation
Figure 412/72-64-02-990-812-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



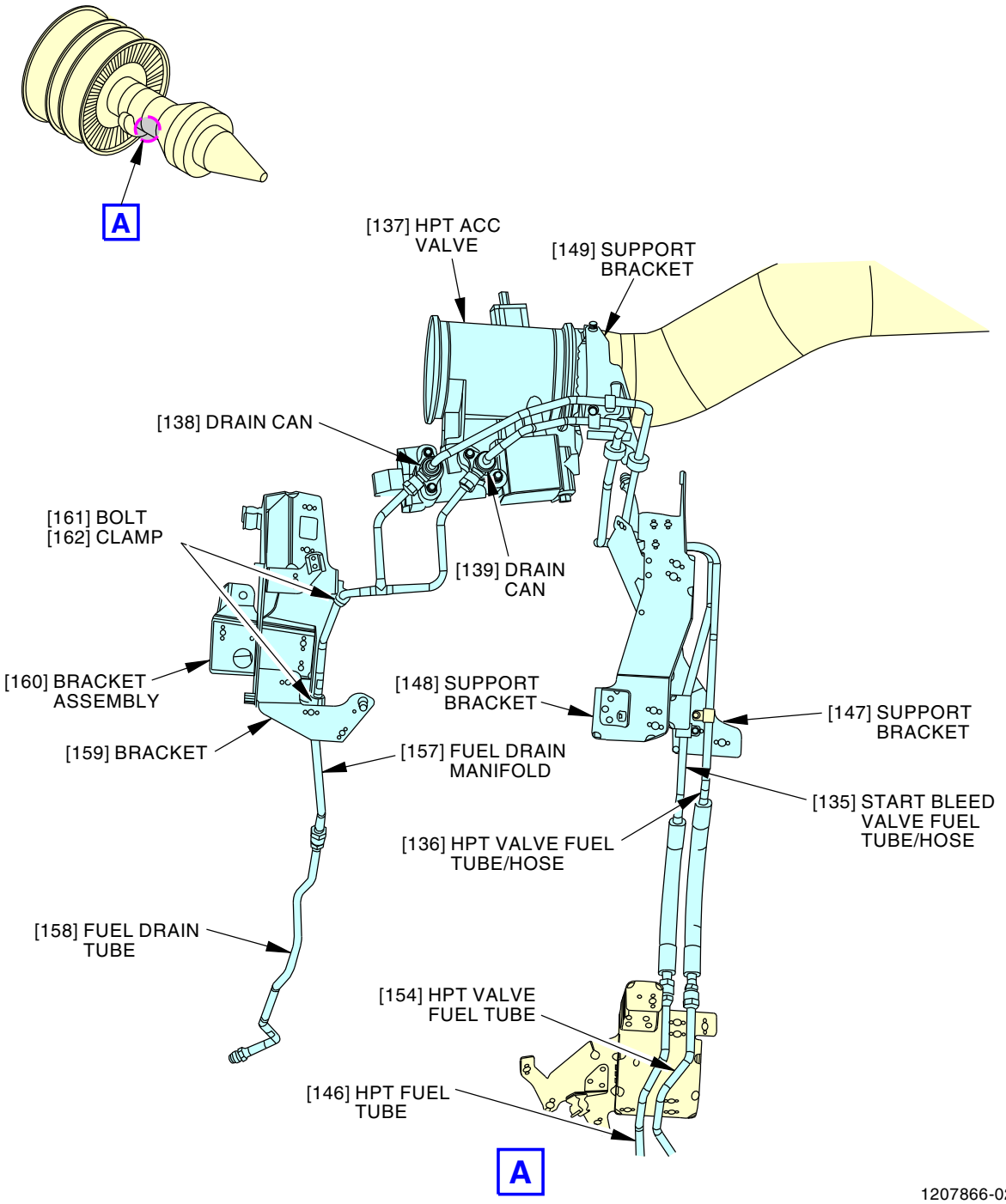
B

1207864-02

2804677 S0000633114_V1

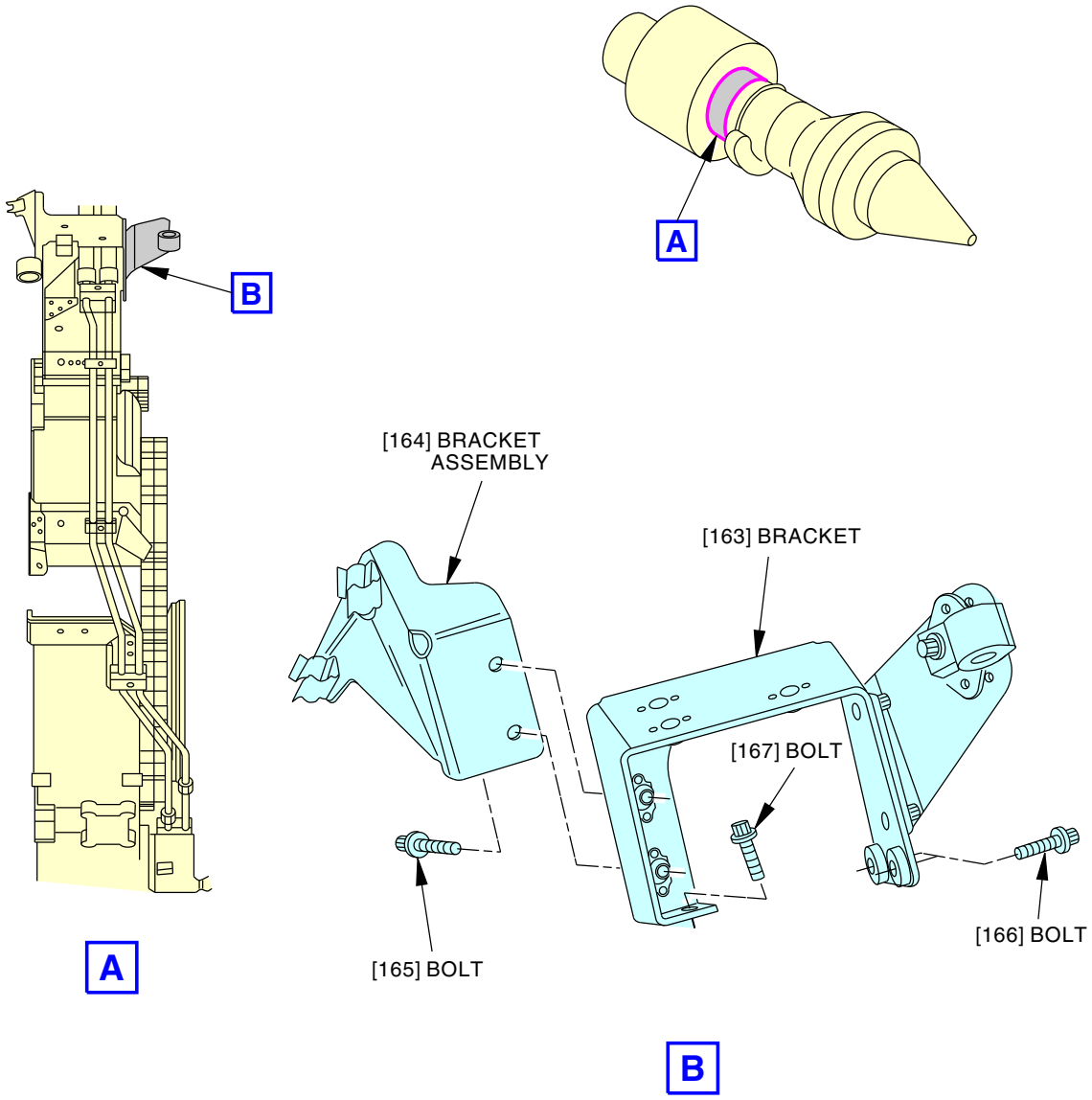
HPT ACC Valve, Start Transient Bleed Valve Fuel Tube/Hoses and Drain Tubes Installation
Figure 412/72-64-02-990-812-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Fuel Drain HPT Manifold and Bracket Hardware Installation
Figure 413/72-64-02-990-813-H00

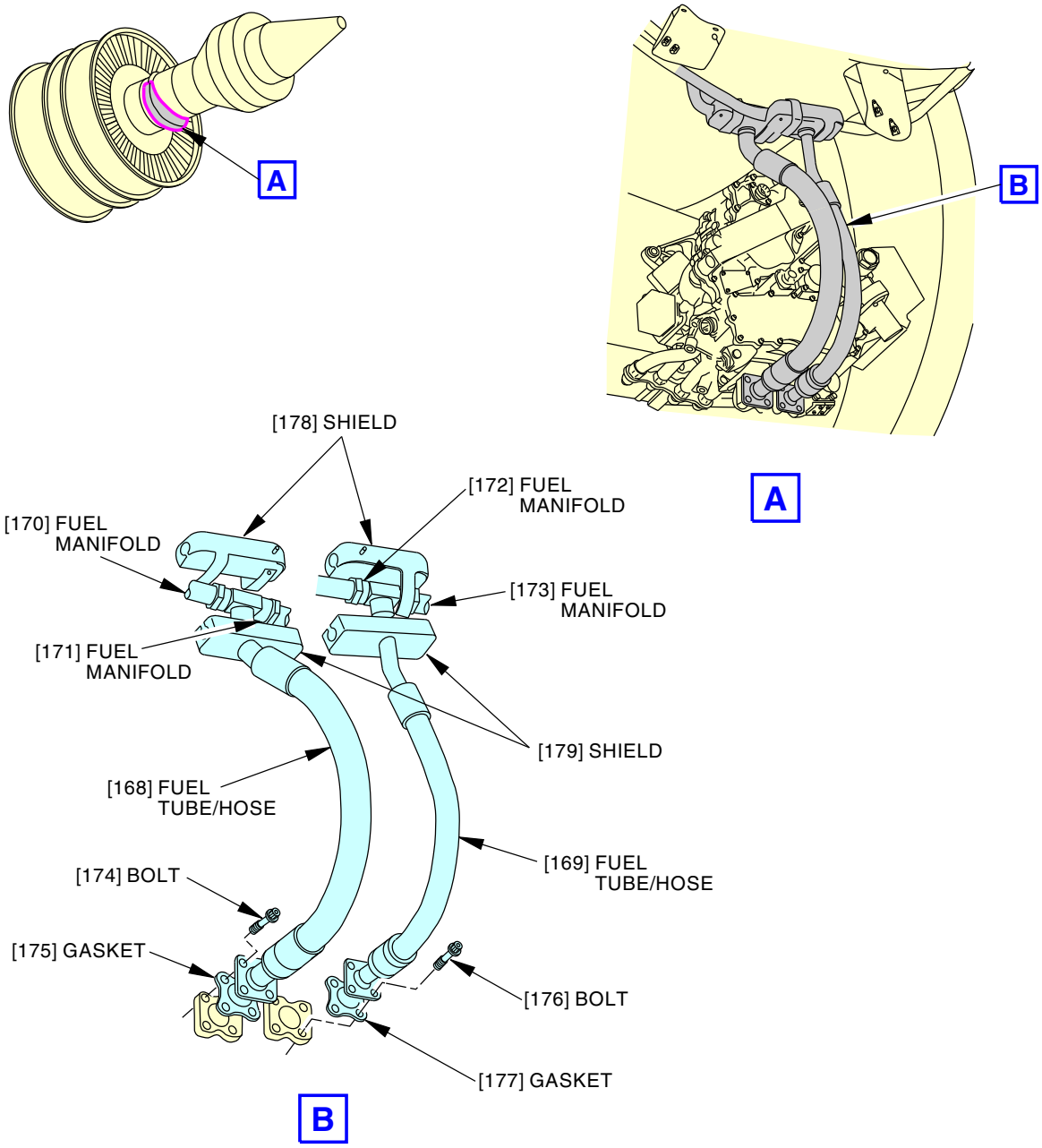
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207865-02
2805076 S0000633116_V1

AGB Brackets Installation
Figure 414/72-64-02-990-814-H00

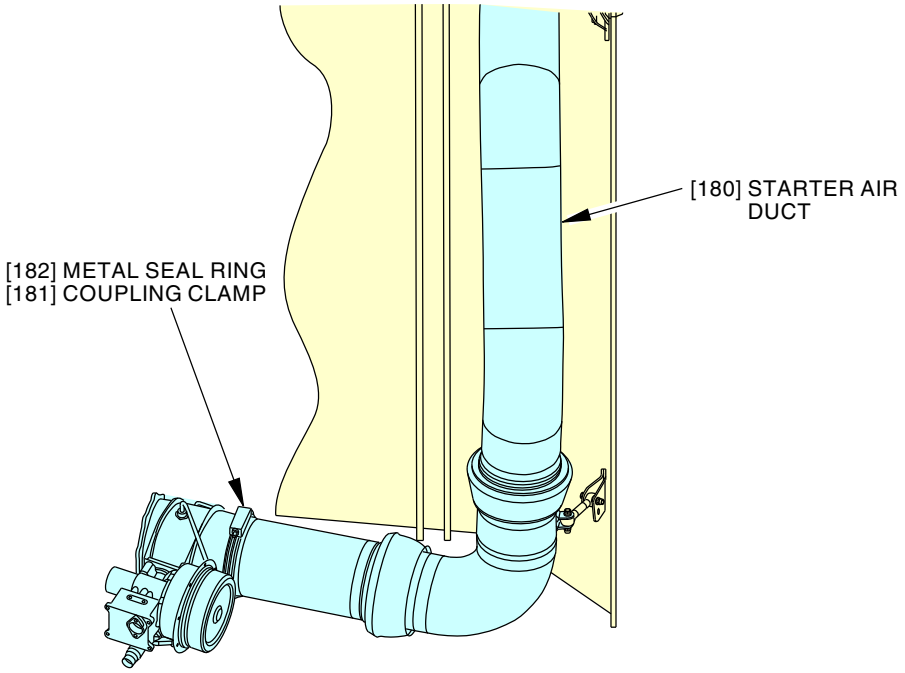
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207867-02
2805083 S0000633117_V1

HMU Start Bleed Valve Tube/Hoses installation
Figure 415/72-64-02-990-815-H00

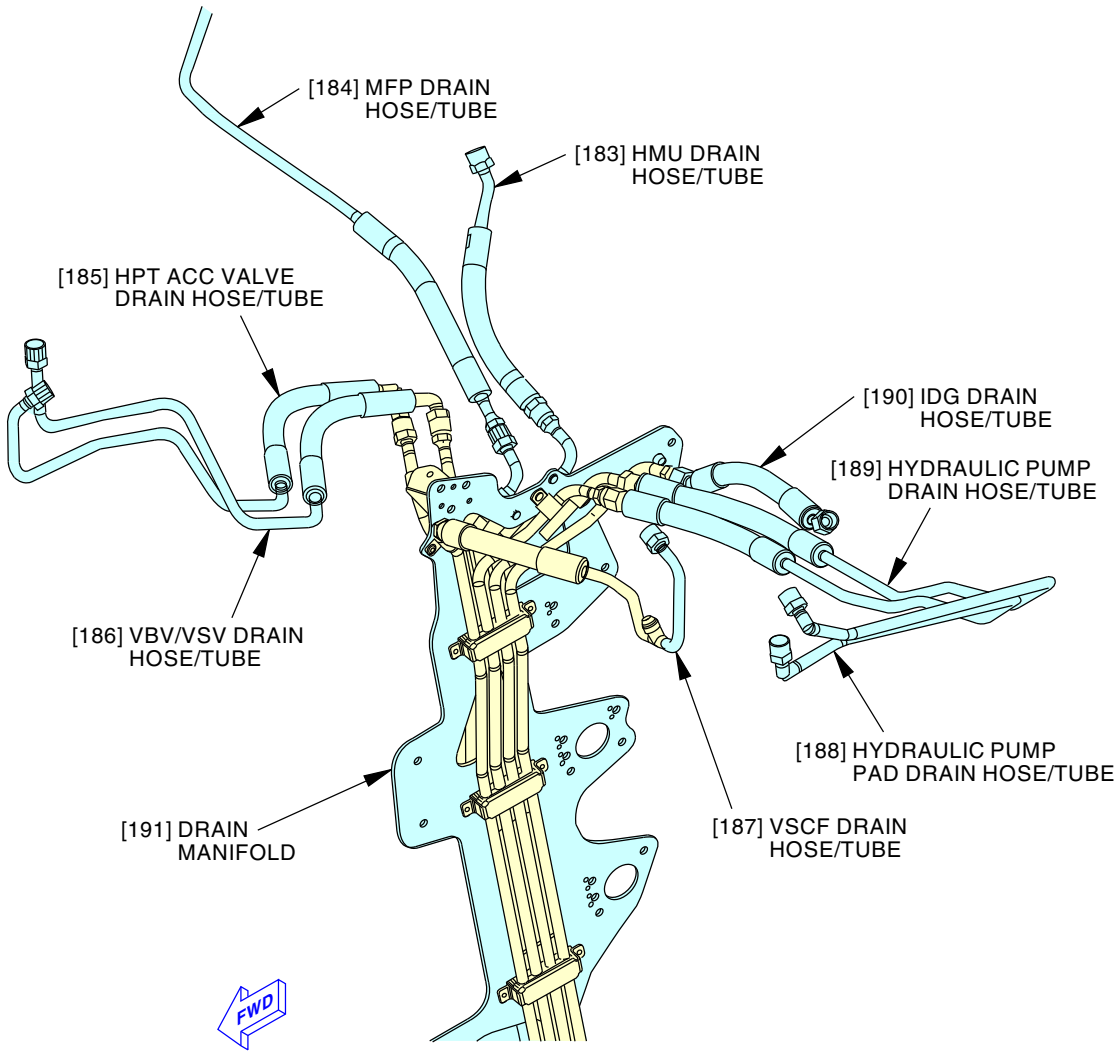
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1213019-01
2805047 S0000633118_V1

Starter Air Duct Installation
Figure 416/72-64-02-990-816-H00

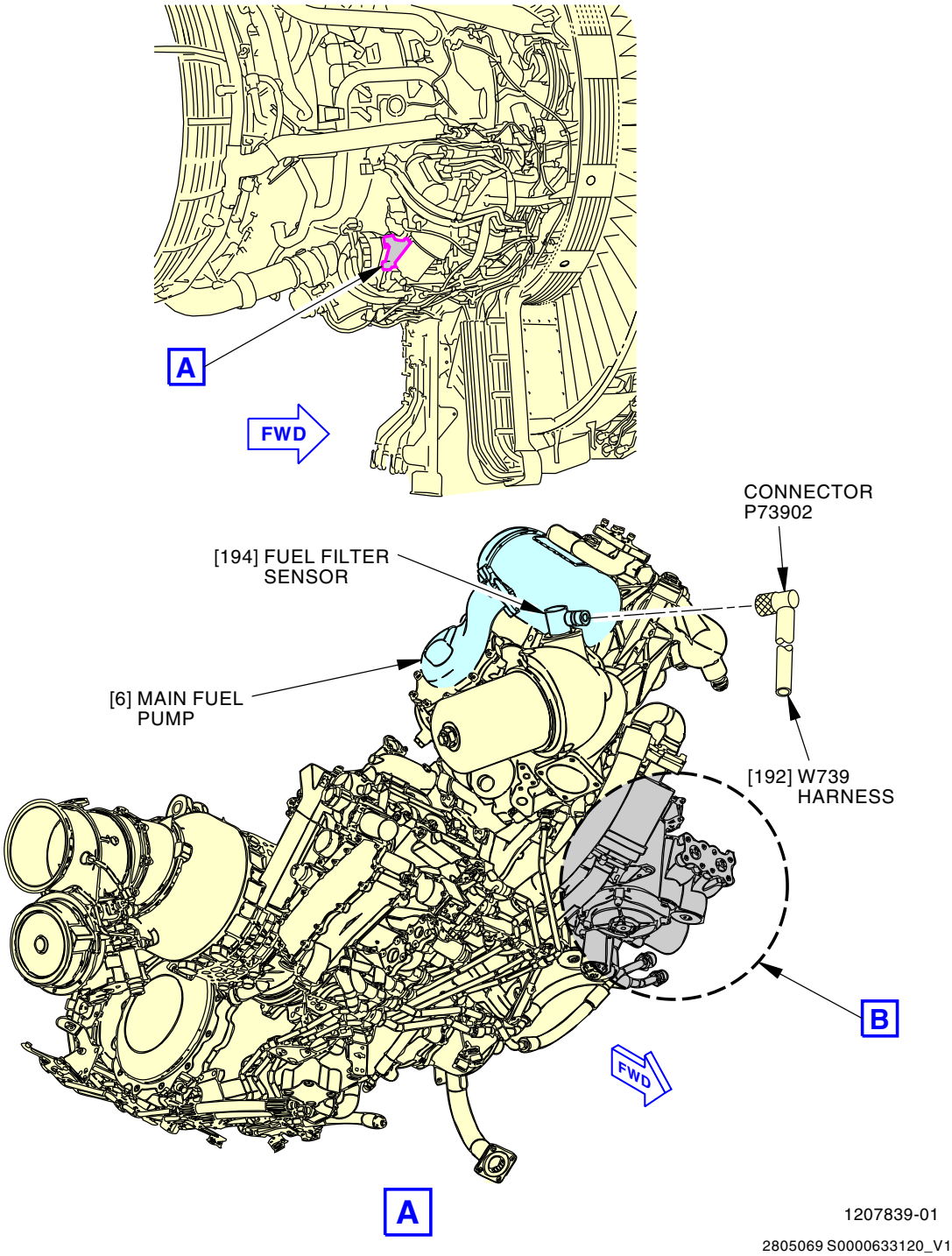
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



1207869-02
2804977 S0000633119_V1

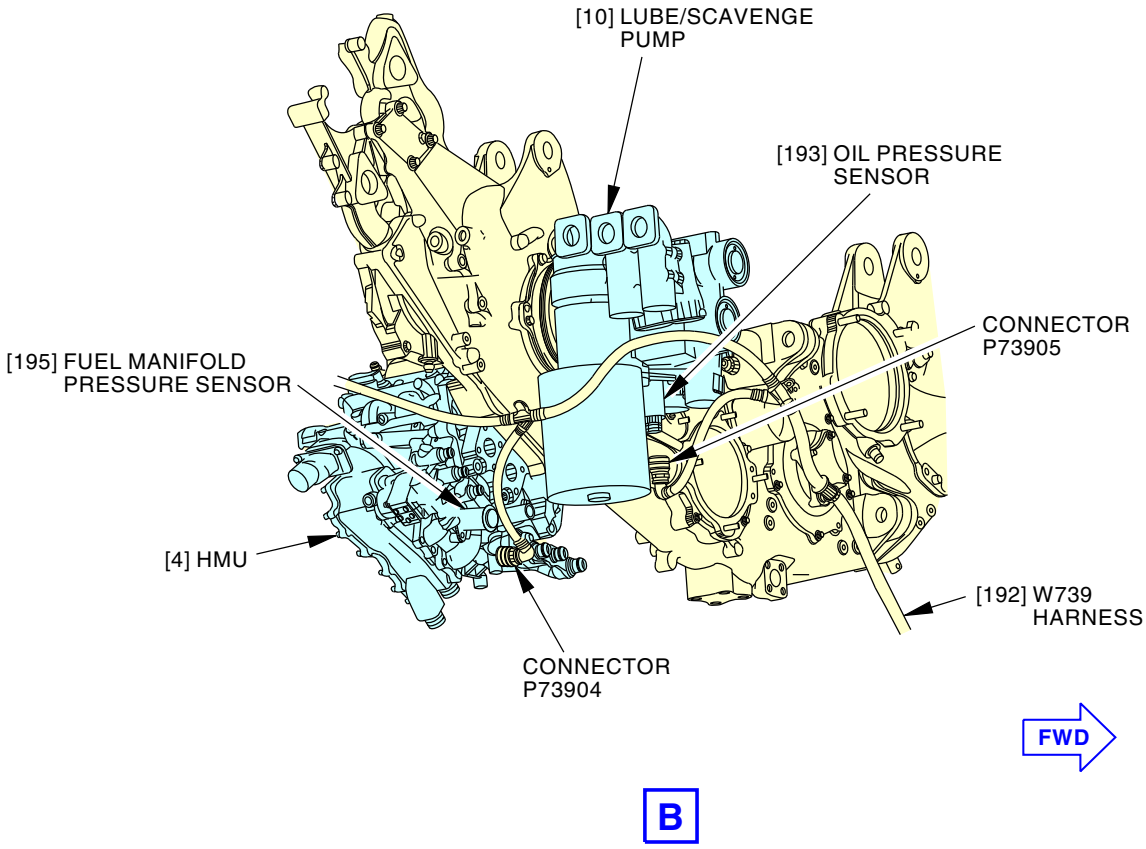
Lower Bifurcation Assembly and Drain Lines Installation
Figure 417/72-64-02-990-817-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



W739 Harness Connectors Installation to the AGB Components
Figure 418/72-64-02-990-818-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

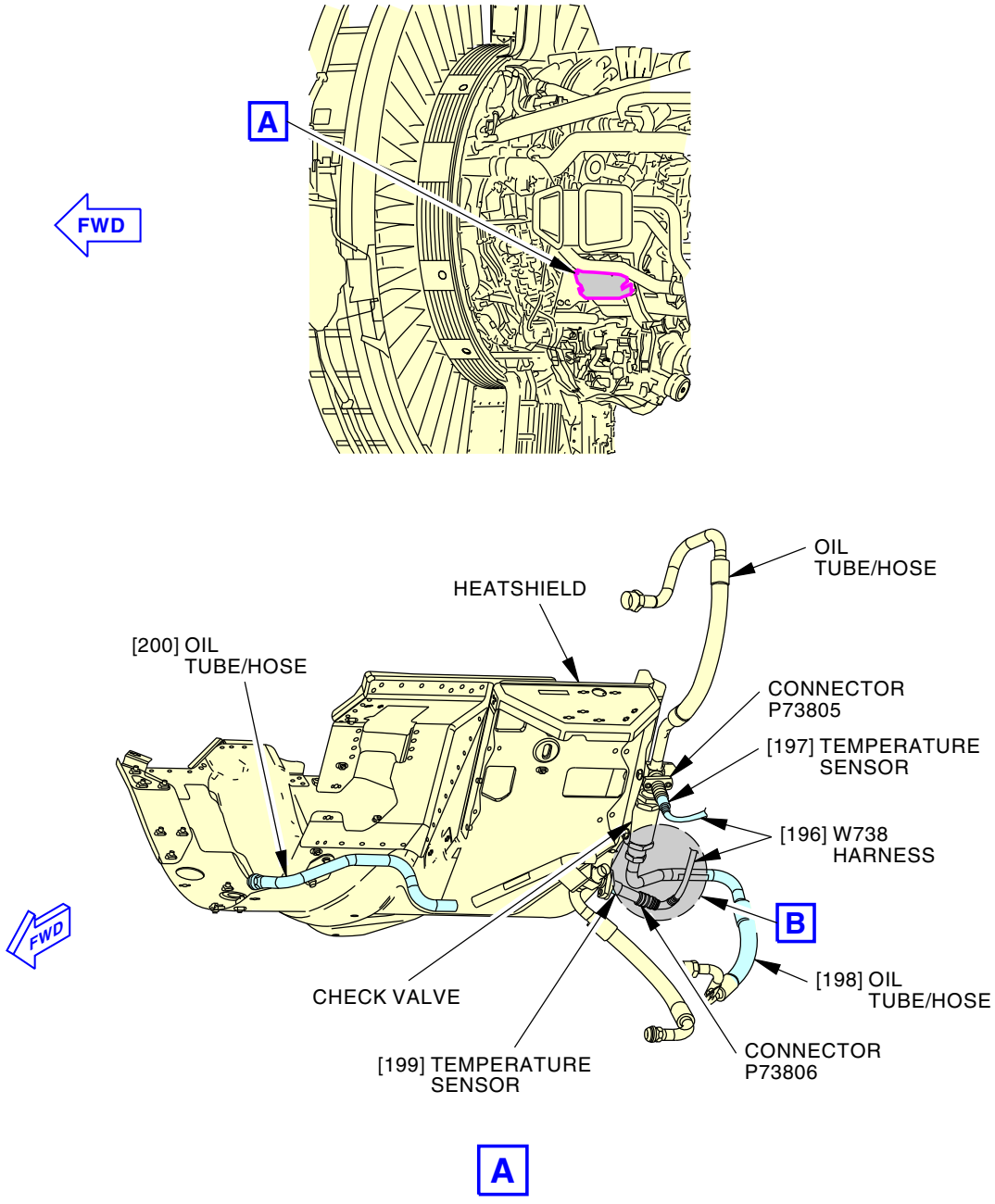


1207870-02

2804976 S0000633121_V1

W739 Harness Connectors Installation to the AGB Components
Figure 418/72-64-02-990-818-H00 (Sheet 2 of 2)

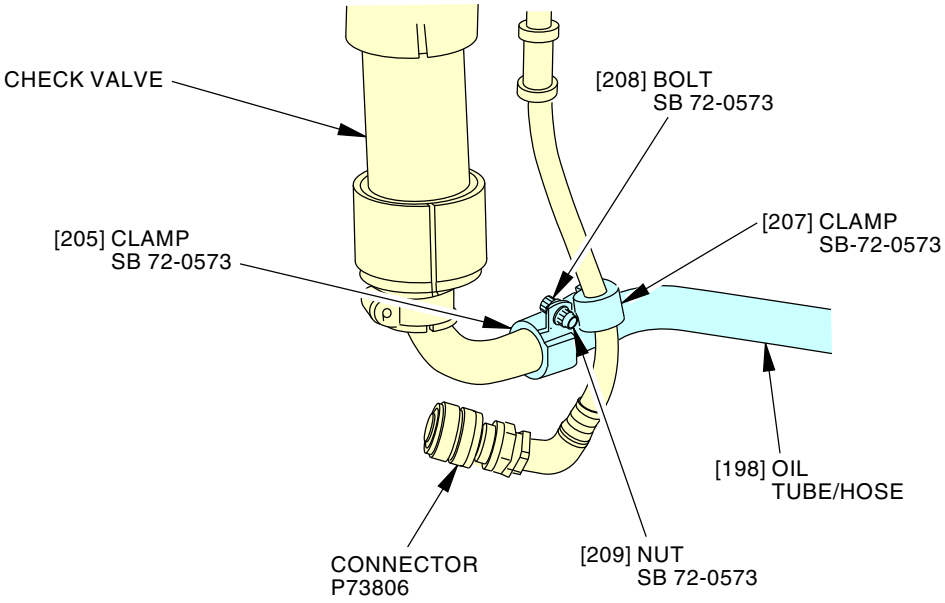
ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



2804789 S0000633122_V1

W738 Harness Connectors Installation to the AGB Components
Figure 419/72-64-02-990-819-H00 (Sheet 1 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



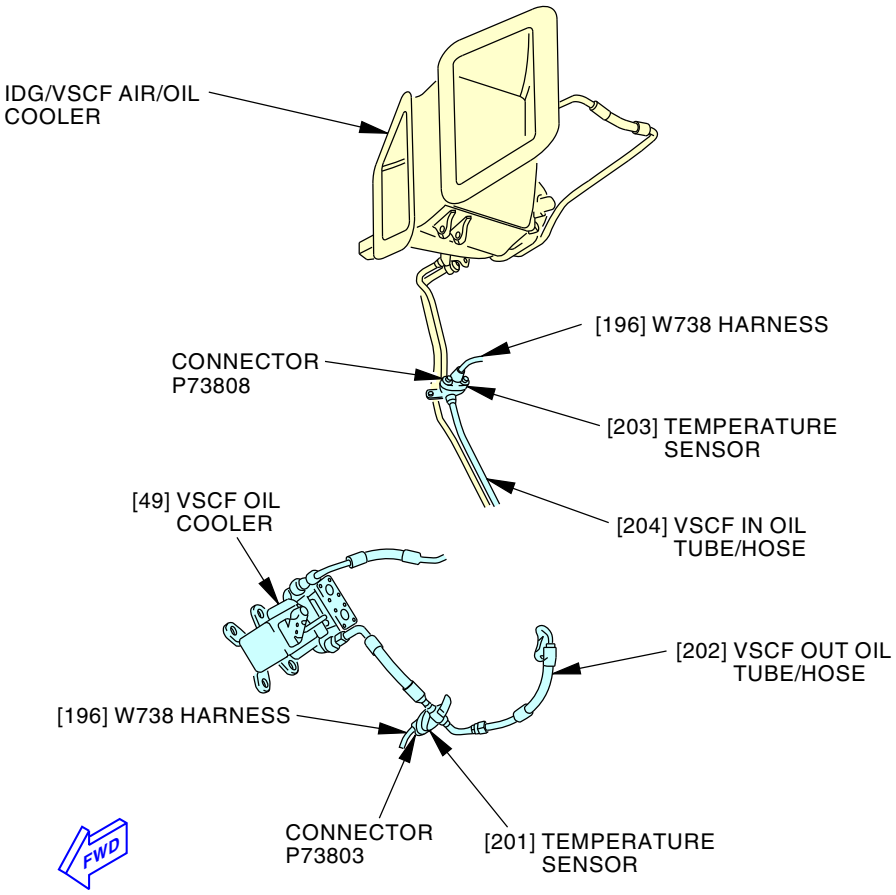
SB 72-0573

B

5008698-01
2804975 S0000633123_V1

W738 Harness Connectors Installation to the AGB Components
Figure 419/72-64-02-990-819-H00 (Sheet 2 of 2)

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

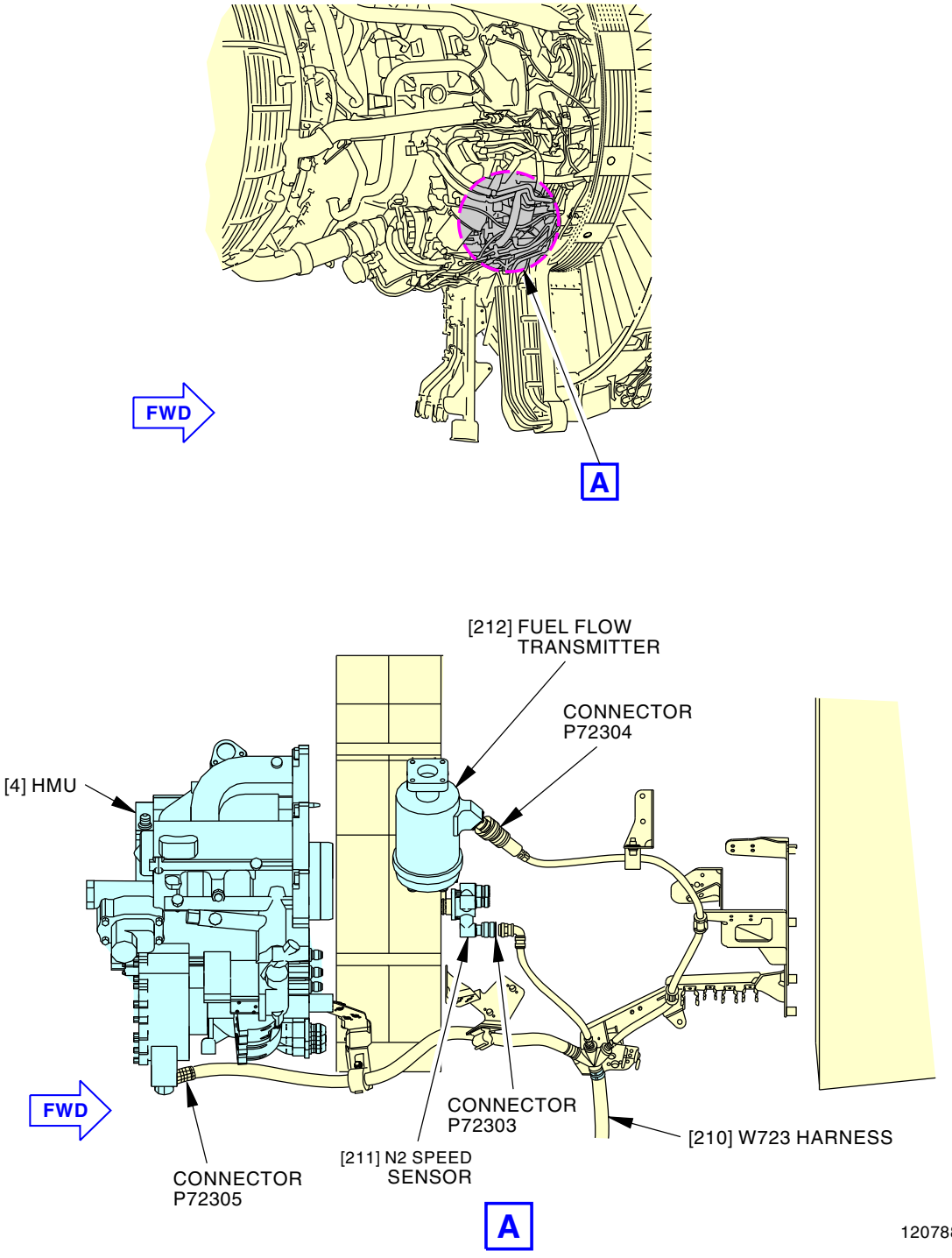


1207875-02

2804653 S0000633124_V1

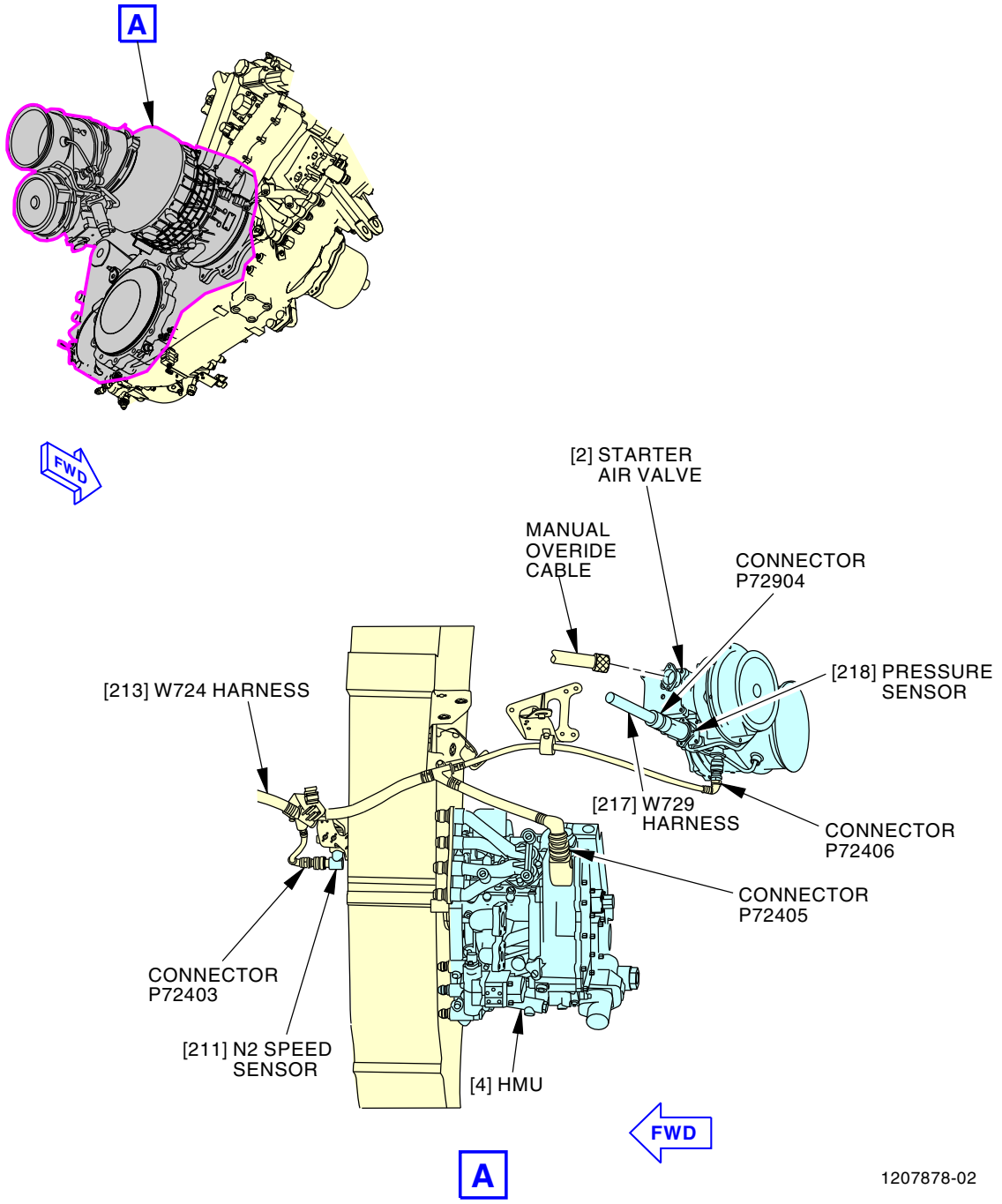
VSCF Oil Temperature Inlet and Outlet electric Connector Installation
Figure 420/72-64-02-990-820-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



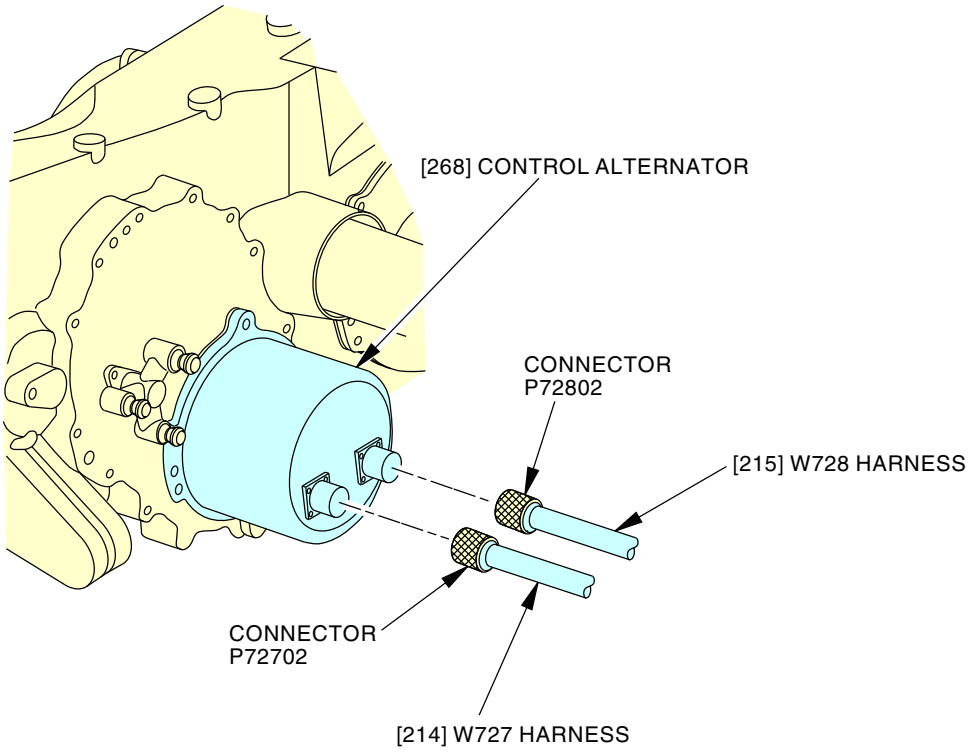
W723 Harness Connectors Installation to the N2 Speed Sensor, HMU, and Fuel Flow Transmitter
Figure 421/72-64-02-990-821-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



Harness Connectors Installation to the Starter Air Valve and Starter Air Pressure Sensor
Figure 422/72-64-02-990-822-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

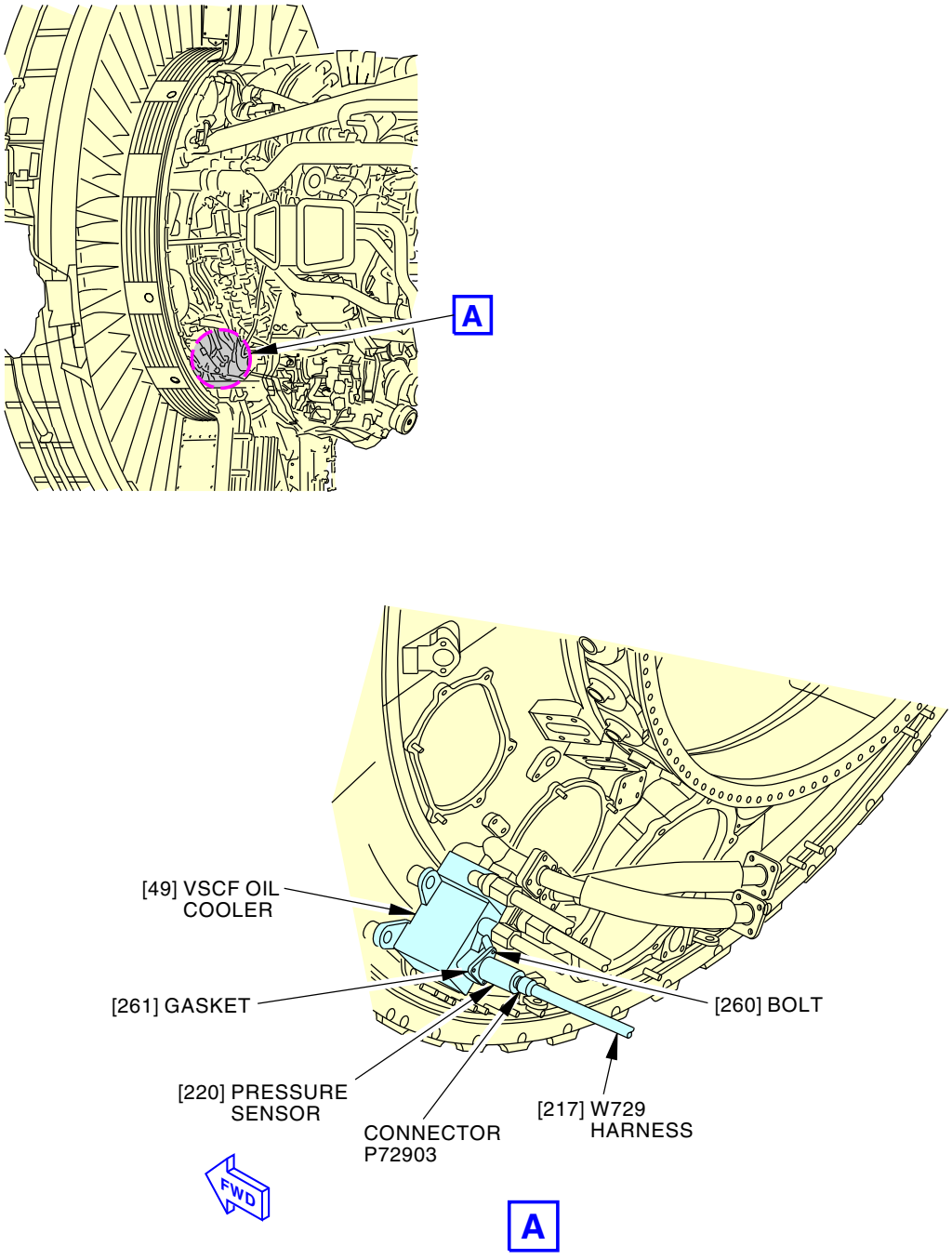


1207879-02

2803985 S0000633127_V1

Control Alternator Channel A and Channel B Electrical Connectors Installation
Figure 423/72-64-02-990-823-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

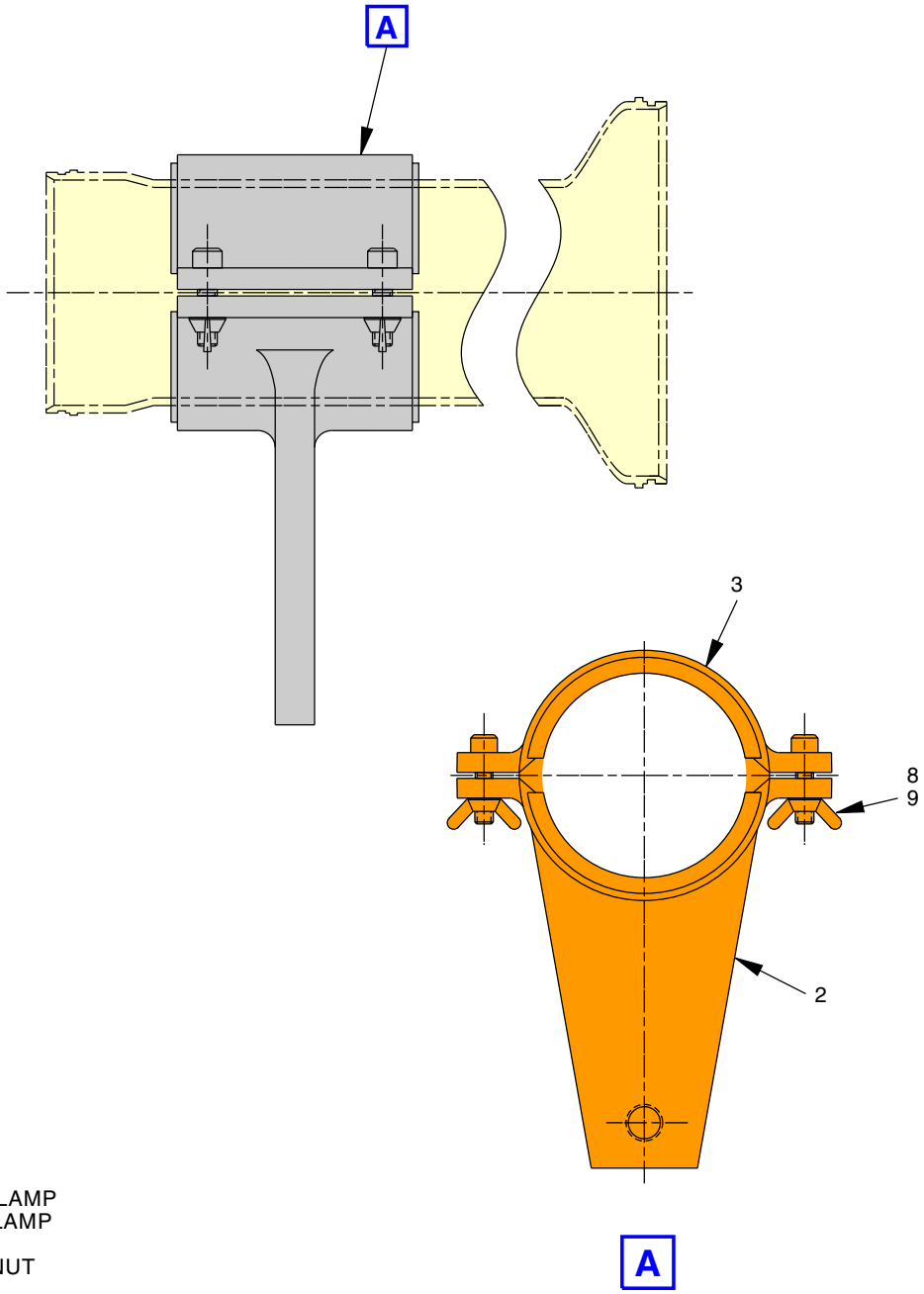


1207877-02

2803958 S0000633128_V1

Engine Oil Pressure Sensor Electrical Cable Installation at the VSCF Oil Cooler
Figure 424/72-64-02-990-824-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEGEND:

2. LOWER CLAMP
3. UPPER CLAMP
8. BOLT
9. WINGED NUT

NOTE:

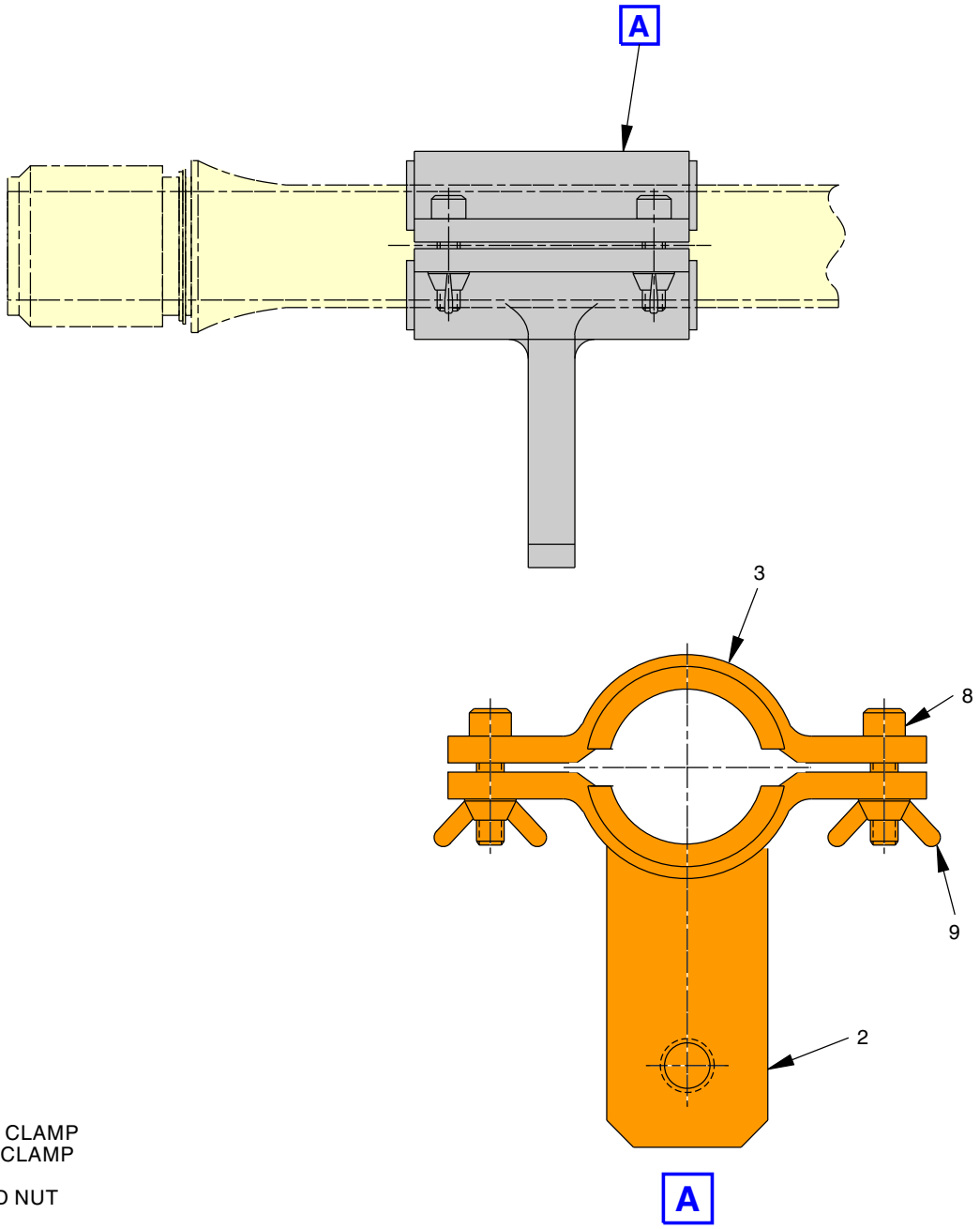
ITEM NUMBERS IN THIS SHEET CORRESPOND WITH ITEMS OF TOOL 9C3134.

1278958-02

2803951 S0000633129_V1

Clamp Assembly, HDS Cover Removal Tool, 9C3134
Figure 425/72-64-02-990-825-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details



LEGEND:

2. LOWER CLAMP
3. UPPER CLAMP
8. BOLT
9. WINGED NUT

NOTE:

ITEM NUMBERS IN THIS SHEET CORRESPOND WITH ITEMS OF TOOL 9C3133.

1278959-01
2803949 S0000633130_V1

Clamp Assembly, HDS Removal Tool, 9C3133
Figure 426/72-64-02-990-826-H00

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 72-64-02-400-801-H00

3. Accessory Gearbox Installation

(Figure 401, Figure 402, Figure 403, Figure 404, Figure 405, Figure 406, Figure 407, Figure 408, Figure 409, Figure 410, Figure 411, Figure 412, Figure 413, Figure 414, Figure 415, Figure 416, Figure 417, Figure 418, Figure 419, Figure 420, Figure 421, Figure 422, Figure 423, Figure 424, Figure 425, Figure 426)

A. General

(1) This task gives instructions to install the Accessory Gearbox (AGB) on an on-wing engine.

(2) The AGB is mounted under the high pressure compressor, at the 6:00 o'clock position.

NOTE: All end fittings on the tubes must be installed finger-tight. Then all clamps and fastening hardware can be installed finger-tight. Once a complete system is installed, all clamps and fastening hardware must be tightened to final assembly torque. Then all tube end fittings can be tightened to final assembly torque.

(3) Make sure that the mating parts are serviceable and have no deterioration.

(4) Read this procedure and become familiar with the instructions and special tool usage before you install the AGB on the engine.

B. References

Reference	Title
12-13-01-130-803-002	Engine Oil Replenishing (P/B 301)
12-22-01-610-806-002	Flush the Oil Tank (P/B 301)
24-11-01-400-801-001	IDG Installation (P/B 401)
24-22-00-860-805	Supply Electrical Power (P/B 201)
24-25-01-400-804-001	Backup Generator Installation (P/B 401)
27-81-00-440-801	Leading Edge Slat Reactivation (P/B 201)
29-11-05-400-801-002	Engine-Driven Pump (EDP) Installation (P/B 401)
70-51-00 P/B 201	TIGHTENING TECHNIQUES AND TORQUE VALUES
71-00-00-800-833-H00	Power Plant Test Reference Table (P/B 501)
71-00-05-400-801-H01	Fan Stator Module to Engine Installation (P/B 401)
71-11-04-410-814-H00	Close the Fan Cowl Panel (Selection) (P/B 201)
73-21-08-400-801-H01	Control Alternator (Stator) Installation (P/B 401)
73-21-09-400-801-H00	Control Alternator Rotor Installation (P/B 401)
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)
79-00-00-200-804-H01	Engine Oil System (DMS) (Scheduled Maintenance Task) Inspection (P/B 601)
79-00-00-200-805-H01	Engine Oil System (Lube and Scavenge Pump Screens and Magnetic Plugs) Inspection (P/B 601)
80-11-01-000-801-H01	Engine Starter Removal (P/B 401)
80-11-01-400-801-H01	Engine Starter 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
SPL-15695	Fixture - Raise/Lower, Accessory Gearbox Module Part #: 9C1385G02 Supplier: 06083
SPL-15697	Bracket Set - Support/Lift, Accessory Gearbox Module Part #: 9C1229G02 Supplier: 06083
SPL-15780	AGB Install/Remove Fixture Part #: 9C1172G03 Supplier: 06083
SPL-15781	AGB Raise/Lower Fixture Part #: 9C1385G01 Supplier: 06083

D. Consumable Materials

Reference	Description	Specification
D00634 [C02-060]	Compound - Antiseize, Lithium-Based - Never-Seize Regular Grade	
D50072 [C02-023]	Oil - Engine Lubricating	MIL-PRF-23699

E. Expendables/Parts

AMM Item	Description	AIPC Reference	AIPC Effectivity
1	AGB	72-00-05-20E-035	ARO ALL
2	Starter air valve	80-11-02-03-045	ARO ALL
3	Starter	80-11-02-03-070	ARO ALL
4	HMU	73-21-14-05-040	ARO ALL
6	Main fuel pump	73-11-01-03-090	ARO ALL
7	Lube/servo fuel/oil cooler	79-21-02-02-020	ARO ALL
10	Lube/scavenge pump	79-21-03-03-012	ARO ALL
		79-21-03-03-015	ARO ALL
12	Preformed packing	80-11-01-01B-050	ARO ALL
13	Preformed packing	80-11-01-01B-035	ARO ALL
141	Preformed packing	73-11-51-18-080	ARO ALL
		73-11-51-18-082	ARO ALL
142	Preformed packing	73-11-51-18-075	ARO ALL
		73-11-51-18-077	ARO ALL
144	Preformed packing	73-11-51-18-080	ARO ALL
		73-11-51-18-082	ARO ALL
145	Preformed packing	73-11-51-18-075	ARO ALL
		73-11-51-18-077	ARO ALL

F. Location Zones

Zone	Area
411	Engine, Left
421	Engine, Right

G. 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

H. Prepare for the Accessory Gearbox Installation

SUBTASK 72-64-02-860-005-H00

(1) Make sure that these circuit breakers are open:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

I. Accessory Gearbox Installation

SUBTASK 72-64-02-420-001-H00

NOTE: Do not install the following accessories on the AGB before the AGB on-wing installation. These accessories are heavy and it will increase the weight of the AGB Module. Install these accessories on the AGB after the AGB is installed on-wing.

- IDG
- BUG
- EDP
- Starter

(1) Install the horizontal shaft protector [11] on the AGB [1] as follows (Figure 402):

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

(a) Apply the engine lubricating oil, D50072 [C02-023] to the preformed packing [12] and preformed packing [13].

(b) Apply the engine lubricating oil, D50072 [C02-023] to the lead-in chamfer of the horizontal shaft protector [11].

CAUTION MAKE SURE THAT THE PREFORMED PACKING IS NOT TWISTED SO THAT IT FITS IN THE GROOVE CORRECTLY. IF THIS IS NOT DONE, IT WILL INCREASE THE CHANCES OF UNWANTED CONTACT DURING THE INSTALLATION PROCEDURE OF THE HORIZONTAL SHAFT PROTECTOR AND CAUSE DAMAGE AND POSSIBLE OIL LEAKAGE.

(c) Install the preformed packing [12] on the forward end of the horizontal shaft protector [11].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

MAKE SURE THAT THE PREFORMED PACKING IS NOT TWISTED SO THAT IT FITS IN THE GROOVE CORRECTLY. IF THIS IS NOT DONE, IT WILL INCREASE THE CHANCES OF UNWANTED CONTACT DURING THE INSTALLATION PROCEDURE OF THE HORIZONTAL SHAFT PROTECTOR AND CAUSE DAMAGE AND POSSIBLE OIL LEAKAGE.

(d) Install the preformed packing [13] on the aft end of the horizontal shaft protector [11].

(e) Put the retaining ring [14] over the aft end of the horizontal shaft protector [11] and attach with the nuts [15].

CAUTION

WATCH THE PREFORMED PACKING VERY CAREFULLY ON THE INSIDE OF THE AGB TO HELP PREVENT DAMAGE TO THE PREFORMED PACKING. THE PREFORMED PACKING TOUCHES THE SLEEVE OF THE HDS BORE OF THE AGB. THE MOVEMENT OF THE SHAFT PROTECTOR IN AND OUT OF THE AGB INCREASES THE RISK FOR THE PREFORMED PACKING TO ROLL OUT OF ITS GROOVE AND/OR PINCH/ NICK/CUT IT DURING ENTRY/EXIT AT THE LEAD-IN OF THE HDS BORE. IF YOU MAKE SURE THERE IS SUFFICIENT LUBRICATION, IT WILL ALSO HELP TO PROTECT THE PREFORMED PACKING.

(f) Install the horizontal shaft protector [11] into the AGB port until the shaft protector stops.

SUBTASK 72-64-02-840-001-H00

(2) Prepare the AGB [1] for installation to the engine as follows (Figure 403):

NOTE: For AGB on-wing installation, the AGB raise/lower fixture, SPL-15695 or the AGB Raise/Lower Fixture, SPL-15781 height is not sufficient to reach up to the AGB attaching mount. You can use a flat platform or adjustable platform and keep the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781 on that platform. The height adjustable table will be preferred to adjust the height.

NOTE: Make sure that the platform height is approximately 3 ft (91.4 cm) and the platform can take weight up to 3200 lb (1451.5 kg).

NOTE: The engines are installed on the aircraft at approximately six degrees dihedral to the ground. If necessary, you can adjust AGB fixture height/angle for correct attachment of the AGB to engine.

(a) Move the AGB [1] under the engine with the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781.

(b) Align the AGB [1] at the AGB support brackets located at the forward compressor stator case of the engine.

(c) Raise the AGB [1] with the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781 to put the AGB left and right mount links in position at the support brackets.

SUBTASK 72-64-02-420-002-H00

(3) Install the AGB [1] to the core module mounts as follows (Figure 404):

(a) Apply the Never-Seize Regular Grade compound, D00634 [C02-060] to the shank and threads of the bolts [17] and bolt [18].

(b) Install the bushing [24] in the left horizontal link [19], left vertical link [20] and right vertical link [21].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(c) Align the left horizontal link [19], left vertical link [20] and right vertical link [21] to the compressor case mounts.

(d) Install the bolt [18] in the left horizontal link [19].

(e) Install the bolts [17] in the left vertical link [20] and right vertical link [21].

(f) Install the washers [22] and nuts [23] to the bolts [17] and bolt [18].

(g) Tighten the nuts [23] to 250 in-lb (28.3 N·m) - 270 in-lb (30.5 N·m).

SUBTASK 72-64-02-420-003-H00

(4) Install the AGB axial center link [29] and lateral side links [30] as follows (Figure 405):

(a) Apply the Never-Seize Regular Grade compound, D00634 [C02-060] to the shank and threads of the bolts [27] and bolts [28].

(b) Attach the left lateral side link [30] to the clevis on the forward side of the AGB with the bolt [27], washer [31] and nut [32].

1) Make sure that the bolt head is pointed outboard to the left (ALF).

(c) Attach the left lateral side link [30] to the clevis on the right side of the fan frame with the bushing [34], bolt [28], washer [31] and nut [32].

1) Make sure that the bolt head is on top.

(d) Do the step (b) and step (c) again to install the right lateral side link [30].

NOTE: The bolt head at the AGB end of the link will face outboard to the right (ALF).

(e) Attach the axial center link [29] to the center clevis on the forward side of the AGB [1] with the bolt [27], washer [31], and nut [32].

1) Make sure that the bolt head is pointed outboard to the left (ALF).

(f) Attach the axial center link [29] to the clevis on the left of the transfer gearbox with the bolt [27], washer [31], and nut [32].

1) Make sure that the bolt head is pointed outboard to the left (ALF).

(g) Tighten the nuts [32] to 250 in-lb (28.3 N·m) - 270 in-lb (30.5 N·m).

SUBTASK 72-64-02-420-004-H00

(5) Attach the AGB bonding jumper [35] as follows (Figure 406):

(a) Attach the bonding jumper [35] to the AGB [1] with the bolt [36].

(b) Tighten the bolt [36] to 55 in-lb (6.2 N·m) - 70 in-lb (7.9 N·m).

SUBTASK 72-64-02-080-001-H00

(6) Remove the bracket set, SPL-15697, the AGB Install/Remove Fixture, SPL-15780 and the AGB raise/lower fixture, SPL-15695 or the AGB Raise/Lower Fixture, SPL-15781 from the AGB [1] as follows (Figure 403):

(a) Loosen and remove the screws (item 11) and washers (item 5) that attach the AGB [1] to the AGB Install/Remove Fixture, SPL-15780 at the 6:00 o'clock position.

(b) Loosen and remove the cap screws (item 18) and washers (item 16) that attach the right bracket (item 21) to the right adapter (item 20).

(c) Lower the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781 away from the AGB [1].

(d) Roll the AGB raise/lower fixture, SPL-15695 or AGB Raise/Lower Fixture, SPL-15781 away from the AGB [1].

(e) Loosen and remove the cap screws (item 22) and washers (item 16) that attach the right bracket (item 21) to the AGB [1].

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(f) Attach the right bracket (item 21) to the right adapter (item 20) with the cap screws (item 18) and washers (item 16) for storage.

SUBTASK 72-64-02-420-005-H00

(7) Install the horizontal shaft [16] to the TGB [38] as follows (Figure 407):

WARNING THE STARTER IS VERY HEAVY. MAKE SURE THAT YOU CORRECTLY SUPPORT THE STARTER BEFORE YOU LOOSEN THE COUPLING CLAMP. IF YOU DO NOT, INJURY TO PERSONS CAN OCCUR.

(a) If not removed, remove the starter [3] from the AGB [1] (TASK 80-11-01-000-801-H01).

(b) Install the spirolox into the ID groove at the forward end of the horizontal shaft [16].

(c) Install the horizontal shaft [16] into the AGB [1] as follows:

1) Put the horizontal shaft [16] through the aft side of the AGB [1] at the starter pad.

2) Move the horizontal shaft [16] forward to the edge of the TGB horizontal bevel gearshaft [37].

3) Align the splines of the horizontal shaft [16] with the splines of the TGB horizontal bevel gearshaft [37].

4) If the splines do not align, turn the gears in the AGB [1] as follows:

a) Remove the nuts [40] from the crank cover [41] on the forward side of the AGB [1].

<1> Remove the crank cover [41].

b) Use a 1/2-inch drive ratchet and extension to turn the AGB shaft.

<1> Align the splines of the horizontal shaft [16] with the splines of the TGB horizontal bevel gearshaft [37].

5) Use your hand to move the horizontal shaft [16] forward into the TGB horizontal bevel gearshaft [37] as far as possible.

6) Make sure that the horizontal shaft [16] is fully installed as follows:

a) Put a nylon drift through the starter pad on the aft side of the AGB [1] until the nylon drift touches the aft side of the horizontal shaft [16].

b) Use a mallet to hit the nylon drift with a firm steady blow to fully install the horizontal shaft [16] in the TGB horizontal bevel gearshaft [37].

7) Make sure that the AGB [1], TGB [38], Inlet Gearbox (IGB) and core are free to turn as follows:

a) Use a 1/2-inch drive extension and a 0-100 ft-lb dial torque wrench and turn the AGB shaft in a counterclockwise direction (aft looking forward) for two turns minimum.

b) Make sure that the force necessary to turn the AGB shaft is no more than 50 ft-lb (68 N·m).

c) While you turn the AGB shaft, listen for any unusual sound.

8) If you removed the crank cover [41], install it again on the AGB [1] as follows:

a) Install the crank cover [41] with the nuts [40].

b) Tighten the nuts [40] to 55 in-lb (6.2 N·m) - 70 in-lb (7.9 N·m).

(d) Install the starter [3] again on the AGB [1] (TASK 80-11-01-400-801-H01).

1) Make sure the starter [3] is filled with oil (TASK 80-11-01-400-801-H01).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

MAKE SURE THAT THE PREFORMED PACKING ON THE INSIDE OF THE AGB IS CORRECTLY LUBRICATED WITH ENGINE OIL TO PREVENT DAMAGE. BECAUSE OF THE TIGHT FIT OF THE PREFORMED PACKING WITH THE AGB, IT IS EASY TO ROLL, PINCH, NICK, OR CUT THE PREFORMED PACKING WHEN YOU MOVE THE HORIZONTAL SHAFT PROTECTOR IN AND OUT OF THE AGB. BE CAREFUL NOT TO DAMAGE THE PREFORMED PACKING.

(e) Attach the horizontal shaft protector [11] to the TGB [38] with the retaining ring [14] and nuts [15].

1) Torque the nuts [15] to 110 in-lb (12.4 N·m) - 120 in-lb (13.6 N·m).

SUBTASK 72-64-02-420-006-H00

(8) Install the starter air valve [2] as follows (Figure 408):

(a) Install the metal seal ring [47] on the aft side of the starter [3].

(b) Install the starter air valve [2] on the aft side of the starter [3] with the coupling [48].

(c) Align the opening of the coupling [48] at the 6:00 o'clock position and the hinge at the 12:00 o'clock position.

1) Tighten the nut at the coupling [48] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

SUBTASK 72-64-02-420-007-H00

(9) Attach the AGB lubrication system hoses and tubes as follows (Figure 409):

(a) Locate the VSCF oil cooler [49] at the 7:00 o'clock position on the fan frame, aft as you look forward.

(b) Attach the oil tube [50] to the left outboard flange face of the VSCF oil cooler [49].

1) Attach the oil tube [50] with the gasket [51] and bolts [52].

(c) Tighten the four bolts [52] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(d) Attach the oil tube [50] to the bracket assembly [53], bracket assembly [54] and bracket assembly [55] with the clamps [56] and bolts [57]. Do not tighten the bolts at this time.

(e) Attach the oil tube [58] to the lube/servo fuel/oil cooler [7] with the gasket [60] and bolts [61].

1) Tighten the bolts [61] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(f) Attach the oil tube [58] to the bracket [62] with the clamp [64] and bolt [63]. Do not tighten the bolts at this time.

(g) Attach the oil tube [58] to the oil tube [50] with the gasket [65], bolts [67] and nuts [66].

1) Tighten the nuts [66] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

2) Tighten the bolt [63] and bolts [67] to 58 in-lb (6.5 N·m) - 68 in-lb (7.7 N·m).

(h) Attach the oil tube [68] to the VSCF oil cooler [49] and the support bracket [70] with the gasket [71] and bolts [69].

1) Tighten the bolts [69] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(i) Attach the oil tube [68] to the bracket assembly [53], bracket assembly [54] and bracket assembly [55] with the clamps [73] and bolts [72]. Do not tighten the bolts at this time.

(j) Attach the forward sump tube [74] to the oil tube [68] and the fan frame with the B-nuts.

(k) Attach the AGB oil supply hose [75] to the oil tube [68] with the B-nut.

(l) Tighten the bolts [57] and bolts [72] to 58 in-lb (6.5 N·m) - 68 in-lb (7.7 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(m) Tighten the tube fittings that attach the oil tube [68] to the forward sump tube [74] and AGB oil supply hose [75] (TIGHTENING TECHNIQUES AND TORQUE VALUES, PAGEBLOCK 70-51-00/201).

(n) Attach the oil scavenge tube [76] to the center port on the lube/scavenge pump [10] with the gasket [78] and bolts [77]. Do not tighten the bolts at this time.

(o) Attach the oil scavenge tube [76] to the No. 4 bearing scavenge manifold [79] with the gasket [82], bolts [81] and nuts [80].

1) Tighten the bolts [77] and nuts [80] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(p) Attach the oil scavenge tube [76] to the support bracket [83] and lube/servo fuel/oil cooler [7] with the clamps [85] and bolts [84].

1) Torque the bolts [84] to 58 in-lb (6.5 N·m) - 68 in-lb (7.7 N·m).

(q) Attach the oil tube [86] to the lube/scavenge pump [10] with the gasket [88] and bolts [87]. Do not tighten the bolts at this time.

(r) Attach the oil tube [86] to the No. 5 bearing oil tube [89] with the gasket [92], bolts [91] and nuts [90].

(s) Tighten the bolts [87] and nuts [90] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(t) Attach the oil tube [86] to the support bracket [83] and lube/servo fuel/oil cooler [7] with the clamps [94] and bolts [93].

1) Tighten the bolts [93] to 58 in-lb (6.5 N·m) - 68 in-lb (7.7 N·m).

(u) Attach the TGB scavenge tube [95] to the TGB [38] at the 6:00 o'clock position with the gasket [97] and bolts [96].

1) Tighten the bolts [96] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(v) Attach the oil tube/hose [98] to the TGB scavenge tube [95] with the B-nut. Do not tighten at this time.

(w) Attach the oil tube/hose [98] to the center port on the lube/scavenge pump [10] with the gasket [233] and bolts [234].

1) Tighten the bolts [234] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(x) Tighten the tube fitting that connects the TGB scavenge tube [95] to the oil tube/hose [98] (TIGHTENING TECHNIQUES AND TORQUE VALUES, PAGEBLOCK 70-51-00/201).

(y) Attach the oil tube [99] to the lube/scavenge pump [10] with the gasket [101] and bolts [100].

1) Tighten the bolts [100] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(z) Attach the forward sump oil scavenge tube [102] to the lube/scavenge pump [10] with the gasket [104] and bolts [103]. Do not tighten the bolts at this time.

(aa) Attach the forward sump oil scavenge tube [102] to the fan frame at the 5:30 o'clock position with the gasket [106] and bolts [105].

(ab) Tighten the bolts [103] and bolts [105] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(ac) Attach the anti-leak valve [107] to the upper inner left port on the lube/scavenge pump [10] with the gasket [110], washers [109] and bolts [108].

1) Tighten the bolts [108] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(ad) Attach the oil tube/hose [111] to the anti-leak valve [107] with the gasket [113] and bolts [112].

1) Tighten the bolts [112] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(ae) Attach the B-nut of the IDG fuel/oil tube and hose [114] to the IDG fuel/oil cooler [9] (Figure 410).

(af) Attach the B-nut of the IDG fuel/oil tube and hose [115] to the IDG fuel/oil cooler [9].

(ag) Tighten the B-nut connection of the IDG fuel/oil tube and hose [114] and IDG fuel/oil tube and hose [115] with the triple torque method as follows:

1) Tighten the B-nut connection to 78 ft-lb (105 N·m) - 92 ft-lb (124.7 N·m).

2) Loosen the B-nut connection of the IDG fuel/oil tube and hose [114] and IDG fuel/oil tube and hose [115] and tighten it again to 78 ft-lb (105 N·m) - 92 ft-lb (124.7 N·m).

3) Apply the specified torque again and do a check of torque of the B-nut of the IDG fuel/oil tube and hose [114] and IDG fuel/oil tube and hose [115].

a) Tighten the B-nut to 78 ft-lb (105 N·m) - 92 ft-lb (124.7 N·m).

SUBTASK 72-64-02-420-008-H00

(10) Attach the VBV and VSV actuator hoses and tubes as follows (Figure 411):

(a) Tighten the B-nut connections of the VBV rod fuel tube/hose [116] to the VBV rod supply tube/hose [117] with triple torque method as follows:

1) Tighten the B-nut connections to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

2) Loosen the B-nuts of the VBV rod fuel tube/hose [116] and tighten them again to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

3) Apply the specified torque again and do a check of the torque of the B-nut of the VBV rod fuel tube/hose [116].

a) Tighten the B-nut to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

(b) Tighten the B-nut connections of the VBV head fuel tube/hose [118] or VBV head fuel hose [119] to the VBV head supply tube/hose [120] with triple torque method as follows:

1) Tighten the B-nut connections to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

2) Loosen the B-nuts of the VBV head fuel tube/hose [118] or VBV head fuel hose [119] and tighten them again to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

3) Apply the specified torque again and do a check of the torque of the B-nut of the VBV head fuel tube/hose [118] or VBV head fuel hose [119].

a) Tighten the B-nut to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

(c) Tighten the B-nut connections of the VSV rod fuel tube/hose [121] or VSV rod fuel hose [122] to the VSV rod supply fuel tube/hose [123] with triple torque method as follows:

1) Tighten the B-nut connections to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

2) Loosen the B-nuts of the VSV rod fuel tube/hose [121] or VSV rod fuel hose [122] and tighten them again to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

3) Apply the specified torque again and do a check of the torque of the B-nut of the VSV rod fuel tube/hose [121] or VSV rod fuel hose [122].

a) Tighten the B-nut to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

(d) Tighten the B-nut connections of the VSV head fuel tube/hose [124] to the VSV head supply fuel tube/hose [125] with triple torque method as follows:

1) Tighten the B-nut connections to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).

2) Loosen the B-nuts of the VSV head fuel tube/hose [124] and tighten them again to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Apply the specified torque again and do a check of the torque of the B-nut of the VSV head fuel tube/hose [124].
   a) Tighten the B-nut to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).

(e) Tighten the B-nut connections of the VBV rod fuel tube/hose [116] to the HMU [4] with triple torque method as follows:
1) Tighten the B-nut connections to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).
2) Loosen the B-nuts of the VBV rod fuel tube/hose [116] and tighten them again to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).
3) Apply the specified torque again and do a check of the torque of the B-nut of the VBV rod fuel tube/hose [116].
   a) Tighten the B-nut to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

(f) Tighten the B-nut connections of the VBV head fuel tube/hose [118] or VBV head fuel tube [126] to the HMU [4] with triple torque method as follows:
1) Tighten the B-nut connections to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).
2) Loosen the B-nuts of the VBV head fuel tube/hose [118] or VBV head fuel tube [126] and tighten them again to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).
3) Apply the specified torque again and do a check of the torque of the B-nut of the VBV head fuel tube/hose [118] or VBV head fuel tube [126].
   a) Tighten the B-nut to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).

(g) Tighten the B-nut connections of the VSV rod fuel tube/hose [121] or VSV rod fuel tube [131] to the HMU [4] with triple torque method as follows:
1) Tighten the B-nut connections to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).
2) Loosen the B-nuts of the VSV rod fuel tube/hose [121] or VSV rod fuel tube [131] and tighten them again to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).
3) Apply the specified torque again and do a check of the torque of the B-nut of the VSV rod fuel tube/hose [121] or VSV rod fuel tube [131].
   a) Tighten the B-nut to 460 in-lb (52.0 N·m) - 540 in-lb (61.0 N·m).

(h) Tighten the B-nut connections of the VSV head fuel tube/hose [124] to the HMU [4] with triple torque method as follows:
1) Tighten the B-nut connections to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).
2) Loosen the B-nuts of the VSV head fuel tube/hose [124] and tighten them again to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).
3) Apply the specified torque again and do a check of the torque of the B-nut of the VSV head fuel tube/hose [124].
   a) Tighten the B-nut to 55 ft-lb (74.5 N·m) - 65 ft-lb (88.1 N·m).

(i) Attach the VBV rod fuel tube/hose [116] to the outboard side of the bracket [128] with the clamps [130] and bolts [129]. Do not tighten the bolts [129] at this time.

(j) Attach the VBV head fuel tube/hose [118] or VBV head fuel tube [126] to the inboard side of the bracket [128] with the clamps [130] and bolts [129].

(k) Tighten the bolts [129] to 55 in-lb (6.2 N·m) - 70 in-lb (7.9 N·m).

(l) Attach the VSV rod fuel tube/hose [121] or VSV rod fuel tube [131] to the outboard side of the bracket [134] with the clamps [133] and bolts [132]. Do not tighten the bolts [132] at this time.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(m) Attach the VSV head fuel tube/hose [124] to the inboard side of the bracket [134] with the clamps [133] and bolts [132].

(n) Tighten the bolts [132] to 55 in-lb (6.2 N·m) - 70 in-lb (7.9 N·m).

SUBTASK 72-64-02-420-009-H00

(11) Install the SBV fuel tube/hose [135] and HPT valve fuel tube/hose [136] to the HPT ACC valve [137] as follows (Figure 412 and Figure 413):

(a) Install the drain can [139] on the SBV fuel tube/hose [135] as follows:

1) Install the drain can [139] on the SBV fuel tube/hose [135].

2) Install the retaining ring [140] in the inner groove on the drain can [139].

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

3) Apply engine lubricating oil, D50072 [C02-023] to the preformed packing [141] and preformed packing [142].

4) Install the preformed packing [142] in the outer groove on the SBV fuel tube/hose [135].

5) Install the preformed packing [141] in the groove of the drain can [139] mounting surface.

(b) Install the drain can [138] on the HPT valve fuel tube/hose [136] as follows:

1) Install the drain can [138] on the HPT valve fuel tube/hose [136].

2) Install the retaining ring [143] in the inner groove on the drain can [138].

WARNING ENGINE OIL IS POISONOUS. USE PROTECTION EQUIPMENT IN AN AREA WITH GOOD AIR FLOW TO AVOID INJURY.

3) Apply engine lubricating oil, D50072 [C02-023] to the preformed packing [144] and preformed packing [145].

4) Install the preformed packing [145] in the outer groove on the HPT valve fuel tube/hose [136].

5) Install the preformed packing [144] in the groove of the drain can [138] mounting surface.

(c) Install the SBV fuel tube/hose [135] with the drain can [139] installed, to the HPT ACC valve [137] and the left side of the core assembly as follows:

1) Attach the SBV fuel tube/hose [135] to the HPT fuel tube [146] on the AGB [1].

2) Attach the SBV fuel tube/hose [135] with the drain can [139] to the HPT ACC valve [137].

3) Attach the SBV fuel tube/hose [135] to the support bracket [147], support bracket [148] and support bracket [149] with the clamps [150] and bolts [151].

4) Tighten the bolts [151] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

5) Tighten the B-nuts at both ends of the SBV fuel tube/hose [135] with triple torque method as follows:

a) Tighten the B-nut connections to 262 in-lb (29.6 N·m) - 308 in-lb (34.8 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

b) Loosen the B-nuts of the SBV fuel tube/hose [135] and tighten them again to 262 in-lb (29.6 N·m) - 308 in-lb (34.8 N·m).

c) Apply the specified torque again and do a check of the torque of the B-nuts of the SBV fuel tube/hose [135].

<1> Tighten the B-nuts to 262 in-lb (29.6 N·m) - 308 in-lb (34.8 N·m).

6) Attach the drain can [139] to the HPT ACC valve [137] with the bolts [152].

a) Tighten the bolts [152] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(d) Install the HPT valve fuel tube/hose [136] with the drain can [138] installed, to the HPT ACC valve [137] and the left side of the core assembly as follows:

1) Attach the HPT valve fuel tube/hose [136] to the HPT valve fuel tube [154] on the AGB [1].

2) Attach the HPT valve fuel tube/hose [136] with the drain can [138] to the HPT ACC valve [137].

3) Attach the HPT valve fuel tube/hose [136] to the support bracket [147], support bracket [148] and support bracket [149] with the clamps [155] and bolts [156].

4) Tighten the bolts [156] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

5) Tighten the B-nuts at both ends of the HPT valve fuel tube/hose to 262 in-lb (29.6 N·m) - 308 in-lb (34.8 N·m).

6) Attach the drain can [138] to the HPT ACC valve [137] with the bolts [153].

a) Tighten the bolts [153] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

SUBTASK 72-64-02-420-010-H00

(12) Install the fuel drain manifold [157] on the lower left side of the compressor assembly as follows (Figure 413):

(a) Connect the B-nuts on the fuel drain manifold [157] to the fittings on the drain can [138] and drain can [139] at the HPT ACC valve [137]. Tighten by hand.

(b) Connect the B-nut on the lower end of the fuel drain manifold [157] to the fuel drain tube [158]. Tighten by hand.

(c) Attach the fuel drain manifold [157] to the bracket [159] and bracket assembly [160] as follows:

1) Attach the fuel drain manifold [157] to the bracket [159] with the clamp [162] and bolt [161].

2) Attach the fuel drain manifold [157] to the bracket assembly [160] with the clamp [162] and bolt [161].

3) Tighten the bolts [161] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(d) Tighten the B-nut connections on all ends of the fuel drain manifold [157] with the triple torque method as follows:

1) Tighten the B-nut connections to 262 in-lb (29.6 N·m) - 308 in-lb (34.8 N·m).

2) Loosen the B-nuts of the fuel drain manifold [157] and tighten them again to 262 in-lb (29.6 N·m) - 308 in-lb (34.8 N·m).

3) Apply the specified torque again and do a check of the torque of the B-nuts of the fuel drain manifold [157].

a) Tighten the B-nut to 262 in-lb (29.6 N·m) - 308 in-lb (34.8 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

SUBTASK 72-64-02-420-011-H00

(13) Install the bracket [163] and bracket assembly [164] to the AGB [1] at the 8:00 o'clock position as follows (Figure 414):

(a) Install the bracket assembly [164] on the forward side of the bracket [163] as follows:

1) Install the bracket assembly [164] on the bracket [163] and align the bolt holes.

2) Install the bolts [165] and tighten to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(b) Install the bracket [163] on the AGB [1] as follows:

1) Install the bracket [163] on the bottom left side of the AGB [1] with the inside spacers on the aft side of the AGB [1]. Align the bolt holes.

2) Install the bolts [166] to attach the bracket [163] to the AGB [1].

3) Align the forward mounting hole of the bracket [163] with the AGB [1] mounting hole and install the bolt [167].

4) Tighten the bolts [166] and bolt [167] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

SUBTASK 72-64-02-420-012-H00

(14) Attach the fuel tube/hose [168] and fuel tube/hose [169] to the HMU [4] and fuel manifold [170], fuel manifold [171], fuel manifold [172] and fuel manifold [173] as follows (Figure 415):

CAUTION MAKE SURE THAT THE TWO TUBE FITTINGS ON EACH FUEL MANIFOLD AND FUEL TUBE/HOSE ARE FULLY TIGHTENED WITH YOUR HAND BEFORE THE FINAL TORQUE IS APPLIED. IF NOT, IT CAN CAUSE DAMAGE.

(a) Connect the fuel tube/hose [168] to the aft left side of the HMU [4] with the gasket [175] and bolts [174].

(b) Connect the fuel tube/hose [169] to the aft right side of the HMU [4] with the gasket [177] and bolts [176].

(c) Attach the fuel tube/hose [168] to the forward fuel manifold [170] and fuel manifold [171]. Tighten by hand.

(d) Attach the fuel tube/hose [169] to the aft fuel manifold [172] and fuel manifold [173]. Tighten by hand.

(e) Tighten the B-nuts of the fuel tube/hose [168] and fuel tube/hose [169] to 78 ft-lb (106 N·m) - 92 ft-lb (125 N·m).

(f) Tighten the bolts [174] and bolts [176] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

(g) Install the shields [178] and shields [179] to the fuel manifold [170], fuel manifold [172] and the connection of the fuel tube/hose [168] and fuel tube/hose [169].

SUBTASK 72-64-02-420-013-H00

(15) Attach the starter air duct [180] as follows (Figure 416):

(a) Install the metal seal ring [182] between the starter air duct adapter and the starter air duct [180].

(b) Install the coupling clamp [181] on the starter air duct adapter flange and the starter air duct flange.

(c) Tighten the coupling clamp [181] as follows:

1) Lightly tap around the outside of the coupling clamp [181] with a soft mallet to engage the coupling clamp [181].

2) Tighten the coupling clamp [181] to 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

3) Lightly tap around the outside of the coupling clamp [181] again with a soft mallet to engage the coupling clamp [181].

4) Tighten the coupling clamp [181] to a final torque of 109 in-lb (12.3 N·m) - 127 in-lb (14.3 N·m).

SUBTASK 72-64-02-420-014-H00

(16) Install the lower bifurcation assembly (TASK 71-00-05-400-801-H01) (Figure 417).

SUBTASK 72-64-02-420-015-H00

(17) Attach the fuel and oil system drain hose/tubes to the drain manifold [191] as follows (Figure 417):

(a) Attach the HMU drain hose/tube [183] to the right side drain manifold fitting.

(b) Attach the MFP drain hose/tube [184] to the right side drain manifold fitting.

(c) Attach the HPT ACC valve drain hose/tube [185] to the right side drain manifold fitting.

(d) Attach the VBV/VSV drain hose/tube [186] to the right side drain manifold fitting.

(e) Attach the VSCF drain hose/tube [187] to the left side drain manifold fitting.

(f) Attach the hydraulic pump pad drain hose/tube [188] to the left side drain manifold fitting.

(g) Attach the hydraulic pump drain hose/tube [189] to the left side drain manifold fitting.

(h) Attach the IDG drain hose/tube [190] to the left side drain manifold fitting.

(i) Tighten the lower bifurcation hose/tube fittings (TIGHTENING TECHNIQUES AND TORQUE VALUES, PAGEBLOCK 70-51-00/201).

SUBTASK 72-64-02-420-016-H00

(18) Connect the W739 harness [192] to the system components as follows (Figure 418):

CAUTION DO NOT USE STANDARD PLIERS WHEN YOU TIGHTEN ELECTRICAL CONNECTORS. YOU MUST USE SOFT-JAWED PLIERS TO PREVENT DAMAGE TO THE EQUIPMENT.

CAUTION MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Remove all protective covers from the electrical connectors.

(b) Attach the connector P73905 to the oil pressure sensor [193] on the lube/scavenge pump [10].

(c) Tighten the connector with soft-jawed pliers.

(d) Attach the connector P73902 to the fuel filter sensor [194] on the main fuel pump [6].

(e) Tighten the connector with soft-jawed pliers.

(f) Attach the connector P73904 to the fuel manifold pressure sensor [195] on the HMU [4].

(g) Tighten the connector with soft-jawed pliers.

(h) Install the electrical harness with the attached cable clamps.

SUBTASK 72-64-02-420-017-H00

(19) Connect the W738 harness [196] to the system components as follows (Figure 419 and Figure 420):

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT USE STANDARD PLIERS WHEN YOU TIGHTEN ELECTRICAL CONNECTORS. YOU MUST USE SOFT-JAWED PLIERS TO PREVENT DAMAGE TO THE EQUIPMENT.

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Remove all protective covers from the electrical connectors.

(b) Attach the connector P73805 to the temperature sensor [197] on the oil tube/hose [198].

(c) Attach the connector P73806 to the temperature sensor [199] on the IDG in oil tube/hose [200].

(d) Attach the connector P73803 to the temperature sensor [201] on the VSCF out oil tube/hose [202].

(e) Attach the connector P73808 to the temperature sensor [203] on the VSCF in oil tube/hose [204].

(f) Tighten the connectors with soft-jawed pliers.

(g) Install the electrical harness with the attached cable clamps.

ARO ALL POST SB 777-GE90-72-0573

(h) Install the clamp [205] on the oil tube/hose [198] and the clamp [207] on the connector P73806 branch of the W738 harness [196].

(i) Align the clamp [205] and clamp [207] and attach with the bolt [208] and nut [209].

(j) Torque the nut [209] to 60 in-lb (6.8 N·m) - 70 in-lb (7.9 N·m).

ARO ALL

SUBTASK 72-64-02-420-018-H00

(20) Connect the W723 harness [210] to the system components as follows (Figure 421):

CAUTION

DO NOT USE STANDARD PLIERS WHEN YOU TIGHTEN ELECTRICAL CONNECTORS. YOU MUST USE SOFT-JAWED PLIERS TO PREVENT DAMAGE TO THE EQUIPMENT.

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Remove all protective covers from the electrical connectors.

(b) Attach the connector P72305 to the channel A receptacle on the HMU [4].

(c) Attach the connector P72303 to the channel A receptacle on the N2 speed sensor [211].

(d) Attach the connector P72304 to the fuel flow transmitter [212].

(e) Tighten the connectors with soft-jawed pliers.

(f) Install the electrical harness with the attached cable clamps.

SUBTASK 72-64-02-420-019-H00

(21) Connect the W724 harness [213] to the system components as follows (Figure 422):

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

CAUTION

DO NOT USE STANDARD PLIERS WHEN YOU TIGHTEN ELECTRICAL CONNECTORS. YOU MUST USE SOFT-JAWED PLIERS TO PREVENT DAMAGE TO THE EQUIPMENT.

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Remove all protective covers from the electrical connectors.

(b) Attach the connector P72405 to channel B receptacle on the HMU [4].

(c) Attach the connector P72403 to the channel B receptacle on the N2 speed sensor [211].

(d) Attach the connector P72406 to the starter air valve [2].

(e) Tighten the connectors with soft-jawed pliers.

(f) Install the electrical harness with the attached cable clamps.

SUBTASK 72-64-02-420-024-H00

(22) Install the control alternator [268] to the AGB [1] as follows (Figure 423):

(a) Install the control alternator [268] rotor (TASK 73-21-09-400-801-H00).

(b) Install the control alternator [268] stator (TASK 73-21-08-400-801-H01).

SUBTASK 72-64-02-420-020-H00

(23) Connect the W727 harness [214] and W728 harness [215] to the system components as follows (Figure 423):

CAUTION

DO NOT USE STANDARD PLIERS WHEN YOU TIGHTEN ELECTRICAL CONNECTORS. YOU MUST USE SOFT-JAWED PLIERS TO PREVENT DAMAGE TO THE EQUIPMENT.

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Remove all protective covers from the electrical connectors.

(b) Attach the connector P72702 to the channel A connector on the control alternator [268].

(c) Attach the connector P72802 to the channel B connector on the control alternator [268].

(d) Tighten the connectors with soft-jawed pliers.

(e) Install the electrical harness with the attached cable clamps.

SUBTASK 72-64-02-420-021-H00

(24) Connect the W729 harness [217] to the system components as follows (Figure 424):

CAUTION

DO NOT USE STANDARD PLIERS WHEN YOU TIGHTEN ELECTRICAL CONNECTORS. YOU MUST USE SOFT-JAWED PLIERS TO PREVENT DAMAGE TO THE EQUIPMENT.

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

(CAUTION PRECEDES)

CAUTION

MAKE SURE THE ELECTRICAL CONNECTORS ARE CLEAN WHEN YOU CONNECT THEM. THE CONTAMINATION OF THE ELECTRICAL CONNECTOR CAN CAUSE DAMAGE TO THE EQUIPMENT.

(a) Remove all protective covers from the electrical connectors.

(b) Attach the connector P72903 to the pressure sensor [220] on the VSCF oil cooler [49].

(c) Attach the connector P72904 to the pressure sensor [218] on the left side of the starter air valve [2] (Figure 422).

(d) Tighten the connectors with soft-jawed pliers.

(e) Install the electrical harness with the attached cable clamps.

SUBTASK 72-64-02-420-022-H00

(25) Install the following accessories on the AGB [1].

(a) Install the IDG (TASK 24-11-01-400-801-001).

(b) Install the BUG (TASK 24-25-01-400-804-001).

(c) Install the EDP (TASK 29-11-05-400-801-002).

SUBTASK 72-64-02-610-001-H00

(26) Service the oil tank (TASK 12-13-01-130-803-002).

SUBTASK 72-64-02-170-001-H00

(27) If the AGB [1] was replaced because of unwanted material found in the DMS/MCD, then flush the oil tank (TASK 12-22-01-610-806-002).

NOTE: This task will remove any unwanted material from the removed AGB. This will also prevent unwanted material collected by the DMS or MCD being transferred to the replacement AGB.

J. Put the Airplane Back to Its Usual Condition

SUBTASK 72-64-02-860-003-H00

(1) Remove the safety tags and close these circuit breakers:

Overhead Circuit Breaker Panel, P11

Row	Col	Number	Name
B	1	C80601	L ENG START VALVE
B	3	C80605	L ENG START SW
B	16	C80600	R ENG START VALVE
B	18	C80606	R ENG START SW

SUBTASK 72-64-02-410-001-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.

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.

SUBTASK 72-64-02-860-004-H00

(3) Supply the electrical power (TASK 24-22-00-860-805).

K. Accessory Gearbox Test

SUBTASK 72-64-02-700-001-H00

(1) Do the test(s) listed in the Power Plant Test Reference Table (TASK 71-00-00-800-833-H00).

SUBTASK 72-64-02-700-002-H00

(2) Between 2 to 10 flight cycles, do a one-time check of the DMS sensor and Lube and Scavenge Pump Screens and Magnetic Plugs for unwanted material.

(a) Do this task: Engine Oil System (DMS) (Scheduled Maintenance Task) Inspection, TASK 79-00-00-200-804-H01.

(b) Do this task: Engine Oil System (Lube and Scavenge Pump Screens and Magnetic Plugs) Inspection, TASK 79-00-00-200-805-H01.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

ENGINE MODULES - REMOVAL/INSTALLATION

1. General

A. This procedure contains scheduled maintenance task data.

B. This procedure contains five scheduled maintenance tasks. These tasks are for life limited components and modules that need to be removed and discarded at scheduled intervals.

TASK 72-99-99-000-801-H01

2. Discard the Fan Disk and the Booster Spool

A. Procedure

SUBTASK 72-99-99-020-001-H01

(1) Remove and discard the fan disk and the booster spool.

——— END OF TASK ———

TASK 72-99-99-000-802-H01

3. Discard the Fan Shaft

A. Procedure

SUBTASK 72-99-99-000-001-H01

(1) Remove and discard the fan shaft.

——— END OF TASK ———

TASK 72-99-99-000-803-H01

4. Discard the HPC Stage Disks, Shaft, Spools, and Seal

A. Procedure

SUBTASK 72-99-99-020-002-H01

(1) Remove and discard the HPC stage 1 disk and forward shaft.

SUBTASK 72-99-99-020-003-H01

(2) Remove and discard the HPC stages 2-5 spool.

SUBTASK 72-99-99-020-004-H01

(3) Remove and discard the HPC stage 6 disk.

SUBTASK 72-99-99-020-005-H01

(4) Remove and discard the HPC stages 7-9 spool.

SUBTASK 72-99-99-020-006-H01

(5) Remove and discard the HPC compressor discharge pressure (CDP) seal.

——— END OF TASK ———

TASK 72-99-99-000-804-H01

5. Discard the HPT Stage Disks and the Seals

A. Procedure

SUBTASK 72-99-99-020-007-H01

(1) Remove and discard the HPT stage S1 disk, stage S2 disk, forward seal, the interstage seal, and the aft seal.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details

TASK 72-99-99-000-805-H01

6. Discard the LPT Shafts and the Stage Disks

A. Procedure

SUBTASK 72-99-99-000-002-H01

(1) Remove and discard the LPT shaft, the LPT cone shaft, and the LPT stage S1-S6 disks.

——— END OF TASK ———

ECCN 9E991 BOEING PROPRIETARY - Copyright © Unpublished Work - See title page for details