A330-200
TECHNICAL TRAINING MANUAL

MECHANICS / ELECTRICS & AVIONICS COURSE

01 GENERAL

GE Metric

For Training Purposes Only
Issued By SPL/GK March 2006

This document must be used
for training purposes only.

Under no circumstances
should this document be used as a reference.

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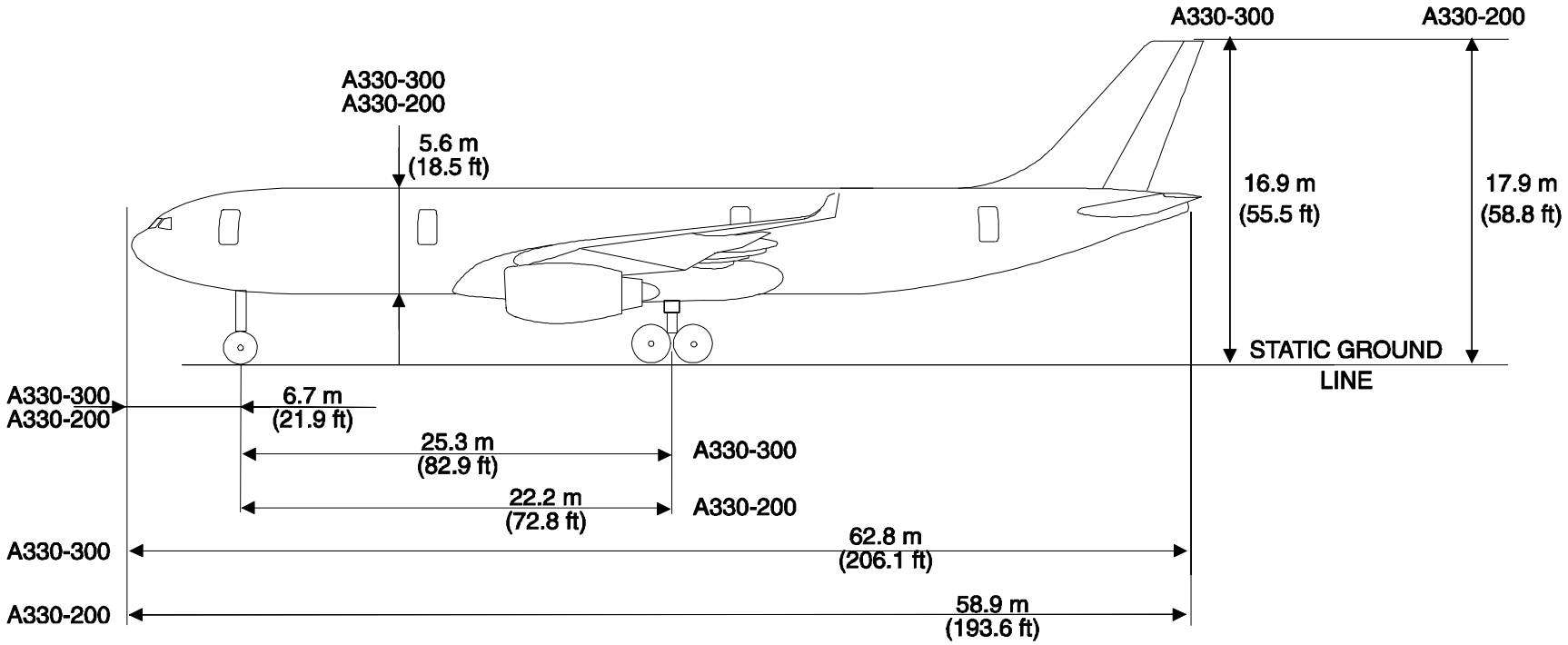

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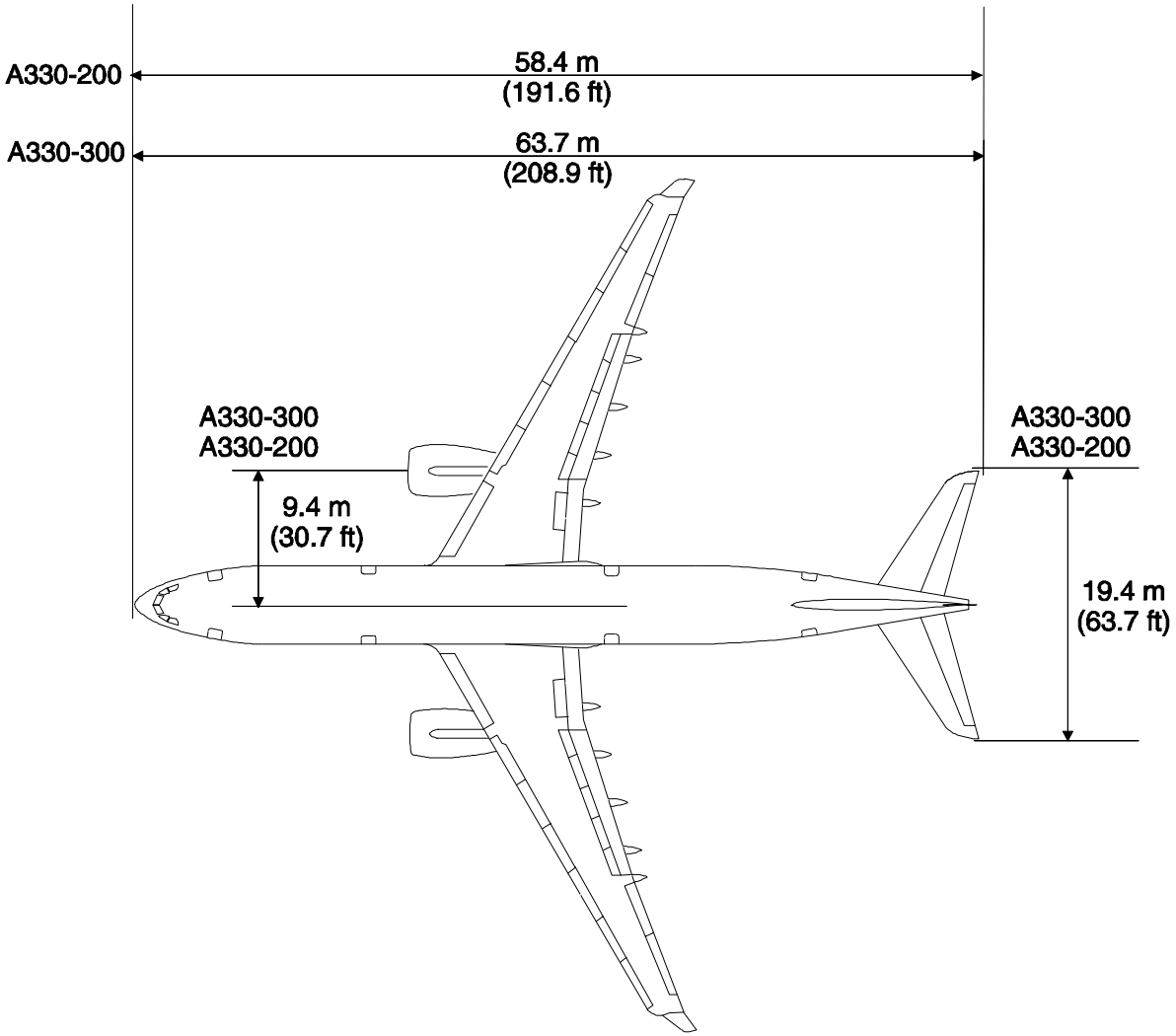
TOP VIEW



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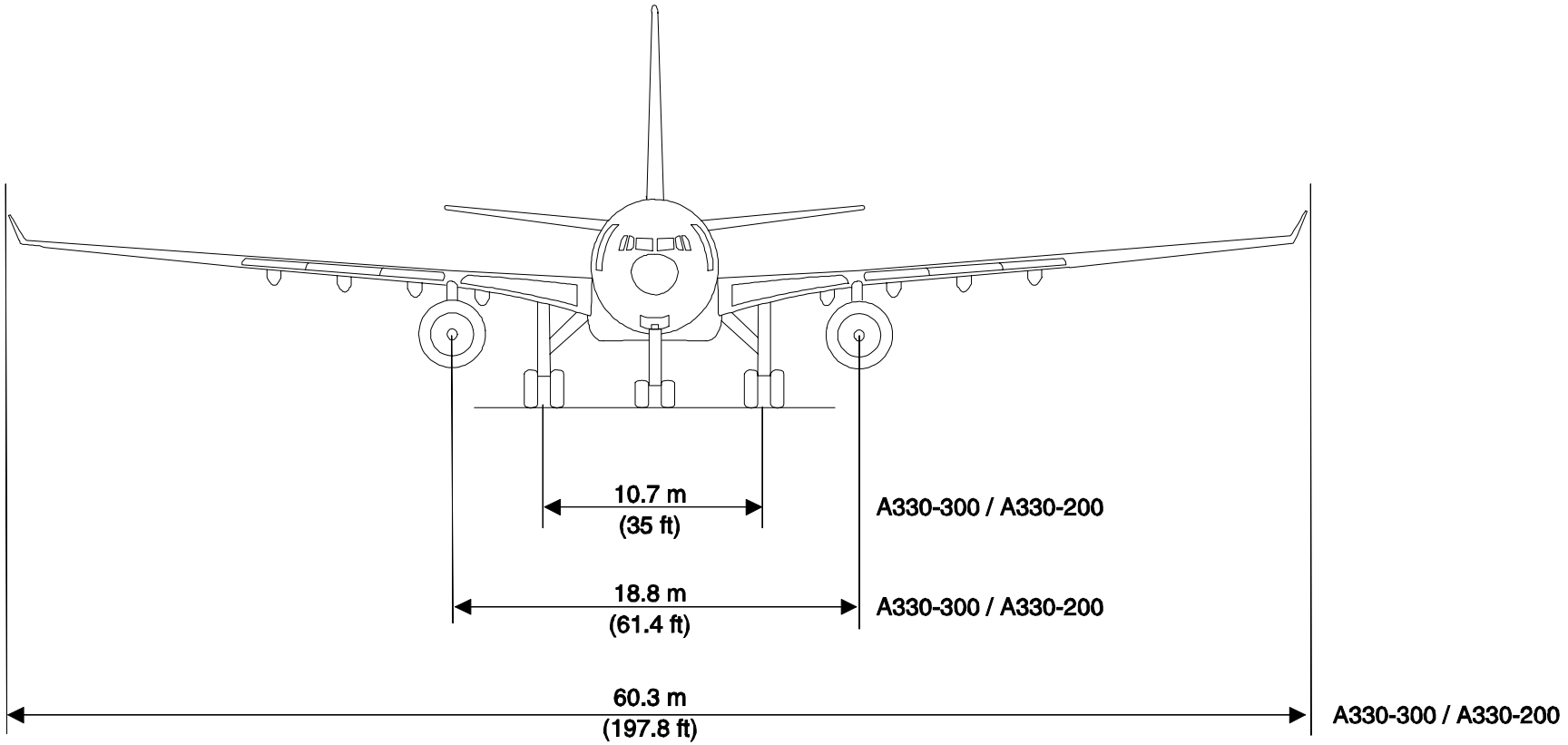
FRONT VIEW



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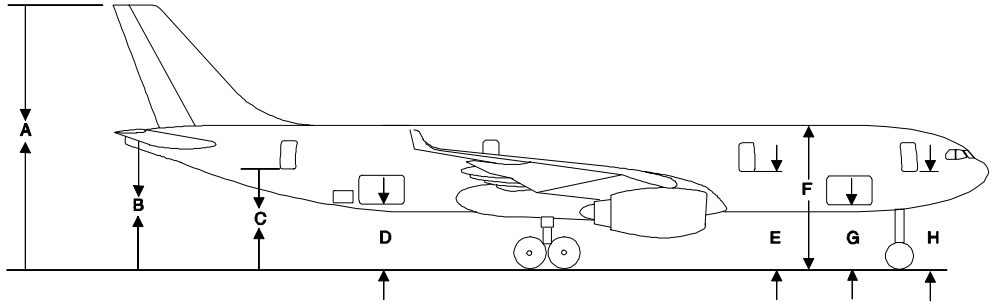
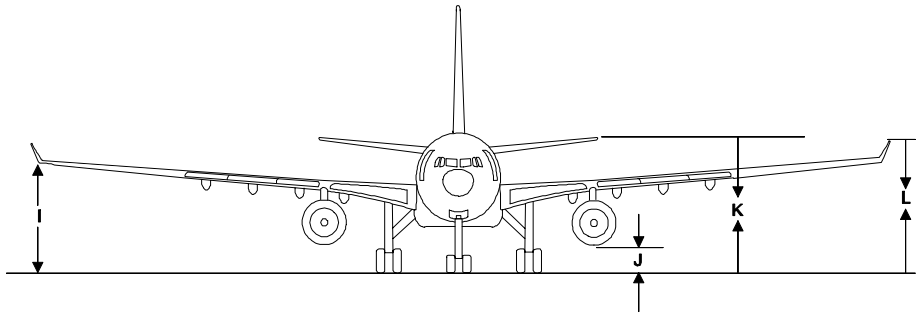
GROUND CLEARANCES





	OPERATING WEIGHT EMPTY CG		MAXIMUM RAMP WEIGHT CG 36.5 %	
	m	ft	m	ft
A	17.2	56.4	16.7	54.9
B	7.5	24.5	7.0	23.0
C	5.78	18.9	5.4	17.8
D	3.4	11.3	3.1	10.3
E	4.8	15.8	4.7	15.5
F	7.7	25.4	7.6	25.2
G	2.7	8.9	2.7	8.7
H	4.6	14.9	4.6	14.9
I	6.5	21.2	6.1	19.9
J1 (GE)	0.77	2.5	0.55	1.80
J2 (PW)	0.73	2.4	0.55	1.80
J3 (RR)	0.67	2.2	0.55	1.80
K	8.3	27.3	7.9	25.9
L	8.0	26.4	7.6	24.9

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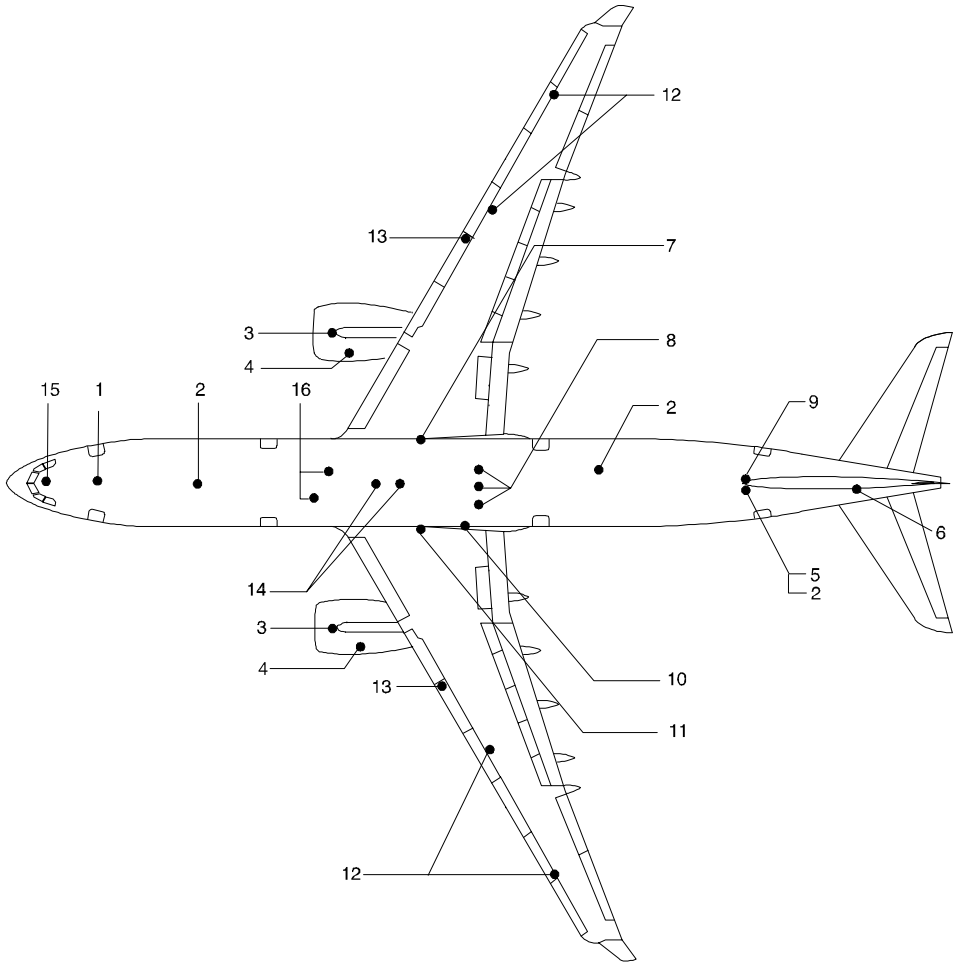
STUDENT NOTES

GROUND HANDLING

Service Points
A/C Service Arrangements
Minimum Turning Radius
Simulator Cockpit Safety Checklist

SERVICE POINTS



1 - ELECTRICAL GROUND POWER
2 - REMOTE WATER DRAIN
3 - IDG OIL FILLING
4 - ENGINE OIL FILLING
5 - POTABLE WATER FILLING
6 - APU OIL FILLING
7 - HYDRAULIC GROUND POWER (YELLOW)
8 - AIR CHARGING FOR HYDRAULIC ACCUMULATORS
9 - TOILET SERVICING
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12 - FUEL GRAVITY FILLING
13 - FUEL PRESSURE FILLING
14 - HIGH PRESSURE AIR CONDITIONING AND ENGINE STARTING
15 - OXYGEN SYSTEM
16 - LOW PRESSURE PRE-CONDITIONING

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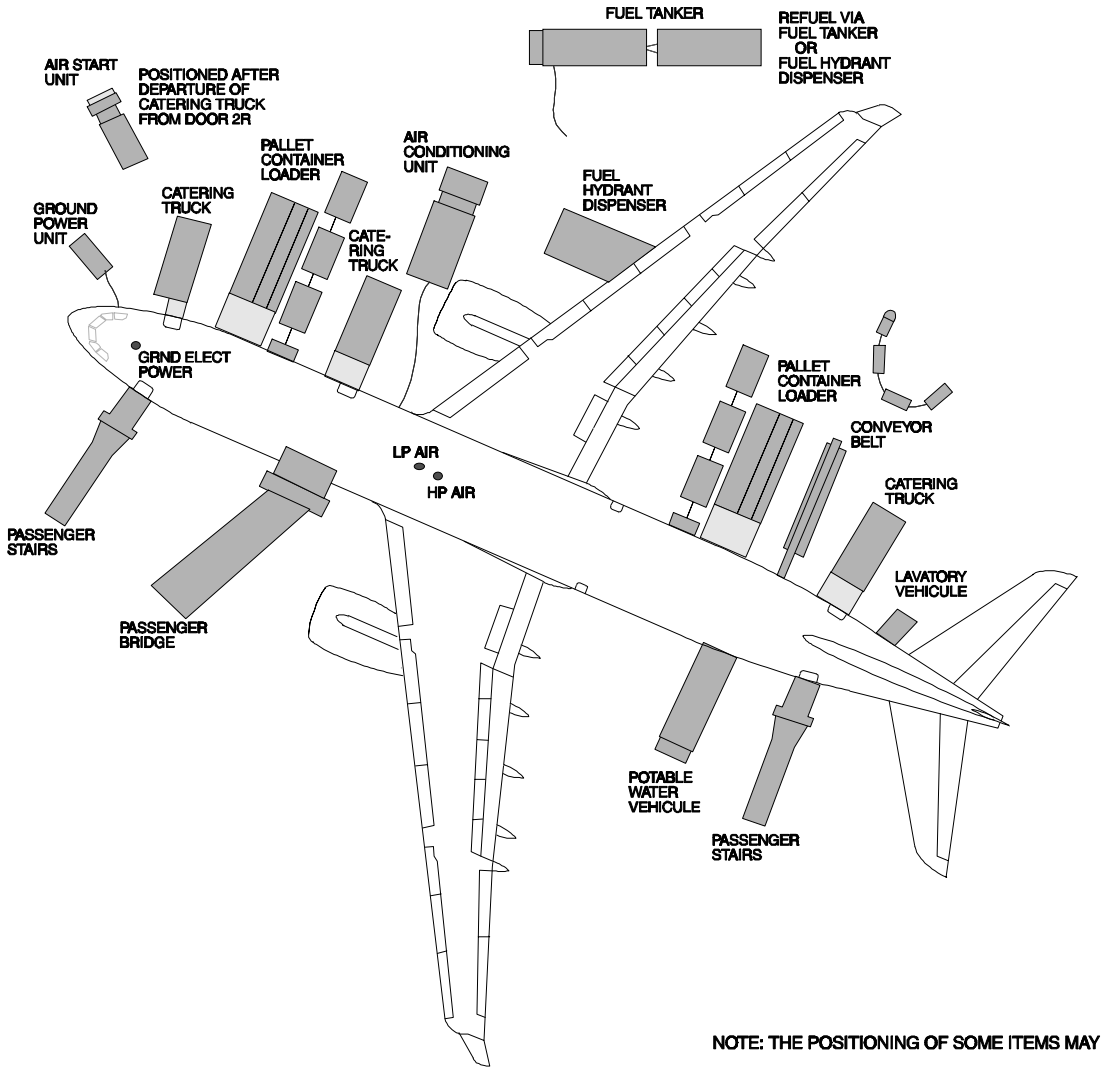
A/C SERVICE ARRANGEMENTS



NOTE: THE POSITIONING OF SOME ITEMS MAY VARY WITH LOCAL ARRANGEMENTS

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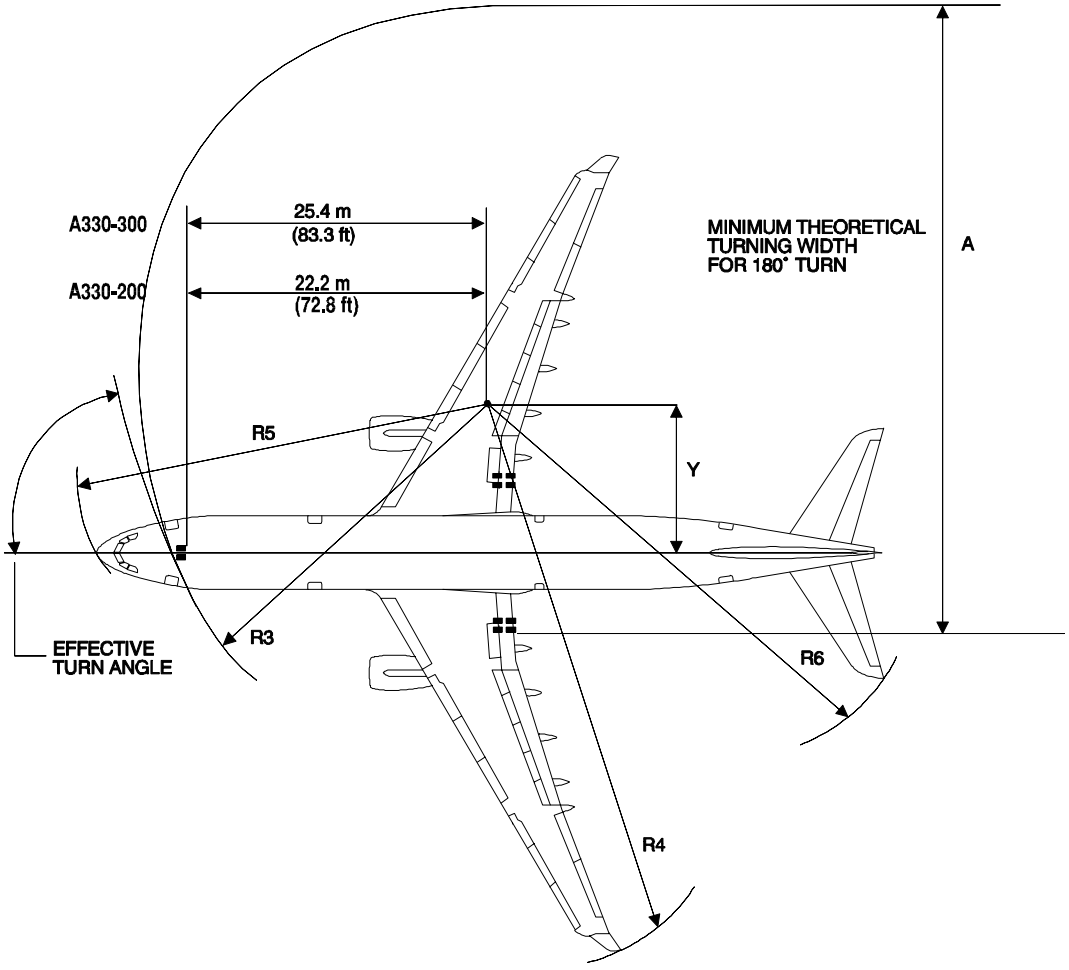
MINIMUM TURNING RADIUS



	A330-200	
	TURN 1	TURN 2
E	77.95°	62.3°
Y	17.5 ft 5.3 m	38.2 ft 11.6 m
A	125.4 ft 38.2 m	143 ft 43.6 m
R3	TBD	TBD
R4	118.8 ft 36.2 m	141.1 ft 43 m
R5	TBD	TBD
R6	115.1 ft 35.1 m	119.6 ft 36.4 m

	A330-300	
	TURN 1	TURN 2
E	77.95°	61.5°
Y	17.5 ft 5.3 m	44.4 ft 13.5 m
A	125.4 ft 38.2 m	158.9 ft 48.4 m
R3	87.2 ft 26.6 m	96.9 ft 29.6 m
R4	118.8 ft 36.2 m	144.6 ft 44.1 m
R5	106.6 ft 32.5 m	114.7 ft 34.9 m
R6	115.1 ft 35.1 m	128.4 ft 39.1 m

NOTE:
TURN 1. ASYMMETRIC THRUST DIFFERENTIAL BRAKING
(PIVOTING ON ONE MAIN GEAR)
TURN 2. SYMMETRIC THRUST NO BRAKING

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SIMULATOR COCKPIT SAFETY CHECKLIST

BEFORE POWER-UP

- Placards ..... check
- Reset Switches ..... check
- Bat 1.2. APU ..... off (check voltage)
- Fire Handle (Engine APU) ..... in/latched
- Wipers ..... off
- Landing Gear Lever ..... down
- Thrust Levers ..... idle/reverse stowed
- Engine Master Levers ..... off
- Engine Start Rotary Selector ..... normal
- Slat/Flaps Lever ..... check position
- Speed Brake Lever ..... check position
- Parking Brake ..... on
- Weather Radar/ATC Transponder ..... off
- External Power (if available) ..... on
- Bat 1.2. , APU ..... on

AFTER POWER-UP

- Vent Panel ..... check no lights on
- Probe Heat/Window Heat ..... as required
- External Light ..... as required
- Annunciator Light Test ..... perform
- Fuel Pumps ..... off
- Landing Gear Indication ..... downlocked

BEFORE LEAVING THE SIMULATOR

- ADIRS ..... off
- External Lights ..... off
- APU Bleed p/b ..... off
- APU Master Switch ..... off
- Emergency Exit Light ..... off
- CRTs (ECAM-EFIS) ..... off
- Bat 1.2. APU ..... off
- External Power ..... off

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STUDENT NOTES

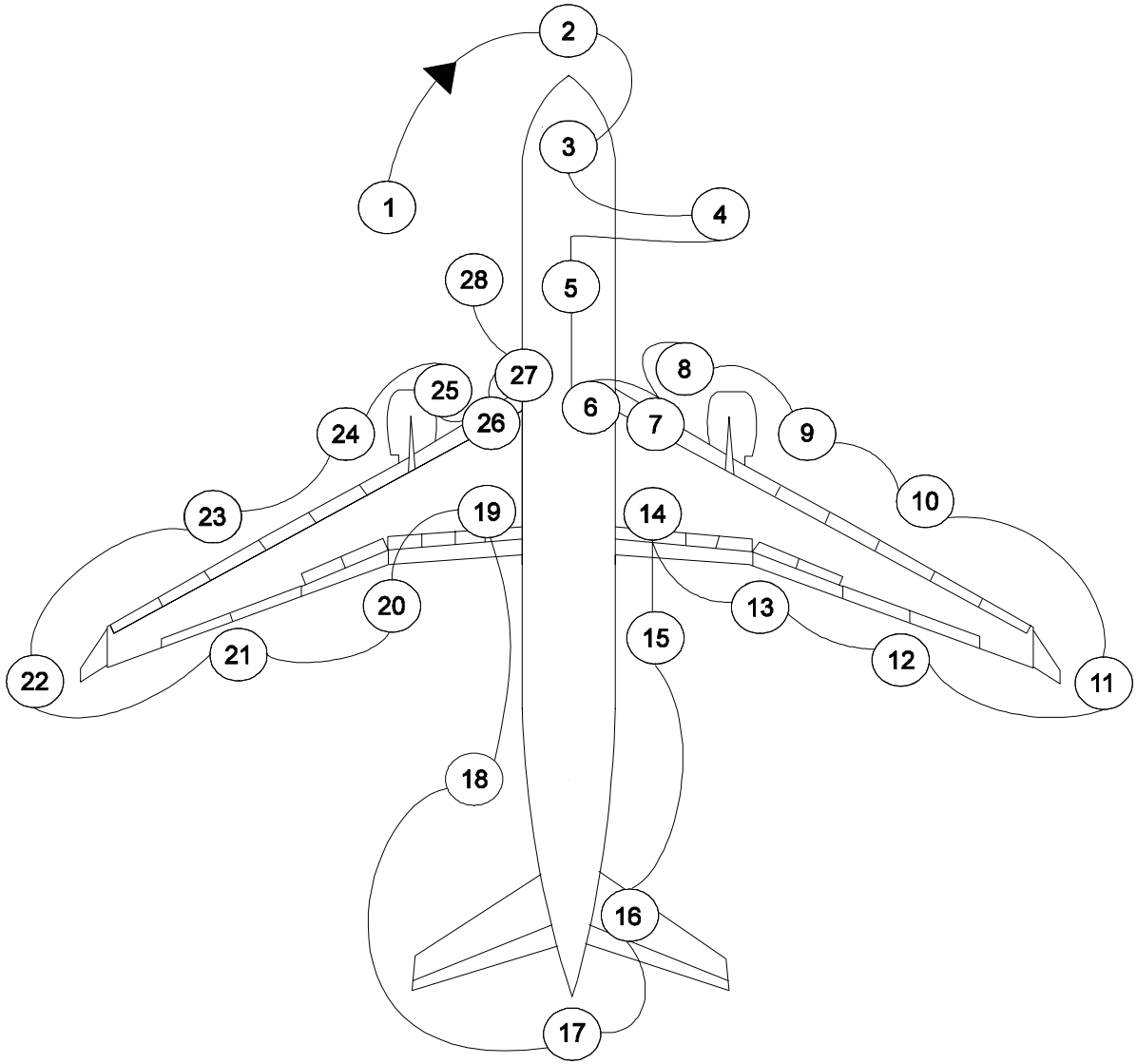
A330 EXTERNAL VISIT (A-CHECK)

This visit corresponds to a detailed A-Check visit focusing on all the elements of the various aircraft zones according to the Maintenance Planning Document.
This is primarily a visual check to ensure that the overall condition of the aircraft, the visible components and equipment are safe.

During the inspection, check for proper position of the control surfaces, damage to the structure, fluid leakage, closure of the access panels and doors. In cold weather condition, check for ice or frost accumulation.

Note: As brake wear has to be checked during the inspection, set the parking brake before leaving the cockpit.

In this file, some components and equipment are shown open for better understanding.



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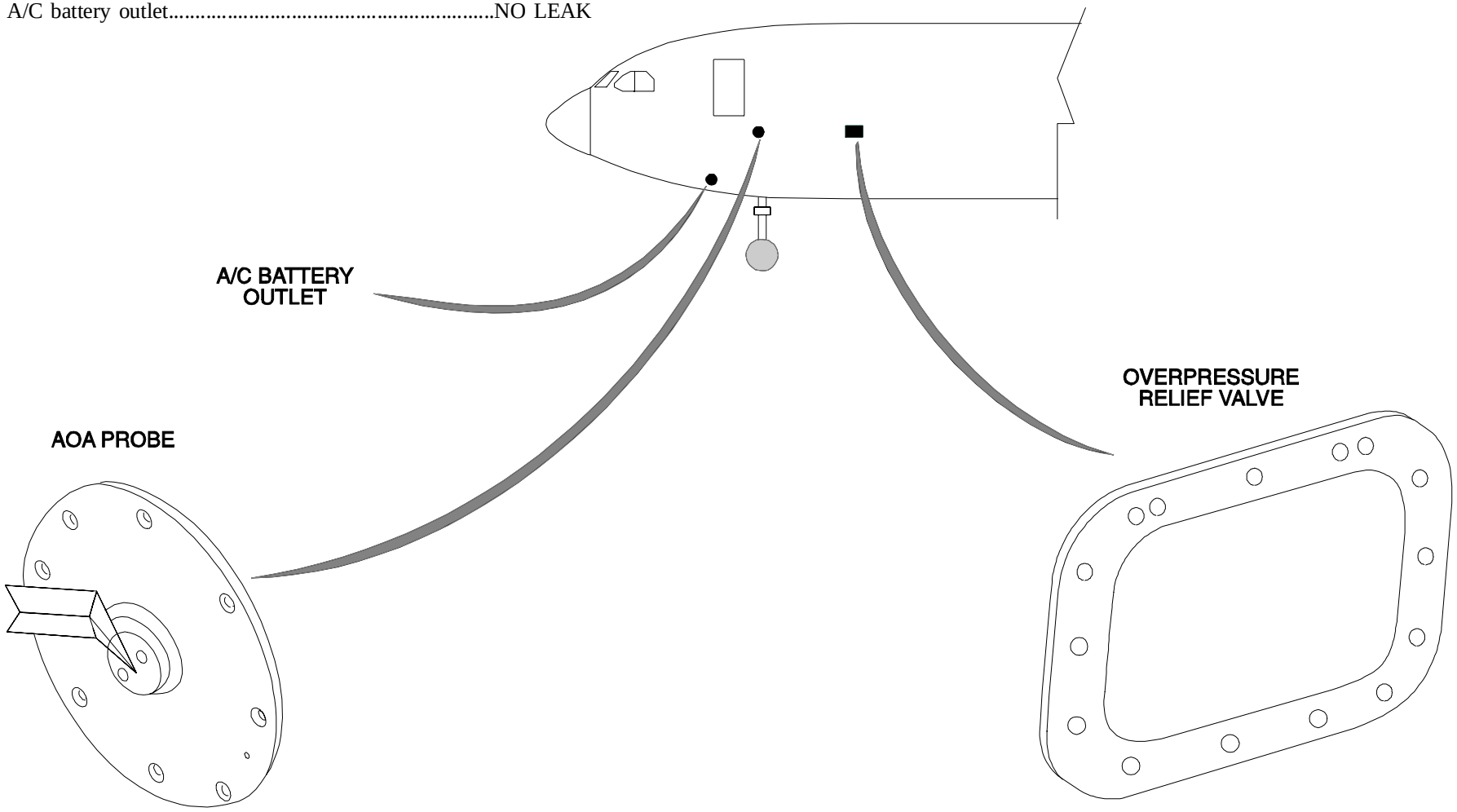
1 - LH FWD FUSELAGE

- Overpressure relief valve.....CLOSED
- AOA probe (CAPT).....CONDITION
- A/C battery outlet.....NO LEAK



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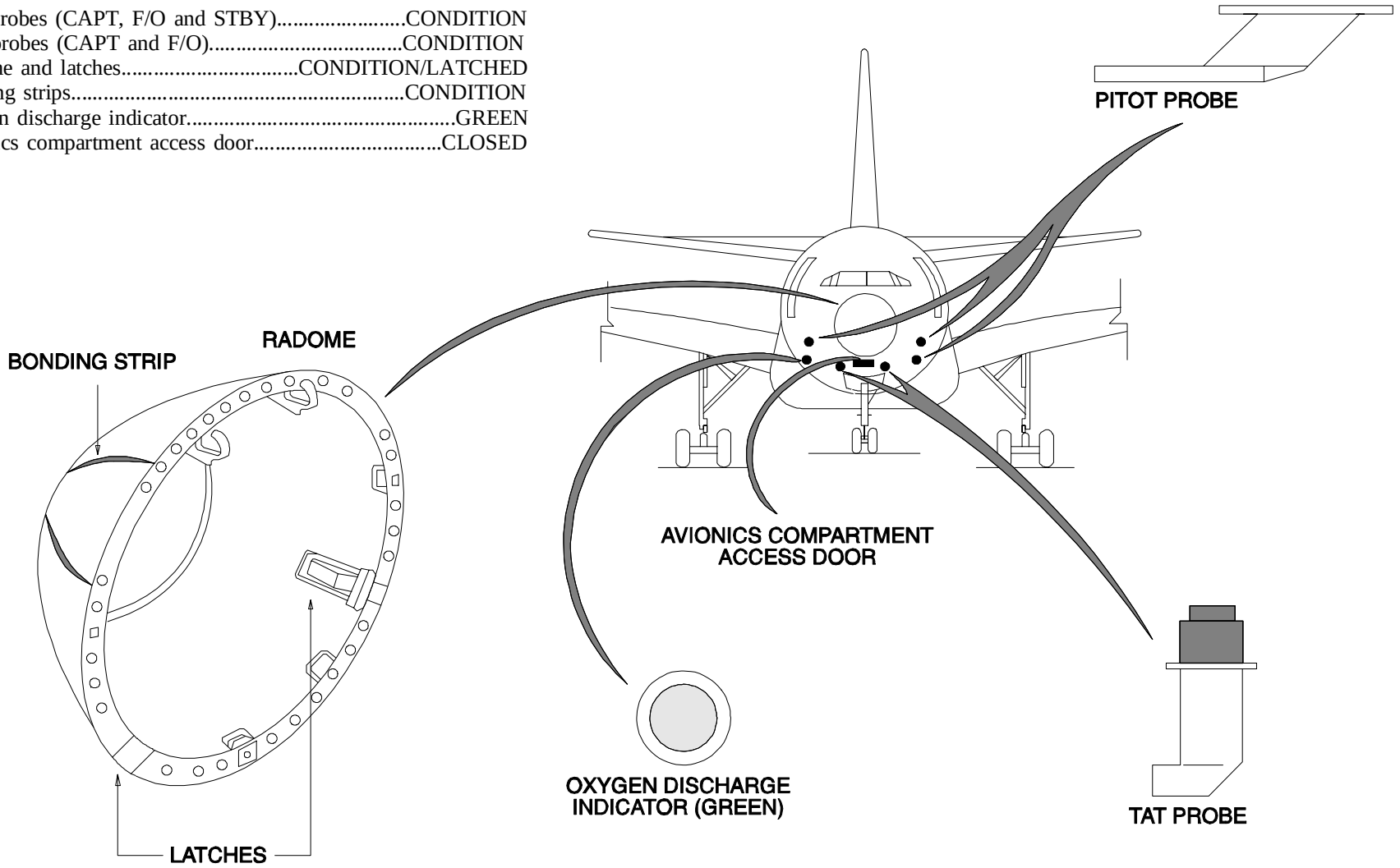
2 - NOSE SECTION

- Pitot probes (CAPT, F/O and STBY).....CONDITION
- TAT probes (CAPT and F/O).....CONDITION
- Radome and latches.....CONDITION/LATCHED
- Bonding strips.....CONDITION
- Oxygen discharge indicator.....GREEN
- Avionics compartment access door.....CLOSED



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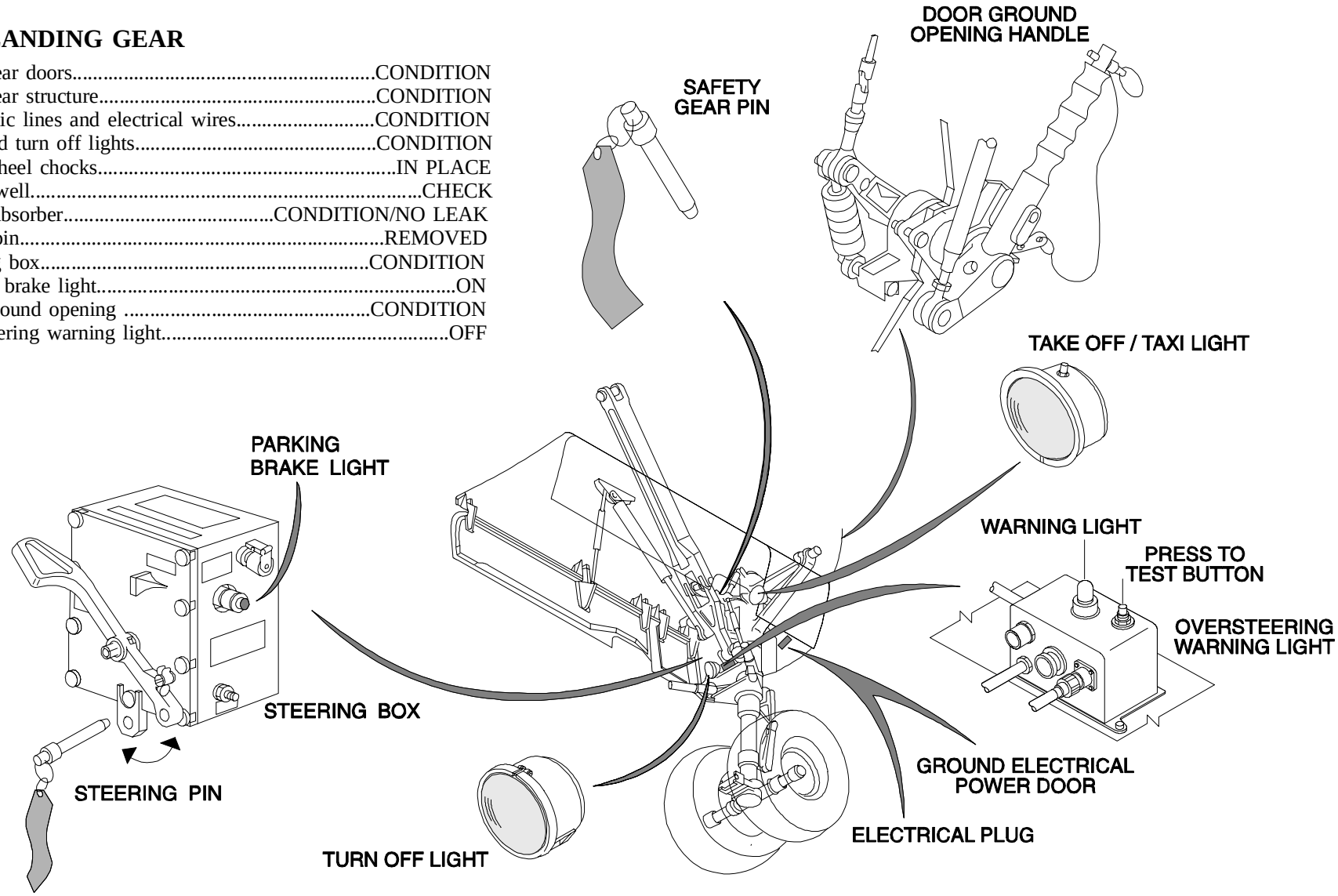
3 - NOSE LANDING GEAR

- Nose gear doors.....CONDITION
- Nose gear structure.....CONDITION
- Hydraulic lines and electrical wires.....CONDITION
- Taxi and turn off lights.....CONDITION
- Nose wheel chocks.....IN PLACE
- Wheel well.....CHECK
- Shock absorber.....CONDITION/NO LEAK
- Safety pin.....REMOVED
- Steering box.....CONDITION
- Parking brake light.....ON
- Door ground opening .....CONDITION
- Oversteering warning light.....OFF



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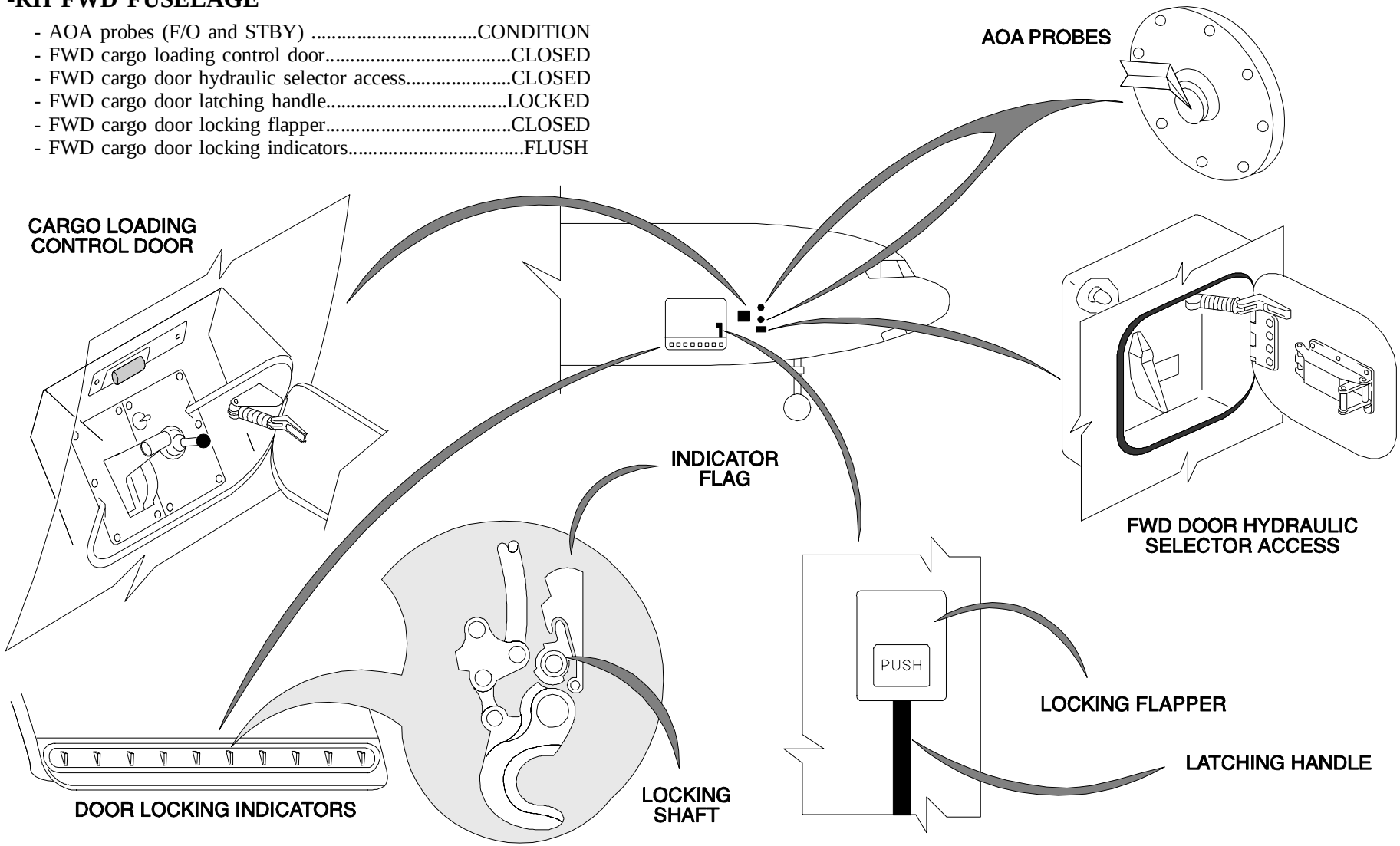
4 -RH FWD FUSELAGE

- AOA probes (F/O and STBY) .....CONDITION
- FWD cargo loading control door.....CLOSED
- FWD cargo door hydraulic selector access.....CLOSED
- FWD cargo door latching handle.....LOCKED
- FWD cargo door locking flapper.....CLOSED
- FWD cargo door locking indicators.....FLUSH



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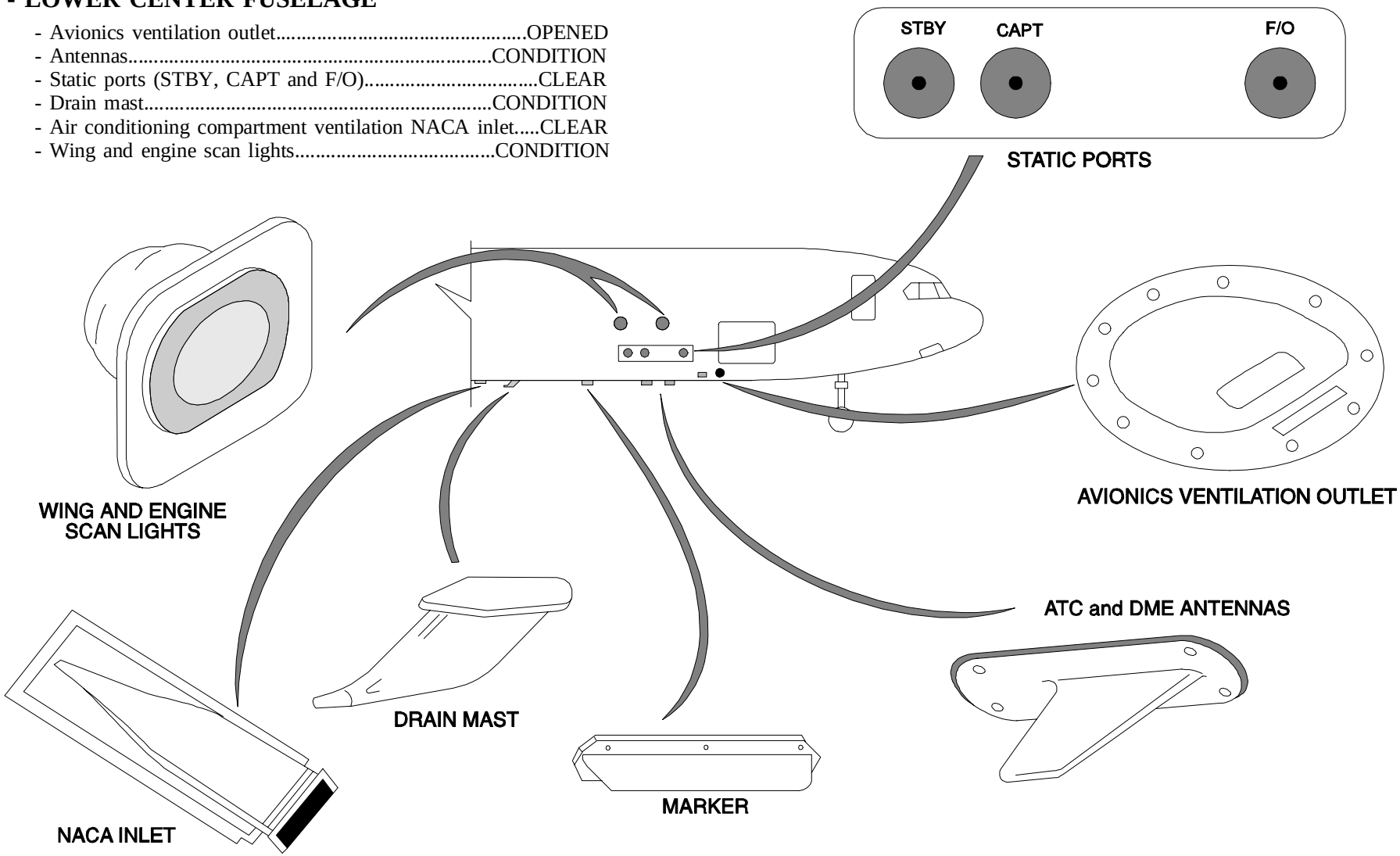
5 - LOWER CENTER FUSELAGE

- Avionics ventilation outlet.....OPENED
- Antennas.....CONDITION
- Static ports (STBY, CAPT and F/O).....CLEAR
- Drain mast.....CONDITION
- Air conditioning compartment ventilation NACA inlet.....CLEAR
- Wing and engine scan lights.....CONDITION



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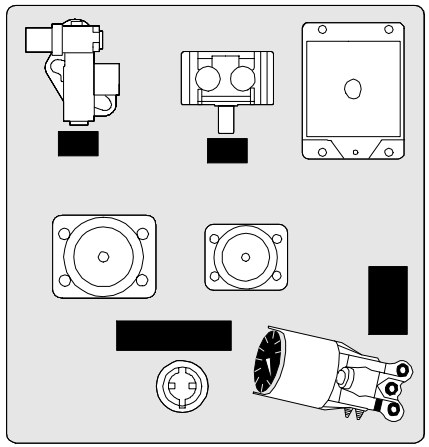
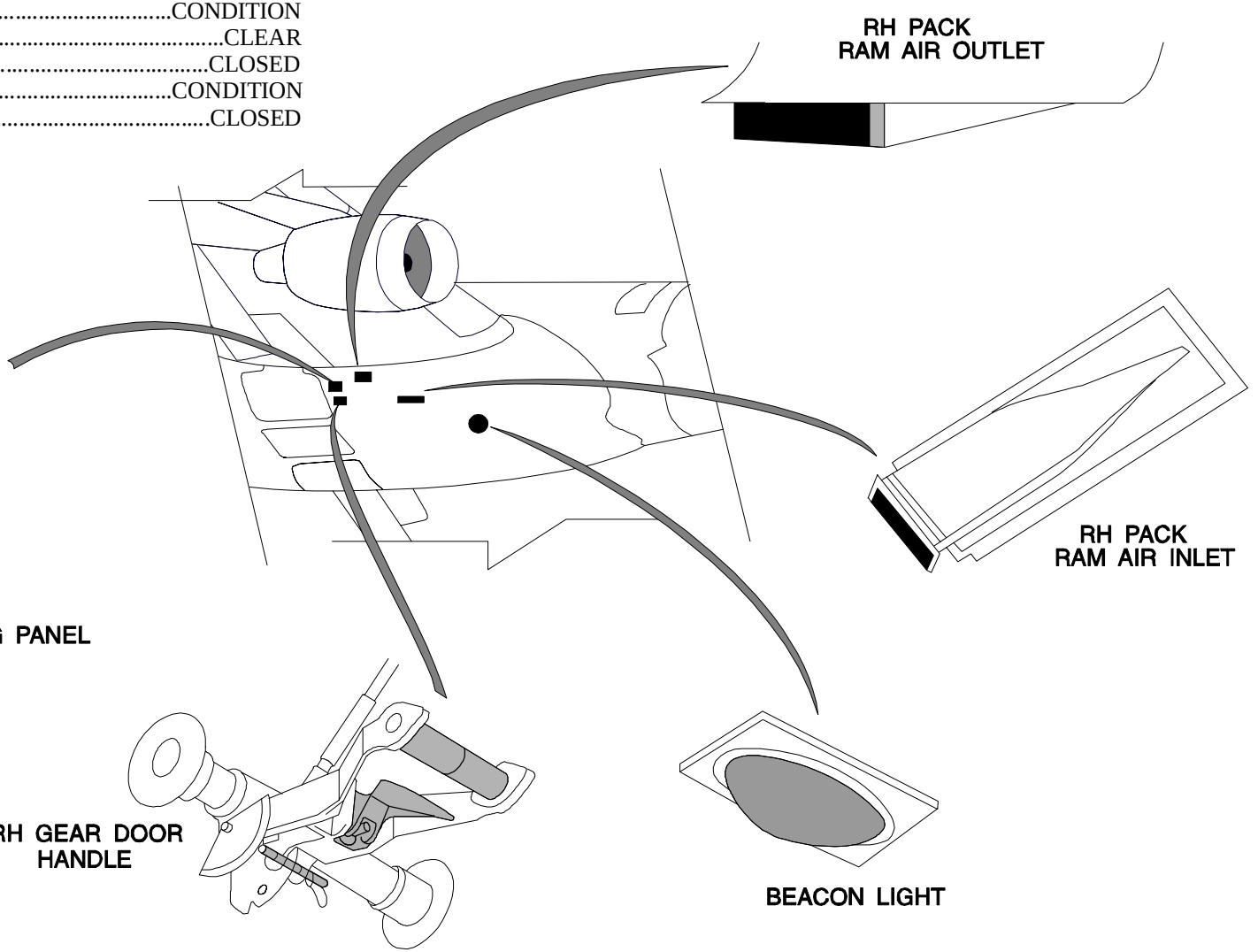
6 - RH CENTER WING

- Beacon light .....CONDITION
- RH Pack Ram Air inlet.....CLEAR
- RH gear door handle access.....CLOSED
- RH Pack Ram Air outlet.....CONDITION
- Yellow hydraulic servicing panel.....CLOSED



YELLOW HYDRAULIC SERVICING PANEL



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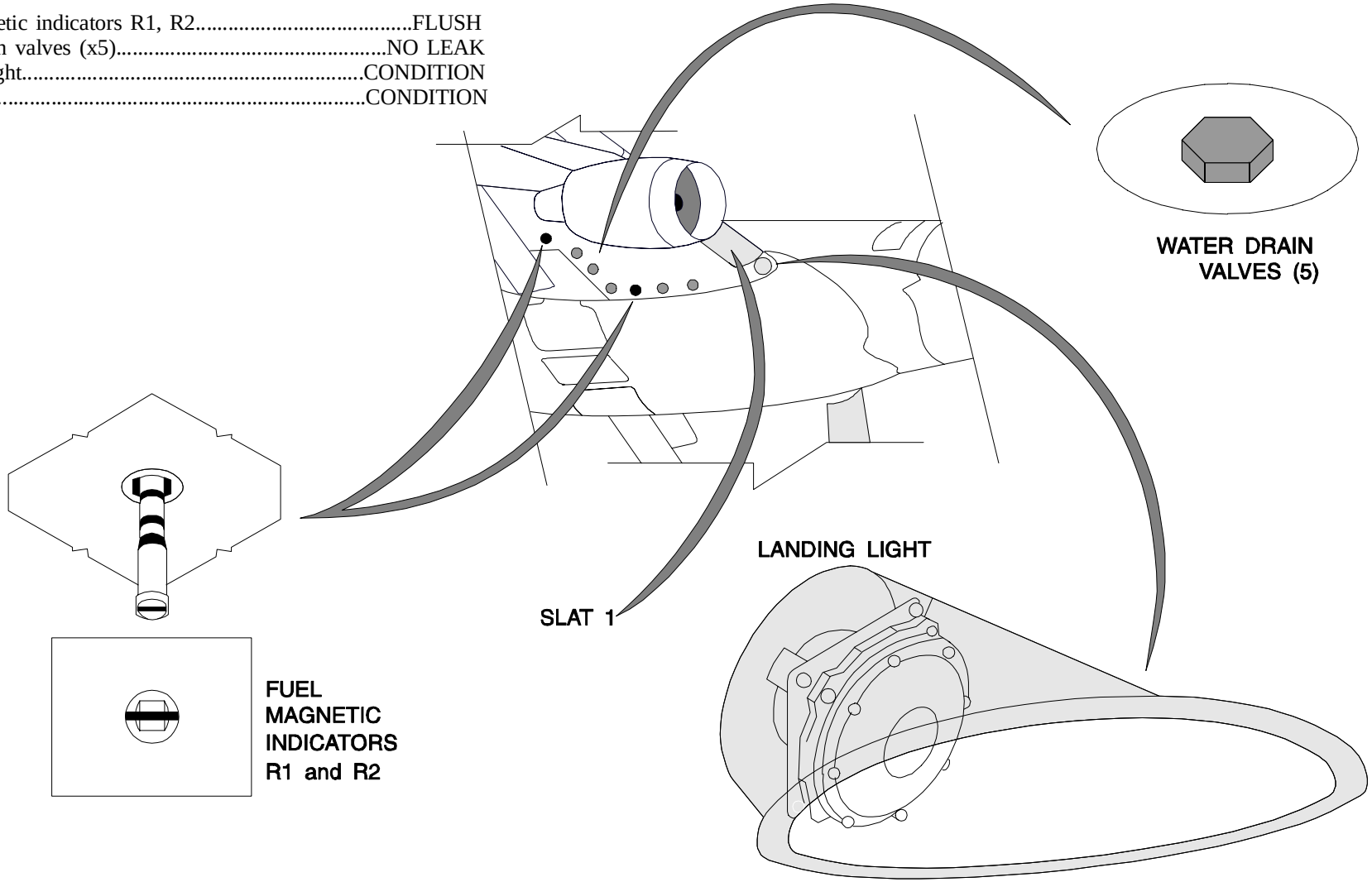
7 - LEADING EDGE - RH

- Fuel magnetic indicators R1, R2.....FLUSH
- Water drain valves (x5).....NO LEAK
- Landing light.....CONDITION
- Slat 1.....CONDITION



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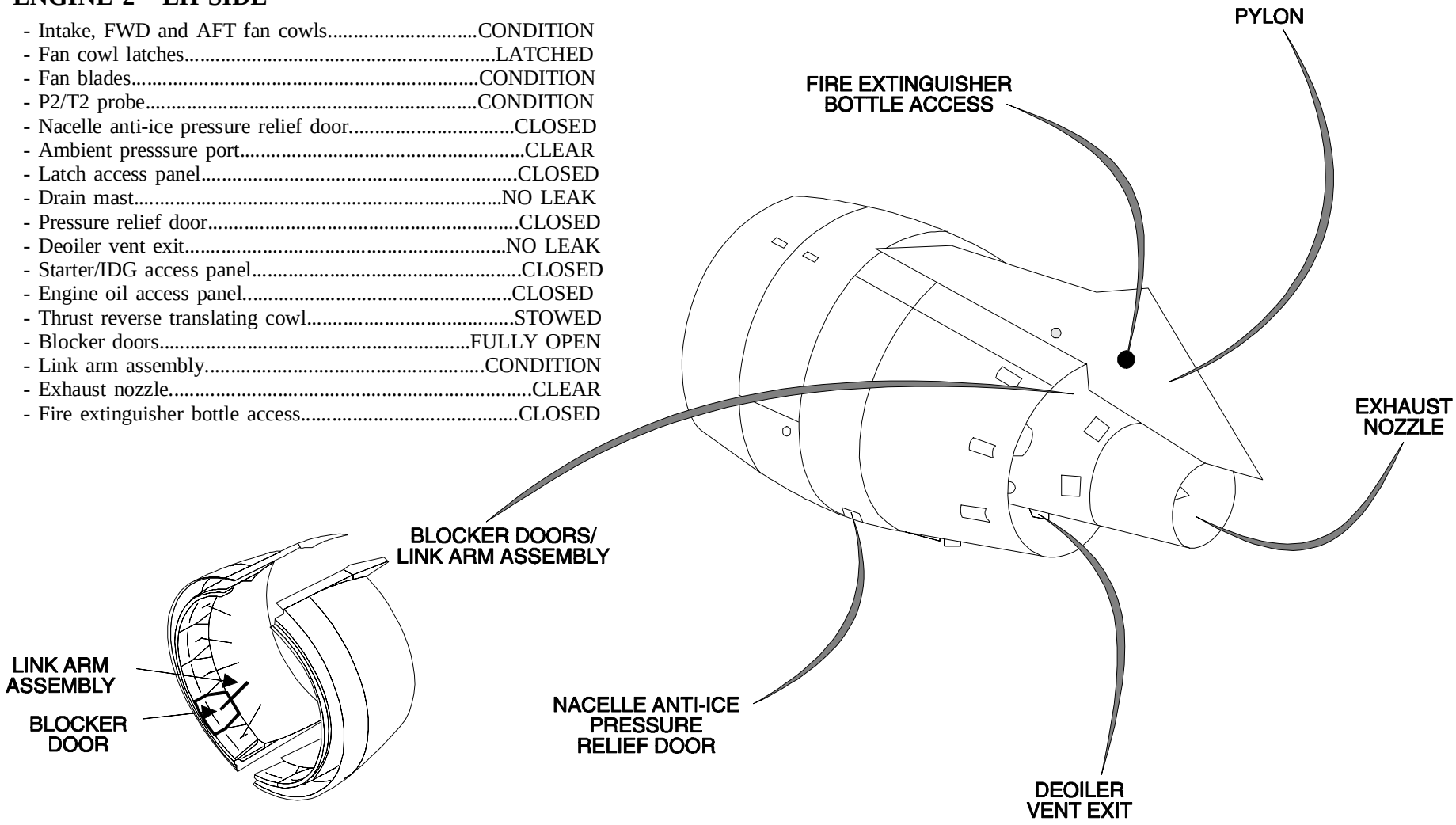
8 - ENGINE 2 - LH SIDE

- Intake, FWD and AFT fan cowls.....CONDITION
- Fan cowl latches.....LATCHED
- Fan blades.....CONDITION
- P2/T2 probe.....CONDITION
- Nacelle anti-ice pressure relief door.....CLOSED
- Ambient presssure port.....CLEAR
- Latch access panel.....CLOSED
- Drain mast.....NO LEAK
- Pressure relief door.....CLOSED
- Deoiler vent exit.....NO LEAK
- Starter/IDG access panel.....CLOSED
- Engine oil access panel.....CLOSED
- Thrust reverse translating cowl.....STOWED
- Blocker doors.....FULLY OPEN
- Link arm assembly.....CONDITION
- Exhaust nozzle.....CLEAR
- Fire extinguisher bottle access.....CLOSED



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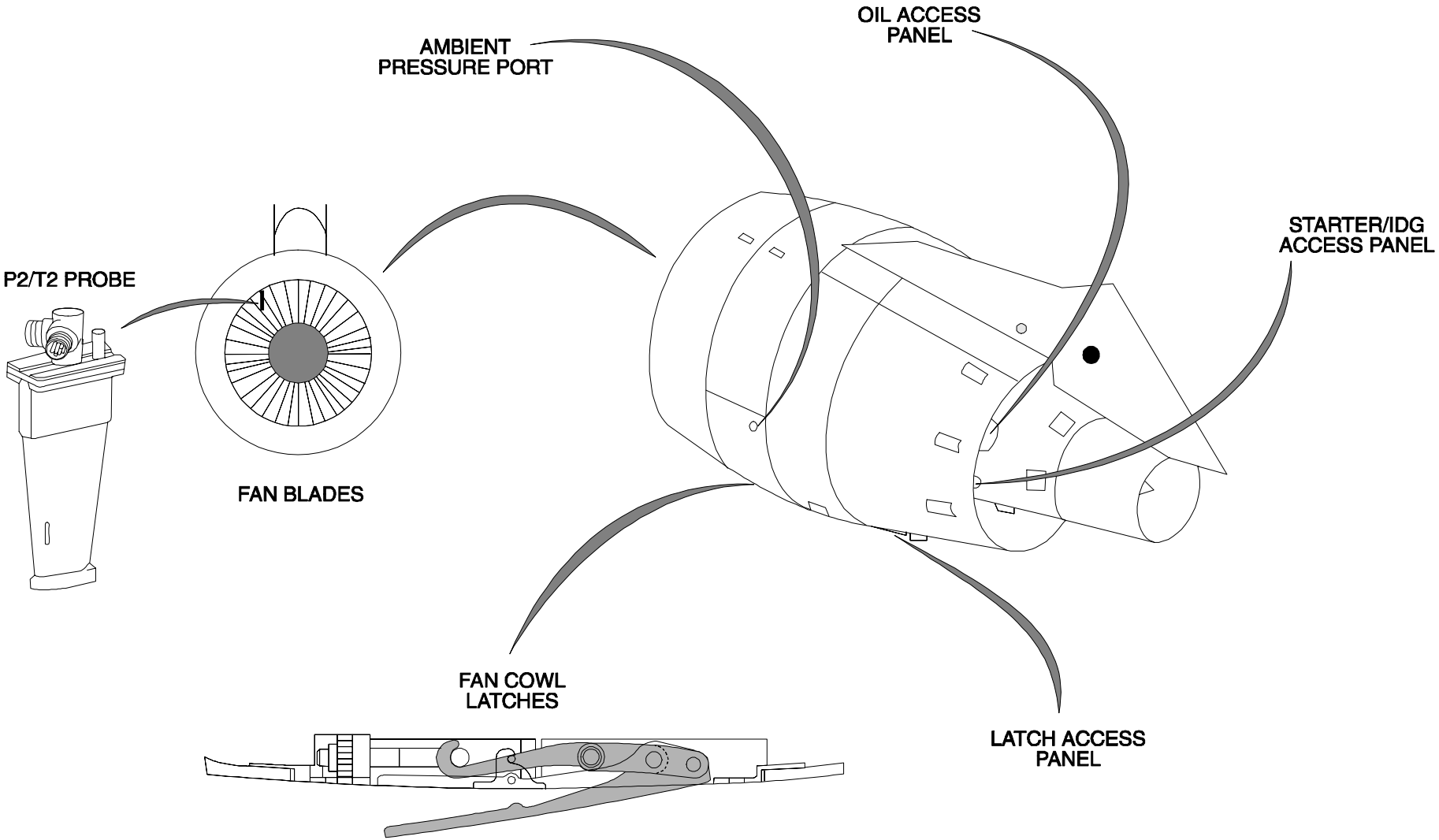

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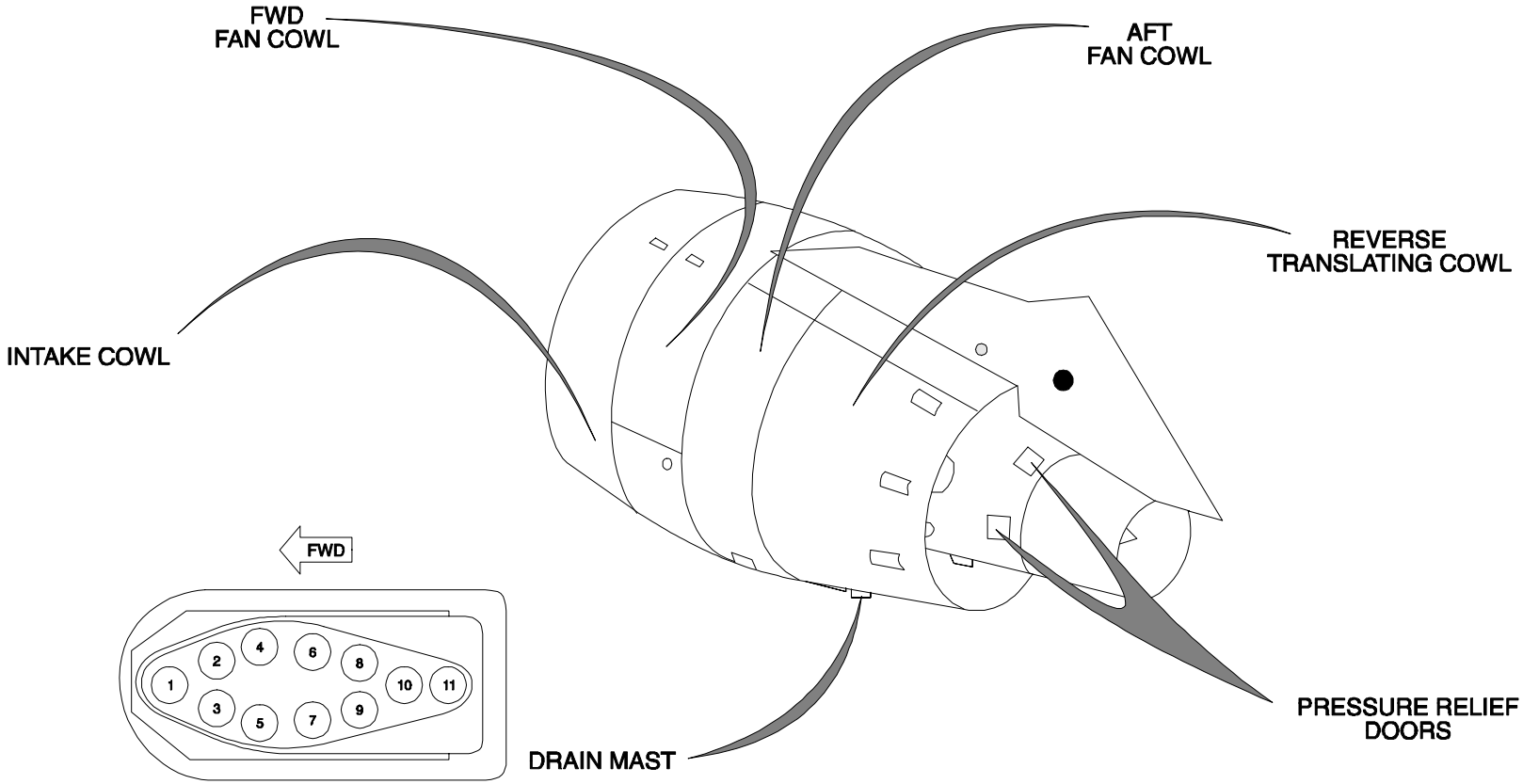

1 - Pylon drain
2 - TCC actuator, stator vane actuator, IDG oil air / oil cooler valve
3 - Engine oil air / oil cooler valve, 2.5 bleed valve actuator
4 - Main accessory gearbox - PMA drive
5 - Fuel/oil cooler, servo fuel heater
6 - Main accessory gearbox - fuel pump drive
7 - Main accessory gearbox - starter drive
8 - Main accessory gearbox - rear hydraulic pump drive
9 - Main accessory gearbox - front hydraulic pump drive
10 - Main accessory gearbox - IDG drive
11 - Oil tank scupper

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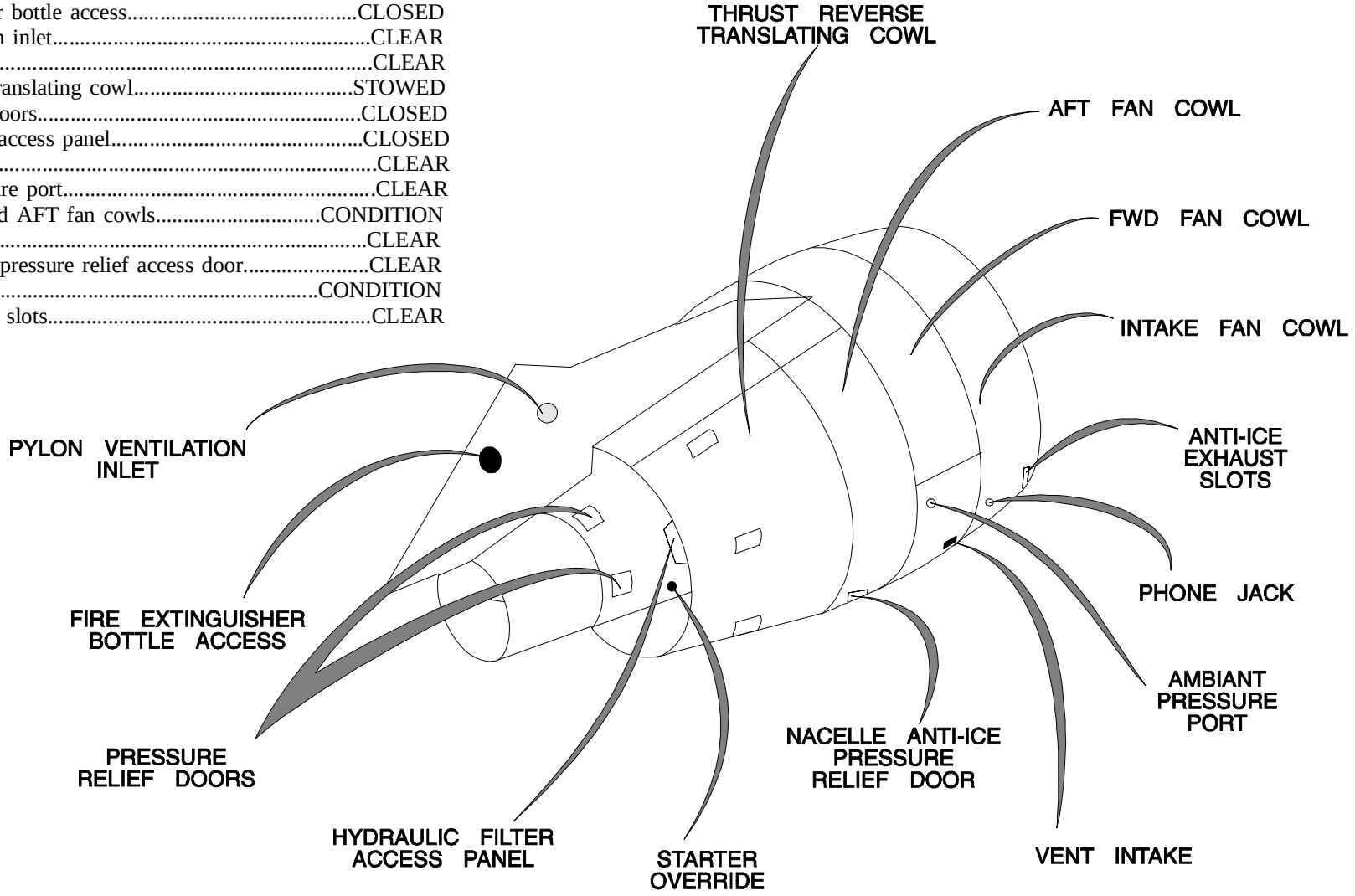
9 - ENGINE 2 - RH SIDE

- Fire extinguisher bottle access.....CLOSED
- Pylon ventilation inlet.....CLEAR
- Pylon drain.....CLEAR
- Thrust reverse translating cowl.....STOWED
- Pressure relief doors.....CLOSED
- Hydraulic filter access panel.....CLOSED
- Starter overrride.....CLEAR
- Ambient presssure port.....CLEAR
- Intake, FWD and AFT fan cowls.....CONDITION
- Vent intake.....CLEAR
- Nacelle anti-ice pressure relief access door.....CLEAR
- Phone jack.....CONDITION
- Anti-ice exhaust slots.....CLEAR



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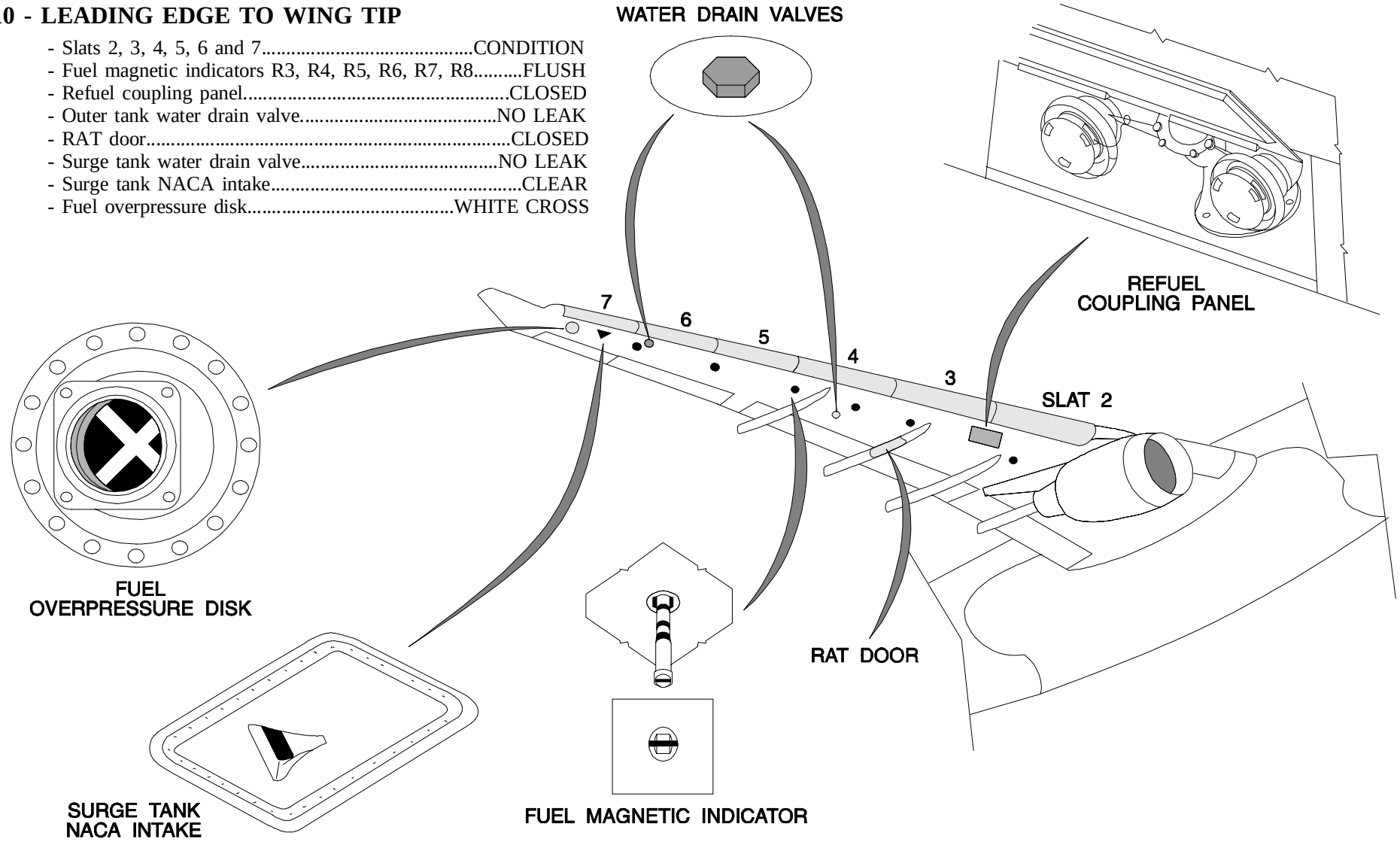
10 - LEADING EDGE TO WING TIP

- Slats 2, 3, 4, 5, 6 and 7.....CONDITION
- Fuel magnetic indicators R3, R4, R5, R6, R7, R8.....FLUSH
- Refuel coupling panel.....CLOSED
- Outer tank water drain valve.....NO LEAK
- RAT door.....CLOSED
- Surge tank water drain valve.....NO LEAK
- Surge tank NACA intake.....CLEAR
- Fuel overpressure disk.....WHITE CROSS



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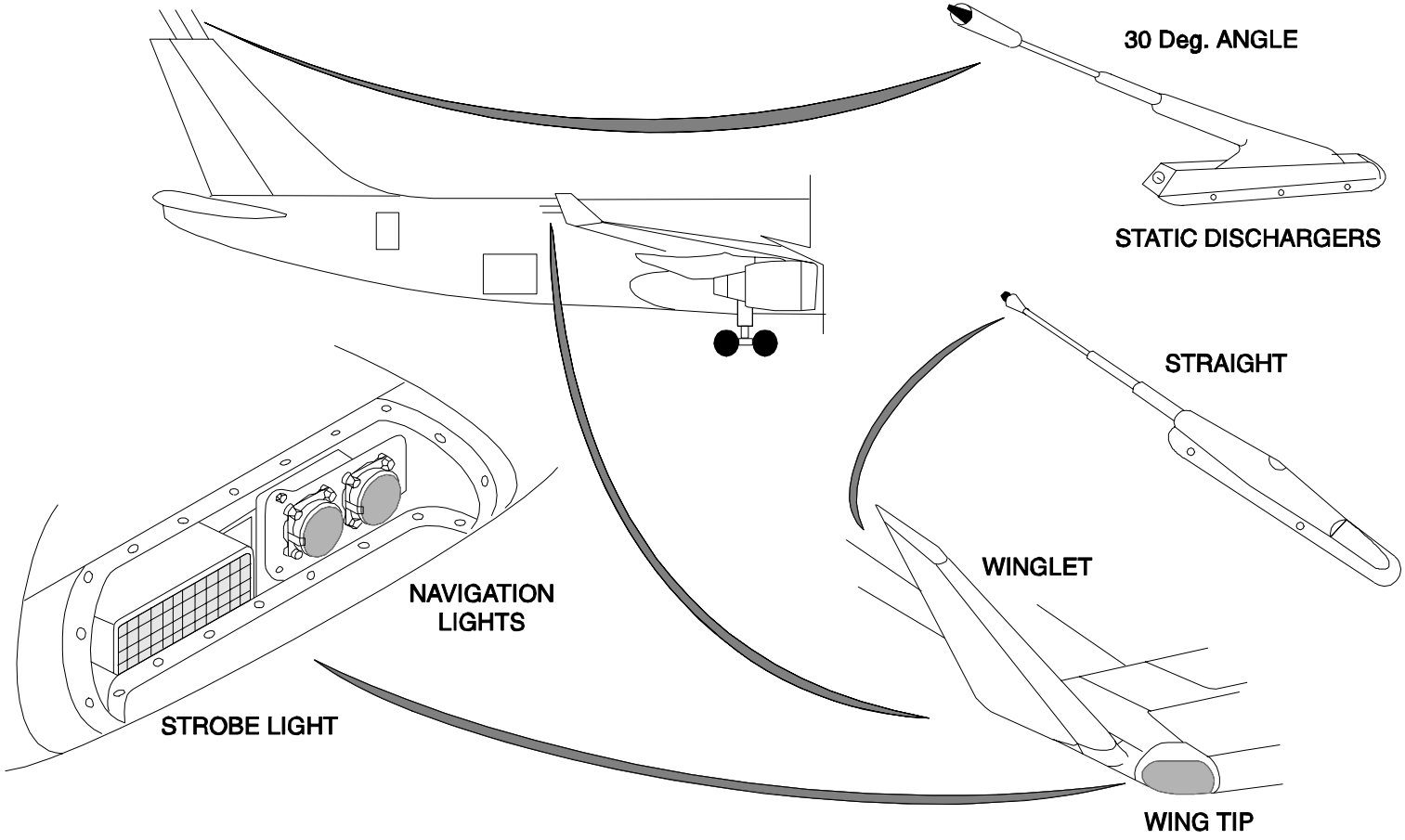
11 - WING TIP

- Navigation lights.....CONDITION/ON
- Strobe light.....CONDITION
- Winglet.....CONDITION
- Static dischargers (x 4).....CHECK
- Static dischargers (top of the tail)..... .....CHECK



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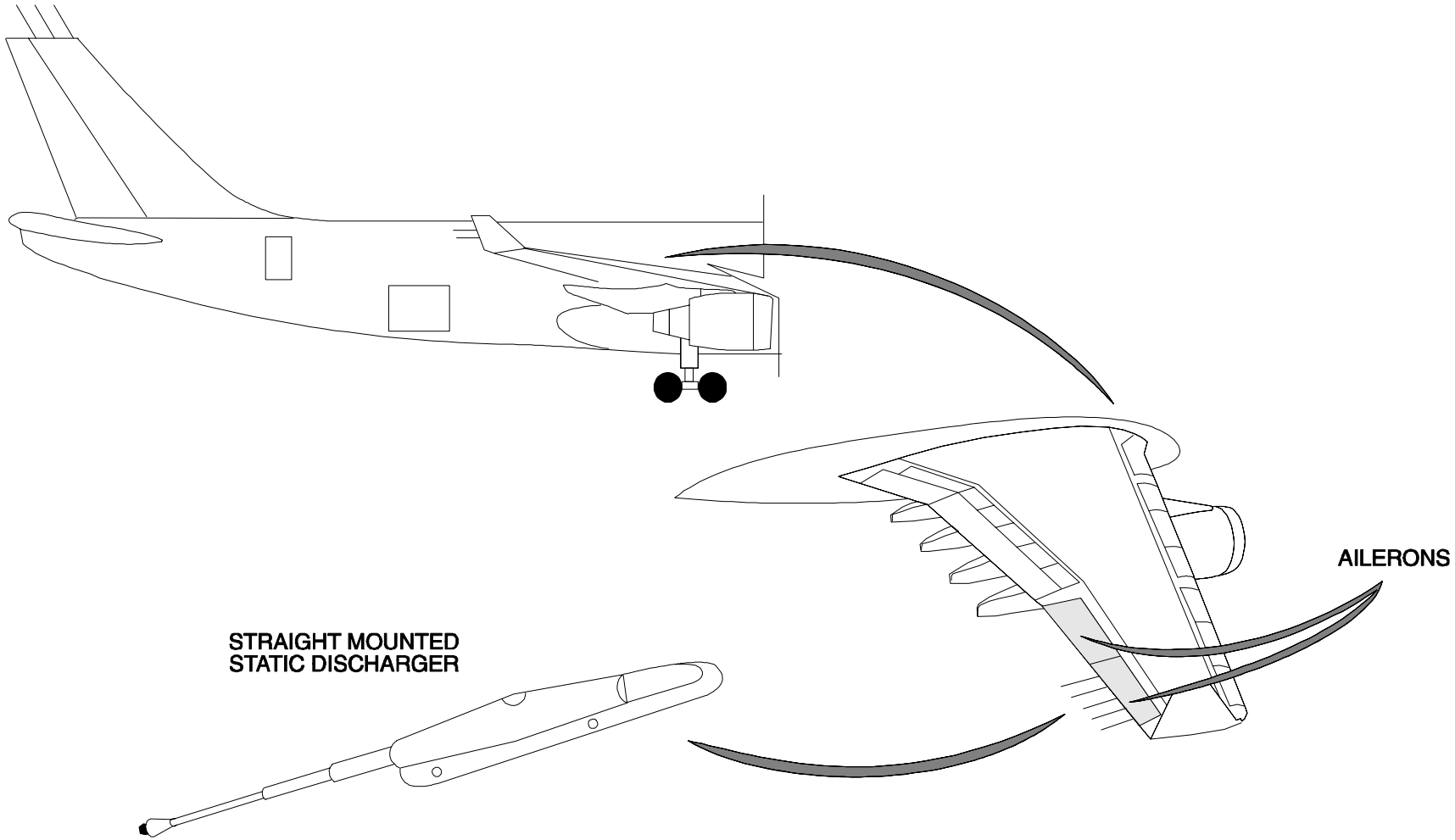
12 - AILERONS - RH

- Ailerons.....CONDITION
- Static dischargers (x 5).....CHECK



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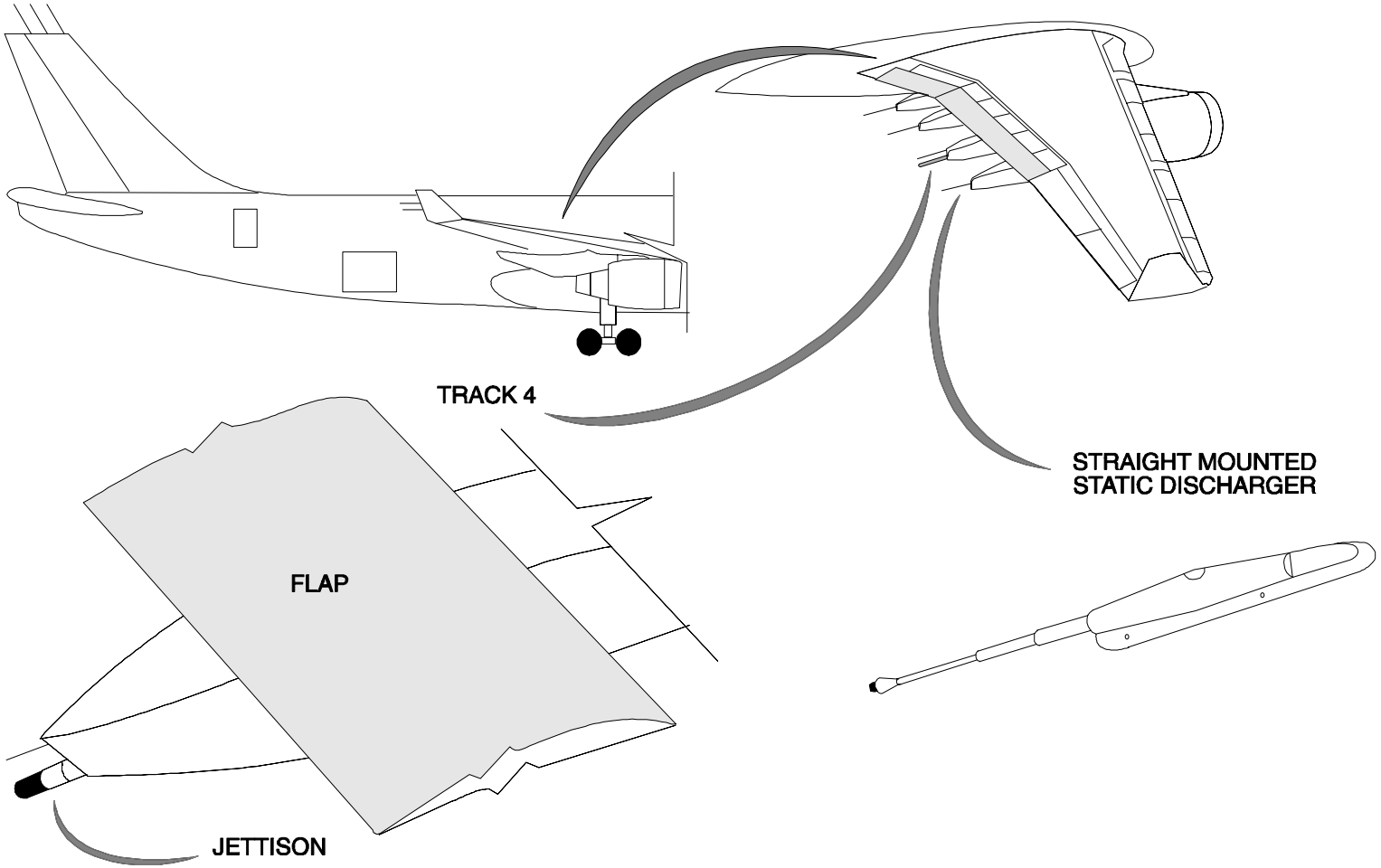
13 - TRAILING EDGE - RH

- Flaps.....CONDITION
- Jettison.....CONDITION
- Static dischargers.....CHECK



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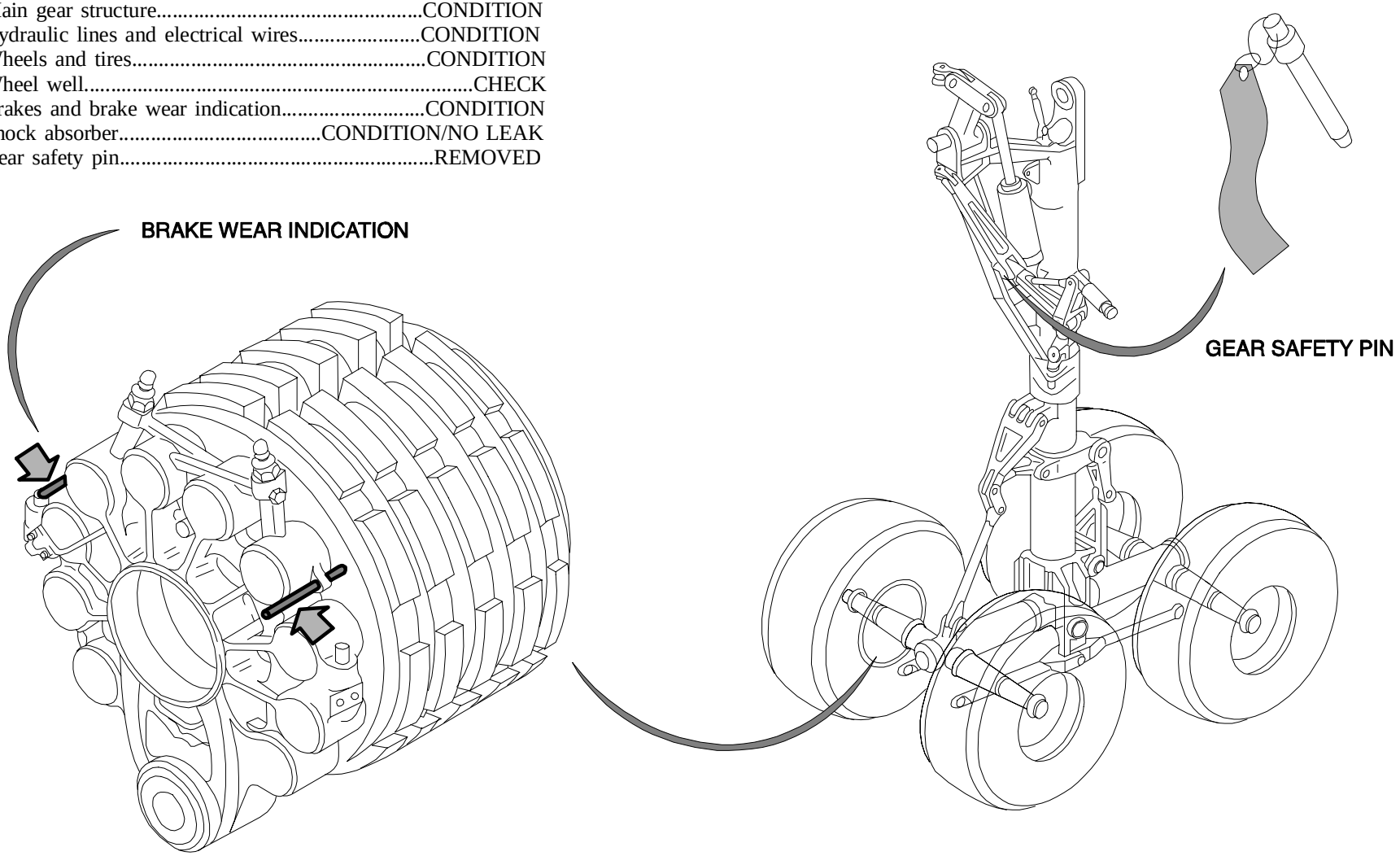
14 - MAIN LANDING GEAR - RH

- Main gear doors.....CONDITION
- Main gear structure.....CONDITION
- Hydraulic lines and electrical wires.....CONDITION
- Wheels and tires.....CONDITION
- Wheel well.....CHECK
- Brakes and brake wear indication.....CONDITION
- Shock absorber.....CONDITION/NO LEAK
- Gear safety pin.....REMOVED



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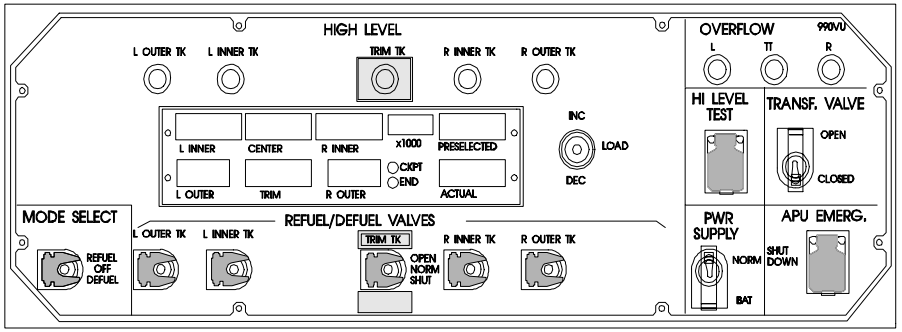
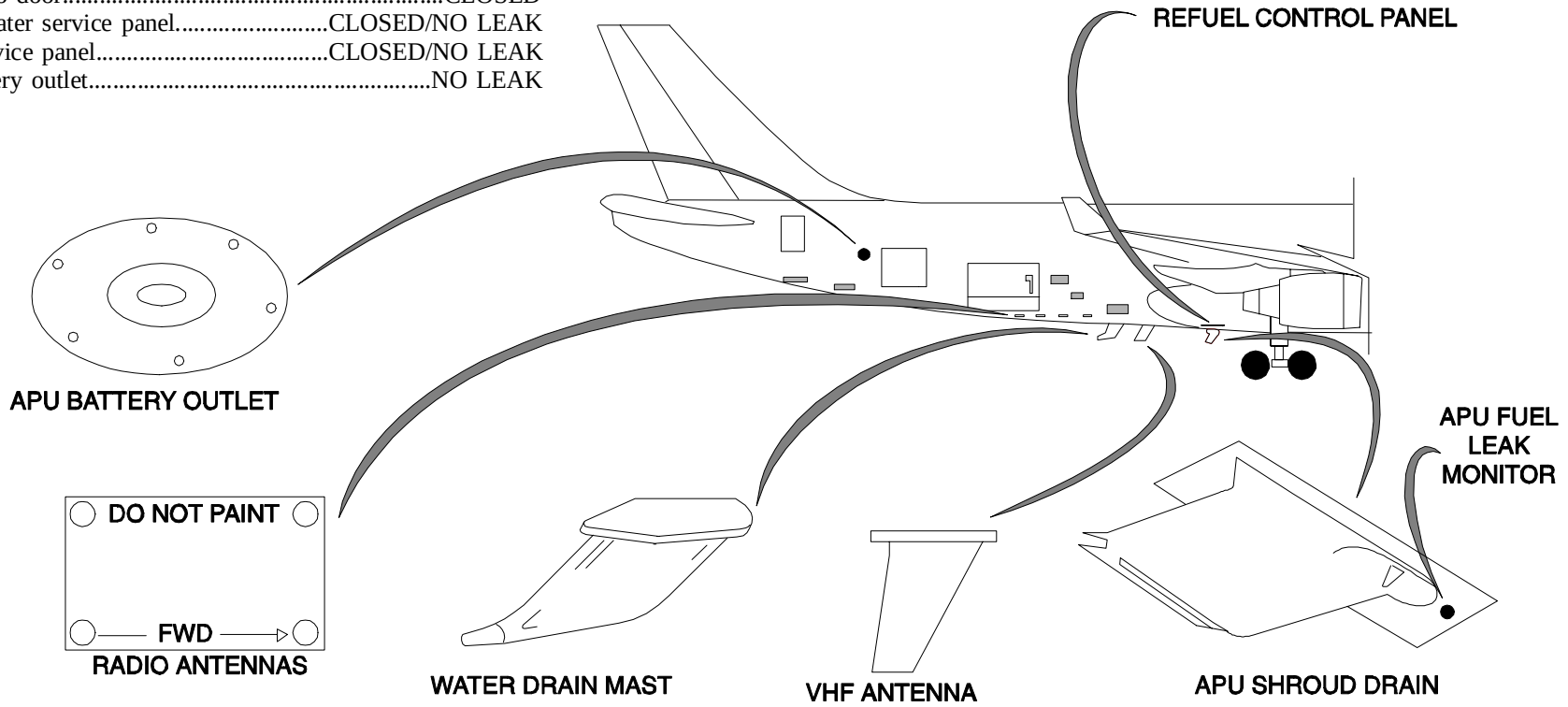
15 - RH AFT FUSELAGE

- Refuel control panel.....CLOSED
- APU shroud drain.....CONDITION/NO LEAK
- Antennas.....CONDITION
- Water drain mast.....CONDITION
- AFT water drain panel.....CLOSED/NO LEAK
- AFT cargo loading control door.....CLOSED
- AFT cargo door hydraulic selector access.....CLOSED
- AFT cargo door latching handle.....LOCKED
- AFT cargo door locking flapper.....CLOSED
- AFT cargo door locking indicators.....FLUSH
- Bulk cargo door.....CLOSED
- Potable water service panel.....CLOSED/NO LEAK
- Toilet service panel.....CLOSED/NO LEAK
- APU battery outlet.....NO LEAK





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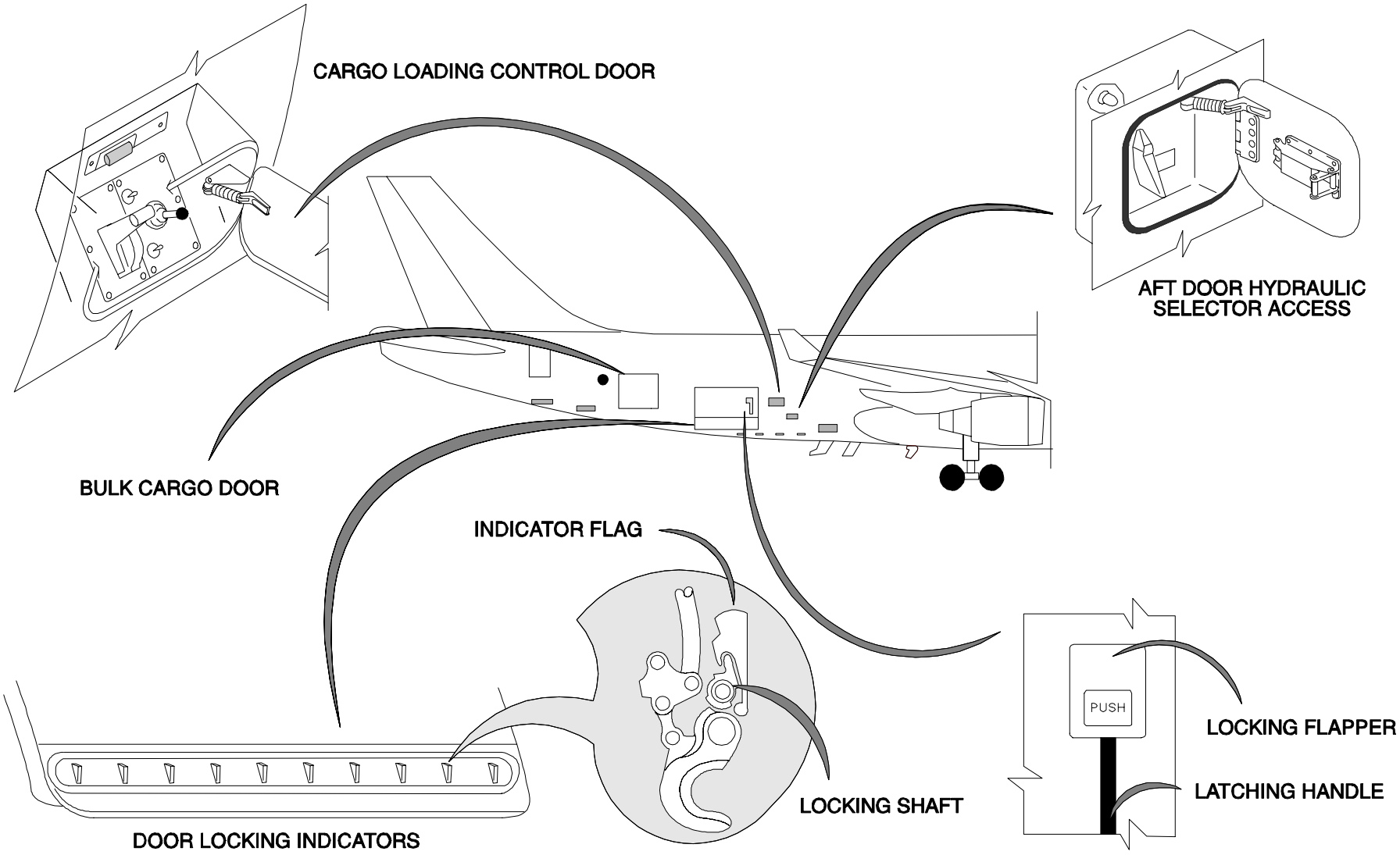

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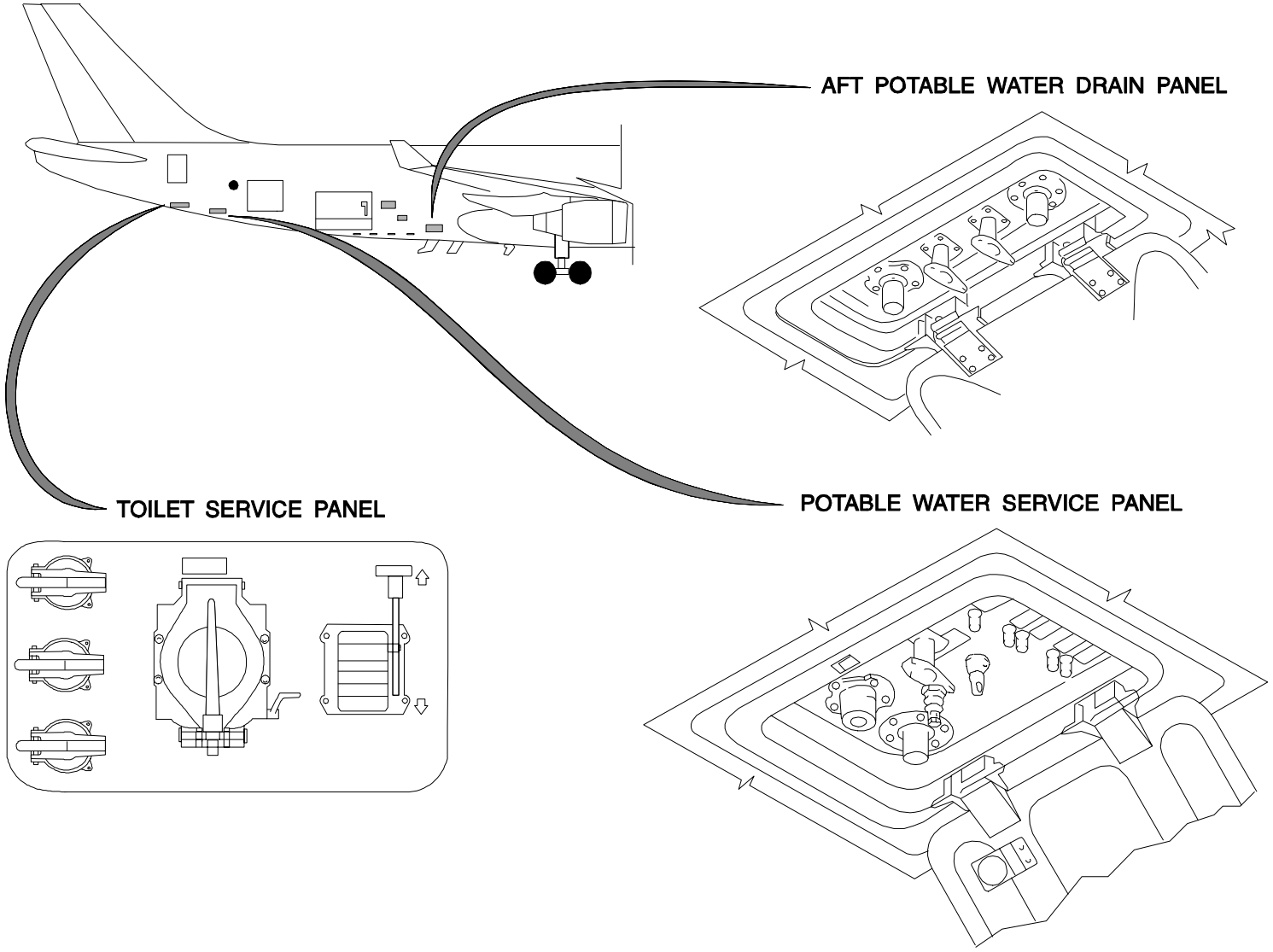

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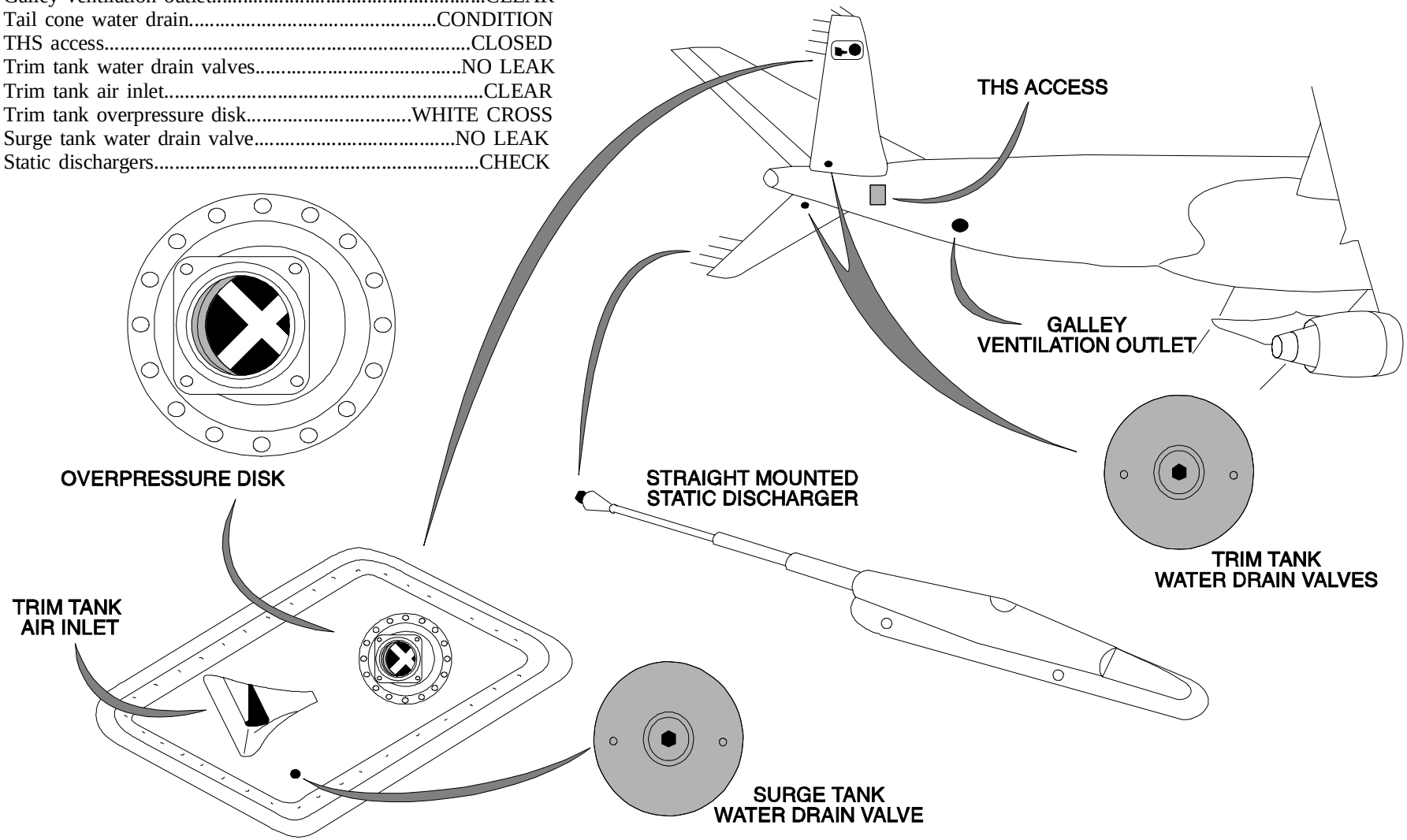
16 - TAIL

- Galley ventilation outlet.....CLEAR
- Tail cone water drain.....CONDITION
- THS access.....CLOSED
- Trim tank water drain valves.....NO LEAK
- Trim tank air inlet.....CLEAR
- Trim tank overpressure disk.....WHITE CROSS
- Surge tank water drain valve.....NO LEAK
- Static dischargers.....CHECK



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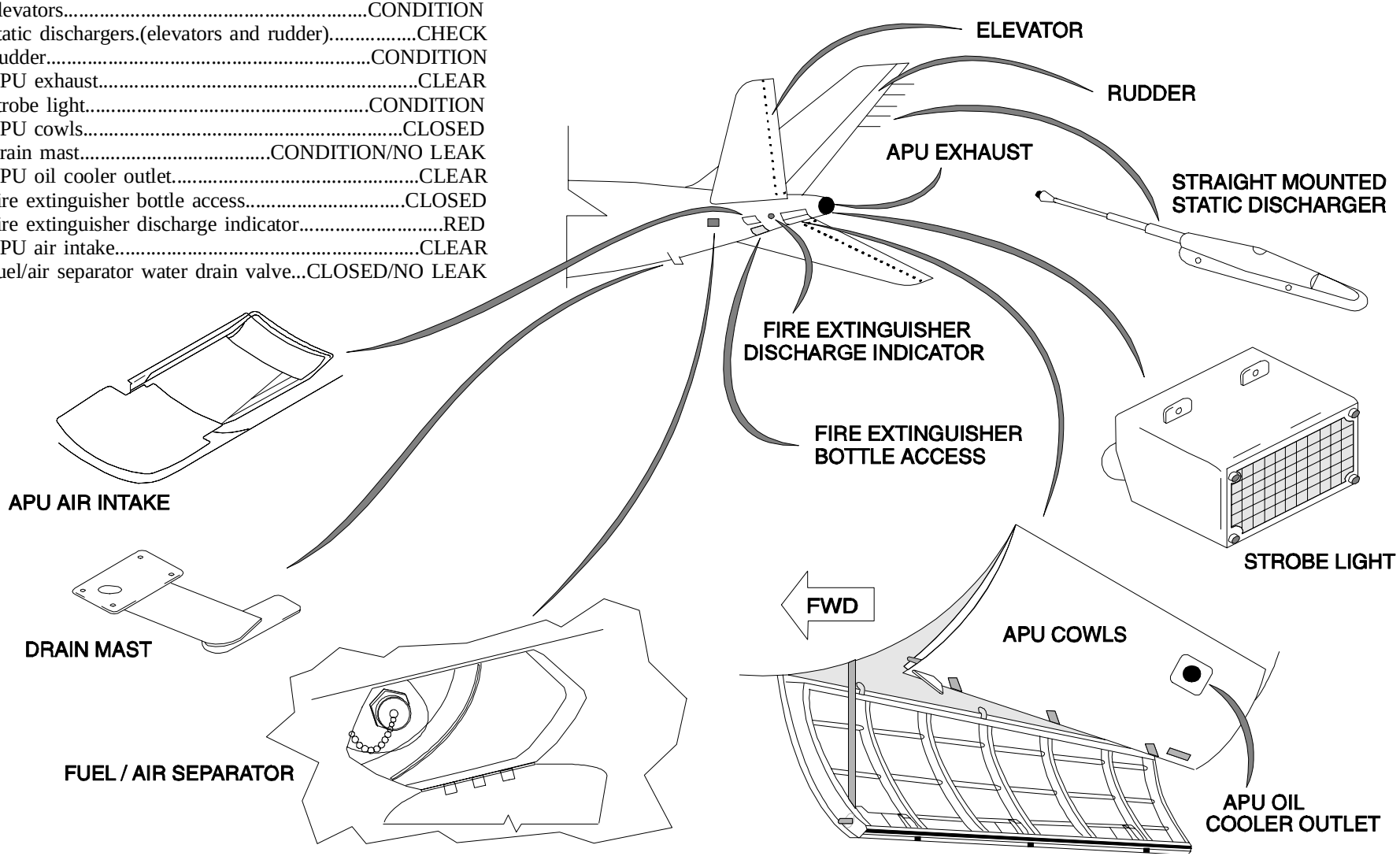
17 - ELEVATOR

- Elevators.....CONDITION
- Static dischargers.(elevators and rudder).....CHECK
- Rudder.....CONDITION
- APU exhaust.....CLEAR
- Strobe light.....CONDITION
- APU cowls.....CLOSED
- Drain mast.....CONDITION/NO LEAK
- APU oil cooler outlet.....CLEAR
- Fire extinguisher bottle access.....CLOSED
- Fire extinguisher discharge indicator.....RED
- APU air intake.....CLEAR
- Fuel/air separator water drain valve...CLOSED/NO LEAK



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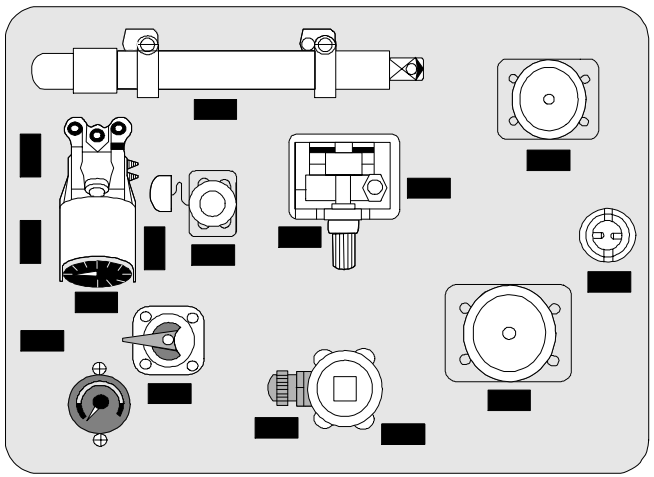
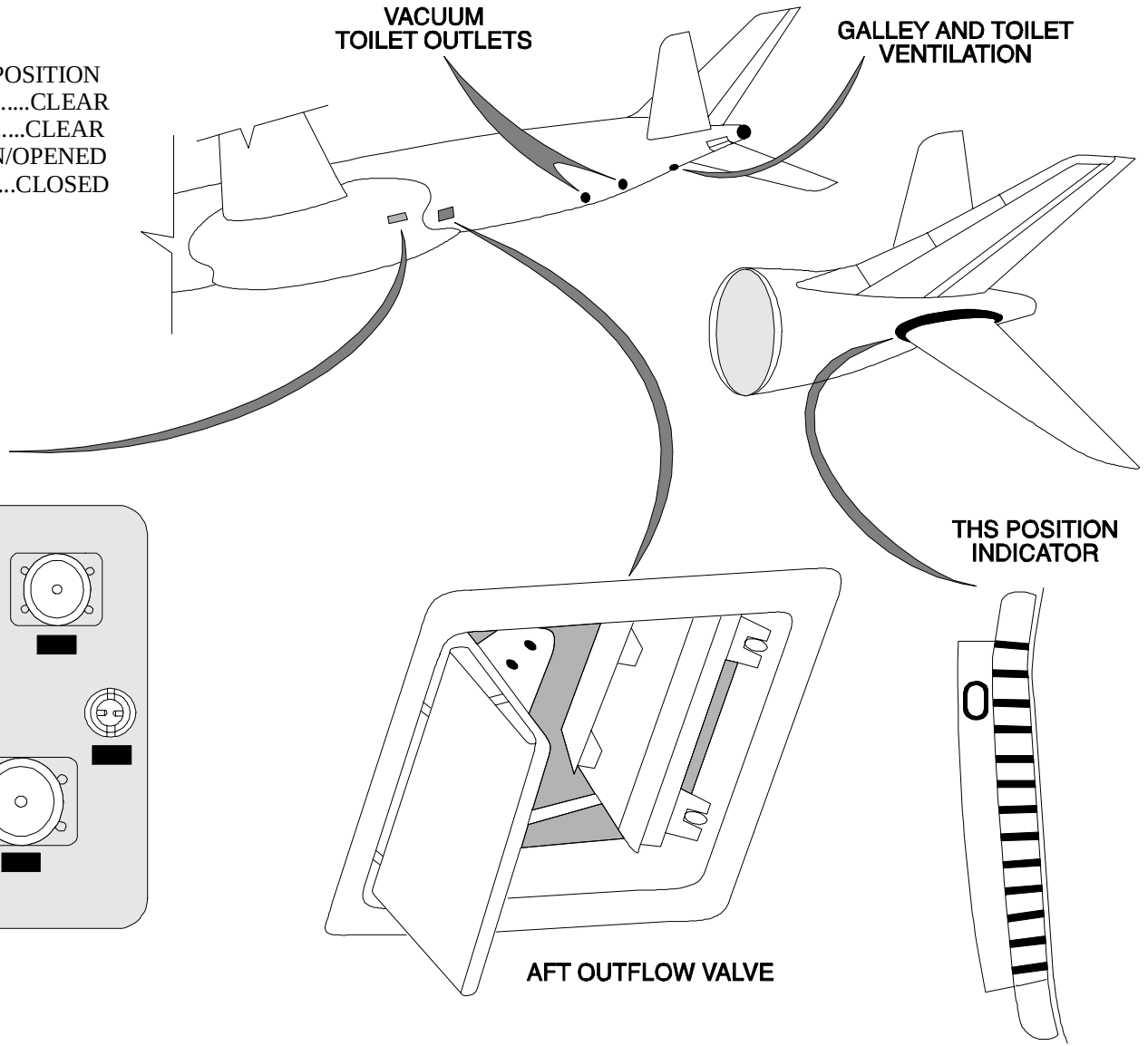
18 - AFT LH FUSELAGE

- THS position indicator.....POSITION
- Galley and toilet ventilation.....CLEAR
- Vacuum toilet outlets.....CLEAR
- AFT outflow valve.....CONDITION/OPENED
- Green hydraulic servicing panel.....CLOSED

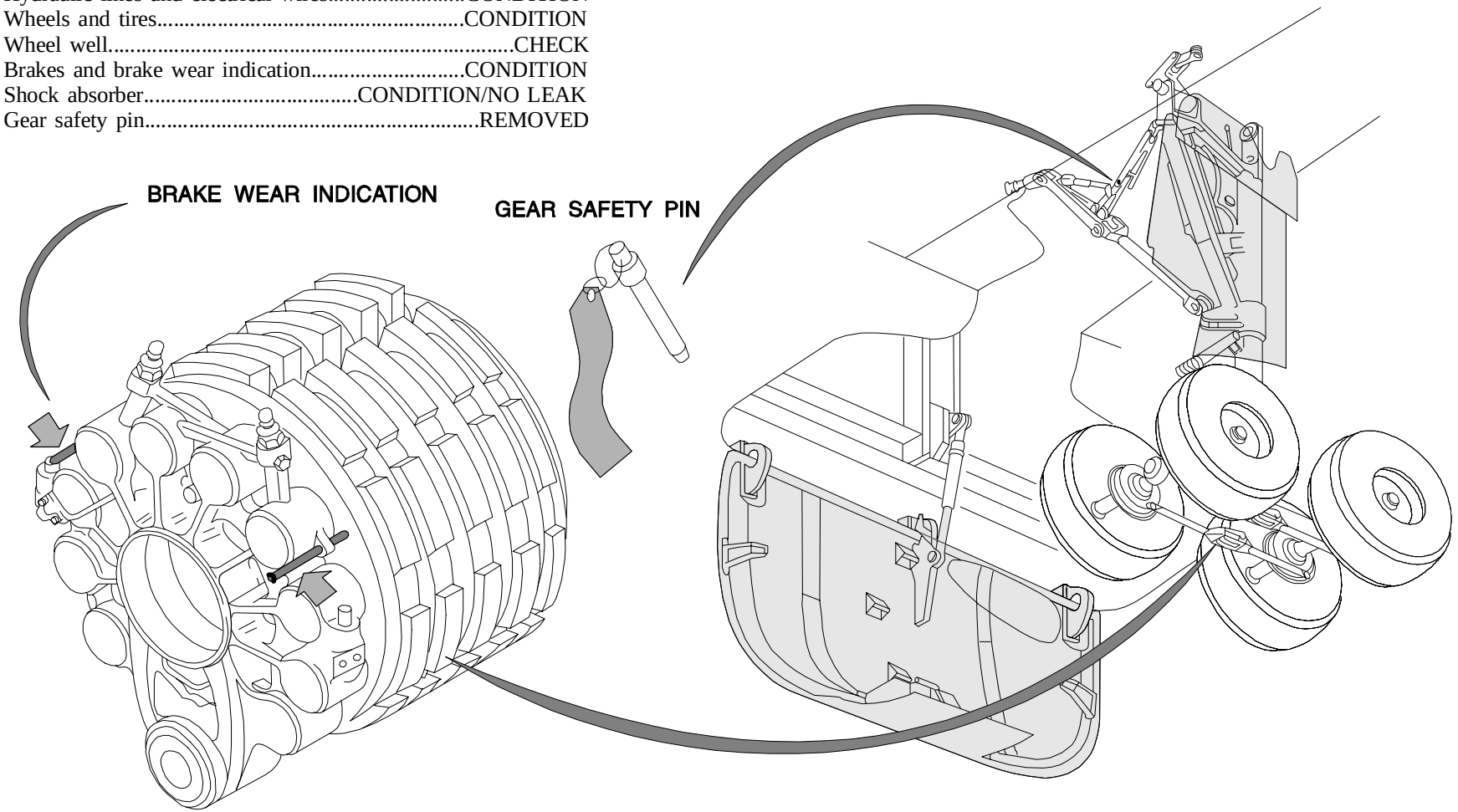




FQW4200 GE Metric

19 - MAIN GEAR - LH

- Main gear doors.....CONDITION
- Main gear structure.....CONDITION
- Hydraulic lines and electrical wires.....CONDITION
- Wheels and tires.....CONDITION
- Wheel well.....CHECK
- Brakes and brake wear indication.....CONDITION
- Shock absorber.....CONDITION/NO LEAK
- Gear safety pin.....REMOVED



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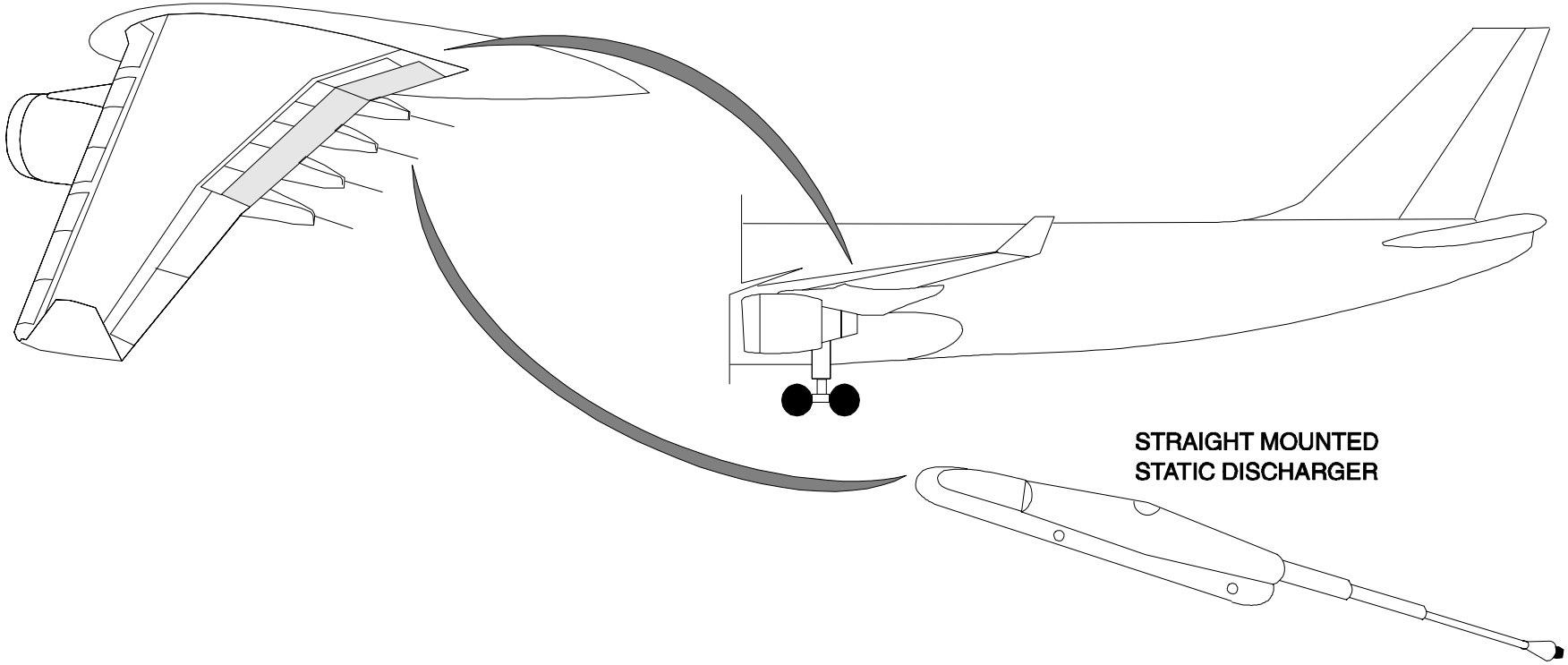
20 - TRAILING EDGE - LH

- Flaps.....CONDITION
- Static dischargers.....CHECK



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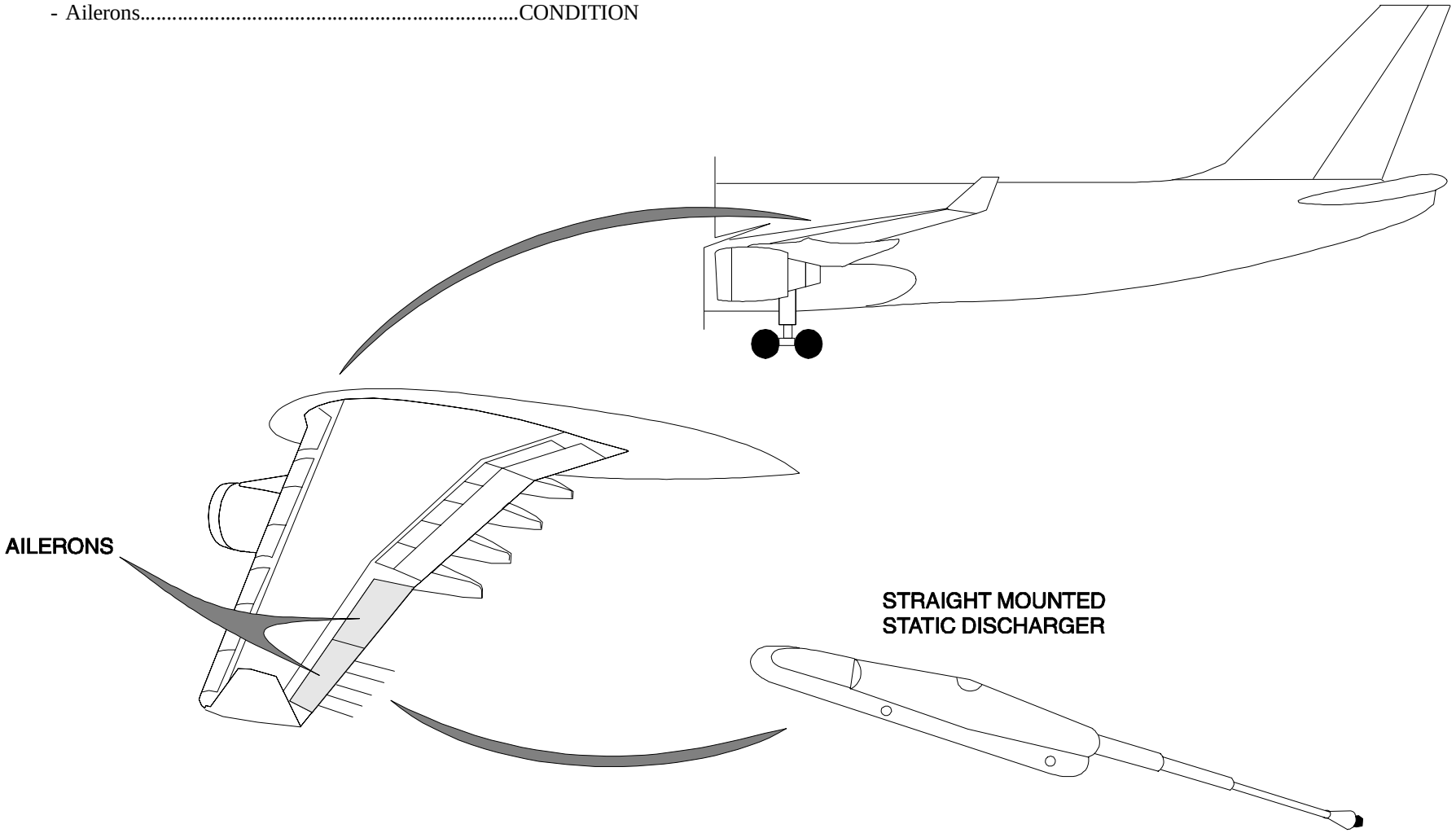
21 - AILERONS - LH

- Ailerons.....CONDITION



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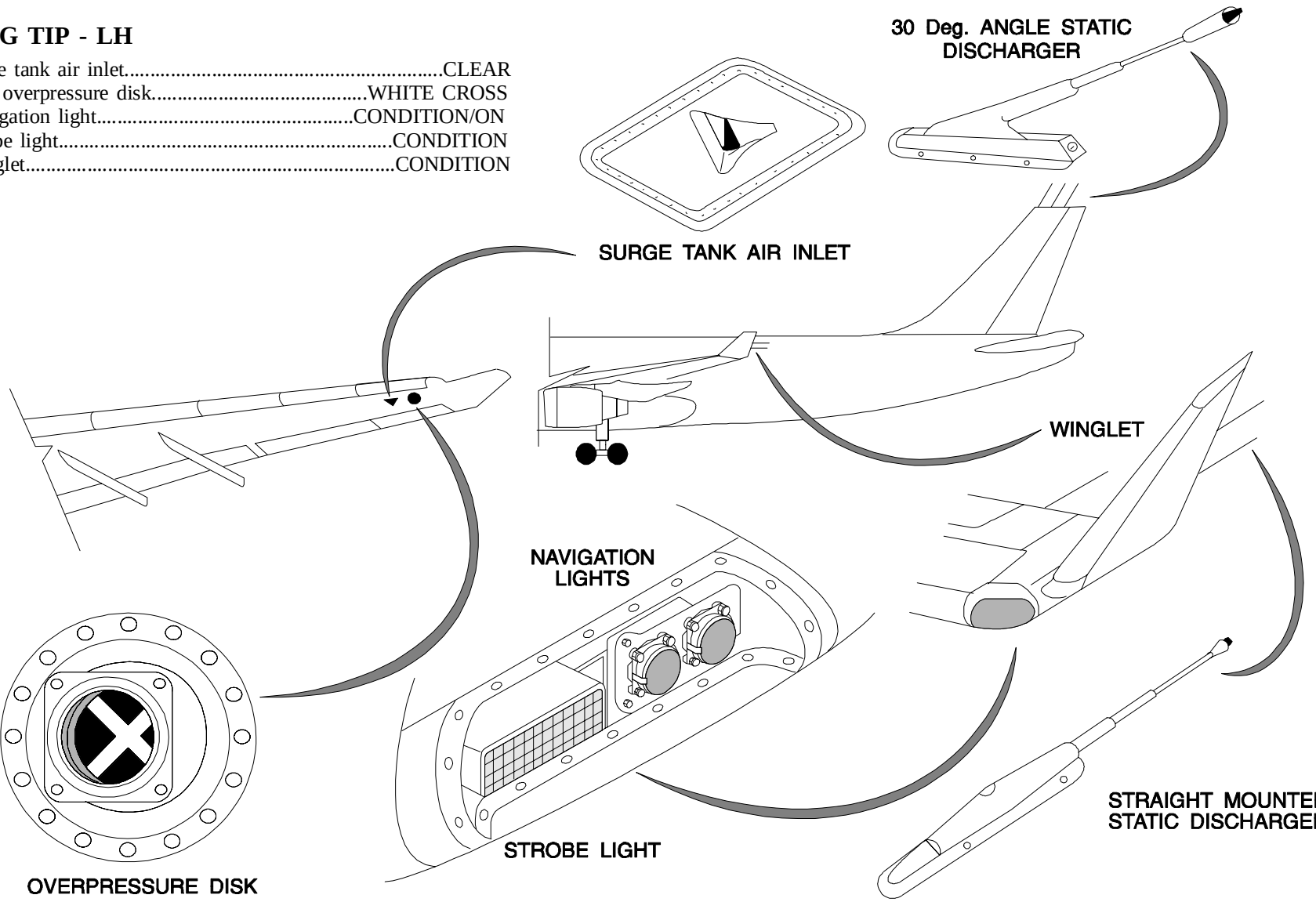
22 - WING TIP - LH

- Surge tank air inlet.....CLEAR
- Fuel overpressure disk.....WHITE CROSS
- Navigation light.....CONDITION/ON
- Strobe light.....CONDITION
- Winglet.....CONDITION



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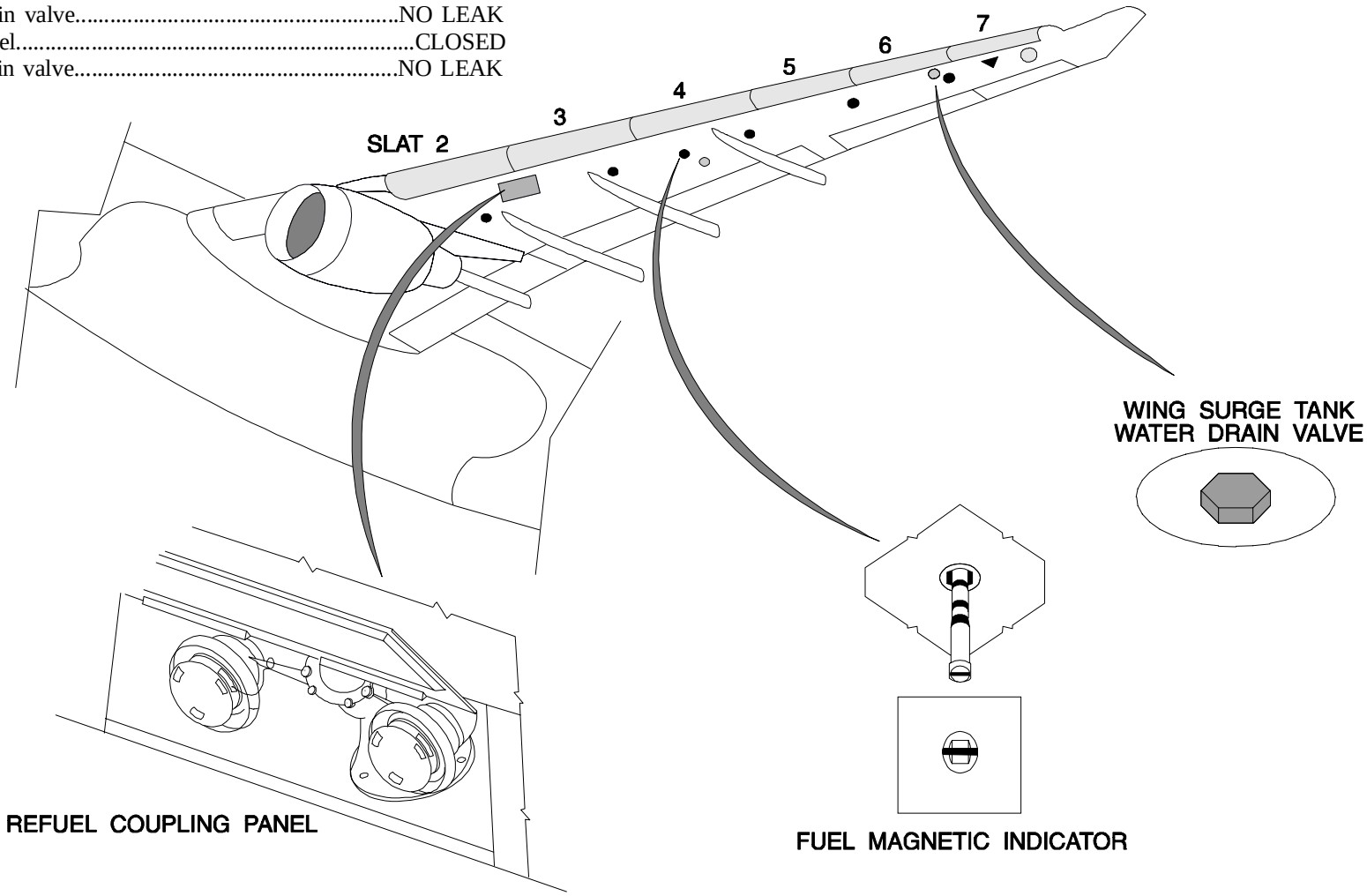
23 - LEADING EDGE - WING TIP TO ENG 1

- Slats 7, 6, 5, 4, 3 and 2.....CONDITION
- Fuel magnetic indicators L8, L7, L6, L5, L4, L3.....FLUSH
- Surge tank water drain valve.....NO LEAK
- Refuel coupling panel.....CLOSED
- Outer tank water drain valve.....NO LEAK



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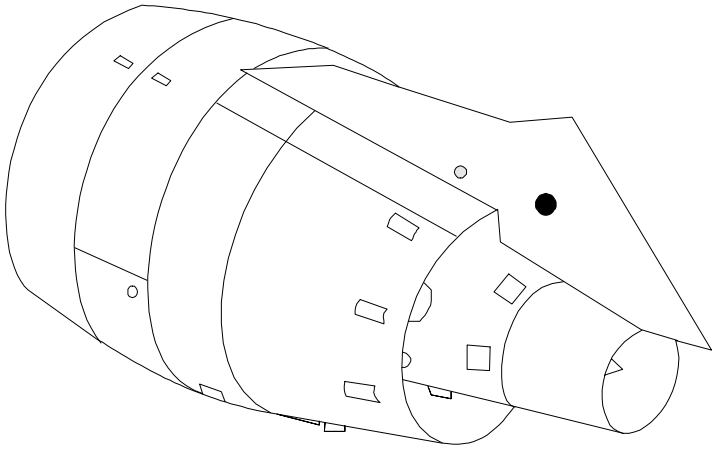
24 - ENGINE 1 - LH SIDE

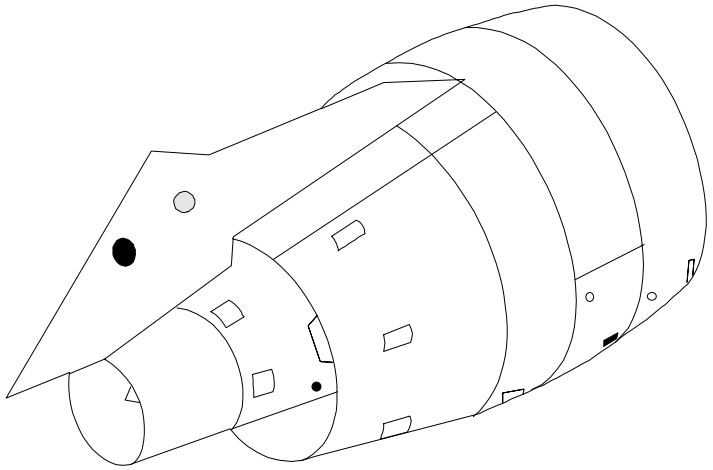
- Intake, FWD and AFT fan cowls.....CONDITION
- Fan cowl latches.....LATCHED
- Fan blades.....CONDITION
- P2/T2 probe.....CONDITION
- Nacelle anti-ice pressure relief door.....CLOSED
- Ambient presssure port.....CLEAR
- Latch access panel.....CLOSED
- Drain mast.....NO LEAK
- Pressure relief door.....CLOSED
- Deoiler vent exit.....NO LEAK
- Starter/IDG access panel.....CLOSED
- Engine oil access panel.....CLOSED
- Thrust reverse translating cowl.....STOWED
- Blocker doors.....FULLY OPEN
- Link arm assembly.....CONDITION
- Exhaust nozzle.....CLEAR
- Fire extinguisher bottle access.....CLOSED



IDENTICAL TO ENGINE 2

25 - ENGINE 1 - RH SIDE

- Fire extinguisher bottle access.....CLOSED
- Pylon ventilation inlet.....CLEAR
- Pylon drain.....CLEAR
- Thrust reverse translating cowl.....STOWED
- Pressure relief doors.....CLOSED
- Hydraulic filter access panel.....CLOSED
- Starter overrride.....CLEAR
- Ambient presssure port.....CLEAR
- Intake, FWD and AFT fan cowls.....CONDITION
- Vent intake.....CLEAR
- Nacelle anti-ice pressure relief access door.....CLEAR
- Phone jack.....CONDITION
- Anti-ice exhaust slots.....CLEAR



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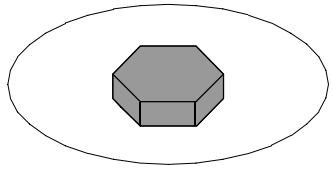
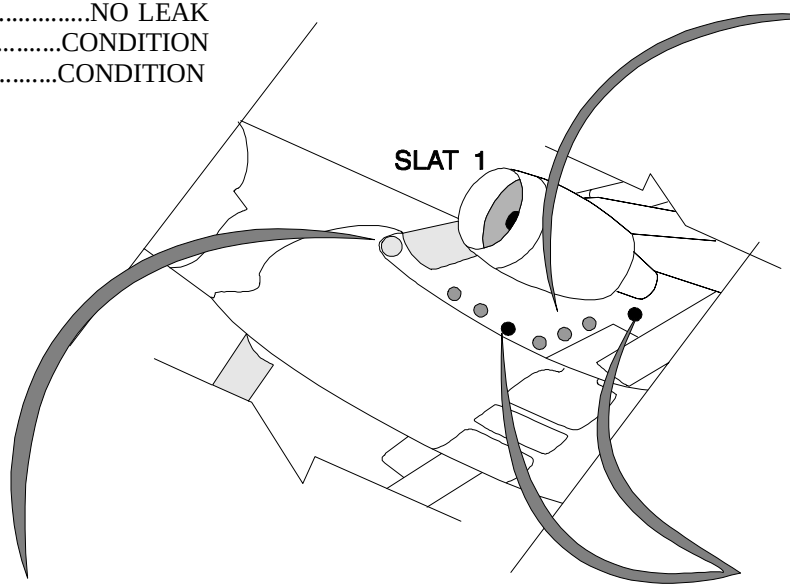
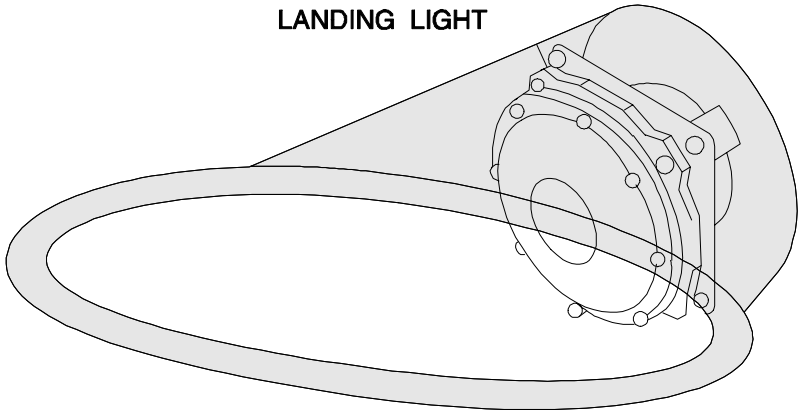
26 - LEADING EDGE TO CENTER WING - LH

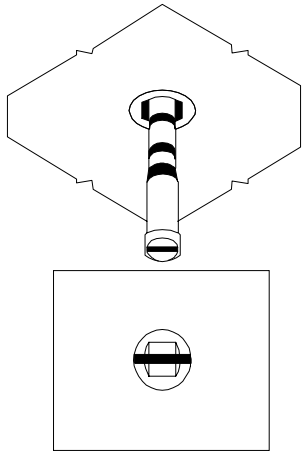
- Fuel magnetic indicators L2, L1.....FLUSH
- Water drain valves (x5).....NO LEAK
- Landing light.....CONDITION
- Slat 1.....CONDITION



WATER DRAIN VALVE (5)







FUEL MAGNETIC INDICATORS L2, L1

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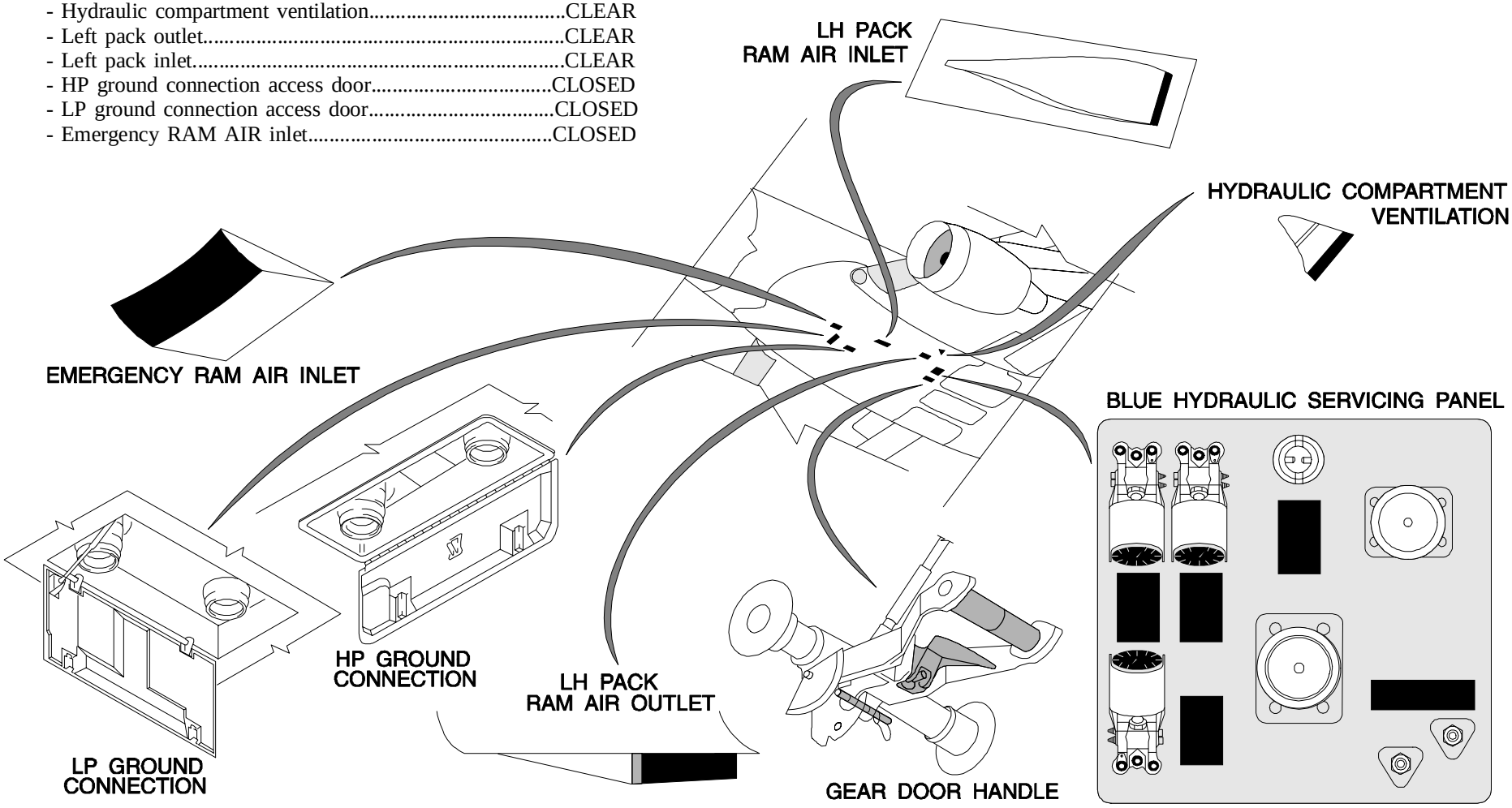
27 - LH CENTER WING

- Blue hydraulic servicing panel.....CLOSED
- LH gear door handle access.....CLOSED
- Hydraulic compartment ventilation.....CLEAR
- Left pack outlet.....CLEAR
- Left pack inlet.....CLEAR
- HP ground connection access door.....CLOSED
- LP ground connection access door.....CLOSED
- Emergency RAM AIR inlet.....CLOSED



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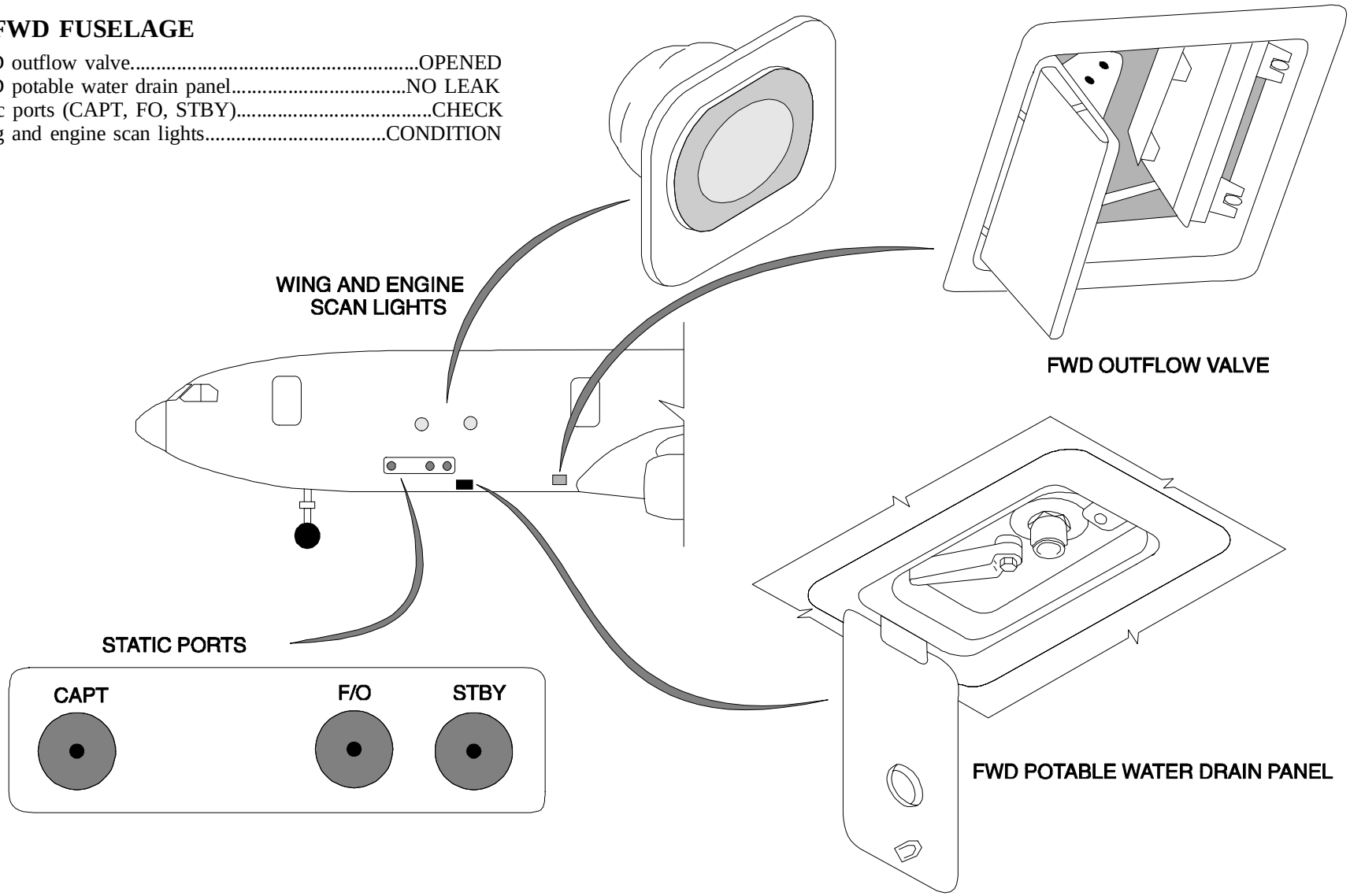
28 - LH FWD FUSELAGE

- FWD outflow valve.....OPENED
- FWD potable water drain panel.....NO LEAK
- Static ports (CAPT, FO, STBY).....CHECK
- Wing and engine scan lights.....CONDITION



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STUDENT NOTES

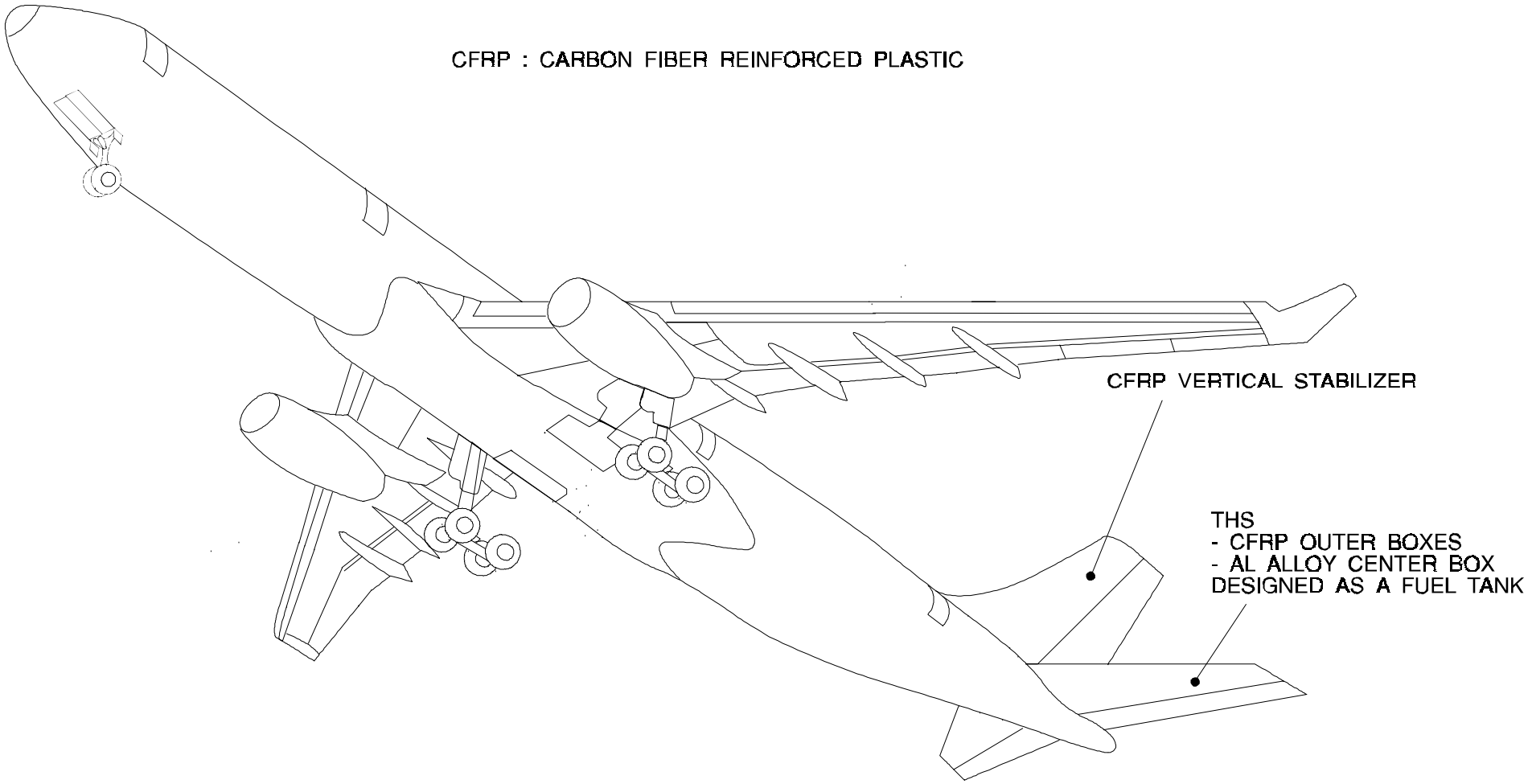
AIRCRAFT STRUCTURE GENERAL PRESENTATION

Design Considerations
Composite Materials
Metallic Materials
Surface Pretreatments
Final Paint System
Aircraft Drainage
Jacking Points
Step Areas

DESIGN CONSIDERATIONS

The structure of the aircraft is generally of conventional design and manufacture.

Conventional materials are used including improved versions of aluminium alloys and an extensive use of composite materials.



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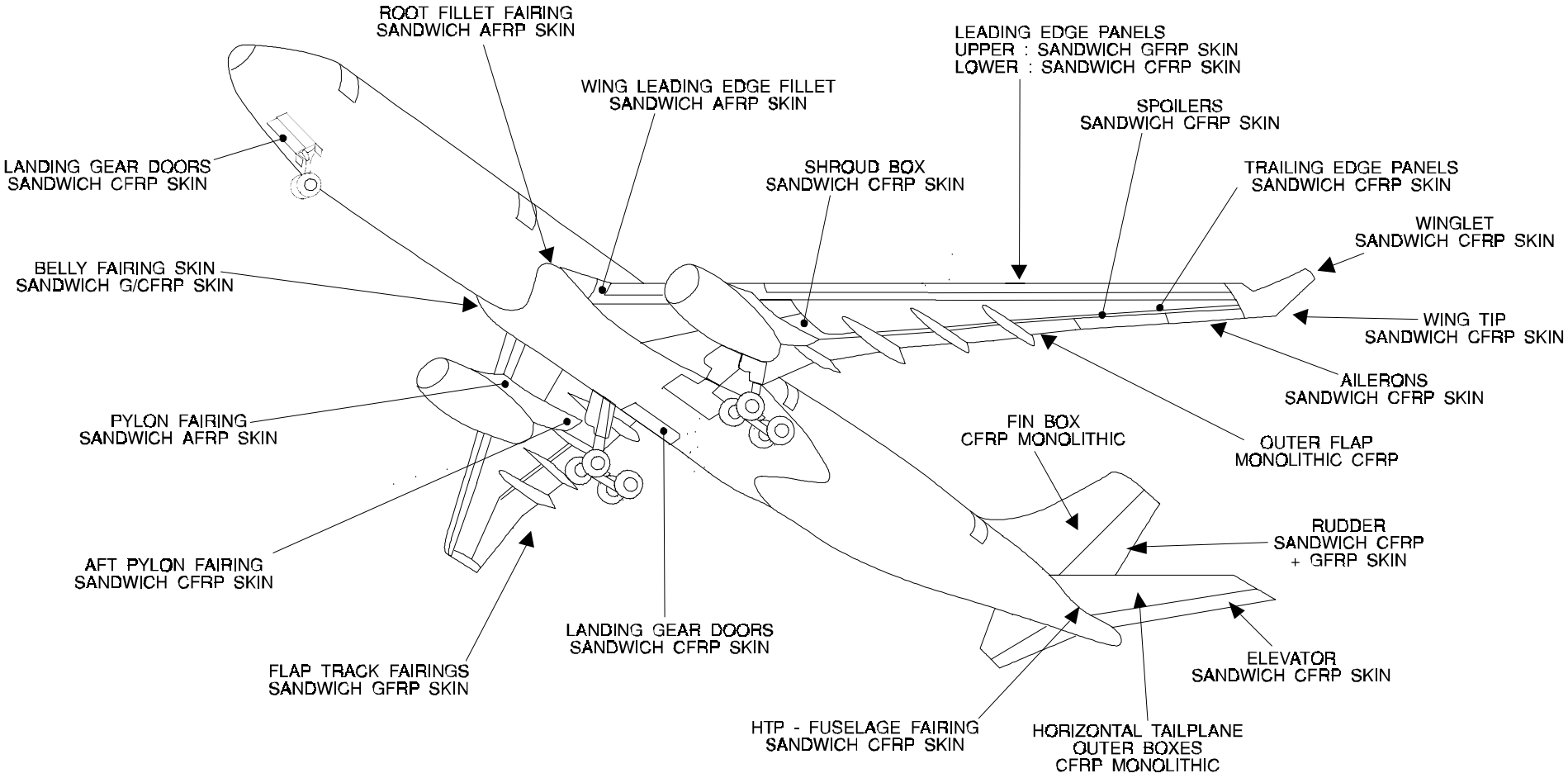
COMPOSITE MATERIALS

Composite materials are extensively used in the aircraft structure.

Carbon Fiber Reinforced Plastic (CFRP) is mainly used for primary structures (stabilizers, outer flap, spoilers/airbrakes...).
Glass and Aramid Fiber Reinforced Plastic (GFRP and AFRP or Kevlar) are used for secondary structures.



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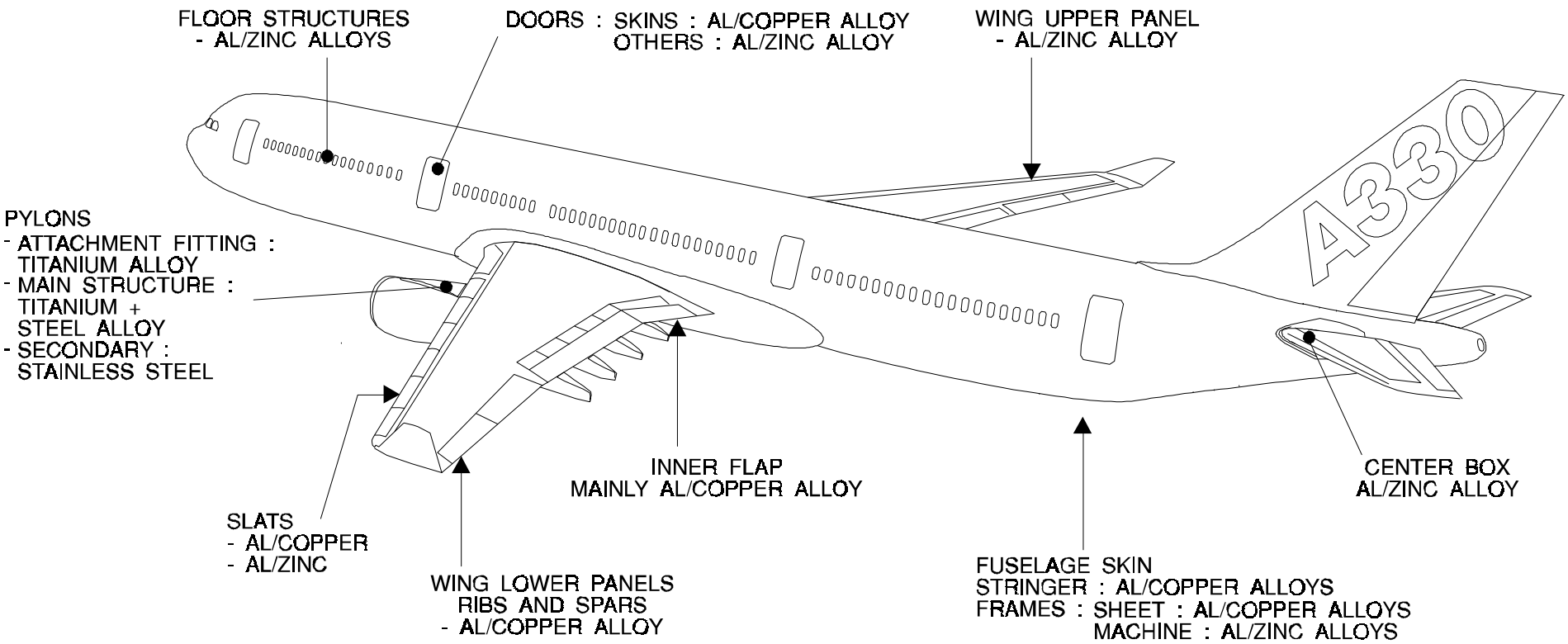
METALLIC MATERIALS

The aircraft basic structure is made from aluminium alloys with titanium, steel and stainless steel alloys in specific areas.



AL/COPPER ALLOY : 2024
AL/ZINC ALLOYS : 7075, 7175, 7475, 7010, ...

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SURFACE PRETREATMENTS

The basic protection of the aircraft structure against corrosion is achieved by means of appropriate surface pretreatment of the metallic parts.

Composites :

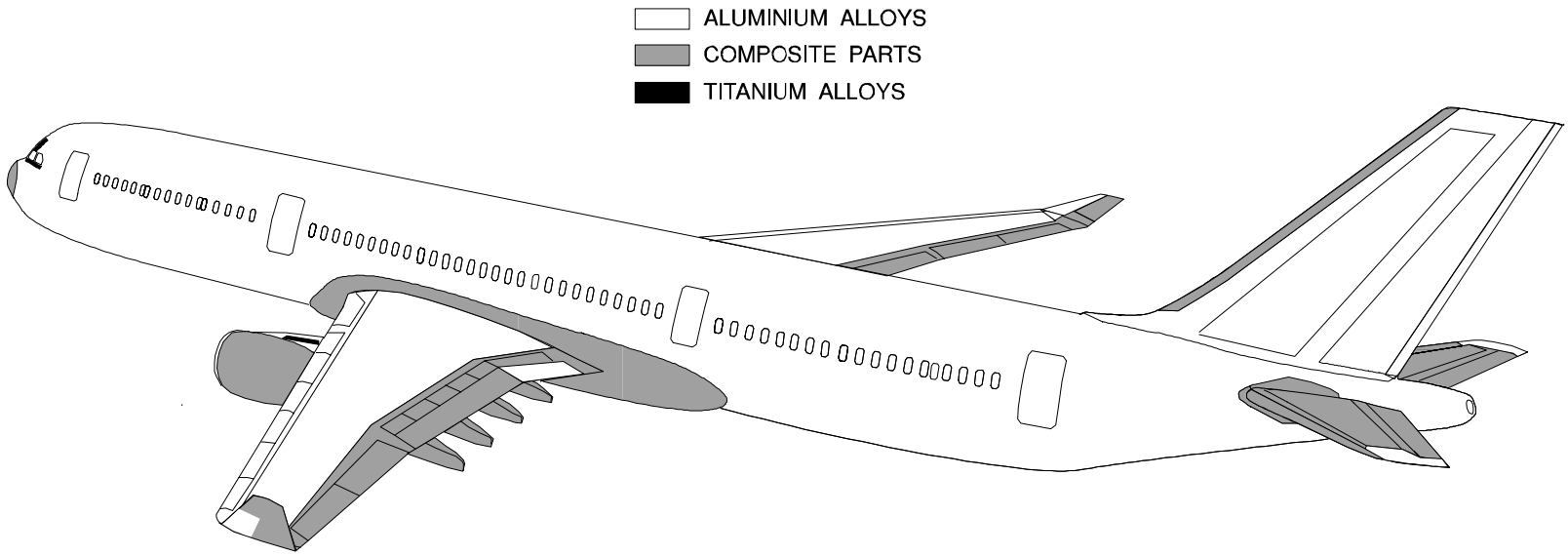
Composite surfaces are left bare.

Aluminium Alloys :

The primary protection is generally a pure aluminium cladding. The main pretreatment used is Chromic Acid Anodizing (CAA).

Titanium Alloys :

Surfaces interfaying with Aluminium alloy parts are zinc sprayed, the others are left bare.



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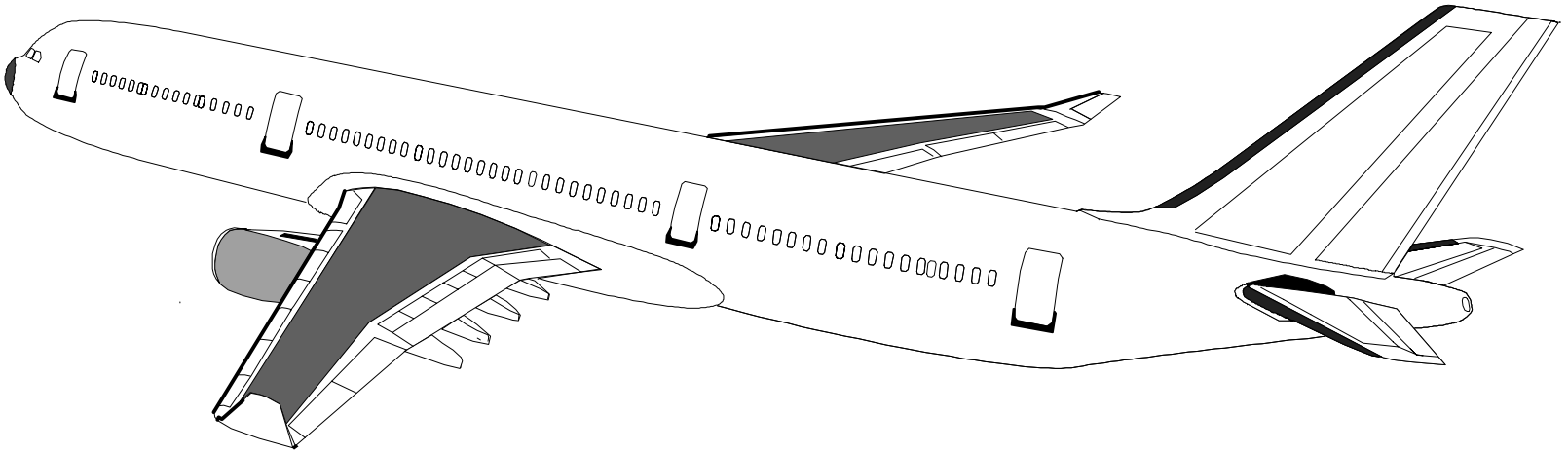
FINAL PAINT SYSTEM

Before final paint coating application, all the aluminium alloy parts are primed.

The paint system generally includes wash primer, polyurethane primer and external polyurethane topcoat.
Additional special coatings such as anti-erosion, anti-static, anti-slip paints, etc... are used in those specific areas.



PU TOP COAT (PU : POLYURETHANE)
WASH-PRIMER + PRIMER + PU TOP COAT
WASH-PRIMER + PRIMER + ELASTOMERIC PAINT
UNPAINTED AREAS
ANTI-EROSION PAINT SYSTEM
PRIMER + PU TOP COAT

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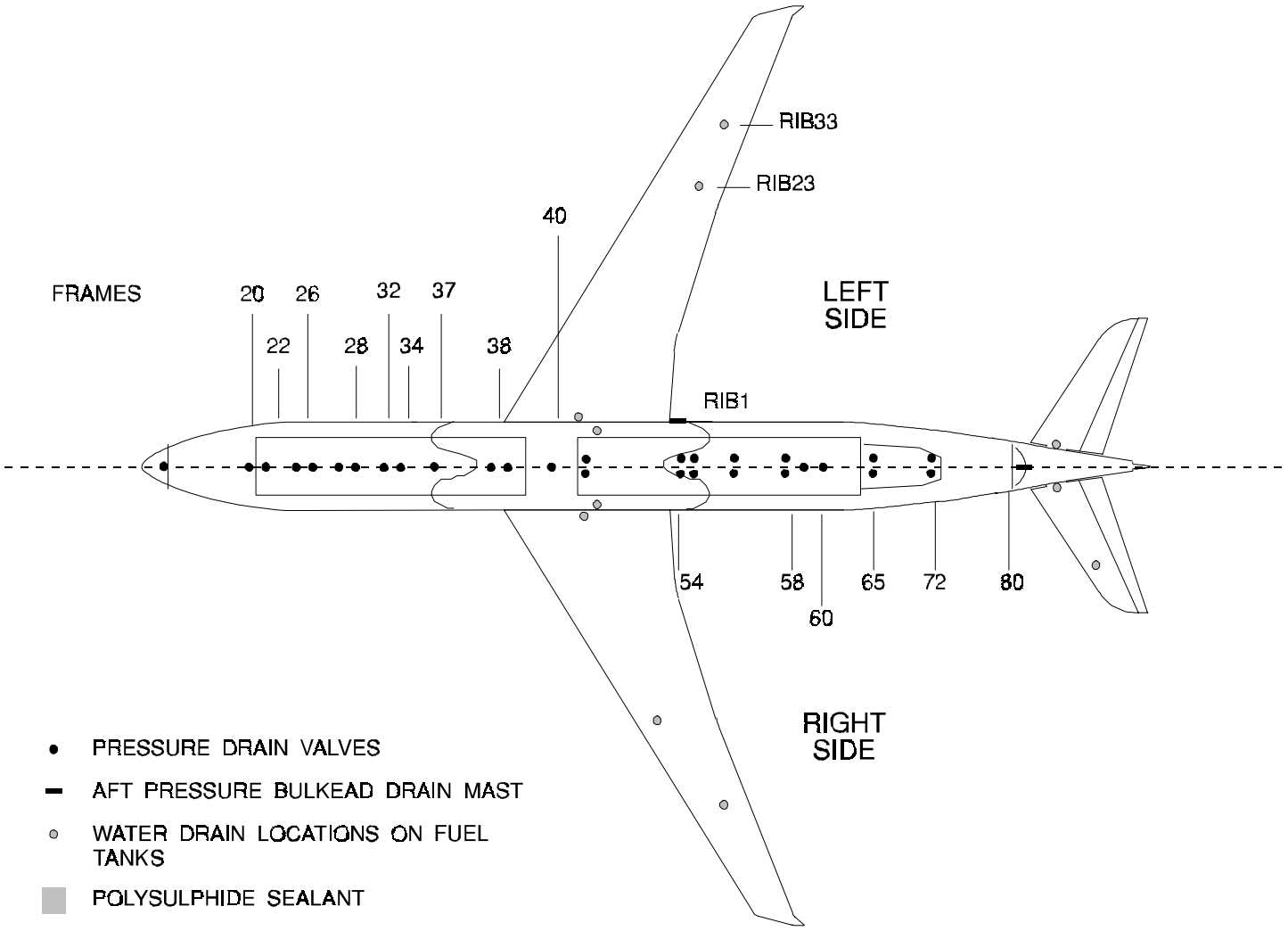
AIRCRAFT DRAINAGE

Corrosion protection of the aircraft structure is achieved by an adequate drainage in order to avoid any fluid accumulation in some critical areas.

Throughout the structure, holes and gaps of adequate size are provided to ensure natural drainage to collection points.
In the fuselage bilge areas any liquid collected is drained overboard through automatic pressure drain valves.
Each tank is fitted with remote control water drains.



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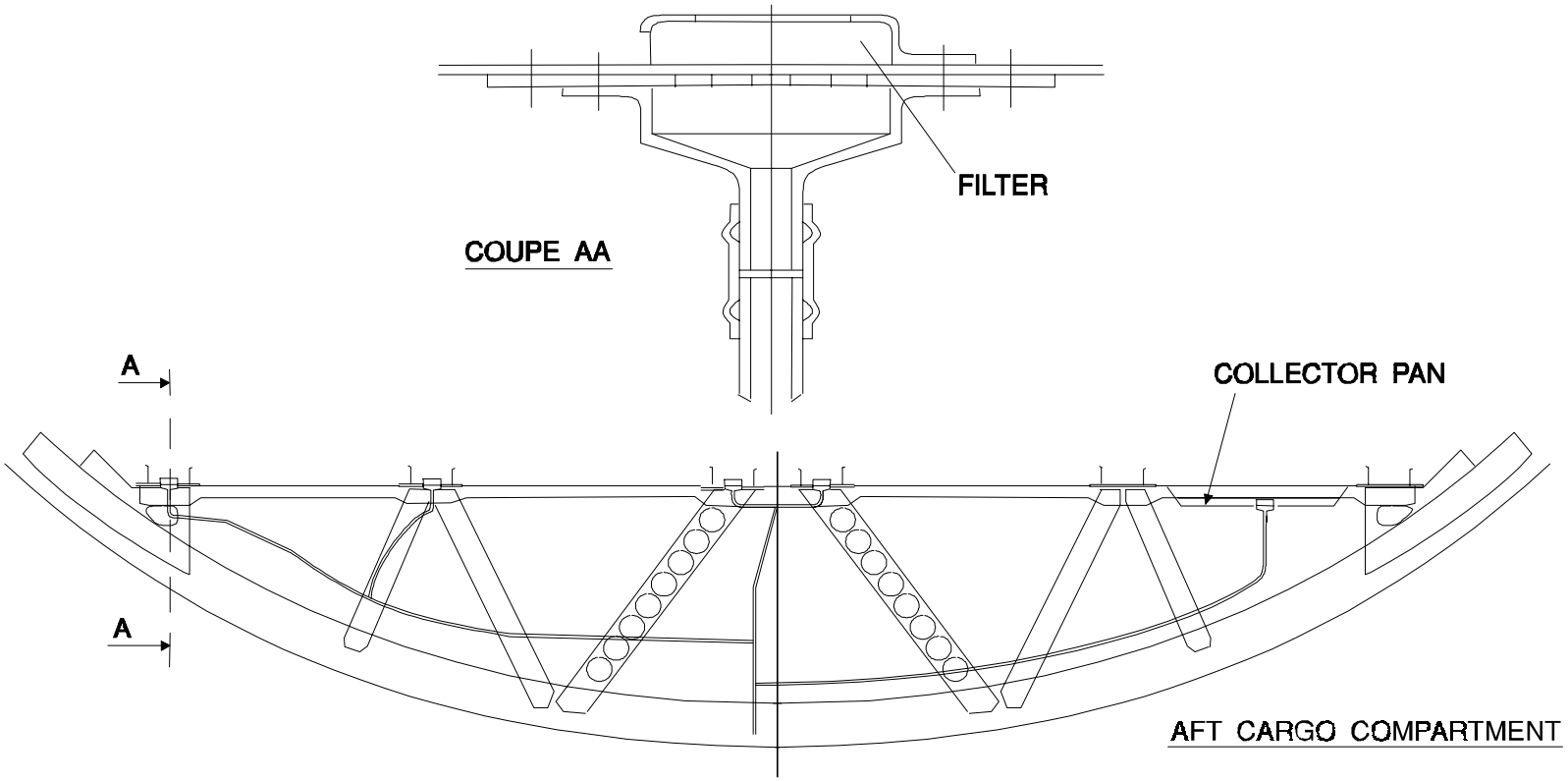
AIRCRAFT DRAINAGE

Cargo compartment fore and aft frames are sealed under the cargo floor to prevent liquids from entering adjacent areas, and insulation blankets are kept away from the skin so that they do not impede drainage.

The cargo compartment drainage system incorporates drains with filters fitted at roller tracks forward and aft ends combined with drain sumps located between the two center roller tracks. The whole system is connected via plastic tubes to the bilge area.



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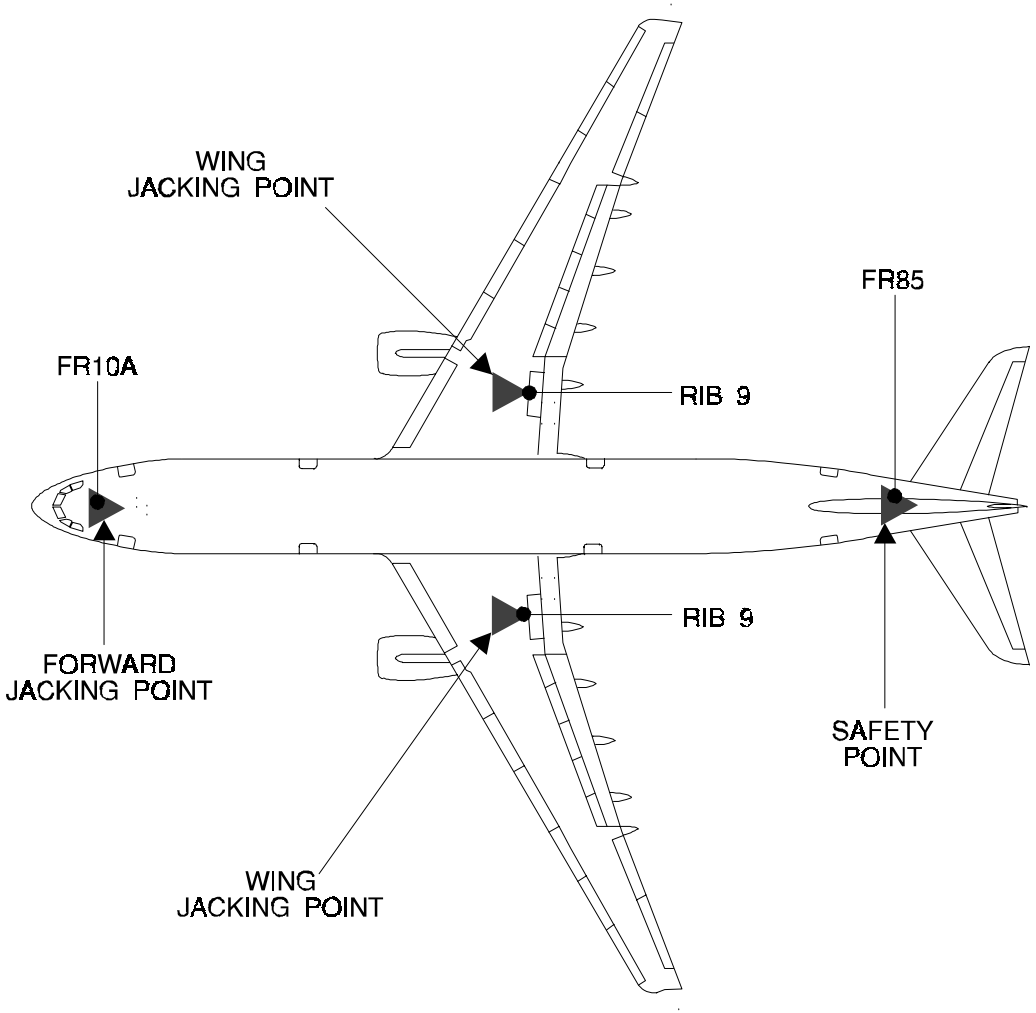
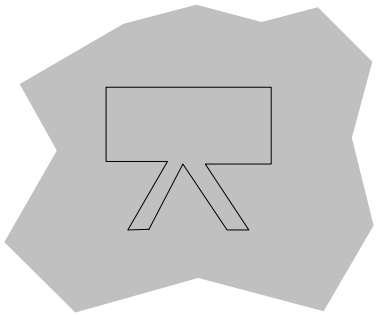
JACKING POINTS

Four jacking points are provided, one below each wing, one in front of the nose landing gear bay and one safety point under the rear fuselage cone.



JACKING POINT SYMBOL



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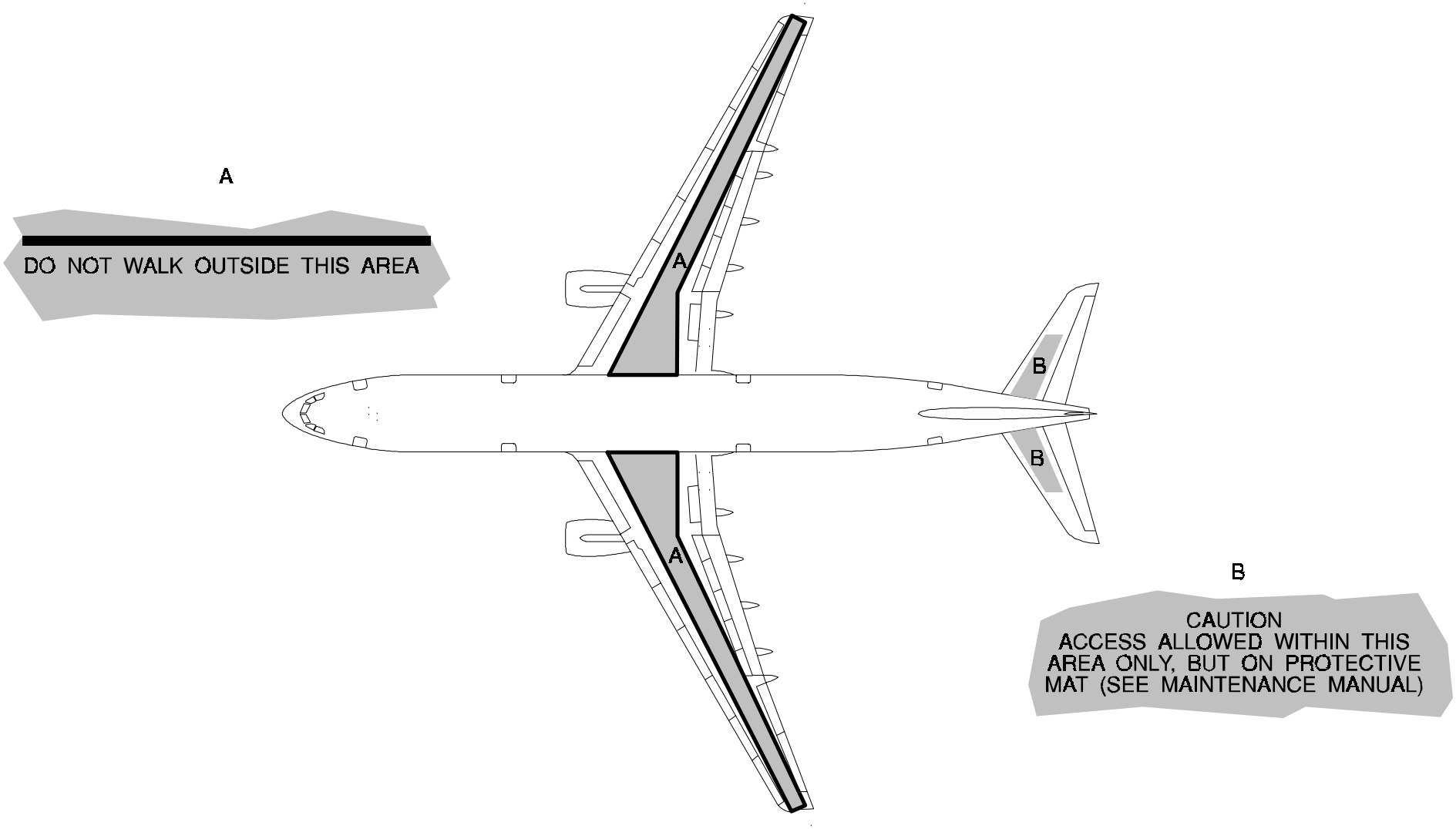
STEP AREAS

Step areas are presented in this view.



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STUDENT NOTES

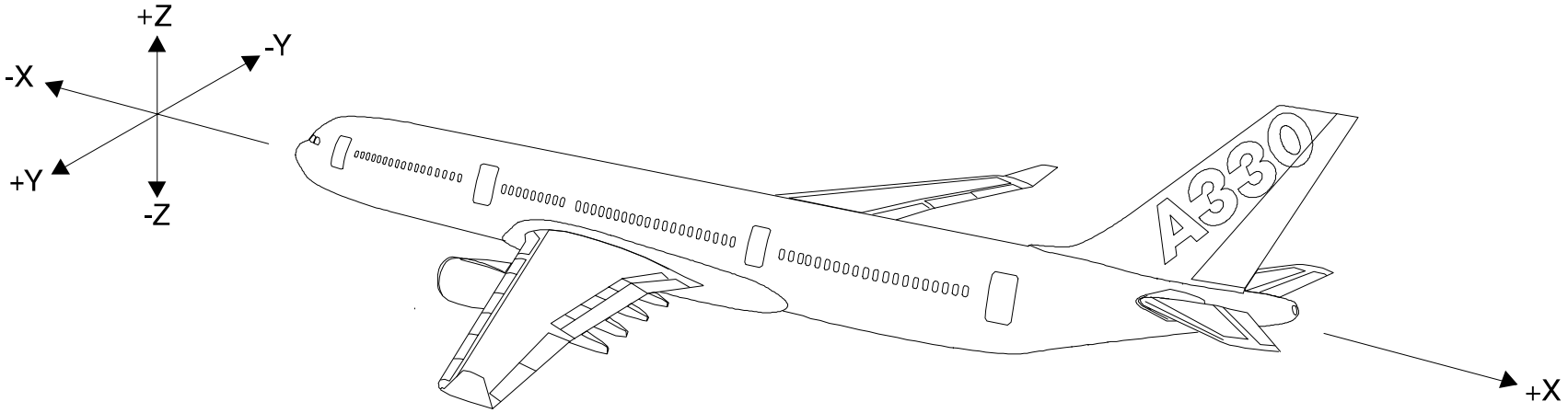
AIRCRAFT STRUCTURE BREAKDOWN AND ZONING

Reference Axes
ATA Chapters
Section Numbers
Station Numbers
Zoning Presentation
Zone Numbers

REFERENCE AXES

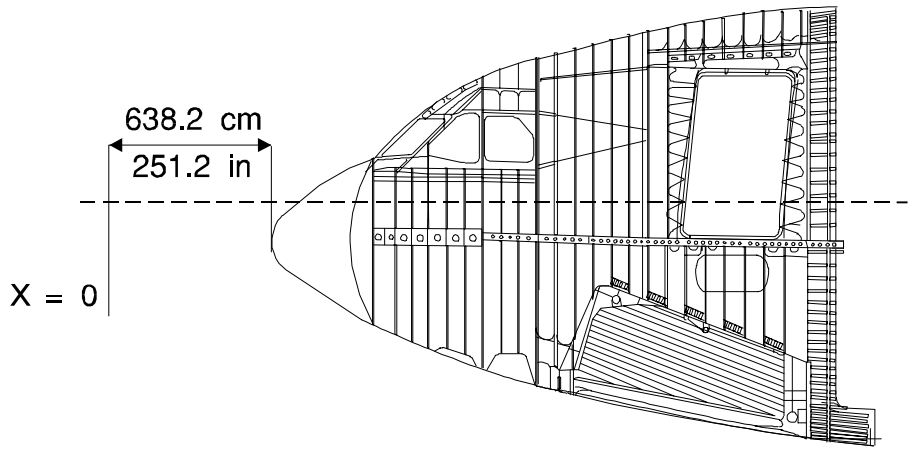
The structure elements are located according to the following reference axes. The reference (station 0) for all structural measurements in the X axis is located 251.2 in. (638.2 cm) forward of the aircraft nose.

These are the major aircraft reference axes.



X = DISTANCE FROM STA "0"
Y = LATERAL DIST. FROM "AD"
Z = VERTICAL DIST. FROM "FD"

AD = AIRCRAFT DATUM
FD = FUSELAGE DATUM



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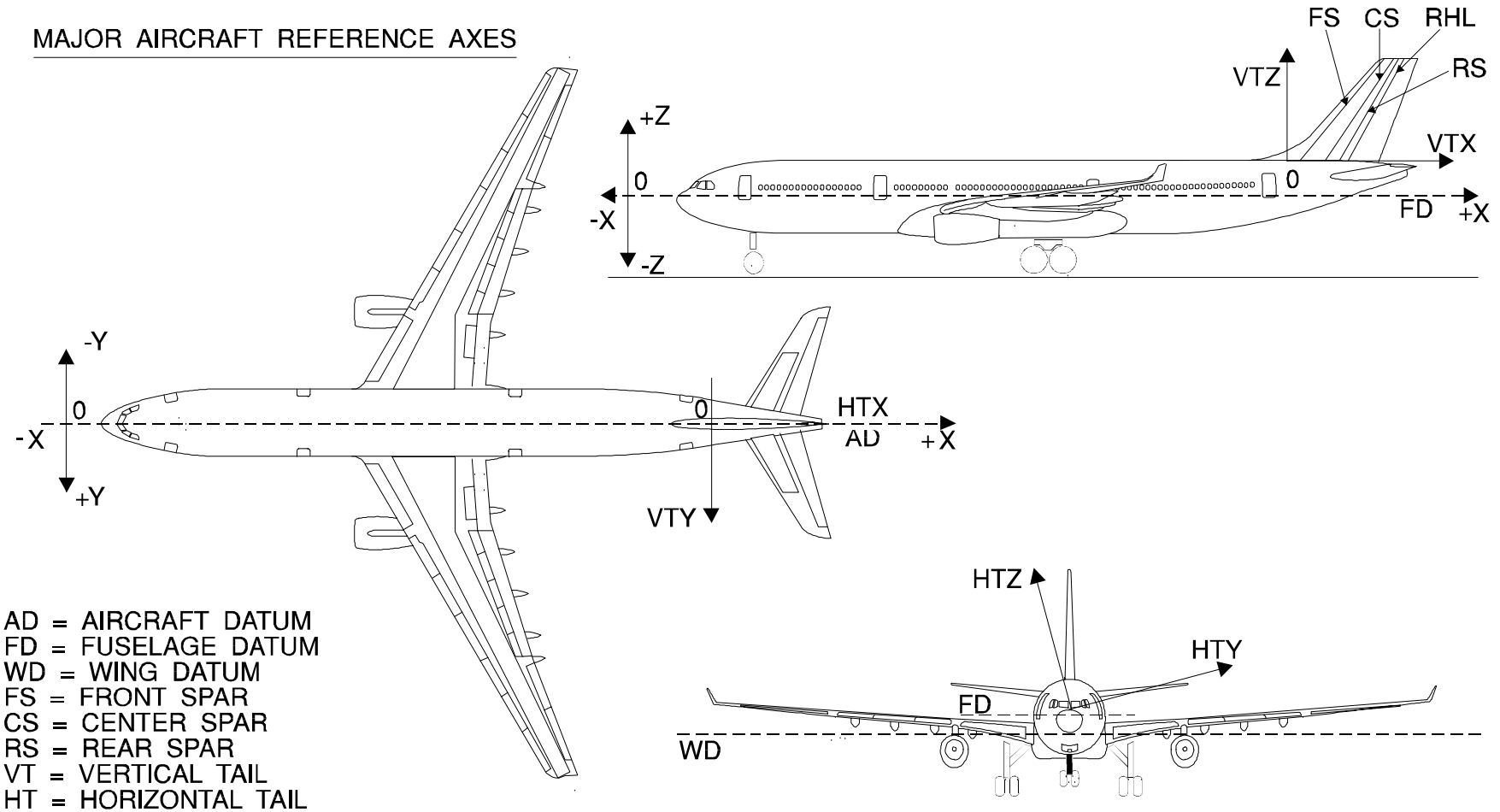
MAJOR AIRCRAFT REFERENCE AXES



AD = AIRCRAFT DATUM
FD = FUSELAGE DATUM
WD = WING DATUM
FS = FRONT SPAR
CS = CENTER SPAR
RS = REAR SPAR
VT = VERTICAL TAIL
HT = HORIZONTAL TAIL
RHL = RUDDER HINGE LINE

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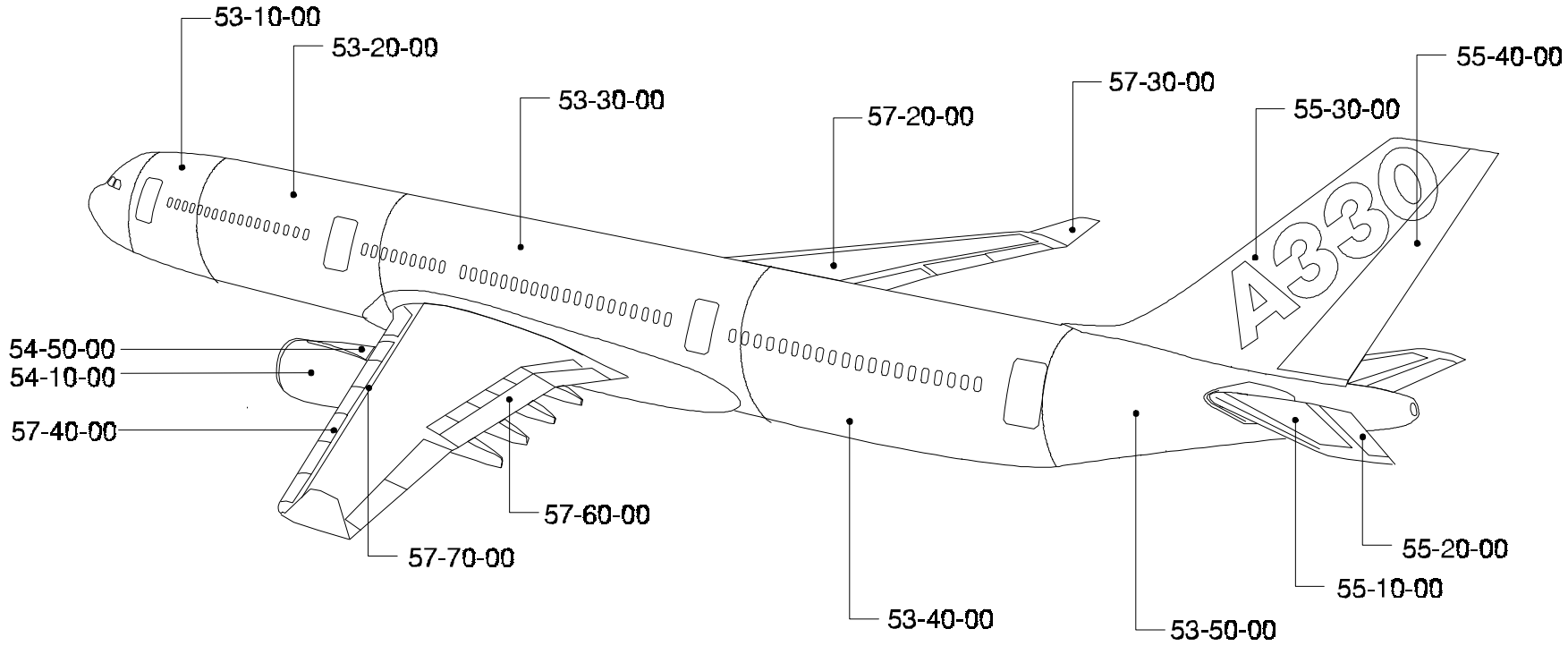
STUDENT NOTES

ATA CHAPTERS

The aircraft structure is divided according to the ATA 100 specifications.

51-00-00 : Structures - General
52-00-00 : Doors - General
53-00-00 : Fuselage - General
54-00-00 : Nacelles/pylons - General
55-00-00 : Stabilizers - General
56-00-00 : Windows - General
57-00-00 : Wings - General



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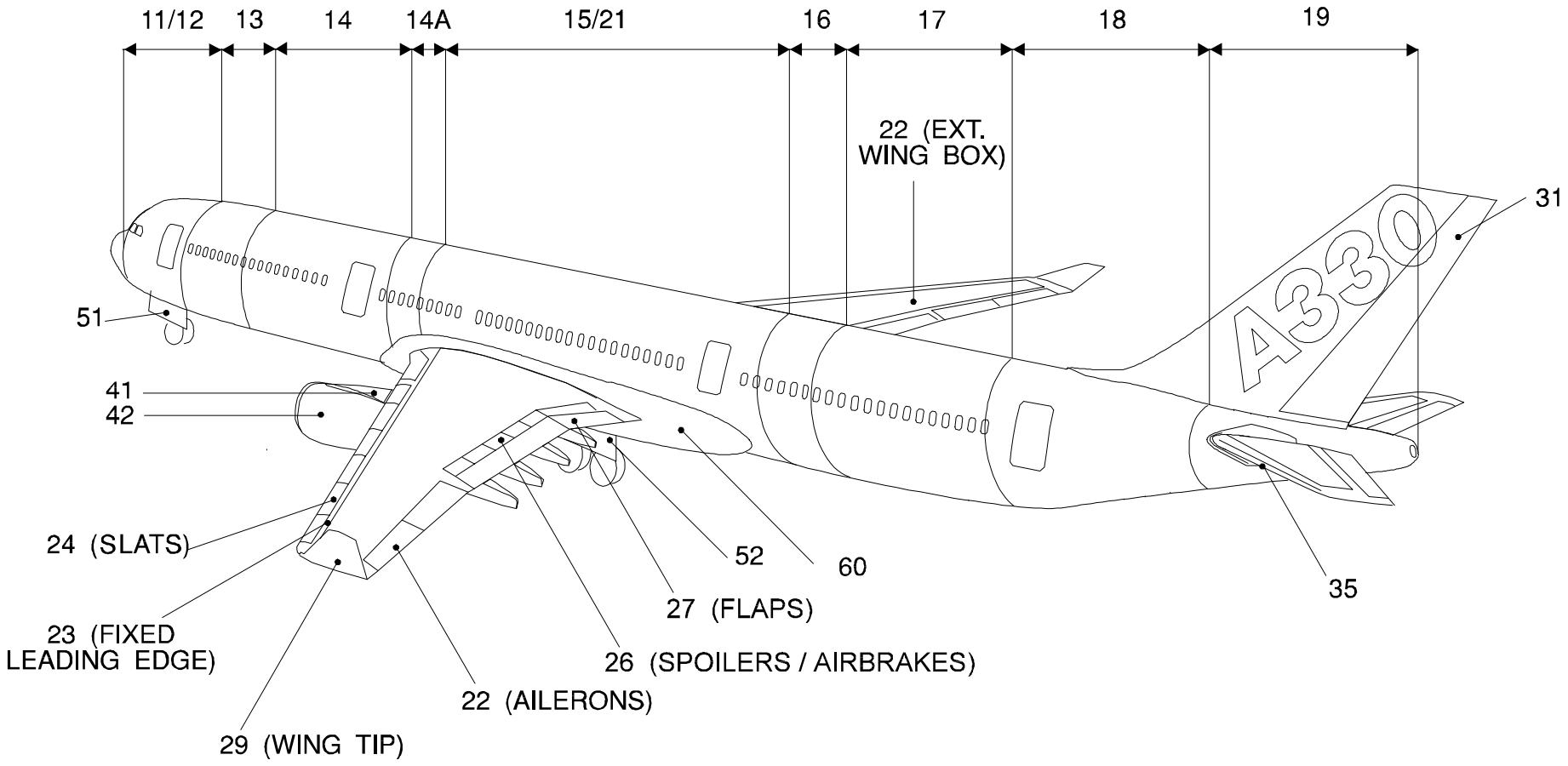
SECTION NUMBERS

Each major part of the aircraft, corresponding to the production sharing, receives a section number.

The fuselage is divided into various sections for manufacturing reasons.

- Fuselage section number : 10 thru 19
- Wing section number : 20
- Vertical stabilizer number : 31
- Horizontal stabilizer section number : 35
- Engine section number : 40
- Landing gear section number : 50
- Belly fairing section number : 60



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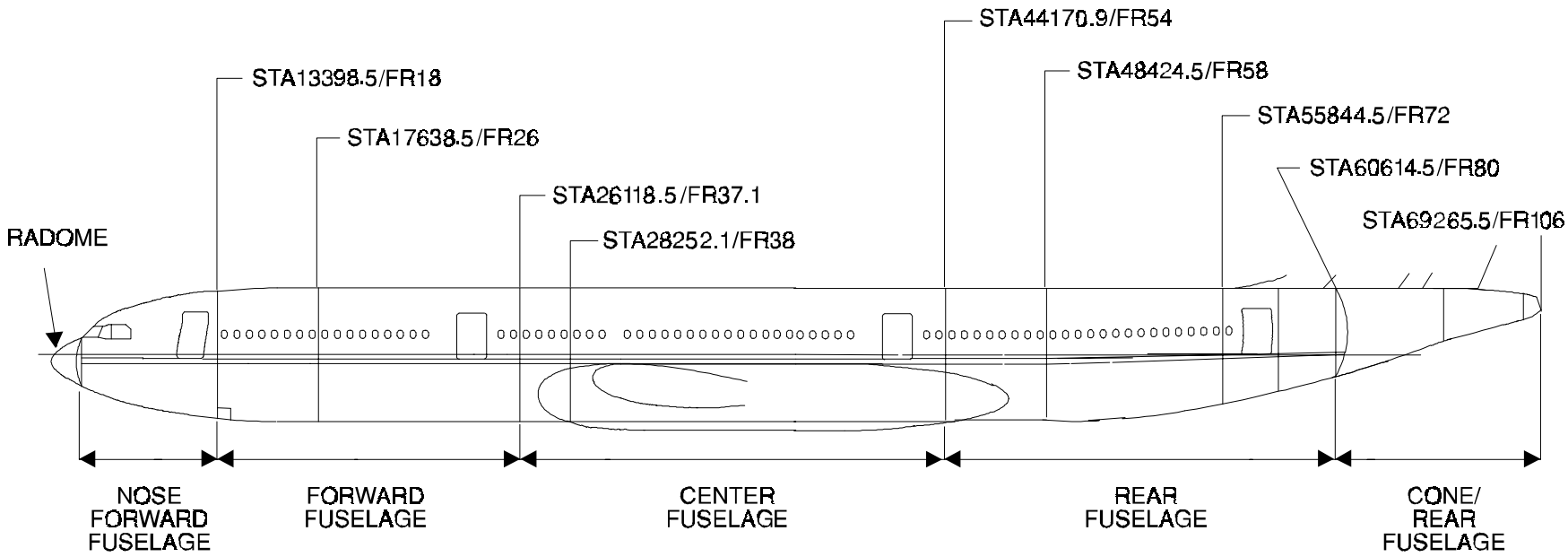
STATION NUMBERS

The station number is the distance in millimeters of a cross section from a reference point.

Here are presented the fuselage station numbers which correspond to the section boundaries.

The engine, vertical stabilizer, horizontal stabilizer, and wing station numbers are shown too.

For the vertical stabilizer the reference station is z=0 at the aircraft VTZ axis and for the horizontal stabilizer it is y=0 at the aircraft Y axis.
For the wing the reference station is the wing reference axis (WY).
WY is located at 2793.2 mm from the A/C X axis.



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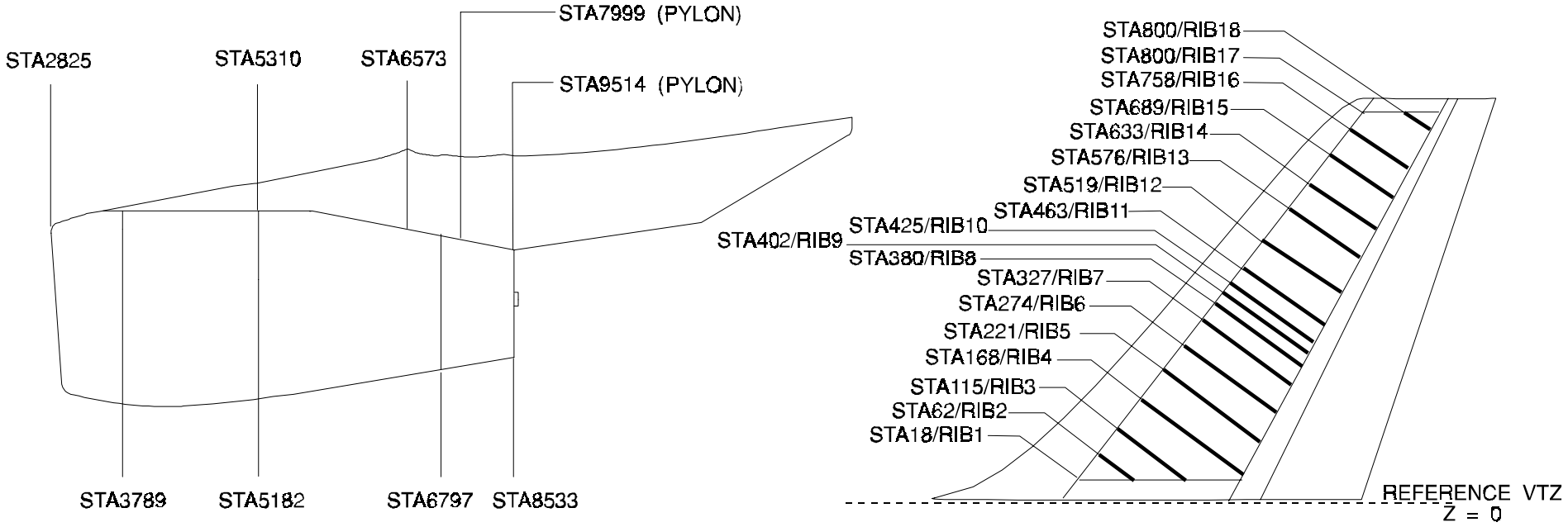

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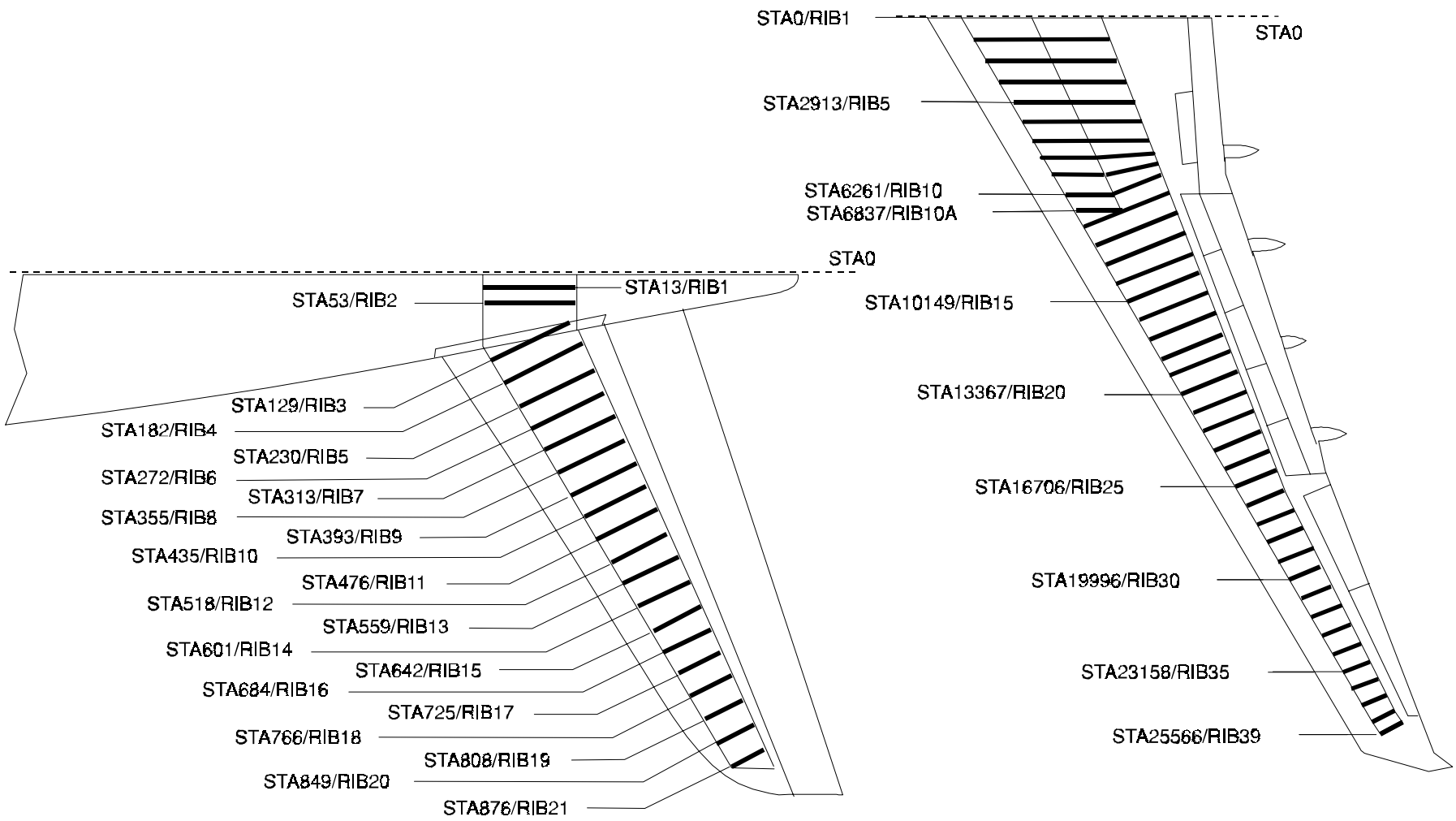

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ZONING PRESENTATION

The aircraft is divided into zones in order to facilitate maintenance and component location.

Each area is identified by major zones (hundreds), sub zones (tens) and zones (units).

The aircraft is divided into 8 major zones :

- 100 : Lower Fuselage
- 200 : Upper Fuselage
- 300 : Stabilizers
- 400 : Nacelles/Pylons
- 500 : Left Wing
- 600 : Right Wing
- 700 : Landing Gear
- 800 : Doors

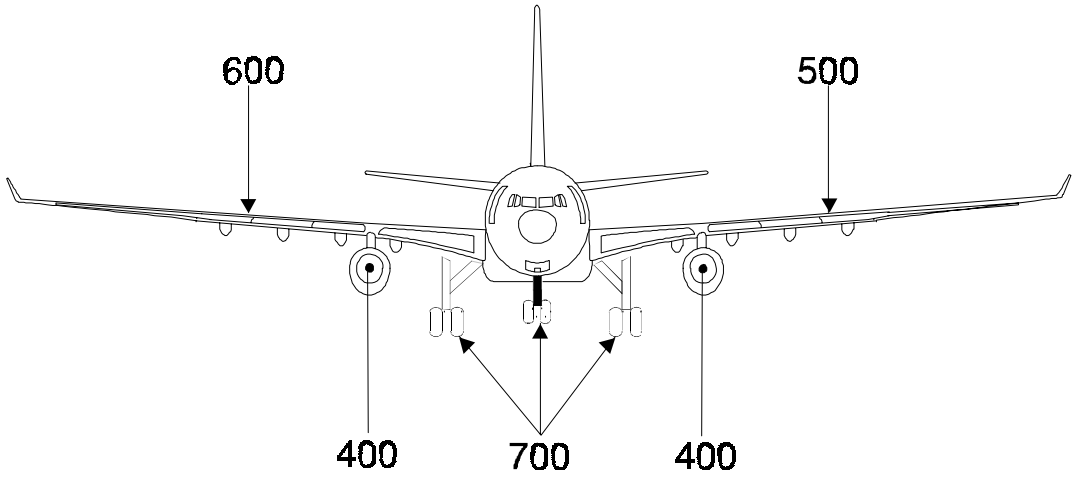
Each major zone is divided into sub zones.
Here are shown the engines and pylons as an example.

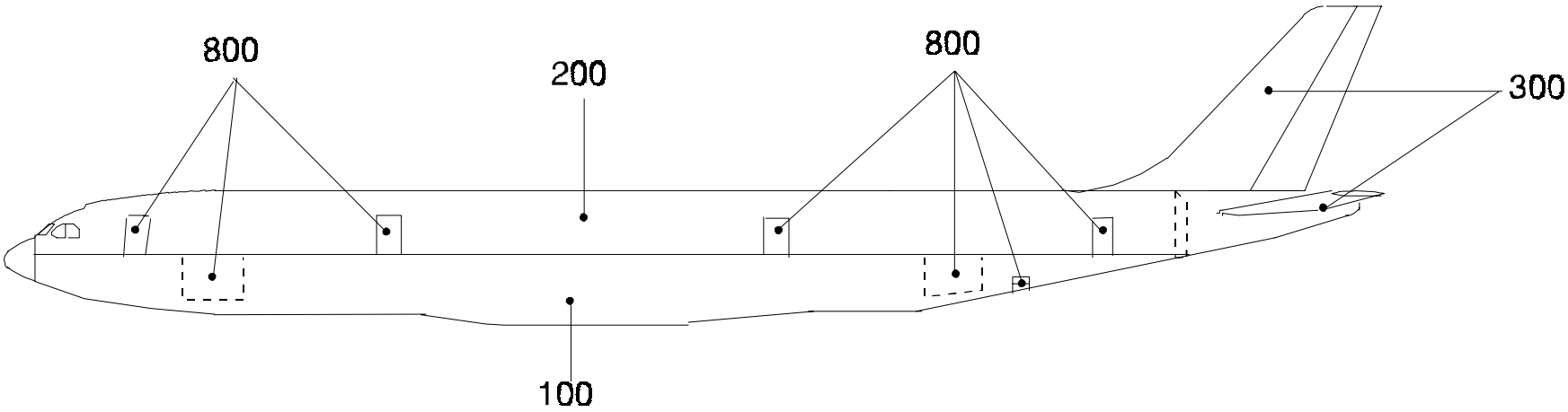
400 identifies the engine major zones :

- 410 : engine 1
- 420 : enfine 2
- 450 : pylon 1
- 460 : pylon 2

Each sub zone is divided into zones.
Here are shown the engines and the pylons as an example.

When two numbers are at the same place, one is for the left hand side and the other for the right hand side.





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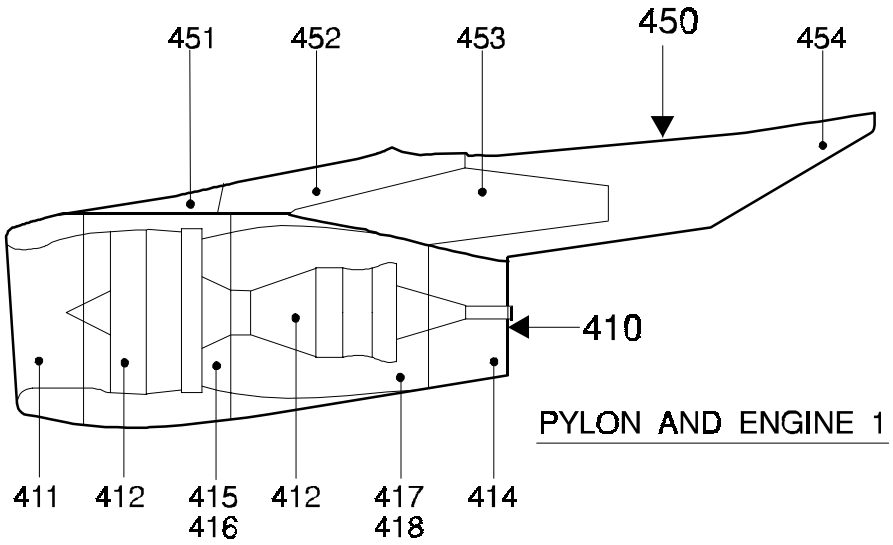
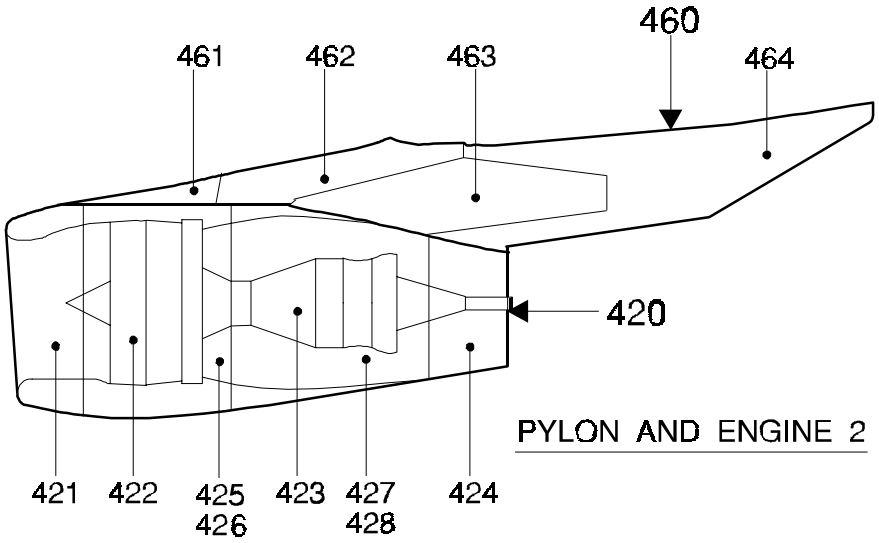


PYLON AND ENGINE 1



PYLON AND ENGINE 2

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STUDENT NOTES

ZONE NUMBERS

These are the fuselage and vertical stabilizer zone numbers.

The belly fairing zone numbers are presented here.

The landing gear is divided into these zone numbers.

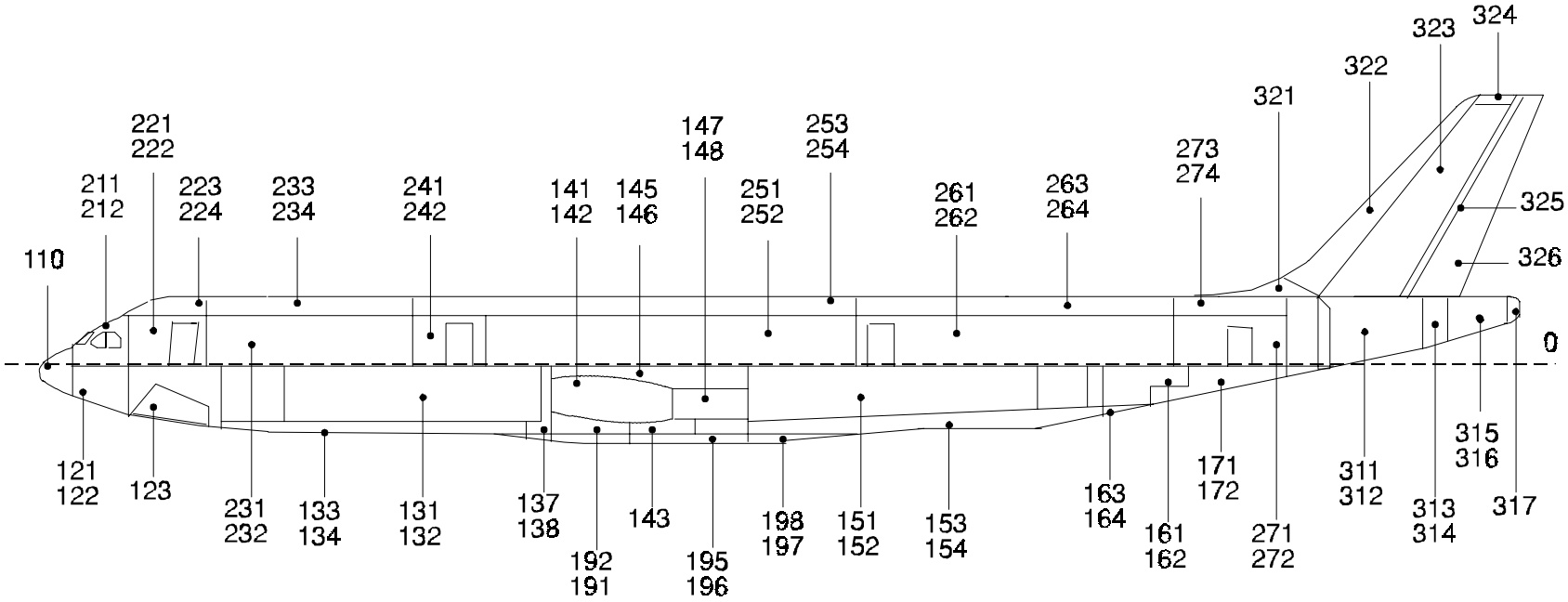
These are the wing and horizontal stabilizer zone numbers.

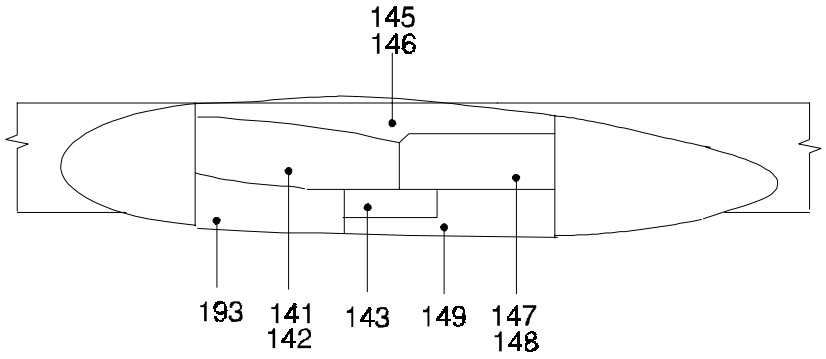
The door zone numbers are shown here.

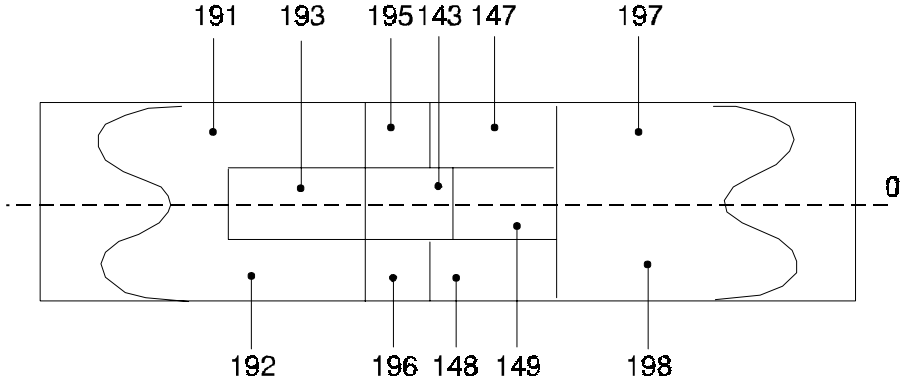
Access doors and panels are identfied by the number of the zone in which the panel is located followed by a two-letter suffix which locates it within the zone.

Access door and panel identification.
The first letter indicates which access door or panel it is, starting from the reference axis (A = first, B = second..... G = seventh...ect.).
The second letter indicates the access door or panel location :

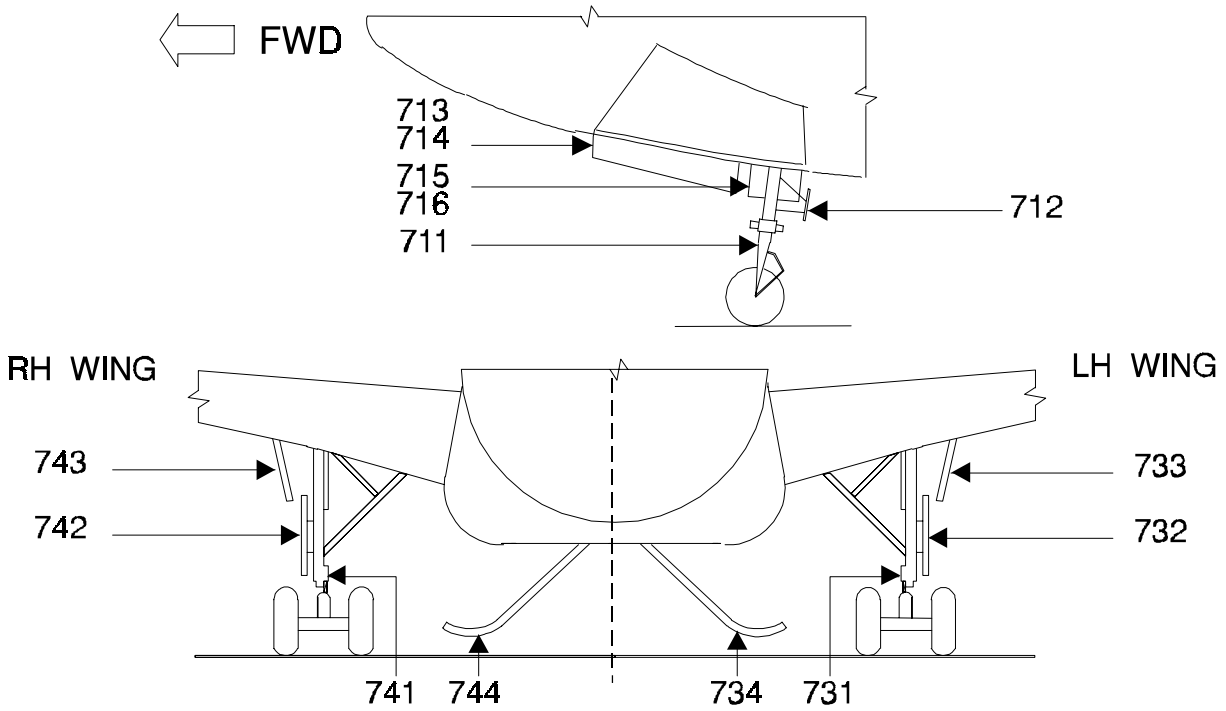
T = Top (upper) surface
B = Bottom (lower) surface
L = Left hand side
R = Right hand side
Z = Internal
F = Floor panel
W = Sidewall panel
C = Ceiling panel



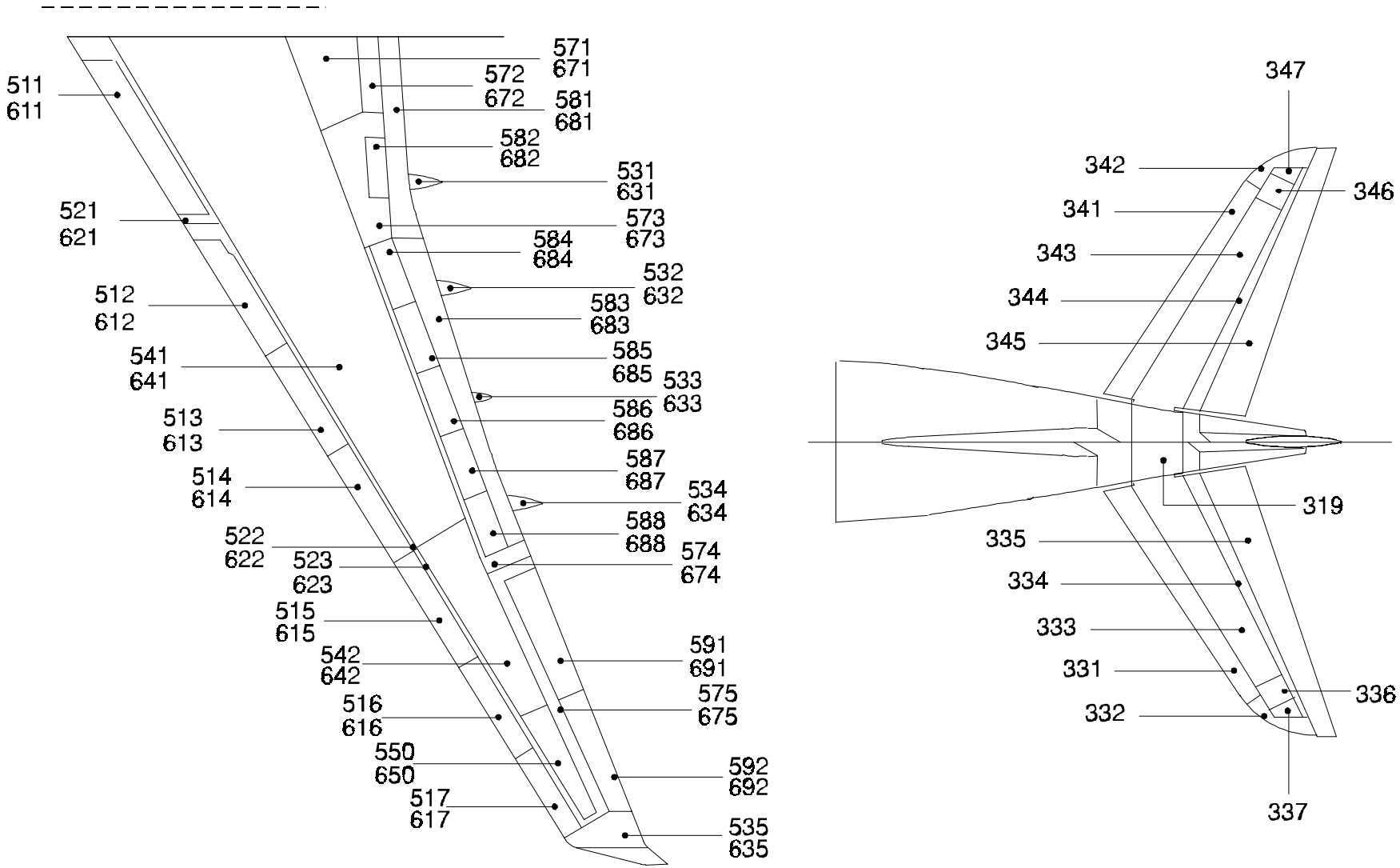




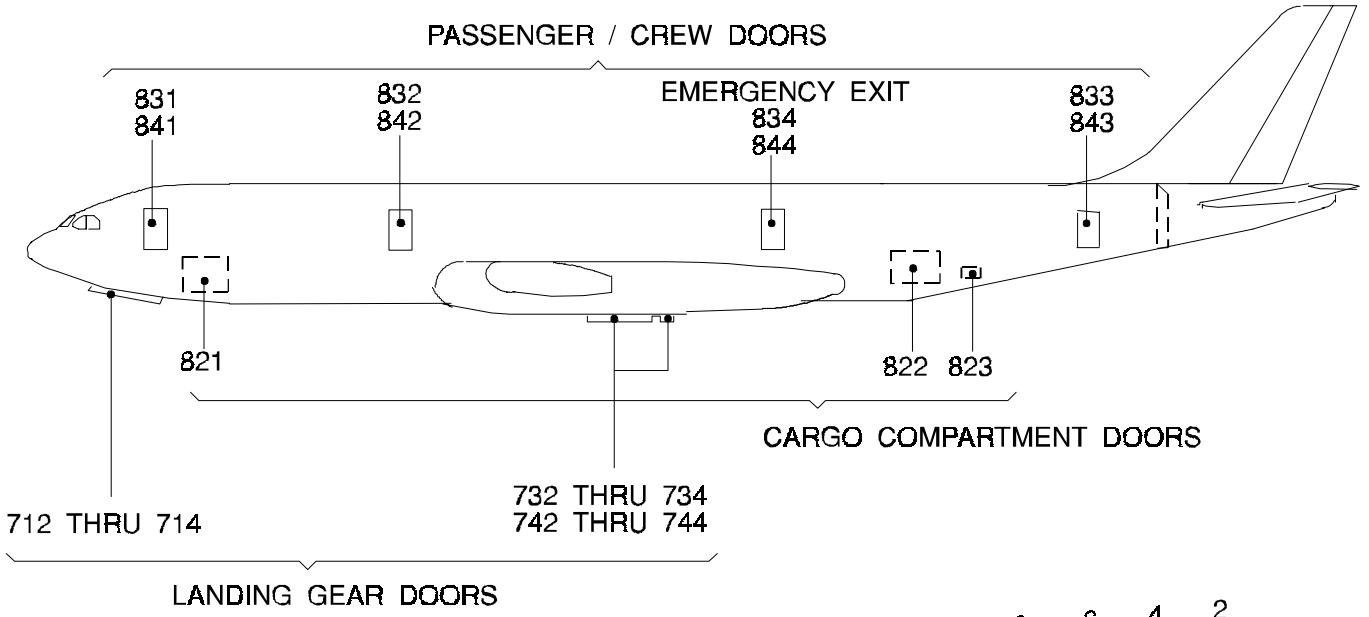
FQW4200 GE Metric

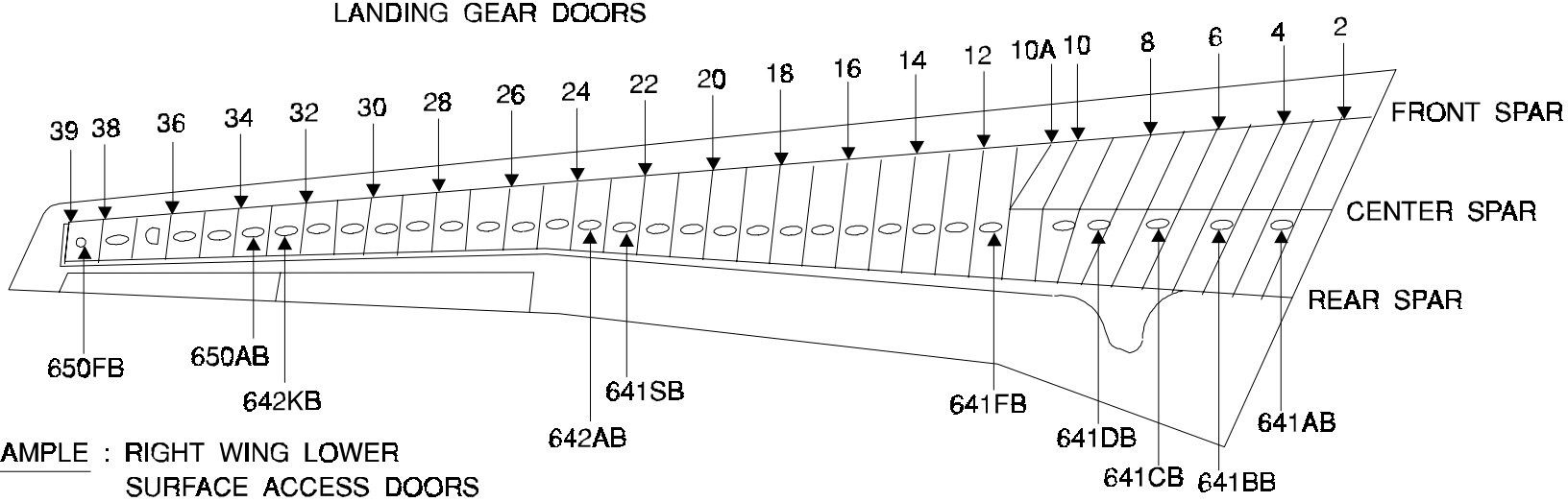


FQW4200 GE Metric



FQW4200 GE Metric





EXAMPLE : RIGHT WING LOWER SURFACE ACCESS DOORS

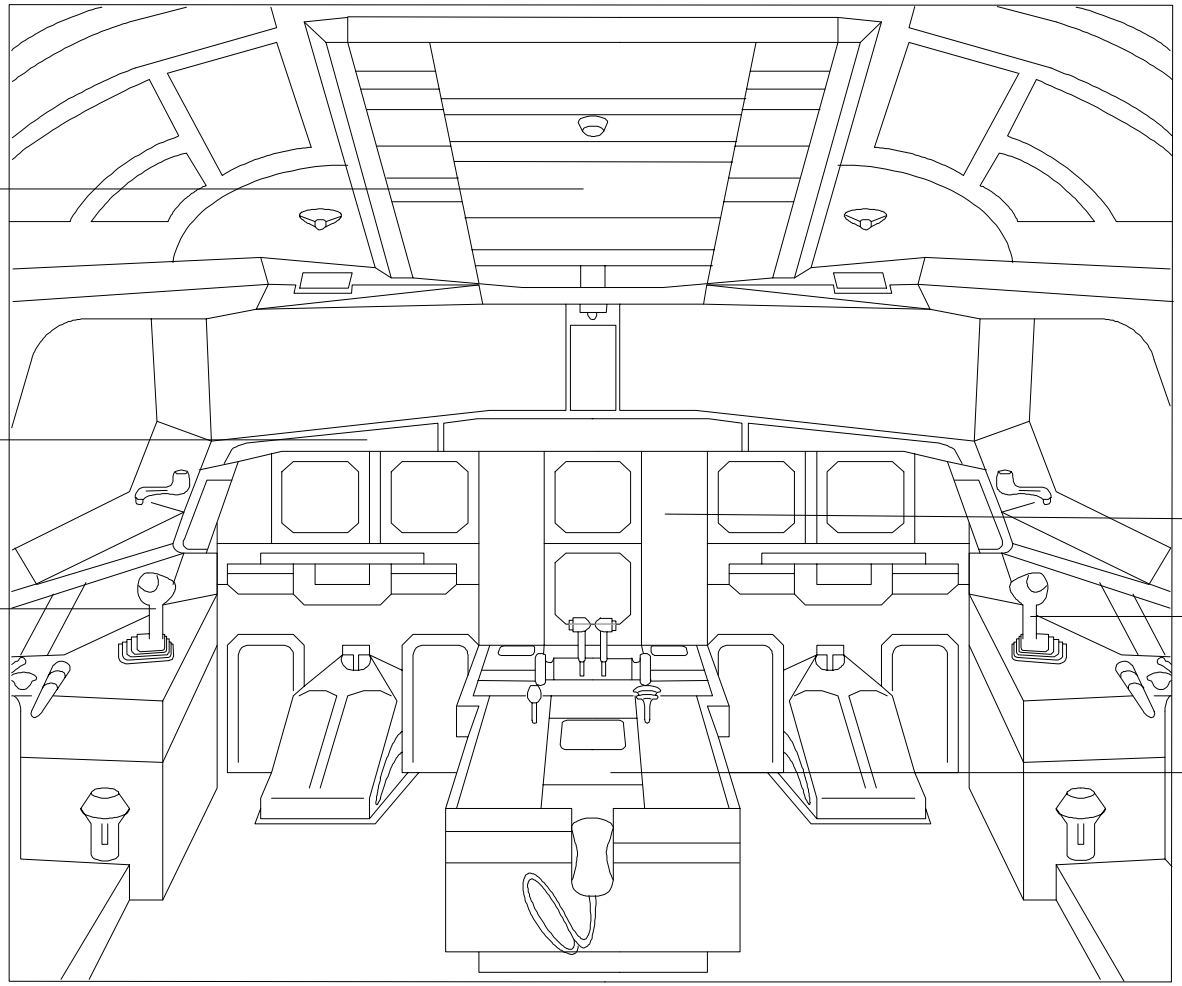
FQW4200 GE Metric

COCKPIT PANELS

General
Overhead Panel
Glareshield
Main Instrument Panel
Pedestal
Vu(s)

GENERAL

The cockpit comprises various panels: Overhead panel, Glareshield, Main instrument panel and Pedestal.
The aircraft is flown by using two side sticks located on the side consoles.



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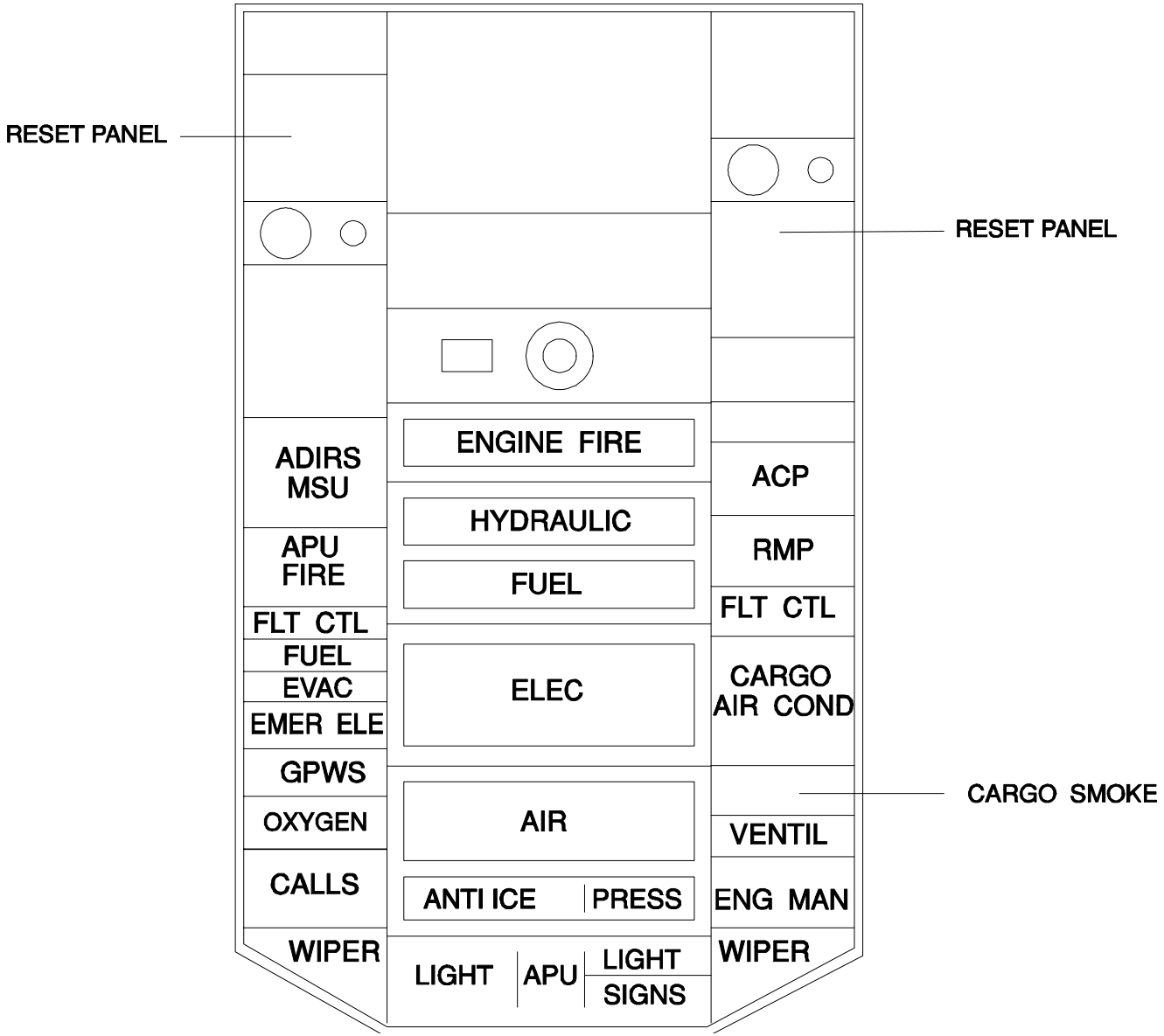
OVERHEAD PANEL

Most of the aircraft system controls are located on the Overhead panel. The main systems are located in the center of the overhead panel and the others on the side with the controls of each system grouped in a single place. There are no longer any circuit breakers in the cockpit. Most of them are located in the avionics compartment. However some computers can be reset from two reset panels.

A maintenance panel is provided for on-ground maintenance operations on some systems (hyd, engines...).

The overhead panel is scanned by using a standardized Airbus pattern.



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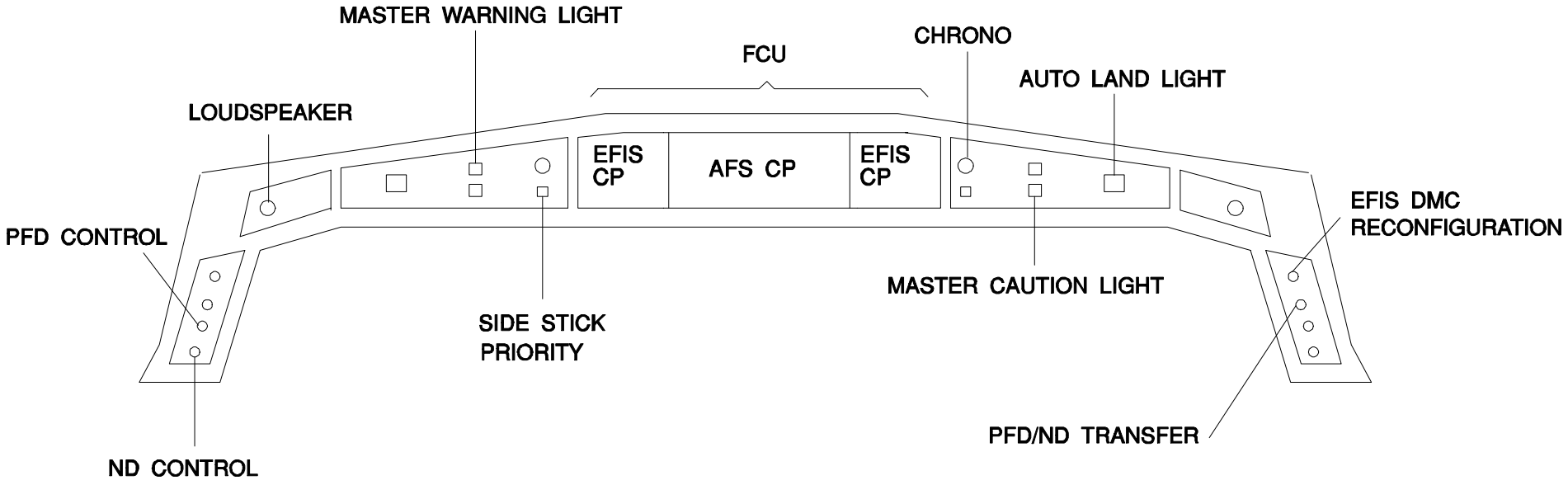
GLARESHIELD

The various rotary selectors and attention getters are located on the glareshield. In the center is the Flight Control Unit (FCU), made up of an Auto Flight System (AFS) Control Panel and two Electronic Flight Instrument System (EFIS) Control Panels.



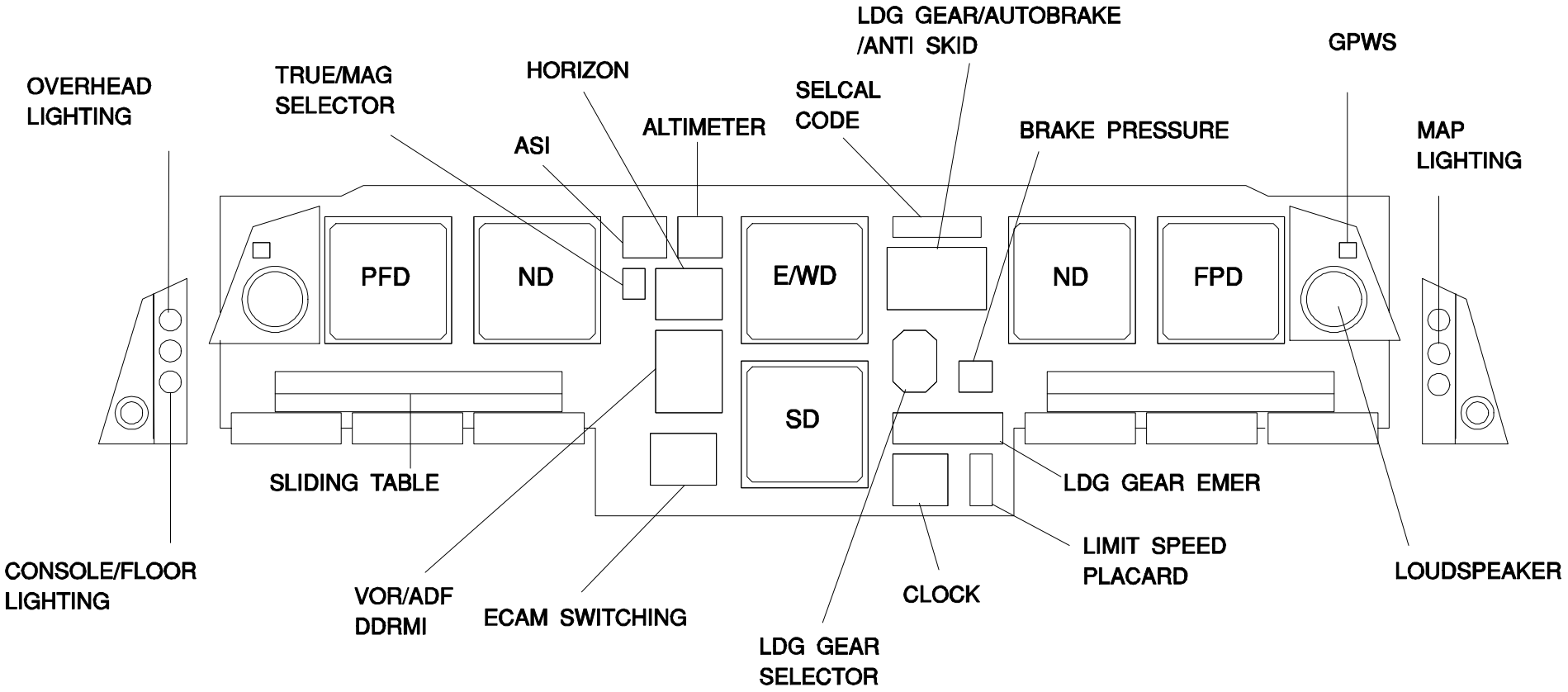
FQW4200 GE Metric

MAIN INSTRUMENT PANEL

6 identical and interchangeable Cathode Ray Tubes are installed on the main instrument panel.

The Cathode Ray Tubes (CRTs) are two Primary Flight Displays (PFDs), two Navigation Displays (NDs), an Engine/Warning Display (E/WD) and a System Display (SD). The main instrument panel is more of a rack with a cover plate than a panel.

Note: the landing gear emergency extension is no longer mechanical but electrical.



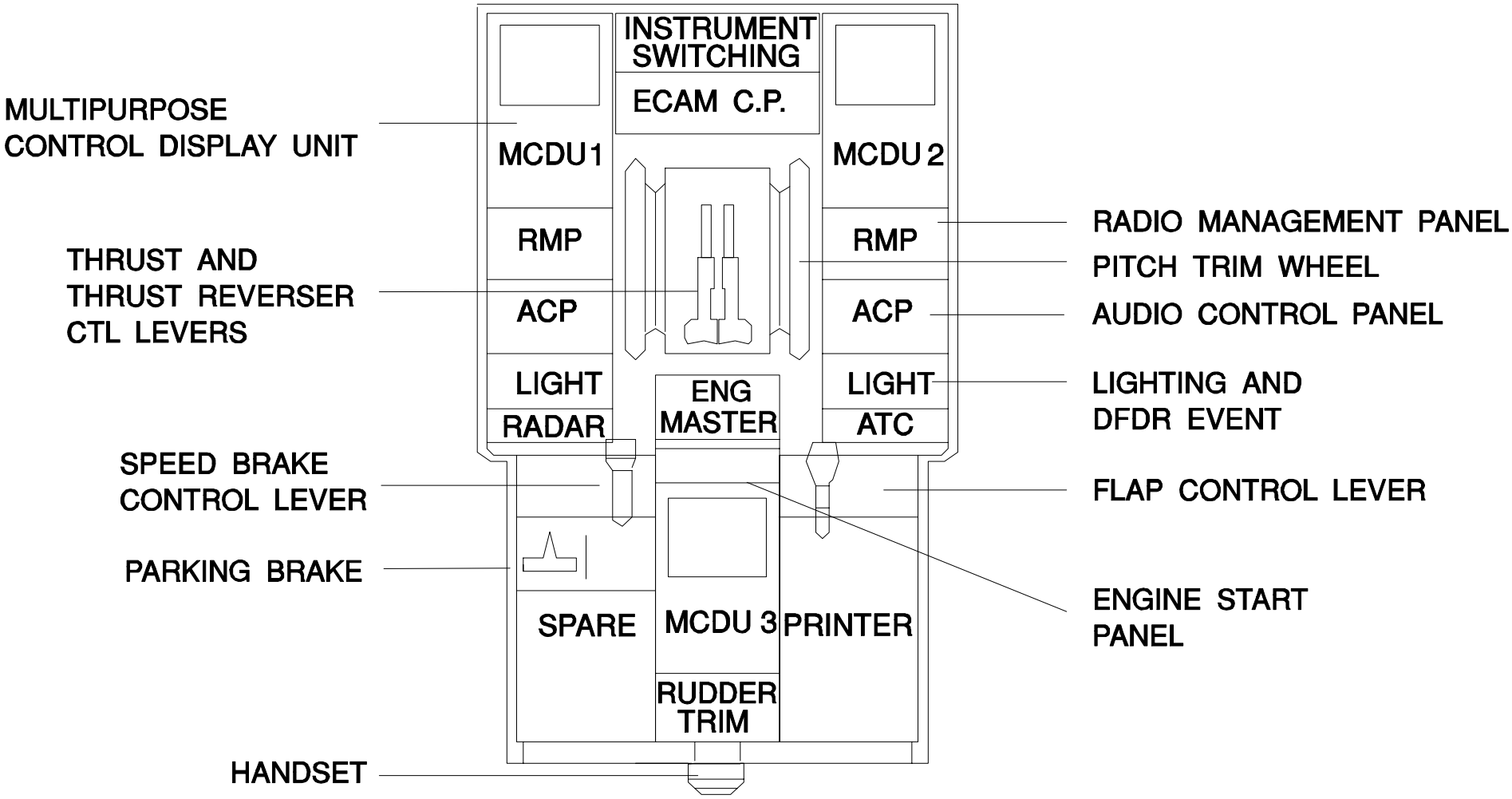
FQW4200 GE Metric

PEDESTAL

Three identical and interchangeable Multipurpose Control and Display Units (MCDUs) are installed on the pedestal. They provide an interface with the FMS, ACARS (if installed), Aircraft Condition Monitoring System (ACMS) if DMU installed and Centralized Maintenance System (CMS).

The parking brake handle, thrust levers, flap control lever and speed brake lever control their respective systems electrically. Each pilot station is provided with a Radio Management Panel (RMP) and an Audio Control Panel (ACP) for communication and back up navigation.

Usually, the two forward MCDUs are for pilot use and the rear one for maintenance use.



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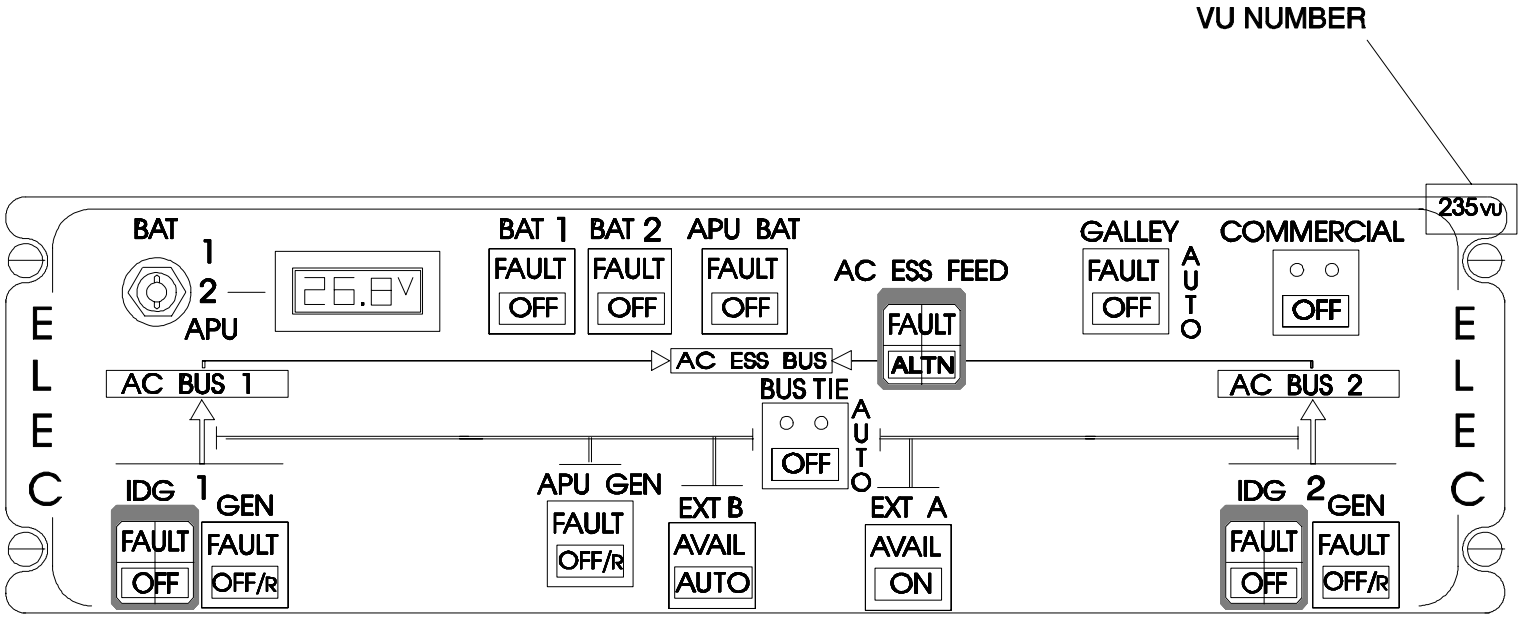
VU(S)

All panels are identified by VU numbers, except those manufactured by vendors.

This panel is presented as an example.



FQW4200 GE Metric

STUDENT NOTES

COCKPIT PHILOSOPHY

Philosophy
Pushbutton Principle
Color Philosophy

PHILOSOPHY

All the aircraft and system controls are arranged to be within easy reach of the two crew members. The concentration of system controls on the overhead panel is achieved by extensive use of illuminated pushbuttons directly installed on the system synoptic panel.

In normal operation, no lights are illuminated in the cockpit. This is called the " lights out philosophy ".

This panel is presented as an example.

PUSHBUTTON PRINCIPLE

Status and failure indications are integrated whenever possible into the relevant illuminated pushbuttons which must be operated for corrective action.
Most of the illuminated pushbuttons have two stable positions: pressed in and released out; each position corresponding to a control signal sent to a system.

Pressed in (Recessed):
- Normally used system activation (AUTO or ON)
- Temporarily used system activation (ON)
- System activated for maintenance operation (ON) or override (OVRD).

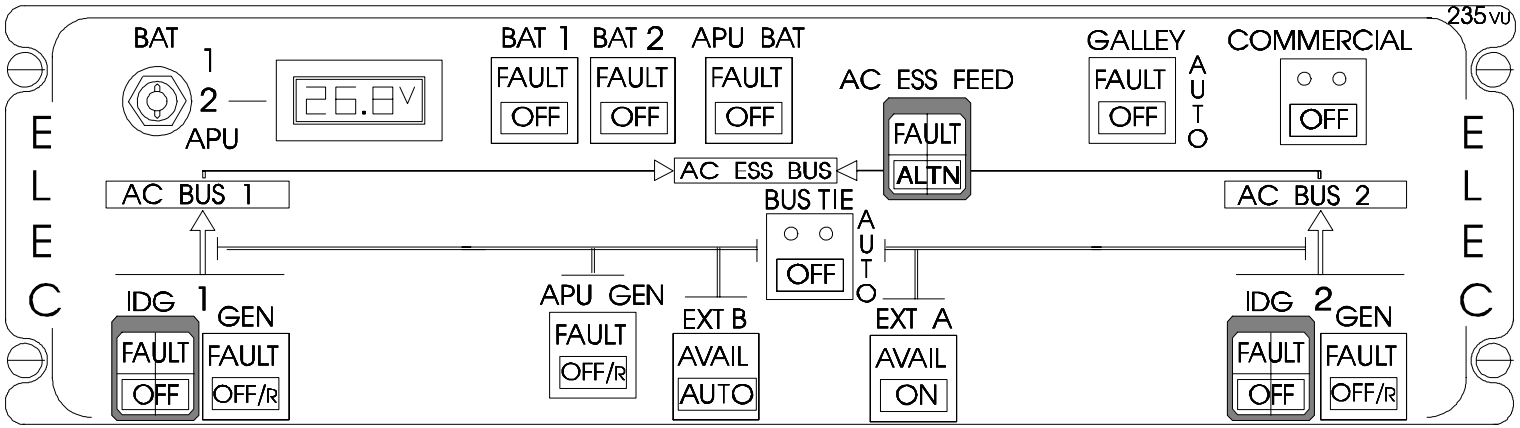
Released out (flush with the panel):
- System deactivation (OFF)
- Manual activation of a system (ON)
- Activation of an alternate system (ALTN).

Some pushbuttons have only one stable position: released out. When pushed they send a control signal to the system.

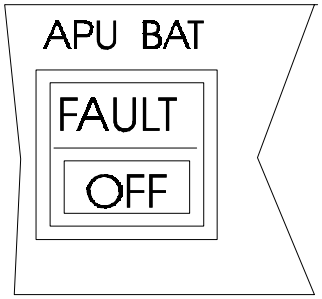
COLOR PHILOSOPHY

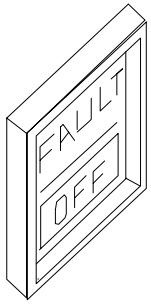
The illuminated pushbutton and annunciator lights are of different colors according to their function.
In normal operation, only green lights and sometimes blue lights are illuminated.

STUDENT NOTES

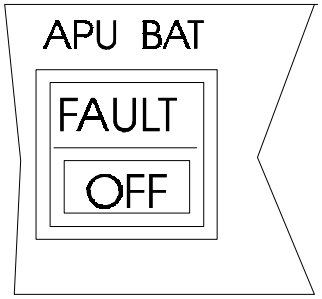


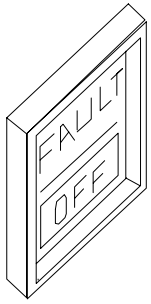
FQW4200 GE Metric



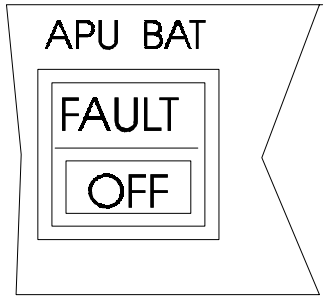


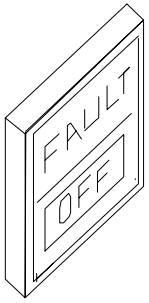
PRESSED IN
NO LIGHT
SYSTEM ACTIVATED
CORRECT OPERATION





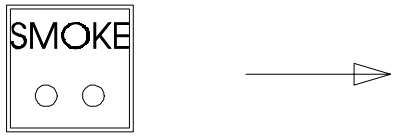
PRESSED IN
FAULT LIGHT ON
SYSTEM ACTIVATED
FAULTY CONDITION



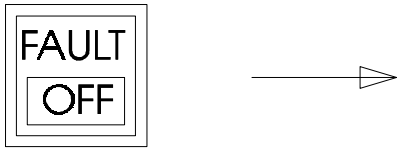


RELEASED OUT
OFF LIGHT ON
SYSTEM DEACTIVATED

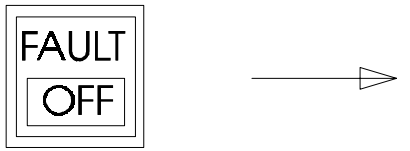
FQW4200 GE Metric



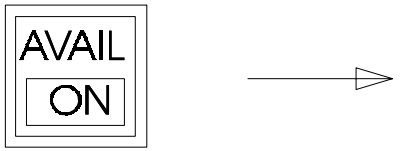
RED IS USED FOR A FAILURE NEEDING IMMEDIATE ACTION.



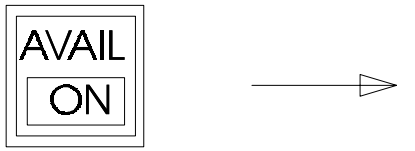
AMBER IS USED FOR A FAILURE NEEDING AWARENESS BUT NO IMMEDIATE ACTION.



WHITE IS USED TO INDICATE A PUSH BUTTON IN AN ABNORMAL POSITION OR MAINTENANCE OPERATION.



GREEN IS USED TO INDICATE NORMAL OPERATION OF A BACK UP SYSTEM.



BLUE IS USED TO INDICATE NORMAL OPERATION OF A TEMPORARILY USED SYSTEM.

FQW4200 GE Metric

OTHER PANELS AND RACKS

General
Attendant Panel
Cargo Loading Panel
External Power Panel
Refuel Panel
Water Service Panel
Toilet Service panel
Avionics Bay

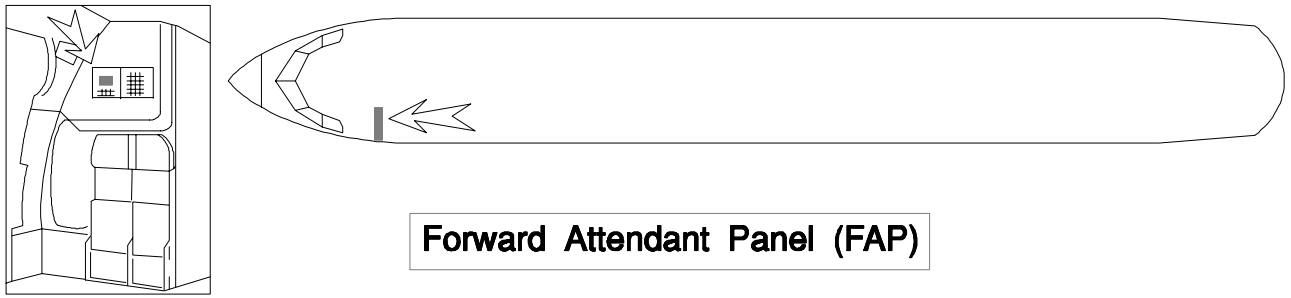
GENERAL

Panels and racks are installed at several different places in the aircraft. They are identified by VU numbers, except for those manufactored by vendors. All panels are presented as an example.

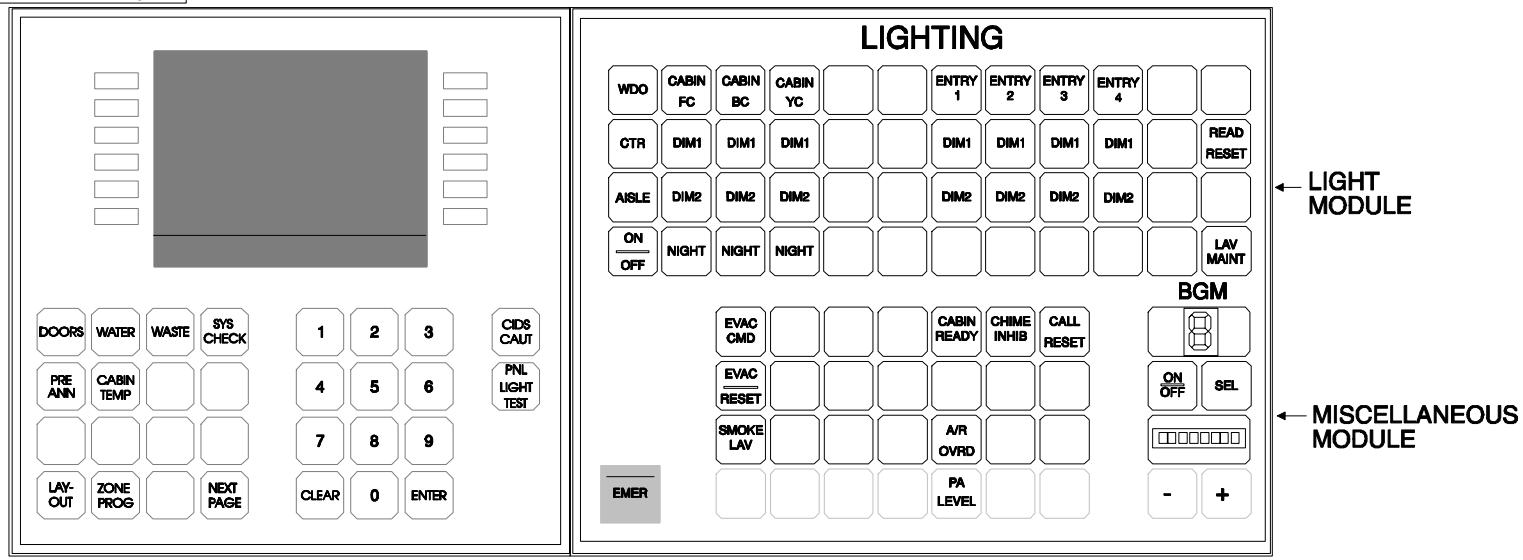
ATTENDANT PANEL

A forward attendant panel is located near cabin door number 1 on the left hand side. It is divided into three modules:

- the light module
- the miscellaneous module
- the programming indicating module



Forward Attendant Panel (FAP)



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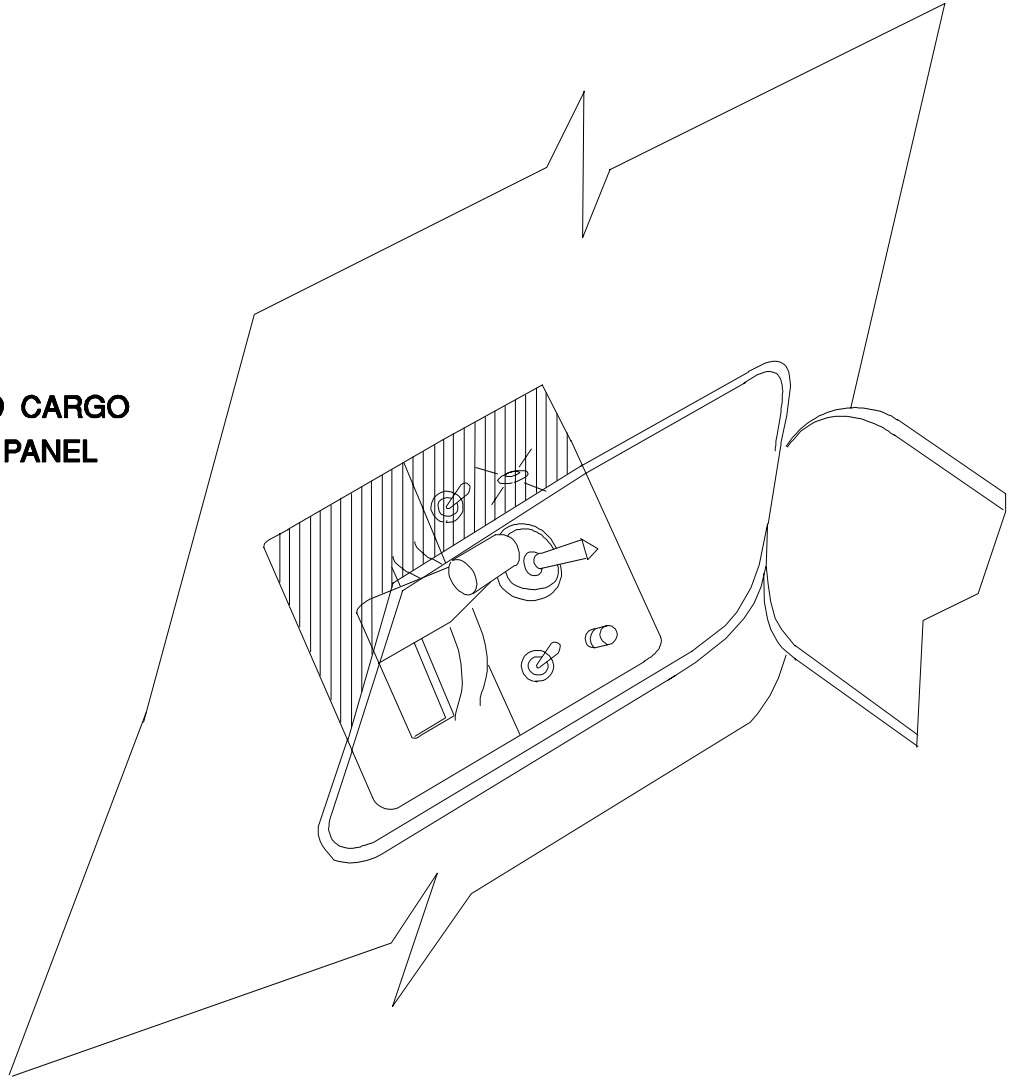
CARGO LOADING PANEL

One cargo loading panel is located near each cargo compartment door. It enables the semi automatic cargo loading system to be operated.

FORWARD CARGO
LOADING PANEL
5020 VU



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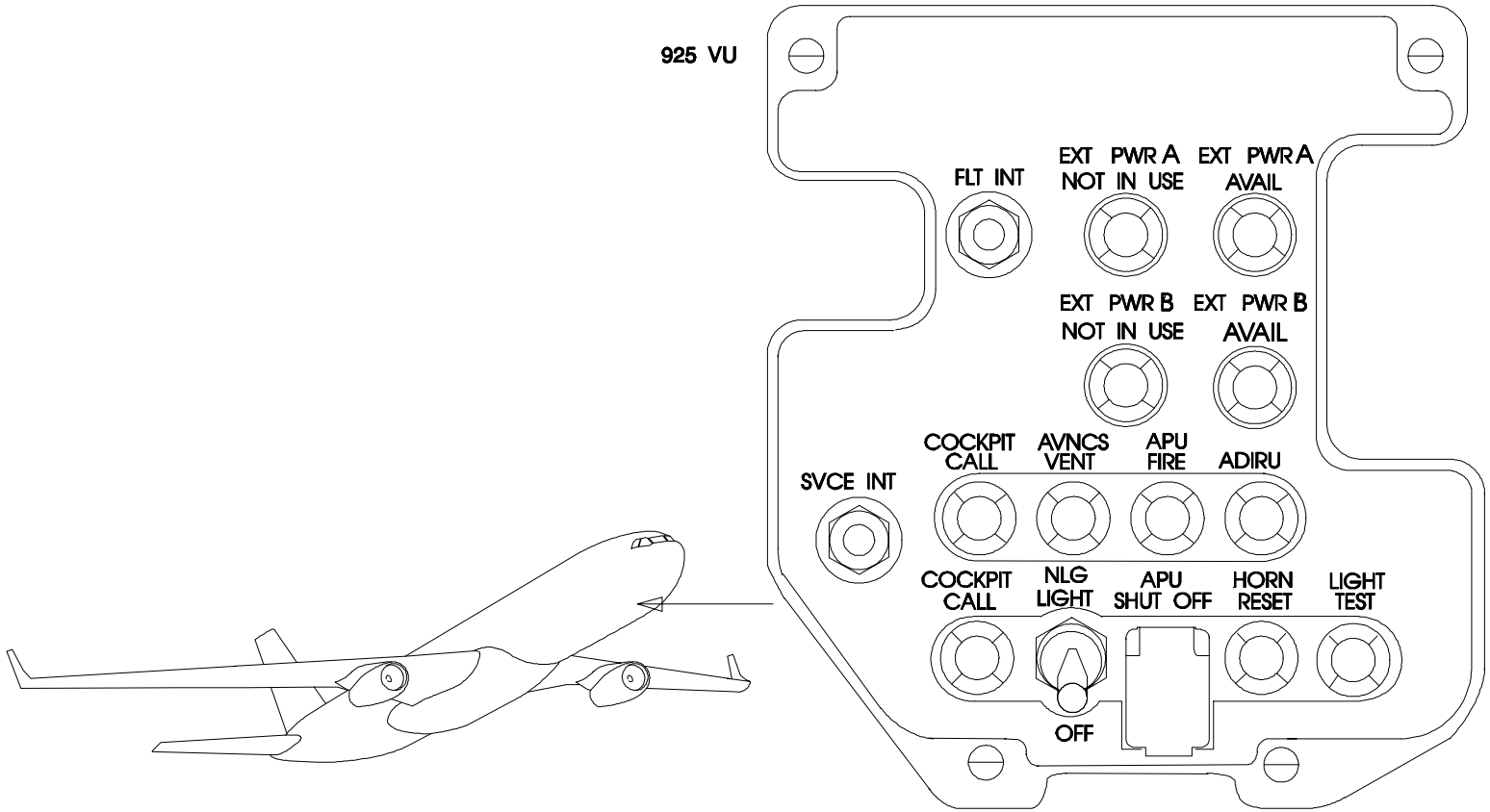
EXTERNAL POWER PANEL

The external power panel is located behind the nose landing gear. It is used for communicating with the cockpit, and for indications and warnings for others systems.



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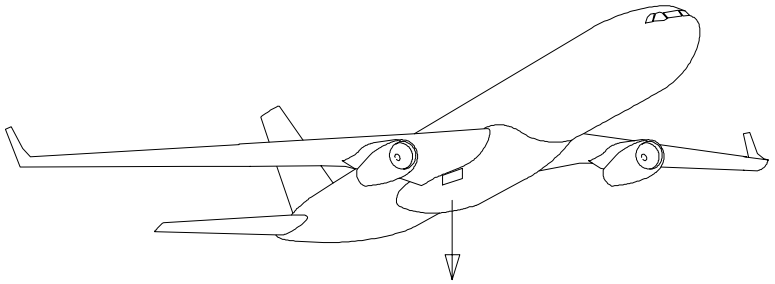
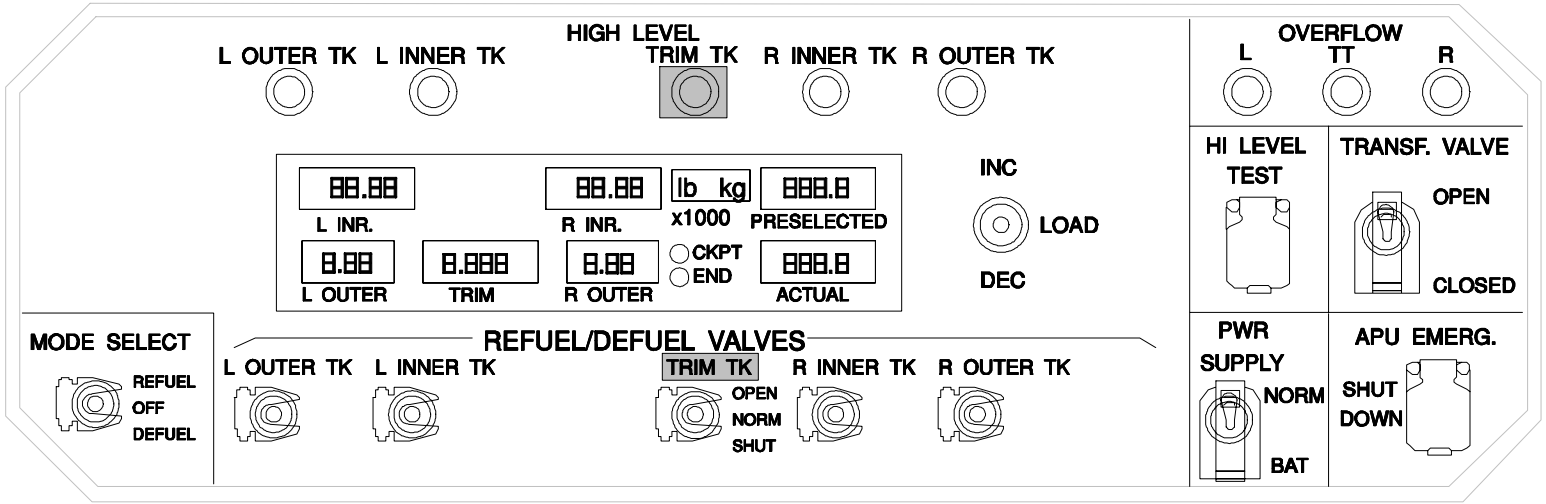
REFUEL PANEL

The refuel panel is located under the right hand side of the fuselage. It is used for refueling or defueling the aircraft.



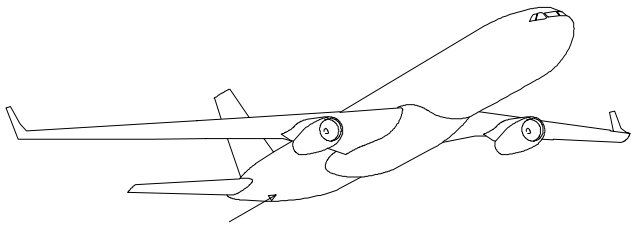
990 VU



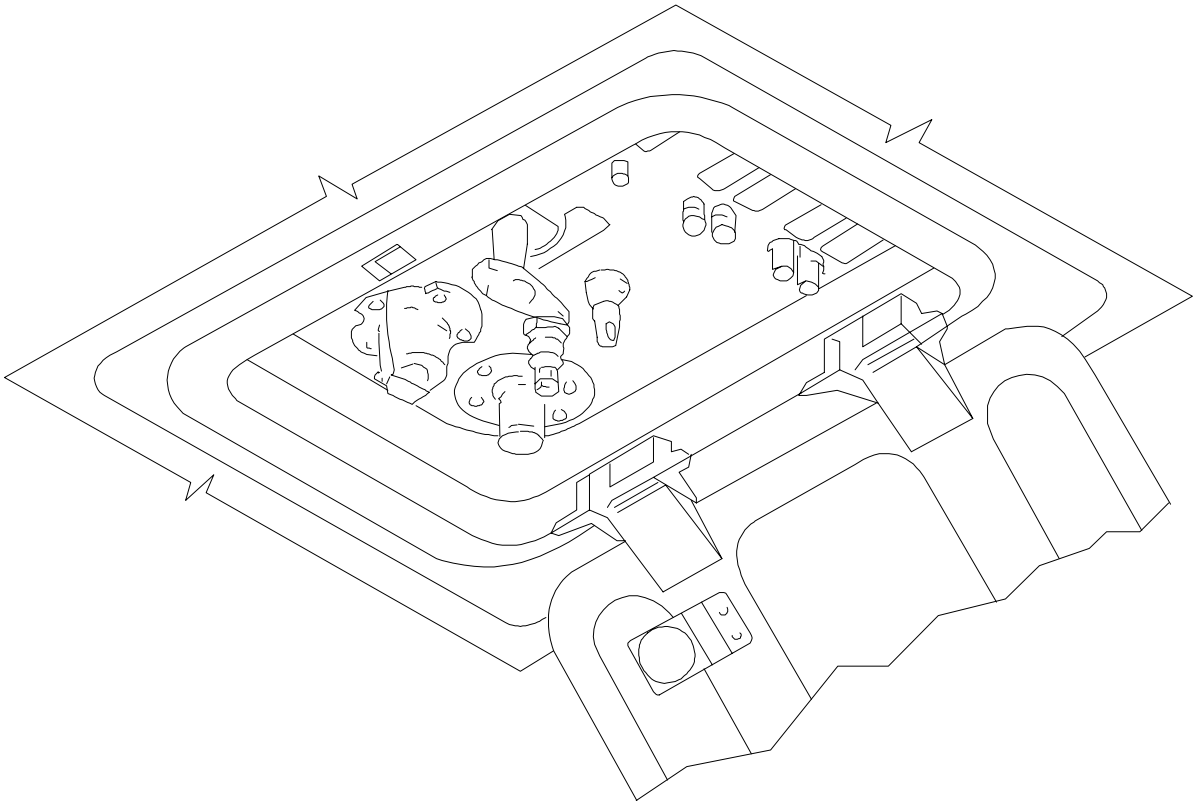
FQW4200 GE Metric

POTABLE WATER SERVICE PANEL

Potable water system is serviced from a service panel located at the rear of the aircraft.



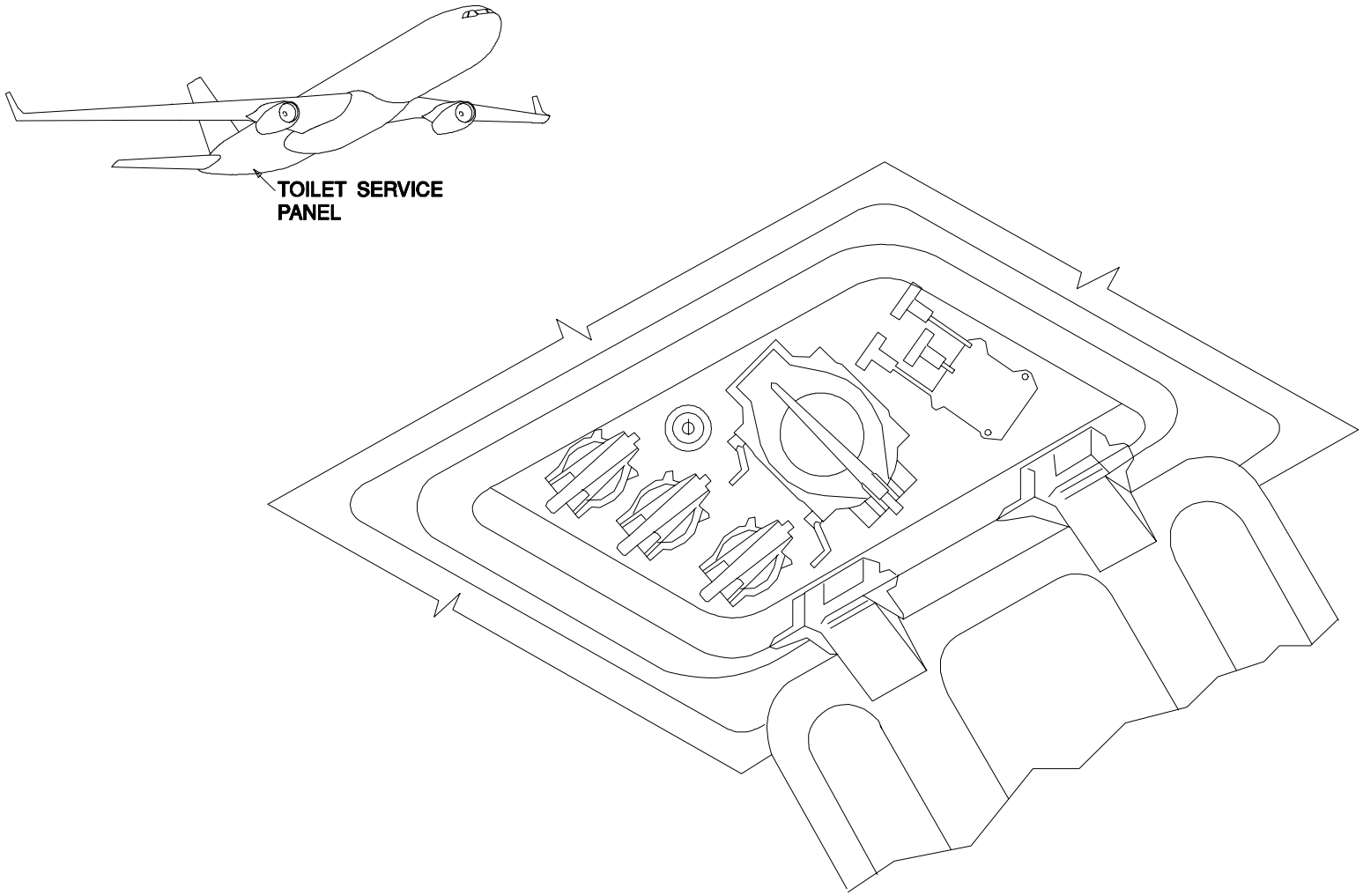
WATER SERVICE
PANEL



FQW4200 GE Metric

TOILET SERVICE PANEL

Toilet servicing is performed from a servicing panel located at the rear of the aircraft.



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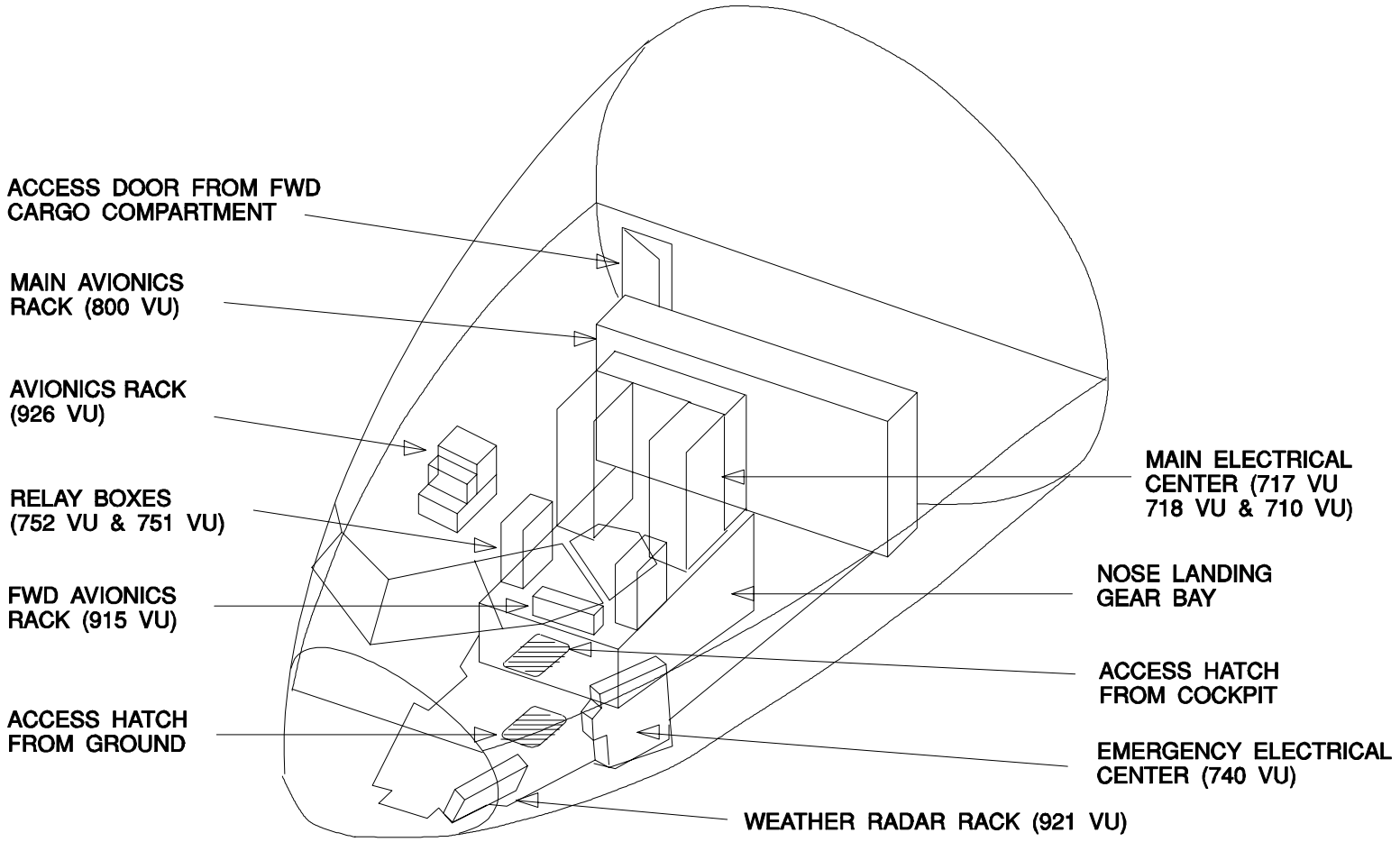
AVIONICS BAY

The electronic avionics compartment is located below the cockpit and cabin floors. It includes the avionics racks, electrical racks and relay boxes. Access is gained from three different ways. Most of the circuit breakers are located in this compartment. There are also two circuit breaker panels in the passenger cabin.



FQW4200 GE Metric

STUDENT NOTES

ELECTROSTATIC DISCHARGE

ESD Problems
ESD Protection
LRU Removal
LRU Test
Work Station

ESD PROBLEMS

ESD stands for ELECTROSTATIC DISCHARGE which is generated by rubbing materials with each other.

By moving over plastic materials (synthetic fibers), wearing synthetic fiber clothing, electrical charges build up on the body.

Thus voltages of 12000 to 35000 volts can develop on a person.

Touching connector pins of computer units (Fig. 1), a discharge path is formed through wiring and components.

Integrated Circuit(IC) chips can be partly damaged or totally destroyed.

On Fig. 2, you can see the so-called "TRIBO-ELECTRIC" series of materials.

Rubbing materials from this series against each other and then separating them from each other causes a build-up of electrostatic charges.

If the materials are far apart in the series, there will be a higher electric charge.

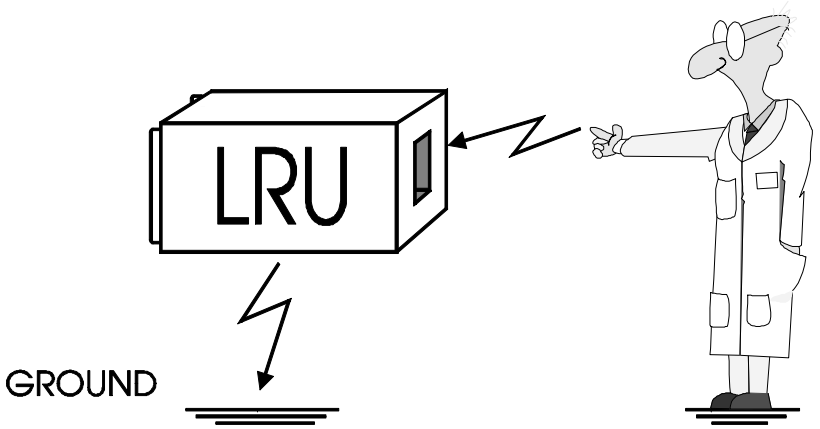


FIG. 1

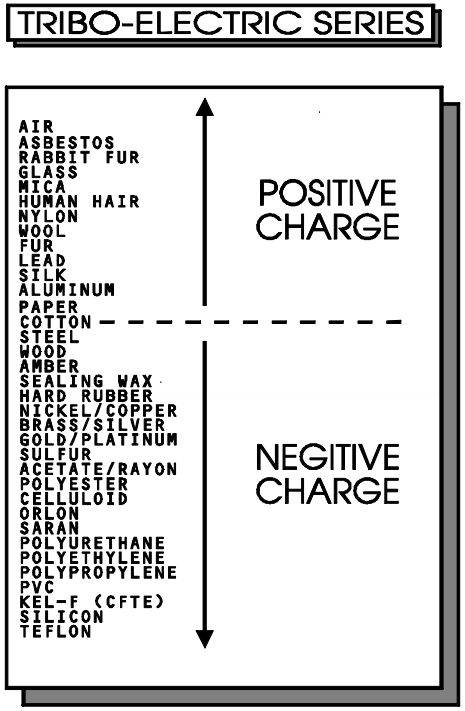
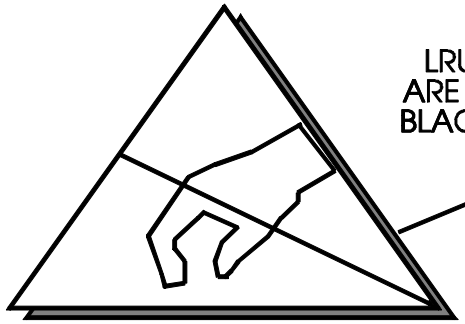


FIG. 2

FQW4200 GE Metric

ESD PROTECTION

Here are some precautions to avoid damage of electronic equipment by ELECTROSTATIC DISCHARGE:



1) Do not touch connectors pins, avoid using flying leads on pins for testing.

2) Establish good grounds (as for fuelling) if a unit has to be serviced.

3) Put yourself to ground: Either discharge yourself on the metallic structure or connect yourself to ground via 200 000, ..., 1000 000 ohms or a wrist band with lead and connector.

4) Wrap up the unit in conductive plastic foil or use a conductive (black) bag.

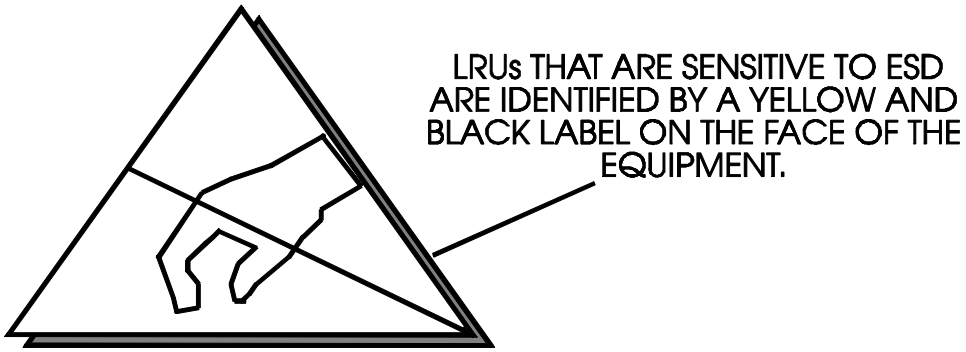
5) Protect the unit by placing protective caps on the connectors.

6) Place the unserviceable unit in its re-usable shipping container.

FQW4200 GE Metric

LRU REMOVAL

Replacing an LRU (LINE-REPLACEABLE UNIT) bearing this label, requires these precautions:



1) First discharge your own body electricity by touching the metallic aircraft structure or by using a grounded wrist band.

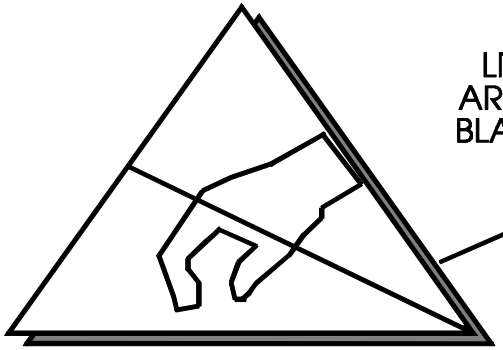
2) Cover connectors with protective dust caps on the removed LRU and do not touch any pins.

3) In addition, the removed LRU can be covered with conductive plastic wrap. Do not use ordinary plastic wrap.

FQW4200 GE Metric

LRU TEST

Testing of installed LRUs requires the following precautions:



1) First discharge your own body electricity by touching the metallic aircraft structure or by using a grounded wrist band.

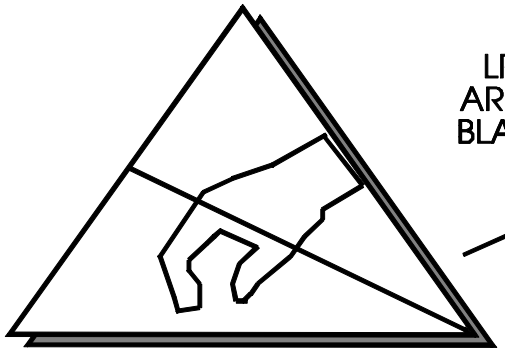
2) When connecting test equipment, first establish the ground connection,.

3) Do not use low-impedance multimeters or dielectric testers.

FQW4200 GE Metric

WORK STATION

The removal and testing of PRINTED-CIRCUIT BOARDS from an LRU bearing this label, are carried out as follows:



1) The LRU can only be opened at an " ESD-controlled " workstation, where the bench surface is grounded.

2) The technician has to wear a grounded wrist band.
All test equipment and tools are grounded.

3) Removed printed-circuit boards are stored and shipped in conductive plastic bags or conductive plastic wrap.

FQW4200 GE Metric

STUDENT NOTES:

COMPUTER REMOVAL INSTALLATION

Before starting a computer removal installation procedure, the aircraft has to be set in maintenance configuration.
The first task is to make sure that the ground service network is energized and the access door is open and accessible.

Then make sure that the circuit breaker listed in the removal of the computer procedure of the AMM is open.

The first action is to loosen the nut and then to lower the nut.

When the nut is lowered, pull the computer on its rack to disconnect the electrical connectors and remove the computer from its rack.

Before starting a computer installation procedure, clean and do a visual inspection of the component interface and of the adjacent area.

The first task is to remove the blanking caps from the electrical connectors and make sure that the electrical connectors are clean and in the correct condition.

Then install the computer on its rack and push it on its rack to connect the electrical connectors.

Now you can engage the nuts on the studs and tighten them.

The installation is finished. You can close the circuit breaker.

The last actions of the computer installation are to do a test through the MCDU and to close the access. Make sure that the work area is clean and clear of tools and other items, close the access door and remove the access platform.

A330 PUSH BACK AND TOWING

Safety Precautions
Push back and Towing

SAFETY PRECAUTIONS

WARNING :

MAKE SURE THAT WHEN THE A/C MOVES WITH ITS POWER ON THE GROUND

- NO ONE GOES WHERE THE A/C CAN CAUSE INJURY OR KILL
- THERE ARE NO OBJECT IN THE AREA WHERE THE ENGINES CAN BLOW THEM AWAY OR PULL THEM BY SUCTION.

WARNING :

OBEY THESE SAFETY PRECAUTIONS DURING TOWING, PUSHBACK OR MOVEMENT OF THE AIRCRAFT.

MAKE SURE THAT THE PATH OF THE AIRCRAFT IS CLEAR MAKE SURE THAT NO ONE SITS OR STANDS ON THE TOW BAR OR USES THE TRACTOR AS TRANSPORT.

WARNING :

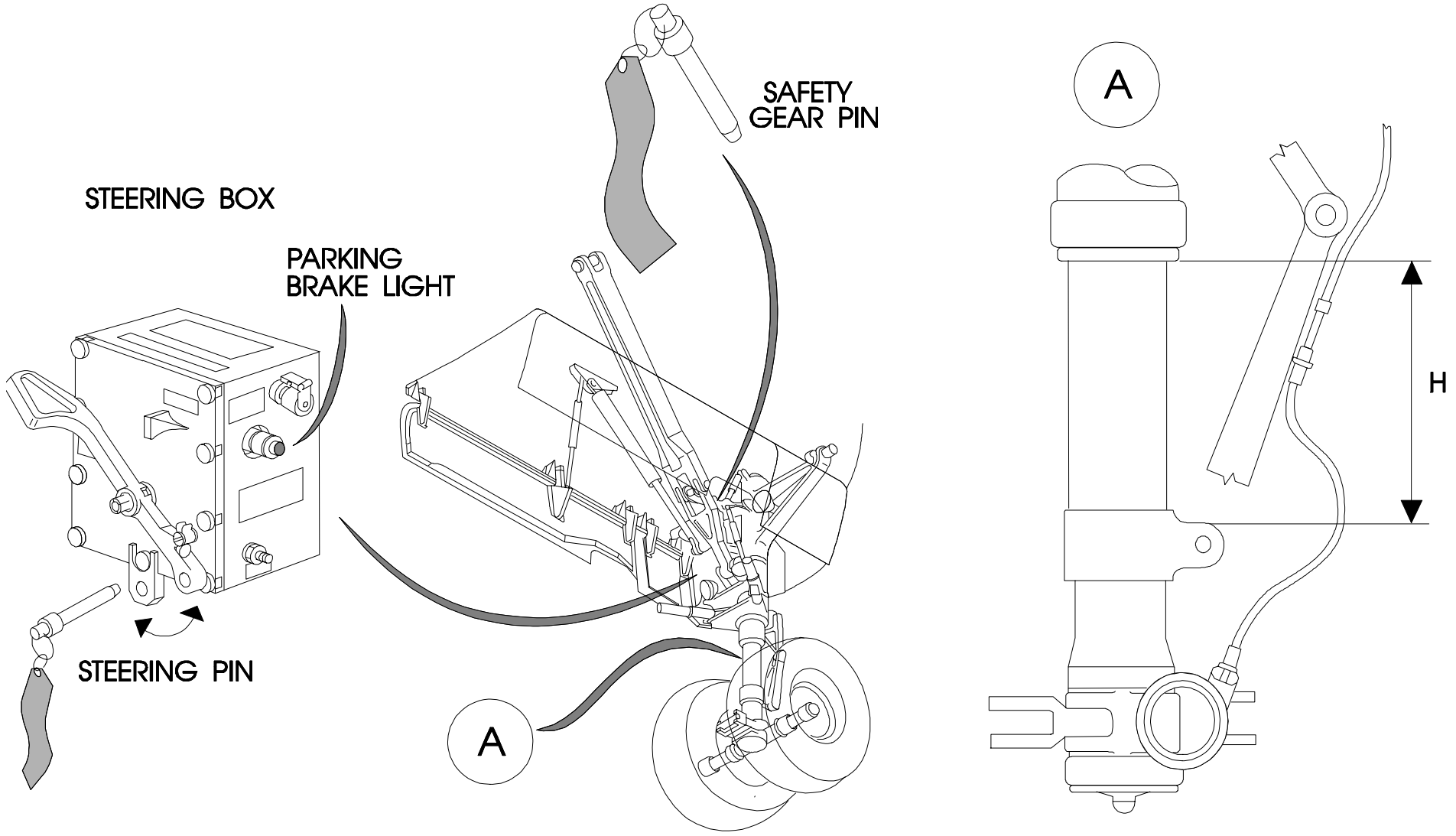
THE PERSON WHO OPERATES THE BRAKES FROM THE COCKPIT DURING TOWING/TAXIING MUST ATTACH THE SEATBELT.

IF NOT, THERE IS A RISK OF INJURY IF THE AIRCRAFT STOPS SUDDENLY.

CAUTION :

DO NOT TOW OR MOVE THE AIRCRAFT ON THE GROUND IF THE ENGINE COWLS ARE OPEN.

MOVEMENT OF THE AIRCRAFT WITH THE COWLS OPEN CAN CAUSE DAMAGE TO THE COWLS AND THE NACELLE STRUCTURE.



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PUSH BACK

Make sure that the safety pins are installed on the nose, the main and the centerline gear.

After the cockpit checks, energize the aircraft electrical circuits following the AMM procedure by using external power or by starting the APU.
Then set batteries 1 and 2 to ON.
Check the brake accumulator pressure on the triple indicator.
The pointer in the green range indicates that a minimum of seven brake applications can be performed.
If the pressure is too low, you have to pressurize the system through the blue electrical pump.
Ask for clearance then pressurize the blue hydraulic system.
When the pressure is correct, switch off the blue electrical pump.
Apply the parking brake and start the APU.

The ground mechanic sets the towing lever to the towing position and installs the pin.
Before you install the towbar make sure that the dimension "H" is correct.
Attach the towbar to the nose gear fitting.
Make sure that the towbar is equipped with:

- a damping system
- a traction shear pin calibrated at the required value
- a torsion shear pin calibrated at the required value

Connect the tractor to the towbar.
Carry out an inspection around the aircraft.
Make sure that the area is clear.
Make sure that the engine cowls are properly locked, all the doors are closed and the gear doors are closed.
Remove the main wheel chocks.
Disconnect the external power.
Contact the cockpit so that the operator asks for clearance.

In the cockpit, select VHF on the control and monitoring radio panels.
Contact Air Traffic Control to request push back and towing and wait for their authorization.
Set the NAVIGATION lights, BEACON lights and LOGO lights to ON.
When ready, contact the ground operator.
When authorized by the ground operator, release the parking brake and check the triple indicator.
When the brake is OFF, the ground operators start the push back operation.

Push the aircraft smoothly and slowly.
If you push or tow the aircraft in an area with nearby obstacles, two operators are required at the wing tips.
The maximum towing angle, left and right, is indicated by a red mark painted on the nose gear fixed door.
A steering angle protection system will activate an oversteer warning light if the steering angle exceeds a predetermined value.
If exceeded, an inspection of the nose landing gear has to be carried out according to the AMM procedure.
If you push or tow the aircraft with the engines at IDLE, the maximum steering angle is 40 degres on each side to avoid nose landing gear slippage.
When the push back operation is completed, make sure that the nose wheels are aligned with the aircraft centerline.
If not, tow the aircraft as required.

In the cockpit, apply the parking brake and check the triple indicator.
The towbar can be disconnected..

TOWING

During the towing operation, communications between the tractor and the cockpit can be ensured by the headset or through a VHF radio.
Once in position, make sure that the nose wheels are aligned with the aircraft centerline.
Inform the cockpit that the parking brake can be applied.
In the cockpit, apply the parking brake and check the triple indicator.
Inform the ground operator that the brake is applied, switch off the lights and set the radio to OFF.
Put the wheel chocks in position .
Disconnect the tow bar.
Disconnect the headset
Remove the steering pin.
The push back and towing operation is completed.
Put the aircraft in the configuration related to the next operation.

STUDENT NOTES

PARKING AND MOORING

Parking
Mooring

This part gives information about the parking and mooring of the aircraft, the subsequent safety precautions and the equipment required.

PARKING

SAFETY PRECAUTIONS
- Put the aircraft in a safety area.
- Make sure that the nose gear wheels are on the aircraft axis.
- Install the safety devices on the landing gear and put the wheel chocks in position.
- On panel 117VU, set the parking brake selector switch to ON.
- Clean and deodorize the toilets.

INSTALLATION OF THE PROTECTION DEVICES ON THE FWD FUSELAGE.
- Put the Total Temperature Sensor SLIP-ON COVERS in position.
- Put the Pitot Probe SLIP-ON COVERS in position.
- Put the ICE DETECTION Probe COVERS in position.
- Put the AOA COVERS in position.
- Put the STATIC Probe COVERS in position.

INSTALLATION OF THE PROTECTION DEVICES ON THE ENGINES.
Protection of the engine air intakes:
- Put the INLET COWL COVERS (PWA88060) in position.

Protection of the engine exhaust nozzles and center plug openings:
- Put the PRIMARY EXHAUST NOZZLE COVERS (PWA88434) in position.

Protection of the THRUST REVERSER DUCTS
- Put the THRUST REVERSER COVERS (PWA88008) in position.

INSTALLATION OF THE PROTECTION DEVICES ON THE APU AREA.
- Put the APU EXHAUST DUCT PROTECTION in position.
- Put the APU, OIL COOLER OUTLET PLUG in position.

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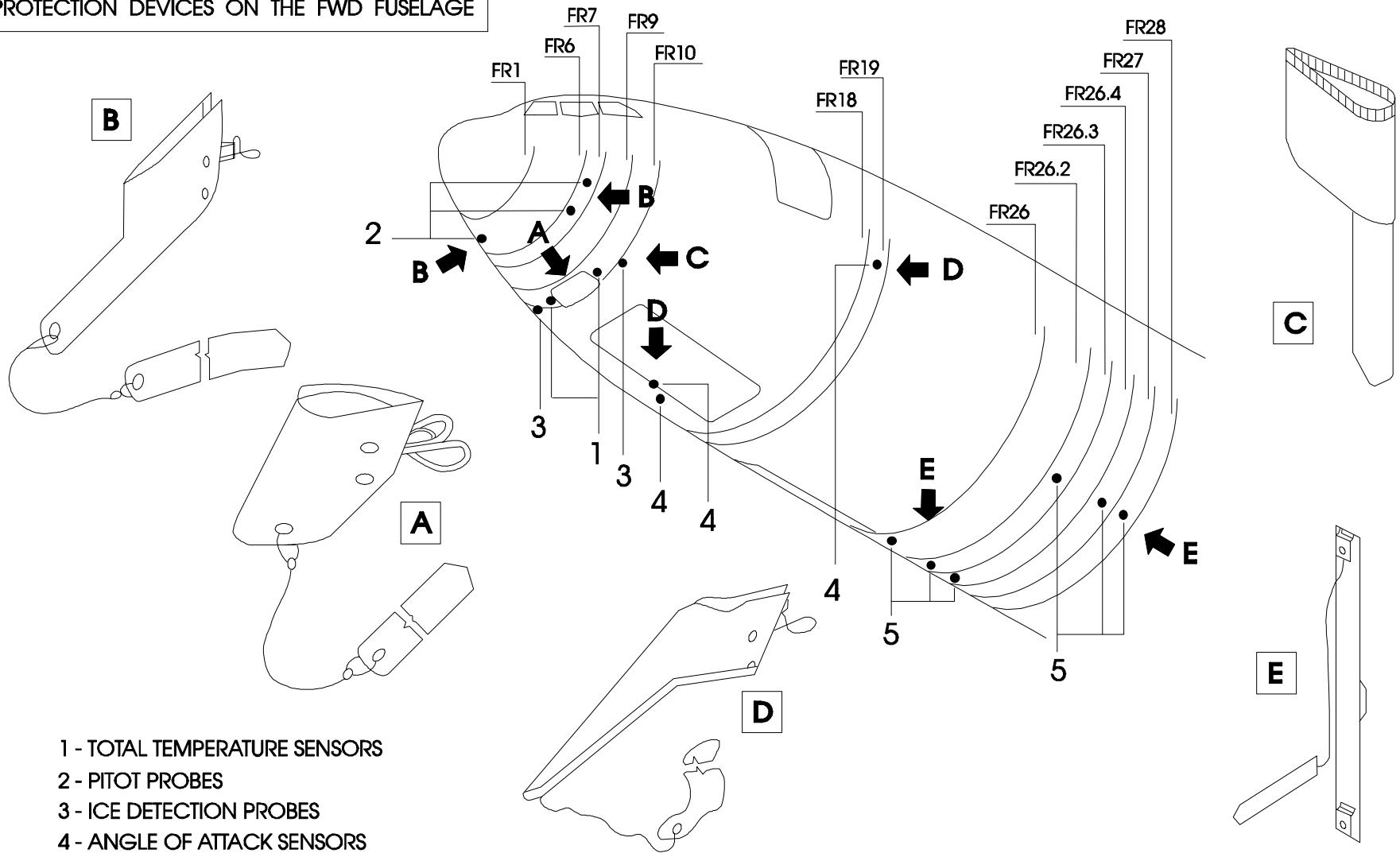
PROTECTION DEVICES ON THE FWD FUSELAGE



1 - TOTAL TEMPERATURE SENSORS
2 - PITOT PROBES
3 - ICE DETECTION PROBES
4 - ANGLE OF ATTACK SENSORS
5 - STATIC PROBES

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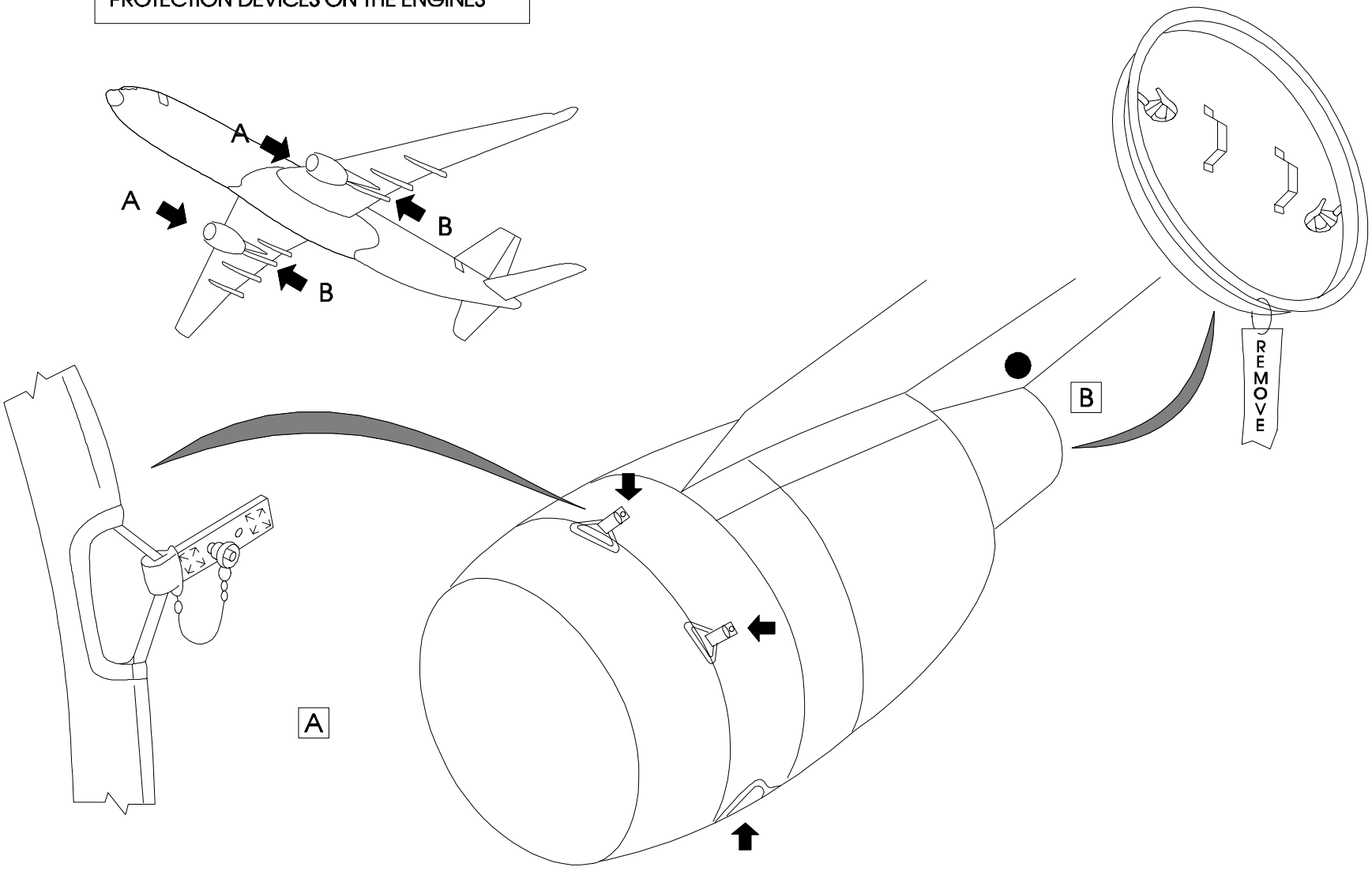
PROTECTION DEVICES ON THE ENGINES



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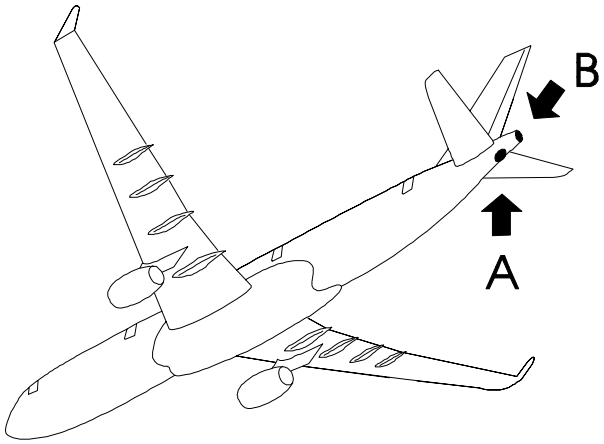
PROTECTION DEVICES ON THE APU AREA



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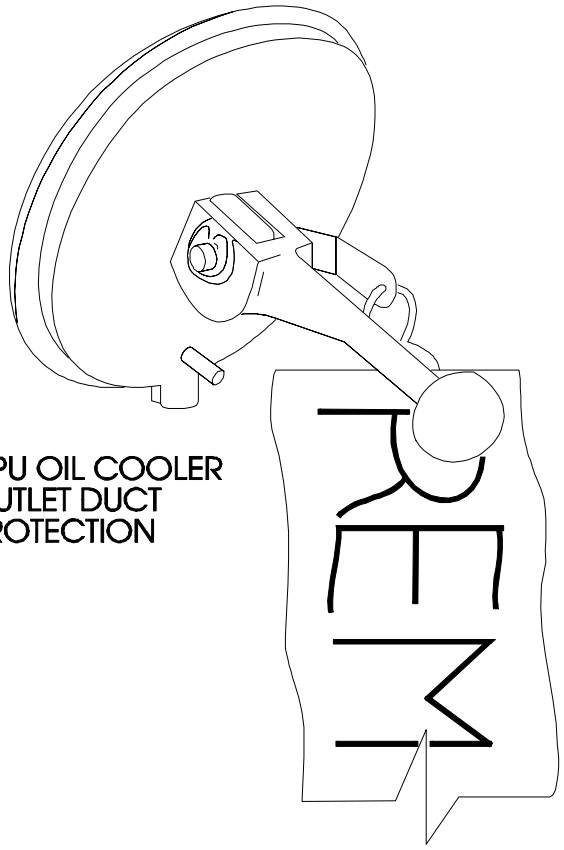
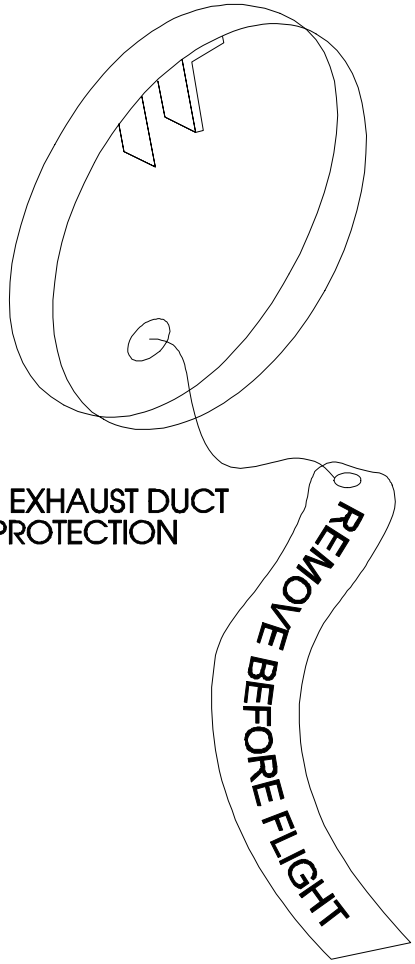


APU OIL COOLER
OUTLET DUCT
PROTECTION

B



APU EXHAUST DUCT
PROTECTION

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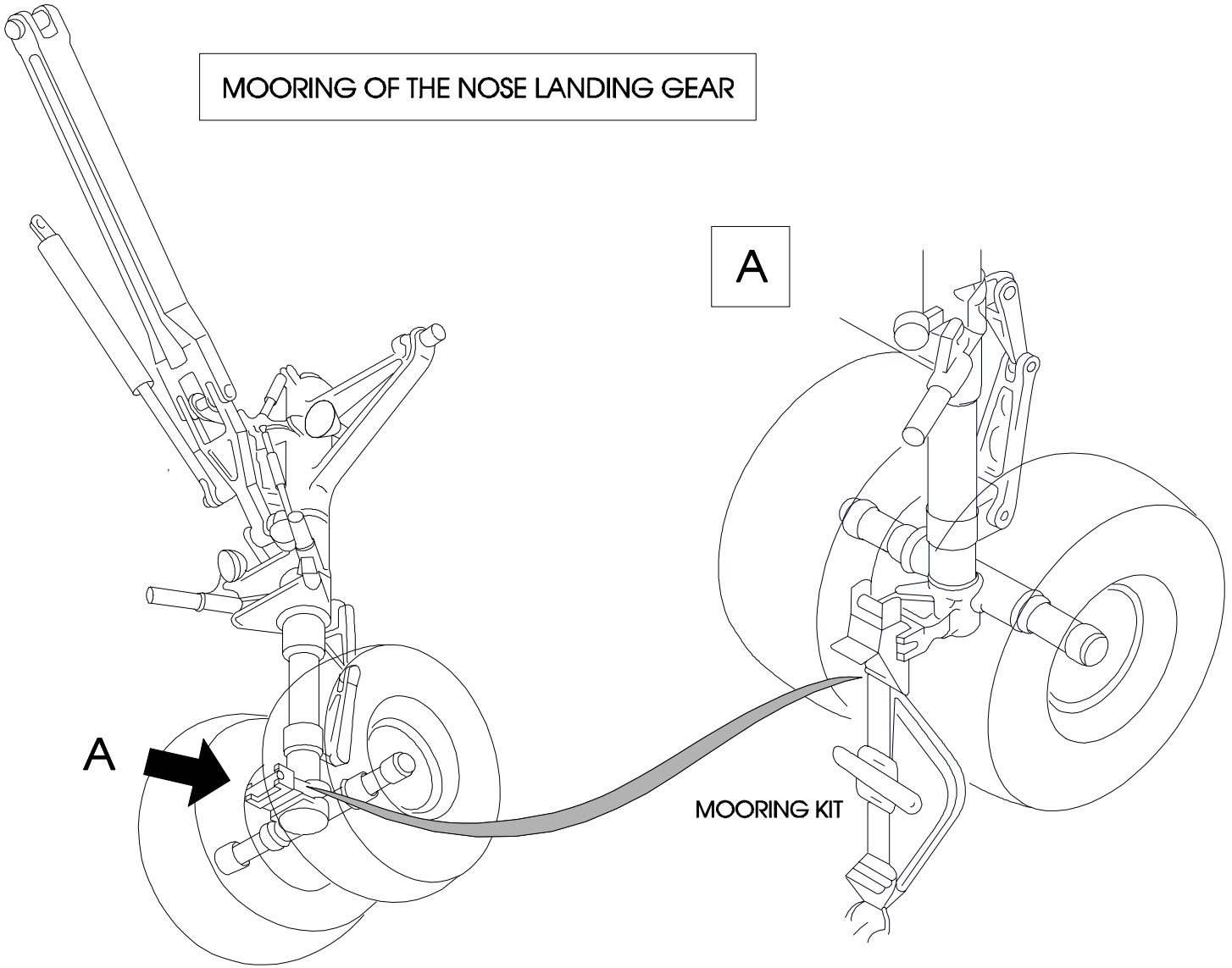
MOORING

Before mooring the aircraft, check for its stability and make a visual inspection of the surfaces, the thrust reversers, the doors and cockpit windows.

- Put the aircraft in position on a flat surface and make sure it is parked into the wind.
- Make sure that the aircraft is stable.
- Put it in the parking configuration as seen before.
- Make sure that the slats, the flaps, the spoilers, the speed brakes and the thrust reversers are retracted.
- Make sure that the THS is set to neutral.
- Make sure that the sliding windows of the cockpit are closed.
- Make sure that the pax/crew doors and the cargo compartment doors are closed.

MOORING OF THE NOSE LANDING GEAR

- Put one NLG MOORING KIT (98F1020 1000000) in position on the towing fittings of the nose landing gear and on the mooring point.
- Make sure that the work area is clear and clean of tools and other items.



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STUDENT NOTES

EXTERIOR PLACARDS INSTALLATION

Installation of Decals
Installation of Self-Adhesive Placards in Non-Skydrol Areas
Installation of Self-Adhesive Placards in Skydrol Areas
Installation of Placards on the Landing Gear

INSTALLATION OF DECALS

The decals give information related to service and safety markings on the external surfaces of the aircraft.
The decals have to be specially protected in areas on which fluid can fall (fuel, hydraulic, etc.)
For the complete procedure, refer to AMM chapter 11-00-00.
Task 11-00-00-400-801.

INSTALLATION OF SELF-ADHESIVE PLACARDS IN NON-SKYDROL AREAS

The self-adhesive placards are installed in the non-skydrol areas. They are of Fotofoil and Scotcheal types.
For the complete procedure, refer to AMM chapter 11-00-00.
Task 11-00-00-400-802.

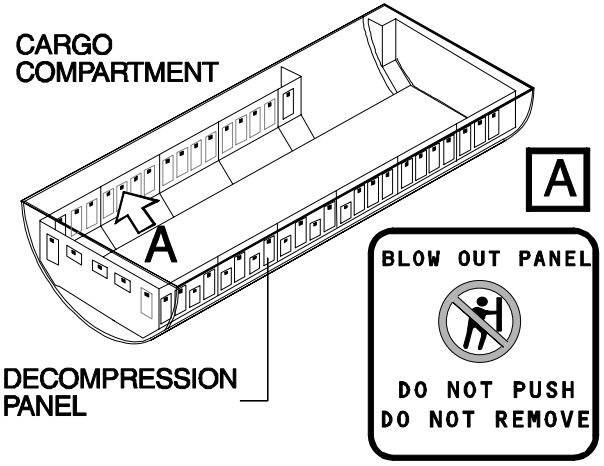
INSTALLATION OF SELF-ADHESIVE PLACARDS IN SKYDROL AREAS

The self-adhesive placards are installed in the skydrol areas. They are of Fotofoil and Scotcheal types.
For the complete procedure, refer to AMM chapter 11-00-00.
Task 11-00-00-400-803.

INSTALLATION OF PLACARDS ON THE LANDING GEAR

To install a placard on the landing gear legs, follow the specific procedure in the AMM chapter 11-00-00. Task 11-00-00-400-805.

EXAMPLE OF A DECAL

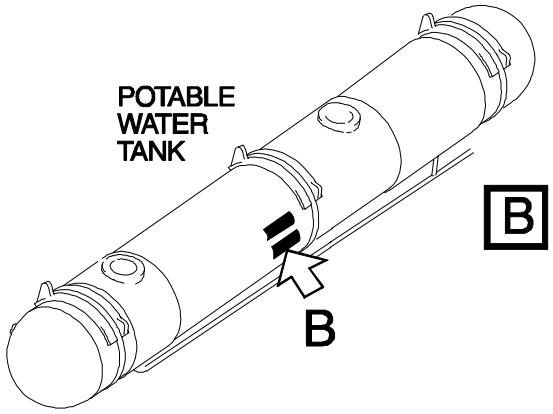


A

BLOW OUT PANEL

DO NOT PUSH
DO NOT REMOVE

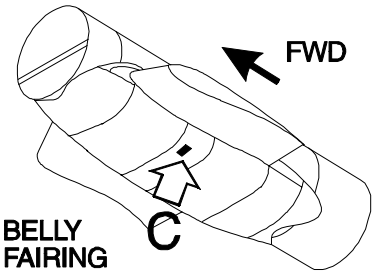
EXAMPLE OF A PLACARD IN A NON-SKYDROL AREA



B

CAUTION: RELIEVE TANK PRESSURE
BEFORE REMOVING COVER

MEDIUM	POTABLE WATER
CAPACITY	350L / 92,5 U.S. GALS
WORKING PRESSURE	$1,72^{+0,2}$ BAR / 25^{+3} PSI
MAX. PRESSURE	2,1 BAR / 30 PSI



EXAMPLE OF A PLACARD IN A SKYDROL AREA

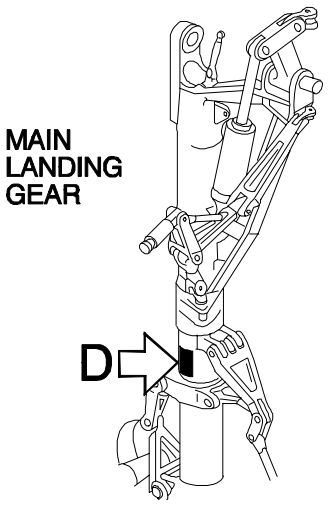
C

NITROGEN FILLING PRESSURE
IN RELATION TO THE AIR
TEMPERATURE FOR BRAKE:

-20°C,-4°F,86.5 BARS/1255 PSI
-10°C,+14°F,90 BARS/1305 PSI
0°C,+32°F,93 BARS/1349 PSI
+10°C,+50°F,96.5 BARS/1400 PSI
+30°C,+86°F,103.5 BARS/1501 PSI
+40°C,+104°F,107 BARS/1552 PSI

NITROGEN FILLING PRESSURE
IN RELATION TO THE AIR
TEMPERATURE FOR GENE:

-30°C,-22°F,108 BARS/1566 PSI
-20°C,-4°F,112 BARS/1624 PSI
-10°C,14°F,116.5 BARS/1689 PSI
0°C,32°F,121 BARS/1754 PSI
10°C,50°F,125.5 BARS/1820 PSI
20°C,68°F,130 BARS/1885 PSI
30°C,86°F,134.5 BARS/1950 PSI
40°C,104°F,139 BARS/2015 PSI
50°C,122°F,143.5 BARS/2081 PSI
60°C,140°F,148 BARS/2146 PSI



EXAMPLE OF A PLACARD ON THE LANDING GEAR

GROUND

D

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STUDENT NOTES

DIFFERENT USES OF PLACARDS

Identification Placards
Procedure Placards
Location Placards

IDENTIFICATION PLACARDS

Identification placards show the name and Functional Item Number of the components.

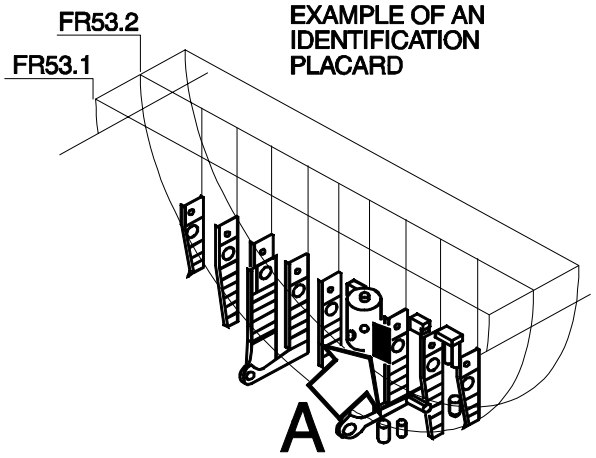
PROCEDURE PLACARDS

Procedure placards show the steps of the procedure to perform.

LOCATION PLACARDS

Location placards show where a component is located.

EXAMPLE OF AN IDENTIFICATION PLACARD



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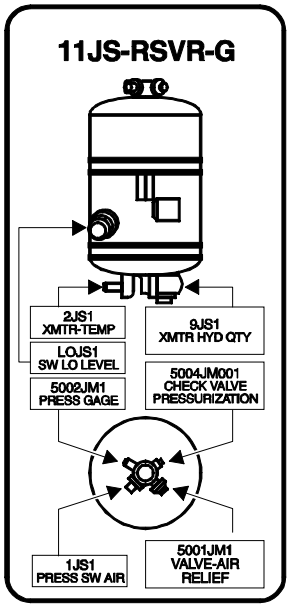
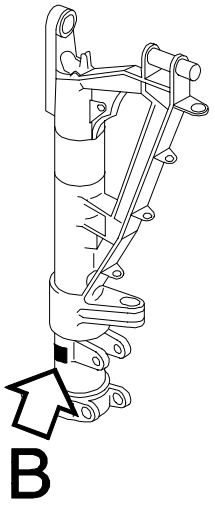
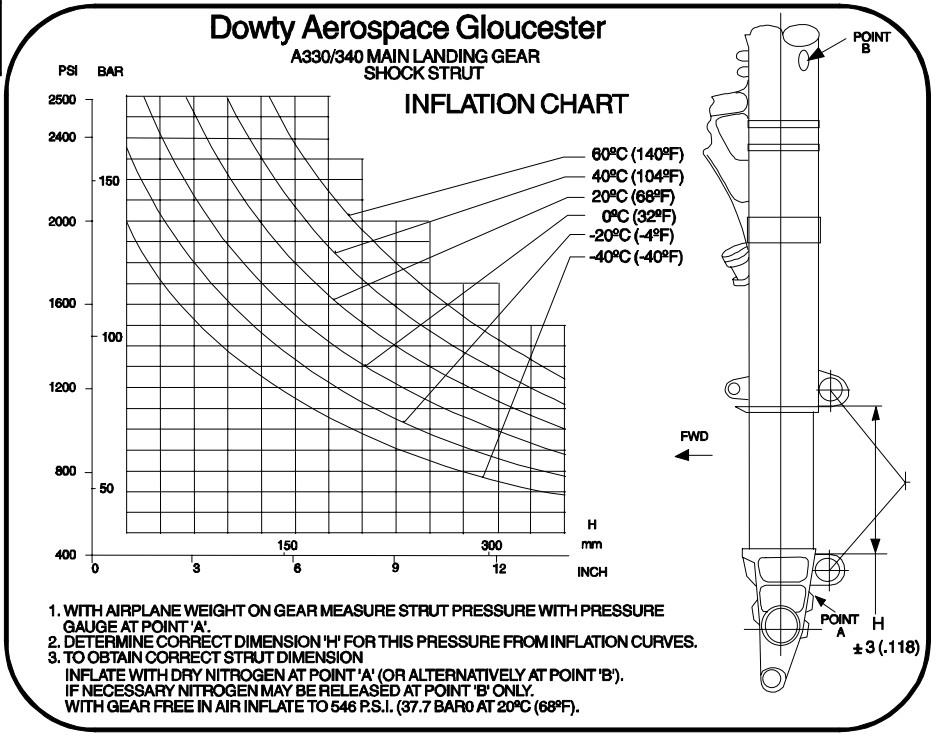


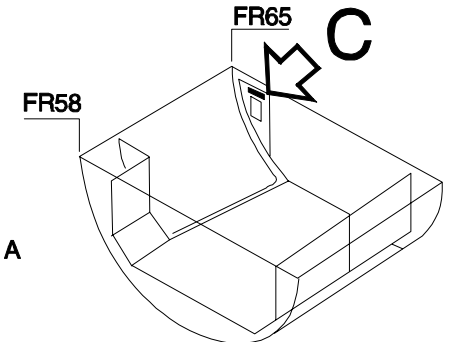
EXAMPLE OF A PROCEDURE PLACARD

B





EXAMPLE OF A LOCATION PLACARD



C

ACCESS RAD.ALT II

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STUDENT NOTES