737-7/8/8200/9 - Student Reference Guide

737-7/8/8200/9

Student Reference Guide

The Student Reference Guide is a supplemental training manual that contains enhanced diagrams called synoptics. Synoptics are enhanced diagrams that provide a source of information to assist in understanding system function and interface. The intent of the diagrams is to understand what data is sent and received between system components and interfacing systems using color, symbols, signal descriptions and pictorials of major components.

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TABLE OF CONTENTS

ATA 21 - Air Conditioning
ATA 22 - Auto Flight
ATA 23 - Communications
ATA 24 - Electrical Power
ATA 25 - Equipment/Furnishings
ATA 26 - Fire Protection
ATA 27 - Flight Controls
ATA 28 - Fuel
ATA 29 - Hydraulic Power
ATA 30 - Anti-Ice & Rain Protection
ATA 31 - Indicating/Recording Systems
ATA 32 - Landing Gear
ATA 33 - Lights
ATA 34 - Navigation
ATA 35 - Oxygen
ATA 36 - Pneumatics
ATA 38 - Water/Waste
ATA 46 - Information Systems
ATA 47 - Nitrogen Generation System (NGS)
ATA 49 - Auxiliary Power Unit (APU)
ATA 52 - Doors
ATA 71-80 - Engines

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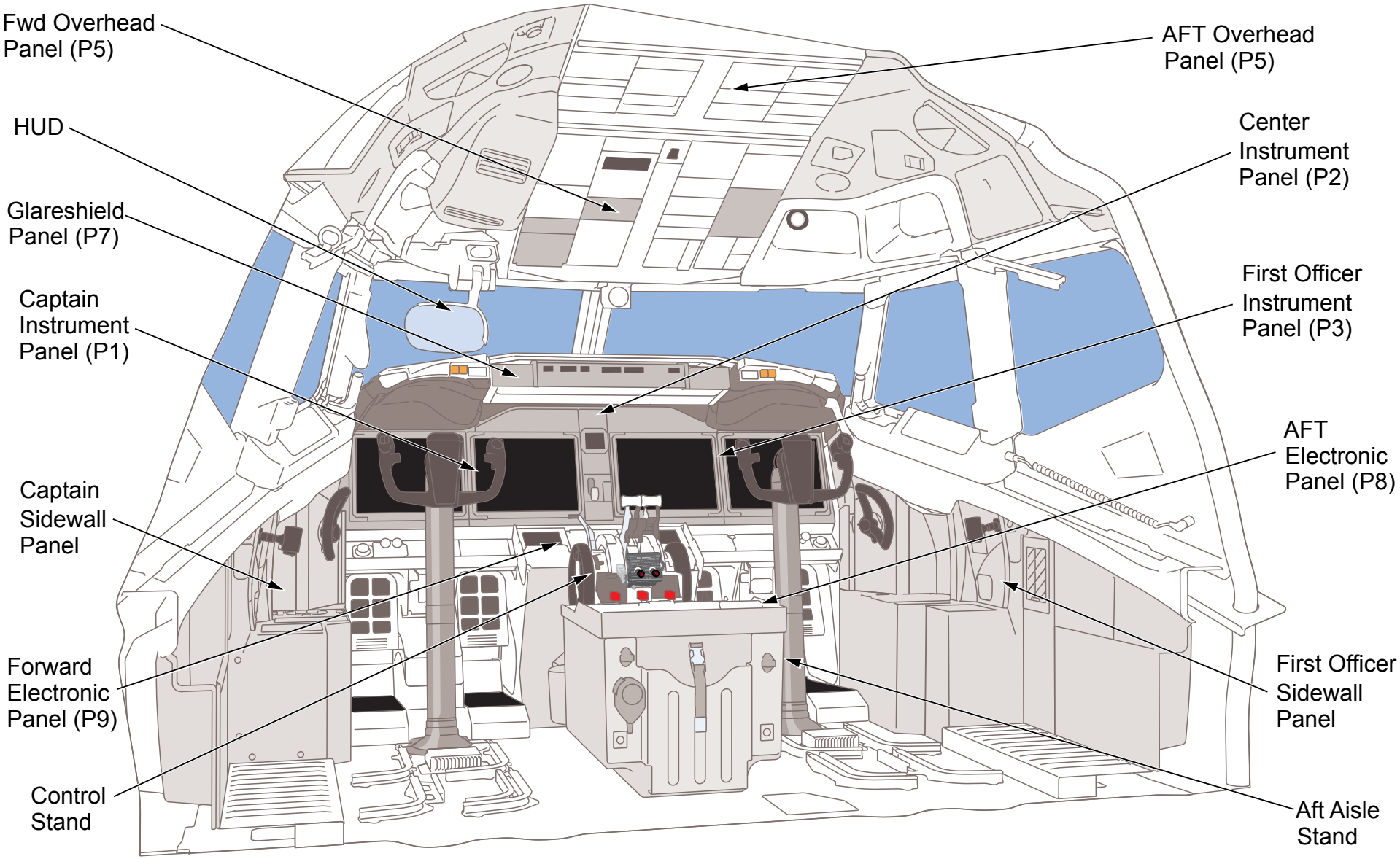

FLIGHT DECK (TYPICAL)

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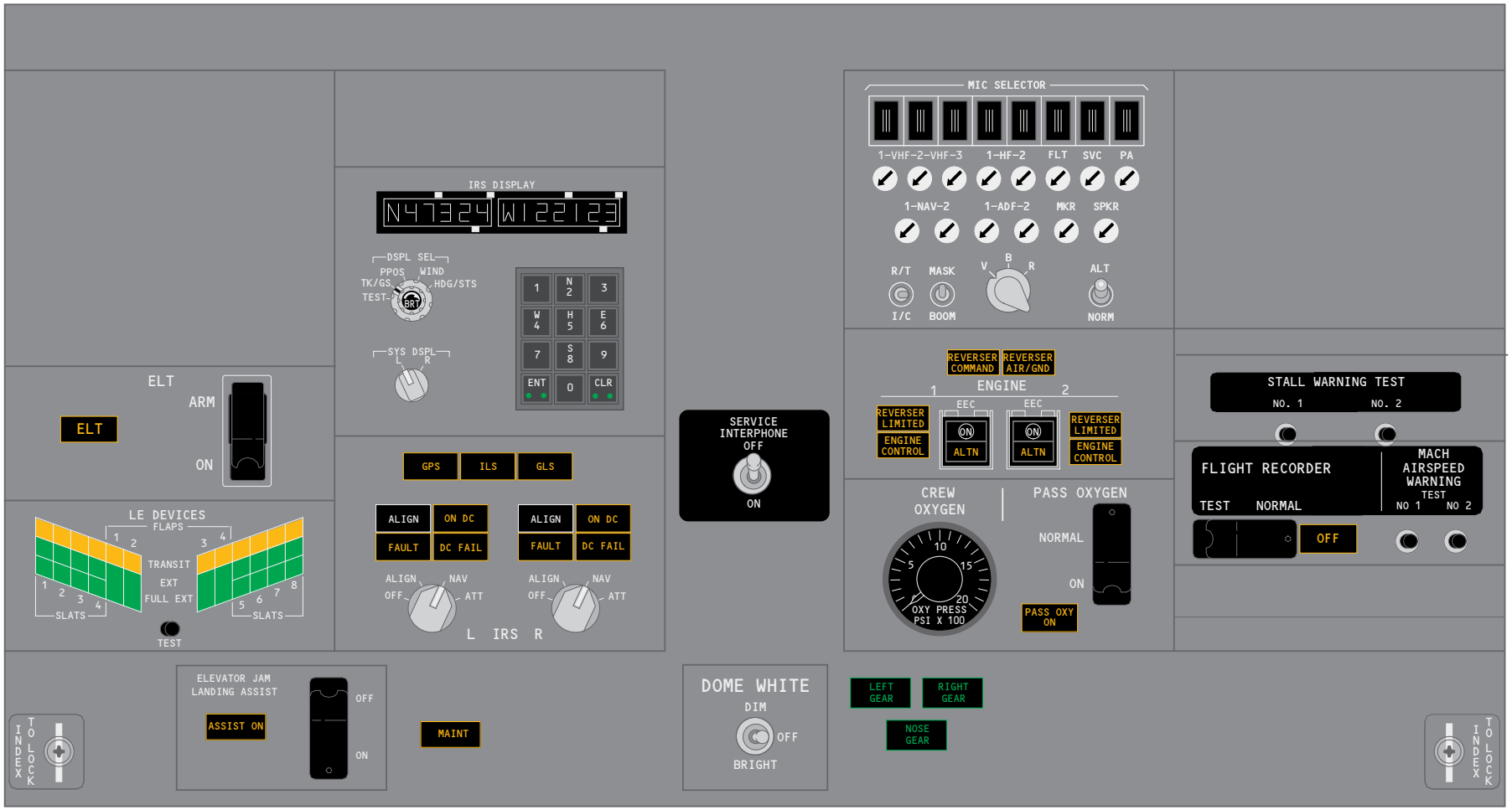

AFT OVERHEAD PANEL (P5)

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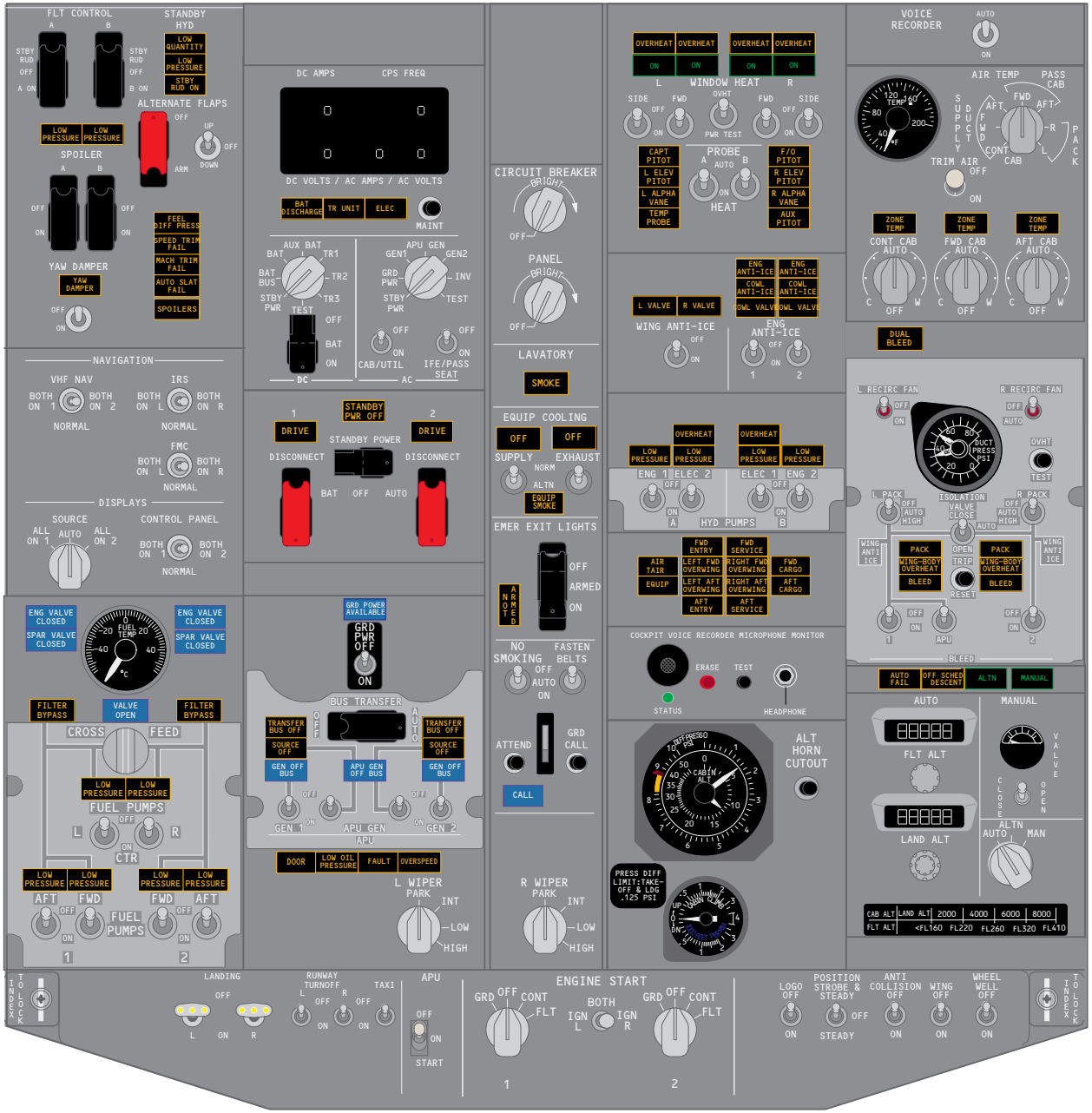

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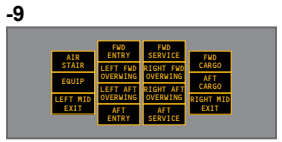

FWD OVERHEAD PANEL (P5)

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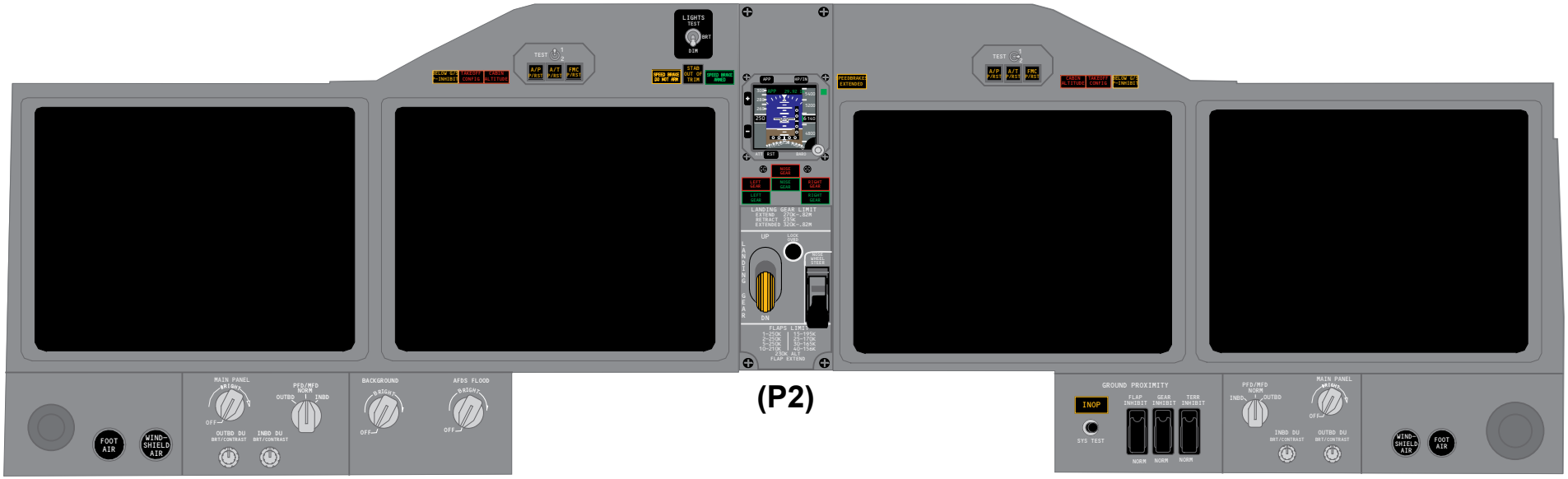

(P1) (P2) (P3)

INSTRUMENT PANELS AND GLARESHIELD

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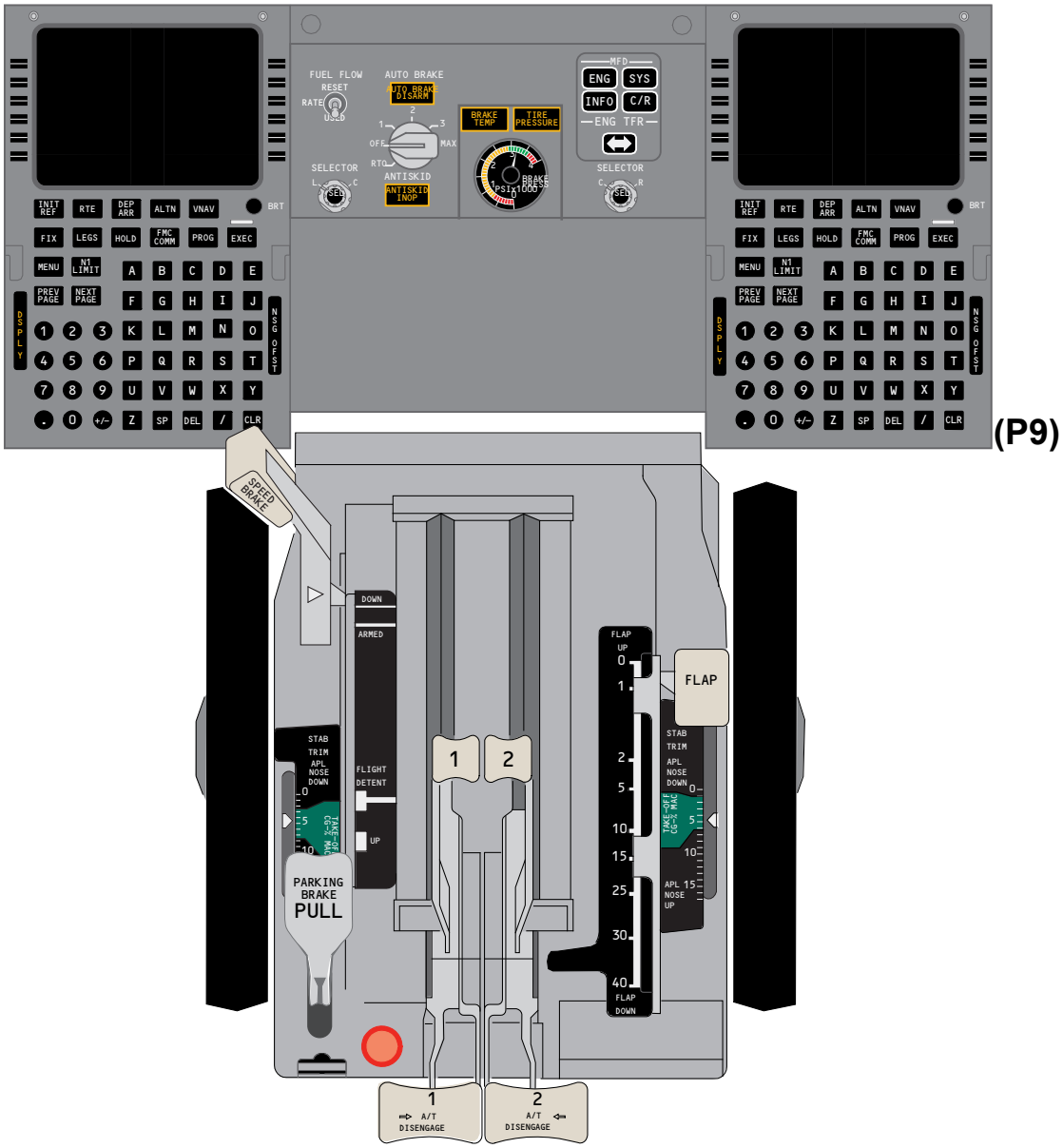

FWD ELECTRONIC PANEL AND CONTROL STAND

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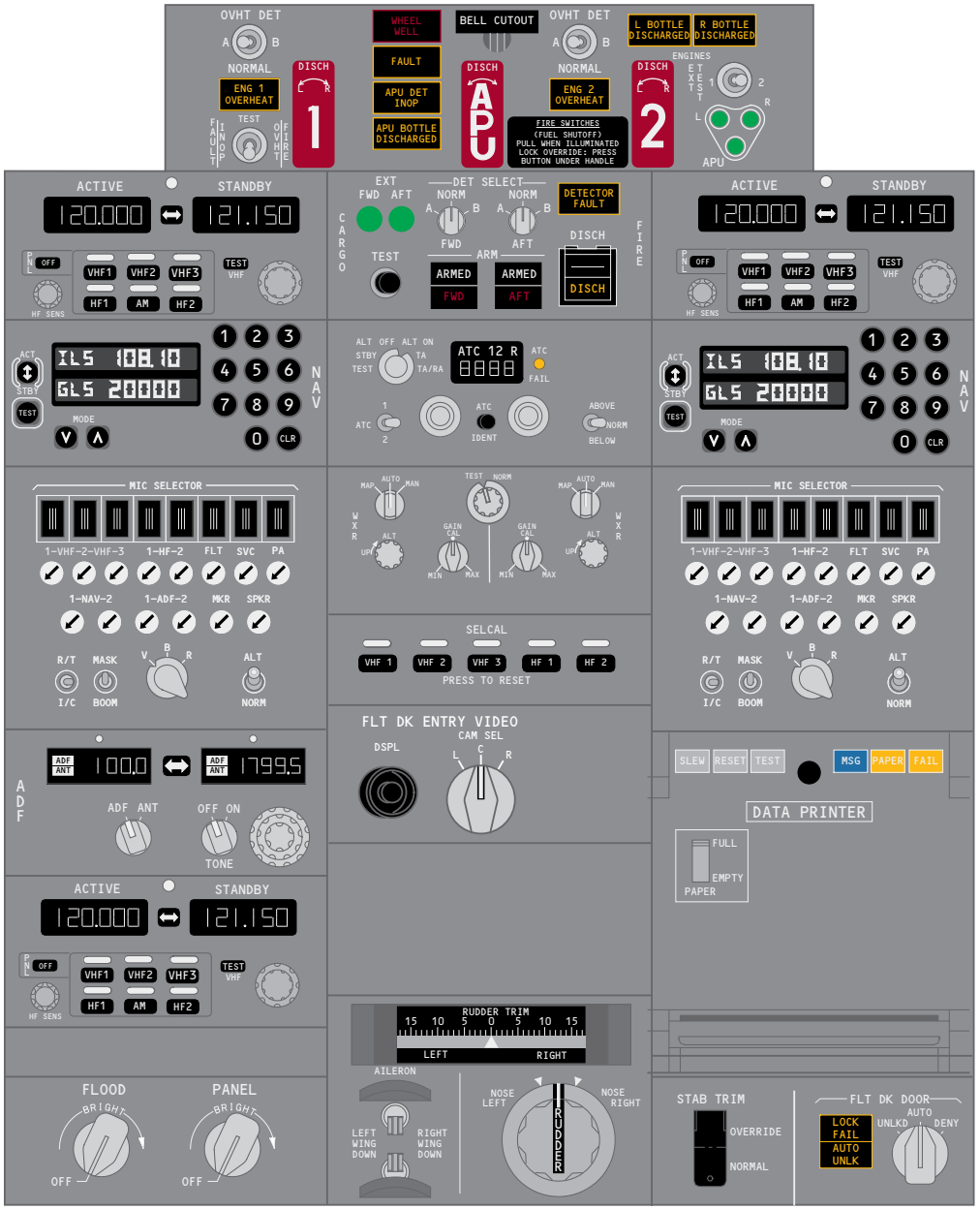

AFT ELECTRONIC PANEL (P8)

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ATA 21

Air Conditioning

Air Conditioning (ATA 21)

1 Air Temperature (TEMP) Indicator

Indicates temperature at location selected with AIR TEMP source selector.

2 ZONE TEMP Lights

Illuminated (amber) –

- CONT CAB indicates a duct temperature overheat or failure of the flight deck primary and standby temperature control
- FWD CAB or AFT CAB indicates duct temperature overheat.

During Master Caution light recall:

- CONT CAB indicates failure of the flight deck primary or standby temperature control
- either FWD CAB or AFT CAB indicates failure of the associated zone temperature control
- lights will extinguish when Master Caution is reset.

3 Temperature Selector

AUTO – provides automatic temperature control for the associated zones. Rotating the control toward C (cool) or W (warm) manually sets the desired temperature.

OFF – closes the associated trim air modulating valve.

4 Air Conditioning PACK Switch

OFF – turns pack OFF.

AUTO –

- with both packs operating, each pack regulates to low flow
- with one pack operating, operating pack regulates to high flow in flight with flaps up
- when operating one pack from APU (both engine BLEED air switches OFF), regulates to high flow.

HIGH –

- pack regulates to high flow
- provides maximum flow rate on ground with APU BLEED air switch ON.

5 AIR Temperature (TEMP) Source Selector

SUPPLY DUCT – selects appropriate zone supply duct temperature

PASS CAB – selects forward or aft passenger cabin temperature

PACK – selects left or right pack temperatures.

6 TRIM AIR Switch

ON - trim air pressure regulating and shutoff valve signaled open.

OFF - trim air pressure regulating and shutoff valve signaled closed.

7 Recirculation (RECIRC) FAN Switches

OFF – turns fan off.

AUTO –

- in-flight –
  - the left recirculation fan operates if both packs are operating unless either PACK switch is in HIGH
  - the right recirculation fan operates if both packs are operating unless both PACK switches are in HIGH.
- on the ground –
  - the left recirculation fan operates unless both PACK switches are in HIGH
  - the right recirculation fan operates even if both PACK switches are in HIGH.

8 PACK Light

Illuminated (amber) –

- indicates pack trip off or failure of both primary and standby pack controls, or

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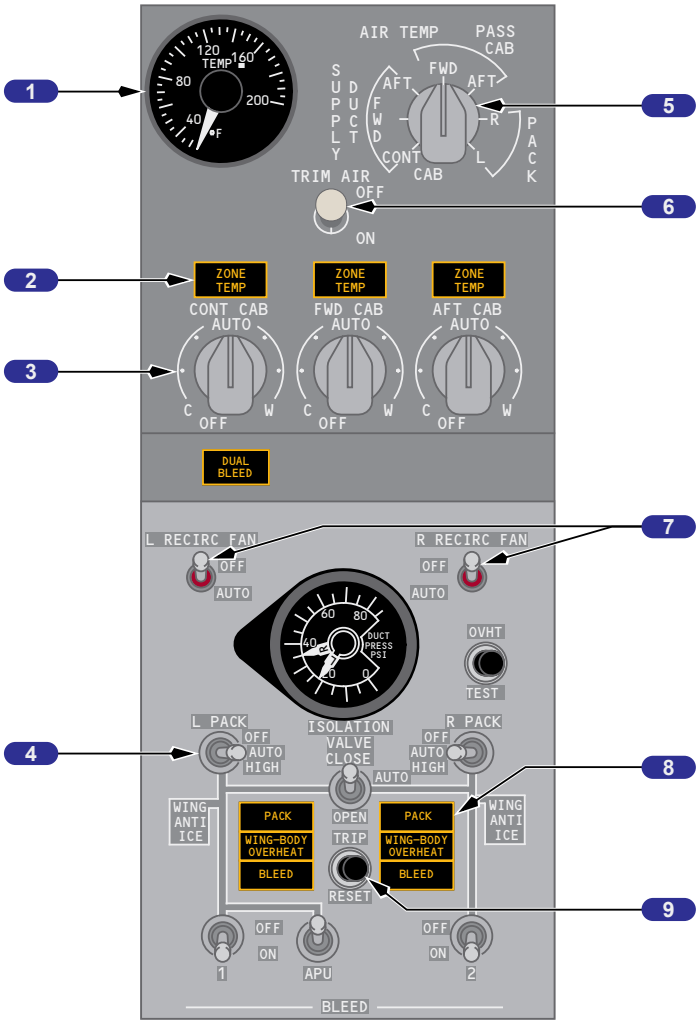
- indicates failure of the Flow Control Valve to open when commanded on, or
- during Master Caution recall, indicates failure of either primary or standby pack control. Extinguishes when Master Caution is reset

9 TRIP RESET Switch

Push (if fault condition is corrected) –

- resets PACK, ZONE TEMP, and BLEED lights
- related engine bleed valve opens, or related pack valve opens, or related trim air modulating valve opens
- lights remain illuminated until reset.



TEMPERATURE CONTROL MODULE, AND IR CONDITIONING MODULE (FWD P5)

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Bleed Air Controls and Indications

1 DUAL BLEED Light

Illuminated (amber) – APU bleed air valve open and engine No. 1 BLEED air switch ON, or engine No. 2 BLEED air switch ON, APU bleed air valve and isolation valve open.

2 ISOLATION VALVE Switch

CLOSE – closes isolation valve.

AUTO –

- closes isolation valve if both engine BLEED air switches are ON and both air conditioning PACK switches are AUTO or HIGH
- opens isolation valve automatically if either engine BLEED air or air conditioning PACK switch positioned OFF.

OPEN – opens isolation valve.

3 WING – BODY OVERHEAT Light

Illuminated (amber) –

- left light indicates overheat from bleed air duct leak in the left engine strut, left inboard wing leading edge, left air conditioning bay, keel beam or APU bleed air duct
- right light indicates overheat from bleed air duct leak in the right engine strut, right inboard wing leading edge, or right air conditioning bay.

4 Engine BLEED Air Switch

OFF – closes engine Pressure Regulating Shutoff Valve (PRSOV).

ON – opens engine Pressure Regulating Shutoff Valve (PRSOV) when engines are operating.

5 APU BLEED Air Switch

OFF – closes APU bleed air valve.

ON – opens APU bleed air valve when APU is operating.

6 Bleed Air DUCT PRESSURE Indicator

Indicates pressure in L and R (left and right) bleed air ducts.

7 Wing - Body Overheat (OVHT) TEST Switches

Push –

- tests wing–body overheat detector circuits
- illuminates both WING–BODY OVERHEAT lights
- illuminates both MASTER CAUTION lights
- illuminates AIR COND light.

8 BLEED Light

Illuminated (amber) – excessive engine bleed air temperature, over-pressure, or under pressure.

- related engine PRSOV closes automatically
- requires reset.

OR

Illuminated (amber) – a failure within the bleed air system, or an incorrect bleed air configuration after takeoff or go-around.

- bleed system failure may not be resettable
- turning either BLEED switch ON will extinguish both BLEED lights if illuminated because of a configuration problem.

9 TRIP RESET Switch

Push (if fault condition is corrected) –

- resets PACK, ZONE TEMP, and BLEED lights
- related engine bleed valve opens, or related pack valve opens, or related trim air modulating valve opens
- lights remain illuminated until reset.

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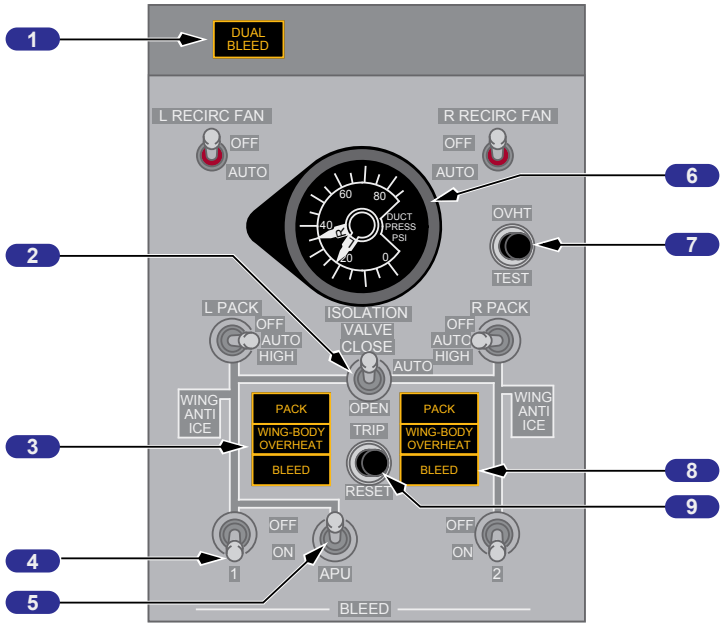


AIR CONDITIONING MODULE (FWD P5)

Equipment Cooling Panel

1 Equipment (EQUIP) COOLING SUPPLY OFF Light

Illuminated (amber) – no airflow from selected cooling supply fan.

2 Equipment (EQUIP) COOLING SUPPLY Switch

NORM – normal cooling supply fan activated.

ALTN – alternate cooling supply fan activated.

3 Equipment (EQUIP) COOLING EXHAUST OFF Light

Illuminated (amber) – no airflow from selected cooling exhaust fan.

4 Equipment (EQUIP) COOLING EXHAUST Switch

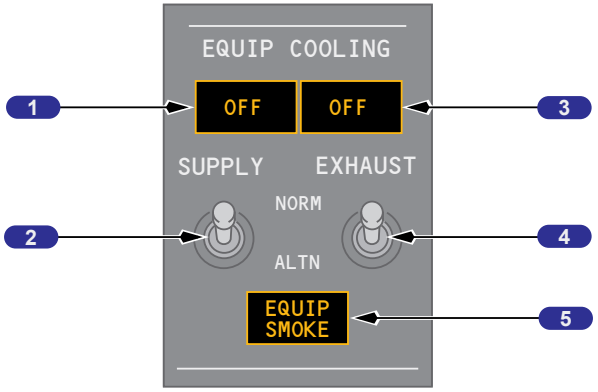
NORM – normal cooling exhaust fan activated.

ALTN – alternate cooling exhaust fan activated.

5 Equipment (EQUIP) COOLING EQUIP SMOKE Light

Illuminated (amber) – Smoke is detected in the equipment cooling system.

- light extinguishes 30 seconds after smoke is no longer detected.



OVERHEAD PANEL (FWD P5)

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Cabin Altitude Panel

1 CABIN ALTITUDE (ALT)/Differential Pressure (DIFF PRESS) Indicator

Inner Scale – indicates cabin altitude in feet.

Outer Scale – indicates differential pressure between cabin and ambient in psi.

2 CABIN Rate of CLIMB Indicator

Indicates cabin rate of climb or descent in feet per minute.

3 Altitude (ALT) HORN CUTOUT Switch

Push –

- cuts out intermittent cabin altitude warning horn
- altitude warning horn sounds when cabin reaches 10,000 feet altitude.

4 High Altitude Landing (HIGH ALT LDG) Switch (Optional)

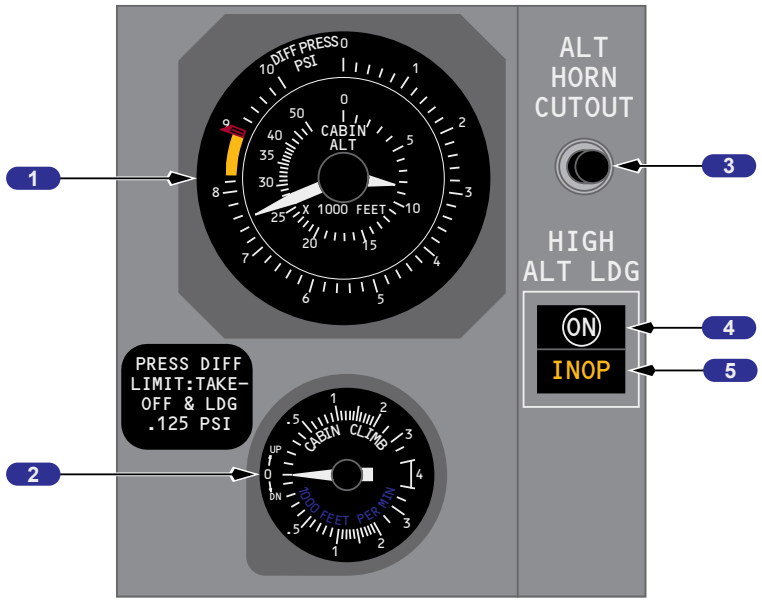
ON (white) – reprograms initiation of cabin altitude warning annunciation from 10,000 to 15,000 feet.

OFF – (ON not visible)

- reprograms cabin pressurization from high altitude to normal operation
- extinguishes INOP light.

5 High Altitude Landing INOP Light

Illuminated (amber) – indicates high altitude landing system fault.



CABIN ALTITUDE PANEL (FWD P5)

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Cabin Pressure Control Panel

1 AUTO FAIL Light

Illuminated (amber) – automatic pressurization system failure detected:

- indicates a single controller failure when ALTN light is also illuminated
- indicates a dual controller failure when illuminated alone.

2 OFF Schedule (SCHED) DESCENT Light

Illuminated (amber) – airplane descended before reaching the planned cruise altitude set in the FLT ALT indicator.

3 Flight Altitude (FLT ALT) Indicator

- indicates selected cruise altitude
- set before takeoff.

4 Flight Altitude Selector

Rotate – set planned cruise altitude.(-1,000 ft. to 42,000 ft. in 500 ft. increments).

5 Landing Altitude (LAND ALT) Indicator

- indicates altitude of intended landing field
- set before takeoff.

6 Landing Altitude Selector

Rotate – select planned landing field altitude. (-1,000 ft. to 14,000 ft. in 50 ft. increments).

7 MANUAL Light

Illuminated (green) – pressurization system operating in the manual mode.

8 Alternate (ALTN) Light

Illuminated (green) – pressurization system operating in the alternate automatic mode:

- Illumination of both ALTN and AUTO FAIL lights indicates a single controller failure and automatic transfer to ALTN mode
- pressurization mode selector in ALTN position.

9 Outflow VALVE Position Indicator

- indicates position of outflow valve
- operates in all modes.

10 Outflow Valve Switch (spring–loaded to center)

CLOSE – closes outflow valve electrically with pressurization mode selector in MAN position.

OPEN – opens outflow valve electrically with pressurization mode selector in MAN position.

11 Pressurization Mode Selector

AUTO – pressurization system controlled automatically.

ALTN – pressurization system controlled automatically using ALTN controller.

MAN –

- pressurization system controlled manually by outflow valve switch
- both auto controllers bypassed.

12 Cabin Altitude/Flight Altitude (CAB ALT)(FLT ALT) Placard

Used to determine setting for cabin altitude when operating in manual mode.

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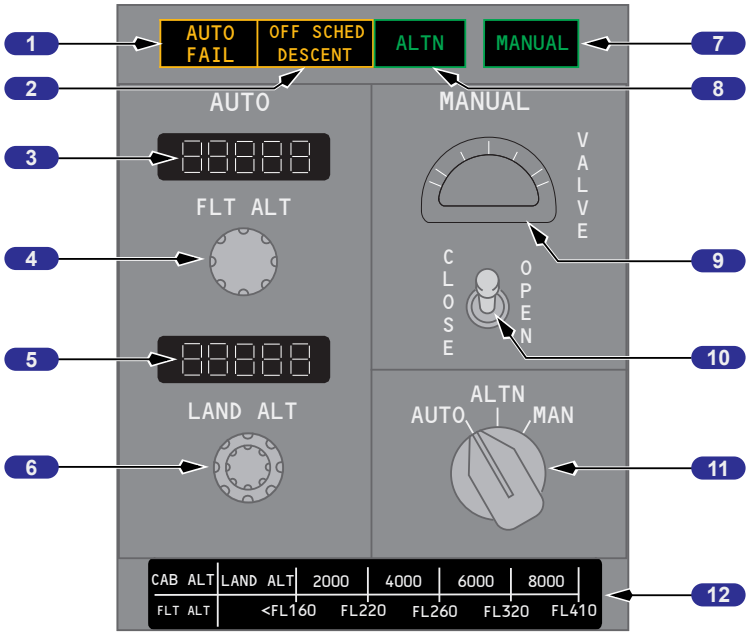

CABIN PRESSURE CONTROL MODULE (FWD P5)

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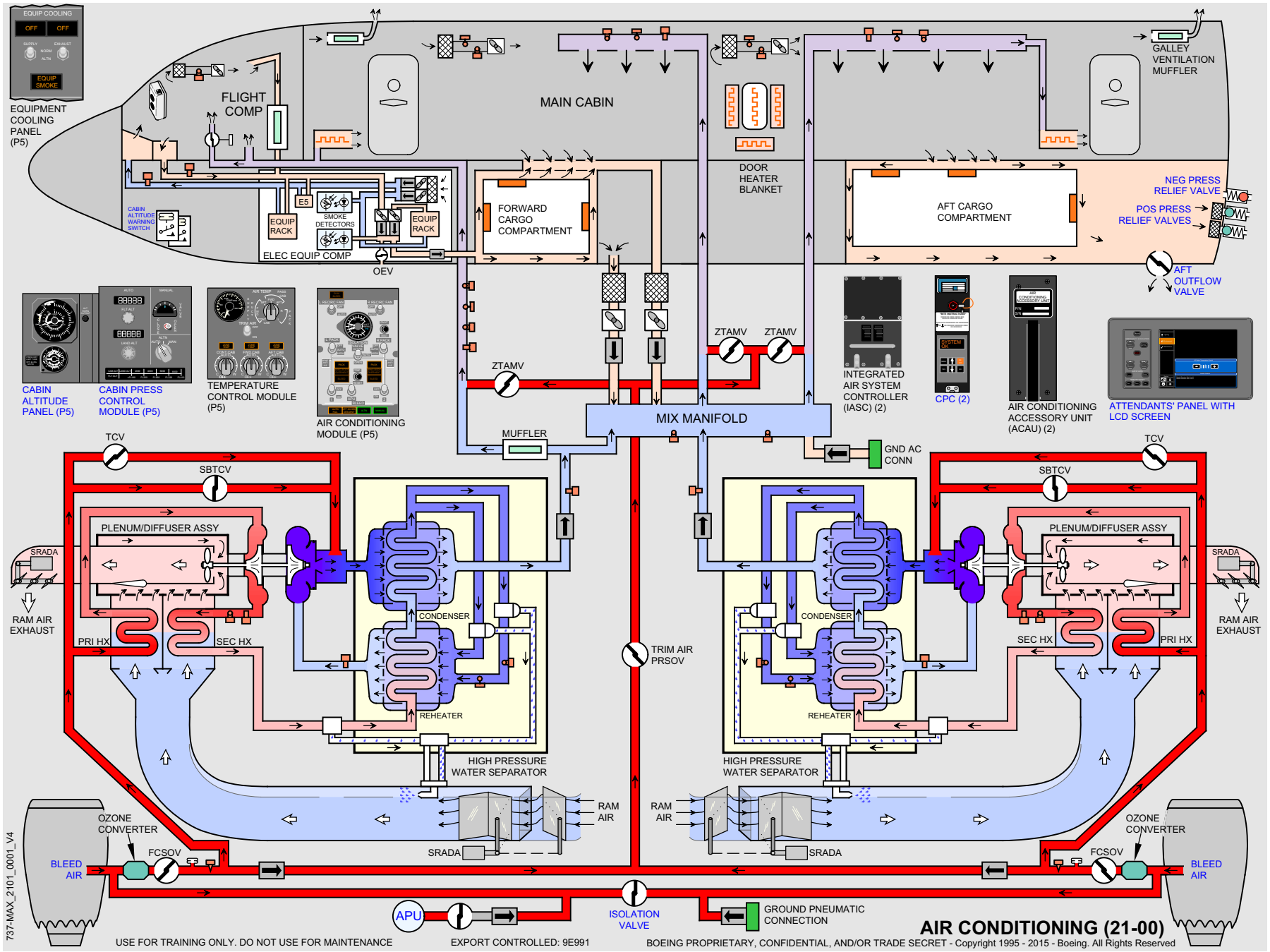

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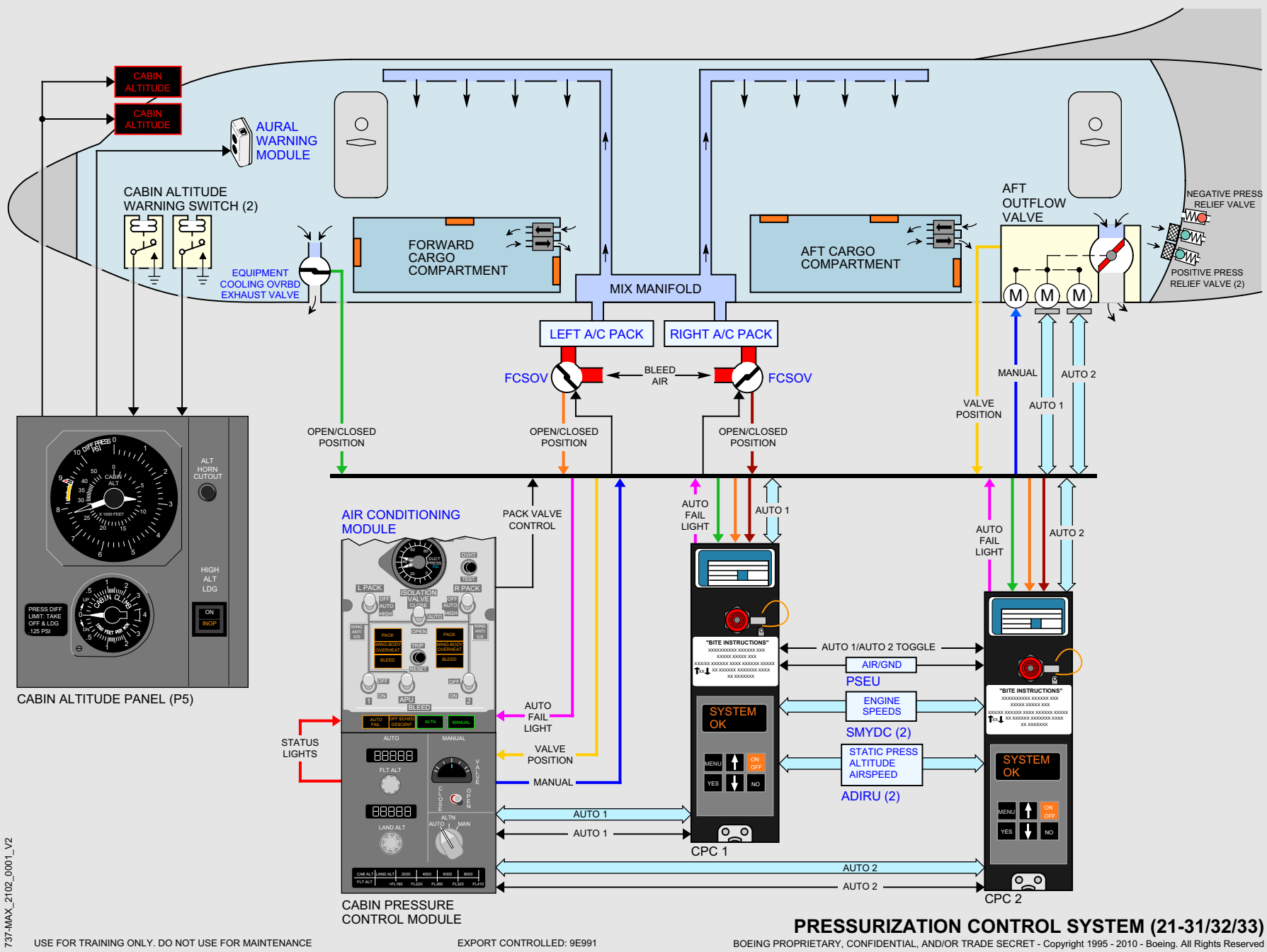

PRESSURIZATION CONTROL SYSTEM (21-31/32/33)

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ATA 22

Auto Flight

Auto Flight (ATA 22)

Mode Control Panel (MCP)

1 Autothrottle (A/T) ARM Switch

ARM – Arms A/T for engagement. Magnetically held at ARM. A/T engages automatically when following DFCS modes are engaged:

- LVL CHG
- ALT ACQ
- V/S
- VNAV
- ALT HOLD
- G/S capture
- TO/GA.

The indicator light illuminates green when A/T ARM switch is in the ARM position.

OFF – disengages A/T and prevents A/T engagement.

2 Changeover (C/O) Switch

Push –

- changes IAS/MACH display between IAS and MACH
- automatic changeover occurs at approximately FL260.

3 MCP Speed Condition Symbols

Overspeed or underspeed limiting symbol appears when commanded speed cannot be reached.

Underspeed limiting (flashing character “A”) – minimum speed

Overspeed limiting (flashing character “8”) –

- Vmo or Mmo limit
- landing gear limit
- flap limit.

4 IAS/MACH Display

Displays speed selected by IAS/MACH selector

- display is blank when:
  - VNAV mode engaged
  - A/T engaged in FMC SPD mode
  - during 2 engine AFDS go–around
- displays 100 knots when power is first applied
- display range is:
  - 100 KIAS – Vmo in 1 knot increments
  - .60M – Mmo in .01M increments.

5 N1 Switch

Push – (light not illuminated)

- engages A/T in N1 mode if compatible with DFCS modes already engaged
- illuminates N1 switch light
- annunciates N1 autothrottle mode.

Push – (light illuminated)

- deselects N1 mode and extinguishes switch light
- engages autothrottles in ARM mode.

N1 Mode

- A/T maintains thrust at N1 limit selected from FMC CDU. N1 mode engaged manually by pushing N1 switch if N1 mode is compatible with existing DFCS modes. N1 mode engages automatically when:
  - engaging LVL CHG in climb (except during inhibit period for 2 1/2 minutes after lift-off)
  - engaging VNAV in climb.

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6 SPEED Switch

Push – (light not illuminated)

- engages A/T in SPEED mode if compatible with engaged AFDS modes
- illuminates SPEED switch light
- annunciates MCP SPD autothrottle mode
- maintains speed in MCP IAS/MACH display.

Push – (light illuminated)

- deselects speed mode and extinguishes switch light
- engages A/T in ARM mode.

Speed Mode

Autothrottle holds speed in IAS/MACH display or a performance or limit speed. Speed mode engaged manually by pushing SPEED switch if speed mode is compatible with existing DFCS modes. Speed mode engages automatically when:

- ALT ACQ engages
- ALT HOLD engages
- V/S engages
- G/S capture occurs.

A/T does not set thrust above displayed N1 limit, however, A/T can exceed N1 value manually set by N1 Manual Set Knob.

7 IAS/MACH Selector

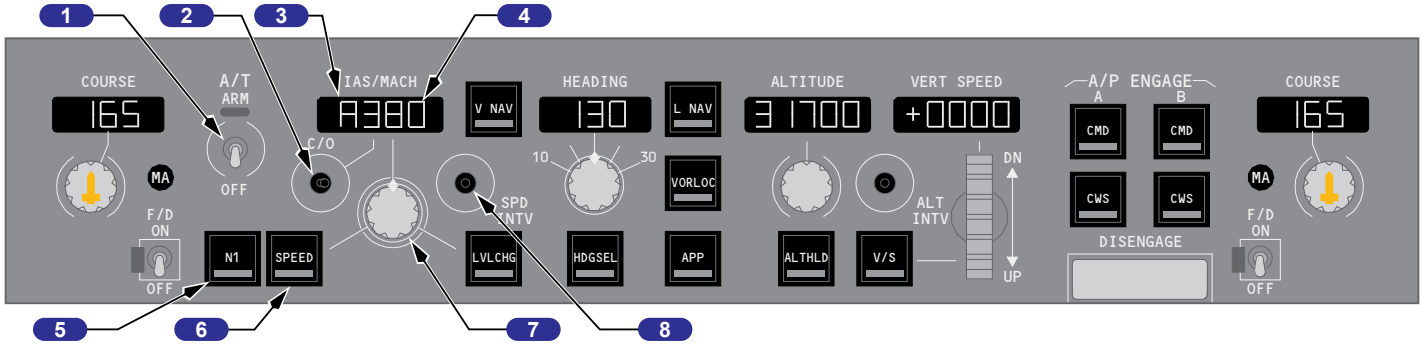
Rotate –

- sets speed in IAS/MACH display and positions airspeed cursor
- selected speed is reference speed for DFCS and A/T
- not operative when IAS/MACH display is blank.

8 Speed Intervention (SPD INTV) Switch

Push (when VNAV engaged) –

- IAS/MACH display alternately shows selected IAS/Mach and blanks
- when IAS/MACH display is unblanked, FMC speed intervention is active, FMC target speed is displayed, and IAS/MACH Selector may be used to set desired speed
- when IAS/MACH display is blank, FMC computed target speed is active and displayed on the airspeed indicator.



MODE CONTROL PANEL (P7)

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9 VNAV Switch

Push –

- VNAV switch light illuminates
- pitch mode annunciates VNAV SPD, VNAV PTH, or VNAV ALT
- A/T mode annunciates FMC SPD, N1, RETARD, or ARM
- IAS/MACH display blanks and airspeed cursors positioned to FMC commanded airspeed.

VNAV Mode

The FMC commands AFDS pitch and autothrottle to fly vertical profile selected on FMC CDUs. Profile includes climb, cruise, descent, speeds, and can also include waypoint altitude constraints.

VNAV arm criteria on the ground:

- a valid flight plan has been entered.
- performance data has been entered and executed.
- both flight director switches have been switched on.
- VNAV guidance becomes active at 400 feet AGL

Climb –

- autothrottle holds FMC thrust limit
- DFCS holds FMC target speed
- automatic level-off occurs at MCP altitude or VNAV altitude, whichever is reached first
  - MCP constrained altitude annunciates VNAV ALT
  - VNAV constrained altitude annunciates VNAV PTH.

Cruise –

- autothrottle holds FMC target speed
- DFCS holds FMC altitude
- selecting a lower MCP altitude arms FMC to automatically begin descent upon arrival at FMC top of descent point.

Descent –

- VNAV SPD descent
  - autothrottle holds idle
  - DFCS holds FMC target speed.
- VNAV PTH descent
  - autothrottle holds idle but can command FMC SPD mode if ground speed becomes too low to maintain FMC vertical path
  - DFCS tracks FMC descent path.
- automatic level-off occurs at MCP altitude or VNAV altitude, whichever is reached first
  - MCP constrained altitude annunciates VNAV ALT
  - VNAV constrained altitude annunciates VNAV PTH.

Inhibited below 400 ft RA or if performance initialization not complete.

VNAV mode is terminated by any one of the following:

- selecting another pitch mode
- glideslope capture
- reaching end of LNAV route
- transition of glideslope intercept waypoint if G/S is armed
- crosstrack deviation exceeds twice the RNP value during PTH descent for an active leg with a database vertical angle and LNAV not engaged

In the event of glideslope intercept waypoint transition, VNAV can be re-engaged.

10 ALTITUDE Display

Displays selected altitude

- displayed altitude is reference for altitude alerting and automatic level–offs
- altitude range is 0 to 50,000 feet in 100 foot increments
- displays previously selected altitude when power first applied.

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11 Vertical Speed (VERT SPEED) Display

Displays:

- blank when V/S mode not active
- present V/S when V/S mode is engaged with V/S switch
- selected V/S when V/S set with thumbwheel
- range is –7900 to +6000 fpm.

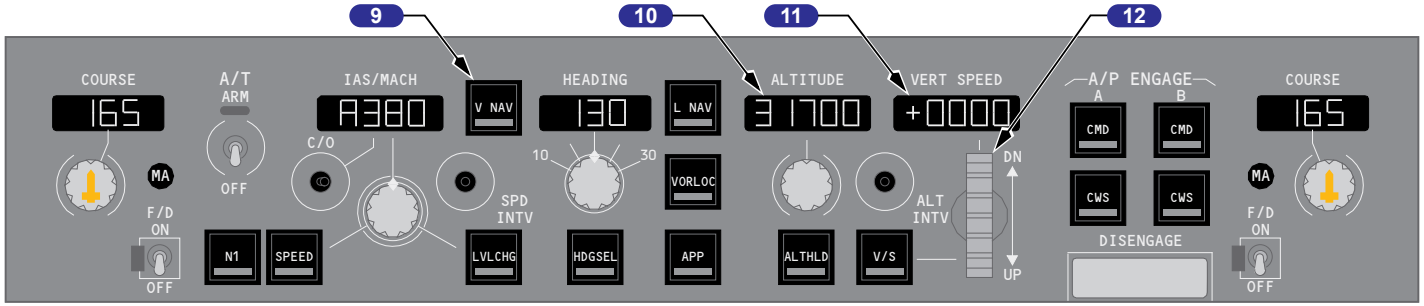
Display increments are:

- 50 fpm if V/S is less than 1000 fpm
- 100 fpm if V/S is 1000 fpm or greater.

12 Vertical Speed Thumbwheel

Rotate –

- DN –
  - sets vertical speed in VERT SPEED display
  - increases rate of descent or reduces rate of ascent.
- UP –
  - sets vertical speed in VERT SPEED display
  - increases rate of ascent or reduces rate of descent.



MODE CONTROL PANEL (P7)

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13 Level Change (LVL CHG) Switch

Push –

- LVL CHG switch light illuminates
- pitch mode annunciates MCP SPD for climb or descent
- autothrottle mode annunciates N1 for climb and RETARD followed by ARM for descent
- IAS/MACH display and airspeed cursors display target speed.

LVL CHG Mode

The LVL CHG mode coordinates pitch and thrust commands to make automatic climbs and descents to preselected altitudes at selected airspeeds.

A LVL CHG climb or descent is initiated by:

- selecting a new altitude
- pushing LVL CHG switch
- setting desired airspeed.

Climb –

- autothrottle holds limit thrust
- DFCS holds selected airspeed.

Descent –

- autothrottle holds idle thrust
- DFCS holds selected airspeed.

Airspeed –

- if a speed mode is active when LVL CHG is engaged, this speed is retained as target speed
- if a speed mode is not active when LVL CHG is engaged, existing speed becomes target speed
- speed can be changed with MCP IAS/MACH Selector.

The LVL CHG mode is inhibited after glideslope capture.

14 Altitude Selector (SEL)

Rotate –

- sets altitude in ALTITUDE display in 100 foot increments
- arms V/S mode if rotated while in ALT HOLD at selected altitude.

15 Altitude Hold (ALT HLD) Switch

Push –

- engages ALT HOLD command mode
- commands pitch to hold uncorrected barometric altitude at which switch was pressed
- annunciates ALT HOLD pitch mode and illuminates ALT HLD switch light.

Altitude Hold Command Mode

ALT HOLD mode commands pitch to hold either:

- MCP selected altitude
  - pitch mode annunciates ALT HOLD
  - ALT HLD switch light extinguishes.
- uncorrected barometric altitude at which ALT HLD switch was pressed if not at MCP selected altitude
  - pitch mode annunciates ALT HOLD
  - ALT HLD switch light illuminates.

When in ALT HOLD at selected MCP altitude:

- selecting a new MCP altitude illuminates the ALT HLD switch light and arms V/S mode
- LVL CHG, V/S, and VNAV climb and descent functions are inhibited until a new MCP altitude is selected.

ALT HOLD mode is inhibited after G/S capture.

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The selected MCP altitude is referenced to:

- Captain's barometric altimeter setting for A A/P and F/D
- First Officer's barometric altimeter setting for B A/P and F/D.

Note: After ALT HOLD engages, changes in altimeter barometric settings do not change the selected altitude reference.

16 Vertical Speed (V/S) Switch

Push –

- arms or engages V/S command mode
- commands pitch to hold vertical speed
- engages A/T in speed mode to hold selected airspeed
- annunciates V/S pitch mode and illuminates V/S switch light.

Vertical Speed Command Mode

The V/S mode commands pitch to hold selected vertical speed and engages A/T in SPEED mode to hold selected airspeed. V/S mode has both an armed and an engaged state.

Engaged –

- annunciates V/S pitch mode
- vertical speed display changes from blank to present vertical speed
- desired vertical speeds can be selected with vertical speed thumbwheel.

V/S becomes armed if:

- pitch mode is ALT HLD at selected MCP altitude and
- new MCP altitude is selected (more than 100 feet from current altitude).

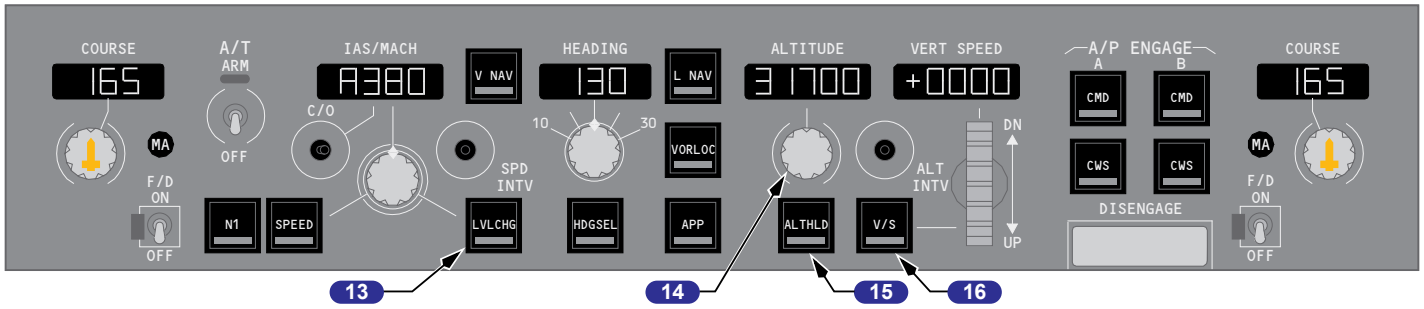
With V/S armed, V/S mode is engaged by moving vertical speed thumbwheel.

V/S mode automatically engages if ALT ACQ mode is engaged and a new MCP altitude is selected which is more than 100 feet different from previously selected altitude.

- vertical speeds can be selected which command flight toward or away from selected altitude.

Inhibited if:

- ALT HOLD mode is active at selected MCP altitude
- glideslope captured in APP mode.



MODE CONTROL PANEL (P7)

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17 Altitude Intervention (ALT INTV) Switch

Allows manual deletion of next FMC altitude constraint via altitude SEL and ALT INTV switch.

Push – (during VNAV climb)

- lowest FMC altitude constraint below selected MCP altitude is deleted
- if airplane is currently at an FMC altitude constraint, deletion allows airplane to resume climb. MCP altitude must be set above current altitude
- for each press of switch, one deletion occurs
- if MCP altitude is set above current FMC altitude, FMC cruise altitude resets to MCP altitude. FMC cruise altitude cannot be decreased using ALT INTV switch.

Push – (during VNAV cruise)

- if MCP altitude is set above current FMC cruise altitude, FMC resets cruise altitude to MCP altitude and initiates a cruise climb
- if MCP altitude is set below current FMC cruise altitude, an early descent is initiated. Lower FMC cruise altitude cannot be entered using ALT INTV switch.

Push – (during VNAV descent)

- the highest FMC altitude constraint above MCP altitude is deleted
- if airplane is currently at an FMC altitude constraint, deletion allows airplane to continue descent. MCP altitude must be set below current altitude
- if all FMC altitude constraints are deleted during VNAV path descent, an automatic transition to a VNAV speed descent is made.

18 COURSE Display

Displays course set by course selector.

Note: Different courses and frequencies on two VHF NAV receivers can cause disagreement between Captain and FO F/D displays and affect A/P operation.

19 Heading Selector

Rotate –

- sets heading in HEADING display
- positions selected heading bugs on the DUs.

20 HEADING Display

Displays selected heading.

21 LNAV Switch

Push –

- commands DFCS roll to intercept and track the active FMC route
- annunciates LNAV as roll mode and illuminates LNAV switch light.

LNAV Mode

In LNAV mode, the FMC controls DFCS roll to intercept and track active FMC route. Active route is entered and modified through FMC CDUs and can include SIDs, STARs, and instrument approaches.

LNAV arming criteria on the ground:

- origin runway in flight plan
- active route entered in FMC

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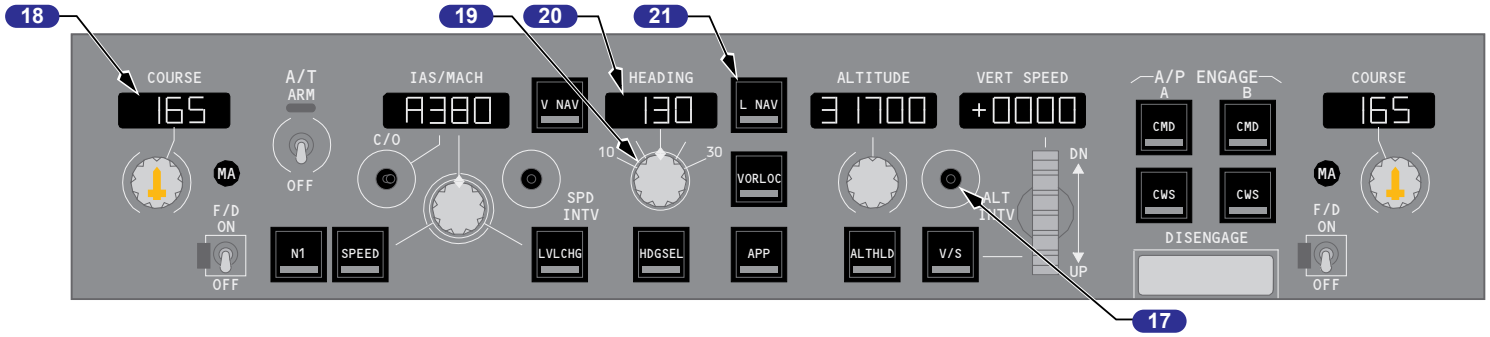
- track of first leg within 5 degrees of runway heading
- LNAV selected prior to TO/GA.
  - LNAV guidance becomes active at 50 feet AGL
  - bank angle is limited to 8 degrees below 200 feet and 30 degrees above 200 feet AGL.

LNAV engagement criteria in flight:

- active route entered in FMC
- within 3 NM of active route, LNAV engagement occurs with any airplane heading
- outside of 3 NM, airplane must:
  - be on intercept course of 90 degrees or less
  - intercept route segment before active waypoint.

LNAV automatically disconnects for following reasons:

- reaching end of active route
- reaching a route discontinuity
- intercepting a selected approach course in VOR LOC or APP modes (VOR/LOC armed)
- selecting HDG SEL
- loss of capture criteria.



MODE CONTROL PANEL (P7)

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22 VOR Localizer (LOC) Switch

Push –

- commands DFCS roll to capture and track selected VOR or LOC course
- annunciates VOR/LOC armed or engaged as roll mode and illuminates VOR LOC switch light.

VOR LOC Mode

Pushing the VOR LOC switch selects VOR mode if a VOR frequency is tuned or selects LOC mode if a localizer frequency is tuned.

The VOR mode provides roll commands to track selected VOR course.

The LOC mode provides roll commands to track selected localizer course along inbound front course bearing.

The selected course can be intercepted while engaged in:

- LNAV
- HDG SEL
- CWS R if an autopilot is engaged in CMD.

The capture point is variable and depends on intercept angle and closure rate. Localizer capture occurs not later than 1/2 dot deviation. Course capture is indicated when VOR/LOC annunciation changes from armed to engaged.

While engaged in VOR or LOC modes:

- A autopilot and Captain's F/D use information from Captain's course selector and No. 1 VHF NAV receiver
- B autopilot and First Officer's F/D use information from First Officer's course selector and No. 2 VHF NAV receiver
- different courses and/or frequencies for two VHF NAV receivers can cause disagreement between the Captain's and First Officer's F/D displays and affect A/P operation.

Note: When a localizer frequency is selected, VHF NAV radios automatically switch from tail antenna to nose antenna when VOR/LOC is annunciated (armed or engaged). If antenna switching does not occur, LOC mode is inhibited.

Note: Localizer backcourse tracking is not available.

23 Course Selector

Sets course in COURSE display for related VHF NAV receiver, DFCS and DU. Two course selectors and COURSE displays are located on the MCP.

Rotate Captain's course selector – provides selected course information to:

- A FCC
- No. 1 VHF NAV receiver
- Captain's course pointer and course deviation bar.

Note: In VOR LOC or APP mode, the A A/P and Captain's F/D use selected course and navigation data from the No. 1 VHF NAV receiver.

Rotate First Officer's course selector – provides selected course information to:

- B FCC
- No. 2 VHF NAV receiver
- First Officer's course pointer and course deviation bar.

Note: In VOR LOC or APP mode, B A/P and First Officer's F/D use selected course and navigation data from No. 2 VHF NAV receiver.

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24 Bank Angle Selector

Rotate –

- sets maximum bank angle for DFCS operation in HDG SEL or VOR modes
- commanded bank angle can be selected at 10, 15, 20, 25, or 30 degrees.

25 Heading Select (HDG SEL) Switch

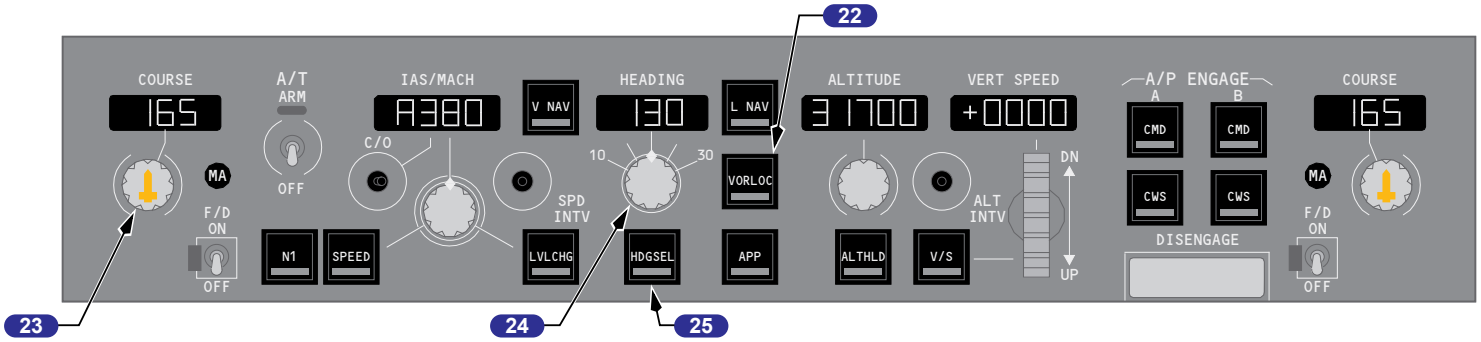
Push –

- engages HDG SEL command mode
- commands roll to follow selected heading
- annunciates HDG SEL as FMA roll mode and illuminates HDG SEL switch light.

Heading Select Command Mode

The HDG SEL mode commands roll to turn to and maintain heading shown in MCP HEADING display:

- initial selection commands turn in shortest direction toward selected heading bug
- after mode engagement, roll commands are given to turn in same direction as rotation of heading selector
- bank angle limit is established by bank angle selector
- HDG SEL mode automatically disengages upon capture of selected radio course in VOR LOC and APP modes (VOR/LOC armed).



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26 Approach (APP) Switch

Push –

- illuminates APP switch light
- arms the DFCS for localizer and glideslope capture
- roll mode annunciates VOR/LOC armed
- pitch mode annunciates G/S armed
- enables engagement of both autopilots.

APP Mode

The approach mode arms DFCS to capture and track localizer and glideslope and can be engaged for dual or single autopilot operation.

One VHF NAV receiver must be tuned to an ILS frequency before approach mode can be engaged. With one VHF NAV receiver tuned, onside DFCS is enabled for guidance and operation.

For dual autopilot operation, both VHF NAV receivers must be tuned to the ILS frequency and both autopilots must be selected in CMD prior to 800 feet RA.

APP mode operation:

- localizer must be captured prior to glideslope
- localizer can be intercepted in HDG SEL, LNAV, or CWS R
- SINGLE CH annunciates in A/P Status Display after localizer capture
  - for single autopilot approach, SINGLE CH remains annunciated for entire approach
  - for dual autopilot approach, SINGLE CH annunciation extinguishes when second autopilot engages and FLARE armed is annunciated
- glideslope capture occurs at 2/5 dot below glideslope
- APP switch light extinguishes after localizer and glideslope capture.

After localizer and glideslope capture, APP mode can be disengaged by:

- pushing a TO/GA switch
- disengaging autopilot(s) and turning off both F/D switches
- retuning the VHF NAV receiver.

While engaged in the APP mode:

- the A autopilot and Captain's F/D use information from Captain's Course Selector and No. 1 VHF NAV receiver
- the B autopilot and First Officer's F/D use information from First Officer's Course Selector and No. 2 VHF NAV receiver
- different courses and/or frequencies for the two VHF NAV receivers can cause disagreement between Captain's and First Officer's F/D displays and affect A/P operation.

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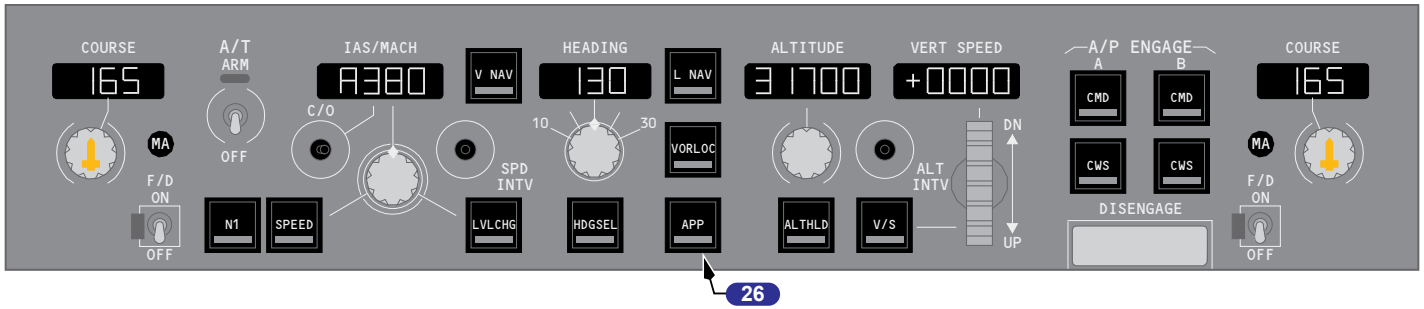

MODE CONTROL PANEL (P7)

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Autopilot / Flight Director

Pushing a CMD or CWS switch engages related A/P in CMD or CWS and illuminates switch lights. A/P can operate in CMD, CWS, or a combination of CMD and CWS.

27 Command Engage (CMD ENGAGE) Switch (A or B):

Push –

- engages A/P
- enables all command modes
- displays CMD in A/P status display
- pushing an engage switch for second A/P, while not in approach mode, engages second A/P and disengages first A/P
- enables CWS operation
- CWS engages if:
  - pitch or roll mode not selected
  - pitch or roll mode deselected
  - pitch or roll mode manually overridden with control column force.
- CWS engaged displays:
  - CWS P and/or CWS R in A/P status display
  - blank in pitch and/or roll mode FMA
- when approaching a selected altitude in CWS P, the pitch mode engages in ALT ACQ and ALT HOLD when reaching selected altitude
- when approaching a selected radio course in CWS R with VOR/LOC or approach mode armed, VOR/LOC engages when course is intercepted
- if pitch is manually overridden while in ALT HOLD and control force is released within 250 feet of selected altitude, A/P pitch mode engages in ALT ACQ and returns to selected altitude in ALT HOLD mode.

Note: During F/D only operation while pitch or roll commands are more than 1/2 scale from center, pushing a CMD A or B switch engages the A/P in CWS for pitch and/or roll and the related F/D bar(s) retract.

28 Control Wheel Steering Engage (CWS ENGAGE) Switch (A or B):

Push –

- engages A/P
- engages pitch and roll modes in CWS. Other pitch and roll modes not enabled
- displays CWS P and CWS R in A/P status display
- CMD not displayed in A/P status display
- F/Ds, if ON, display guidance commands and FD annunciates in A/P status display. A/P does not follow commands while in CWS
- A/P pitch and roll controlled by pilot with control wheel pressure
- when control pressure released, A/P holds existing attitude. If aileron pressure released with 6 degrees or less bank, the A/P rolls wings level and holds existing heading. Heading hold feature inhibited:
  - below 1500 feet RA with gear down
  - after LOC capture in APP mode
  - after VOR capture with TAS 250 knots or less.

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29 Autopilot Disengage (DISENGAGE) Bar

Pull down –

- exposes yellow background
- disengages both A/Ps
- prevents A/P engagement.

Lift up –

- conceals yellow background
- enables A/P engagement.

30 Master (MA) Flight Director Indicators (white letters)

If a F/D switch is ON, the light indicates which FCC is controlling the F/D modes.

- illuminated – related FCC is controlling F/D modes.
- extinguished – F/D modes are controlled from opposite FCC
- both lights illuminated – each FCC is controlling modes for related F/D.

31 Flight Director (F/D) Switch

Left F/D switch activates command bars on the Captain's attitude indicator. Right F/D switch activates command bars on the First Officer's attitude indicator.

ON –

- in flight with A/P ON and F/Ds OFF, turning a F/D switch ON engages F/D in currently selected A/P modes
- displays FD in A/P status display if A/P is OFF or engaged in CWS
- enables command bar display on related pilot's attitude indicator
- command bars are displayed if command pitch and/or roll modes are engaged
- on ground, arms pitch and roll modes for engagement in TO/GA and HDG SEL when TO/GA switch is pushed.

OFF – command bars retract from related pilot's attitude indicator.

MODE CONTROL PANEL (P7)

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Autopilot / Autothrottle Controls

1 Autopilot Disengage Switch

Push –

- disengages both autopilots
- A/P disengage lights flash
- A/P disengage warning tone sounds for a minimum of two seconds
- second push extinguishes disengage lights and silences disengage warning tone
- if autopilot automatically disengages, extinguishes A/P Disengage lights and silences A/P warning tone.

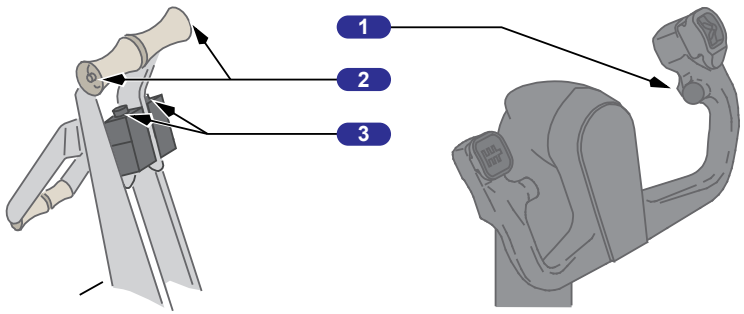
2 Autothrottle Disengage Switches

Push –

- disengages autothrottle
- A/T disengage lights flash
- A/T ARM switch trips OFF
- second press extinguishes A/T disengage lights
- extinguishes A/T disengage lights after automatic A/T disengagement.

3 Takeoff/Go–Around (TO/GA) Switches

Push – engages DFCS and A/T in takeoff or go–around mode if previously armed.



CONTROL STAND CONTROL WHEELS

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Autopilot / Autothrottle Indicators

1 Autopilot (A/P) Disengage Light

Illuminated (red) –

- flashes and tone sounds when autopilot has disengaged
- reset by pushing either disengage light or either A/P disengage switch
- steady for any of following conditions:
  - stabilizer out of trim below 800 feet RA on dual channel approach
  - ALT ACQ mode inhibited during A/P go–around if stabilizer not trimmed for single A/P operation
  - disengage light test switch held in position 2
  - automatic ground system tests fail.

Illuminated (amber) –

- steady – disengage light test switch held in position 1.
- flashing – A/P automatically reverts to CWS pitch or roll while in CMD. Resets by pushing either light or selecting another mode.

2 Autothrottle (A/T) Disengage Light

Illuminated (red) –

- flashing – autothrottle has disengaged
- steady – disengage light test switch held in position 2.

Illuminated (amber) –

- steady – disengage light test switch held in position 1
- flashing – indicates A/T airspeed error under following conditions:
  - inflight
  - flaps not up
  - airspeed differs from commanded value by +10 or -5 knots and is not approaching commanded value.

3 Disengage Light Test (TEST) Switch

TEST 1 – illuminates autopilot/autothrottle disengage and FMC alert lights steady amber.

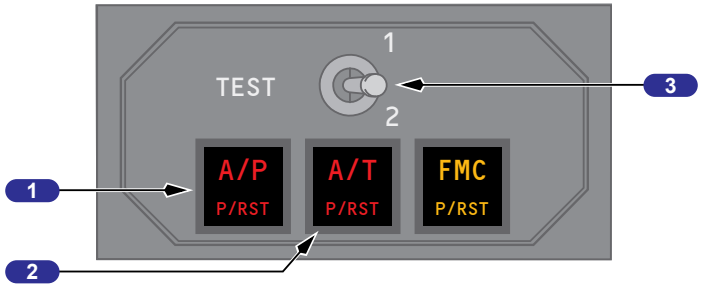
TEST 2 – illuminates autopilot/autothrottle disengage lights steady red and FMC alert light steady amber.

Spring–loaded to center position.

4 Stabilizer Out Of Trim (STAB OUT OF TRIM) Light

Operates only with autopilot engaged. Remains extinguished with autopilot not engaged.

Illuminated (amber) – autopilot not trimming stabilizer properly.



CAPTAIN INSTRUMENT PANEL (P1)
FIRST OFFICER INSTRUMENT PANEL (P3)

CAPTAIN INSTRUMENT PANEL (P1)

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Autoland Advisory Message Display

1 MFD Cancel/Recall (C/R) Switch

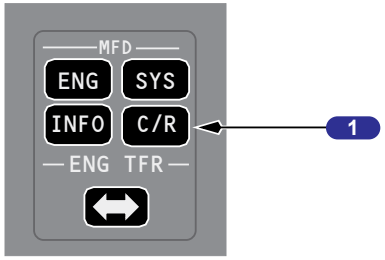
PUSH (once) – Cancels autoland advisory messages.

PUSH (again) – Recalls autoland advisory messages.

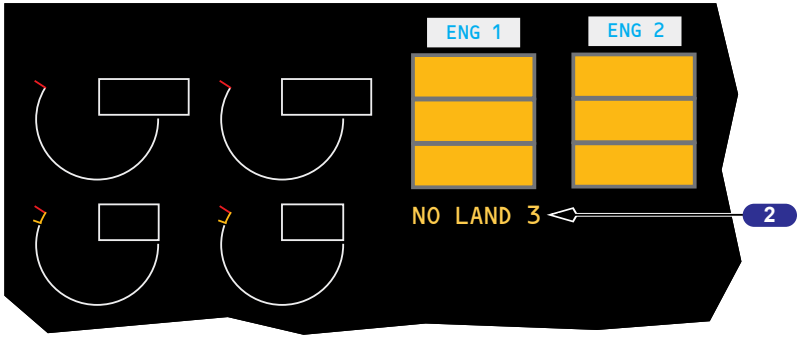
2 Autoland Advisory Message

An (amber) autoland advisory message appears on the upper engine display when a system fault affects autoland status. Two advisories are available:

- NO LAND 3 – the system is still capable of continuing to a safe landing. A system failure has occurred above Alert Height, and a (green) LAND 2 status annunciation appears on the flight crews outboard display units.
- NO AUTOLAND – the system is not capable of performing an automatic landing. A system failure has occurred above Alert Height, and an (amber) NO AUTOLAND status annunciation appears on the flight crews outboard display units.



MULTI-FUNCTION PANEL (P9)



ENGINE DISPLAY

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Thrust Mode Display

1 Thrust Mode Display

N1 limit reference is the active N1 limit for autothrottle and manual thrust control.

N1 limit reference is also displayed by N1 reference bugs with N1 SET control in AUTO position.

N1 limit reference is normally calculated by the FMC.

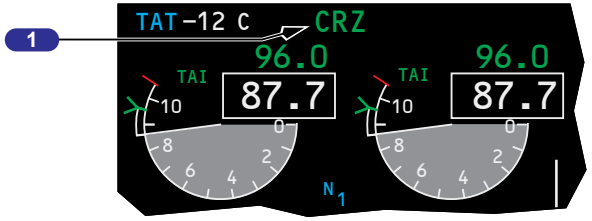
Thrust mode display annunciations are:

- TO – takeoff
- R-TO – reduced takeoff
- R-CLB – reduced climb
- CLB – climb
- CRZ – cruise
- G/A – go–around
- CON – continuous
- —— – FMC not computing thrust limit.
- A/T LIM Indication - Illuminated (white) – the FMC is not providing the A/T system with N1 limit values. The A/T is using a degraded N1 thrust limit from the related EEC.

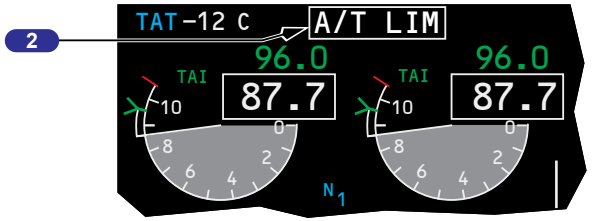
Note: R-TO does not indicate the type of reduced takeoff. The N1 limit may be reduced due to the entry of an assumed temperature, a takeoff thrust derate or a combination of both assumed temperature and takeoff thrust derate.

2 Autothrottle Limit (A/T LIM) Indication

Illuminated (white) - the FMC is not providing the A/T system with N1 limit values. The A/T is using a degraded N1 thrust limit from the related ECC.



ENGINE DISPLAY



ENGINE DISPLAY

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Flight Mode Annunciations (FMAs)

1 Autothrottle (A/T) Engaged Mode

- N1 (green)
- GA (green)
- Retard (green)
- FMC SPD (green)
- MCP SPD (green)
- THR HLD (green)
- ARM (white)

2 Roll Engaged Mode

- HDG SEL (green)
- VOR/LOC (green)
- LNAV (green)

3 Roll Armed Mode

- VOR/LOC (white)
- LNAV VOR/LOC (white)
- LNAV (white)
- LNAV FAC (white)
- LNAV B/CRS (white)
- LNAV ROLLOUT (white)

4 Pitch Engaged Mode

- TO/GA (green)
- V/S (green)
- MCP SPD (green)
- ALT/ACQ (green)
- ALT HOLD (green)
- G/S (green)
- FLARE (green)
- VNAV SPD (green)
- VNAV PTH (green)

5 Mode Highlight Change Symbol

A mode change highlight symbol (rectangle) is drawn around each pitch, roll, CWS, A/P status, and thrust engaged mode annunciation for a period of 10 seconds after each engagement. The mode highlight change symbol for CWS Mode annunciations (CWS R and CWS P) will flash for 10 seconds when CWS mode engages.

6 CWS Roll Engaged

- CWS R (amber)

7 Autopilot Status

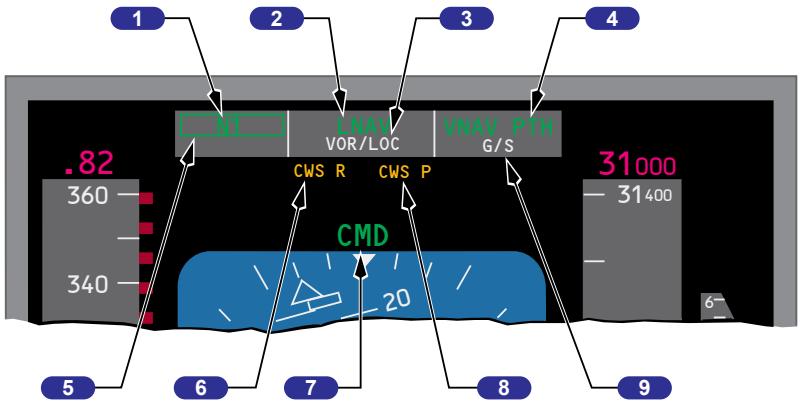
- CMD (green)
- SINGLE CH (amber)
- FD (green)

8 CWS Pitch Engaged

- CWS P (amber)

9 Pitch Armed Mode

- G/S (white)
- V/S (white)
- VNAV (white)
- FLARE (white)
- G/S V/S (white)



OUTER DISPLAY UNITS

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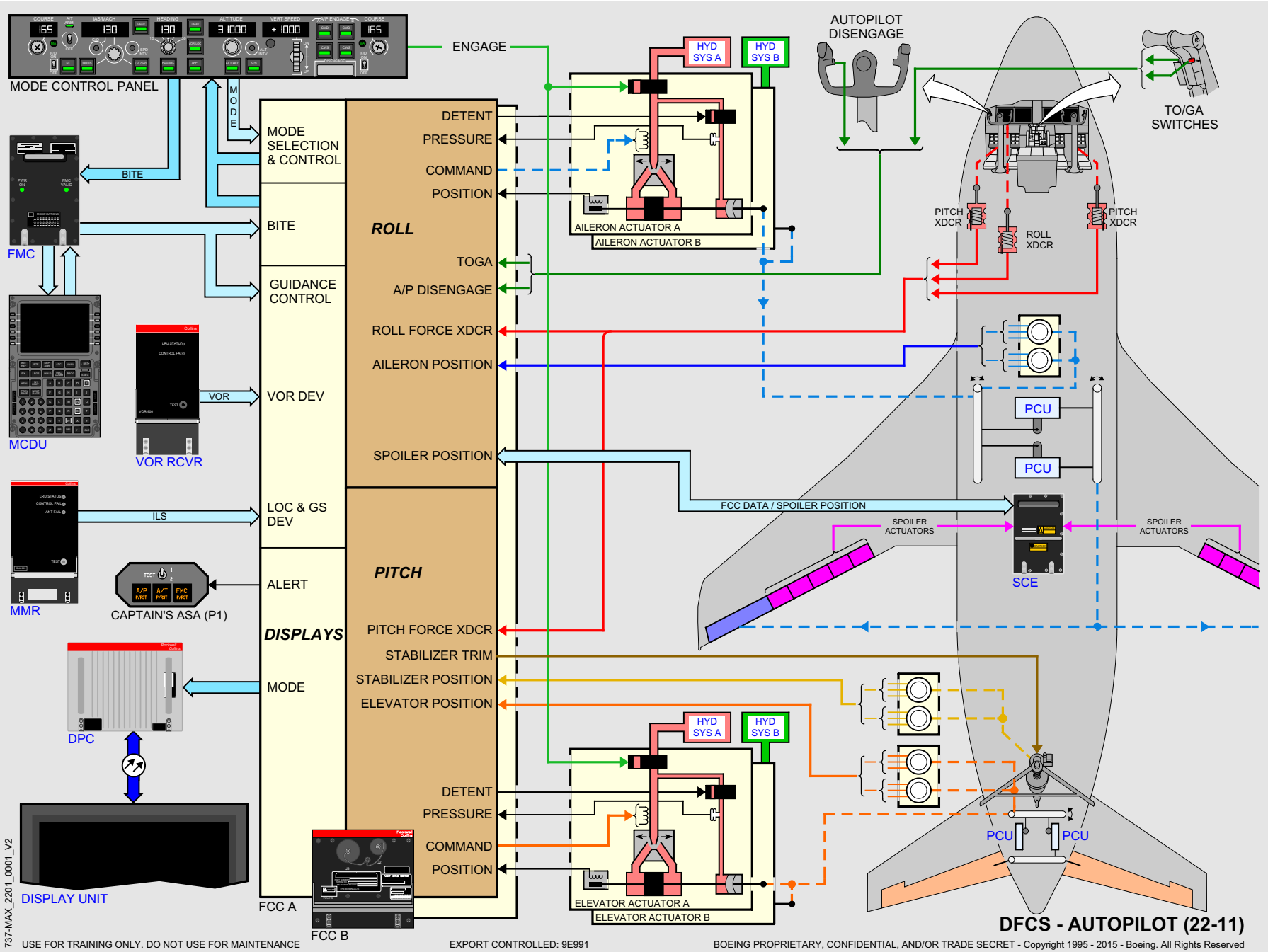

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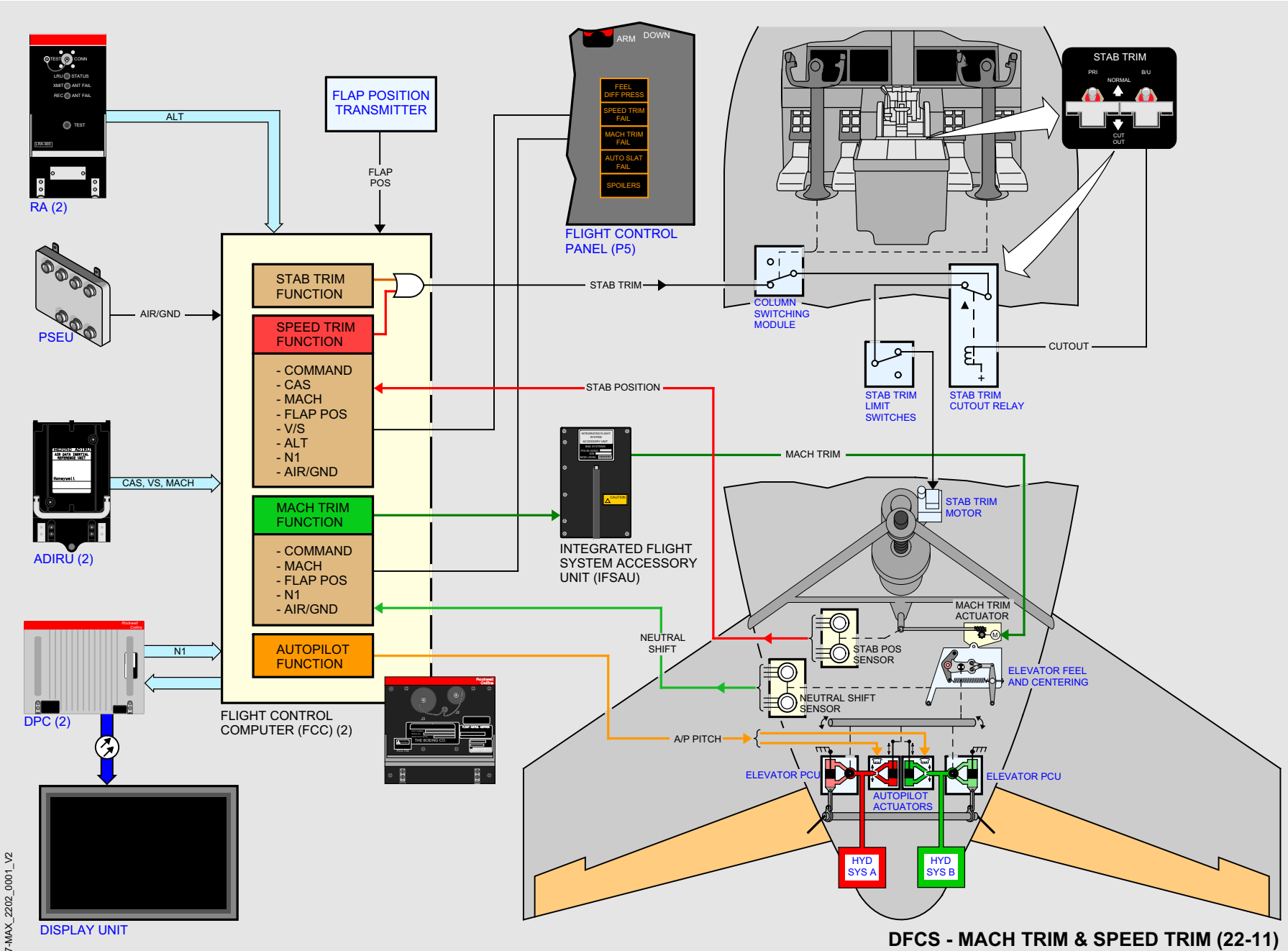

DFCS - MACH TRIM & SPEED TRIM (22-11)

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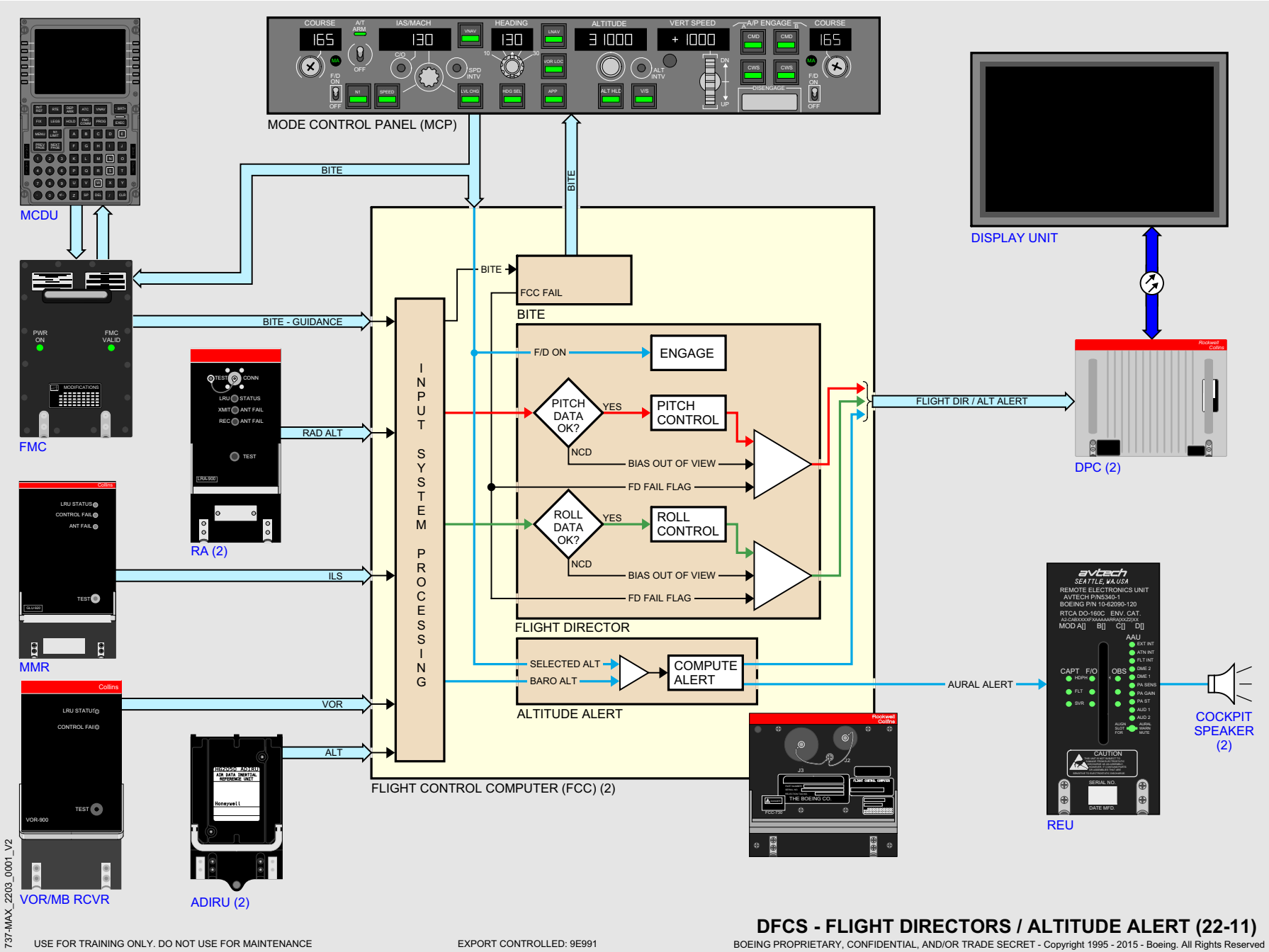

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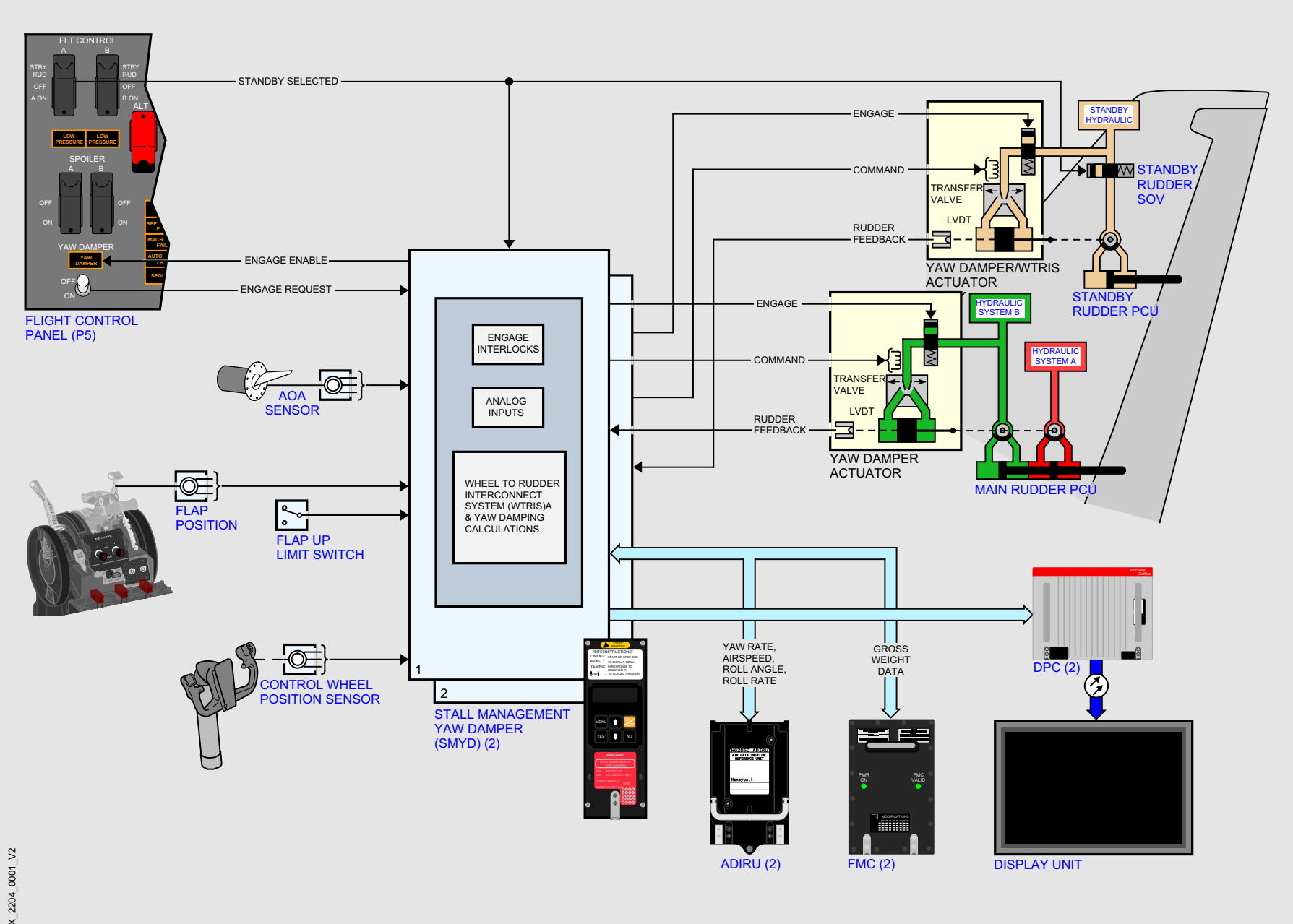

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YAW DAMPER & WHEEL TO RUDDER INTERCONNECT (22-20)

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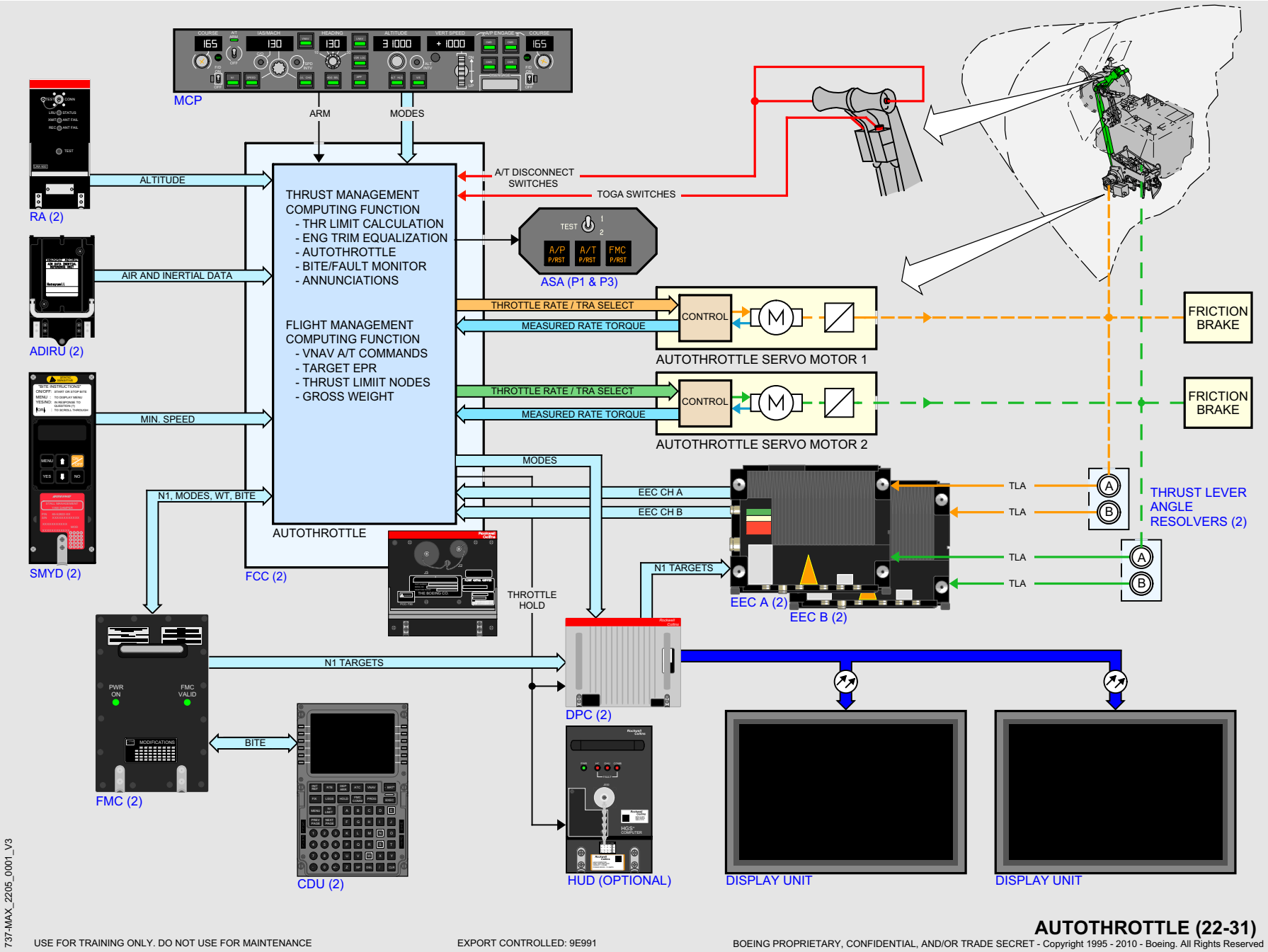

AUTOTHROTTLE (22-31)

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ATA 23

Communications

Communications (ATA 23)

Audio Control Panel (ACP)

1 Transmitter Selector (MIC SELECTOR) Switches

Illuminated – related switch is active

Push –

- selects related communication system for subsequent transmission
- only one switch may be selected at a time; pushing a second switch deselects first switch
- reception possible over selected system regardless of whether related receiver switch is on.

2 Receiver Switches

Illuminated (white) – related switch is active

Rotate – adjusts volume

Push –

- allows reception of related communication system or navigation receiver
- multiple switches may be selected

Push again – deselects related system or receiver.

3 Push–to–Talk Switch

(spring–loaded to neutral position)

RADIO (radio–transmit) – keys oxygen mask or boom microphone for transmission as selected by transmitter selector.

INT (Intercom) – keys oxygen mask or boom microphone for direct transmission over flight interphone and bypasses transmitter selector.

4 Filter Switch

V (Voice) – receive NAV and ADF voice audio.

B (Both) – receive NAV and ADF voice and range audio.

R (Range) – receive NAV and ADF station identifier range (code) audio.

5 CALL Light

Illuminated (white) – Accompanied by a chime, indicates call received by SELCAL, ACARS (if installed), ground crew (INT), SATCOM (if installed), or flight crew (CABIN).

Resets when transmitter is selected and microphone is keyed.

PA does not have a CALL indication.

6 Speaker (SPKR) Switch

Illuminated (white) – SPKR switch is active.

Push – audio from selected receiver is heard on overhead speaker.

Rotate – adjusts overhead speaker volume.

Push again – deselects audio from selected receiver to be heard on overhead speaker.

7 Alternate–Normal (ALT–NORM) Switch

Push – Terminates the SATCOM call connection.

8 Alternate-Normal (ALT–NORM) Switch

NORM (Normal) – ACP operates normally.

ALT (Alternate) – ACP operates in degraded mode.

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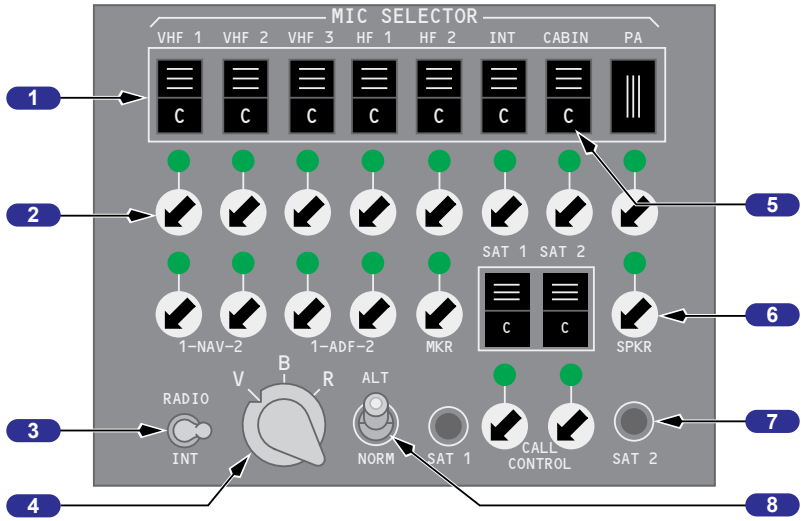


AUDIO CONTROL PANEL (P8)

Radio Tuning Panel

1 Frequency Transfer Switch

Push –

- transfers the STANDBY window frequency to the ACTIVE window and tunes the selected radio to the new active frequency
- transfers the ACTIVE window frequency to the STANDBY window.

2 Frequency Indicator

ACTIVE – displays the tuned frequency of the selected radio.

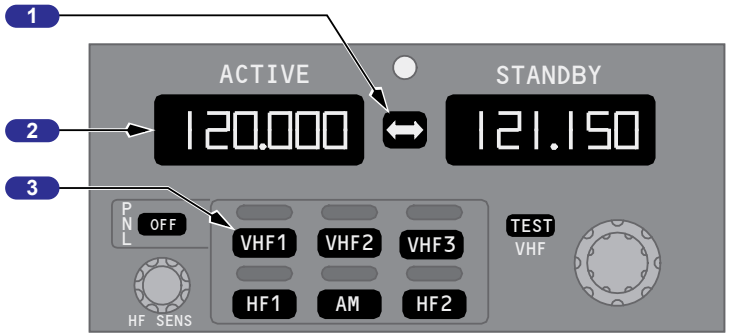
STANDBY – displays the preselected or previously tuned frequency of the selected radio

- displays DATA if the selected radio is in the data mode
- displays five digit frequency in 25 KHz spacing or six digit frequency in 8.33 KHz spacing.

3 Radio Tuning Switch

Push –

- selects the VHF or HF radio to be tuned
- the tuned frequency is displayed in the ACTIVE frequency indicator
- the standby frequency is displayed in the STANDBY frequency indicator



RADIO TUNING PANEL (P8)

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4 Radio Tuning Panel OFF Switch

Push –

- disconnects the panel from the communication radios
- switch illuminates (white).

5 HF Sensitivity Control

Rotate – adjusts the sensitivity of the on–side HF receiver.

6 Radio Tuning Light

Illuminated (white) - indicates the selected radio.

7 Offside Tuning Light

Illuminated (white) –

- the radio normally associated with this panel is being tuned by another radio tuning panel, or
- the radio tuning panel is being used to tune a radio not normally associated with this radio tuning panel.

8 Frequency Selector

Rotate - selects frequency in the STANDBY frequency indicator:

- first digit is always 1
- outer selector changes second and third digits in 1 MHz increments
- inner selector changes fourth and fifth digits in 25 KHz increments.
- inner selector changes fourth, fifth, and sixth digits in 8.33 KHz increments.
- For airplanes with ACARS, tuning above maximum or below minimum frequency displays DATA in Frequency Indicator.

9 VHF TEST Switch

Push –

- removes automatic squelch feature, permitting reception of background noise and thereby testing receiver operation
- improves reception of weak signals.

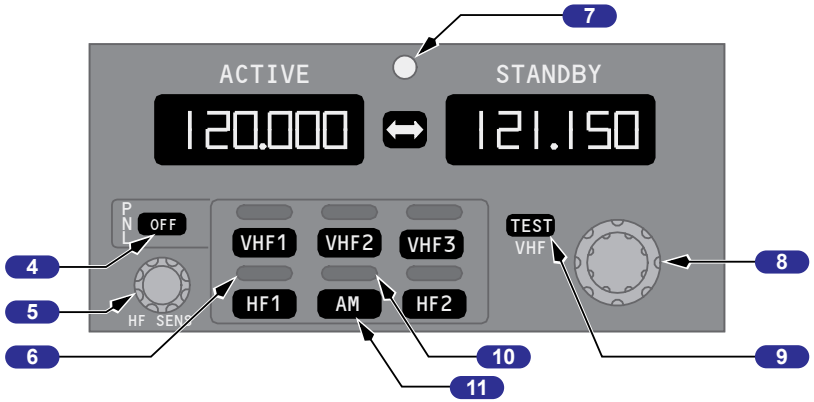
10 AM Light

Illuminated (white) – HF AM is selected.

Extinguished – HF USB is selected.

11 AM Switch

Push – sets the AM (amplitude modulation) or USB (upper side band) mode for the selected HF.



RADIO TUNING PANEL (P8)

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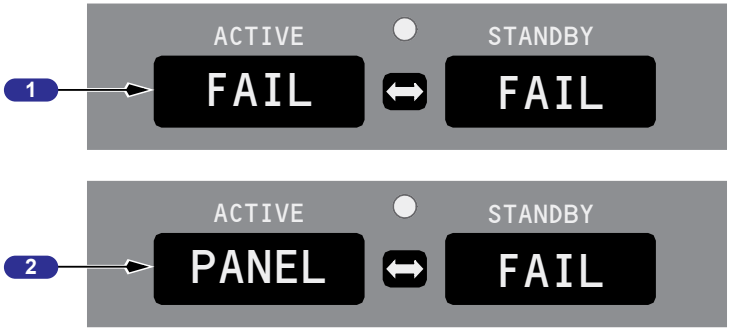
Radio Tuning Panel Fail Modes

1 FAIL FAIL Indication

The VHF transceiver has failed.

2 PANEL FAIL

The radio tuning panel has failed.



RADIO TUNING PANEL (P8)

Note: The selected frequencies may continue to be displayed in the frequency indicator when the radio is not available.

SELCAL Panel

1 SELCAL Light

Illuminated (white) - alerts crew to incoming communication on indicated radio. INOP placards are over the legend of any alert for a radio that is not connected.

2 Reset Switch

Push - extinguishes and resets SELCAL light.

SELCAL CONTROL PANEL (P8)

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Miscellaneous Communication Controls (Typical)

1 Overhead Speaker

Monitors audio from related pilot's ACP.

2 Headset or Headphones

Monitors audio from related ACP.

3 Standard Microphones

Choose desired microphone for voice transmission through selected radio, interphone system, or passenger address (PA).

4 Communication Jacks

Used for appropriate microphone or headphone plugs.

5 Push–To–Talk Switch

MIC (microphone) –

- selects oxygen mask or boom microphone for transmission, as selected by ACP transmitter selector.
- same as using ACP PTT switch (RADIO position).

OFF – center position.

INT (interphone) –

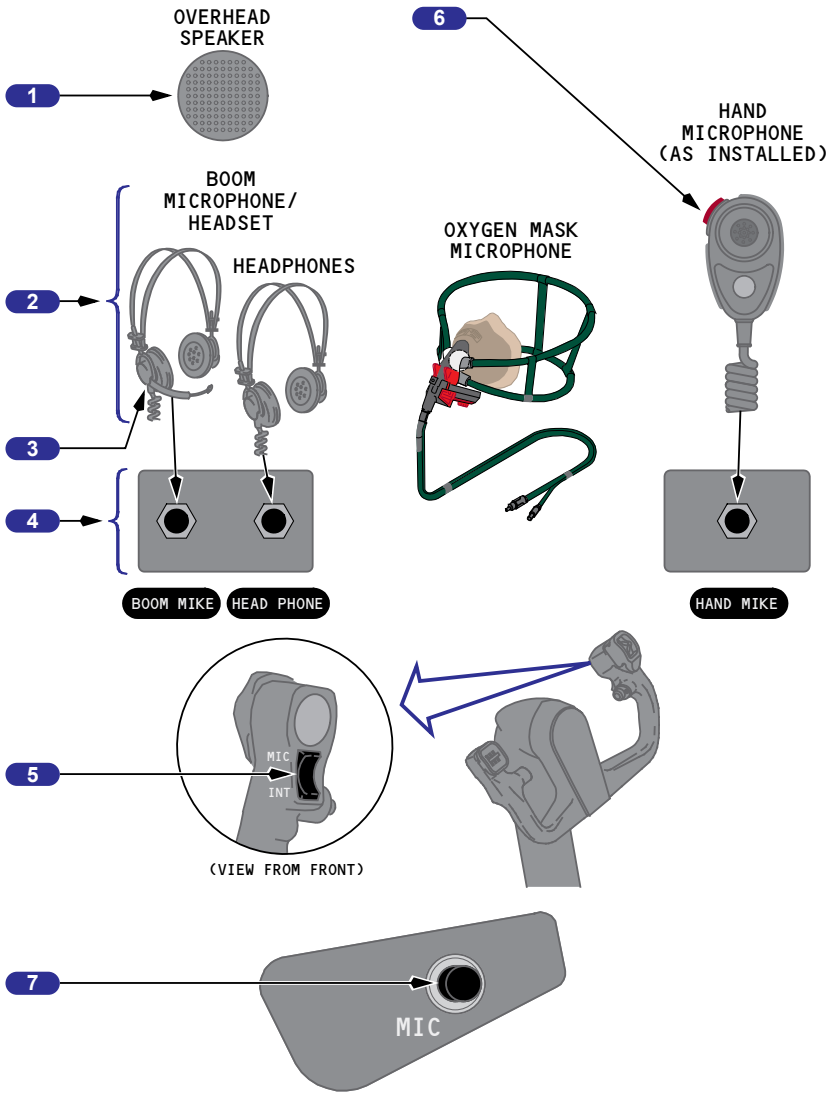
- selects oxygen mask or boom microphone for direct transmission over flight interphone
- bypasses ACP transmitter selector
- same as using ACP PTT switch (INT position)

6 Push–To–Talk Switch

Push – keys hand microphone for transmission, as selected by ACP transmitter selector.

7 Glareshield MIC Switch

Push - allows oxygen mask or boom microphone transmission on the selected transmitter.



FLIGHT DECK CREW STATIONS

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Interphone and Passenger Address Controls

1 SERVICE INTERPHONE Switch

OFF –

- external jacks are deactivated
- communication between flight deck and flight attendants is still possible.

ON – adds external jacks to service interphone system.

2 Service INTERPHONE Handset Jack

With microphone installed, used to communicate with flight attendant stations:

- with SERVICE INTERPHONE switch ON, also used to communicate with any external jack location
- bypasses ACP.

3 Passenger Address (PASS ADDRESS) Hand Microphone Jack

With microphone installed:

- used to make PA announcements
- bypasses ACPs.

4 INTERPHONE FLIGHT Jack

Connects ground crew to flight interphone system.

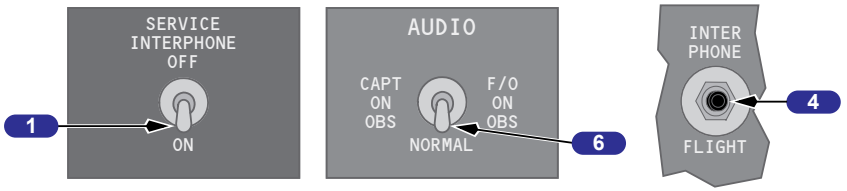
5 Flight Deck / Attendant PA Hand Microphone

Used to make PA announcements.

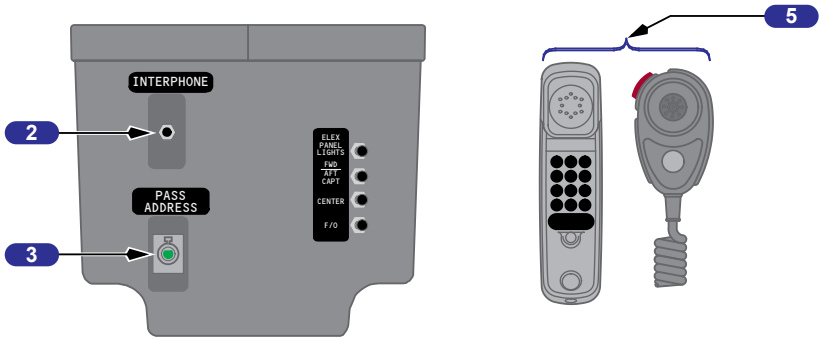
6 Interphone System Transfer Switch

Optional:

Selects Observer's Audio Control Panel for use by the Captain or First Officer in case of a malfunction in the Captain's or First Officer's audio system.



AFT OVHD PANEL FWD OVHD PANEL EXTERNAL POWER CONNECTOR PANEL



CONTROL STAND FLIGHT DECK CREW/ ATTENDANT STATIONS (AS INSTALLED)

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Cockpit Voice Recorder

1 Area Microphone

Active anytime 115V AC is applied to airplane.

2 ERASE Switch (red)

Push (2 seconds) –

- all four channels are erased
- operative only when airplane is on ground and parking brake is set.

3 TEST Switch

Push – after a slight delay and no faults are detected:

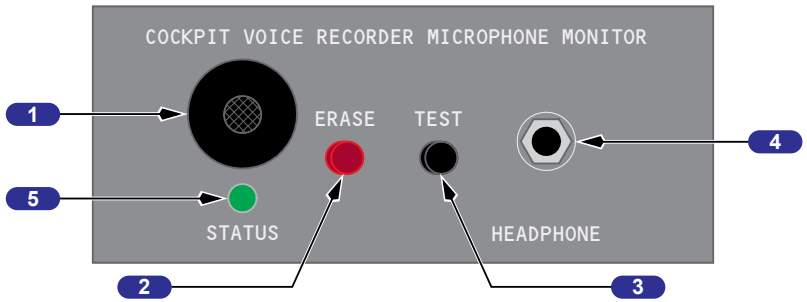
- STATUS light illuminates momentarily
- a tone may be heard through a headset plugged into HEADPHONE jack.

4 HEADPHONE Jack

Headphone may be plugged into jack to monitor tone transmission during test, or to monitor playback of voice audio.

5 STATUS Light

Illuminated (momentary green) – no faults are detected during recorder TEST.



VOICE RECORDER CONTROL PANEL (P5)

Call System

1 Ground Call (GRD CALL) Switch

Push – sounds a horn in nose wheel well until released.

2 Attendant Call (ATTEND) Switch

Push –

- sounds a two–tone chime in passenger cabin
- illuminates both pink master call lights.

3 Flight Deck CALL Light

Illuminated (blue) – flight deck is being called by flight attendants or ground crew.

4 PILOT CALL Switch

Push – sounds a single–tone chime in flight deck.

5 CAPTAIN Call Switch

Push – sounds a single–tone chime in flight deck.

6 ATTENDANT Call Switch

Push –

- sounds a two–tone chime in passenger cabin
- illuminates both pink master call lights.

7 Call RESET Switch

Push –

- extinguishes both pink master call lights
- cancels call
- disconnects the handset from the passenger address system.

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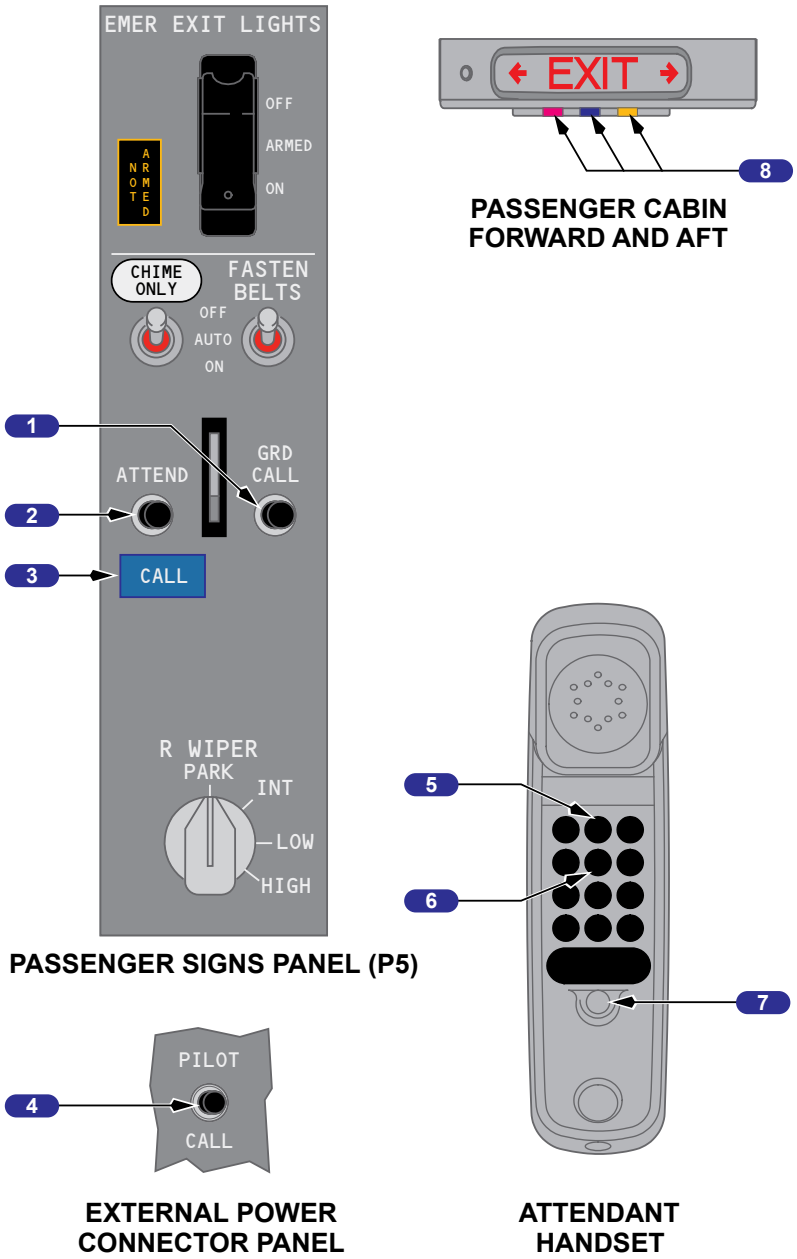
8 Master Call Lights

Illuminated –

- amber – a lavatory call switch is activated.
- pink – flight deck or other flight attendant station is calling.
- blue – a passenger seat call switch is activated.



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Emergency Locator Transmitter

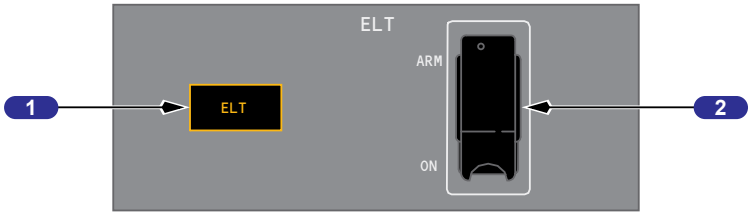
1 Emergency Locator Transmitter Light

Illuminated (amber) – ELT has been activated and is simultaneously transmitting on 121.5, 243.0 and 406.0 MHz.

2 Emergency Locator Transmitter Switch

ARM – (guarded position) ELT transmits automatically when it reaches its preset G–Load limit.

ON – manually activates the ELT.



ELT CONTROL PANEL (AFT P5)

ACARS Printer

1 Slew Switch

Push - advances paper as long as switch is depressed.

2 Reset Switch

Push - resets message light.

3 Test Switch

Push -

- produces character test pattern
- illuminates MSG and FAIL lights.

4 Message Light

Illuminated (blue) -

- incoming message to printer or
- test in progress

5 Paper Light

Illuminated (amber) - paper quantity low.

6 Fail Light

Illuminated (amber) - printer failure or test in progress.

7 Paper Quantity Indicator

Indicates amount of paper remaining.

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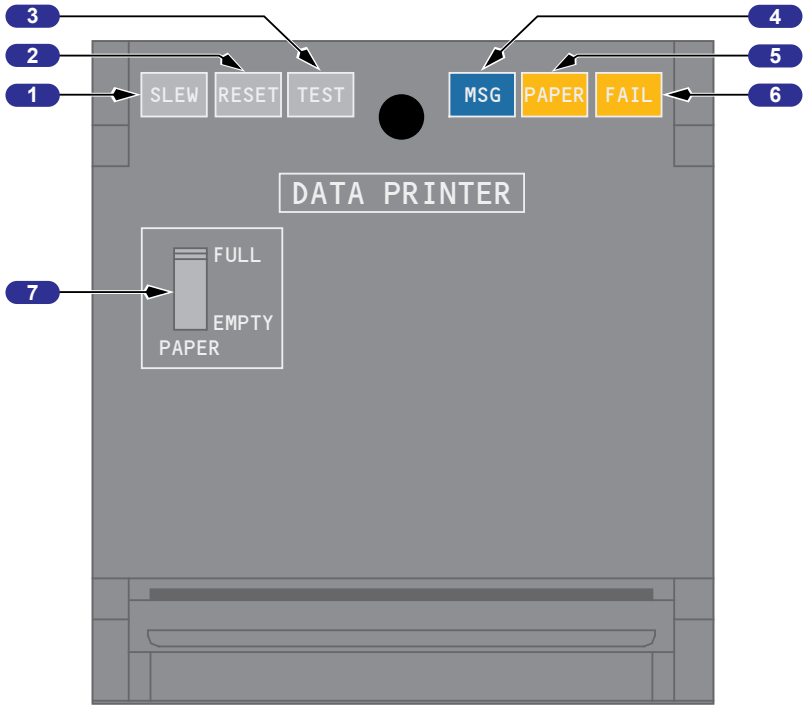

PRINTER (P8)

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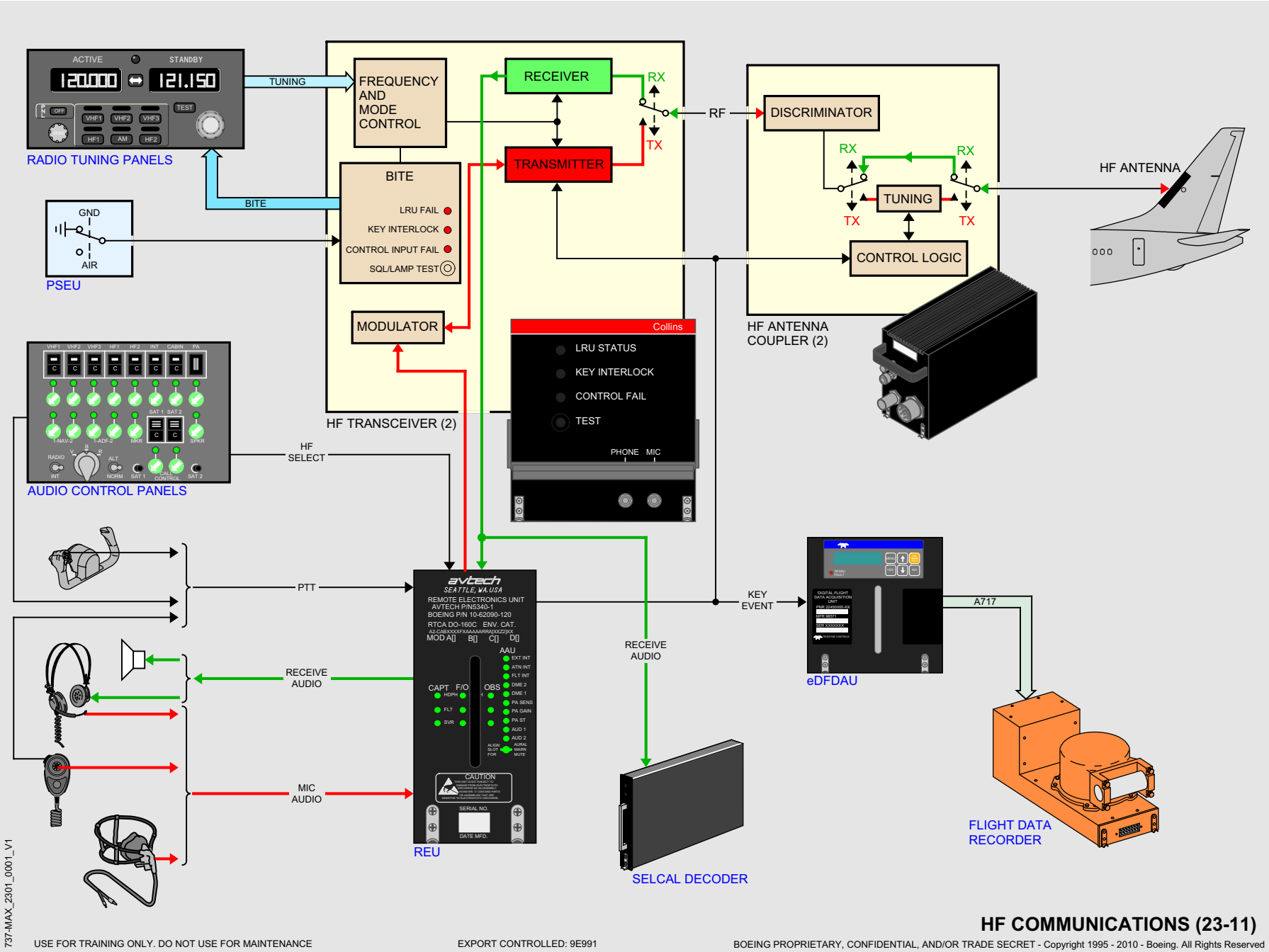

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HF COMMUNICATIONS (23-11)

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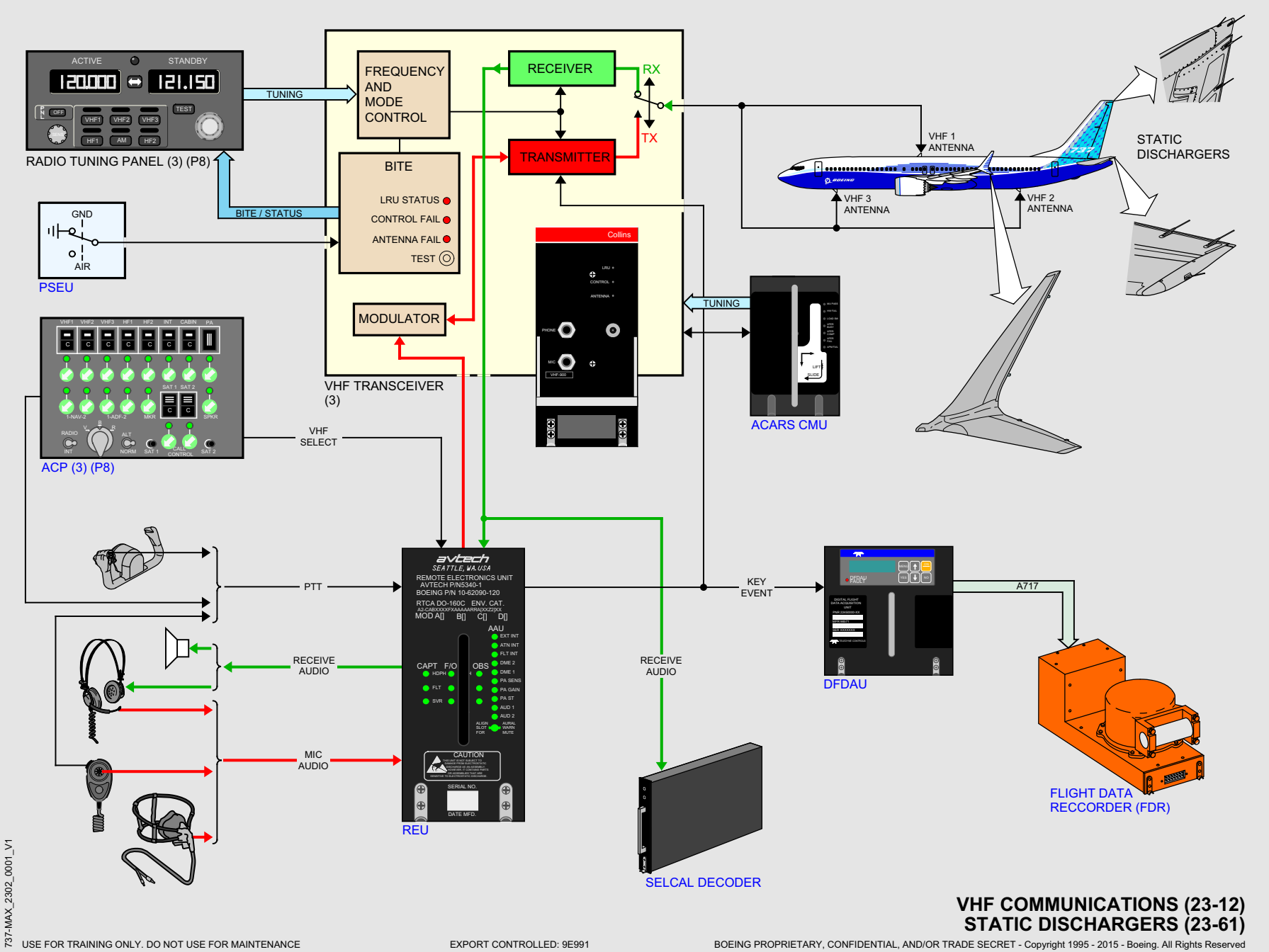

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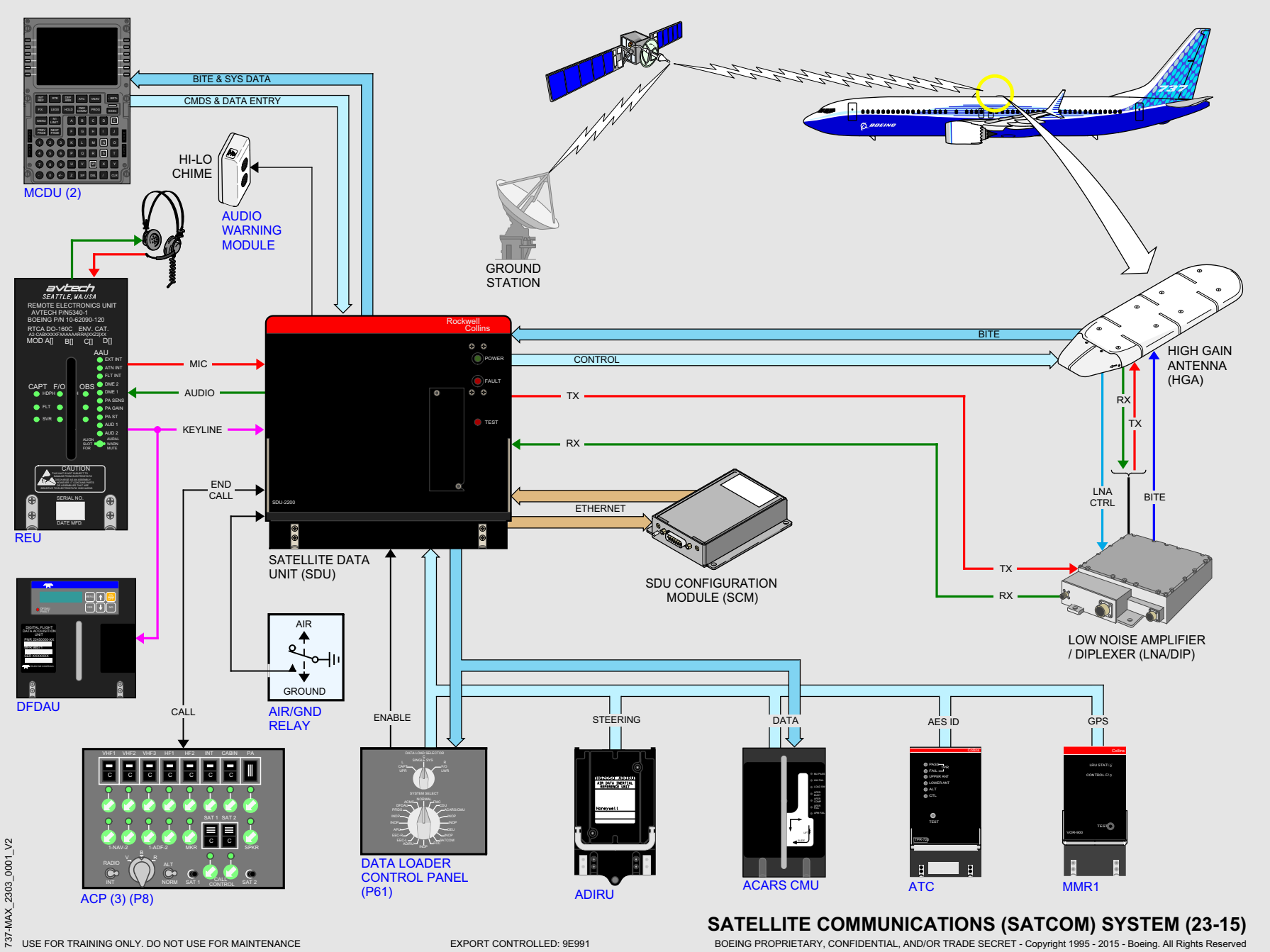

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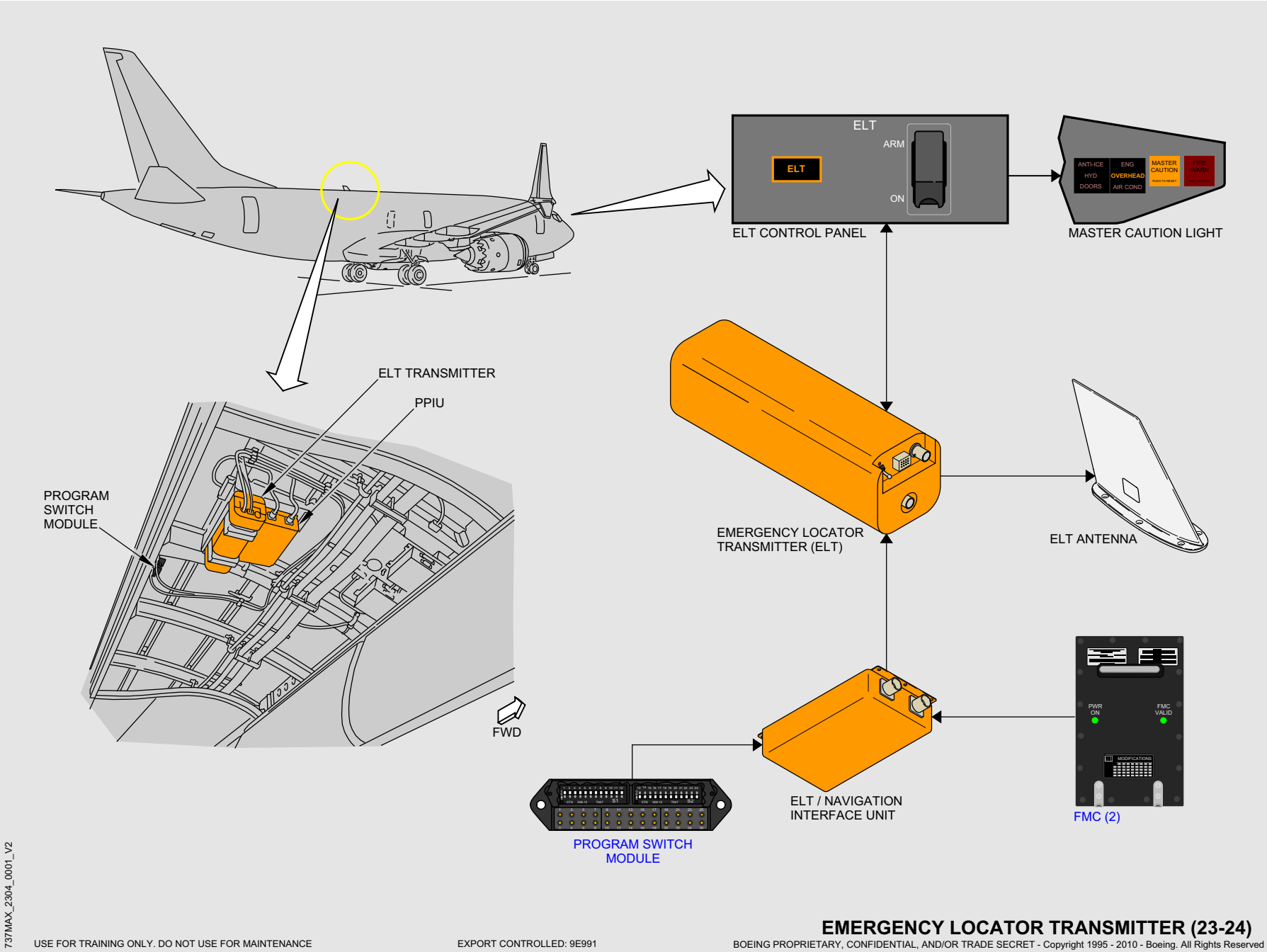

EMERGENCY LOCATOR TRANSMITTER (23-24)

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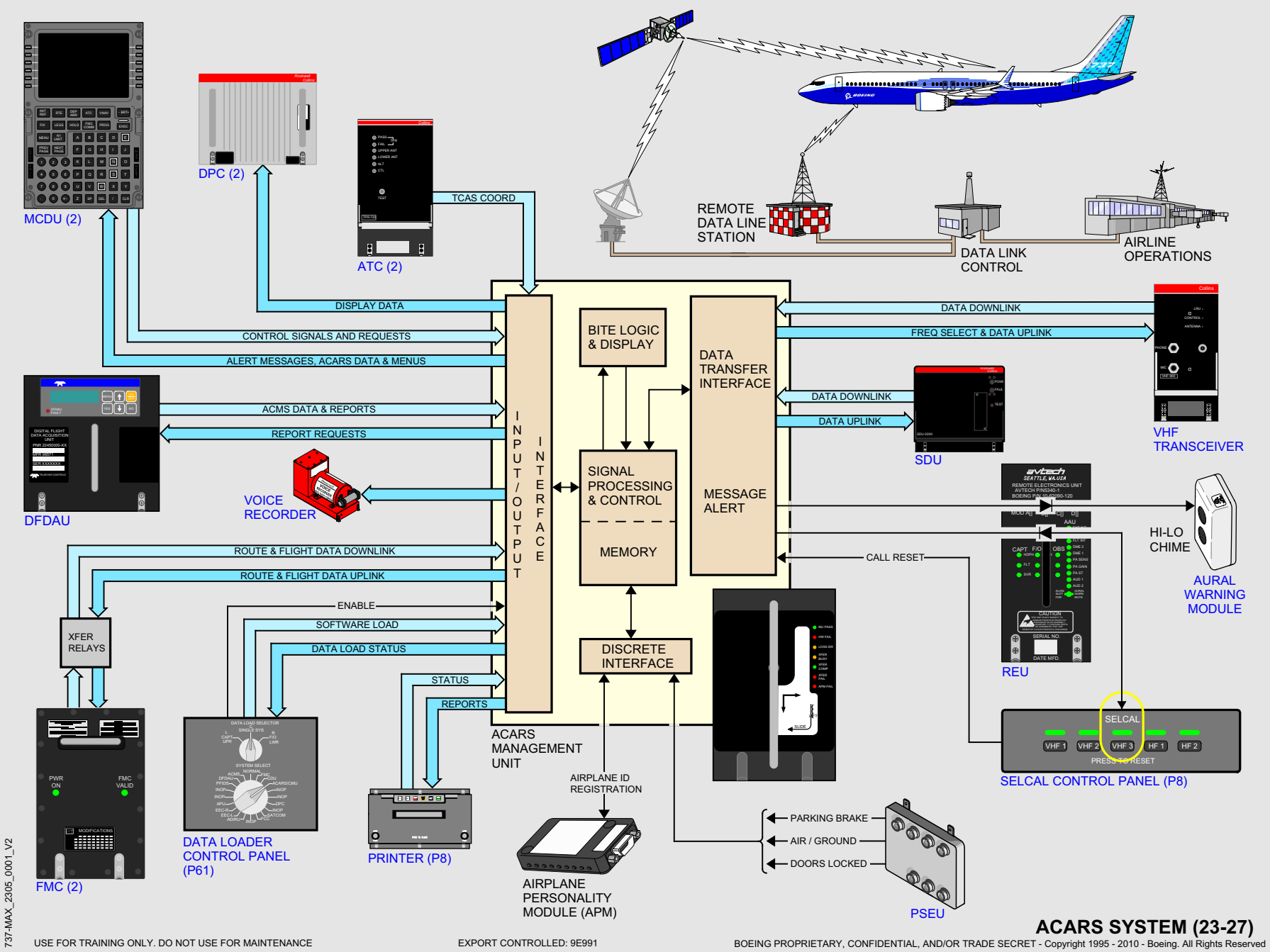

ACARS SYSTEM (23-27)

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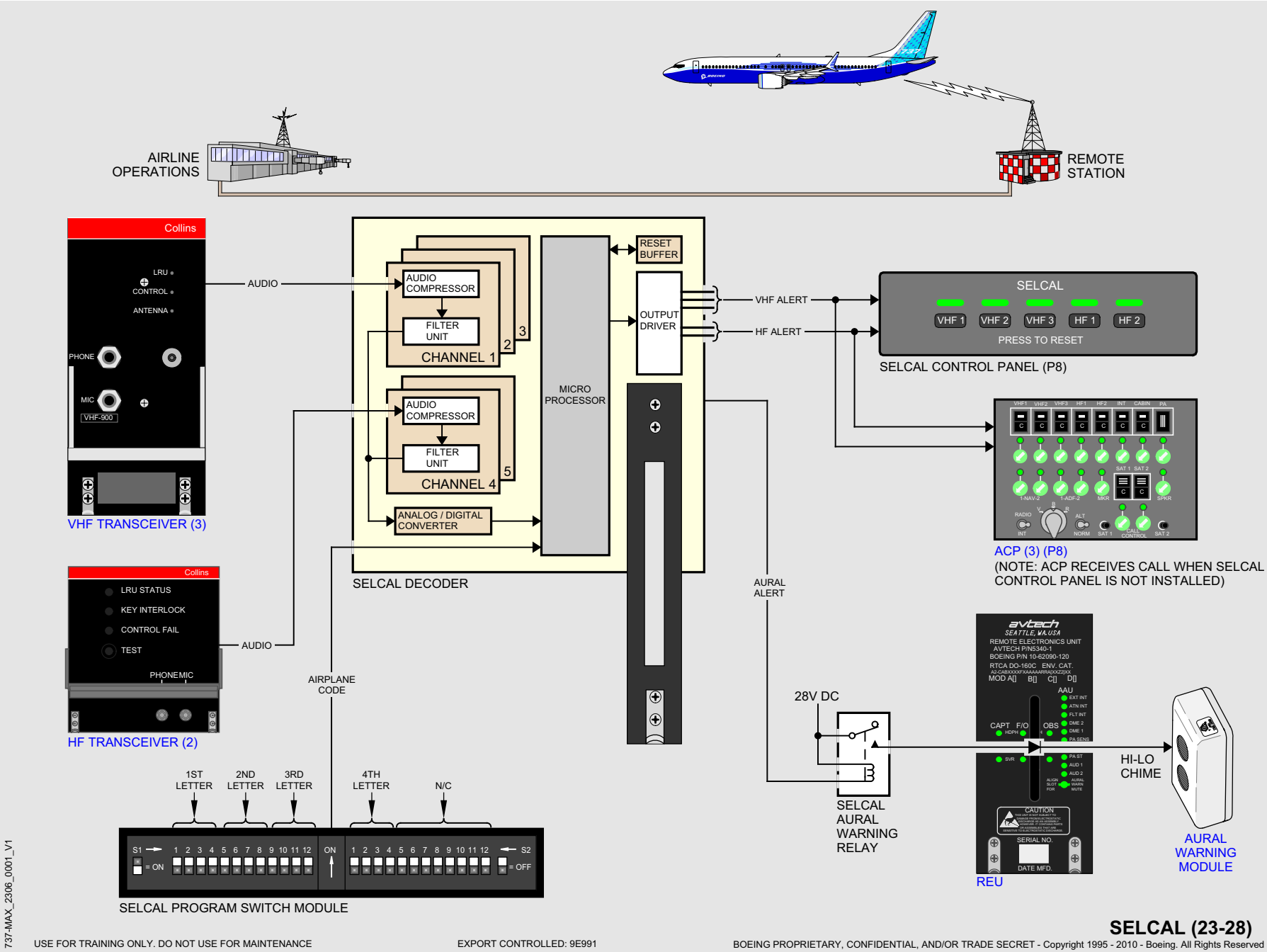

SELCAL (23-28)

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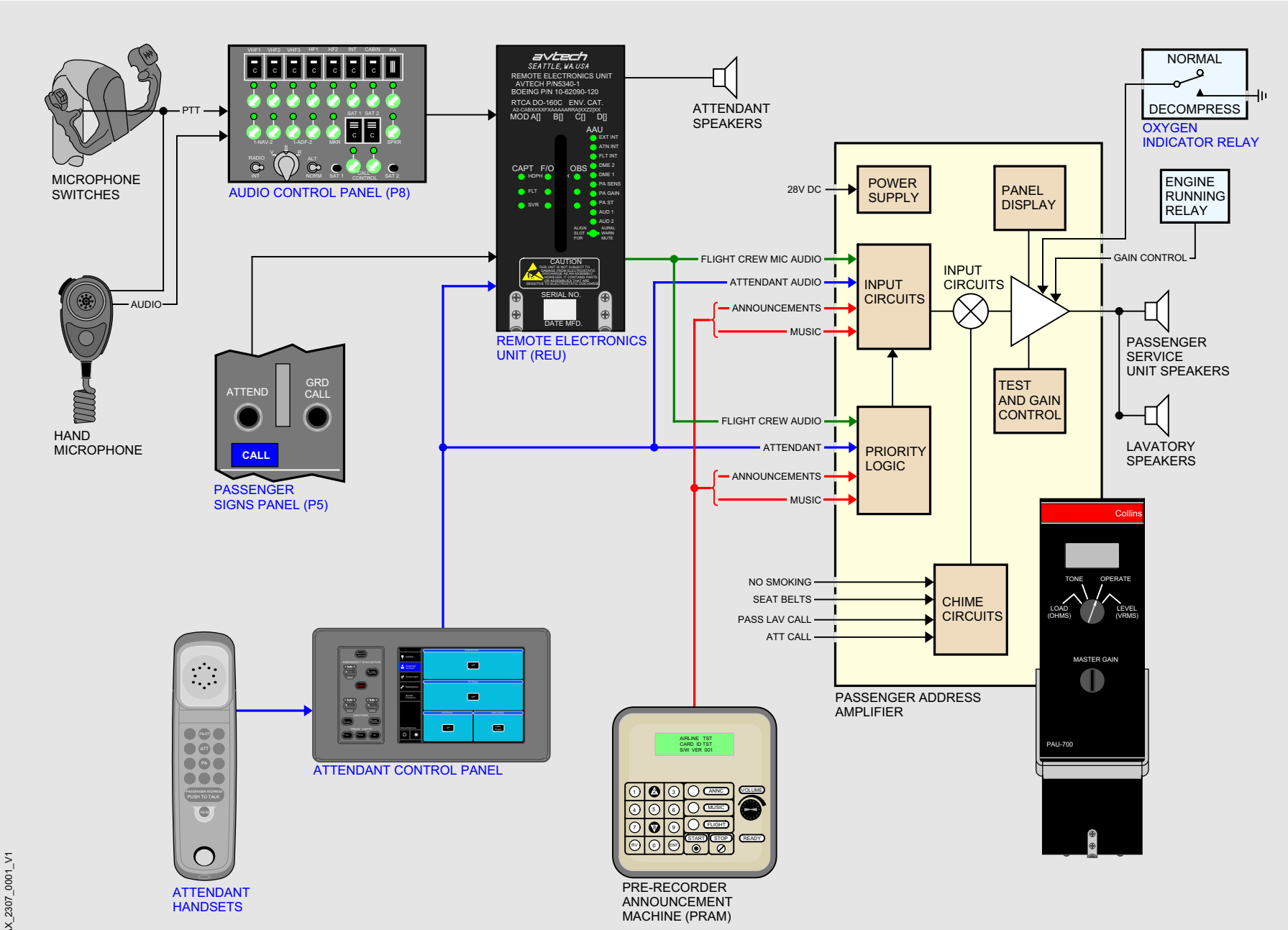

PASSENGER ADDRESS SYSTEM (23-31)

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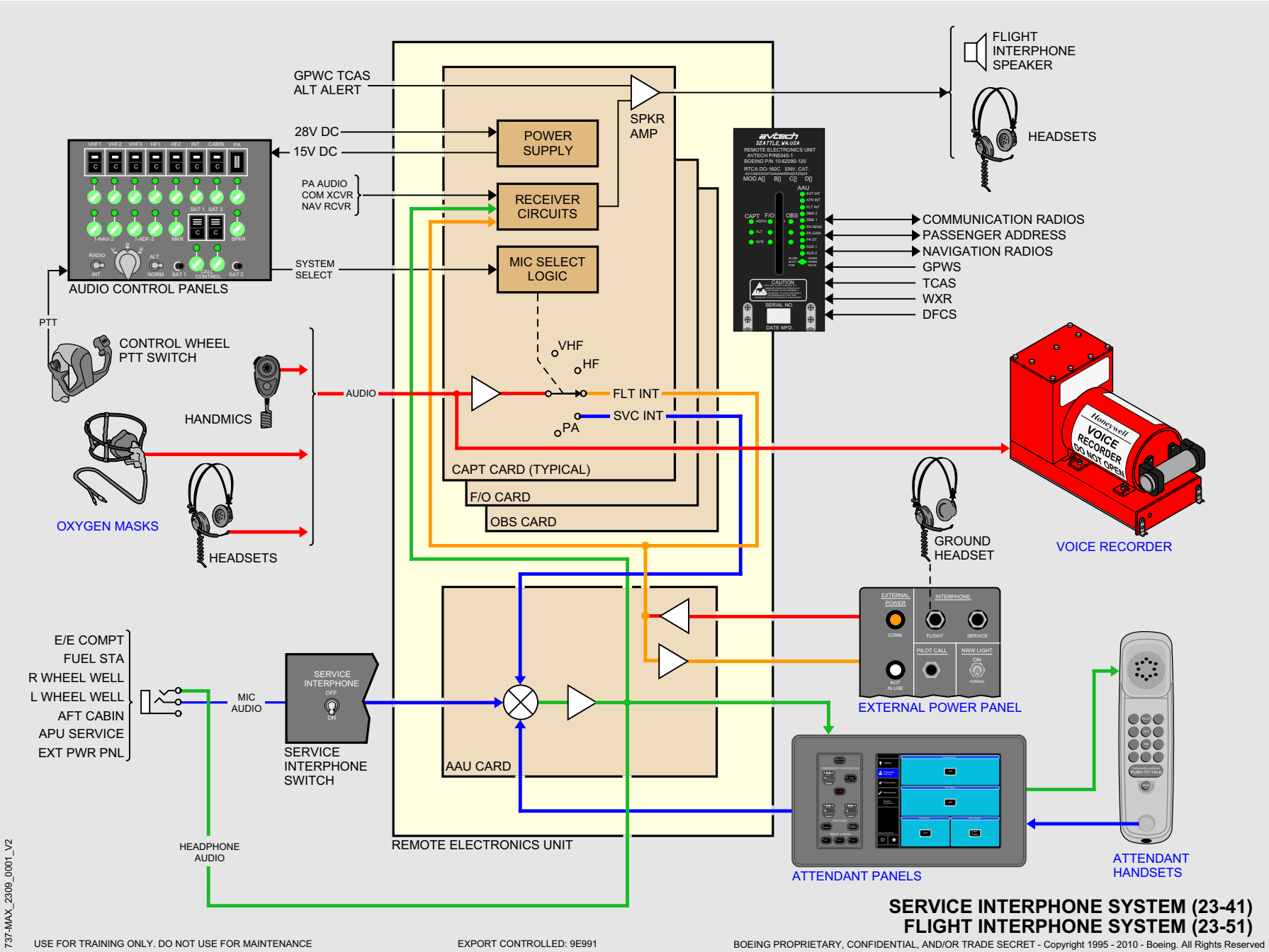

SERVICE INTERPHONE SYSTEM (23-41)
FLIGHT INTERPHONE SYSTEM (23-51)

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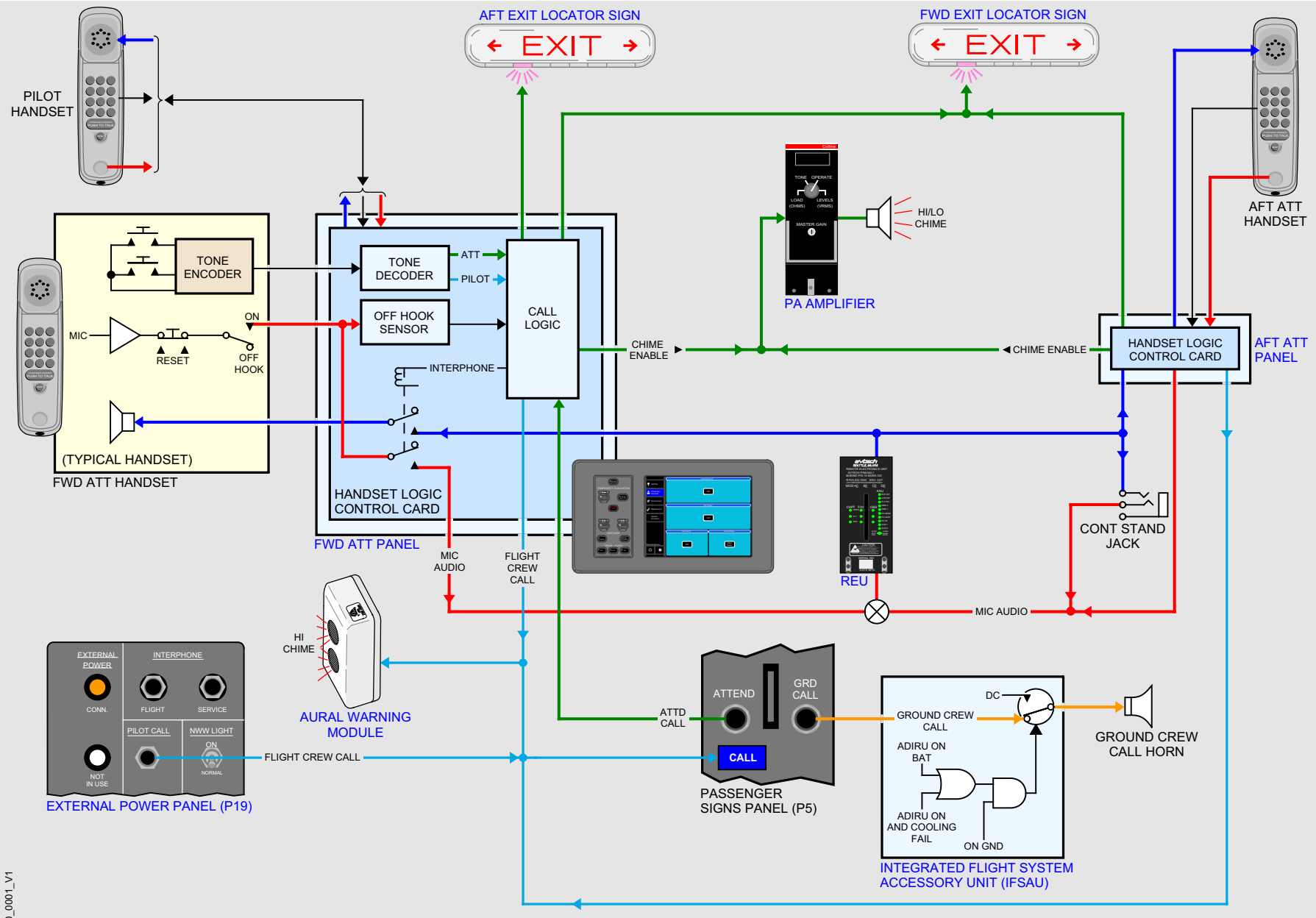

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CABIN INTERPHONE SYSTEM (23-42)
FLIGHT AND GROUND CREW CALL SYSTEM (23-43)

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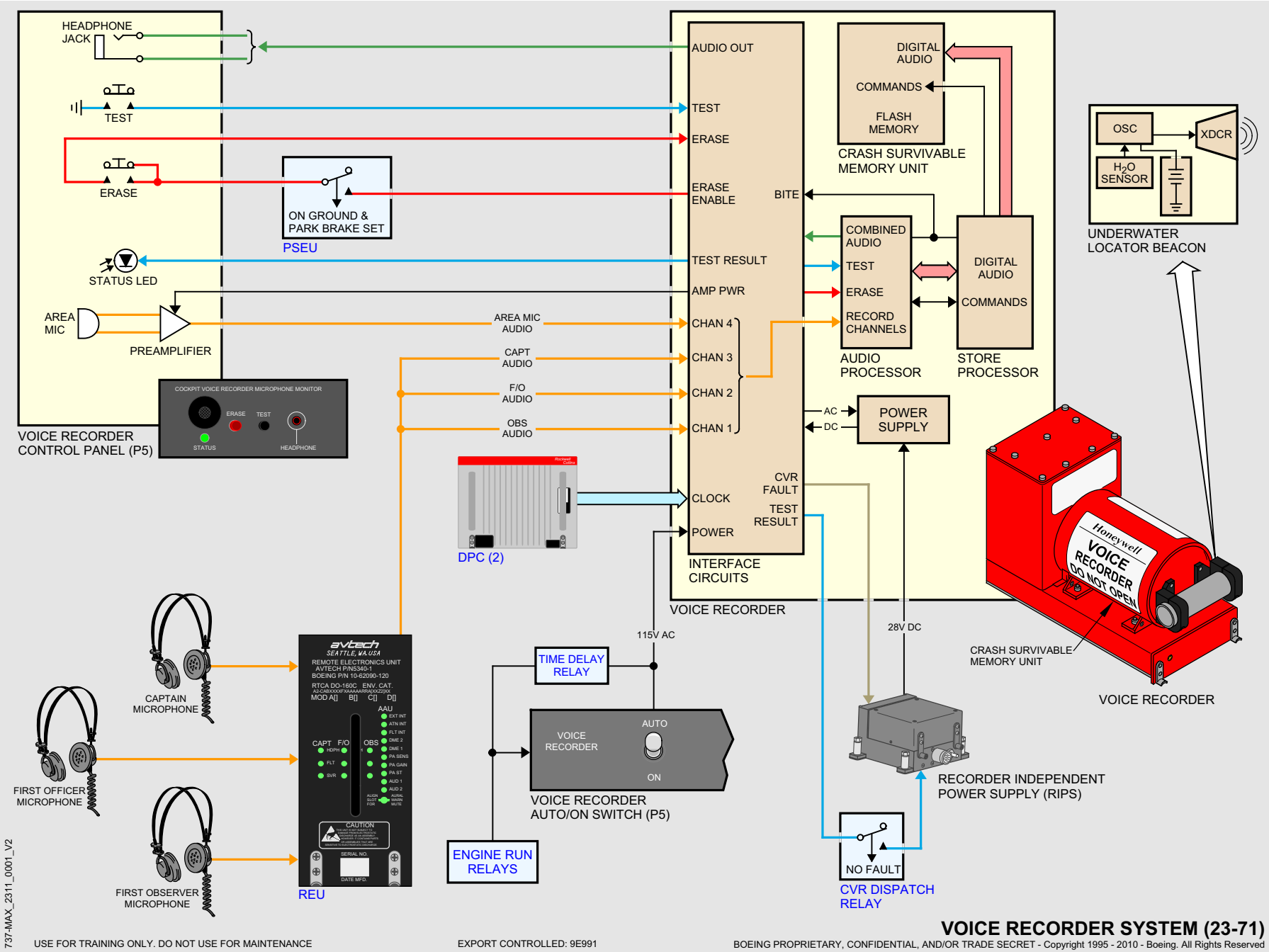

VOICE RECORDER SYSTEM (23-71)

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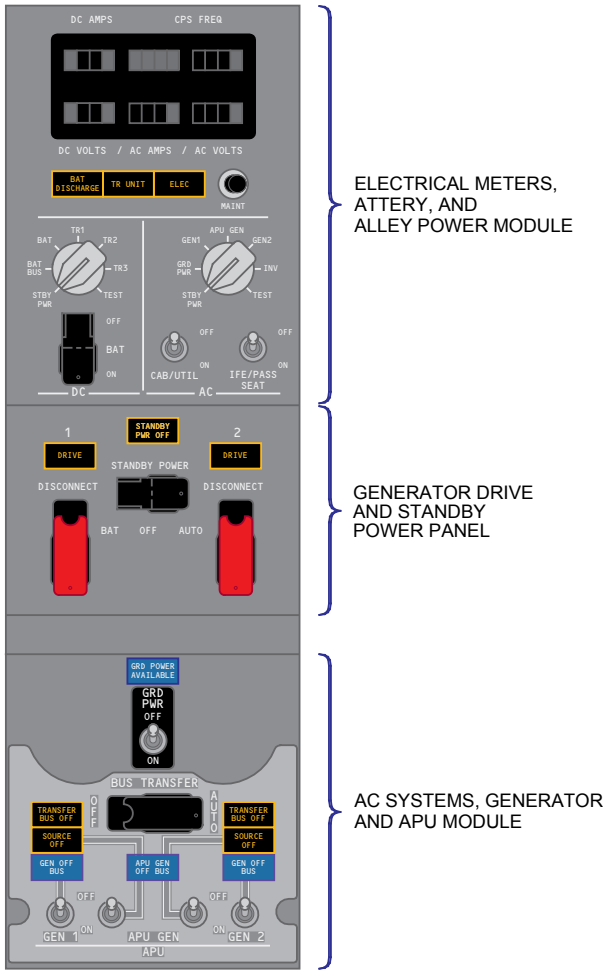
ATA 24

Electrical Power

Electrical Power (ATA 24)

Electrical Panel

Single Battery



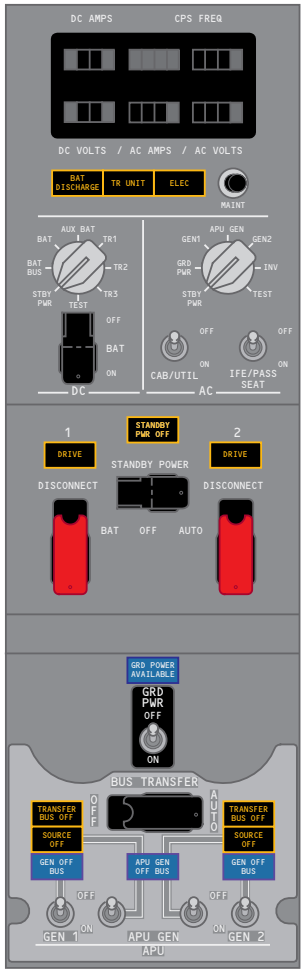
ELECTRICAL METERS, ATTERY, AND ALLEY POWER MODULE

GENERATOR DRIVE AND STANDBY POWER PANEL

AC SYSTEMS, GENERATOR AND APU MODULE

AC/DC POWER CONTROL & DISPLAY PANELS (FWD P5)

Dual Battery



ELECTRICAL METERS, BATTERY, AND GALLEY POWER MODULE

GENERATOR DRIVE AND STANDBY POWER PANEL

AC SYSTEMS, GENERATOR AND APU MODULE

AC/DC POWER CONTROL & DISPLAY PANELS (FWD P5)

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AC and DC Metering Panel

1 DC Ammeter

Indicates amperage of the source selected by DC meters selector.

2 DC Voltmeter

Indicates voltage of the source selected by DC meters selector.

3 AC Ammeter

Indicates amperage of the source selected by AC meters selector.

4 Frequency Meter

Indicates frequency of the source selected by AC meters selector.

5 AC Voltmeter

Indicates voltage of the source selected by AC meters selector.

6 Battery Discharge (BAT DISCHARGE) Light

Illuminated (amber) – with BAT switch ON, excessive battery discharge detected.

7 TR UNIT Light

Illuminated (amber) –

- on the ground – any TR is failed.
- in flight –
  - TR1 failed; or
  - TR2 and TR3 failed.

8 Electrical (ELEC) Light

Illuminated (amber) – a fault exists in DC power system or standby power system.

Note: Illuminates only with airplane on ground.

9 Maintenance (MAINT) Switch

Used by maintenance for BITE.

10 DC Meters Selector

Selects DC source for DC voltmeter and DC ammeter indications.

TEST – used by maintenance for BITE.

11 Battery (BAT) Switch

OFF –

- removes power from battery bus and switched hot battery bus when operating with normal power sources available
- removes power from battery bus, switched hot battery bus, DC standby bus, static inverter, and AC standby bus when battery is only power source.

ON (guarded position) –

- provides power to switched hot battery bus
- Provides automatic switching of standby electrical system to battery power with loss of normal power.

12 AC Meters Selector

Selects AC source for BITE for AC voltmeter, AC ammeter and frequency meter indications

TEST – used by maintenance for BITE.

13 CAB/UTIL Switch

OFF – removes electrical power, (for BITE), from galley and cabin equipment systems including:

- all 115V AC galley busses
- left & right recirculation fans
- fwd and aft door area heaters
- drain mast heaters

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- lavatory water heaters
- logo lights
- potable water compressor
- 115V AC shaver outlets when installed
- LED cabin lighting

ON – supplies power to galley and cabin electrical systems.

14 IFE/PASS SEAT Switch

OFF – removes electrical power from installed components of the passenger seats, in-flight entertainment systems, and other power systems including:

- 115V AC audio entertainment equipment
- 115V AC video entertainment equipment
- cabin telephone equipment
- FAX machine
- 28V DC video equipment and passenger seat electronic outlets

ON – supplies electrical power to the installed components of the passenger seats, in-flight entertainment systems, and other power systems.

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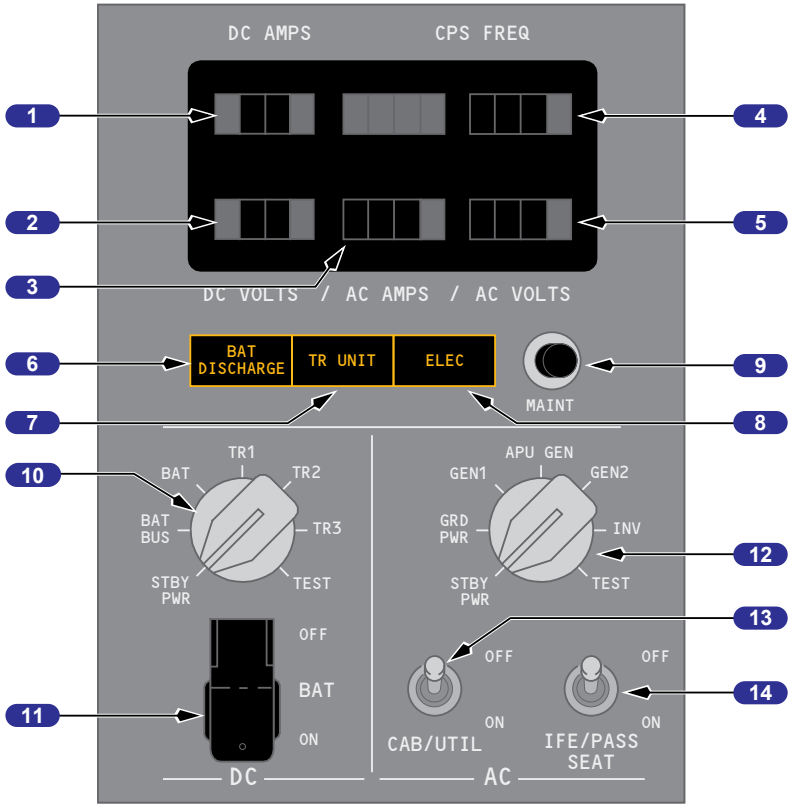
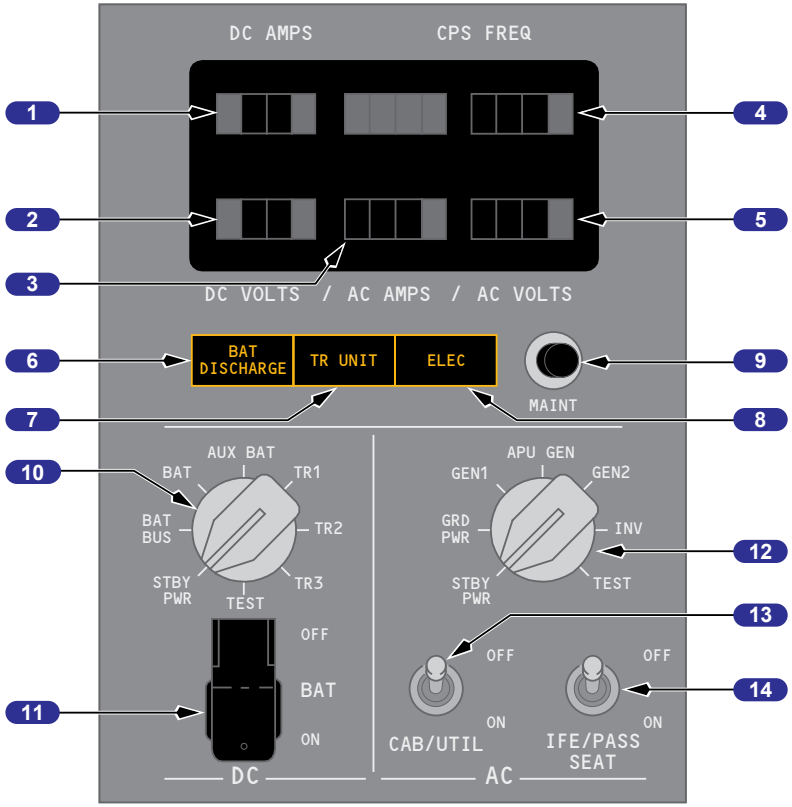
Single Battery



ELECTRICAL METERS, BATTERY, AND GALLEY POWER MODULE (FWD P5)

Dual Battery



ELECTRICAL METERS, BATTERY, AND GALLEY POWER MODULE (FWD P5)

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Generator Drive and Standby Power Panel

1 Generator Drive (DRIVE) Lights

Illuminated (amber) – Integrated drive generator (IDG) low oil pressure underfrequency condition.

2 Generator Drive Disconnect (DISCONNECT) Switches (guarded)

Disconnects the IDG if the battery bus is powered and the engine start lever is in the IDLE position.

3 STANDBY Power Off (PWR OFF) Light

Illuminated (amber) – one or more of the following busses are not powered:

- AC standby bus
- DC standby bus
- battery bus.

4 STANDBY POWER Switch

AUTO (guarded position) –

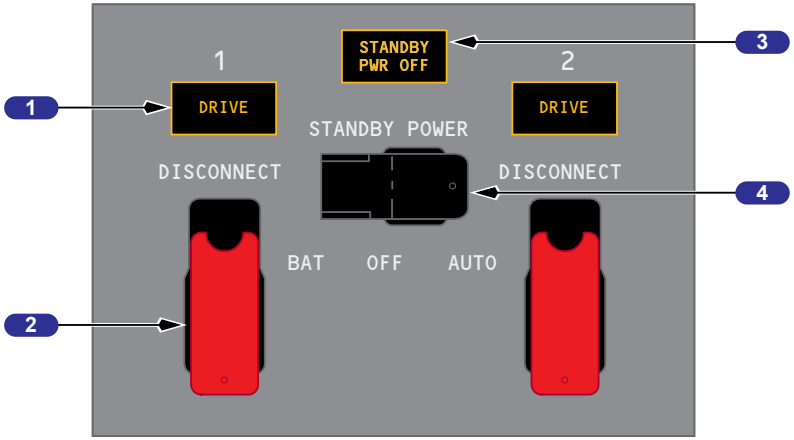
- AC transfer busses are powered and the BAT (battery) switch is on:
  - AC standby bus is powered by AC transfer bus 1
  - DC standby bus is powered by DC bus 1
  - Battery bus is powered by TRU 3
- AC transfer busses are not powered and the BAT (battery) switch is on:
  - AC standby bus is powered by battery through static inverter
  - DC standby bus is powered by the battery
  - Battery bus is powered by the battery.

OFF –

- STANDBY PWR OFF light illuminates
- AC standby bus, static inverter, and DC standby bus are not powered.
- Battery bus is powered if TRU 3 is energized and the battery switch is ON.

BAT (unguarded position) –

- AC standby bus is powered by the battery through static inverter
- DC standby bus and battery bus are powered directly by battery.



GENERATOR DRIVE AND STANDBY POWER MODULE (FWD P5)

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AC Systems, Generator and APU Module

1 Ground Power Available (GRD POWER AVAILABLE) Light

Illuminated (blue) – ground power is connected and the power quality is good.

2 Ground Power (GRD PWR) Switch

Three position switch, spring–loaded to neutral.

OFF – disconnects ground power from the AC transfer busses.

ON – if momentarily moved to ON position and ground power is available:

- removes all AC power from the transfer busses
- connects ground power to the AC transfer busses if power quality is good.

3 TRANSFER BUS OFF Lights

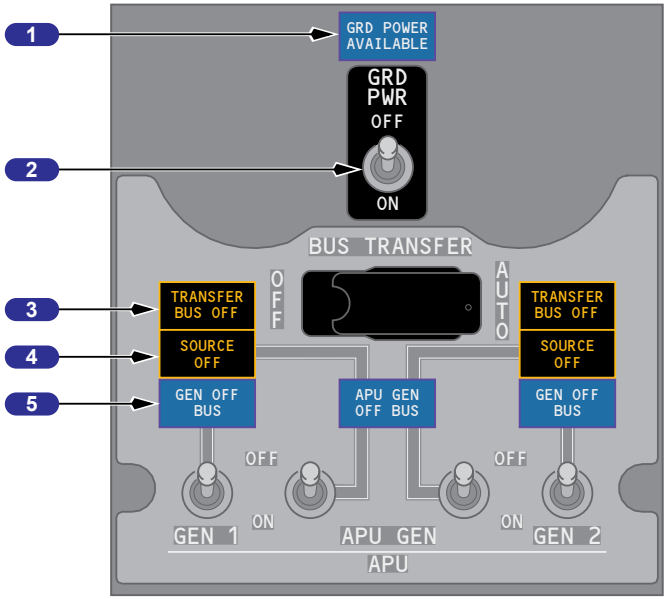
Illuminated (amber) – related transfer bus is not powered.

4 SOURCE OFF Lights

Illuminated (amber) – an AC power source has not been selected to power the related transfer bus, or the manually selected source has been disconnected.

5 Generator Off Bus (GEN OFF BUS) Lights

Illuminated (blue) – the related Generator Control Breaker (GCB) is open.



AC SYSTEMS, GENERATOR AND APU MODULE (FWD P5)

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6 Generator (GEN) Switches

Three position switch, spring–loaded to neutral.

OFF – disconnects IDG from related AC transfer bus by opening generator control breaker.

ON – connects IDG to related AC transfer bus by disconnecting previous power source and closing generator control breaker.

7 BUS TRANSFER Switch

AUTO (guarded position) – BTBs operate automatically to supply power to AC transfer busses from any operating generator or external power:

- DC cross tie relay automatically provides normal or isolated operation.

OFF – If external power is selected, then AC transfer bus 1 and transfer bus 2 are powered:

- the APU supplies power to the AC transfer bus related to the APU power switch when that switch is moved to ON
- the related IDG supplies power to its related AC transfer bus when its generator switch is moved to ON
- DC cross tie relay opens to isolate DC bus 1 from DC bus 2.

8 APU Generator Off Bus (GEN OFF BUS) Light

Illuminated (blue) – APU is running and not powering a bus.

9 APU Generator (GEN) Switches

Three position momentary switch, spring–loaded to neutral.

OFF –

- APU generator supplying power to both AC transfer busses:
  - moving a single APU GEN switch to OFF illuminates related SOURCE OFF light. APU continues supplying power to the AC transfer busses
  - subsequently move the other APU GEN switch to OFF disconnects APU generator from the tie bus and removes APU power from the AC transfer busses.
- APU generator powering one AC transfer bus; the IDG powering opposite AC transfer bus:
  - moving the related APU GEN switch to OFF disconnects the APU generator from the tie bus and the AC transfer bus. The IDG powers the AC transfer busses.

ON –

- Neither AC transfer bus powered by an IDG – move a single APU GEN switch to ON:
  - connects both AC transfer busses to the APU generator
  - disconnects external power, if connected
  - opposite SOURCE OFF light illuminates until the opposite APU GEN switch is moved to ON.
- Both AC transfer busses powered by IDGs – move an APU GEN switch to ON:
  - powers the related AC transfer bus from the APU generator
  - opposite AC transfer bus continues to receive power from the IDG.

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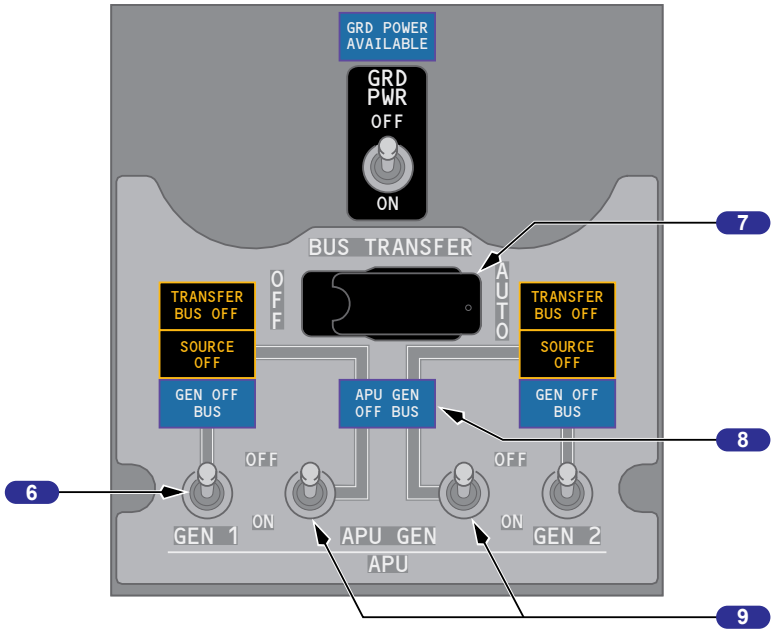


AC SYSTEMS, GENERATOR AND APU MODULE (FWD P5)

Ground Service Switch

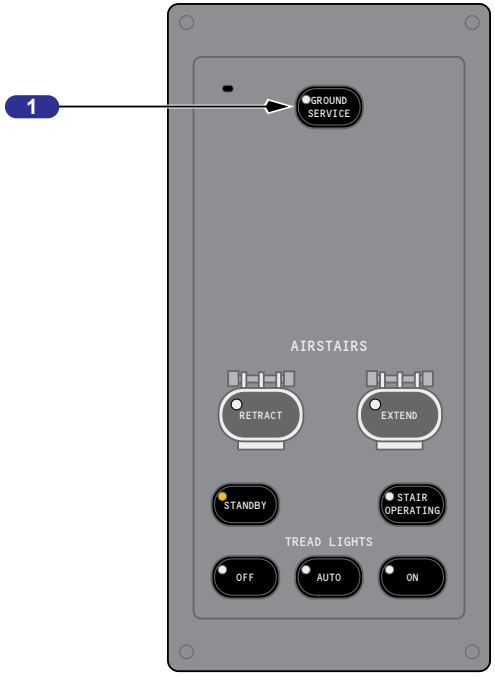
1 GROUND SERVICE Switch

Momentarily push the switch.

Provides manual control of ground service busses. Enables servicing airplane using external power without activating AC transfer busses.

Illuminated (white) –

- ON – connects external power to ground service busses
- OFF – disconnects external power from ground service busses.



FORWARD ATTENDANT CONTROL PANEL

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External Power Receptacle

1 EXTERNAL POWER CONN Light

Illuminated (amber) - ground power plug is connected and the ground power source is operating

Extinguished - ground power plug is connected and the ground power source is not operating or ground power plug is not connected

2 NOT IN USE Light

Illuminated (white) - ground power is not used by ground service system or airplane electrical system

Extinguished - safe to remove the ground power plug

3 PARKING BRAKE Light

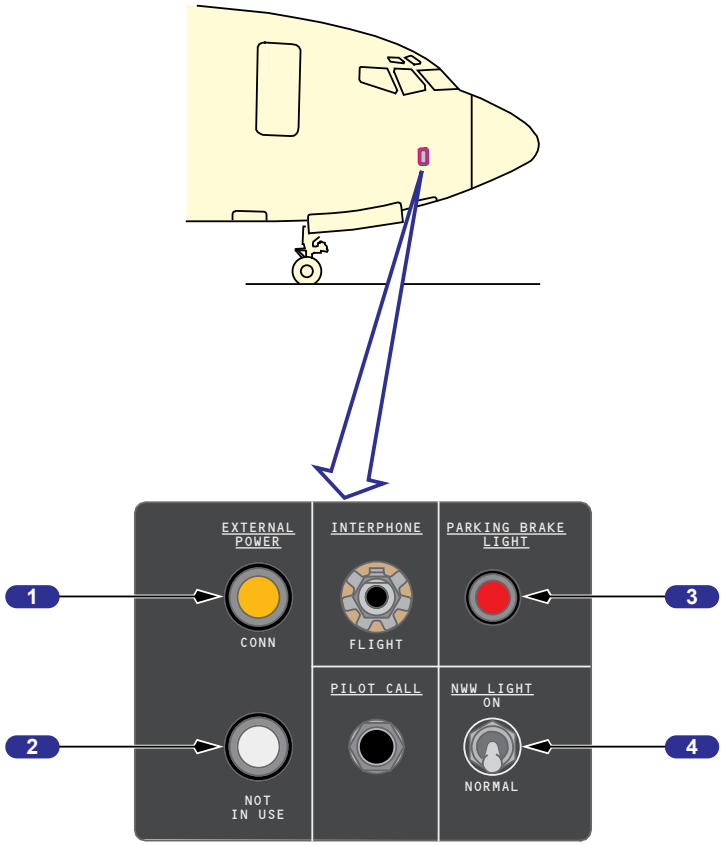
Illuminated (red) - parking brake is set

Extinguished - parking brake not set

4 NWW (Nose Wheel) Light Switch

ON - nose wheel light is not illuminated

NORMAL - nose wheel light is not illuminated



EXTERNAL POWER RECEPTACLE (P19)

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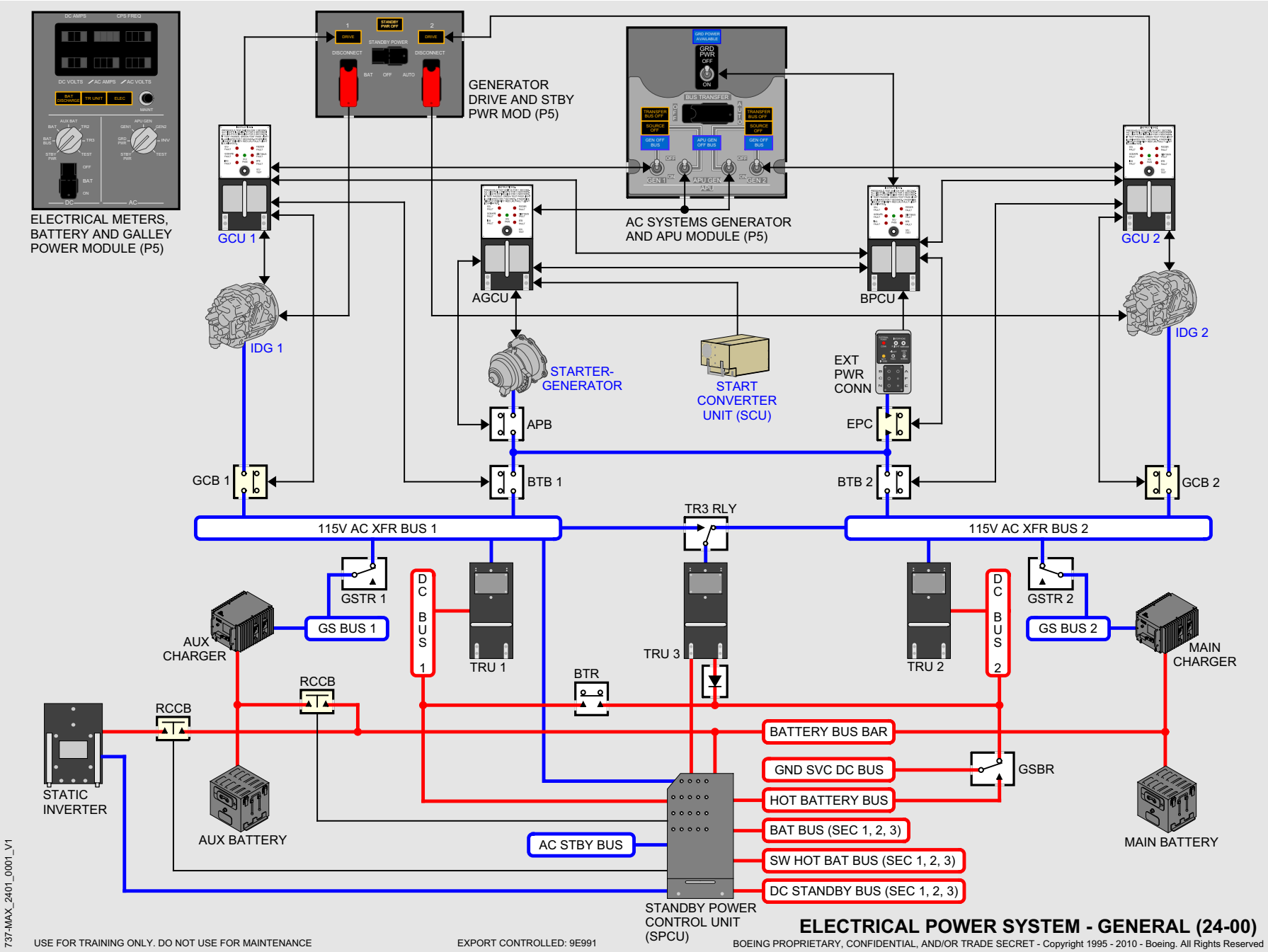

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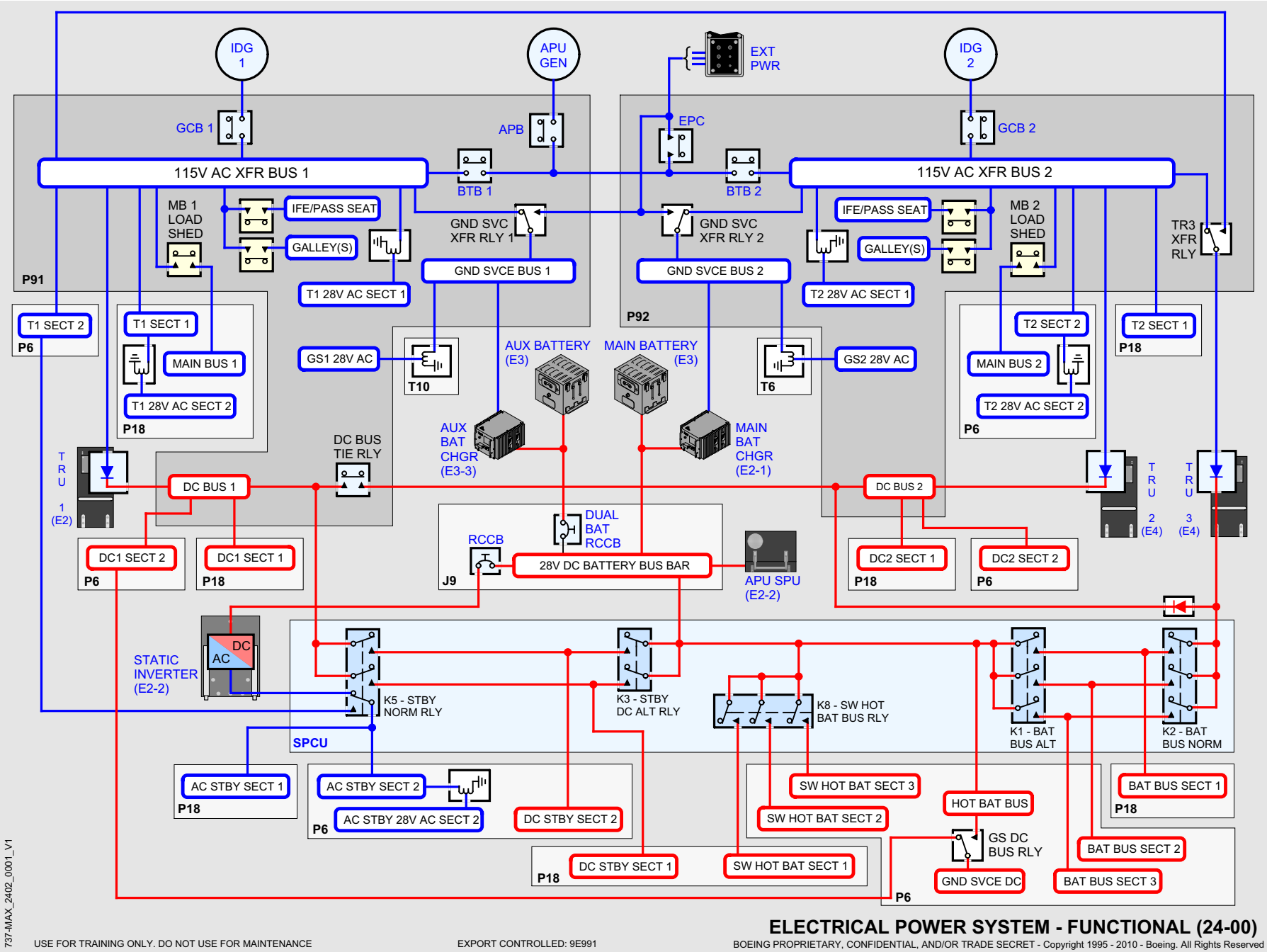

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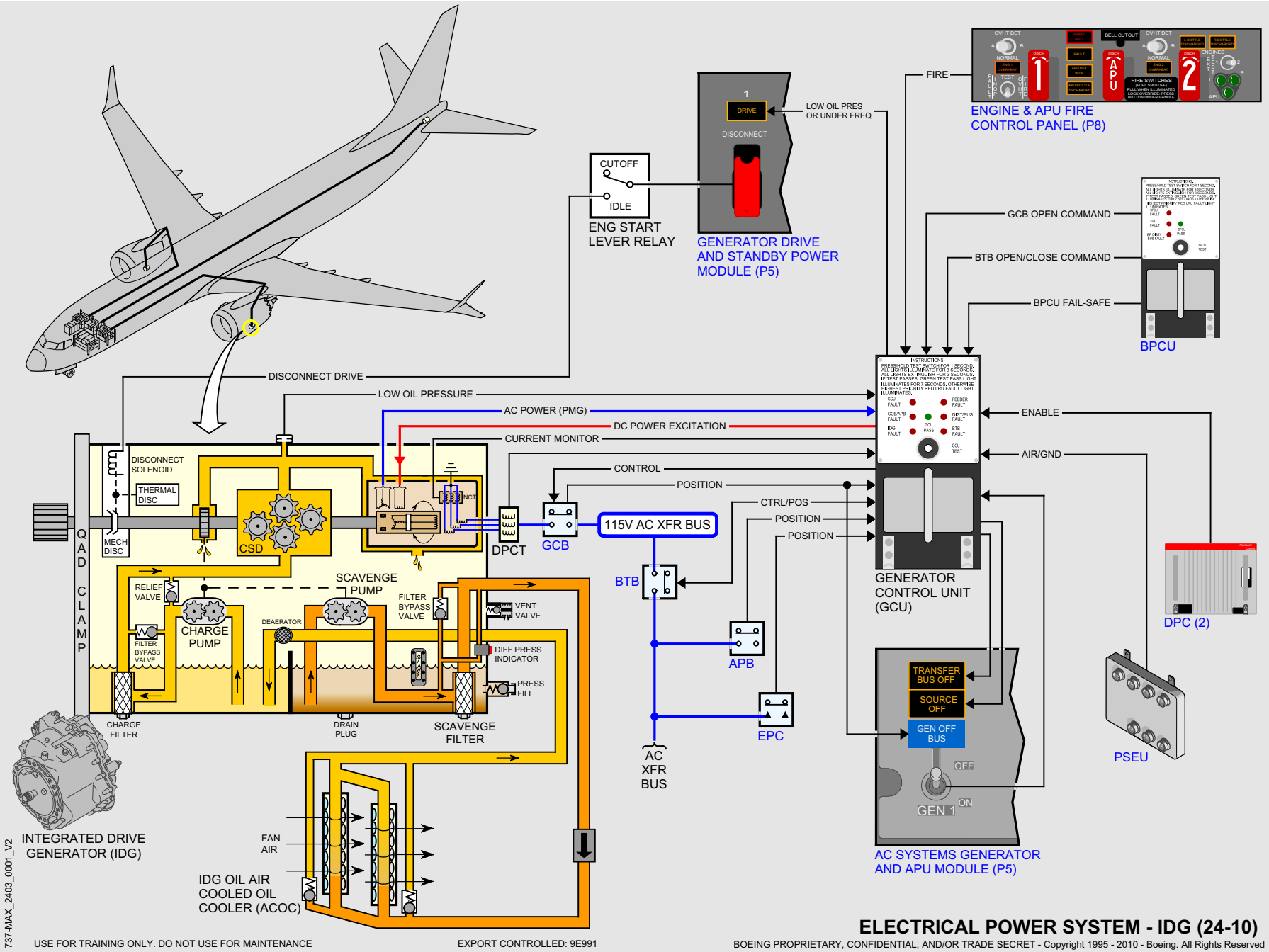

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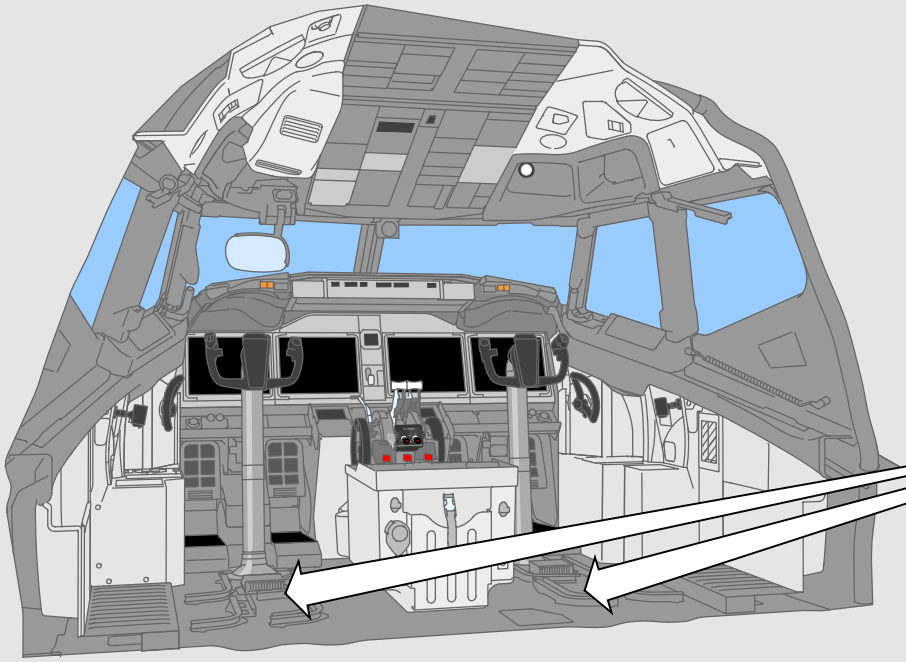
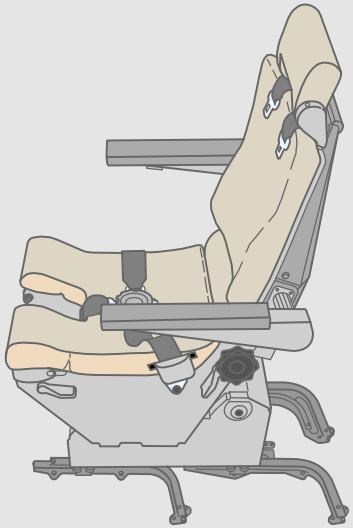
ATA 25

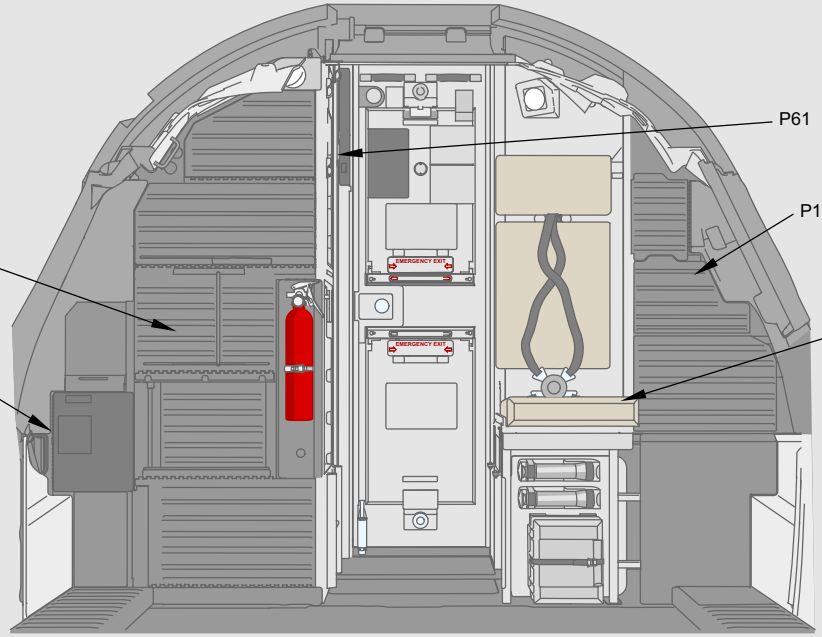
Equipment/Furnishings



FLIGHT COMPARTMENT
(LOOKING FWD)



CAPTAIN AND FIRST OFFICER SEAT



FLIGHT COMPARTMENT (LOOKING AFT)

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FLIGHT COMPARTMENT (25-00)

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PASSENGER COMPARTMENT (25-00)

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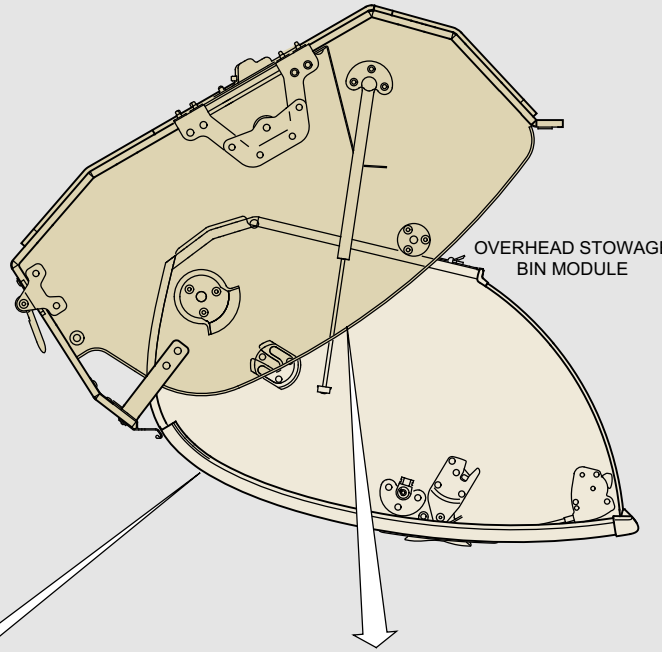

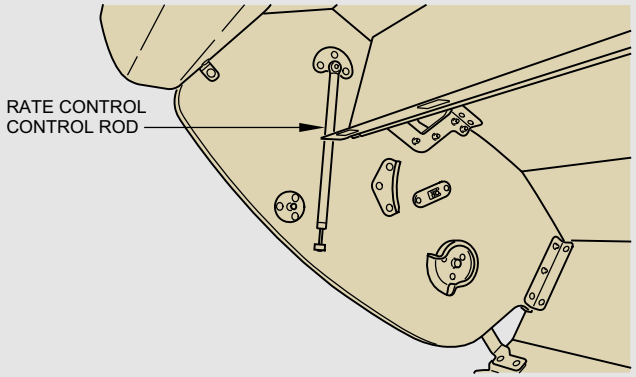

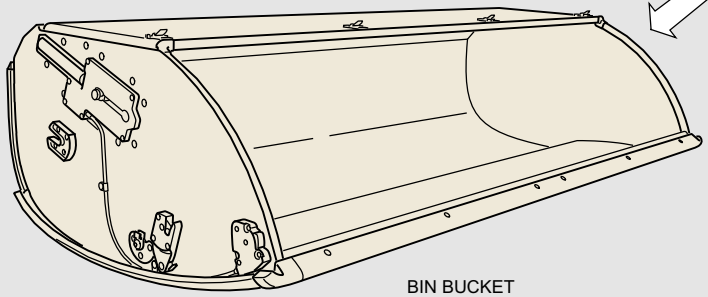

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PASSENGER COMPARTMENT / OVERHEAD STOWAGE BIN (25-20)

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FORWARD ENTRY / ATTENDANT STATION (25-20)

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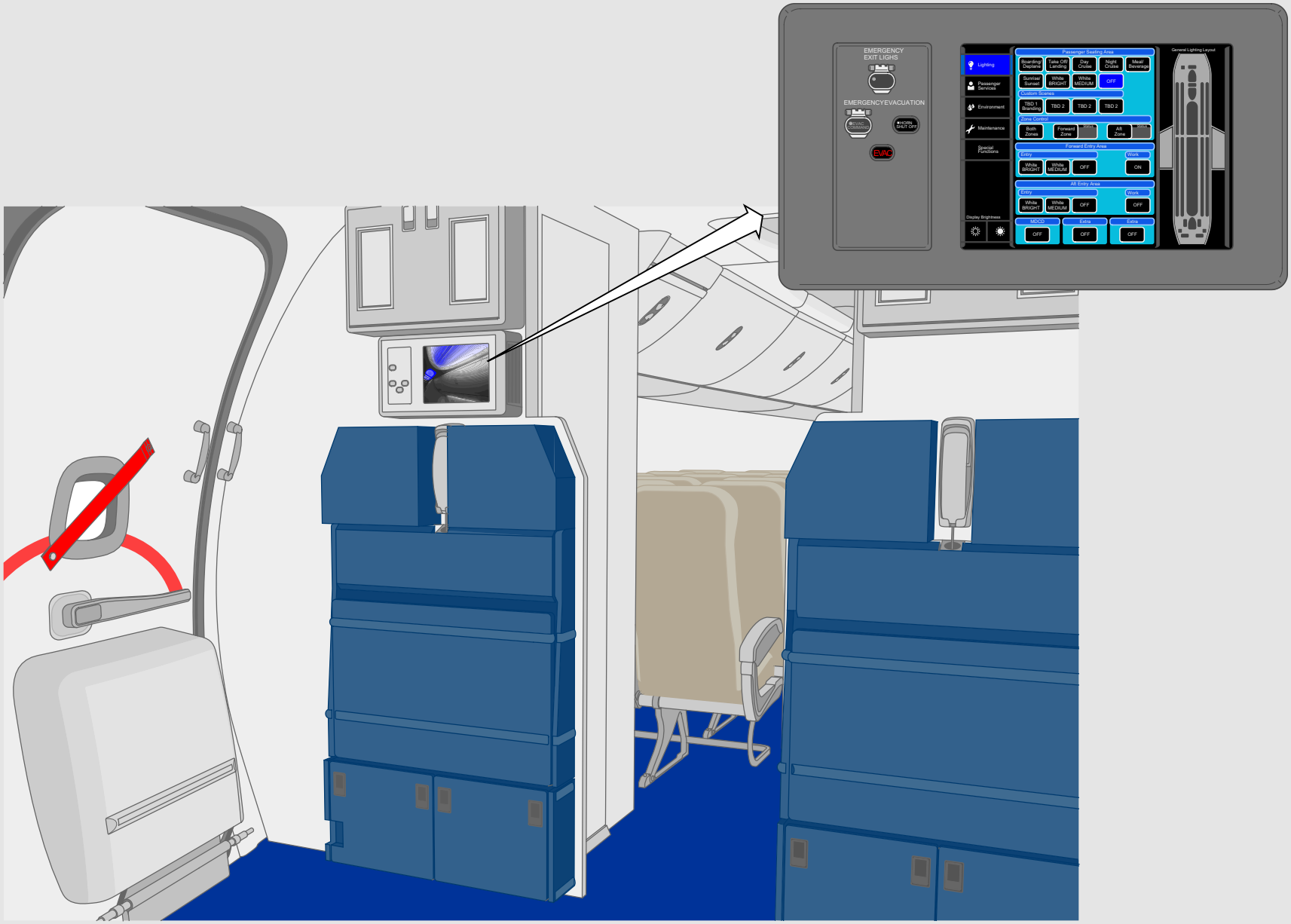

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AFT ENTRY / ATTENDANT AREA (25-00)

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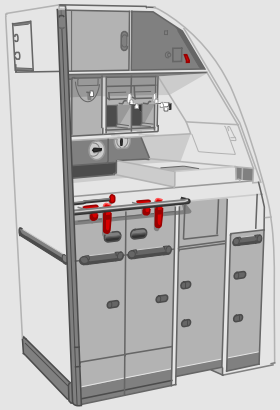
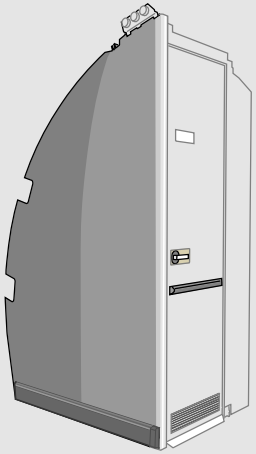
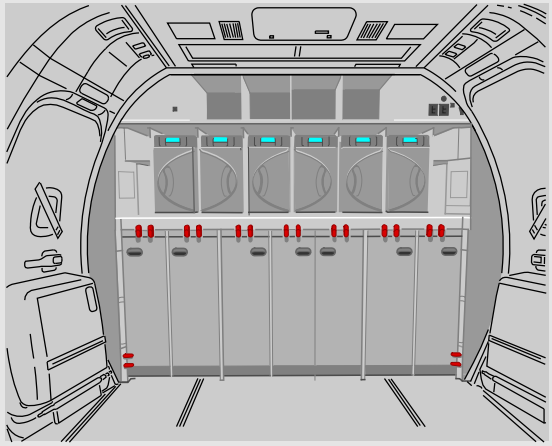


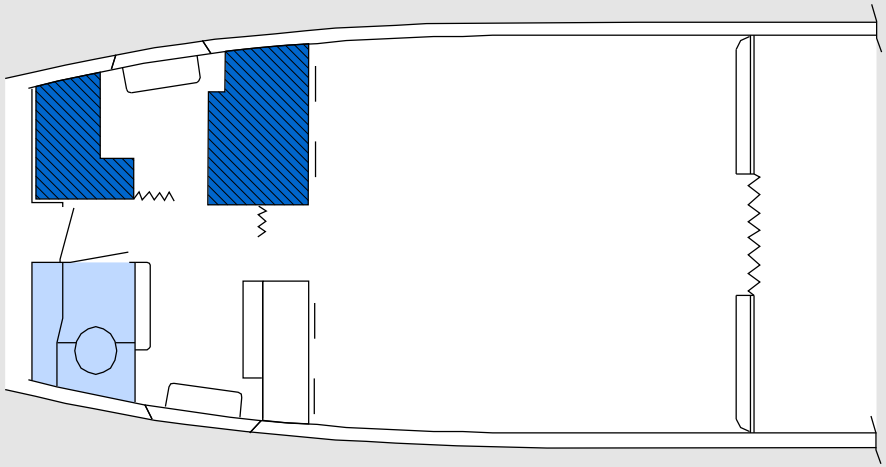
FORWARD FIXED GALLEY
(TYPICAL)

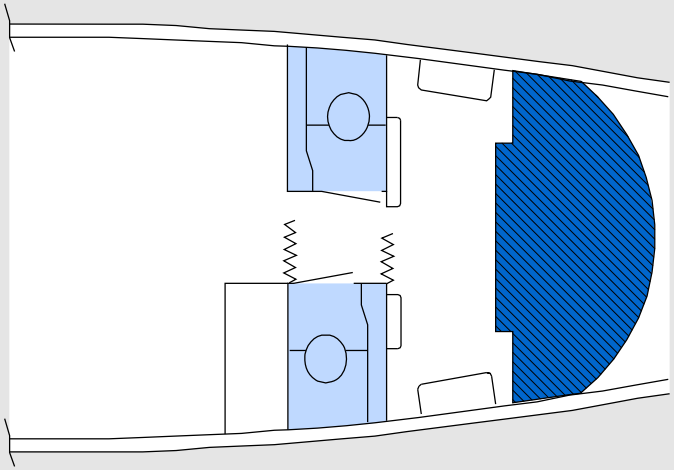


LAVATORY (TYPICAL)



AFT FIXED GALLEY
(TYPICAL)





LAVATORY GALLEY

737-MAX_2506_0001_V1

GALLEY SYSTEMS (25-30)
LAVATORIES (25-40)

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EMERGENCY EQUIPMENT (25-60)

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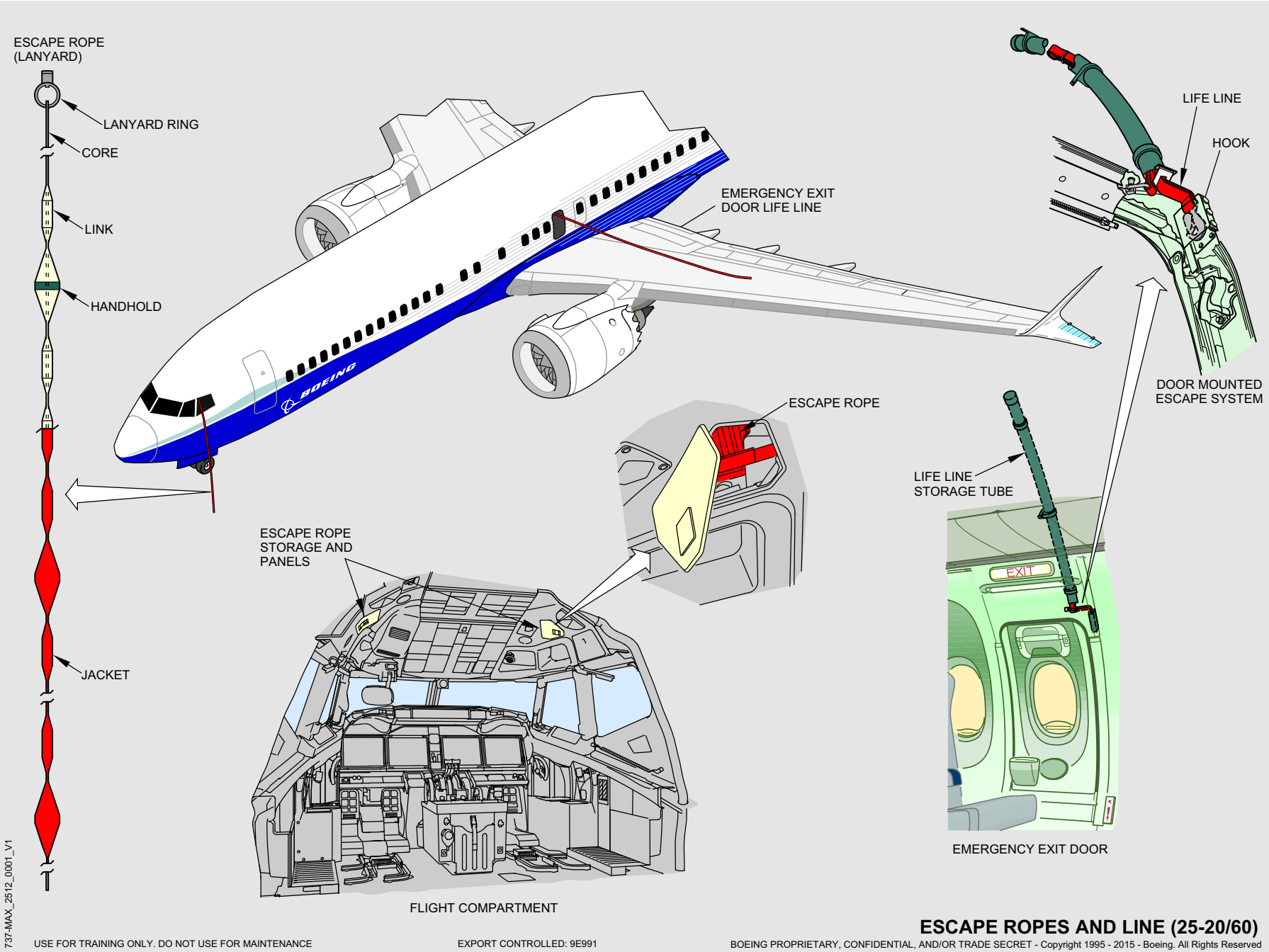

ESCAPE ROPES AND LINE (25-20/60)

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ATA 26

Fire Protection

Fire Protection (ATA 26)

ENGINE AND APU FIRE CONTROL PANEL Switches

1 Overheat Detector (OVHT DET) Switch

NORMAL – detection loop A and loop B are active.

A – detection loop A is active.

B – detection loop B is active.

2 Fire Warning BELL CUTOUT Switch

Push –

- extinguishes both master FIRE WARN lights
- silences the fire warning bell
- silences the remote APU fire warning horn (on the ground only)
- resets the FIRE WARN lights and fire bell for additional warnings.

3 Extinguisher (EXT) TEST Switch

(spring–loaded to center)

1 or 2 – tests bottle discharge circuit continuity for all three extinguisher bottles.

4 Fault/Inoperative (FAULT/INOP) and Overheat/Fire (OVHT/FIRE) TEST Switch

(spring–loaded to center)

FAULT/INOP – tests fault detection circuits for both engines and the APU.

OVHT/FIRE – tests overheat and fire detection loops on both engines and APU, and wheel well fire detector.

5 APU Fire Handle Switch

Illuminated (red) –

- indicates fire in APU
- unlocks APU fire switch.

Note: Master FIRE WARN lights illuminate, fire warning bell sounds, and in the main wheel well the APU fire warning horn sounds (on ground only), and APU fire warning light flashes.

Down – normal position, mechanically locked if no fire signal.

Up –

- arms APU extinguisher circuit
- closes fuel shutoff valve, APU bleed air valve, and APU inlet door
- trips generator control relay and breaker
- allows APU fire handle switch to rotate.

Rotate (left or right) –

- discharges APU fire bottle.

6 Engine Fire Handle Switch

Illuminated (red) –

- indicates fire in related engine
- unlocks related engine fire handle switch.

Note: Master FIRE WARN lights illuminate and fire warning bell sounds.

Down – normal position, mechanically locked if no fire signal.

Up –

- arms one discharge squib on each engine fire extinguisher
- closes fuel, hydraulic shutoff and engine bleed air valves

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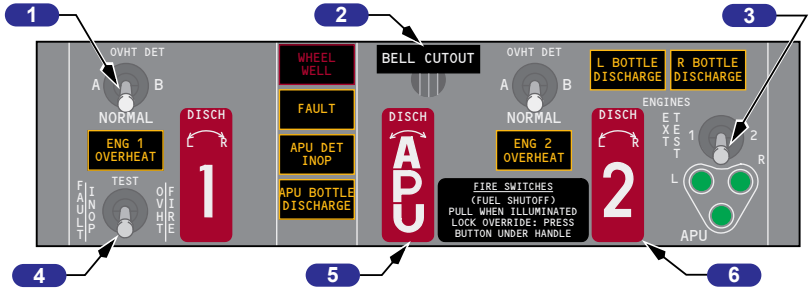
- disables thrust reverser
- trips generator control relay and breaker
- deactivates engine driven hydraulic pump LOW PRESSURE light
- allows engine fire handle switch to rotate.

Rotate (left or right) – discharges related fire bottle.

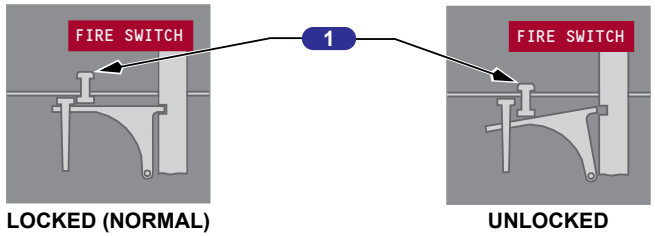


ENGINE AND APU FIRE CONTROL PANEL (P8)

Fire Handle Switch Override

1 Handle Switch Override

Push – unlocks the APU or fire handle switch.



ENGINE AND APU FIRE CONTROL PANEL (P8)

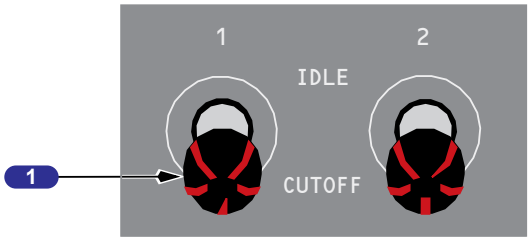
Engine Start Levers

1 Engine Start Levers

Illuminated (red) –

indicates fire in

- related engine, or
- the fire TEST switch is held to the OVHT/FIRE position.



CONTROL STAND

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ENGINE AND APU FIRE CONTROL PANEL Lights

1 Engine (ENG) OVERHEAT Light

Illuminated (amber) – indicates overheat in related engine.

Note: MASTER CAUTION and OVHT/DET system annunciator lights illuminate.

2 FAULT Light

Illuminated (amber) – with the overheat detector switch in NORMAL – indicates both detector loops for an engine have failed.

Illuminated (amber) – with the overheat detector switch in A or B – indicates the selected loop for an engine has failed.

Note: MASTER CAUTION and OVHT/DET system annunciator lights do not illuminate.

3 WHEEL WELL Fire Warning Light

Illuminated (red) – indicates fire in main gear wheel well.

Note: Master FIRE WARN lights illuminate and fire warning bell sounds.

4 Engine BOTTLE DISCHARGE Light

Illuminated (amber) – indicates related fire extinguisher bottle has discharged.

5 APU Detector Inoperative (DET INOP) Light

Illuminated (amber) – indicates APU detector loop has failed.

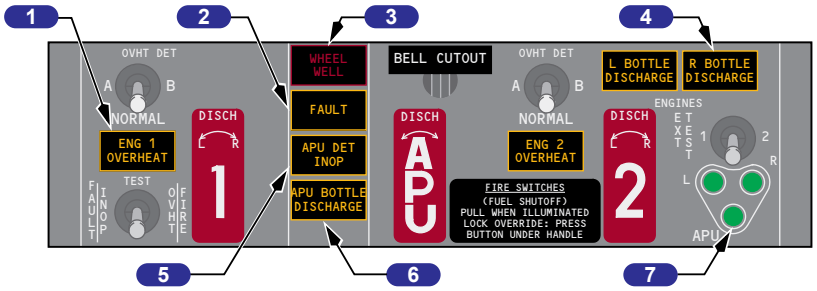
Note: MASTER CAUTION and OVHT/DET system annunciator lights illuminate.

6 APU BOTTLE DISCHARGE Light

Illuminated (amber) – indicates APU extinguisher bottle has discharged.

7 Extinguisher Test (EXT TEST) Lights

Illuminated (green) – EXT TEST switch is positioned to 1 or 2 and circuit continuity is normal.



ENGINE AND APU FIRE CONTROL PANEL (P8)

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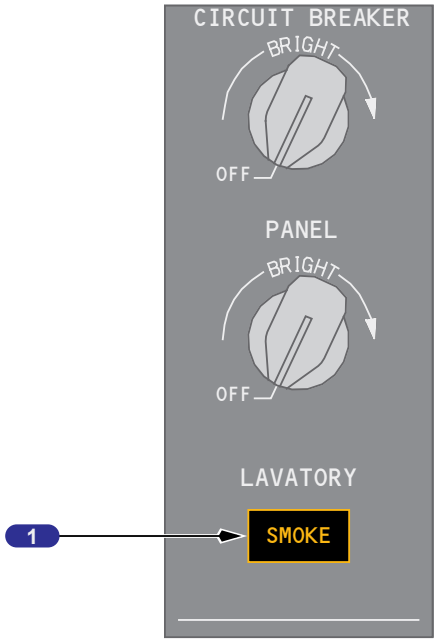
Lavatory Smoke Detection

1 LAVATORY SMOKE Light

Illuminated (amber) – indicates smoke detected in a lavatory

Note: The MASTER CAUTION lights and OVERHEAD annunciator lights illuminate.



OVERHEAD PANEL (FWD P5)

Lavatory Fire Extinguisher

1 TEMPERATURE INDICATOR Placard

White – normal condition.

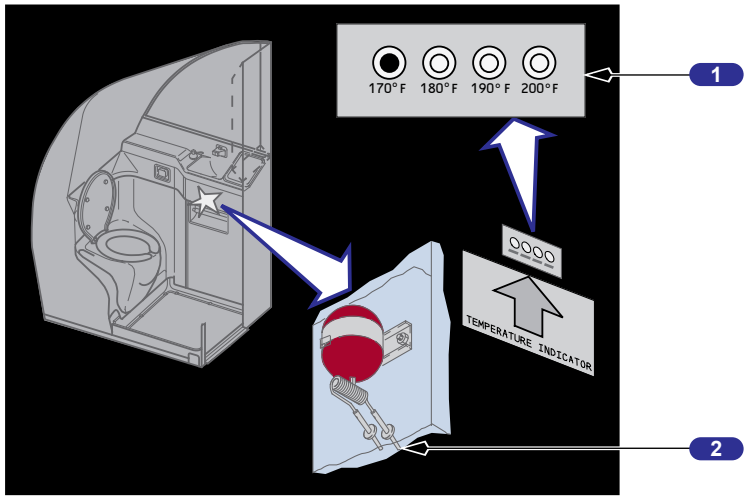
Black – exposed to temperatures greater than 170˚F.

2 Heat Activated Nozzles

Flat black – normal condition.

Aluminum – indicates extinguisher has discharged.

Both nozzles discharge toward the towel disposal container.



BELOW LAVATORY SINK

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Cargo Fire Control Panel

1 Extinguisher (EXT) Test Lights

Illuminated (green) – Cargo Fire TEST switch is pushed and fire bottle discharge squib circuit continuity is normal.

2 Detector Select (DET SELECT) Switches

NORM – detection loop A and B are active.

A – detection loop A is active.

B – detection loop B is active.

3 DETECTOR FAULT Light

Illuminated (amber) –

- One or more of the selected detector loop(s) in either cargo compartment has failed.

4 Cargo Fire TEST Switch

PUSH – tests circuits for both forward and aft cargo fire detector loops and suppression system.

5 Cargo Fire ARM Switches

PUSH –

- FWD ARMED – extinguisher armed for the forward cargo compartment
- AFT ARMED – extinguisher armed for the aft cargo compartment.

Note: If the first bottle has discharged and the system remains armed, the second bottle discharge is inhibited upon landing. The second bottle discharge timer is disabled when the system is disarmed.

6 Cargo Fire (FWD/AFT) Warning Lights

Illuminated (red) –

- at least one detector in each loop detects smoke
- with power failed in one loop, at least one detector on the remaining loop detects smoke.

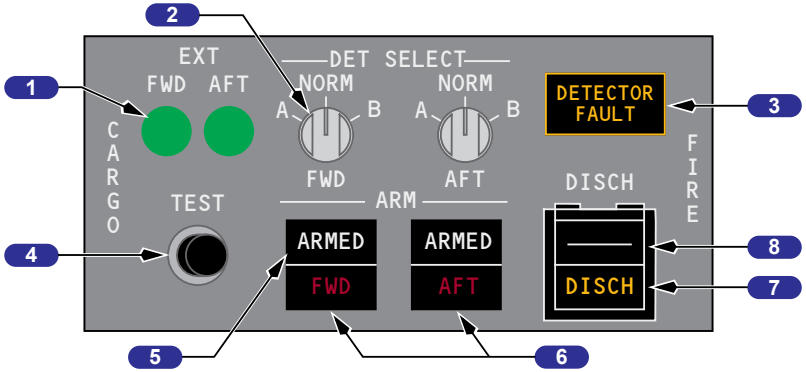
Note: Master FIRE WARN lights illuminate and fire warning bell sounds.

7 Cargo Fire Bottle Discharge (DISCH) Light

Illuminated (amber) – indicates that either extinguisher bottle has discharged.

8 Cargo Fire Discharge (DISCH) Switch

PUSH – if system is armed, discharges the first extinguisher bottle. The timer is set for 60 minutes to discharge the second extinguisher bottle.



CARGO FIRE CONTROL PANEL (P8)

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Fire Warning and Master Caution System

1 Master Fire Warning (FIRE WARN) Lights

Illuminated (red) – indicates a fire warning (or system test) in engine, APU, main gear wheel well, or cargo compartment.

- fire warning bell sounds
- if on ground, remote APU fire warning horn sounds.

Push – extinguishes both master FIRE WARN lights.

- silences fire warning bell
- silences remote APU fire warning horn
- resets FIRE WARN lights and fire bell for additional warnings.

Note: Pushing the fire warning BELL CUTOUT switch on the ENGINE AND APU FIRE CONTROL PANEL results in the same actions.

2 MASTER CAUTION Lights

Illuminated (amber) – a system annunciator light has illuminated.

Push – extinguishes both MASTER CAUTION lights.

- system annunciator light(s) extinguish
- resets system for additional master caution conditions.

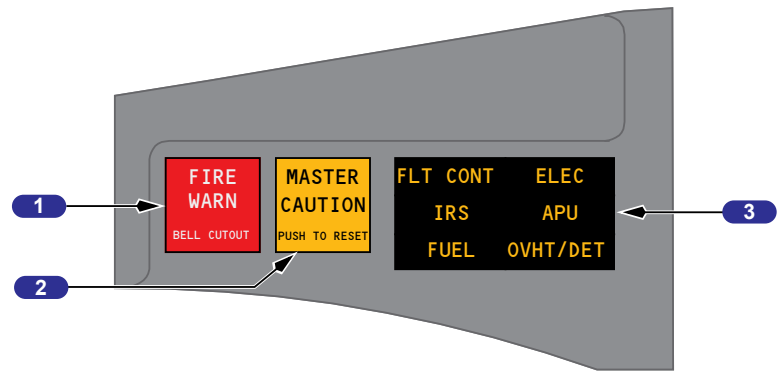
3 System Annunciator Panel

Illuminated (amber) – an amber light, relating to illuminated system annunciator, has illuminated on the forward overhead, aft overhead, or overheat/fire protection panel.

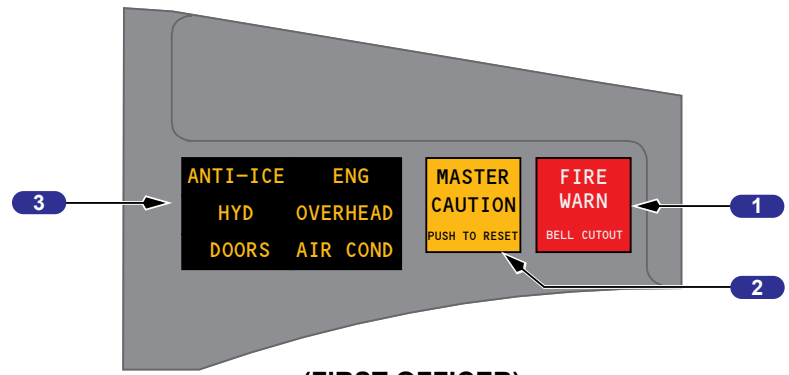
Push – either MASTER CAUTION light to extinguish the annunciator light(s).

Push and Release – either system annunciator panel to recall the illuminated light(s).

- if a master caution condition exists, appropriate system annunciator(s) and MASTER CAUTION lights illuminate
- a single fault in certain redundant systems, or some simple faults, cause the system annunciator light to illuminate during a recall. The system annunciator light will extinguish when the MASTER CAUTION light is pushed.



(CAPTAIN)



(FIRST OFFICER)

GLARESHIELD (P7)

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Remote APU Control Panel

1 APU BOTTLE DISCHARGE Switch

(spring-loaded to the right and safety wired.)

Left – discharges APU extinguisher.

Note: Armed only if APU Fire Control Handle is pulled at this panel.

2 APU Fire Control Handle

Up – normal position.

Down –

- arms APU BOTTLE DISCHARGE switch (on this panel only)
- closes APU fuel shutoff, bleed air valve and APU inlet door
- trips generator control relay and breaker.

3 APU Fire Warning HORN CUTOUT Switch

Push –

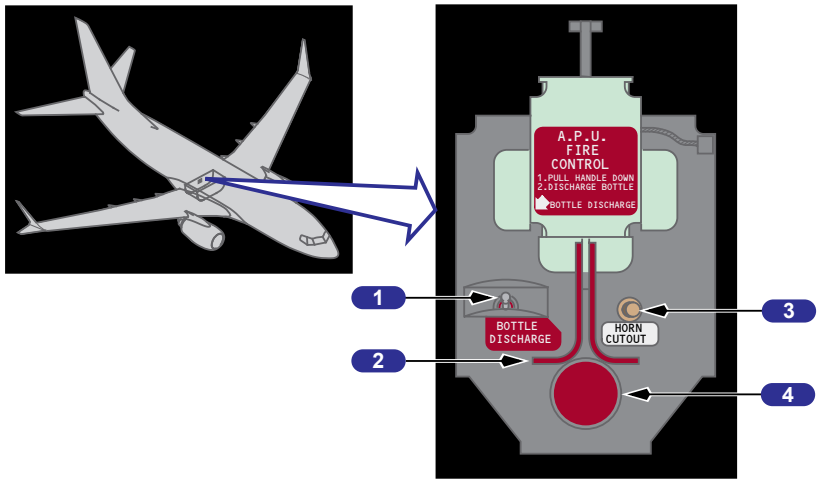
- silences fire warning bell
- silences APU fire warning horn
- causes APU fire warning light to stop flashing but remain illuminated.

4 APU Fire Warning Light

Illuminated (red flashing) – indicates fire in APU.

Note: Also, flight deck fire warning bell sounds and APU fire warning horn in main wheel well sounds.

Illuminated (red steady) – indicates APU fire warning HORN CUTOUT switch has been pushed following an APU fire indication.



REMOTE APU CONTROL PANEL (P28)
(RIGHT MAIN WHEEL WELL)

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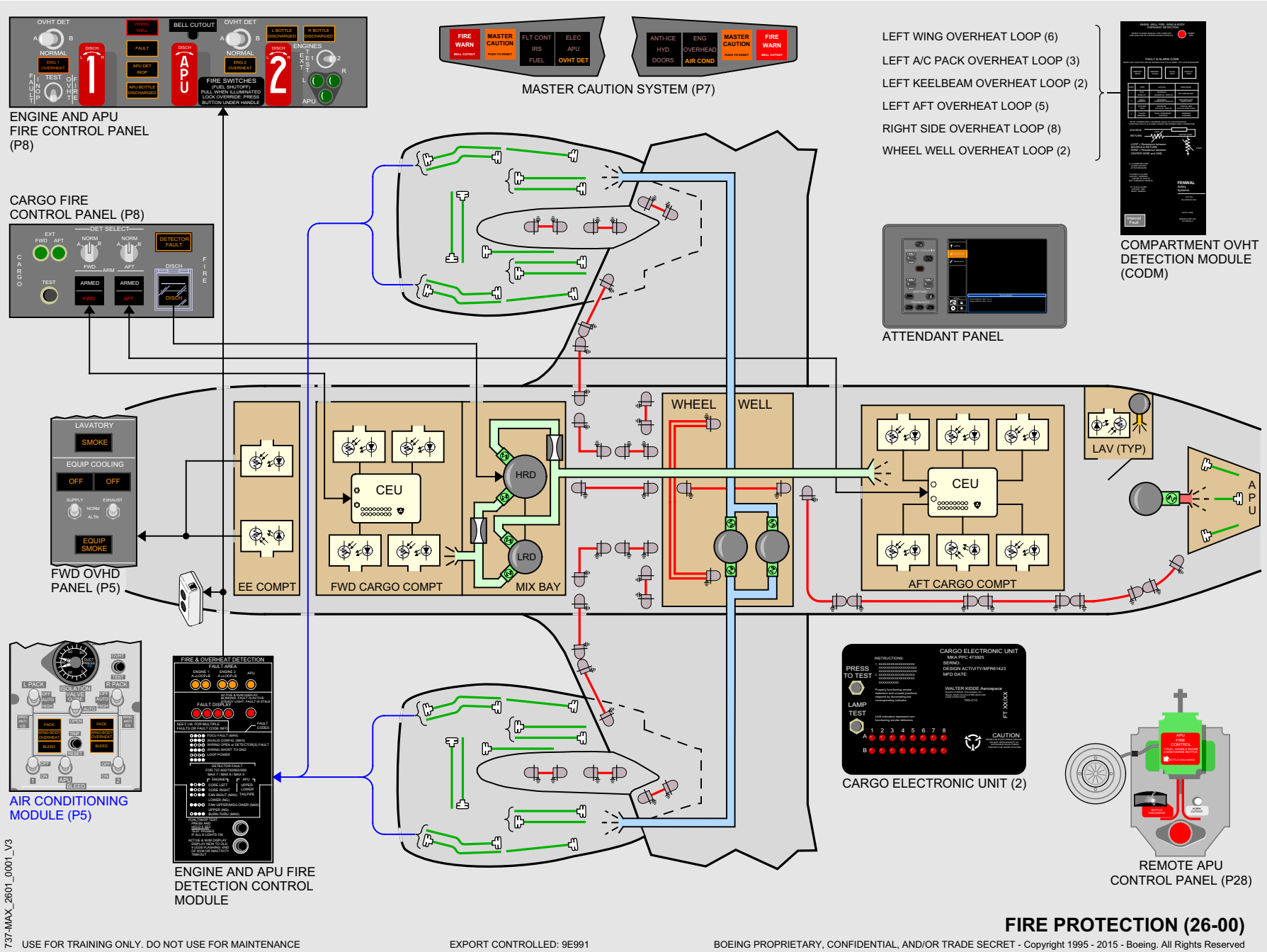

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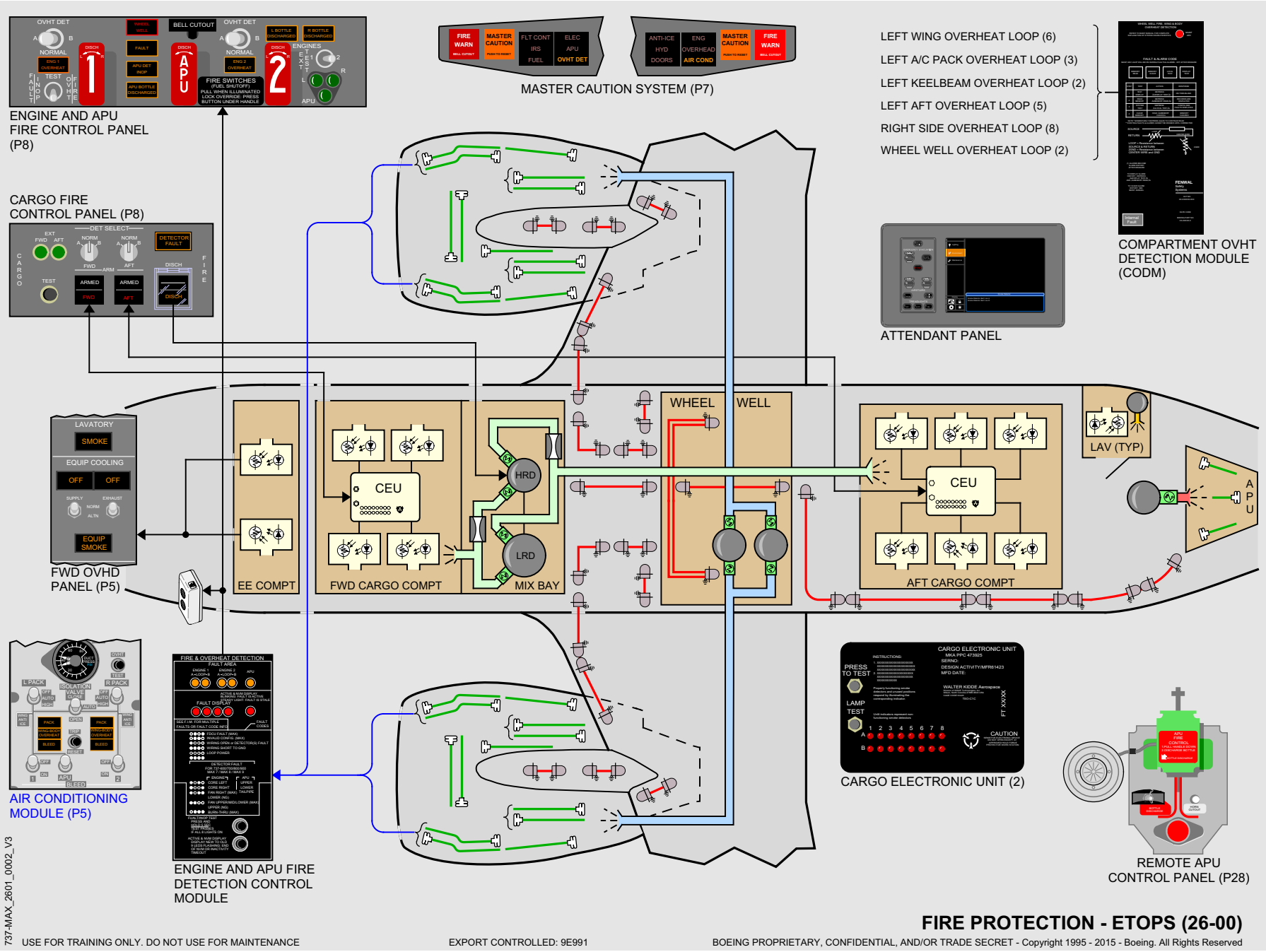

FIRE PROTECTION - ETOPS (26-00)

USE FOR TRAINING ONLY. DO NOT USE FOR MAINTENANCE
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ATA 27

Flight Controls

Flight Controls (ATA 27)

Flight Controls Panel

1 Flight (FLT) CONTROL Switches

STBY RUD – activates standby hydraulic system pump and opens standby rudder shutoff valve to pressurize standby rudder power control unit.

OFF – closes flight control shutoff valve isolating ailerons, elevators and rudder from associated hydraulic system pressure.

ON (guarded position) - normal operating position.

2 FLT CONTROL LOW PRESSURE Lights

Illuminated (amber) –

- indicates low hydraulic system (A or B) pressure to ailerons, elevator and rudder
- deactivated when associated FLT CONTROL switch is positioned to STBY RUD and standby rudder shutoff valve opens.

3 Flight SPOILER Switches

ON (guarded position) – normal operating position.

OFF – closes the respective flight spoiler shutoff valve.

Note: Used for maintenance purposes only.

4 YAW DAMPER Light

Illuminated (amber) – yaw damper is not engaged.

5 YAW DAMPER Switch

OFF – disengages yaw damper.

ON –

- engages main yaw damper to main rudder power control unit if the B FLT CONTROL switch is in the ON position
- engages standby yaw damper to standby rudder power control unit if both the A and B FLT CONTROL switches are in the STBY RUD position.

6 STANDBY HYD Lights

STANDBY HYD LOW QUANTITY Light

Illuminated (amber) –

- indicates low quantity in standby hydraulic reservoir
- always armed.

STANDBY HYD LOW PRESSURE Light

Illuminated (amber) –

- indicates output pressure of standby pump is low
- armed only when standby pump operation has been selected or automatic standby function is activated.

STANDBY HYD STBY RUD ON Light

- Illuminated (amber) - indicates the standby rudder system is commanded on to pressurize the standby rudder power control unit.

7 ALTERNATE FLAPS Arm Switch

OFF (guarded position) – normal operating position.

ARM – closes TE flap bypass valve, activates standby pump, and arms the ALTERNATE FLAPS control switch.

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8 ALTERNATE FLAPS Position Switch

Functions only when the ALTERNATE FLAPS arm switch is in the ARM position.

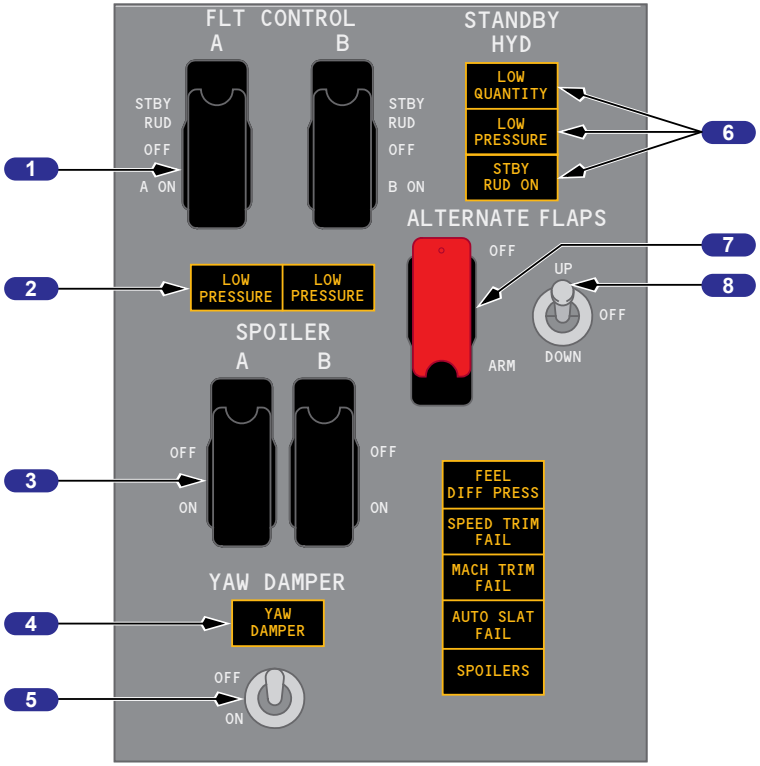
UP –

- electrically retracts TE flaps
- LE devices remain extended and cannot be retracted by the alternate flaps system.

OFF – normal operating position.

DOWN (spring loaded to OFF) –

- (momentary) fully extends LE devices using standby hydraulics
- (hold) electrically extends TE flaps until released.



FLIGHT CONTROLS PANEL (FWD P5)

9 Feel Differential Pressure (FEEL DIFF PRESS) Light

Illuminated (amber) –

- indicates excessive differential pressure in the elevator feel computer.

Note: Excessive differential pressure can be caused by erroneous activation of the Elevator Feel Shift module.

10 Speed Trim Failure (SPEED TRIM FAIL) Light

Illuminated (amber) –

- indicates failure of the speed trim system
- indicates failure of a single FCC channel when MASTER CAUTION light recall is activated and light extinguishes when Master Caution System is reset.

11 Mach Trim Failure (MACH TRIM FAIL) Light

Illuminated (amber) –

- indicates failure of the mach trim system
- indicates failure of a single FCC channel when MASTER CAUTION light recall is activated and light extinguishes when master caution system is reset.

12 Automatic Slat Failure (AUTO SLAT FAIL) Light

Illuminated (amber) –

- indicates failure of the auto slat system
- indicates failure of a single Stall Management/Yaw Damper (SMYD) computer when illuminated during MASTER CAUTION recall and extinguishes when master caution system is reset.

13 SPOILERS Light

Illuminated (amber) –

- activated by signal from the spoiler control electronics (SCE)
- indicates spoiler system fault.

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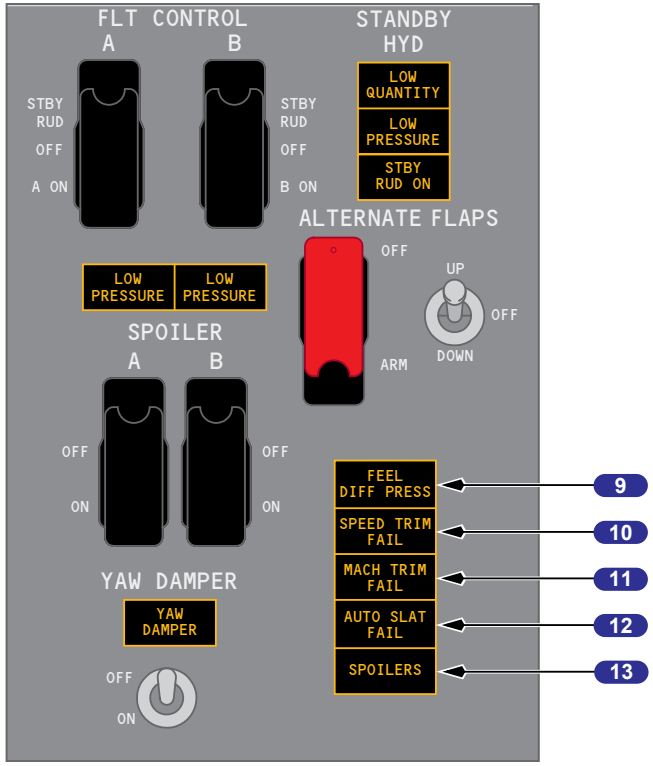


FLIGHT CONTROLS PANEL (FWD P5)

Elevator Jam Landing Assist Panel

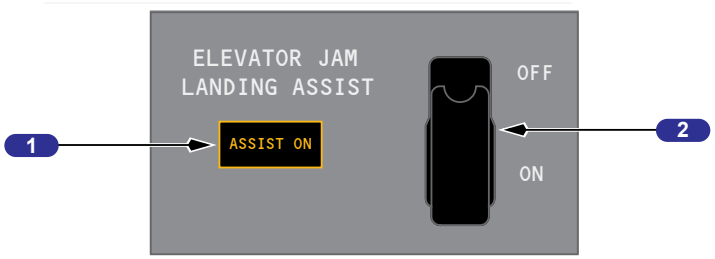
1 ASSIST ON Light

Illuminated (amber) – indicates the Elevator Jam Landing Assist function is activated.

2 Elevator Jam Landing Assist Switch

OFF (guarded position) – Elevator Jam Landing Assist function is inactive.

ON – Activates Elevator Jam Landing Assist function when flaps are selected to 1 or greater.



AFT OVERHEAD PANEL (P5)

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Stabilizer

1 Stabilizer Trim Wheel

- provides for manual operation of stabilizer
- overrides any other stabilizer trim inputs
- rotates when stabilizer is in motion.

Note: Handle should be folded inside stabilizer trim wheel for normal operation

2 Stabilizer Trim (STAB TRIM) Indicator

Indicates units of airplane trim on the adjacent scale.

3 Stabilizer Trim Green Band Range

Corresponds to allowable range of trim settings for takeoff.

4 Stabilizer Trim Switches (spring-loaded to neutral)

Push (both) –

- electrically commands stabilizer trim in desired direction
- autopilot disengages if engaged.

5 Stabilizer Trim (STAB TRIM) Primary (PRI) Cutout Switch

NORMAL – normal operating position.

CUTOUT – deactivates stabilizer trim switch operation.

6 Stabilizer Trim (STAB TRIM) Backup (B/U) Cutout Switch

NORMAL – normal operating position.

CUTOUT –

- deactivates autopilot stabilizer trim operation
- autopilot disengages if engaged.

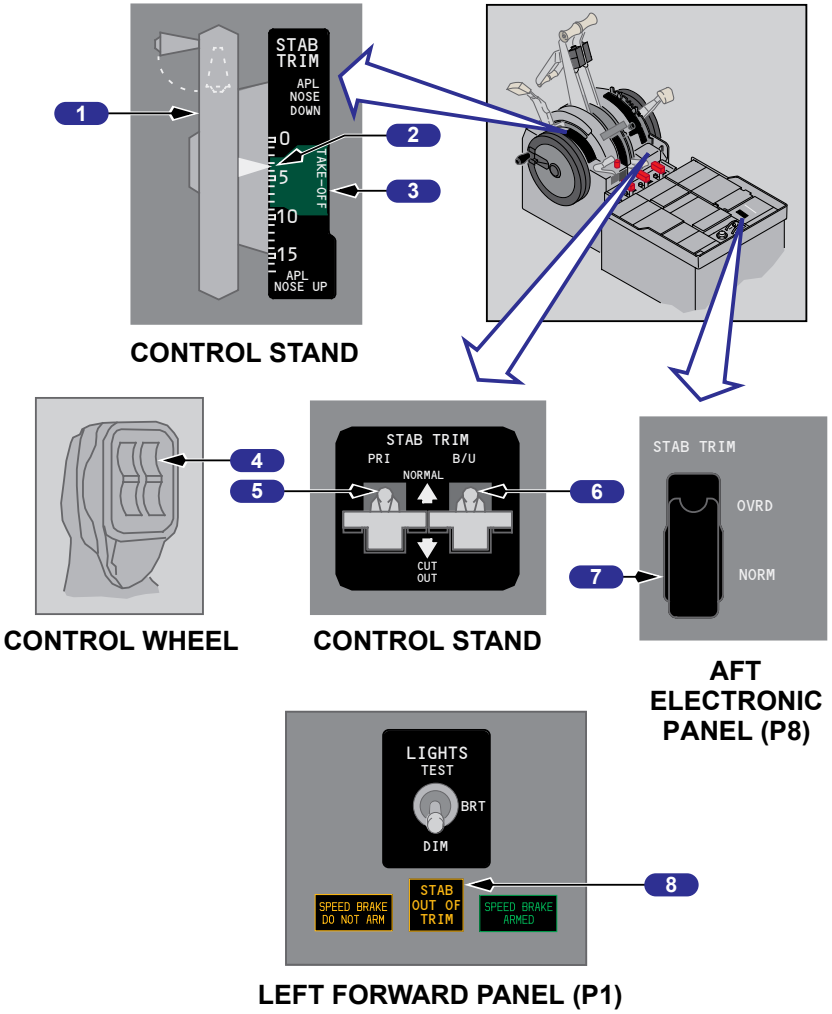
7 Stabilizer Trim (STAB TRIM) Override Switch

OVRD – bypasses the control column actuated stabilizer trim cutout switches to restore power to the Stabilizer Trim Switches.

NORM (guarded position) – normal operating position.

8 Stabilizer Out of Trim (STAB OUT OF TRIM) Light

Illuminated (amber) – autopilot not trimming properly.



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Rudder

1 Rudder Pedals

Push –

- controls rudder position
- permits limited nose gear steering up to 7 degrees each side of center.

2 RUDDER TRIM Indicator

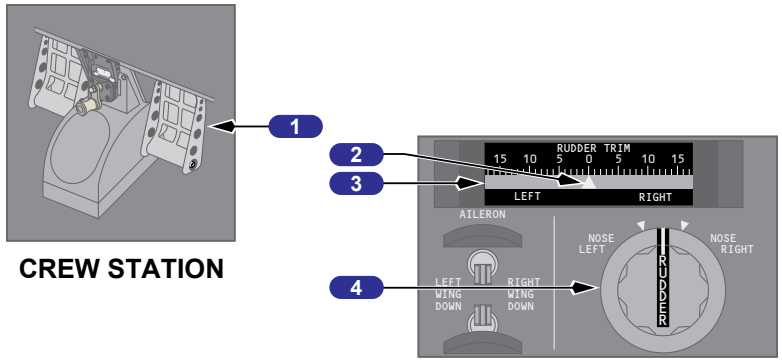
Indicates units of rudder trim.

3 RUDDER TRIM OFF Flag

Illuminated (amber) (in view) – rudder trim indicator is inoperative.

4 RUDDER Trim Control (spring-loaded to off)

Rotate – electrically trims the rudder in the desired direction.



CREW STATION

AFT ELECTRONIC PANEL (P8)

Aileron / Elevator / Flight Spoilers

1 AILERON TRIM Indicator

Indicates units of aileron trim.

2 AILERON Trim Switches (spring-loaded to the off position)

Movement of both switches repositions the aileron neutral control position.

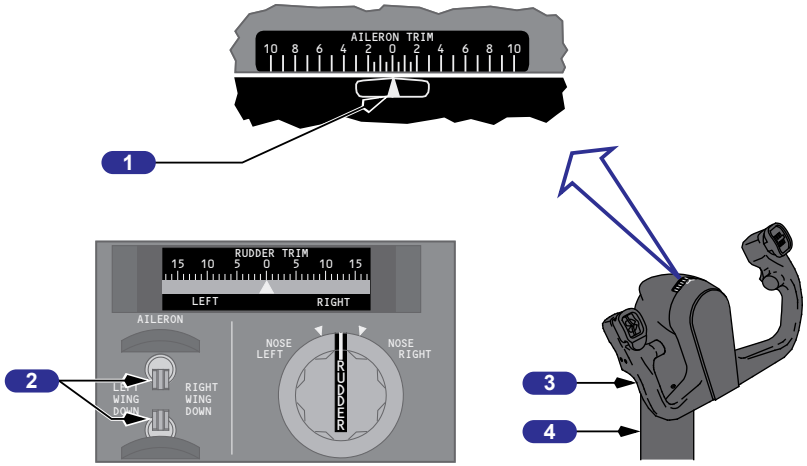
3 Control Wheel

Rotate – operates ailerons and flight spoilers in desired direction.

4 Control Column

Push/Pull –

- operates elevators in the desired direction
- movement opposing stabilizer trim stops electric trimming.



AFT ELECTRONIC PANEL (P8)

CREW STATION

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Speedbrakes

1 Speedbrake (SPD BRK) Lever

DOWN (detent) – all flight and ground spoiler panels in faired position.

ARMED –

- automatic speedbrake system armed
- upon touchdown, the SPD BRK lever moves to the UP position, and all flight and ground spoilers extend.

FLIGHT DETENT – all flight spoilers are extended to their maximum position for inflight use.

UP – all flight and ground spoilers are extended to their maximum position for ground use.

2 SPEED BRAKE DO NOT ARMED Light

Light deactivated when SPD BRK lever is in the DOWN position.

Illuminated (amber) –

- indicates a fault within the speedbrake system or test inputs to the automatic speedbrake system, or
- during landing, indicates wheel speed has dropped below 60 kts, and the SPD BRK lever is not in the DOWN position.

3 SPEED BRAKE ARMED Light

Light deactivated when SPD BRK lever is in the DOWN position.

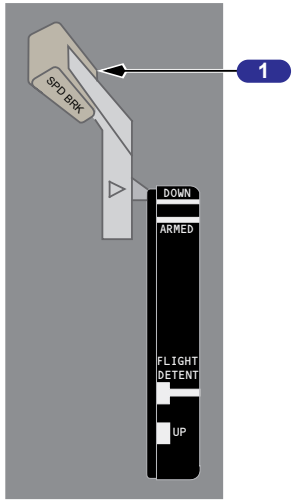
Illuminated (green) – indicates valid automatic speedbrake system inputs.

4 SPEEDBRAKES EXTENDED Light

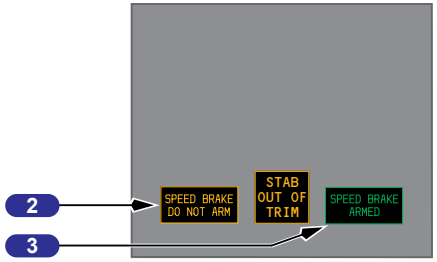
Illuminated (amber) –

- in–flight –
  - SPD BRK lever is beyond the ARMED position for at least 3 seconds, and
    - a thrust lever is above approximately 40 degrees
  - SPD BRK lever is beyond the ARMED position for at least 15 seconds, and
    - a thrust lever is above idle
  - SPD BRK lever is beyond the ARMED position, and
    - TE flaps extended more than flaps 10, or
    - radio altitude less than 800 feet, or
- on the ground –
  - SPD BRK lever is in the DOWN detent,
  - ground spoilers are not stowed.

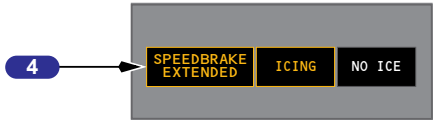
Note: On the ground, the SPEEDBRAKES EXTENDED light does not illuminate when hydraulic system A pressure is less than 750 psi.



CONTROL STAND



LEFT FORWARD PANEL (P1)



RIGHT FORWARD PANEL (P3)

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Trailing Edge Flaps

1 FLAP Lever

- selects position of flap control valve, directing hydraulic pressure for flap drive unit
- position of the LE devices is determined by selecting TE flap position
- FLAP lever positions 10, 15, 25, 30, and 40 arms the flap load relief system.

2 Flap Gates

Prevents inadvertent FLAP lever movement beyond:

- position 1 – to check flap position for one engine inoperative go-around
- position 15 – to check flap position for normal go-around.

3 FLAP Position Indicator

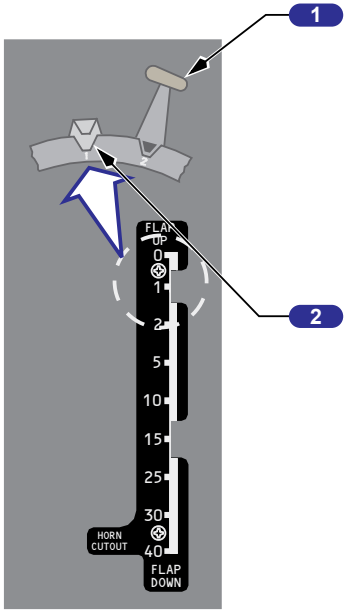
- indicates position of left and right TE flaps
- provides TE flaps asymmetry and skew indication.

4 FLAPS LIMIT SPEED Placard

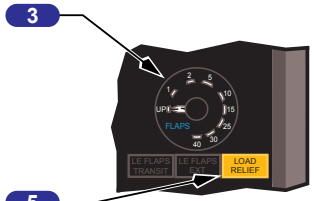
Indicates maximum speed for each flap setting.

5 FLAP LOAD RELIEF Light

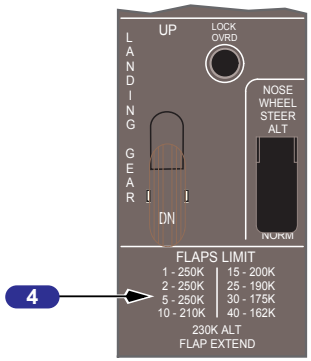
Illuminated (amber) – indicates that flap load relief is active.



CONTROL STAND



ENGINE DISPLAY



CENTER FORWARD PANEL (P2)

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Leading Edge Devices

1 Leading Edge Devices (LE DEVICES) Annunciator Panel

Indicates position of individual LE flaps and slats.

Extinguished – related LE device retracted.

2 Leading Edge Devices TRANSIT Lights

Illuminated (amber) – related LE device in transit.

3 Leading Edge Devices Extended (EXT) Lights

Illuminated (green) – related LE slat in extended (intermediate) position.

4 Leading Edge Devices Full Extended (FULL EXT) Lights

Illuminated (green) – related LE device fully extended.

5 LE DEVICES Annunciator Panel TEST Switch

Press – tests all annunciator panel lights.

6 Leading Edge Flaps (LE FLAPS) Light

Illuminated (amber) –

- any LE device not in programmed position with respect to TE flaps
- a LE uncommanded motion condition exists (two or more LE flaps or slats have moved away from their commanded position)
- during alternate flap extension until LE devices are fully extended and TE flaps reach flaps 10.

Note: Light is inhibited during autoslat operation in flight.

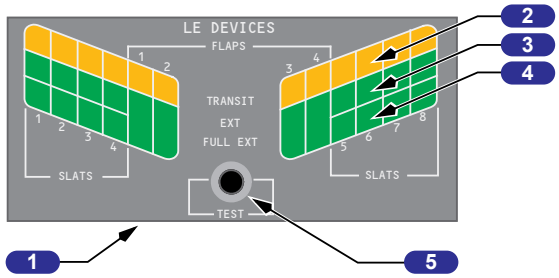
Note: Light is inhibited when trailing edge flap position provided by SMYDs.

7 Leading Edge Flaps Extended (LE FLAPS EXT) Light

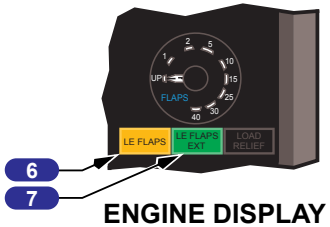
Illuminated (green) –

- all LE flaps extended and all LE slats in extended (intermediate) position (TE flap positions 1, 2, 5, 10, 15, 25).
- all LE devices fully extended (TE flap positions 30 and 40).

Note: Light is inhibited when trailing edge flap position provided by SMYDs.



OVERHEAD PANEL (AFT P5)



ENGINE DISPLAY

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Flight Control Surface Position Indicator

1 MFD System (SYS) Switch

Push – SYS

- displays flight control surface position indications on the MDS Display Unit (DU)
- second push removes indications from the respective DU.

2 Flight Spoilers (FLT SPLR) (white)

Indicates related (left/right) flight spoilers position:

- top mark depicts flight spoilers fully deployed
- bottom mark depicts the spoilers down.

3 Aileron (AIL) (white)

Indicates related (left/right) aileron position:

- top mark depicts maximum up position
- center mark depicts neutral position
- bottom mark depicts maximum down position.

4 Elevator (ELEV) (white)

Indicates elevator position:

- top mark depicts maximum up position
- center mark depicts neutral position when on the ground and trimmed in the green band
- bottom mark depicts maximum down position.

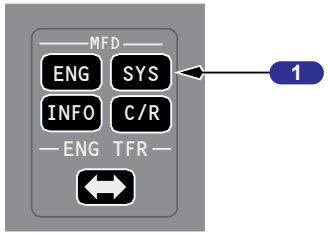
Note: Elevator neutral position varies with stabilizer position, flap position and Mach. The center index mark is set for nominal takeoff conditions. With certain airplane nose up trim settings, the pointer will be somewhat displaced.

5 RUDDER (white)

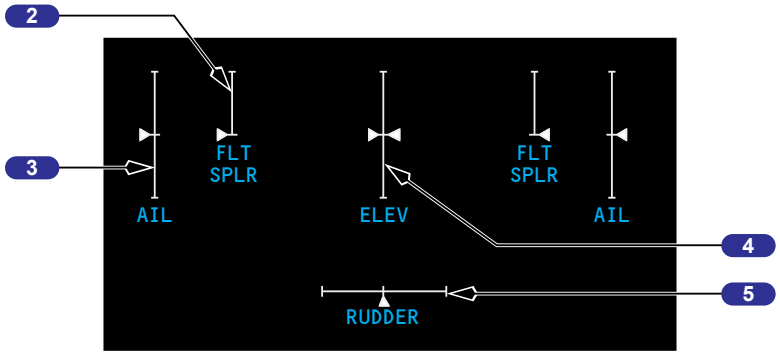
Indicates rudder position:

- left mark depicts maximum left position
- center mark depicts neutral position
- right mark depicts maximum right position.

Note: Main and standby yaw damper movement of the rudder are shown on this indicator.



FORWARD ELECTRONIC PANEL (P9)



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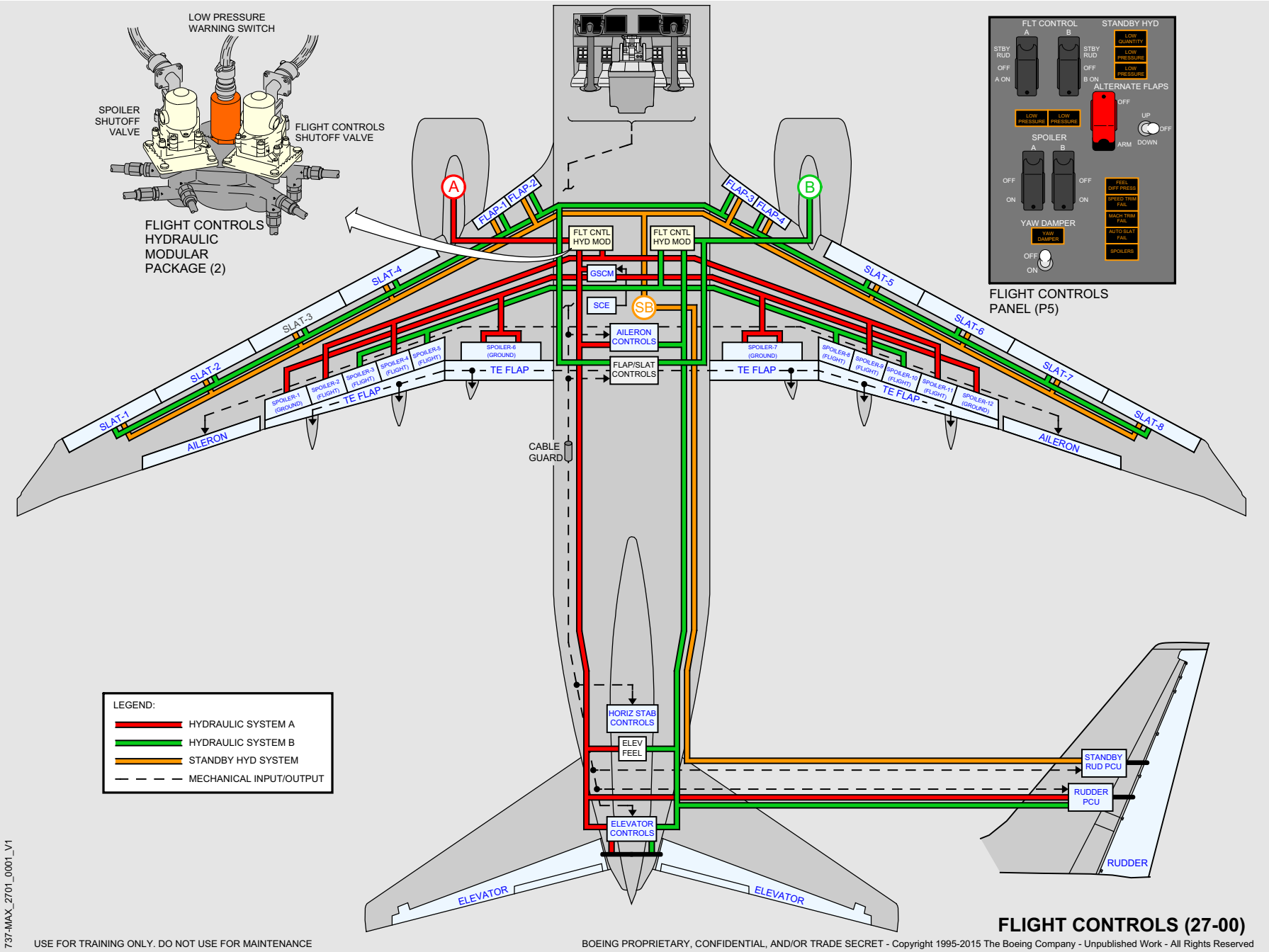

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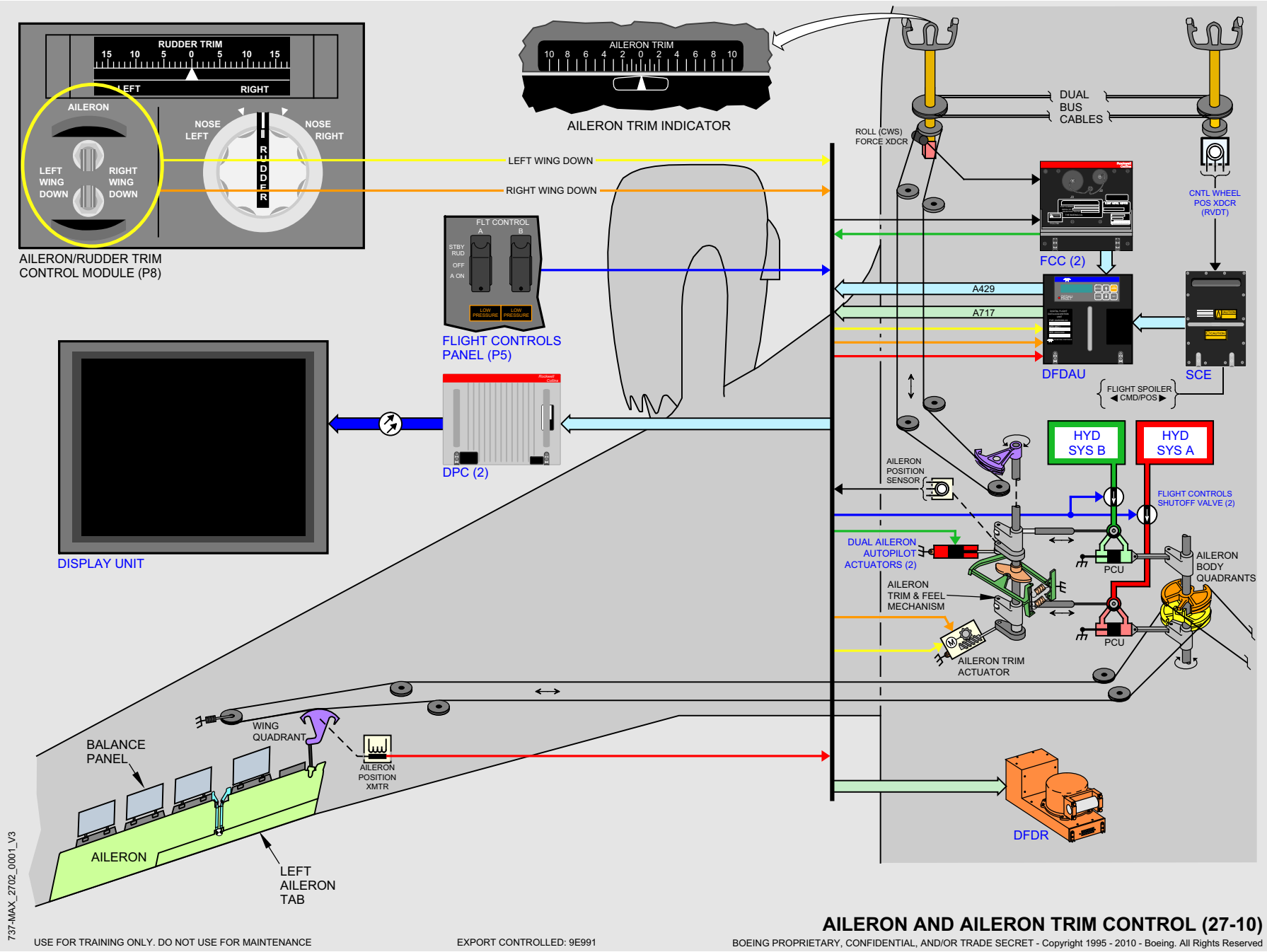

AILERON AND AILERON TRIM CONTROL (27-10)

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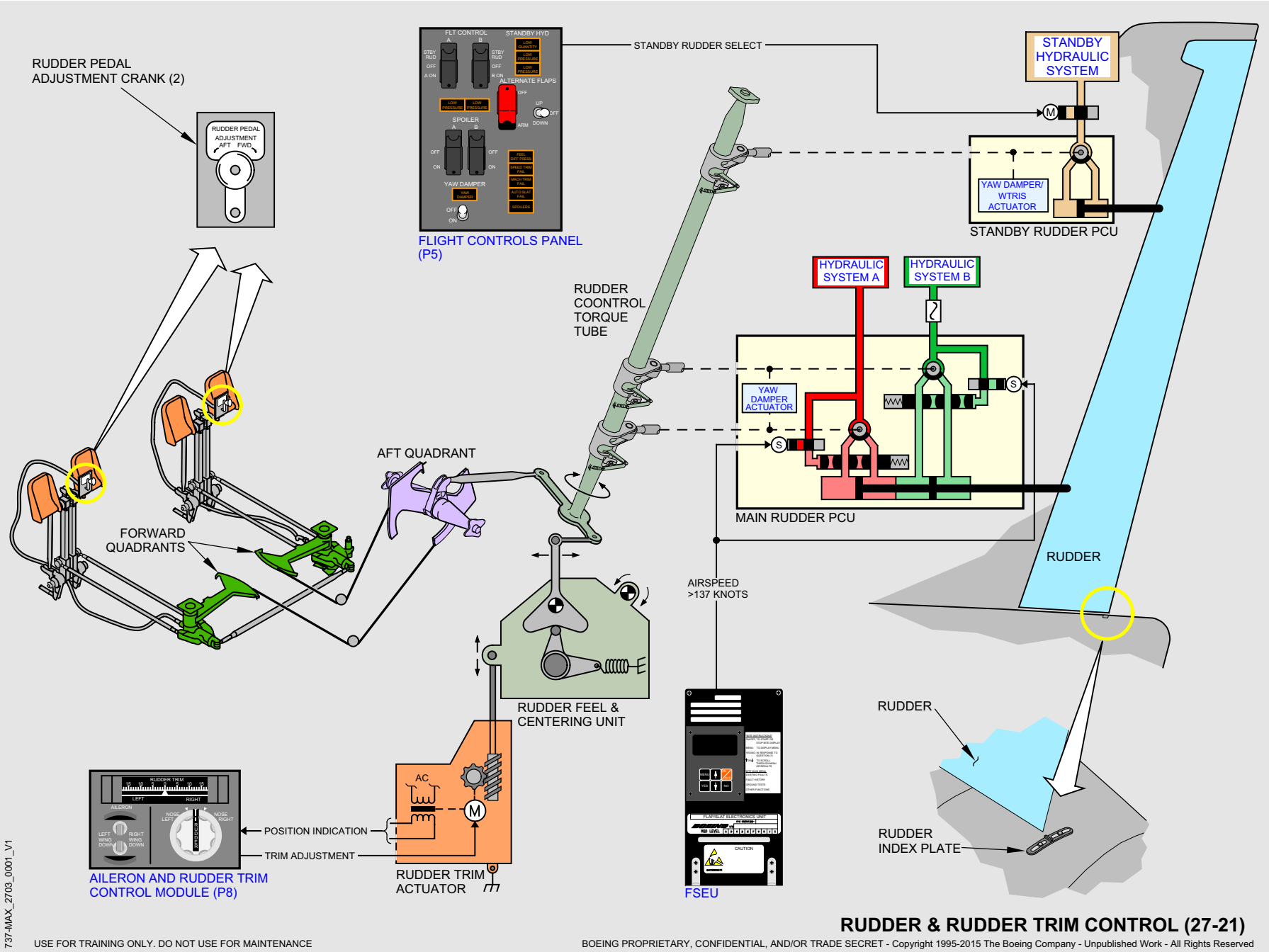

RUDDER & RUDDER TRIM CONTROL (27-21)

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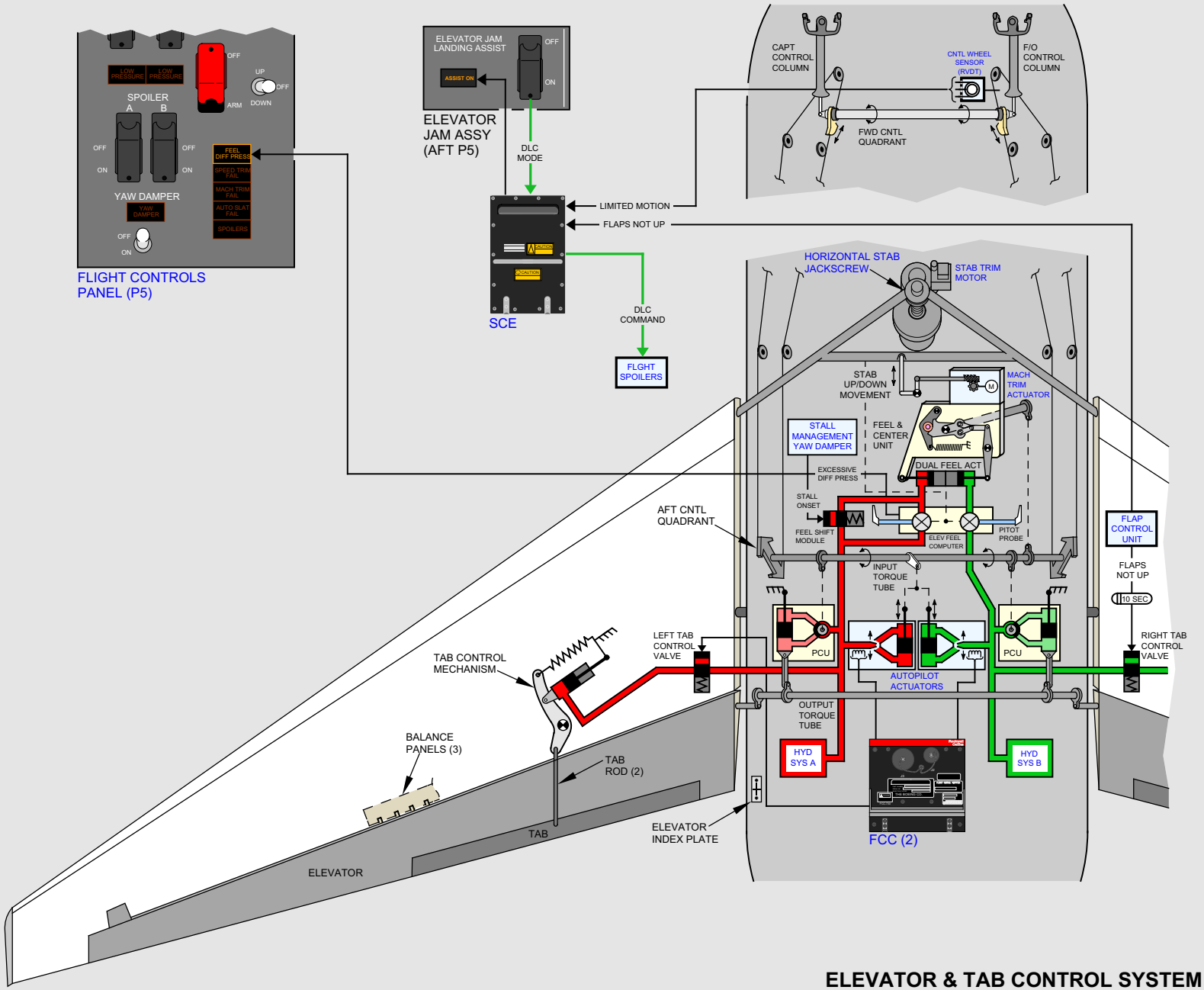

737-MAX_2704_0001_V2

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ELEVATOR & TAB CONTROL SYSTEM (27-31)

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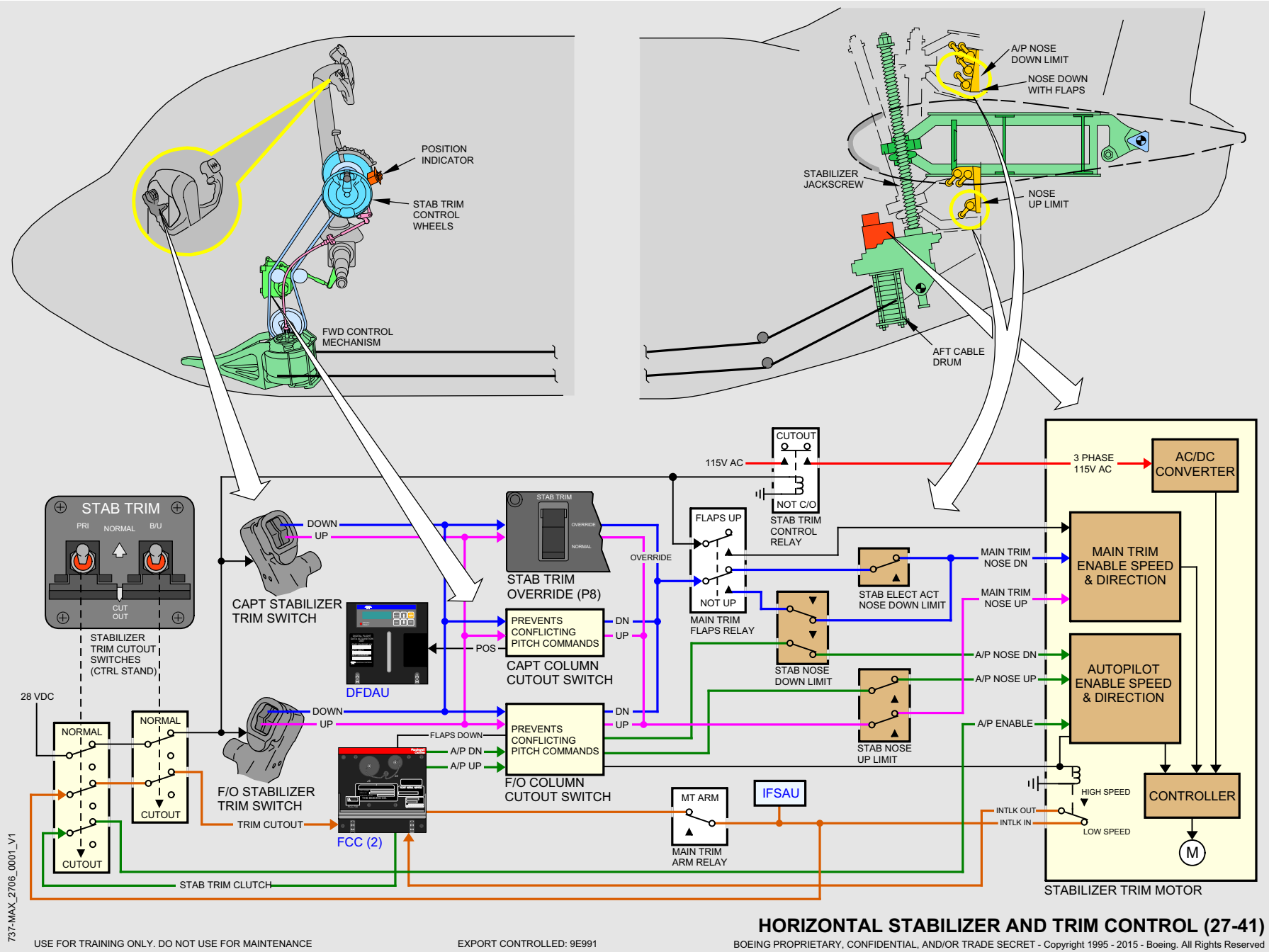

HORIZONTAL STABILIZER AND TRIM CONTROL (27-41)

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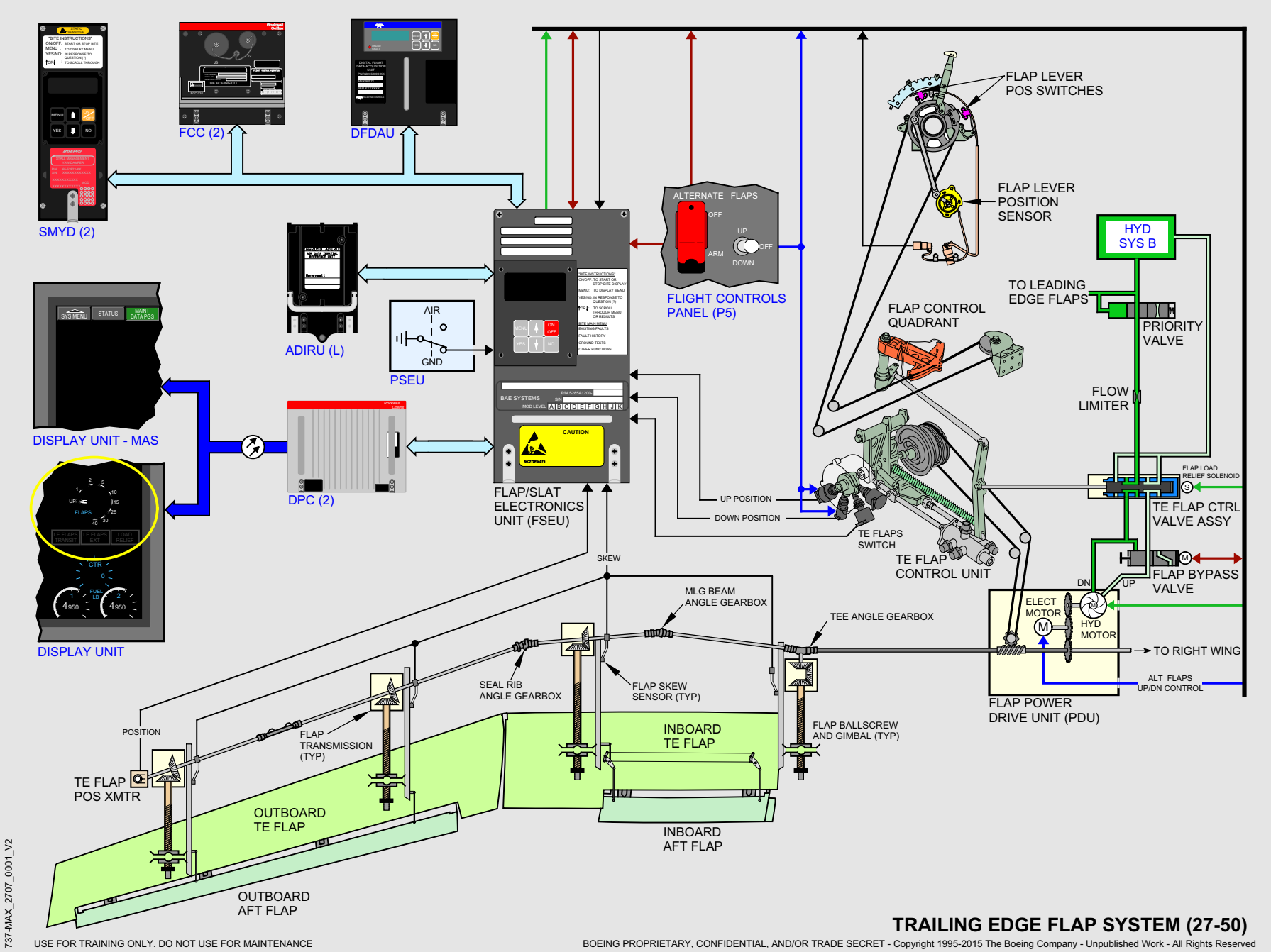

TRAILING EDGE FLAP SYSTEM (27-50)

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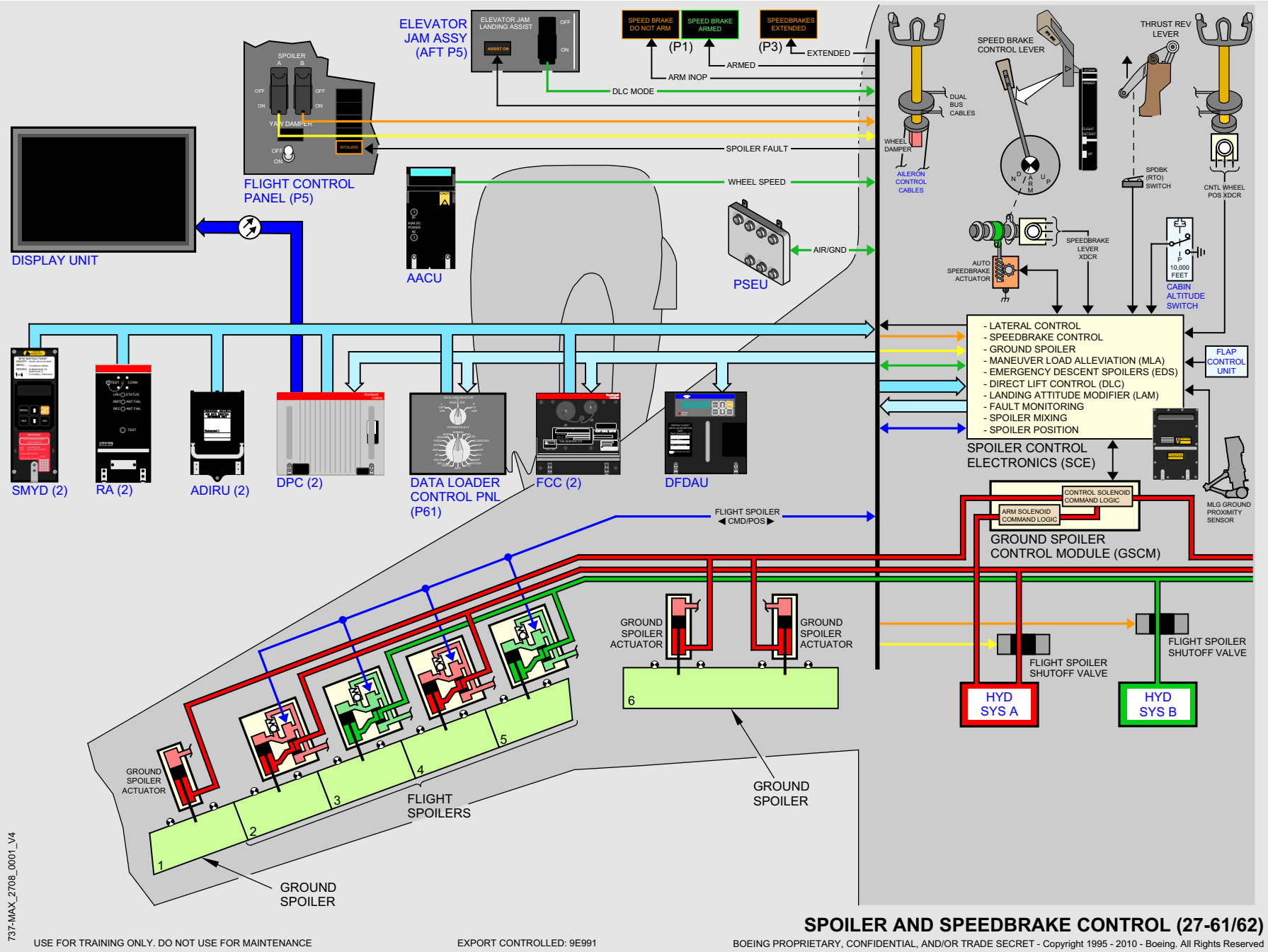

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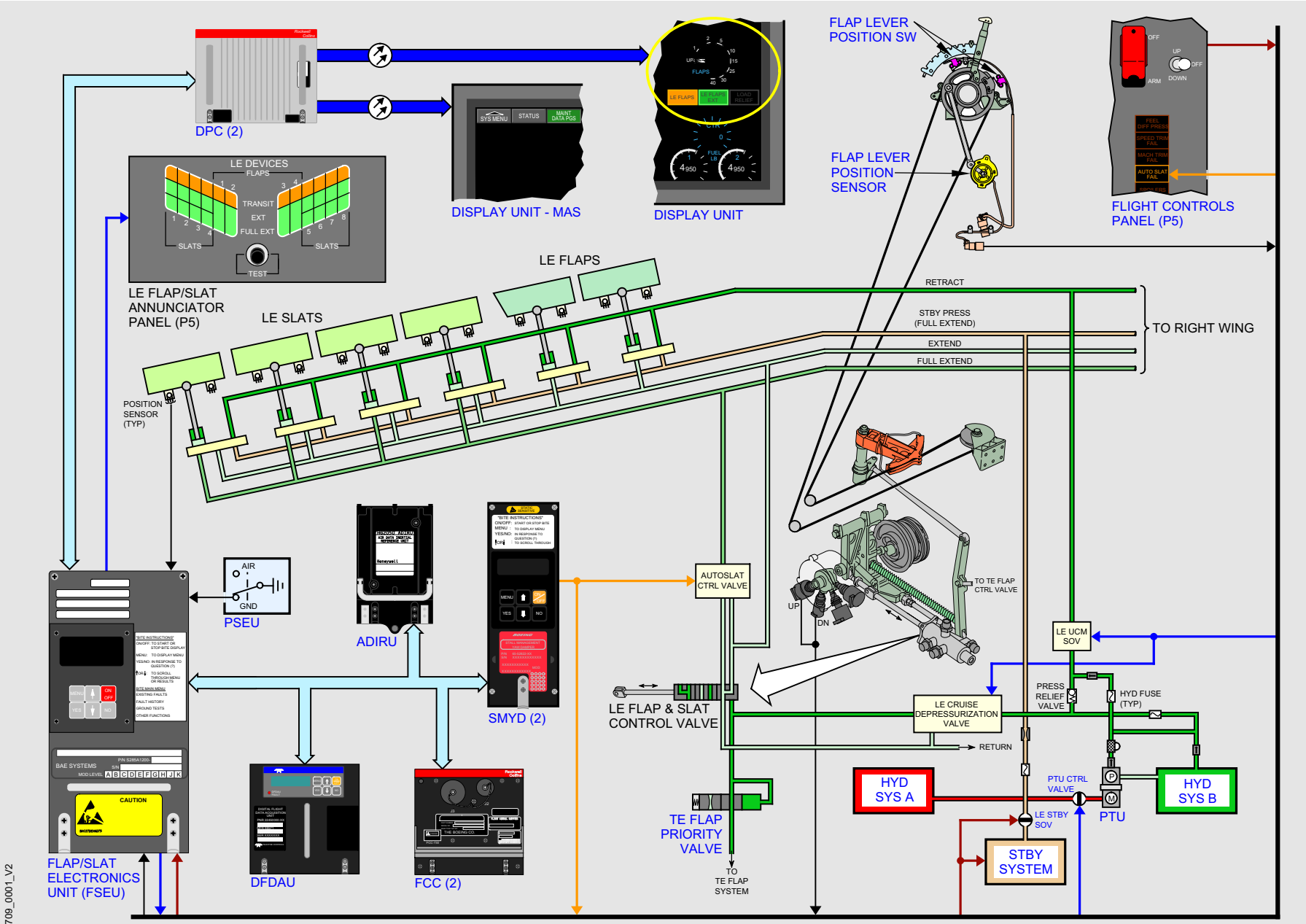

LEADING EDGE FLAP SYSTEM (27-80)

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ATA 28

Fuel

Fuel (ATA 28)

Fuel System Module

1 Engine (ENG) VALVE CLOSED and SPAR VALVE CLOSED Lights

Extinguished – related engine valve or spar valve is open.

Illuminated (blue) –

- bright – related engine or spar fuel shutoff valve is in transit, or valve position and engine start lever or engine fire switch disagree
- dim – related engine valve or spar valve is closed.

2 FUEL Temperature (TEMP) Indicator

Indicates fuel temperature in No. 1 tank.

3 Crossfeed VALVE OPEN Light

Extinguished – crossfeed valve is closed.

Illuminated (blue) –

- bright – crossfeed valve is in transit, or valve position and CROSSFEED selector switch disagree
- dim – crossfeed valve is open.

4 FILTER BYPASS Lights

Extinguished – fuel filter operating normally.

Illuminated (amber) – fuel filter differential pressure switch senses a high pressure condition.

5 CROSSFEED Valve Switch

Controls the fuel crossfeed valve.

Closed – isolates engine No. 1 and No. 2 fuel feed lines.

Open – connects engine No. 1 and No. 2 fuel feed lines.

6 Center Tank FUEL PUMP LOW PRESSURE Lights

Illuminated (amber) – fuel pump pressure is low and FUEL PUMP switch is ON. The MASTER CAUTION and FUEL annunciator lights illuminate at 10 seconds after a center tank LOW PRESSURE light illuminates.

Extinguished – fuel pump pressure is normal, or FUEL PUMP switch is OFF.

7 FUEL PUMP Switches

ON – starts the fuel pump.

OFF – stops the fuel pump.

Note: When a center tank fuel pump switch is set to OFF, the auto shutoff logic for that pump is reset. When the center tank fuel pump switch is set to ON after being OFF, the pump will again activate until the switch is set to OFF or auto shutoff logic deactivates it.

8 Main Tank FUEL PUMP LOW PRESSURE Lights

Illuminated (amber) – fuel pump pressure is low, or FUEL PUMP switch is OFF.

Note: When the two LOW PRESSURE lights illuminate for the related main tank, the MASTER CAUTION and FUEL annunciator lights illuminate. One LOW PRESSURE light causes the MASTER CAUTION and FUEL annunciator lights to illuminate with MASTER CAUTION recall.

Extinguished – fuel pump pressure is normal.

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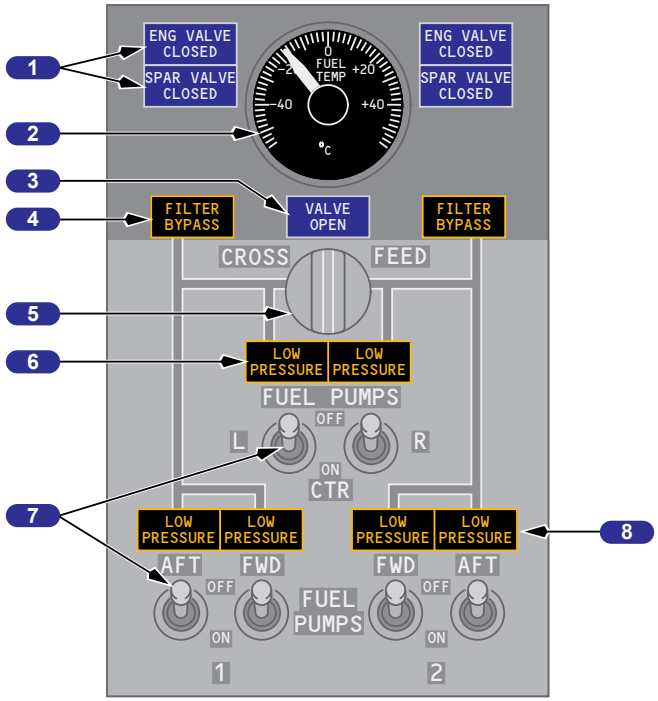


FUEL SYSTEM MODULE (FWD P5)

Fuel Quantity Indications

1 FUEL Quantity Indicators

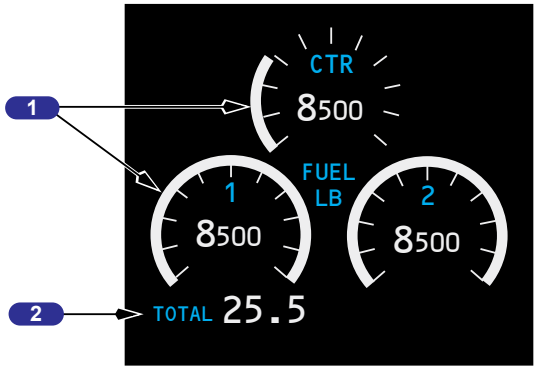
Displayed (white) – indicates usable fuel in the related tank:

- standby AC power is required.

2 Total Fuel Quantity Indicator

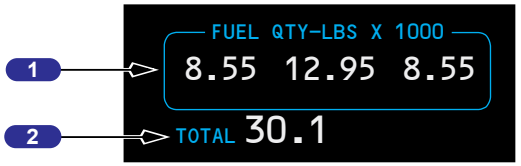
Displayed (white) - indicates total usable fuel.

Analog



CAPT OR F/O INBOARD DU

Digital



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Fuel Alert Indications

1 Fuel Flow (FUEL FLOW) Message

Illuminated (amber) – the difference between actual engine fuel flow rate and the FMCS expected fuel flow rate exceeds the MEDB threshold value for five continuous minutes. The message is displayed independently for each engine.

2 Fuel LOW Message

Displayed (amber) –

- fuel quantity less than 2000 lbs/907 kgs in the related main tank
- display remains until the fuel tank quantity is more than 2500 lbs/1133 kgs.

The fuel quantity arc and digits on the tank(s) with low fuel quantity turn amber.

3 Fuel Configuration (CONFIG) Message

Displayed (amber) –

- either engine running
- center fuel tank quantity is more than 1600 lbs/725 kgs
- both center fuel pump switches are positioned OFF.

The quantity arc and digits on the center tank fuel quantity indicator turn amber.

Display remains until –

- both engines not running
- center fuel tank quantity is less than 800 lbs/363 kgs
- one center fuel tank pump switch ON.

The quantity digits on the center tank fuel quantity indicator return to normal.

4 Fuel Imbalance (IMBAL) Message

Displayed (amber) –

- main tanks fuel quantity is more than 1000 lbs/453 kgs
- displayed below main tank with the lower fuel quantity
- inhibited when the airplane is on the ground
- inhibited by the fuel LOW indication when both indications exist
- displayed until imbalance is reduced to 200 lbs/91 kgs.

The fuel quantity arc and digits on tank with lower fuel quantity turn amber.

5 Fuel Disagree (FUEL DISAGREE) Message

Displayed (amber) – the difference between FMCS CALCULATED and FQIS TOTALIZER fuel has exceeded MEDB threshold value for five continuous minutes.

6 Using Reserve Fuel (USING RSV FUEL) Message

Displayed (amber) – predicted fuel burn to destination to exceed the total fuel on board less entered reserves.

7 Insufficient Fuel (INSUFFICIENT FUEL) Message

Displayed (amber) – predicted fuel burn to destination to exceed the total fuel on board less 2000 lbs/907 kgs.

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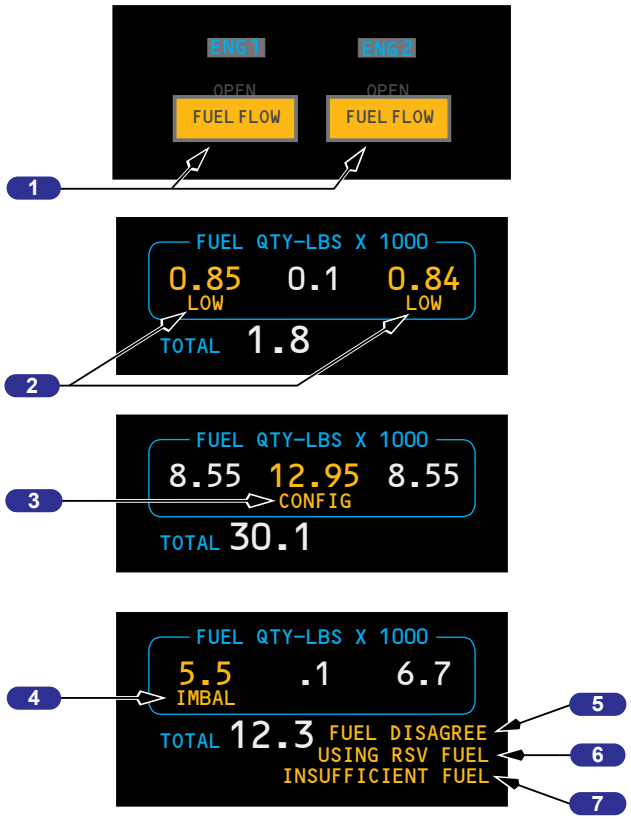

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Fueling / Defueling / Measurement

1 Fuel Measuring Stick

Allows comparison of fuel quantity or weight as determined from measuring stick reading and fuel weight indicated by fuel quantity indicators:

- six fuel measuring sticks are installed in each main tank and four are installed in center tank
- reading is obtained by withdrawing measuring stick from tank and latching it magnetically to an internal float. Fuel depth is read where stick passes through wing skin.

2 Manual Defueling Valve

Open – connects the engine fuel feed system and the refueling station together for:

- defueling
- fuel transfer.

Closed – isolates the engine fuel feed system from the refueling station.

3 Fueling Receptacle

Hose connection for single point fueling.

4 Manual Override

Mechanically opens solenoid operated valve. Fuel valve opens if fuel pressure is available.

5 Fueling Shutoff Valves

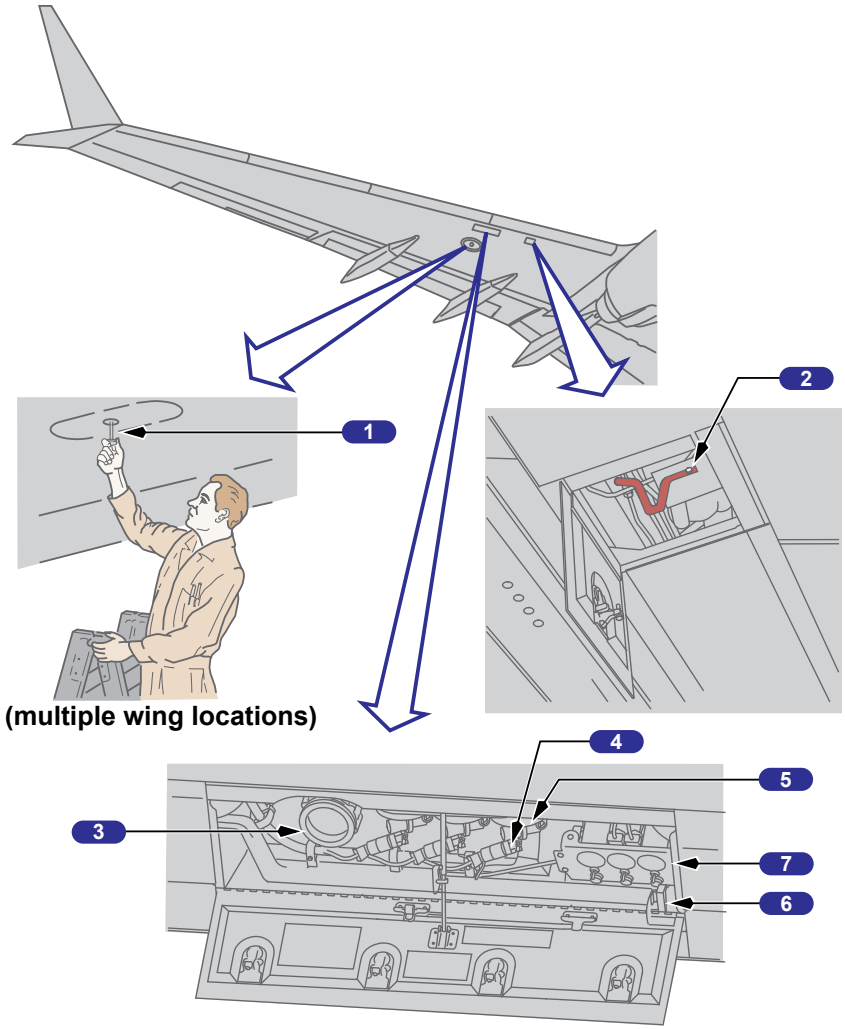
To open the fueling shutoff valve electrically, move the related fueling shutoff valve switch to the open position and supply pressurized fuel to the receptacle.

6 Refueling Power Control Switch

Door closed – removes power from the refueling system.

Door open – the refueling system is powered and the refuel panel lights are on.

7 Refuel Panel



RIGHT WING LEADING EDGE

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Refuel Panel

8 FUELING INDICATION TEST SWITCH

(spring–loaded to OFF position)

TEST GAGES – checks operation of fuel quantity indicators.

FUEL DOOR SWITCH BYPASS – is used to supply dc power to the refueling system if the fueling power control switch fails.

9 Fueling VALVE POSITION LIGHTS

Extinguished –

- fueling valve switch is OPEN and the related tank is full
- fueling valve switch is CLOSED.

Illuminated (blue) – fueling valve switch is OPEN and the related tank is not full. The light does not indicate valve position.

10 Fueling Valve Switches

OPEN – supplies dc power to the fueling valve in related tank.

CLOSED – removes dc power from the fueling valve in related tank.

11 FUEL Quantity (QTY) Indicators

Indicates fuel quantity in related tank.

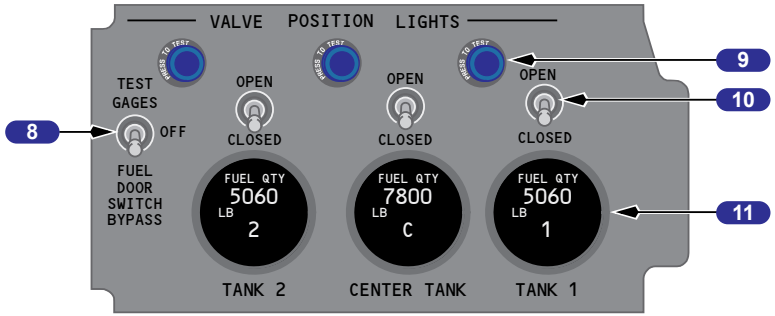
12 Preselect Switches

Rotate – used before refueling to set the total fuel quantity for the related fuel tanks.

Preselect

REFUEL PANEL (P15)
RIGHT WING LEADING EDGE)

Not Preselect



REFUEL PANEL (P15)
(RIGHT WING LEADING EDGE)

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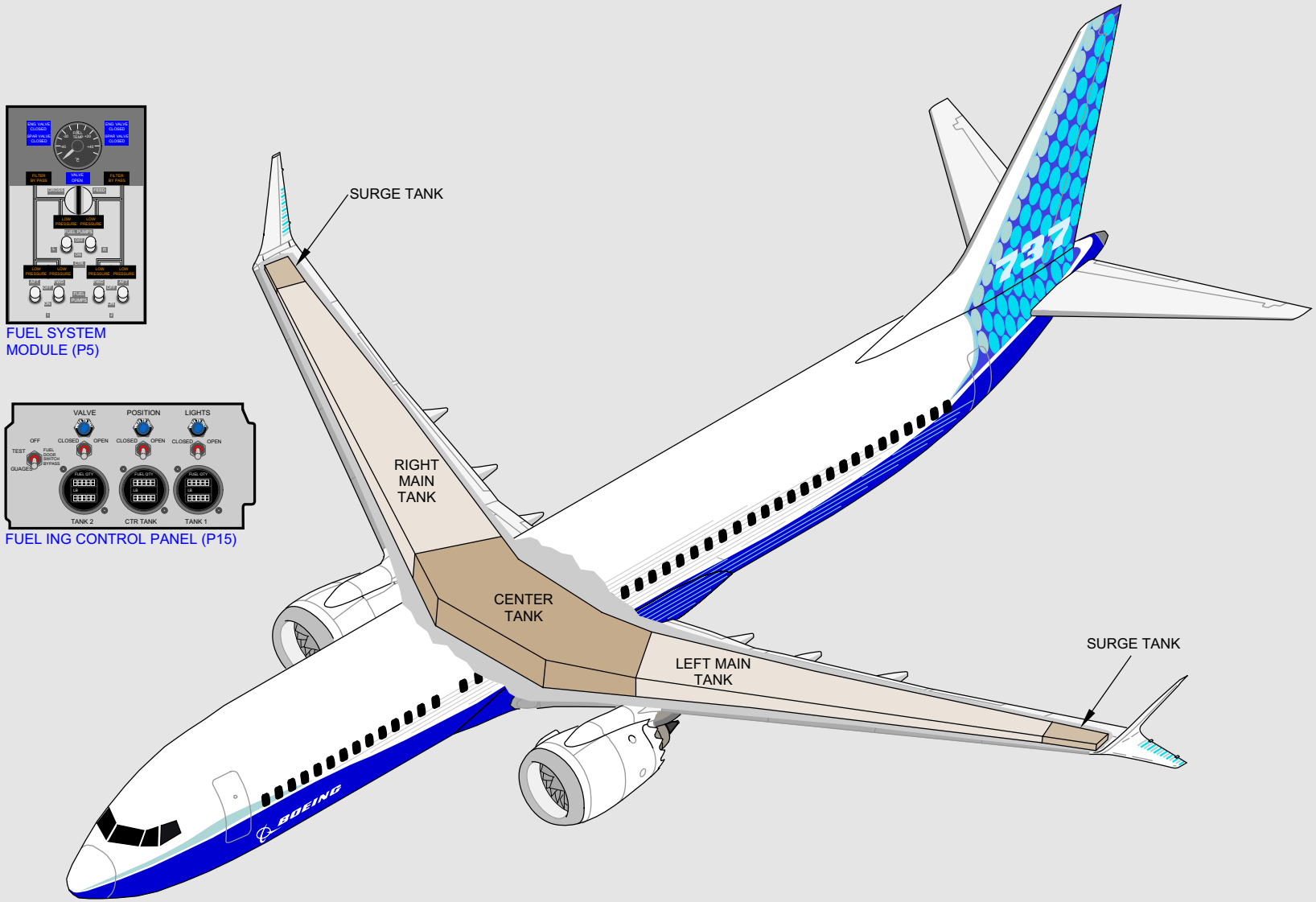

Fuel Storage Vent, Indic (28-10/41)

Fuel Distribution (28-14/20

737-MAX_2803_0001_V1

FUEL SYSTEM (28-00)

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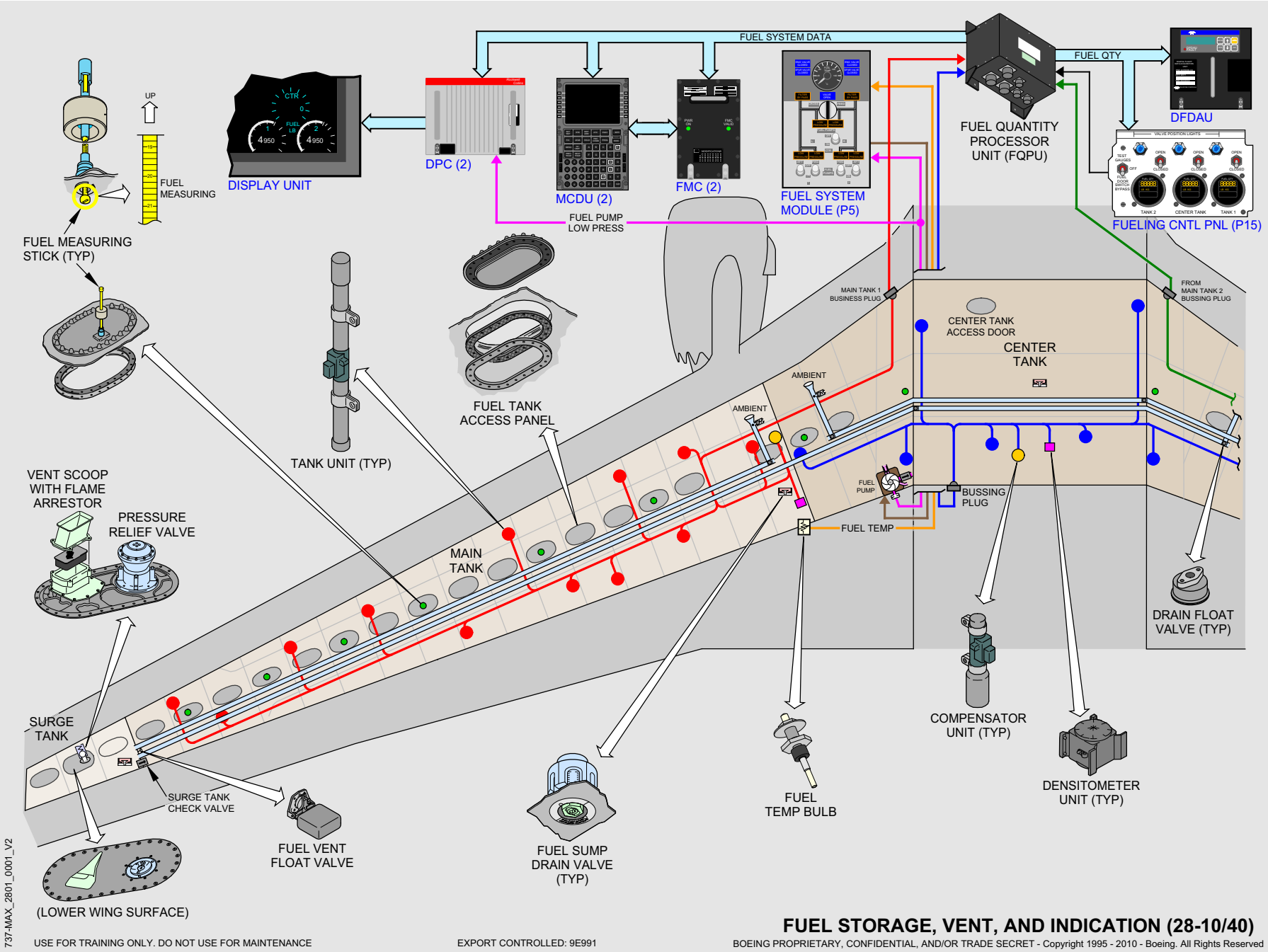

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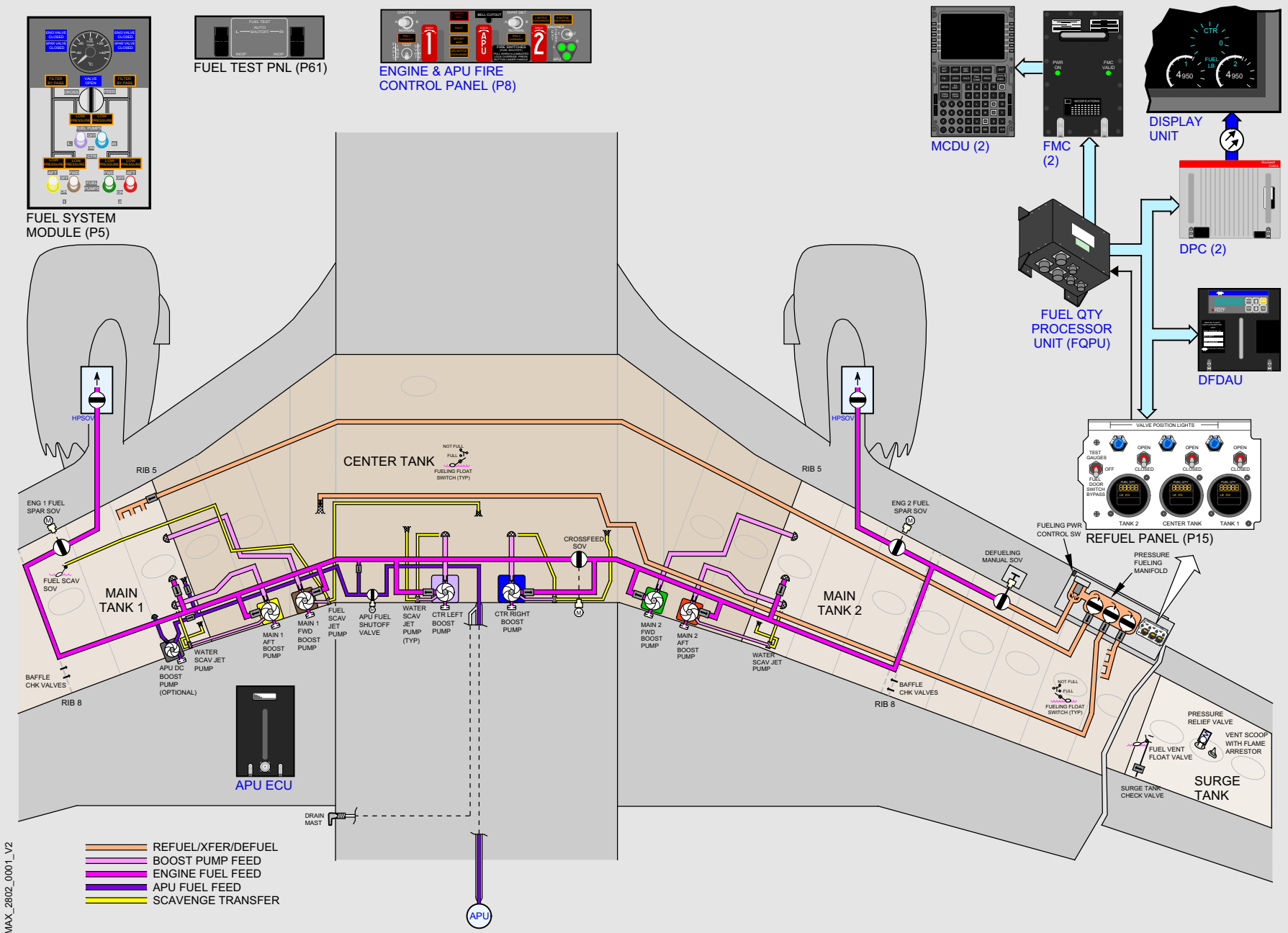

FUEL DISTRIBUTION (28-14/20)

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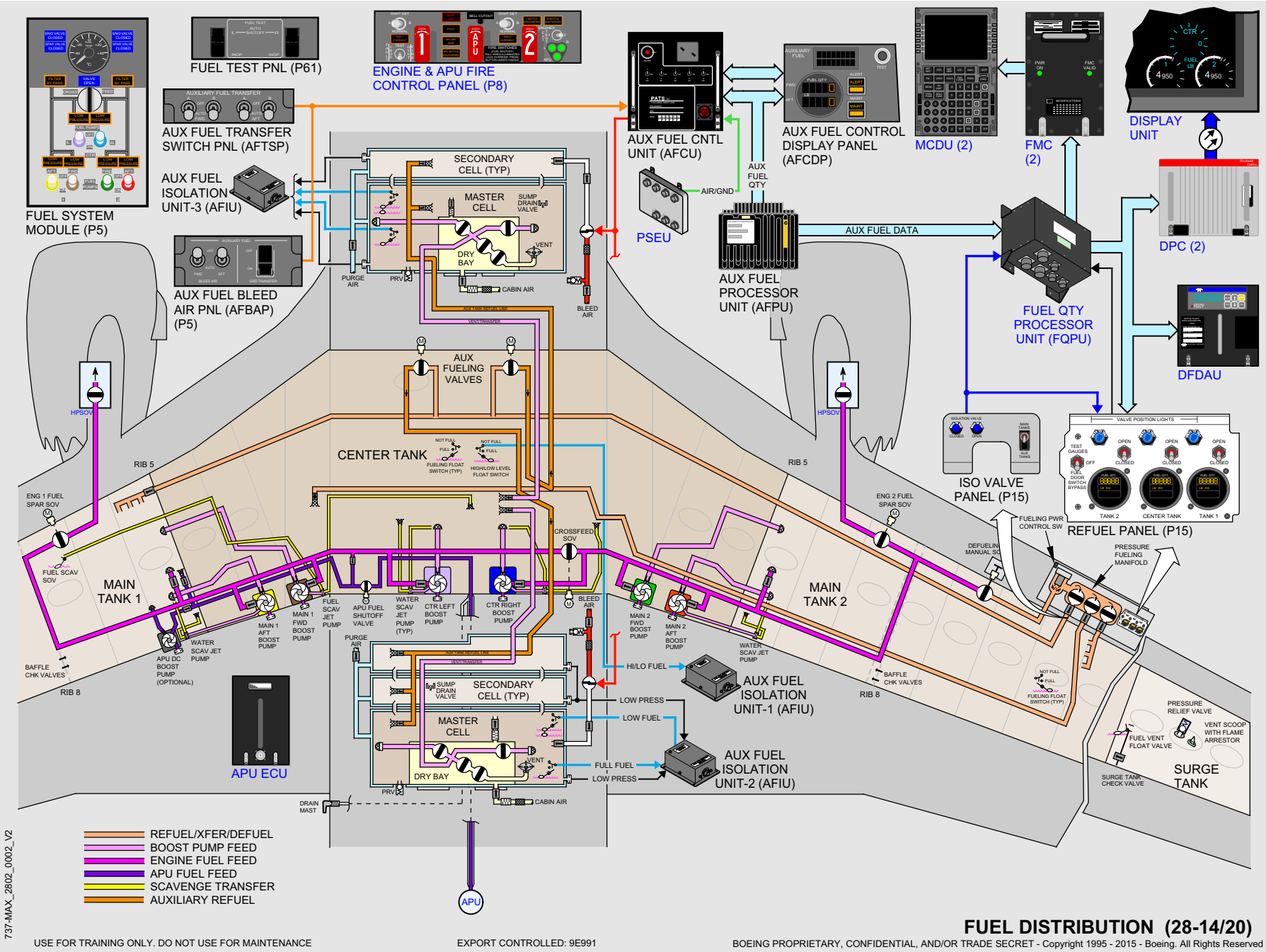

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ATA 29

Hydraulic Power

Hydraulic Power (ATA 29)

Hydraulic Pumps Module

1 Electric Hydraulic Pump OVERHEAT Lights

Illuminated (amber) – Hydraulic fluid used to cool and lubricate the corresponding electric motor driven pump has overheated or the pump itself has overheated.

2 Hydraulic Pump LOW PRESSURE Lights

Illuminated (amber) – output pressure of associated pump is low.

Note: When an engine fire switch is pulled, the LOW PRESSURE light is deactivated.

3 Electric (ELEC) Hydraulic (HYD) PUMPS Switches

ON – provides power to associated electric motor–driven pump.

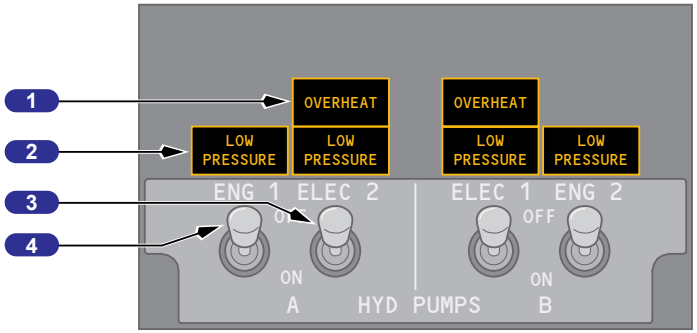
OFF – electrical power removed from pump.

4 ENGINE HYDRAULIC PUMPS Switches

ON – de-energizes depressurization solenoid valve in pump to allow pump pressure to enter system.

Note: Should remain ON at shutdown to prolong solenoid life.

OFF – energizes depressurization valve to block pump output.



HYDRAULIC PUMPS MODULE (FWD P5)

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Hydraulic Indications

1 MFD System (SYS) Switch

Push – SYS

- displays hydraulic indications on the selected DU
- second push removes indications from the respective DU.

2 HYDRAULIC System Quantity (QTY%) Indications (white)

Indicates digital percentage (0% to 106%) of hydraulic quantity.

Note: Quantity also displayed at each reservoir.

3 HYDRAULIC System PRESS Indications (white)

Indicates system pressure:

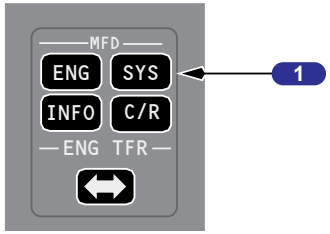
- Normal pressure – 3000 psi
- Maximum pressure – 3500 psi.

Note: When both pumps for a system are OFF, the indication may read hydraulic system reservoir pressure, normally less than 100 psi.

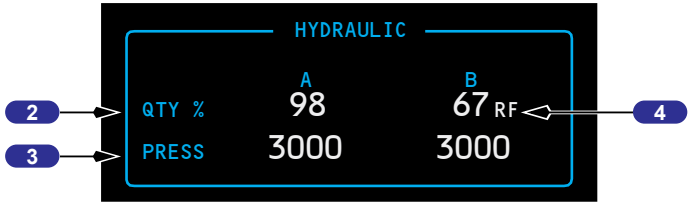
4 Refill (RF) Indication (white)

Illuminated (white) – hydraulic quantity below 76%.

Note: Valid only when airplane is on ground with both engines shutdown or after landing with flaps up.



FORWARD ELECTRONIC PANEL (P9)



DISPLAY UNIT

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Flight Controls Panel

1 Flight (FLT) CONTROL Switches

STBY RUD – activates standby pump and opens standby rudder shutoff valve to pressurize standby rudder power control unit and closes flight control shutoff valve.

OFF – closes flight control shutoff valve isolating ailerons, elevators and rudder from associated hydraulic system pressure.

ON (guarded position) – normal operating position.

2 FLT CONTROL LOW PRESSURE Lights

Illuminated (amber) –

- indicates low hydraulic system (A or B) pressure to ailerons, elevator and rudder
- deactivated when associated FLT CONTROL switch is positioned to STBY RUD and standby rudder shutoff valve opens.

3 STANDBY HYD LOW QUANTITY Light

Illuminated (amber) –

- indicates low quantity in standby hydraulic reservoir
- always armed.

4 STANDBY HYD LOW PRESSURE Light

Illuminated (amber) –

- indicates output pressure of standby pump is low
- armed only when standby pump operation has been selected or automatic standby function is activated.

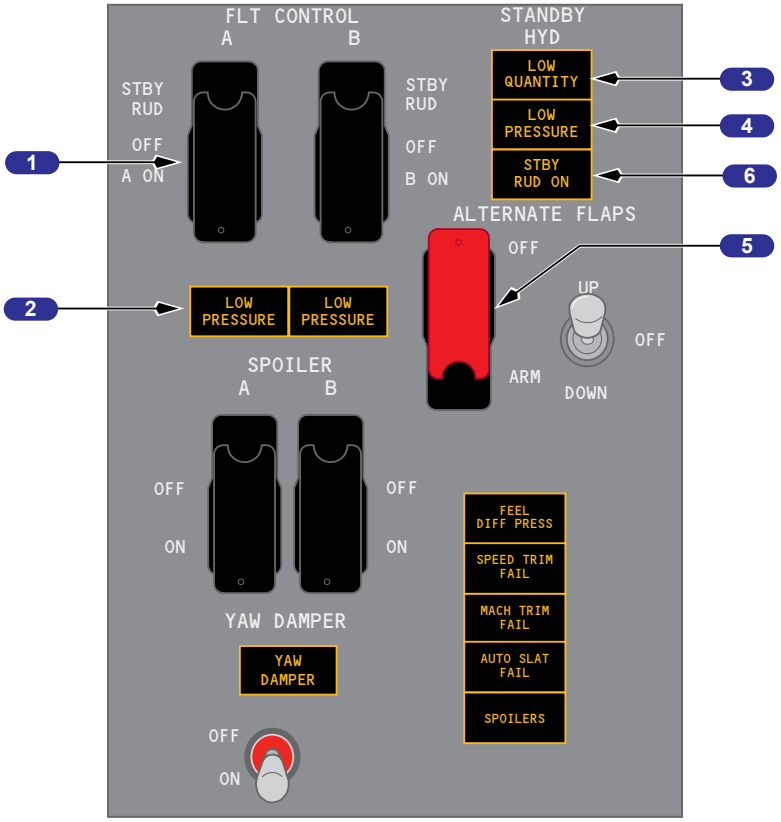
5 ALTERNATE FLAPS Arm Switch

OFF (guarded position) – normal operating position.

ARM – closes trailing edge flap bypass valve, activates standby pump, and arms ALTERNATE FLAPS control switch.

6 STANDBY HYD STBY RUD ON Light

Illuminated (amber) - indicates the standby hydraulic system is commanded on to pressurize the standby rudder power control unit.



FLIGHT CONTROLS PANEL (FWD P5)

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Hydraulic Fluid Quantity Transmitter/Indicator

1 Fluid Quantity Indication

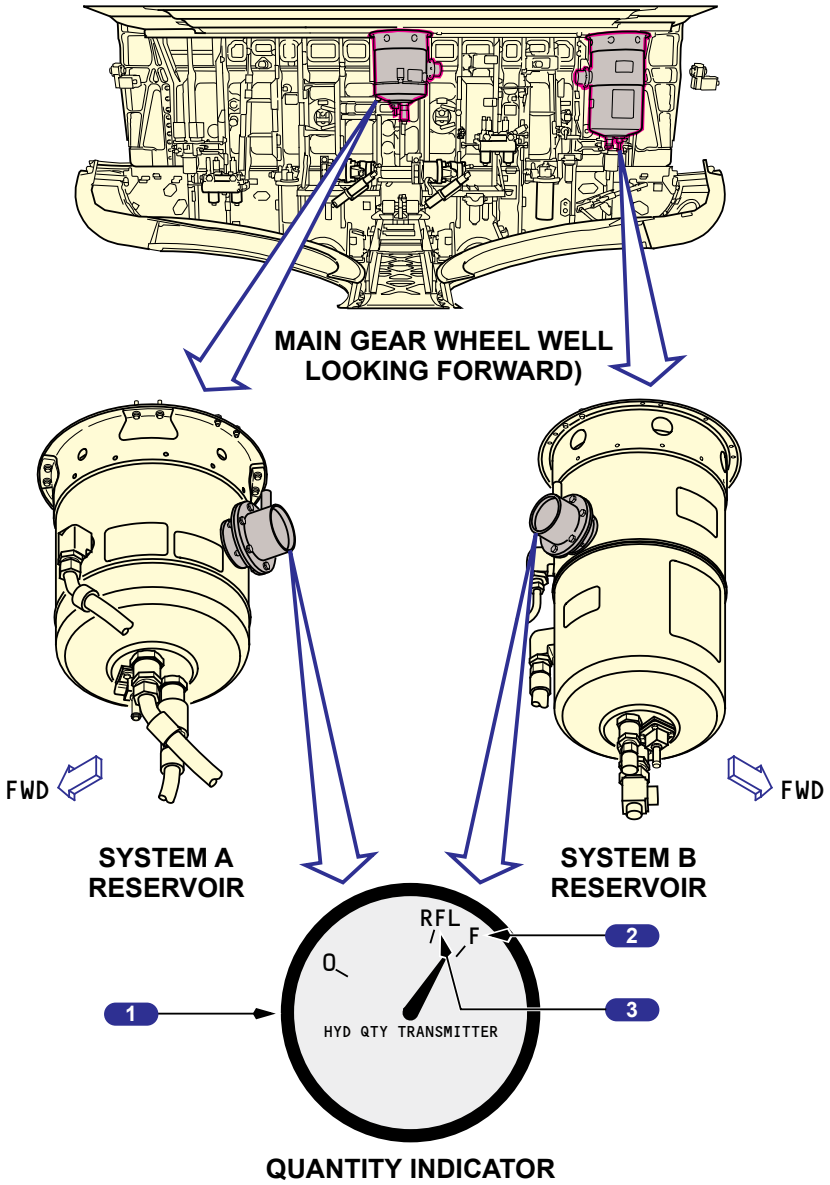
Indicates relative fluid quantity.

2 Full (F) Quantity Indication

Indicates reservoir fluid quantity is full.

3 Refill (RF) Quantity Indication

Indicates reservoir requires refilling.



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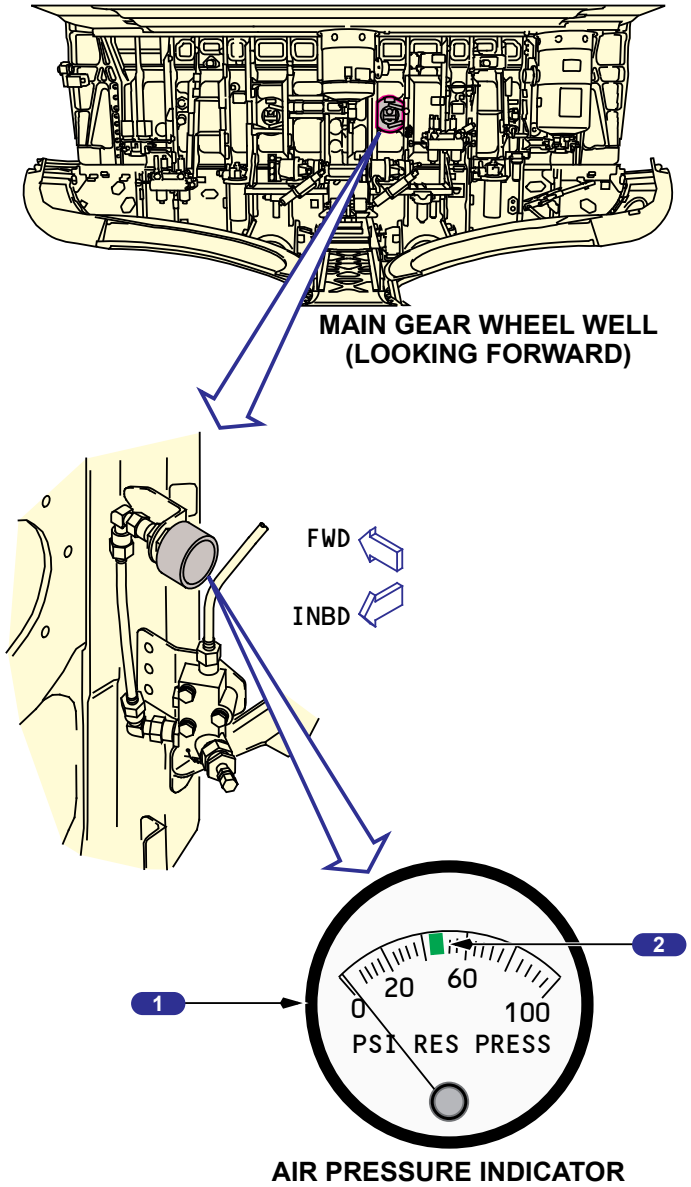
Air Pressure Indicator

1 Air Pressure Indicator

Indicates hydraulic reservoir air pressure in psi.

2 Air Pressure Indicator Green Band

Green band indicates normal pressure.



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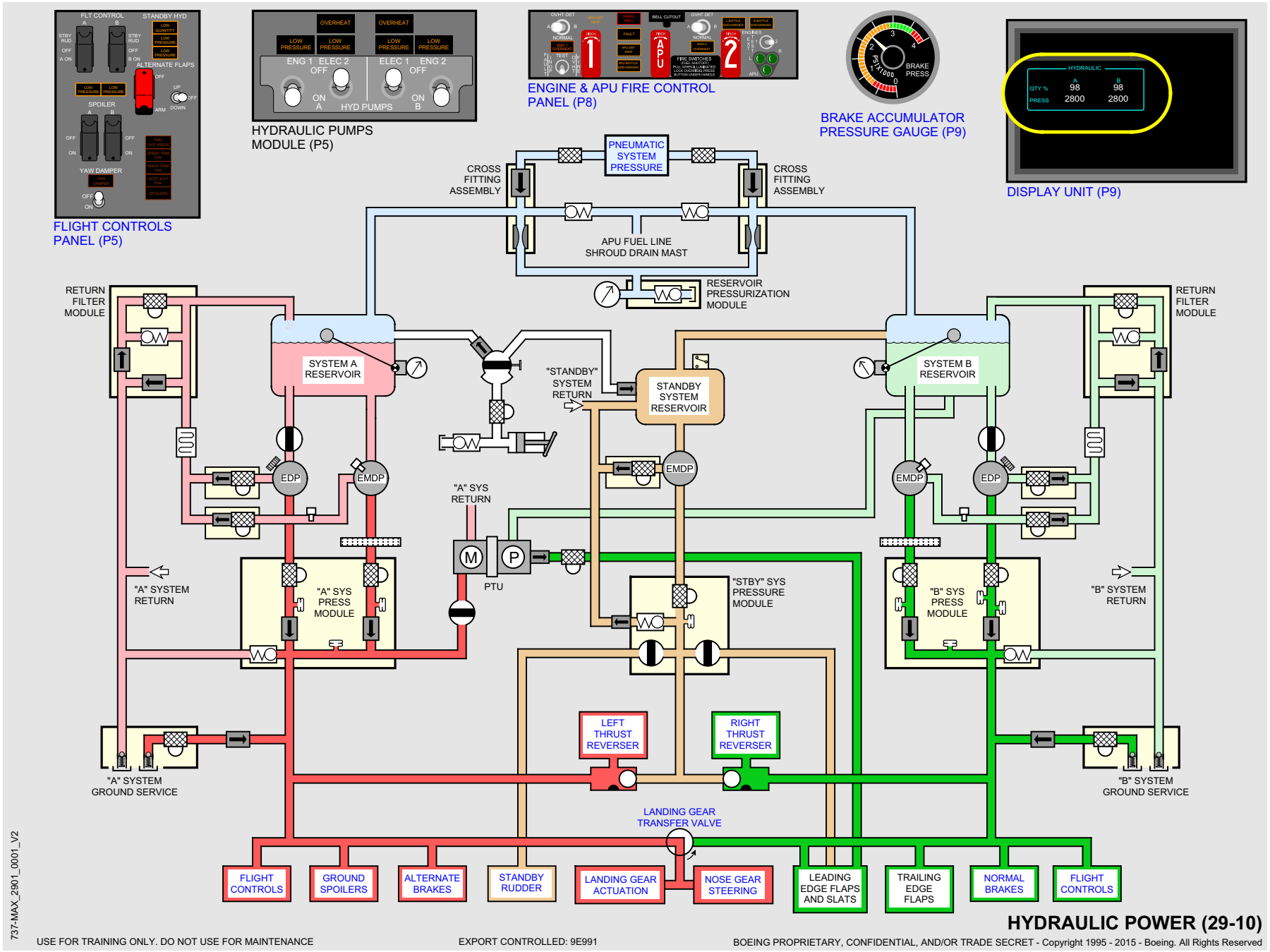

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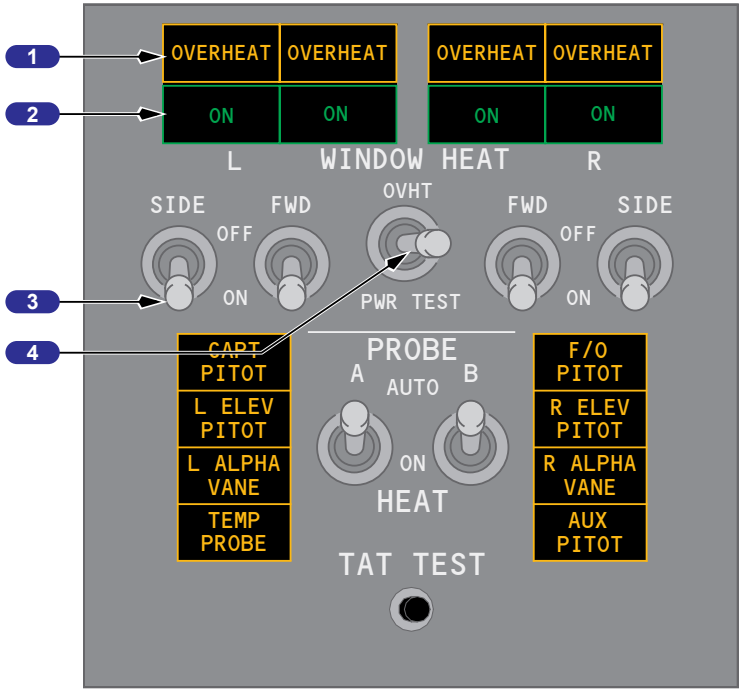
ATA 30

Anti-Ice & Rain Protection

Anti-Ice & Rain Protection (ATA 30)

WINDOW/PITOT HEAT MODULE



WINDOW/PITOT HEAT MODULE (FWD P5)

1 Window OVERHEAT Lights

Illuminated (amber) – overheat condition is detected.

Note: OVERHEAT lights also illuminate if electrical power to window(s) is interrupted.

2 Window Heat ON Lights

Illuminated (green) – window heat is being applied to selected window(s).

Extinguished –

- switch is OFF, or
- an overheat is detected, or
- a system failure has occurred
- window is at correct temperature.

3 WINDOW HEAT (SIDE and FWD) Switches

ON – window heat is applied to selected window(s).

OFF – window heat not in use.

4 WINDOW HEAT Test Switch (spring–loaded to neutral)

OVHT – simulates an overheat condition.

PWR TEST – provides a confidence test.

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WINDOW/PITOT HEAT MODULE

1 Probe Heat Lights

Illuminated (amber) – related probe not heated.

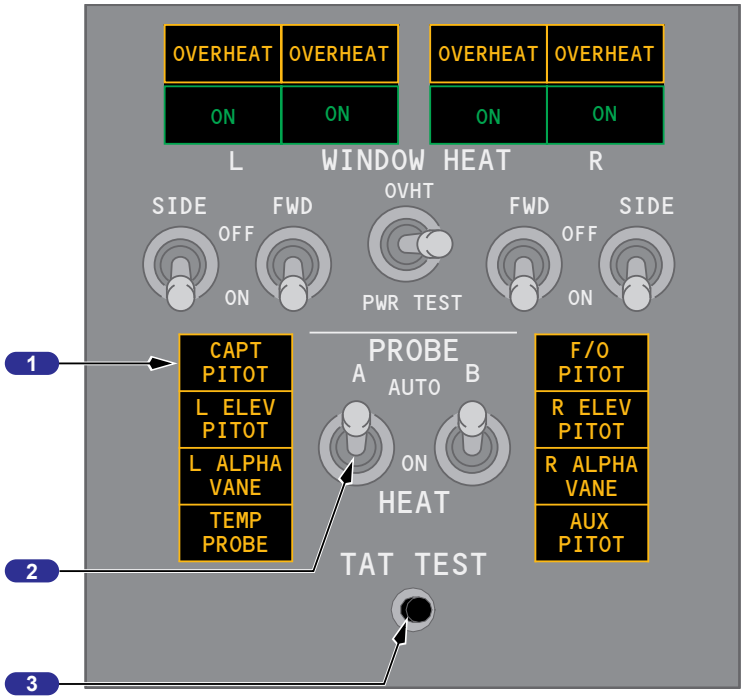
2 PROBE HEAT A and B Switches

ON – power is supplied to heat related system.

AUTO – power is automatically supplied to both A and B probe heat systems when either engine is running.

3 TAT TEST Switch

Push - Electrical power applied to total air temperature probe on the ground.



WINDOW/PITOT HEAT MODULE (FWD P5)

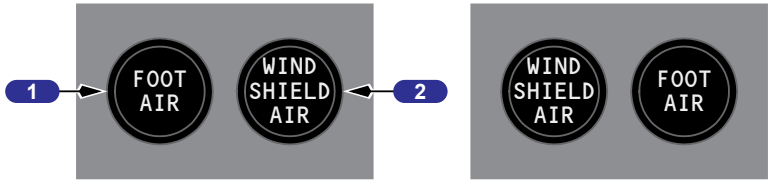
Windshield/Foot Air Controls

1 FOOT AIR Controls

PULL – supplies conditioned air to pilots' feet positions.

2 WINDSHIELD AIR Controls

PULL – supplies conditioned air to number 1 windows for defogging.



BELOW CAPTAIN'S INST PANEL (P1)

BELOW F/O'S INST PANEL (P2)

Windshield Wiper Selector Panel

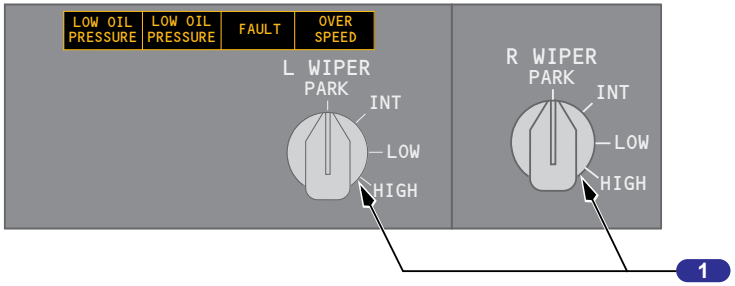
1 Windshield WIPER L and R Selectors

PARK – turns off wiper motors and stows wiper blades.

INT – seven second intermittent operation.

LOW – low speed operation.

HIGH – high speed operation.



FORWARD OVERHEAD PANEL (P5)

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WING ANTI-ICE CONTROL MODULE

1 Engine (ENG) ANTI–ICE Lights

Illuminated (amber) – indicates the engine anti-ice system has been inhibited.

2 COWL ANTI–ICE Lights

Illuminated (amber) – indicates an overpressure condition in duct downstream of engine cowl anti–ice valve.

3 COWL VALVE Lights

Illuminated (amber) –

- momentary – related cowl anti–ice valve is in transit, or the cowl anti–ice valve position disagrees with related ENG ANTI–ICE switch position
- steady – related cowl anti–ice valve is closed (switch OFF), or related cowl anti-ice valve is open (switch ON).

Extinguished – related cowl anti–ice valve is closed (switch OFF).

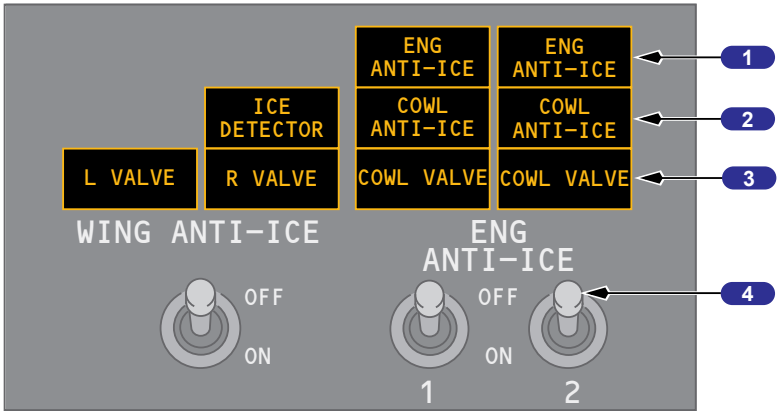
4 Engine (ENG) ANTI–ICE Switches

ON –

- related engine anti–ice valve is open
- stick shaker logic is set for icing conditions.

OFF –

- related engine anti–ice valve is closed
- stick shaker logic returns to normal if wing anti–ice has not been used in flight.



WING ANTI-ICE CONTROL MODULE (FWD P5)

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Wing Anti–Ice Control Module

1 Wing Anti–Ice VALVE Lights

Illuminated (amber) –

- momentary – related wing anti–ice valve is in transit
- steady – wing anti–ice valve position is disagrees with related WING ANTI-ICE switch position.

Extinguished – related wing anti–ice valve is closed (switch OFF), or related wing anti-ice valve is open (switch ON).

2 WING ANTI–ICE Switch

OFF – wing anti–ice valves are closed.

ON (in the air) –

- wing anti–ice valves are open
- stick shaker logic is set for icing conditions.

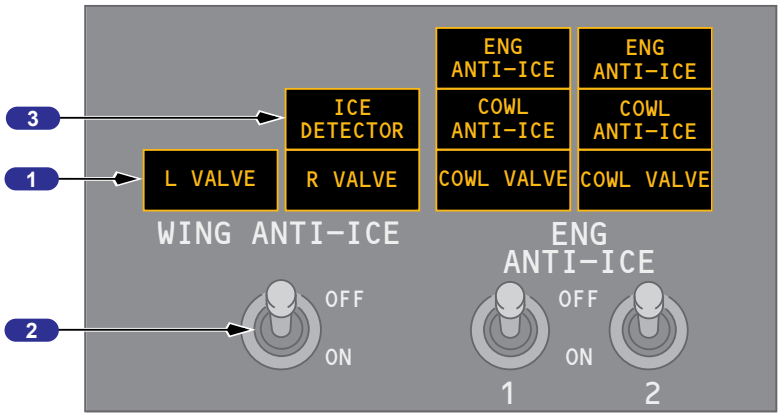
Note: Stick shaker logic remains set for icing conditions for the remainder of the flight, regardless of subsequent WING ANTI–ICE switch position.

ON (on the ground) –

- wing anti–ice valves open if thrust on both engines is below takeoff warning setting and temperature inside both distribution ducts is below thermal switch activation temperature
- wing anti-ice valves close if either engine thrust is above takeoff warning setting or thermal switch is activated in either distribution duct. Switch remains in the ON position
- switch trips to the OFF position at lift–off.

3 ICE DETECTOR Light

Illuminated (amber) – Ice detector system has failed.



WING ANTI-ICE CONTROL MODULE (FWD P5)

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Icing Advisory Lights

1 ICING Light

Illuminated (amber) –

- ice detector is detecting ice
- light is inhibited on the ground.

Press – extinguishes light, if illuminated.

2 NO ICE Light

Illuminated (white) –

- ice detector is not detecting ice, and the ice detector probe had previously detected ice
- light is inhibited on the ground.

Press – extinguishes light, if illuminated.

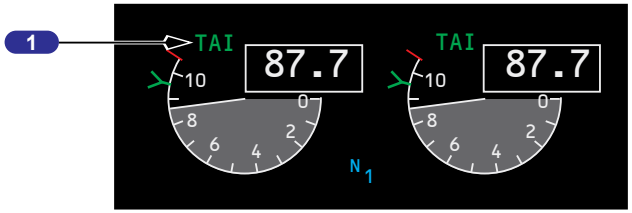
RIGHT FORWARD PANEL (P3)

Engine Anti–Ice Indication

1 Thermal Anti–Ice Indications

Illuminated –

- Green – cowl anti-ice valve(s) open
- Amber – cowl anti-ice valve is not in position indicated by related ENG ANTI-ICE switch.



DISPLAY UNIT

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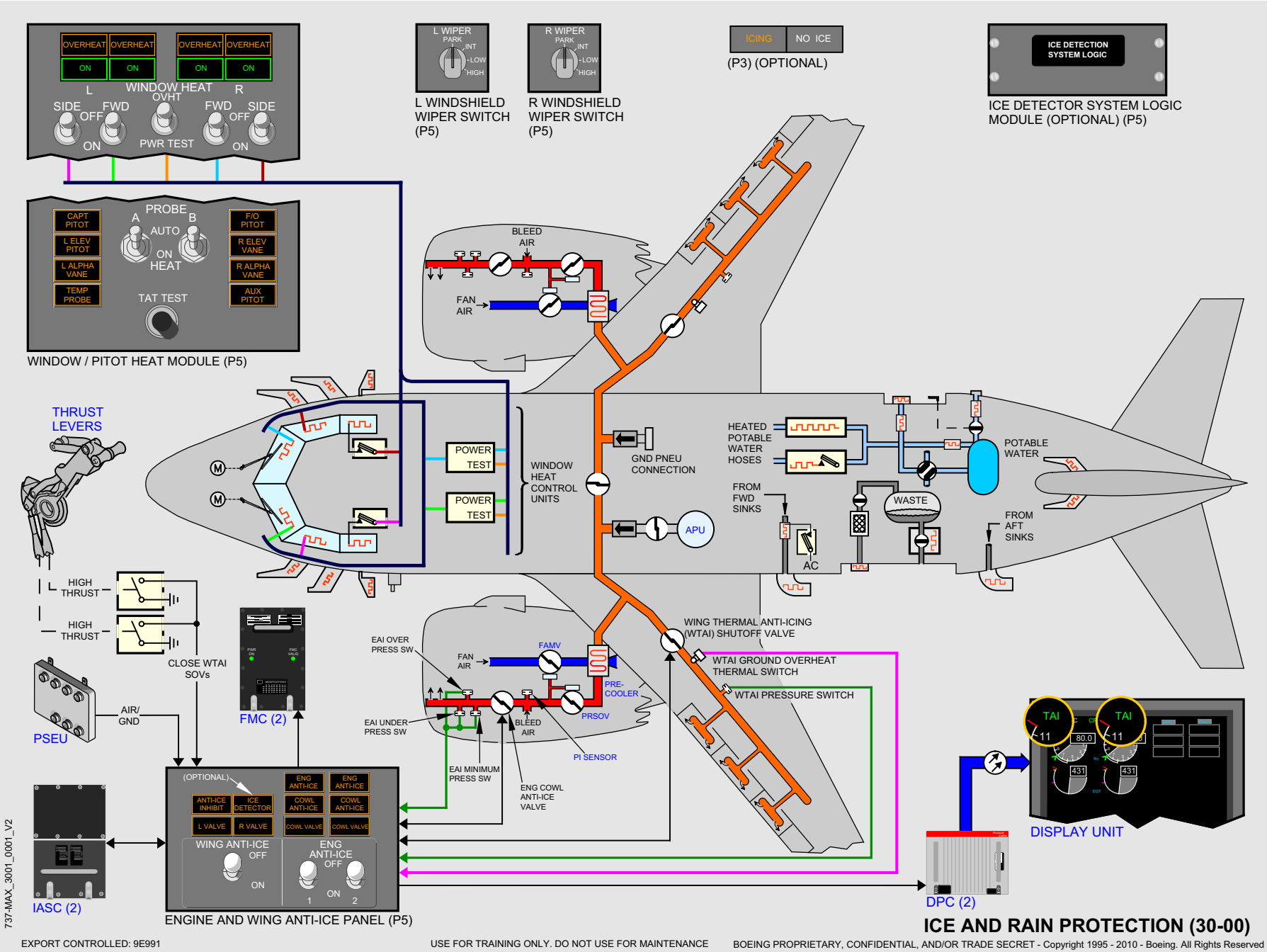

ICE AND RAIN PROTECTION (30-00)

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Intentionally
Blank

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ATA 31

Indicating/Recording Systems

Indicating/Recording Systems (ATA 31)

MAX Display System (MDS) - Introduction

The flight deck has four identical flat panel liquid crystal displays (LCD), referred to as Display Units (DU). An Outboard and Inboard DU is located on both, the Captain's and First Officers instrument panels. The 28V DC standby bus provides input power to the (Captains) Left Outboard, and (First Officers) Right Inboard DU's. The 28V DC BUS 2 powers the (Captains) Right Inboard, and (First Officers) Left Outboard DU's.

The DU's provide the flight crew with one Engine Display, one Multi-function Display (MFD), two sets of Primary Flight Displays (PFDs), Navigation Displays (NDs), and Auxiliary Display (AUX) formats. The MDS normally shows the primary flight data on the outboard DU's, and the navigation data on the inboard DU's.

Each DU is split into two regions to display two formats.

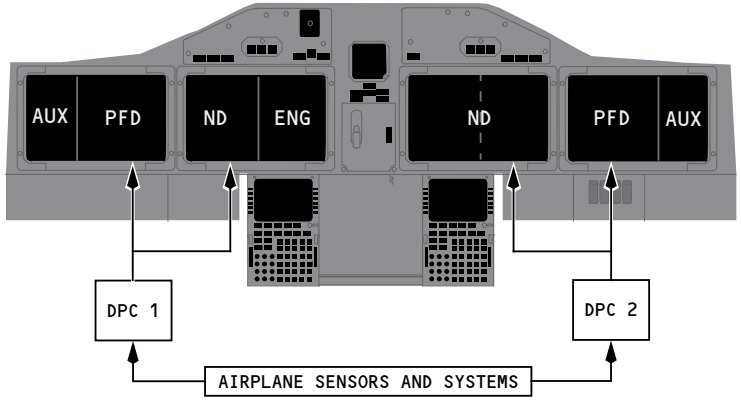
The Outboard DU's can display:

- PFD and AUX
- PFD and Engine Display
- PFD and MFD
- PFD and ND

The Inboard DU's can display:

- PFD and Engine Display
- PFD and MFD
- PFD and ND
- ND and MFD

Note: The Inboard DU's can also display a single format, occupying the entire display for certain formats like the ND.



CAPT AND F/O INSTRUMENT PANELS (P1, P3)

The MDS utilizes two identical Display Processing Computers (DPC) that interface with airplane subsystems and sensors to collect data. The collected data is then processed and displayed on the flight deck DU's.

Each DPC is capable of providing completely independent sources of flight information presented on the Captains and First Officers displays. Normally, DPC 1 supplies data to the Captains displays, while DPC 2 supplies data to the First officers displays. Automatic switching is provided to select which DPC drives all four displays after a single DPC failure.

EFIS Control Panel

Pilots interact with the display suite using an EFIS Control Panel. Two EFIS control panels are located on each side of the Glareshield Panel, and they both control display options, mode, and range for the related pilot's displays.

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The left EFIS control panel controls the Captains outboard and inboard DU's. The right EFIS control panel controls the First Officers outboard and inboard DU's. If one EFIS control panel fails, the displays can be controlled by the remaining control panel.

EFIS Control Panel Controls – Flight Instrument Displays

1 Minimums (MINS) Reference Selector (outer) (two position)

RADIO – selects radio altitude as the minimums reference.

BARO – selects barometric altitude as the minimums reference.

2 Minimums (MINS) Selector (middle) (slew)

ROTATE – adjusts the radio or baro minimums altitude.

3 Radio Minimums (MINS) Reset (RST) Switch (inner) (momentary action)

PUSH –

- resets the alert minimums annunciation
- blanks minimums display if alert is not active.

4 Meters (MTRS) Switch (momentary action)

PUSH – displays altitude indications in meters.

5 Barometric (BARO) Reference Selector (outer) (two position)

IN – selects inches of mercury as the barometric altitude reference.

HPA – selects hectopascals as the barometric altitude reference.

6 Barometric (BARO) Selector (middle) (slew)

ROTATE –

- adjusts the barometric altitude setting on the altitude tape
- if STD displayed, adjusts the preselected BARO reference.

7 Barometric (BARO) Standard (STD) Switch (inner) (momentary action)

PUSH –

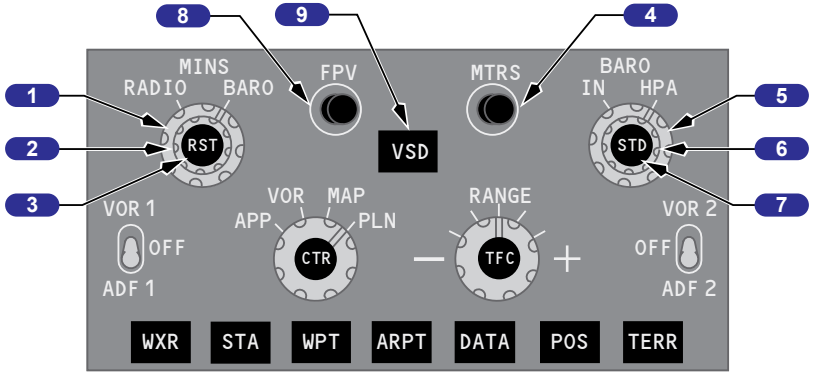
- selects the standard barometric setting (29.92 inches Hg/1013 HPA) for barometric altitude reference
- if STD is displayed, selects the preselected barometric reference
- if no preselected barometric is displayed, displays the last value before STD was selected.

8 Flight Path Vector (FPV) Switch (momentary action)

PUSH – displays flight path vector on the attitude indicator.

9 Vertical Situation Display (VSD) Switch (momentary action)

PUSH – turns on the VSD inset on the Expanded MAP and Center Map modes on the ND. Pressing the VSD switch again will deselect the VSD from the MAP mode. If the VSD switch is selected when the ND mode is not MAP, MDS will arm the VSD for display when the MAP mode is displayed.



GLARESHIELD PANEL (P7)

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EFIS Control Panel Controls – Navigation Displays

10 VOR/ADF Switch (three position)

Displays VOR or ADF information on all navigation modes except PLAN.

VOR – displays the selected VOR bearing pointer, frequency or identification and DME.

OFF – removes the VOR or ADF displays.

ADF – displays the selected ADF pointer and ADF frequency or identification.

11 Mode Selector (outer)

Selects the desired display.

APP –

- displays localizer and glideslope information in heading–up format.
- displays reference ILS receiver, ILS frequency or identification, course and DME.
- weather radar and TCAS are not displayed in center APP mode.

VOR –

- displays VOR navigation information in heading–up format
- displays reference VOR receiver, VOR frequency or identification, course, DME and TO/FROM information
- weather radar and TCAS are not displayed in center VOR mode.

MAP –

- displays FMC generated route and MAP information, airplane position, heading and track, in a track–up format
- displays waypoints, including the active waypoint, within the selected range
- displays VNAV path deviation.

PLN –

- displays a non–moving, true north up, route depiction
- the airplane symbol represents actual airplane position and orientation
- allows route step–through using the CDU LEGS page
- weather radar and TCAS are not displayed.

12 Center (CTR) Switch (inner)

PUSH –

- displays the full compass rose (center) for APP, VOR and MAP modes
- in MAP mode, subsequent pushes alternate between center with VSD, expanded and center without VSD; in VOR or APP modes subsequent pushes alternate between expanded and center displays.

13 Range Selector (outer)

Selects desired display range in nautical miles for APP, VOR, MAP or PLN mode.

14 Traffic (TFC) Switch (inner)

PUSH – displays TCAS information on the navigation display.

15 MAP Switches (momentary action)

The MAP switches:

- add background data/symbols to MAP and center MAP modes
- displays can be selected simultaneously
- second push removes the information.

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WXR (weather radar) – energizes weather radar transmitter and displays weather radar returns in MAP, center MAP, expanded VOR, and expanded APP modes. When the 640 nm range is selected, weather radar returns are limited to 320 nm.

STA (station) –

- displays all FMC data base navigation aids if on map scales 5, 10, 20 or 40 nm
- displays FMC data base high altitude navigation aids on map scales 80, 160, 320 or 640 nm.

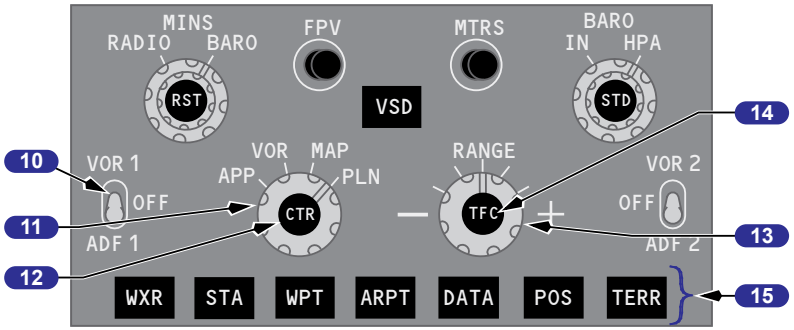
WPT (waypoint) – displays the waypoints in the FMC data base which are not in the flight plan route if the selected range is 40 nm or less.

ARPT (airport) – displays all airports which are stored in the FMC data base and which are within the viewable map area.

DATA – displays altitude constraint, if applicable, and estimated time of arrival for each active route waypoint.

POS (position) – displays IRS positions, GPS positions and VOR bearing vectors extended from the nose of the airplane symbol to the stations.

TERR (terrain) – displays GPWS generated terrain data in MAP, center MAP, VOR, and APP modes.



GLARESHIELD PANEL (P7)

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Instrument Switching Module

The Instrument Switching Module is located above the Captain, on the forward overhead (P5) panel. The bottom portion of the module is the DISPLAYS Control Panel that contains source select controls for the DPC's and the EFIS control panels.

1 DISPLAYS – SOURCE Selector – DPC

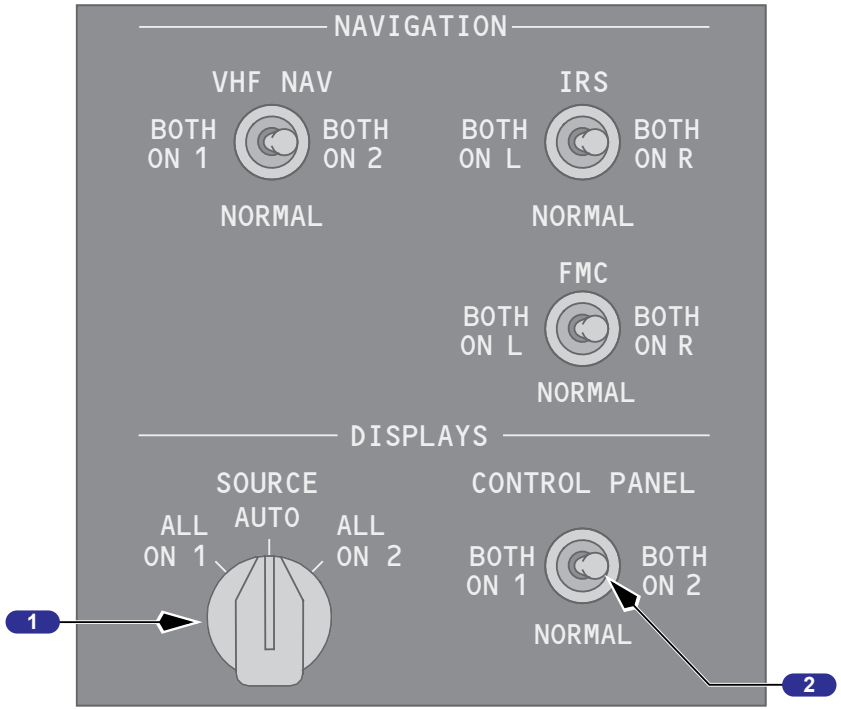
One, or both of the DPC's can drive all four of the flight deck display units. The SOURCE selector is normally set to the AUTO mode:

- ALL ON 1 – selects the Captains DPC to drive all four of the flight deck display units
- AUTO – allows DPC 1 to drive the Captains outboard and inboard display units, while DPC 2 drives the First Officers outboard and inboard display units. Provides automatic switching from both DPC's to one in case of a single DPC failure
- ALL ON 2 – selects the First Officers DPC to drive all four of the flight deck display units.

Note: These source selectors and switches are normally used while the aircraft is on the ground for maintenance purposes.

2 DISPLAYS – CONTROL PANEL Switch – EFIS

- BOTH ON 1 – both pilots' displays are set to the Captains EFIS control panel
- NORMAL – the left EFIS control panel controls the Captains displays, and the right EFIS control panel controls the First Officers displays
- BOTH ON 2 – both pilots' displays are set to the First Officers EFIS control panel.



INSTRUMENT SWITCHING MODULE, FWD OVERHEAD PANEL (P5)

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Lighting Control Module

The Lighting Control Module allows the crew to manually move displays from one DU to a different DU, and also allows the crew to manually adjust the brightness/contrast of the displays.

1 Display Configuration Switch (PFD/MFD)

Display switching, in the case of undetected DU failure, is initiated using the Display Configuration Switch located on each crew's Lighting Control Module. This switch may also be used for reconfiguring displays, in the event of a DU and Graphics Generator (GG) failure.

NORMAL – PFD/MFD configured in the normal display layout.

INBD – the outboard DU is blanked and the inboard DU displays the cropped PFD and Engine display format if the Engine display format was previously displayed on this side. Otherwise, whichever display that was shown in place of the Engine Display format before the failure will be shown.

OUTBD - the inboard DU is blanked. The outboard half of the outboard DU displays the cropped PFD. The inboard half displays the Engine display format if the Engine display format was previously shown on that side of the flight deck. Otherwise, whichever display that was shown in place of the Engine Display format before the failure will be shown.

2 Inboard Display Unit Brightness/Contrast (INBD DU BRT/CONTRAST) Control (outer) (rotary)

ROTATE – adjusts the brightness of the respective inboard DU.

3 Inboard Display Unit Radar Brightness/Contrast (INBD DU BRT/CONTRAST) Control (inner) (rotary)

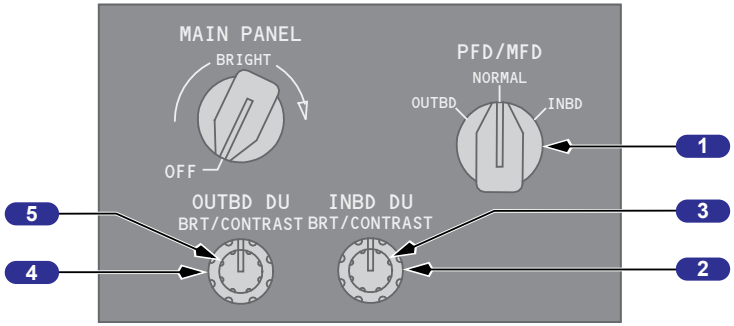
ROTATE – adjusts weather radar and terrain display brightness on the respective inboard DU.

4 Outboard Display Unit Brightness/Contrast (OUTBD DU BRT/CONTRAST) Control (outer) (rotary)

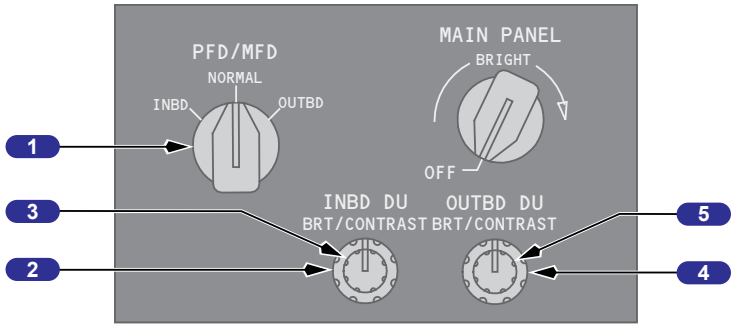
ROTATE – adjusts the brightness of the respective inboard DU.

5 Outboard Display Unit Radar Brightness/Contrast (OUTBD DU BRT/CONTRAST) Control (inner) (rotary)

ROTATE – adjusts weather radar and terrain display brightness on the respective inboard DU.



CAPT INSTRUMENT PANEL (P1)



F/O INSTRUMENT PANEL (P3)

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Interactive Display SELECTOR

There are two Interactive Display Selectors located on the Multi-Function Panel, which allow the crew to interact with the MFD. Each selector consists of two stacked selectors, with a push button select on top.

1 Outer Selector

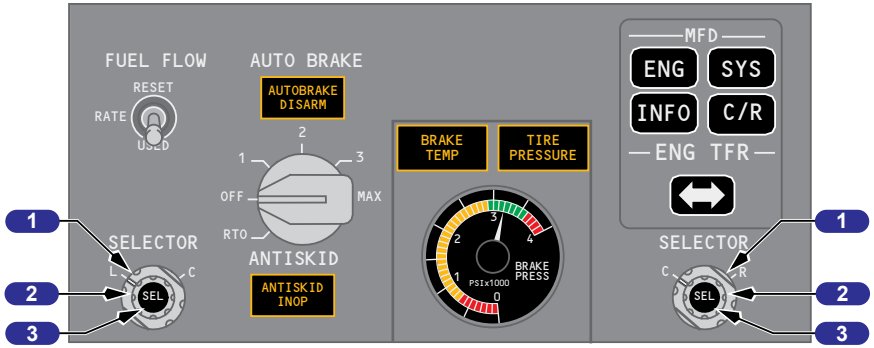
The two position outer selector commands the cursor and highlight to a display. The (L or R) selection places the cursor on the outboard half of the inboard display. The (C) selection places the cursor on the display which is normally on the inboard half of the inboard DU. The (L or R) selections are only used by maintenance, when going through the maintenance formats on the main displays.

2 Inner Selector

The sixteen detent, continuously rotating, inner selector has two modes of operation. The default mode of the inner selector controls the highlight position. Turning the inner selector in the default mode moves the cursor and highlight symbol from one interactive element to another. The second mode of operation is data entry. When a data entry field is selected, the inner selector will stop controlling the highlight position, and will begin controlling the value inside the data entry field. If the data entry field is a number, then turning the selector will increment or decrement the number. If the data entry field is an alpha character, then turning the selector will increment one letter at a time. Pressing the select switch will set that active character and begin controlling the next character.

3 Select (SEL) Switch

Interactive elements on the display are selected by moving the highlight to the desired element and pressing the select (SEL) switch on the selector.



MULTI-FUNCTION PANEL, FWD ELECTRONIC PANEL (P9)

Multi-Function Display (MFD) Switches

The MFD Switches control of the Multi-function Display on the inboard half of the DU, opposite of the Engine format. Each DU has a left and right window. The inboard half of the DU is the only MFD location.

1 MFD Engine (ENG) Switch

PUSH – ENG

- displays secondary engine indications on the selected DU
- second push removes secondary engine indications from the respective DU.

2 MFD Information (INFO) Switch

PUSH – displays format containing the N1/SPD REF Set page where the crew can manually enter the N1 Targets and V speed bugs on the Airspeed indicator.

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3 MFD System (SYS) Switch

PUSH – SYS

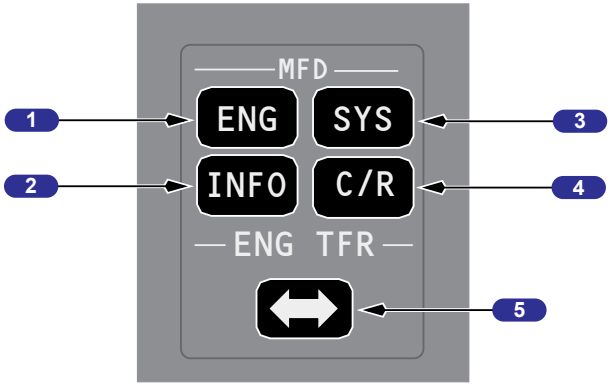
- displays various systems indications on the selected DU
- second push removes systems indications from the DU.

4 MFD Cancel/Recall (C/R) Switch

PUSH – cancels and recalls the CAT IIIb annunciations from the selected DU.

5 Engine Transfer (ENG TRF) Switch

PUSH – transfers the Engine display between the Captain and First Officer DU's.



MULTI-FUNCTION PANEL, FWD ELECTRONIC PANEL (P9)

PFD (Outboard Display)

1 Flight Mode Annunciator

Displays current flight modes.

2 Airspeed/Mach Indications

3 Attitude Indications

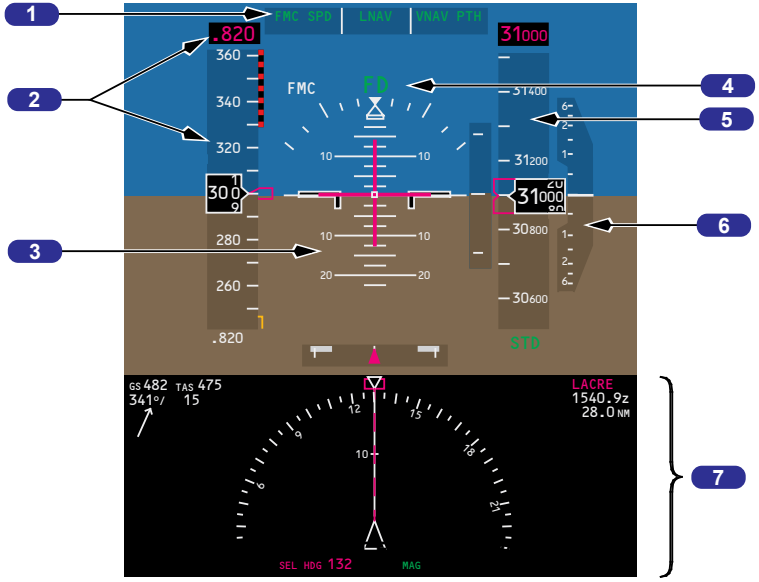
4 Autopilot, Flight Director System Status

5 Altitude Indications

6 Vertical Speed Indications

7 Mini-map

Displays current IRS heading, track and other heading information.



PRIMARY FLIGHT DISPLAY

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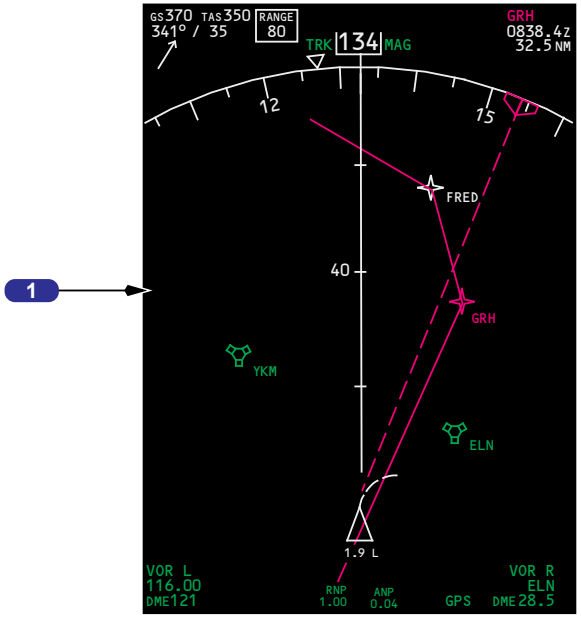
ND (Inboard Display)

1 Navigation Display

Displays map, approach, VOR, or plan modes as selected on the EFIS control panel.



NAVIGATION DISPLAY

Fire Warning and Master Caution System

1 Master Fire Warning (FIRE WARN) Lights

Illuminated (red) – indicates a fire warning (or system test) in engine, cargo, APU or main gear wheel well.

- fire warning bell sounds
- if on ground, remote APU fire warning horn sounds.

Push –

- extinguishes both master FIRE WARN lights
- silences fire warning bell
- silences remote APU fire warning horn
- resets system for additional warnings.

Note: Pushing fire warning bell cutout switch on overheat/fire protection panel results in same actions.

2 MASTER CAUTION Lights

Illuminated (amber) – a system annunciator light has illuminated.

Push – extinguishes both MASTER CAUTION lights.

- system annunciator light(s) extinguish
- resets system for additional master caution conditions.

3 System Annunciator Panel

Illuminated (amber) – an amber light, relating to illuminated system annunciator, has illuminated on forward overhead, aft overhead or overheat/fire protection panel.

Push – either MASTER CAUTION light to extinguish the annunciator light(s).

Push and Release – either system annunciator panel to recall the illuminated light(s).

- if a master caution condition exists, appropriate system annunciator(s) and MASTER CAUTION lights illuminate
- a single fault in certain redundant systems, or some simple faults, cause the system annunciator light to illuminate during a recall. The system annunciator light will extinguish when the MASTER CAUTION light is pushed.

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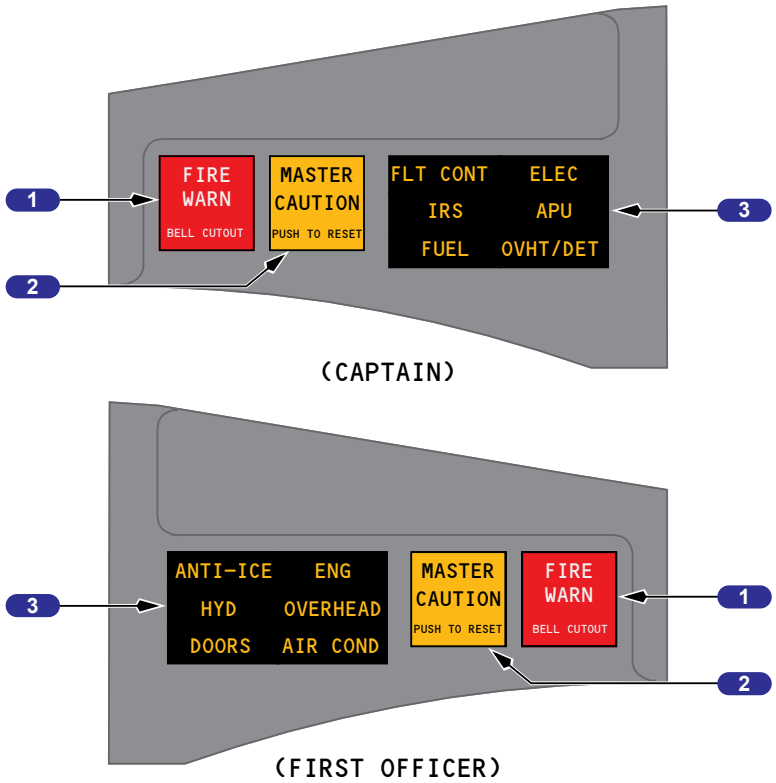


GLARESHIELD PANEL (P7)

Display Selection and Control Examples

The following examples show display selections:

Normal Display Configuration

1 DISPLAYS Control Panel

The DISPLAYS SOURCE selector is in AUTO, and the CONTROL PANEL selector is in NORMAL.

2 EFIS Control Panel

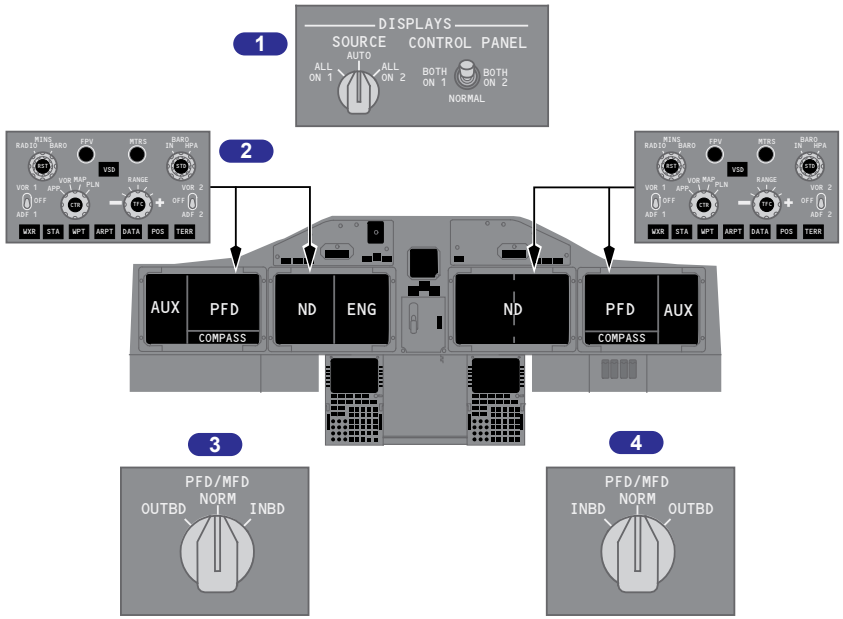
The left EFIS control panel controls the Captain outboard and inboard display DU's. The right EFIS control panel controls the First Officer outboard and inboard DU's.

3 Display Selector Switch (PFD/MFP)

All selectors are in NORMAL.

4 Display Units

- The PFD and AUX displays will be shown on the Outboard DU's
- The Captains Inboard DU will show a half-sized ND and the Engine Display
- The First Officers Inboard DU will show a full-sized ND



NORMAL DISPLAY CONFIGURATION

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Display Unit Failure Automatic Switching

Outboard Display Unit Failure

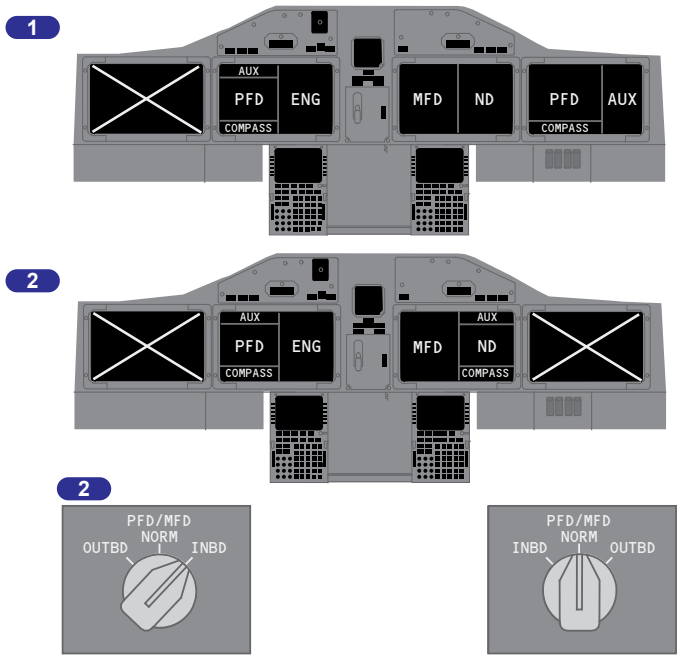
1 Outboard Display Unit Fails

The window management function in MDS places the various display formats on the proper display units. It ensures that each pilot has a PFD, and that an Engine Display is shown.

DU failures may be dealt with automatically or manually. When an Outboard DU failure is sensed, the displays will automatically reconfigure. The MFD display adjacent to the failed DU is replaced by the PFD. The left and right edges of the PFD are cropped, and the AUX display is removed to fit the half-sized display. No information on the PFD is lost with the cropping.

2 Both Outboard Display Units Fail

In the event that both Outboard DU's fail, both Inboard DU's will have the reduced size PFD, and the AUX display will not be shown. If the failure is not detected, pilots can achieve the same reconfiguration pattern manually by switching the PFD/MFD selector to the "INBD" position.



OUTBOARD DISPLAY UNIT FAILURE

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Inboard Display Unit Failure

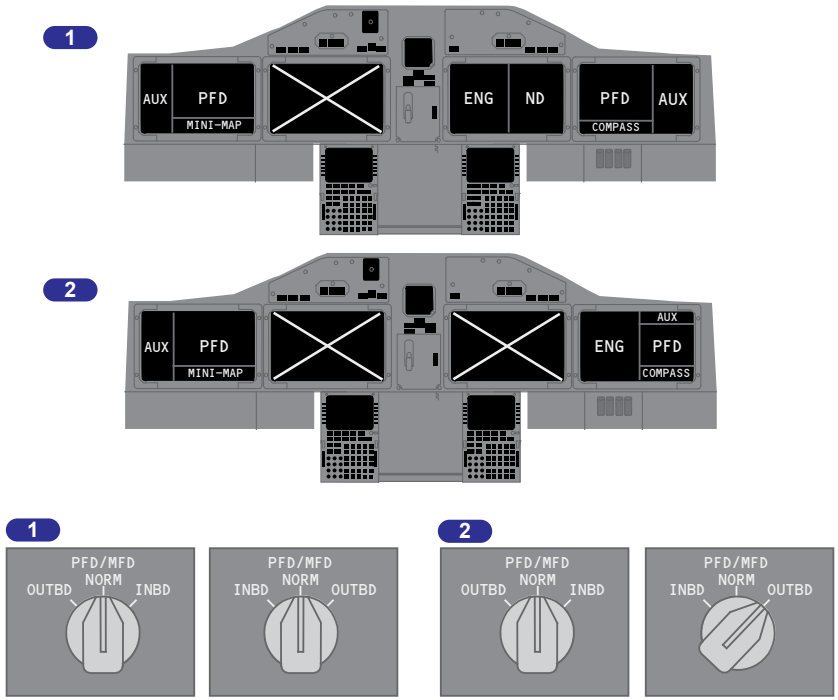
1 Inboard Display Unit Fails

The window management function in MDS places the various display formats on the proper display units. It ensures that each pilot has a PFD, and that an Engine Display is shown.

When either Inboard DU fails while displaying the Engine Display, the Engine Display will transfer to the remaining Inboard DU. Unless the displays are manually reconfigured, the ENG TRF switch will not cause the Engine Display to move to an inoperable DU.

2 Both Inboard Display Units Fail

When both Inboard DU's fail, the Engine Display will not be displayed, and the pilots are required to use the Display Select Switches to tell MDS which Outboard display can be modified to display the Engine Display. The First Office may switch the Display Select Switch to the "OUTBD" position, and the Engine Display will be displayed in the remaining MFD location on their Outboard DU.



INBOARD DISPLAY UNIT FAILURE

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Clock

A clock is located on each AUX display. Each clock displays UTC time and date automatically generated from GPS.

1 UTC Time

2 Chrono Dial and Readout

Major tick marks are placed at 0, 15, 30, and 45 seconds, and minor tick marks are placed at 5, 10, 20, 25, 35, 40, 50 and 55 seconds.

3 Elapsed Time

Starts at weight off wheels, stops 30 seconds after weight on wheels, and resets on power up or new origin airport entered.

LEFT AND RIGHT AUX DISPLAY

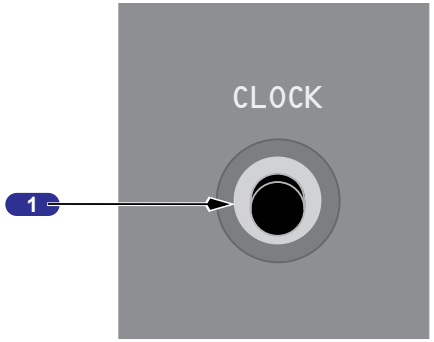
PFD REVERSION MODE

Clock Switch

1 Clock Switch

PUSH –

- first push displays and starts clock function
- second push stops clock function
- third push removes clock.



GLARESHIELD PANEL (P7)

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Flight Recorder

1 Flight Recorder Test Switch

NORMAL (guarded position) –

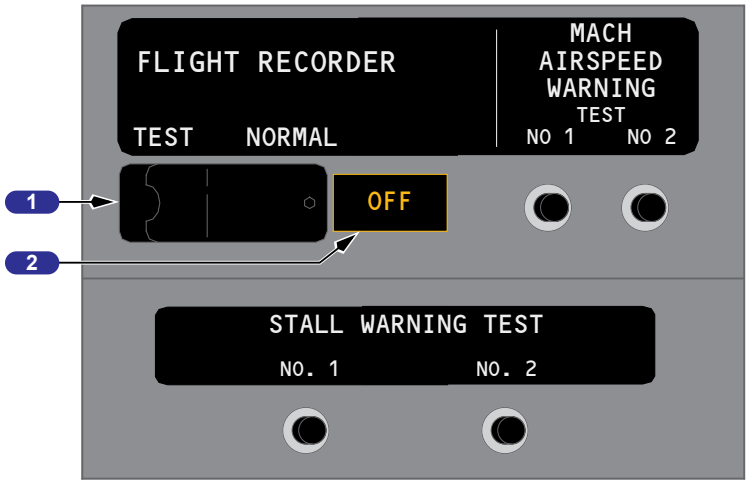
- in flight – the recorder operates anytime electrical power is available
- on the ground – either engine must also be operating.

TEST – powers the flight recorder on the ground.

2 OFF Light (amber)

ILLUMINATED –

- indicates the recorder is not operating or the test is invalid
- may indicate power failure, loss of input data, or electronic malfunction.

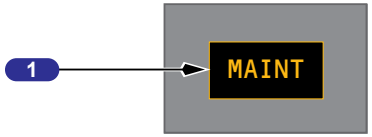


AFT OVERHEAD PANEL (P5)

Maintenance Light

1 Maintenance (MAINT) light

Illuminated (amber) – a system fault exists that must be reviewed by maintenance personnel. Inhibited from first engine start until 30 seconds after landing.



AFT OVERHEAD PANEL (P5)

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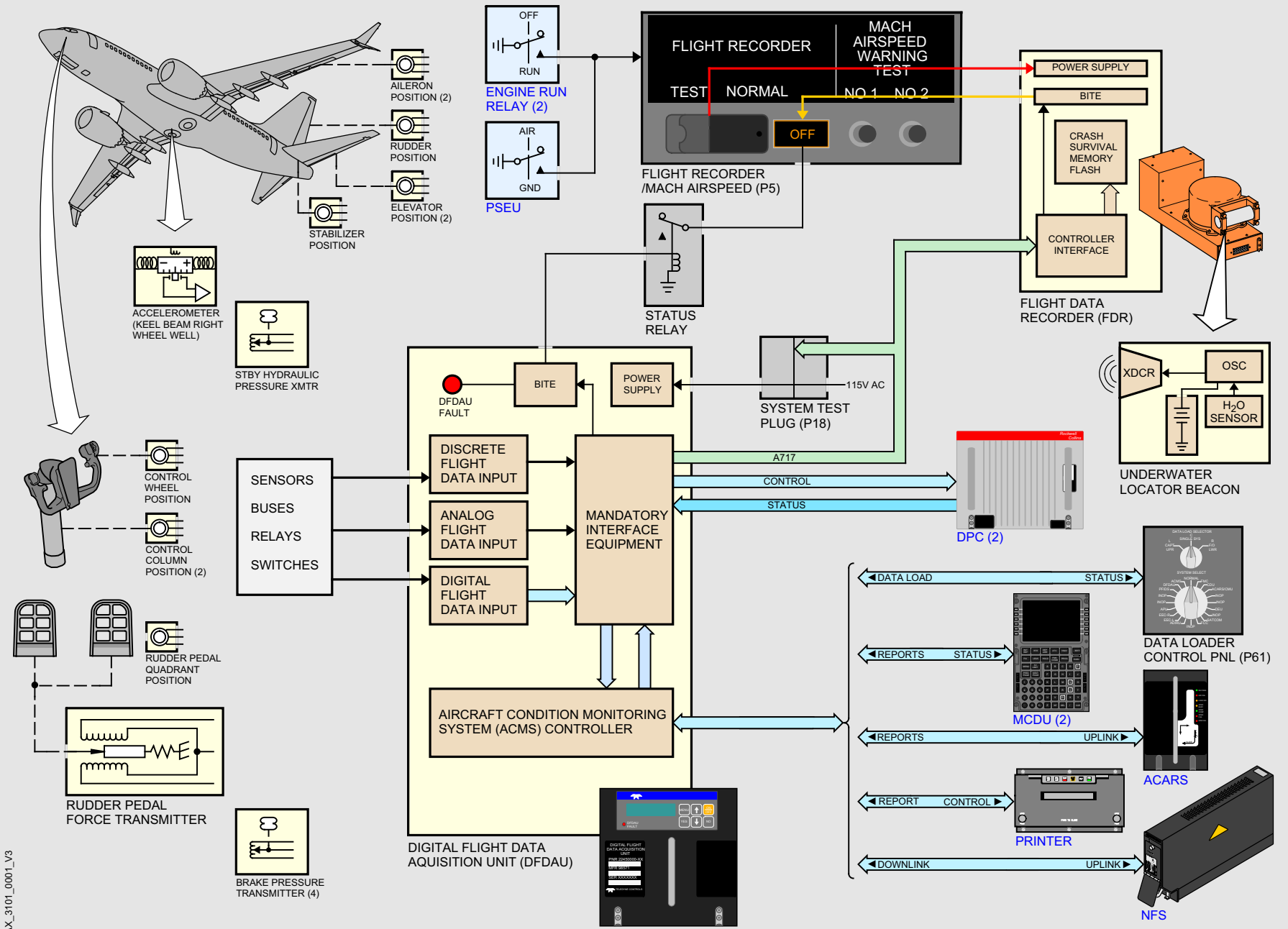

DIGITAL FLIGHT DATA RECORDER (FDR) (31-31)

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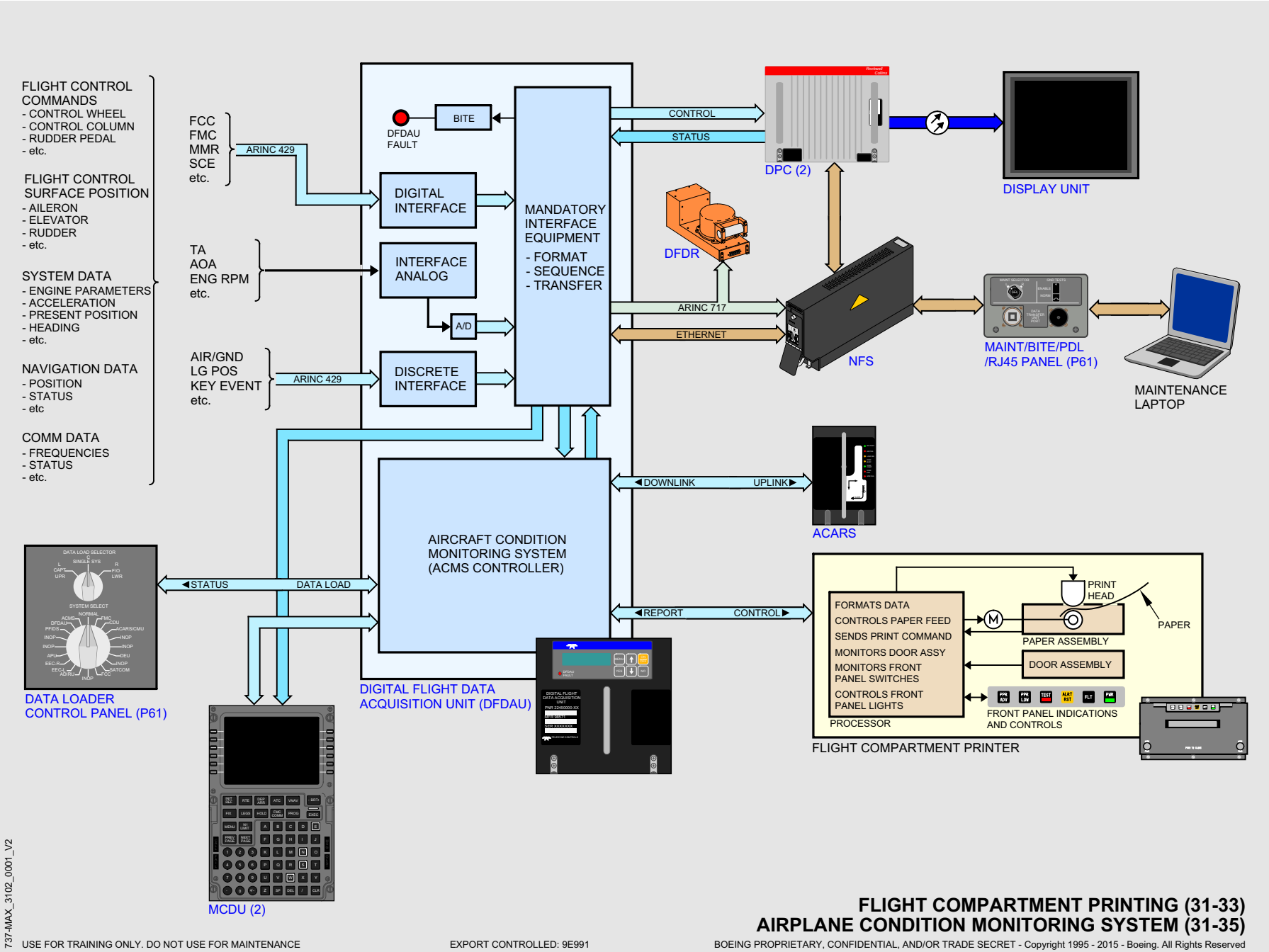

FLIGHT COMPARTMENT PRINTING (31-33)
AIRPLANE CONDITION MONITORING SYSTEM (31-35)

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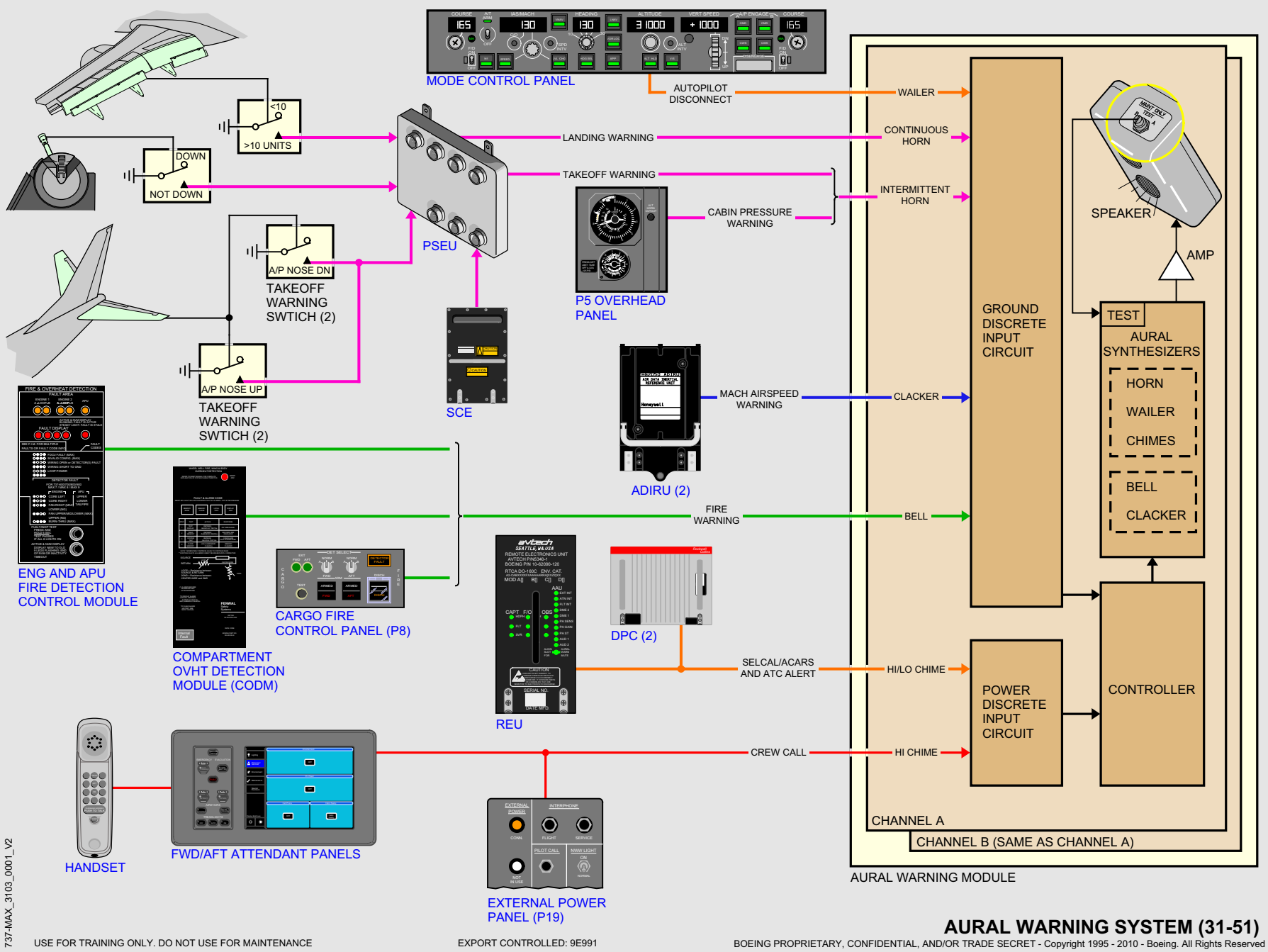

AURAL WARNING SYSTEM (31-51)

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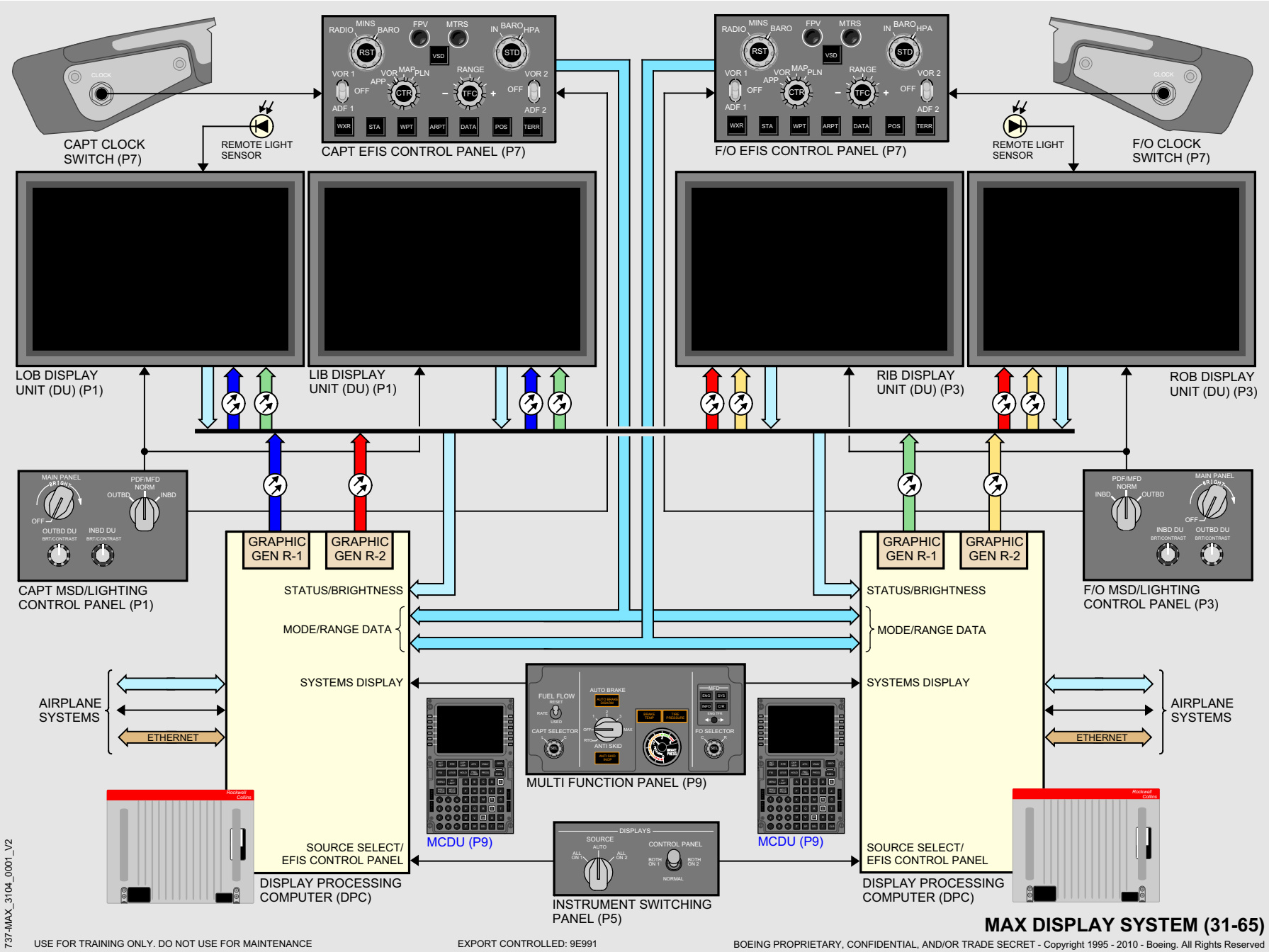

MAX DISPLAY SYSTEM (31-65)

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Intentionally
Blank

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ATA 32

Landing Gear

Landing Gear (ATA 32)

Takeoff Configuration and Cabin Altitude Warning Lights

1 TAKEOFF CONFIGURATION Warning Light

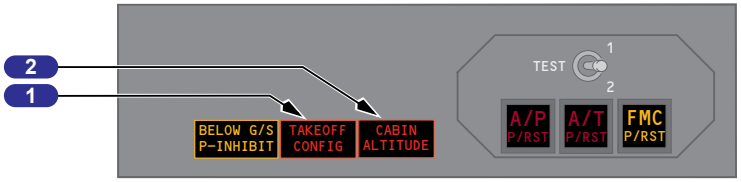
Illuminated (red) –

- activates on the ground as the throttles are advanced if the airplane is not configured correctly for takeoff
- activation is simultaneous with aural warning intermittent horn for takeoff configuration alert.

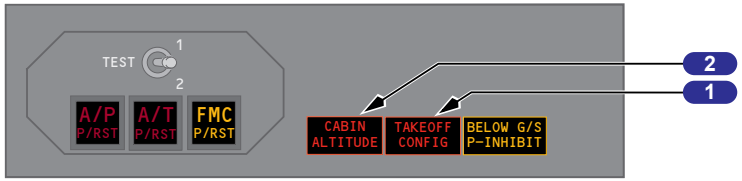
2 CABIN ALTITUDE Warning Light

Illuminated (red) –

- illuminates when cabin altitude exceeds 10,000 feet
- activation is simultaneous with aural warning intermittent horn for cabin altitude alert
- extinguishes when cabin altitude descends below 10,000 feet.



CAPTAIN INSTRUMENT PANEL (P1)



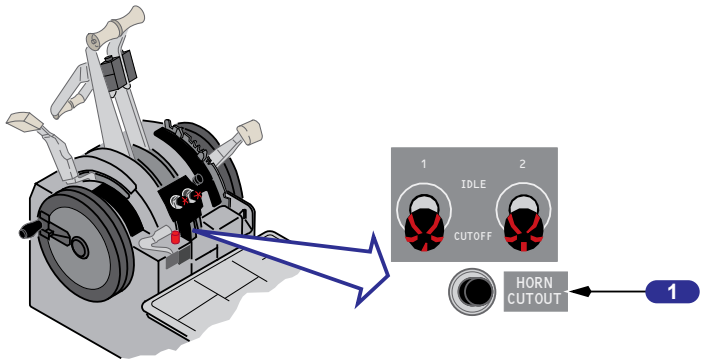
FIRST OFFICER INSTRUMENT PANEL (P3)

Landing Gear Warning HORN CUTOUT Switch

1 Landing Gear Warning HORN CUTOUT Switch

Push – silences landing gear configuration warning aural indication at flaps up through 10 and above 200 feet RA.

Note: The aural indication cannot be silenced with the HORN CUTOUT switch at flaps greater than 10.



CONTROL STAND

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Landing Gear Control Lever Module

1 Landing Gear Indicator Lights (top)

Illuminated (red) –

- landing gear is not down and locked (with either or both forward thrust levers retarded to idle, and below 800 feet AGL)
- related landing gear is in disagreement with LANDING GEAR lever position (in transit or unsafe).

Extinguished -

- landing gear is up and locked with LANDING GEAR lever UP
- landing gear is down and locked with LANDING GEAR lever DN position.

2 Landing Gear Indicator Lights (bottom)

Illuminated (green) – related gear down and locked.

Note: The landing gear warning horn is deactivated with all gear down and locked.

Note: Landing gear is down and locked as long as one green landing gear indicator light (center panel or overhead panel) for each gear is illuminated. The landing gear horn is deactivated with all gear down and locked.

Extinguished – landing gear is not down and locked.

3 LANDING GEAR Lever Lock Override (LOCK OVRD) Switch

PUSH – releases the landing gear lever lock.

4 NOSE WHEEL STEER Switch

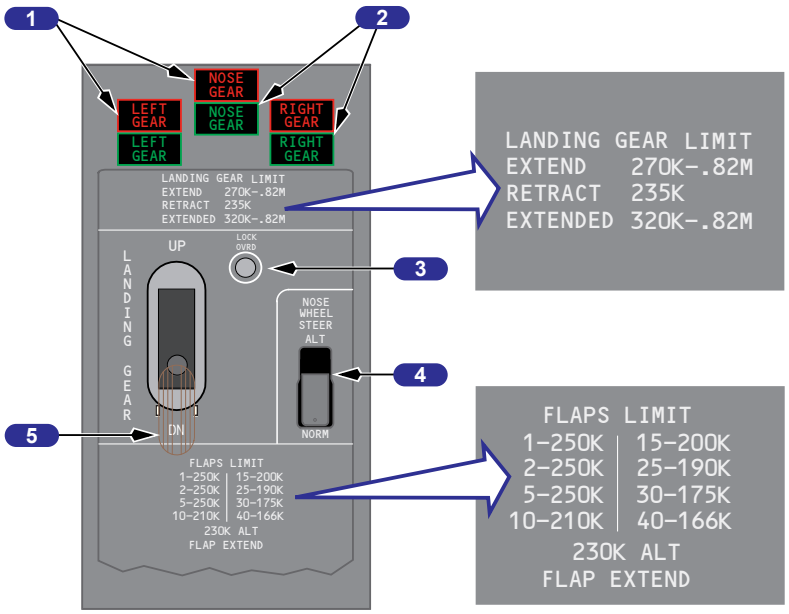
ALT – hydraulic system B provides power for nose wheel steering.

NORM (guarded position) – hydraulic system A provides power for nose wheel steering.

5 LANDING GEAR Lever

UP – landing gear retract.

DN – landing gear extend.



LANDING GEAR CONTROL LEVER MODULE (P2)

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Landing Gear Indicator Lights

This is a redundant, but separate set of landing gear indicator circuits and lights, located on the Aft Overhead Panel.

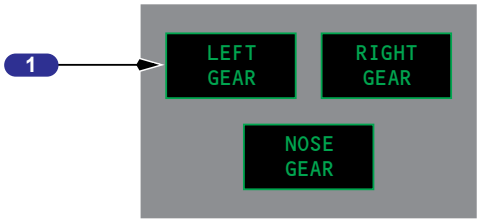
1 Landing Gear Indicator Lights (overhead)

Illuminated (green) – related gear is down and locked.

Note: The landing gear warning horn is deactivated with all gear down and locked.

Note: Landing gear is down and locked as long as one green landing gear indicator light (center panel or overhead panel) for each gear is illuminated.

Extinguished – landing gear is not down and locked.



OVERHEAD PANEL (AFT P5)

Manual Gear Extension

1 Manual Landing Gear Extension Access Door

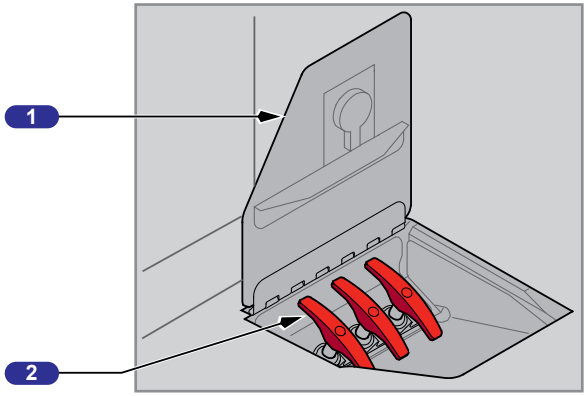
Open –

- manual landing gear extension is possible with LANDING GEAR lever in any position
- normal landing gear extension is still possible if hydraulic system A pressure is available
- landing gear retraction is disabled.

Closed – landing gear operate normally.

2 Manual Landing Gear Extension Handles

Right main, nose, left main – Each landing gear uplock is released when related handle is pulled to its limit, approximately 18.5 inches (46.99 cm).



FLIGHT DECK FLOOR

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Autobrake and Antiskid Controls

1 AUTOBRAKE DISARM Light

Illuminated (amber) –

- SPD BRK lever moved to DOWN detent during RTO or landing
- manual brakes applied during RTO or landing
- thrust lever(s) advanced during RTO or landing
  - except during first 3 seconds after touchdown for landing
- landing made with RTO selected
- RTO mode selected on ground
  - illuminates for one to two seconds, then extinguishes
- a malfunction exists in automatic braking system.

Extinguished –

- AUTO BRAKE select switch set to the OFF position
- autobrake armed.

2 AUTO BRAKE Select Switch

OFF – autobrake system deactivated.

1, 2, 3, or MAX –

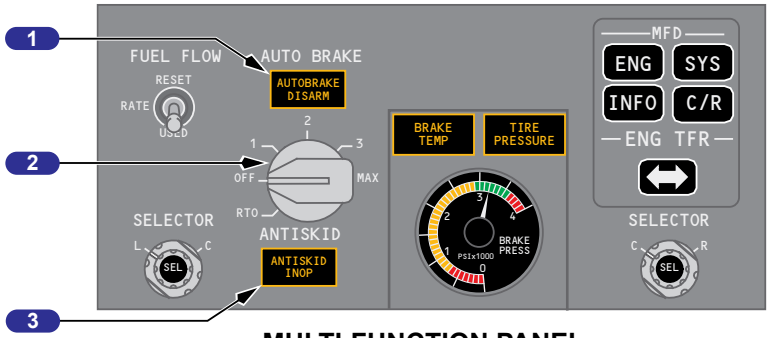
- selects desired deceleration rate for landing
- switch must be pulled out to select the MAX position for maximum deceleration.

RTO – automatically applies maximum brake pressure when thrust levers are retarded to idle at or above 88 knots.

3 Antiskid Inoperative (ANTISKID INOP) Light

Illuminated (amber) – a system fault is detected by antiskid monitoring system.

Extinguished – antiskid system operating normally.



MULTI-FUNCTION PANEL, FORWARD ELECTRONIC PANEL (P9)

Parking Brake

1 PARKING BRAKE Lever

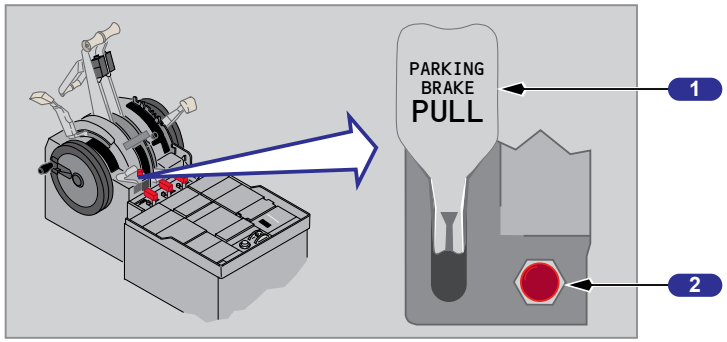
Forward – parking brakes released.

Aft – sets parking brakes when either Captain's or First Officer's brake pedals are fully depressed.

2 Parking Brake Warning Light

Illuminated (red) – parking brake is set (light operates from battery power).

Extinguished – parking brake is released.



CONTROL STAND

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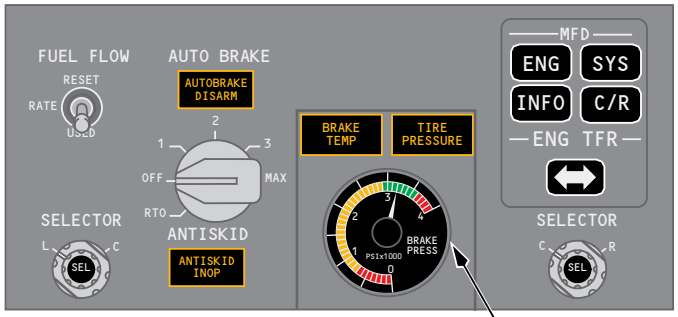
Hydraulic Brake Pressure Indicator

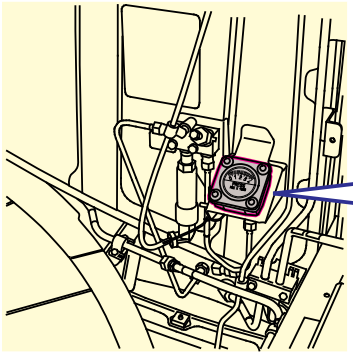
1 Hydraulic Brake Pressure (BRAKE PRESS) Indicator

Indicates brake accumulator pressure:

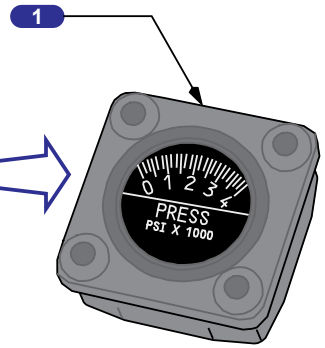
- normal pressure – 3000 psi
- maximum pressure – 3500 psi
- normal precharge – 1000 psi.



MULTI-FUNCTION PANEL, FORWARD ELECTRONIC PANEL (P9)



MLG WHEEL WELL BULKHEAD (LOOKING AFT)



BRAKE ACCUMULATOR PRESSURE INDICATOR

Brake Temperature / Tire Pressure Indicator

1 Brake Temperature (BRAKE TEMP) Light

Illuminated (amber) –

- temperature of one or more brakes exceeds 4.9
- extinguishes when a hot brake condition is no longer indicated on the display unit.

2 Tire Pressure (TIRE PRESSURE) Light

Illuminated (amber) –

- a main or nose gear tire pressure falls below 100 psi
- a differential pressure exists between two main gear tires on the same axle, greater than 25% of the lower tire pressure
- a differential pressure exists between nose gear tires greater than 12% of the lower tire pressure.

3 Tire Pressure

Indicates individual tire pressure

- displays (white) – normal tire pressure condition
- display (amber) – abnormal tire pressure condition.

4 Brake Temperature

Indicates a relative value of wheel brake temperature

- values range from 0.0 to 9.9
- displayed (white) – normal brake temperature range, 0.0 to 4.9
- displayed (amber) – high brake temperature, exceeds 4.9.

5 MFD System (SYS) Switch

PUSH - SYS

- displays brake temperature and tire pressure indications on the selected DU
- second push removes indications from the respective DU.

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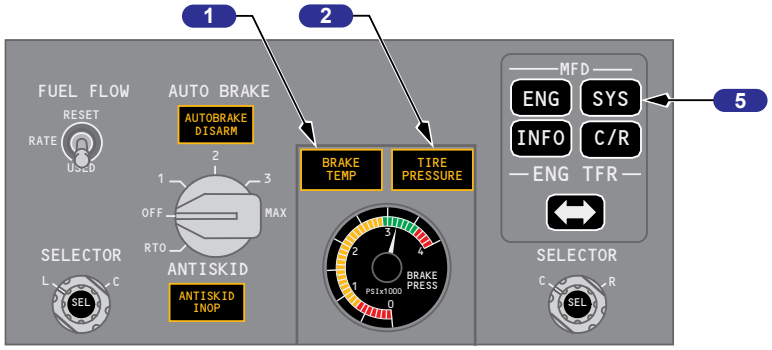
6 Brake Symbol

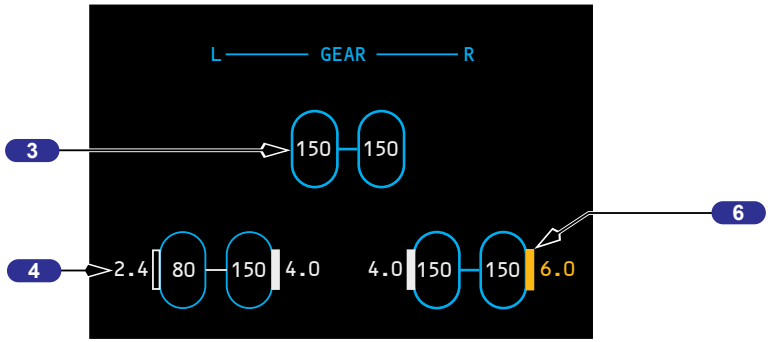
Displayed (blank) – indicates any brake less than 2.5.

Displayed (solid white) – indicates the hottest brake on each main gear truck, within the range of 2.5 to 4.9.

Displayed (solid amber) – indicates brake overheat condition on each wheel within the range of 5.0 to 9.9.



MULTI-FUNCTION PANEL, FORWARD ELECTRONIC PANEL (P9)



MDS DISPLAY UNIT

Rudder/Brake Pedals

1 Rudder/Brake Pedals

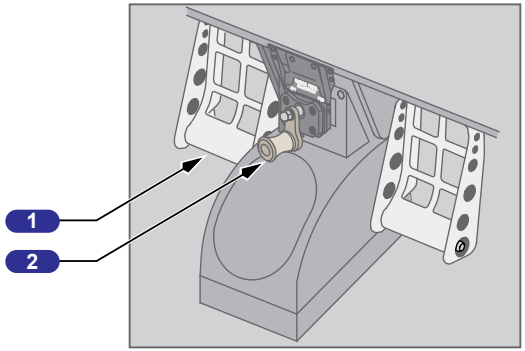
Push full pedal – turns nose wheel up to 7 degrees in either direction.

Push top of pedal only – activates wheel brakes.

2 RUDDER PEDAL ADJUSTMENT Crank

AFT (counter-clockwise) – adjusts rudder pedals aft.

FWD (clockwise) – adjusts rudder pedals forward.



CREW STATION

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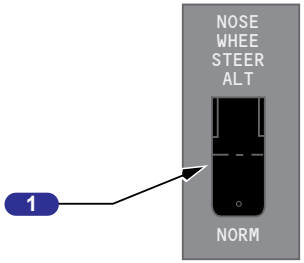
Nose Wheel Steering (STEER) Switch

1 NOSE WHEEL STEER Switch

ALT – hydraulic system B provides power for nose wheel steering.

NORM (guarded position) – hydraulic system A provides power for nose wheel steering.



LANDING GEAR CONTROL LEVER MOULE (P2)

Nose Wheel Steering Wheel

1 Nose Wheel Steering Wheel

Rotate –

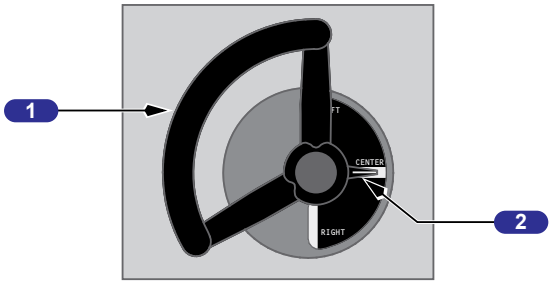
- turns nose wheel up to 78 degrees in either direction.
- overrides rudder pedal steering.

2 Nose Wheel Steering Indicator

LEFT – indicates nose wheel steering displacement left of center position.

CENTER – normal straight ahead position.

RIGHT – indicates nose wheel steering displacement right of center position.



CAPTAIN SIDE PANEL

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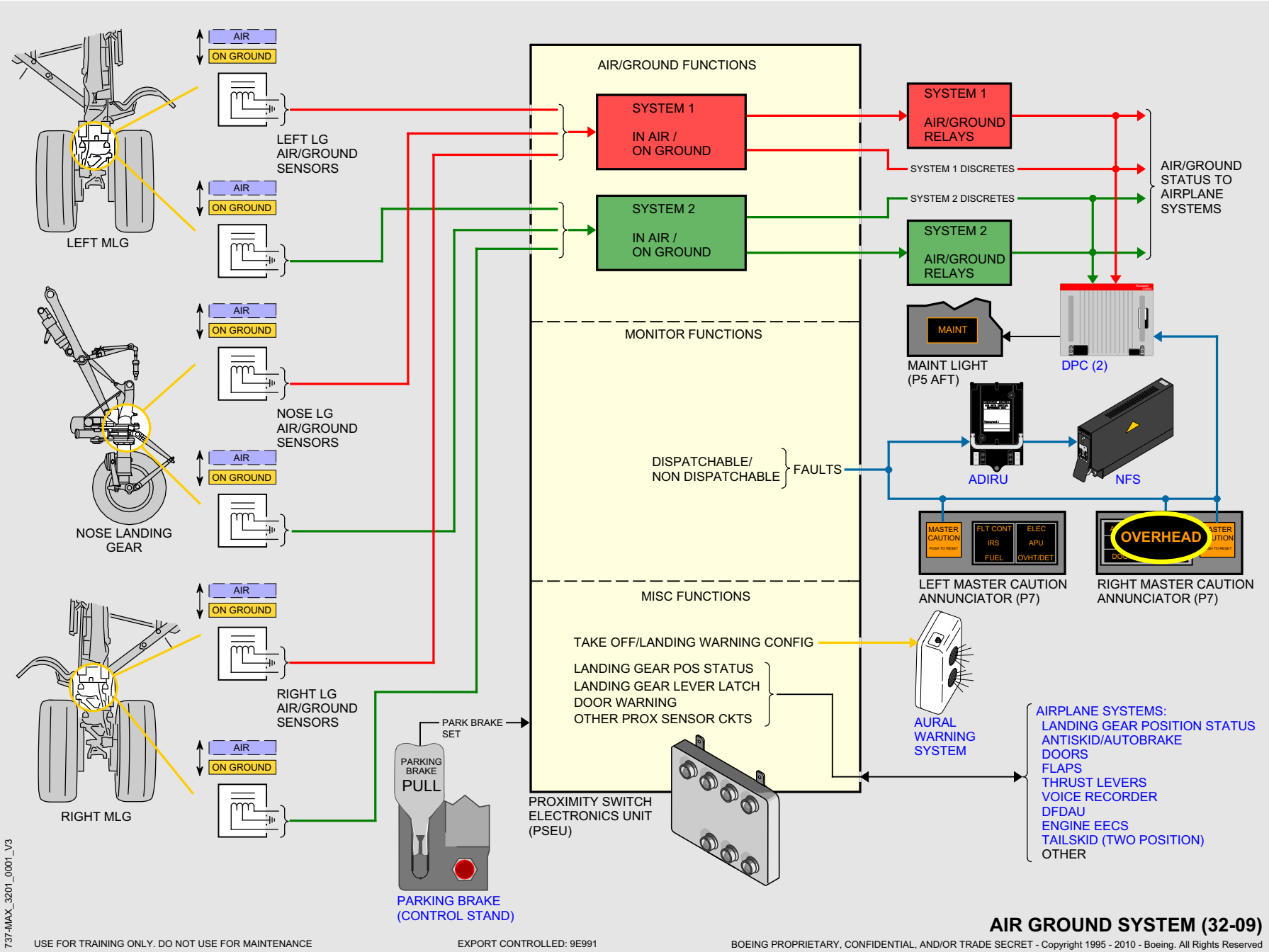

AIR GROUND SYSTEM (32-09)

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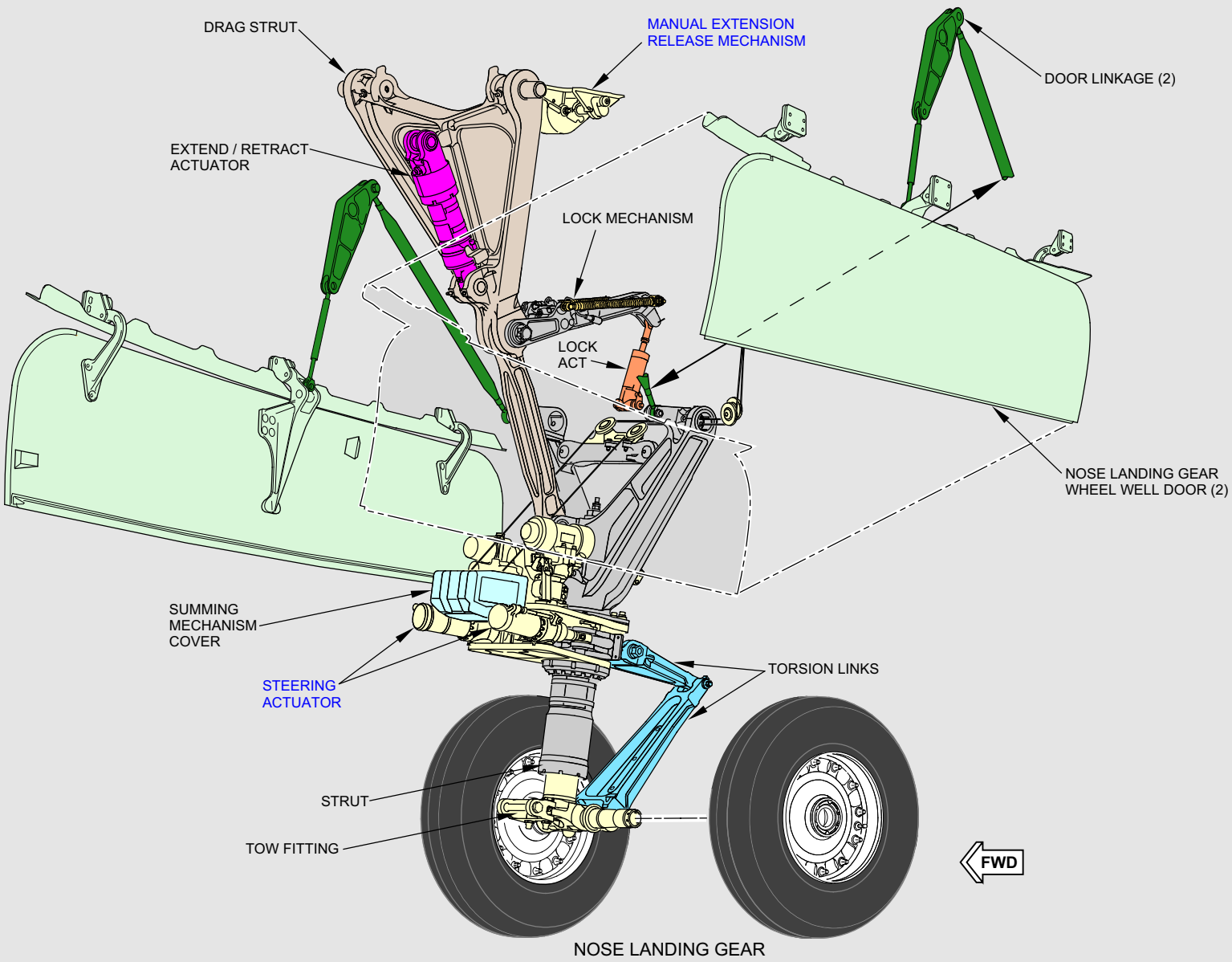

737-MAX_3203_0001_V1

NOSE LANDING GEAR (32-21/22/33)

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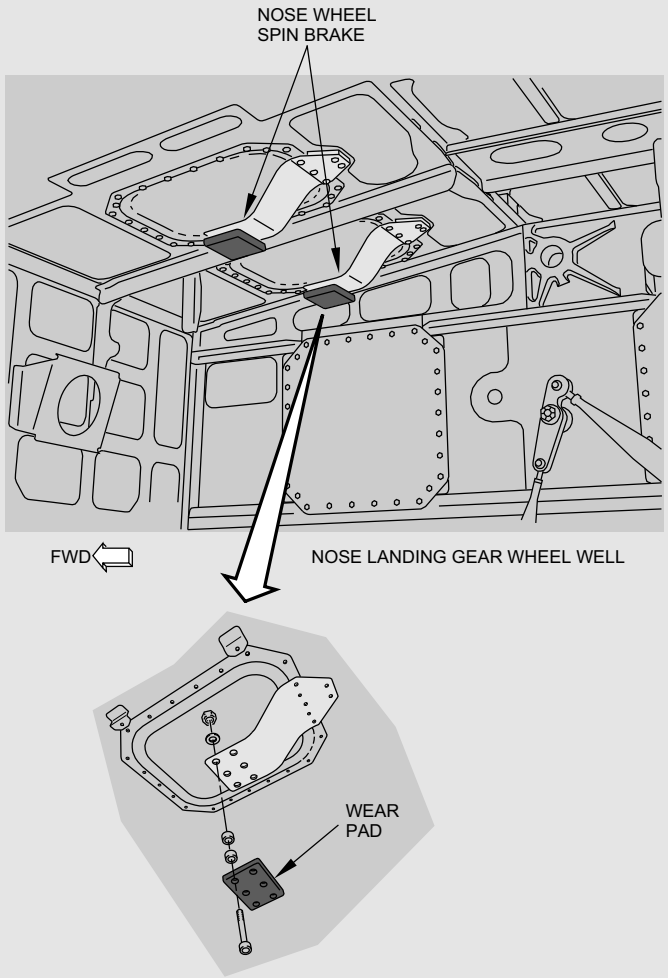

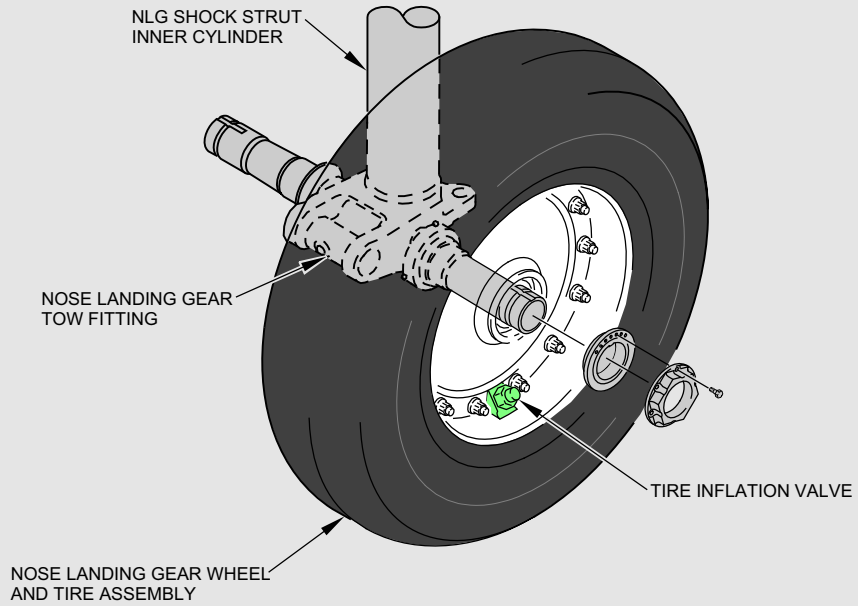

737-MAX_3209_0001_V1

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NOSE LANDING GEAR - WHEELS AND TIRES (32-21/45)

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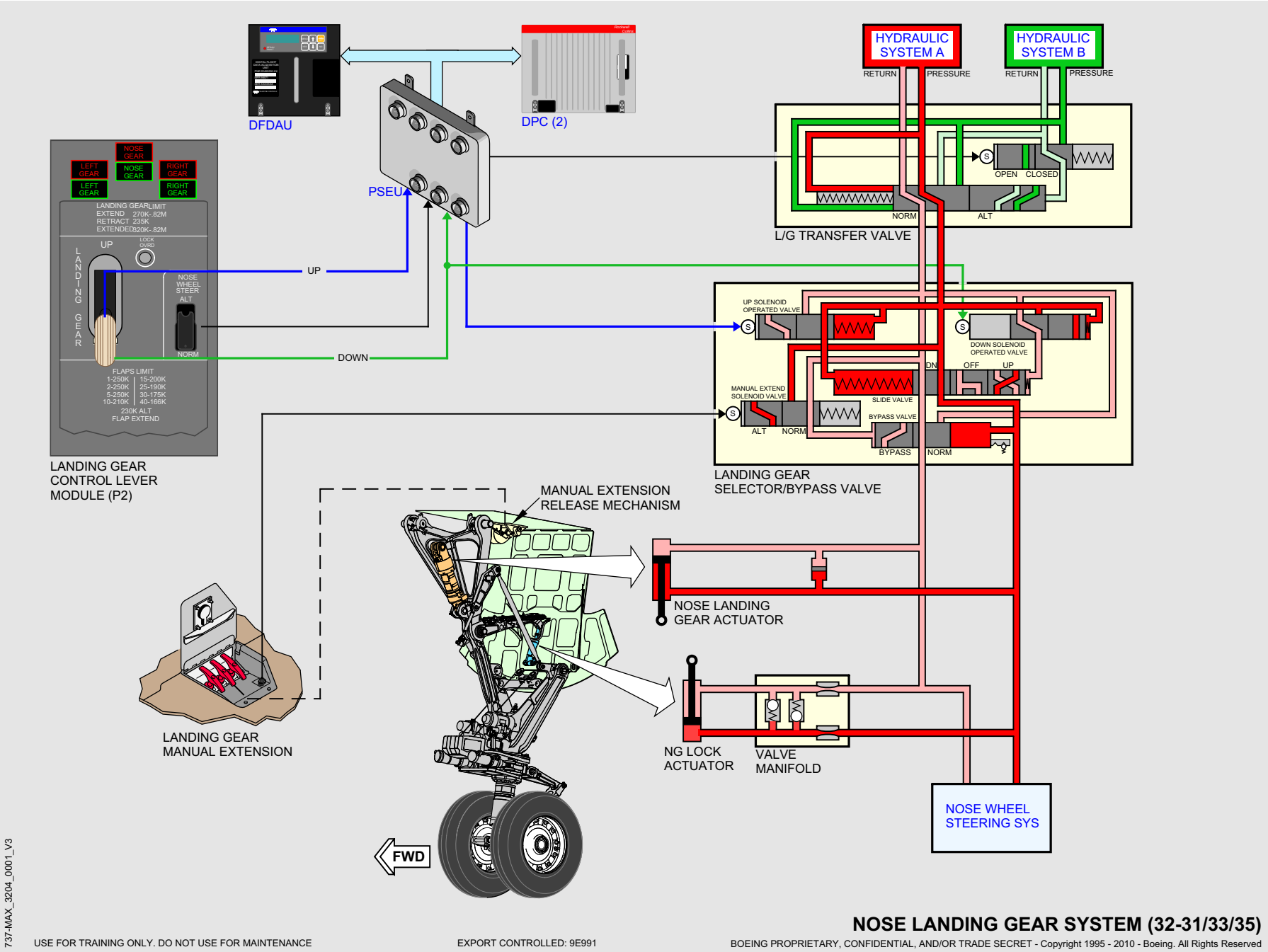

737-MAX_3204_0001_V3

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NOSE LANDING GEAR SYSTEM (32-31/33/35)

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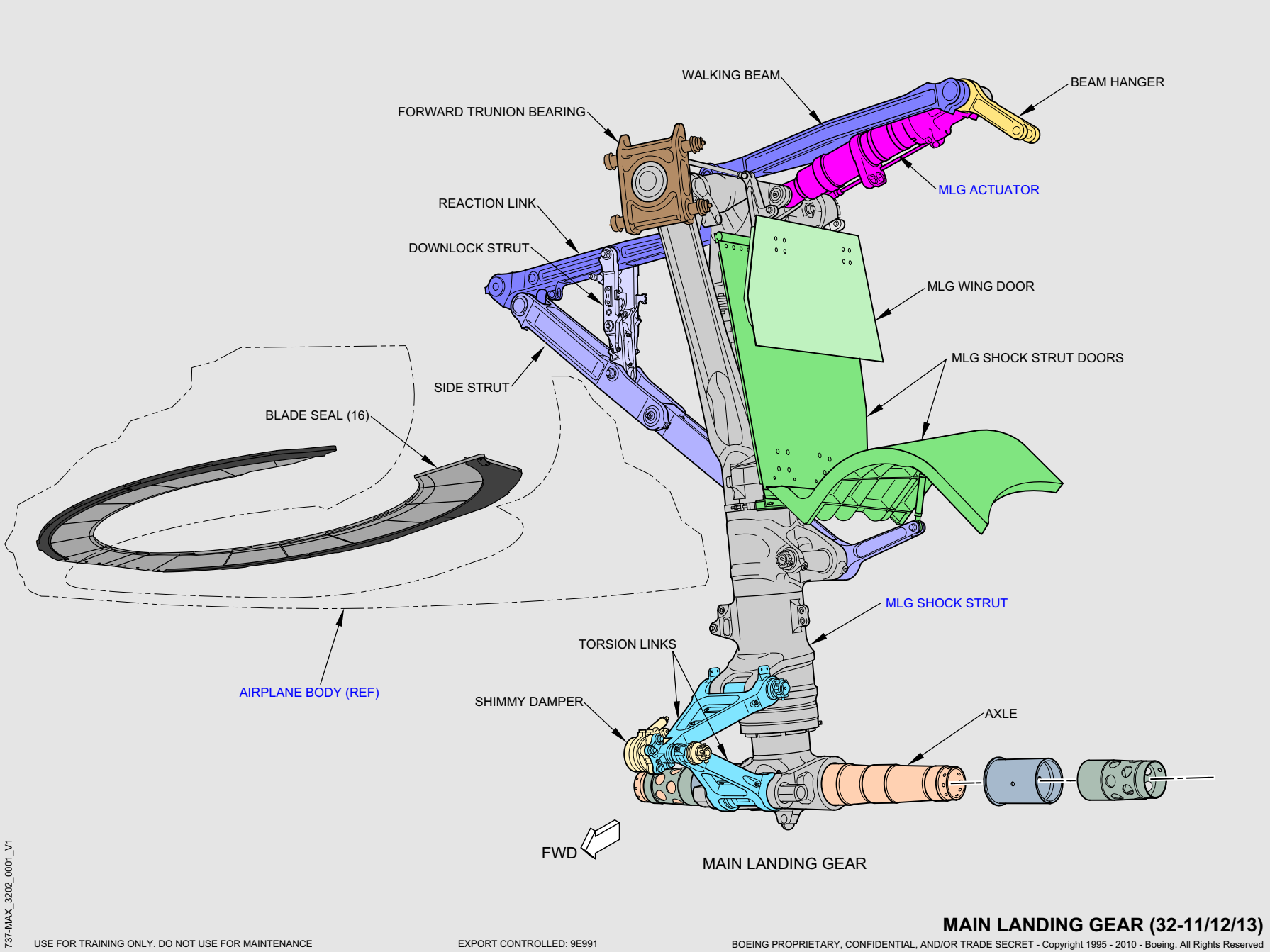

MAIN LANDING GEAR (32-11/12/13)

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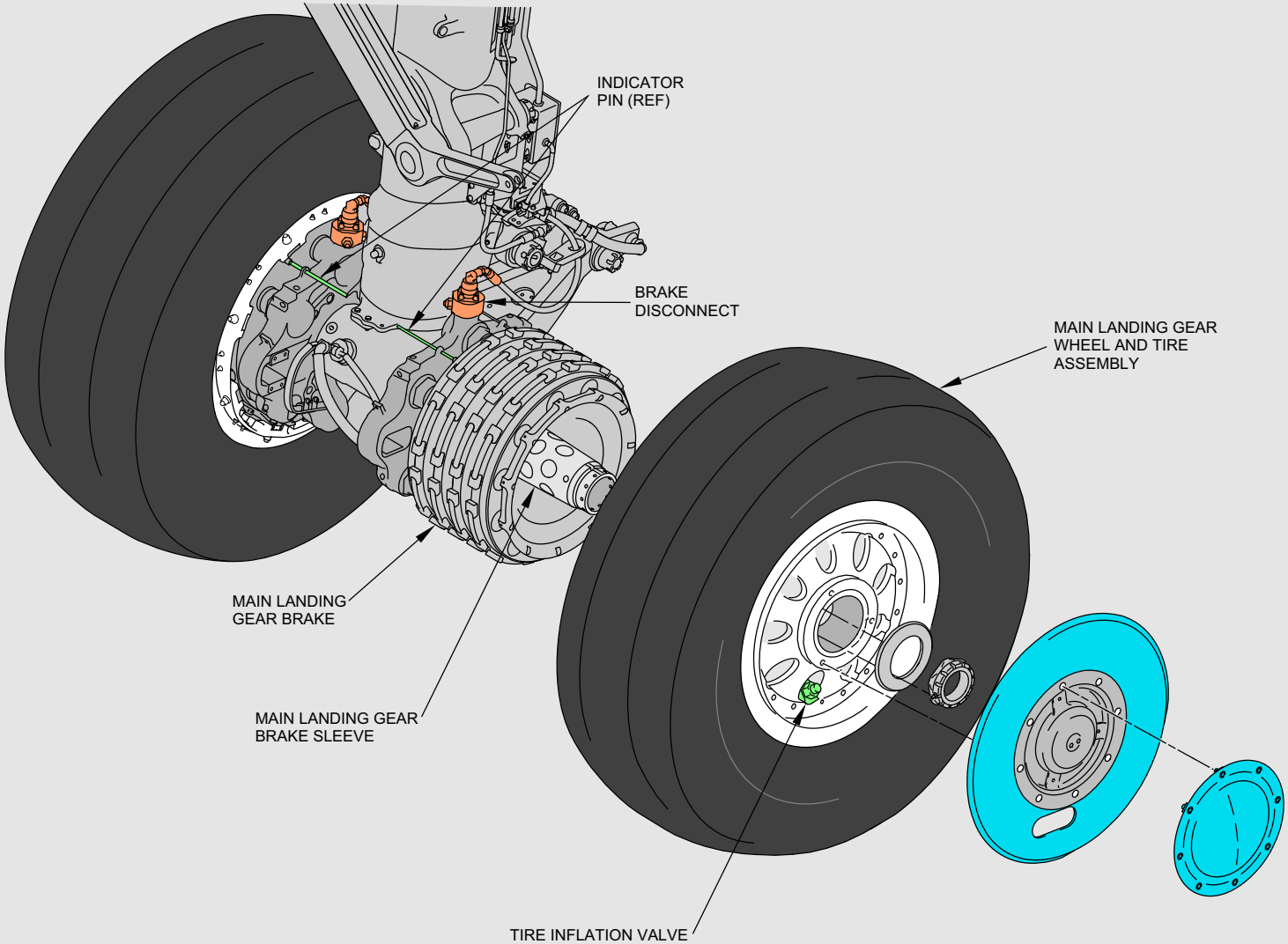

737-MAX_3207_0001_V1

MAIN LANDING GEAR WHEELS AND TIRES (32-41/45)

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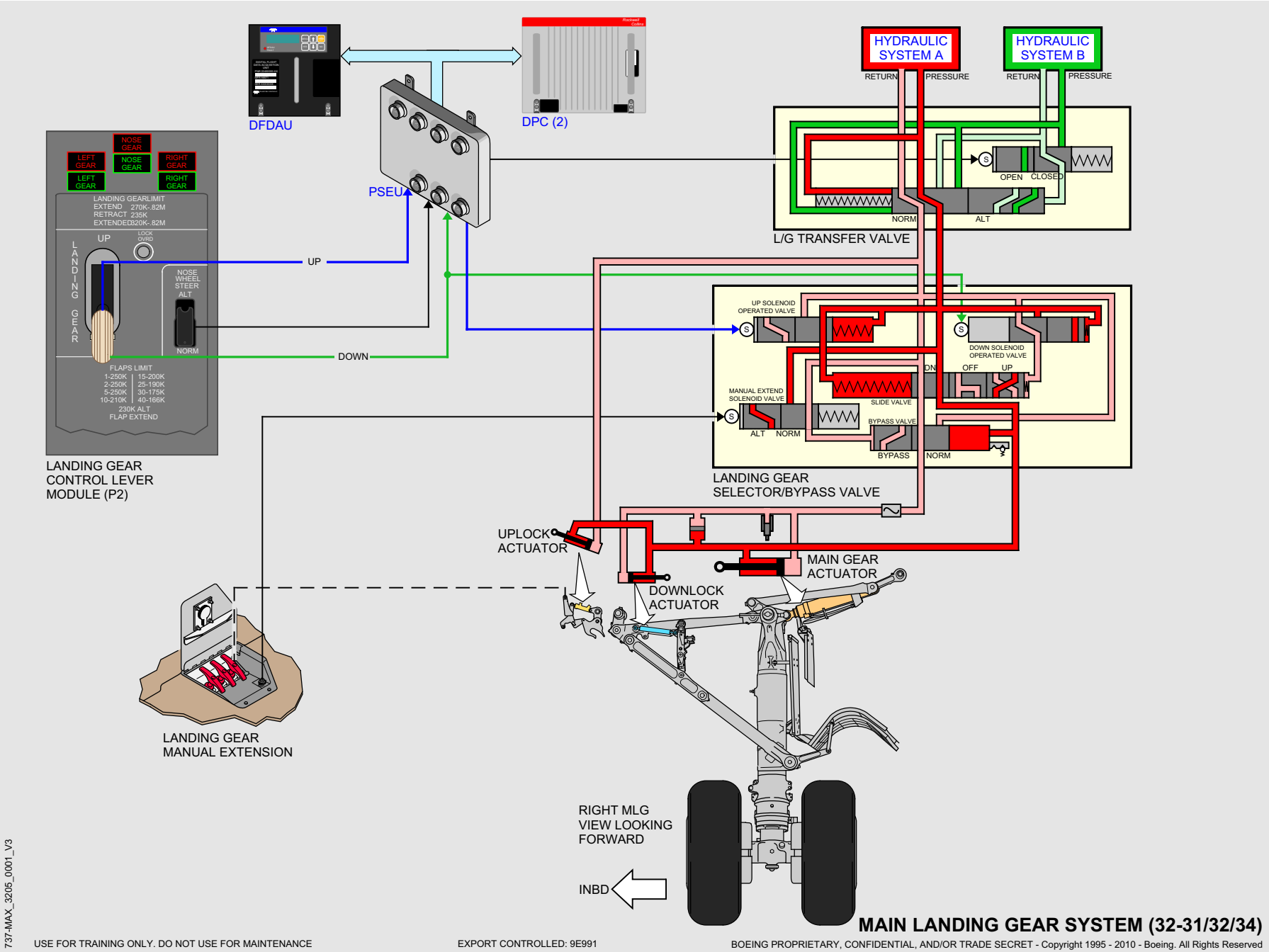

MAIN LANDING GEAR SYSTEM (32-31/32/34)

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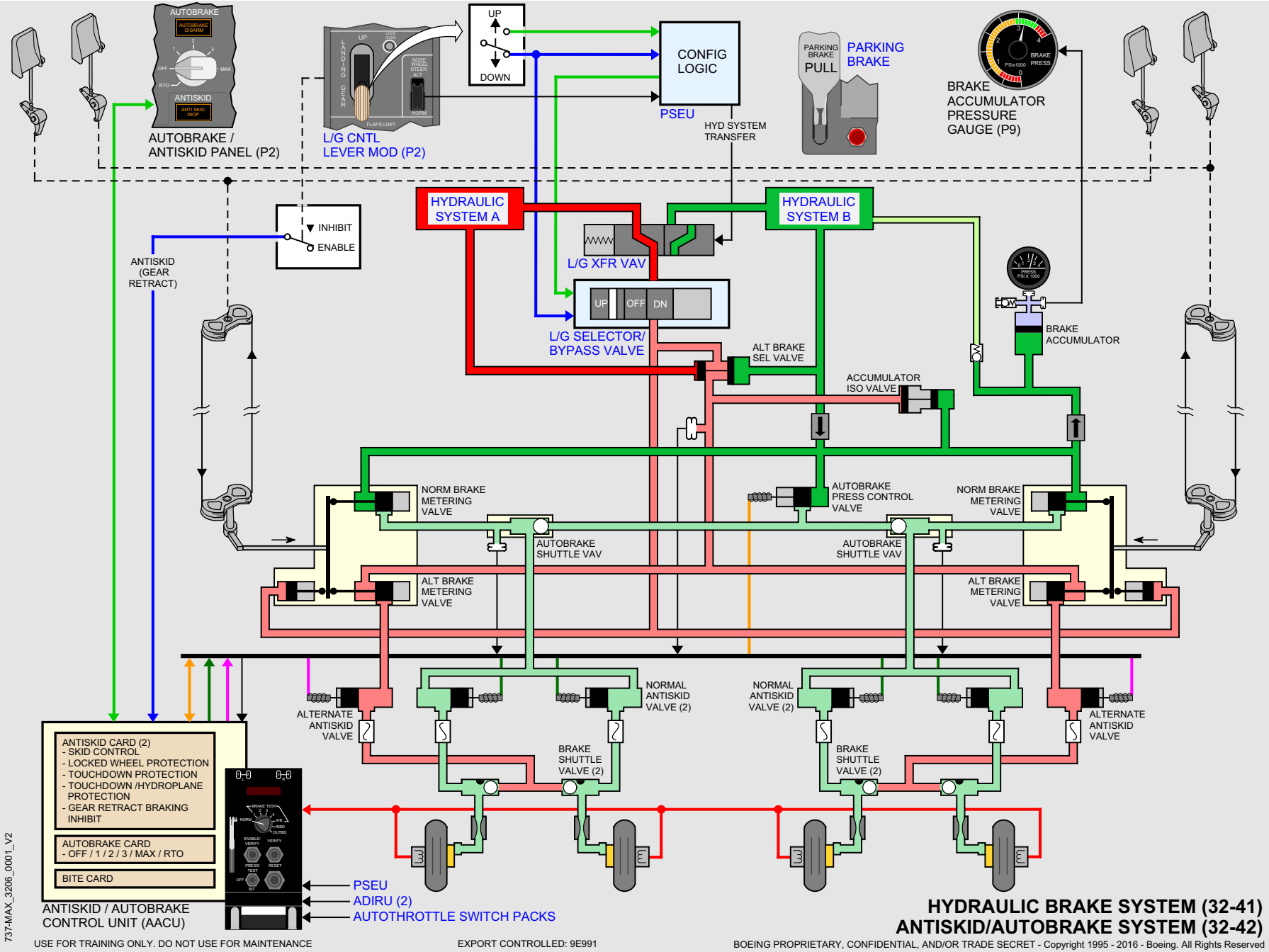

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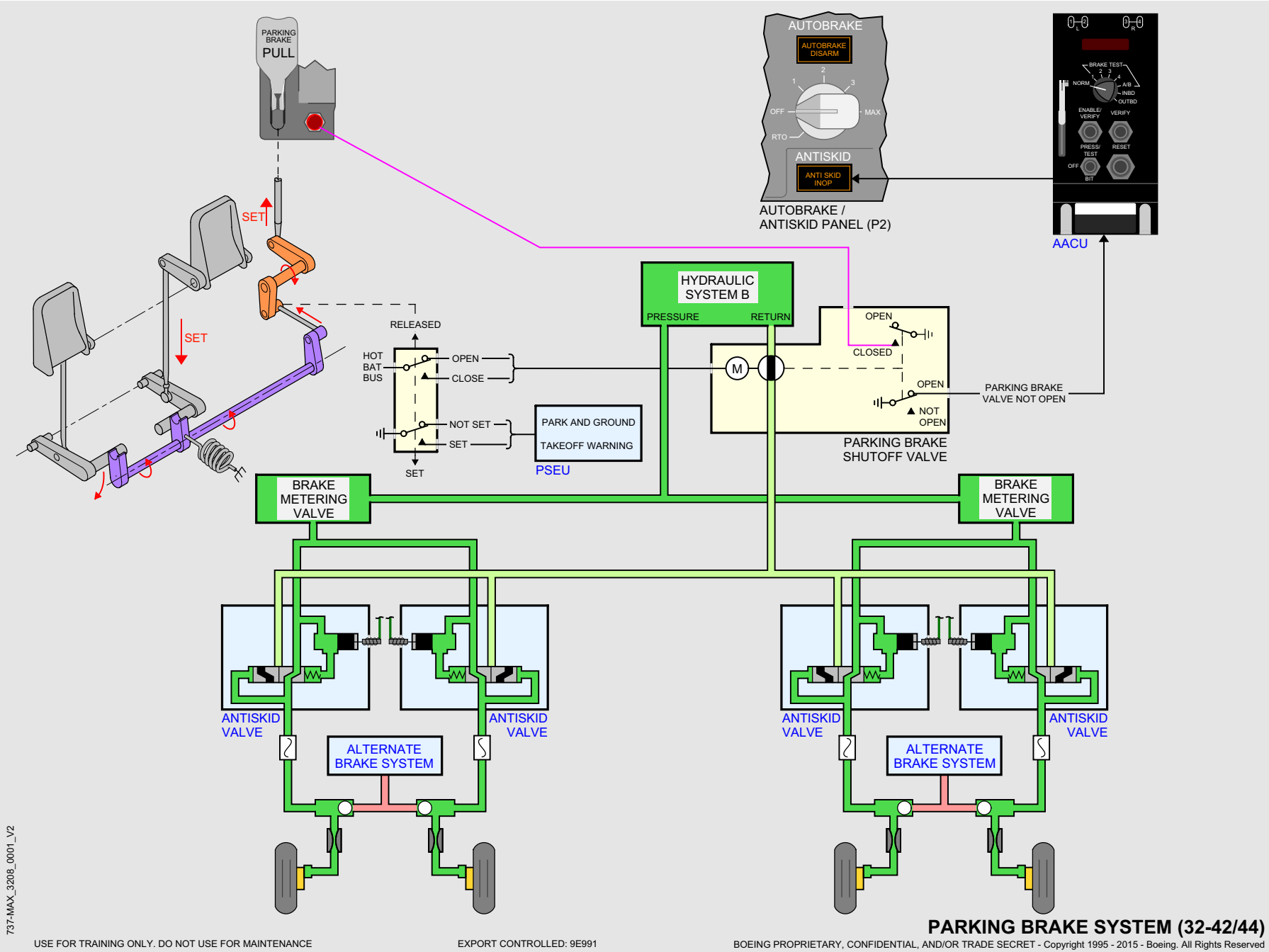

PARKING BRAKE SYSTEM (32-42/44)

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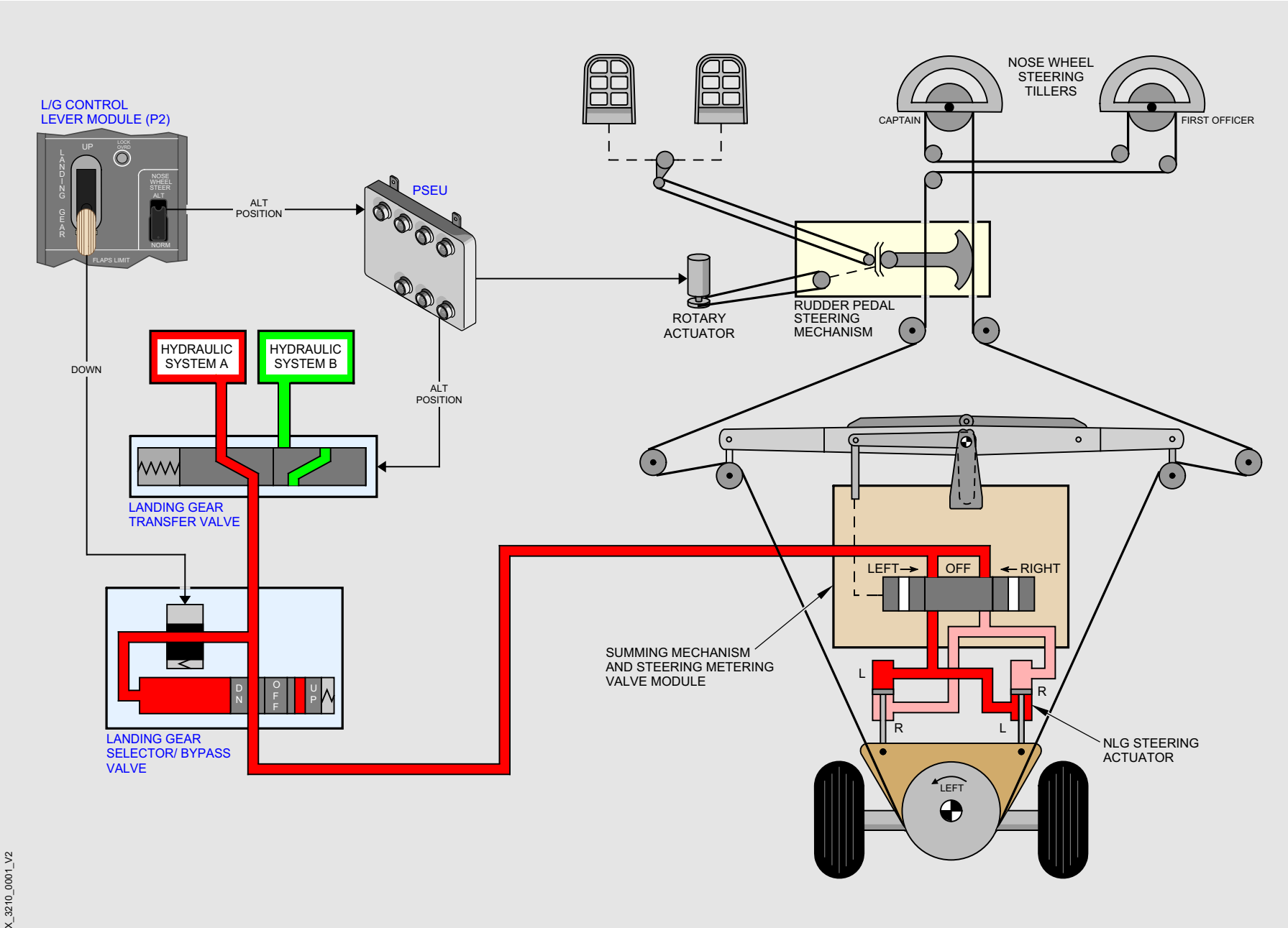

737-MAX_3210_0001_V2

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NOSE WHEEL STEERING SYSTEM (32-51)

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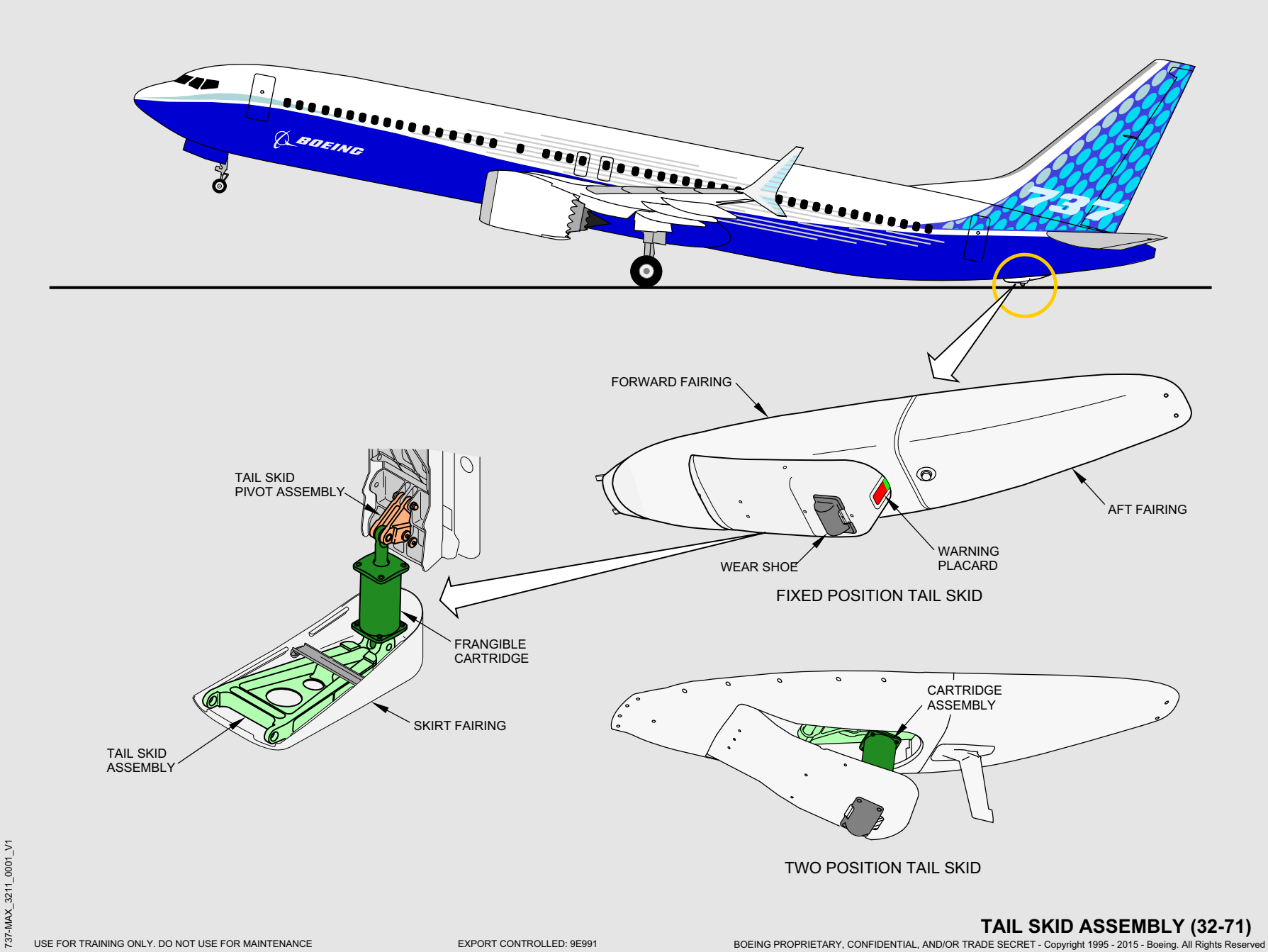

TAIL SKID ASSEMBLY (32-71)

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ATA 33

Lights

Lights (ATA 33)

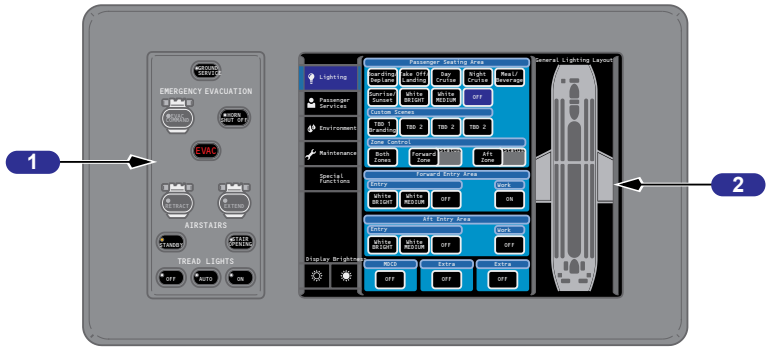
Forward Attendant Control Panel

1 Pushbutton Panel Controls

This is a typical grouping of pushbutton cabin controls.

2 Touch Screen

Touch screen controls various functions such as Lighting, Passenger Services, Environment, Maintenance and Special Functions. A typical Lighting menu is depicted.



FWD ATTENDANT CONTROL PANEL

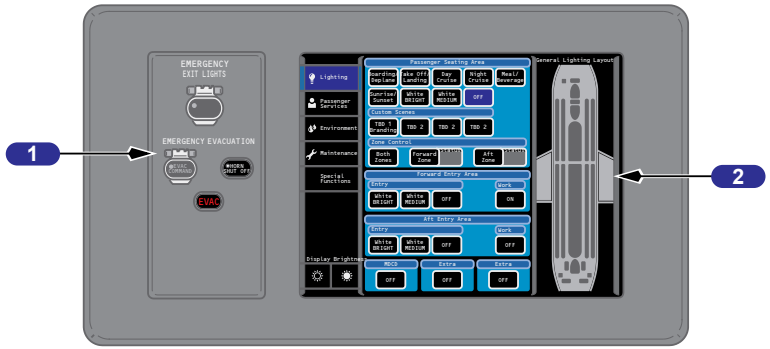
Aft Attendant Control Panel

1 Pushbutton Panel Controls

This is a typical grouping of pushbutton cabin controls.

2 Touch Screen

Touch screen controls various functions such as Lighting, Passenger Services, Environment, Maintenance and Special Functions. A typical Lighting menu is depicted.



AFT ATTENDANT CONTROL PANEL

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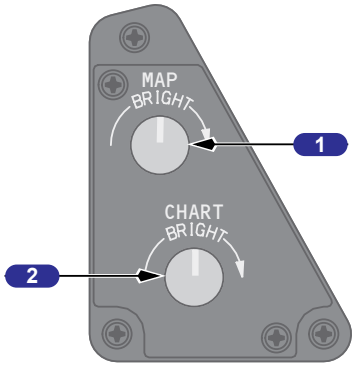
Map and Chart Light Controls

1 MAP Light Control

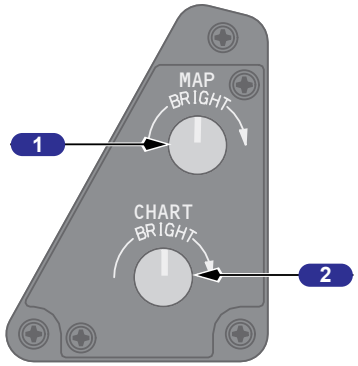
Rotate – adjusts brightness of Captain/First Officer map lights

2 CHART Light Control

Rotate – adjusts brightness of Captain/First Officer chart lights



CAPT MAP LIGHT PANEL (P21)



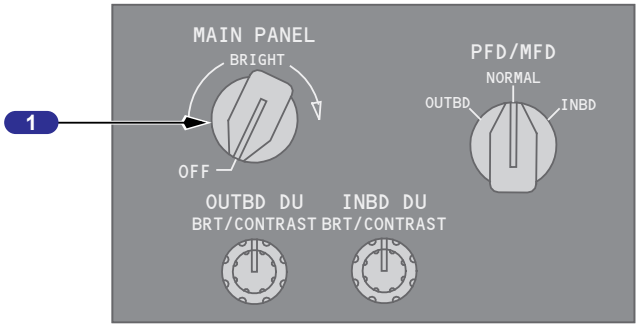
F/O MAP LIGHT PANEL (P23)

Main Panel Lighting

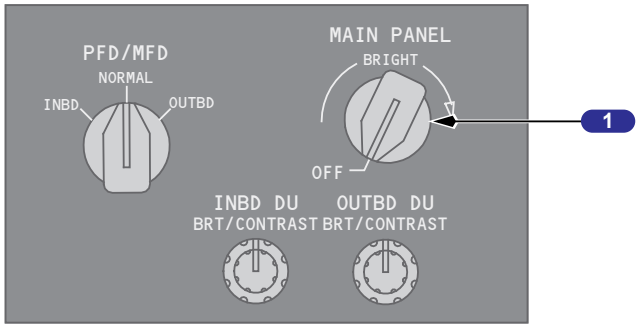
1 MAIN PANEL Light Control

Rotate –

- Captain – controls brightness of Captains panel and instrument lighting, center instrument panel, and AFDS panel displays and edge lighting
- First Officer – controls brightness of First Officers panel and instrument lighting.



CAPT INSTRUMENT PANEL (P1)



F/O INSTRUMENT PANEL (P3)

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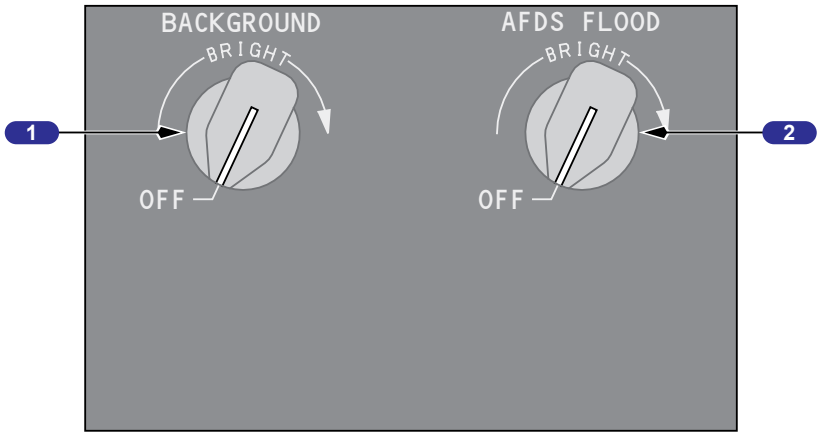
Background and AFDS Flood Light Control

1 BACKGROUND Light Control

Rotate – controls incandescent lighting brightness for Captain's panel, First Officer's panel, and center panel.

2 Autopilot Flight Director System (AFDS) FLOOD Light Control

Rotate – controls brightness of lighting directed at AFDS panel.



CAPT INSTRUMENT PANEL (P1)

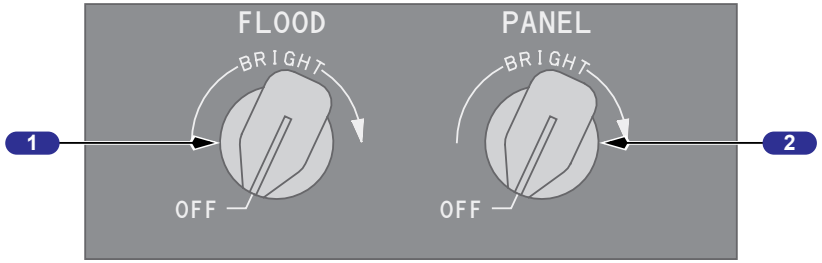
Flood and Aft Electronics Lights Controls

1 FLOOD Light Control

Rotate – controls overhead spotlight brightness directed at thrust lever quadrant.

2 PANEL Light Control

Rotate – controls forward and aft electronic control panel lights brightness.



AFT ELECTRONIC PANEL (P8)

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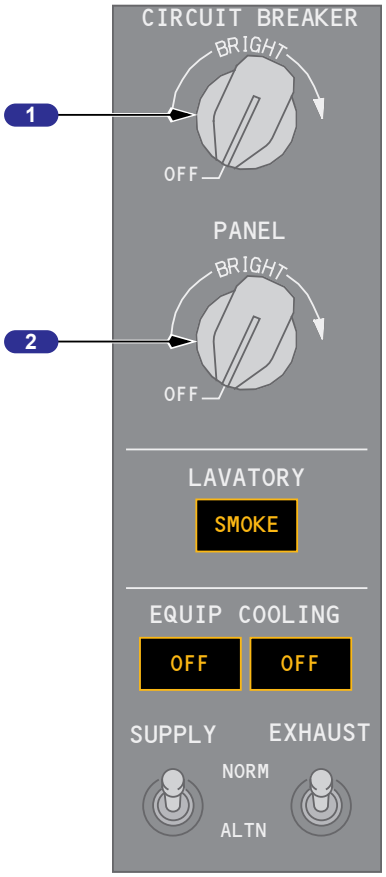
Overhead/Circuit Breaker Panel Light Controls

1 CIRCUIT BREAKER Light Control

Rotate – controls P–6 and P–18 circuit breaker panel lights brightness.

2 PANEL Light Control

Rotate – controls forward and aft overhead panel lights brightness.



FWD OVERHEAD PANEL (P5)

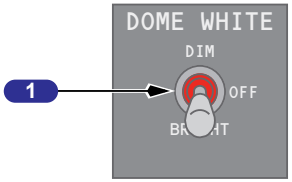
Dome Light Control

1 DOME LIGHT Switch

DIM – sets overhead dome lights to low brightness.

OFF – overhead dome lights are extinguished.

BRIGHT – sets overhead dome lights to full brightness.



AFT OVERHEAD PANEL (P5)

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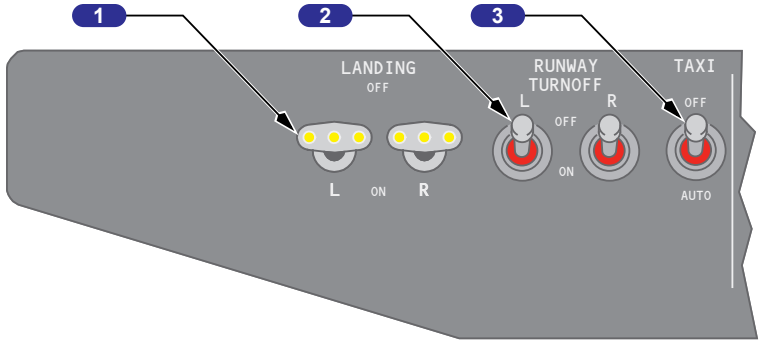
Landing, Runway Turnoff and Taxi Lights



FWD OVERHEAD PANEL (P5)

1 FIXED LANDING Light Switches

OFF – fixed landing lights are extinguished.

ON – fixed landing lights are illuminated.

2 RUNWAY TURNOFF Light Switches

OFF – runway turnoff lights located in leading edge of wing root are extinguished.

ON – runway turnoff lights are illuminated.

3 TAXI Light Switch

OFF – nose wheel well taxi light extinguished.

AUTO – nose landing gear taxi light automatically extinguishes when the nose landing gear retracts.

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Miscellaneous Exterior Lights

1 LOGO Light Switch

OFF – logo lights on each side of vertical fin extinguished.

ON – logo lights illuminated.

2 POSITION Light Switch

STROBE & STEADY – red and green wing–tip position lights, white trailing edge wing–tip lights and wing–tip and tail strobe lights illuminated.

OFF – red and green wing–tip position lights, white trailing edge wing-tip lights and wing-tip and tail strobe lights extinguished.

STEADY – red and green wing–tip position lights and white trailing edge wing-tip lights illuminated.

3 WHEEL WELL Light Switch

OFF – three wheel well lights extinguished.

ON – wheel well lights illuminated.

4 WING Illumination Switch

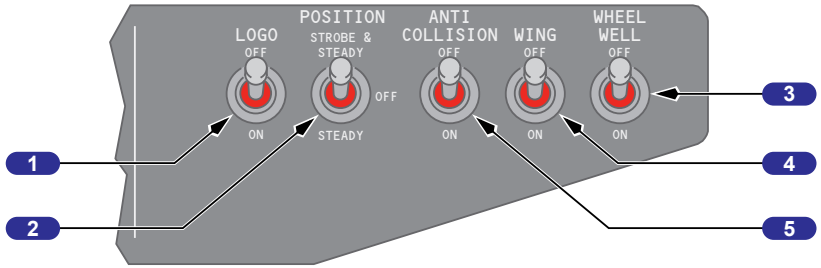
OFF – wing leading edge lights on fuselage forward of wing extinguished.

ON – wing leading edge lights illuminated.

5 ANTI-COLLISION Light Switch

OFF – red strobe/rotating beacon lights on upper and lower fuselage extinguished.

ON – red strobe/rotating beacon lights illuminated.



FWD OVERHEAD PANEL (P5)

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Flight Deck

1 Emergency (EMER) EXIT LIGHTS Switch

OFF – prevents emergency lights system operation if airplane electrical power fails or is turned off.

ARMED – (guarded position) all emergency lights illuminate automatically if airplane electrical power to DC bus No. 1 fails.

ON – all emergency lights illuminate.

2 Emergency (EMER) EXIT LIGHTS NOT ARMED Light

Illuminated (amber) – EMER EXIT LIGHTS switch not in ARMED position.

3 NO SMOKING Switch

OFF – the NO SMOKING signs are not illuminated.

AUTO – the NO SMOKING signs are illuminated or extinguished automatically with reference to airplane configuration.

ON – the NO SMOKING signs are illuminated.

3 NO SMOKING Switch

The No Smoking signs permanently indicate smoking is not allowed.

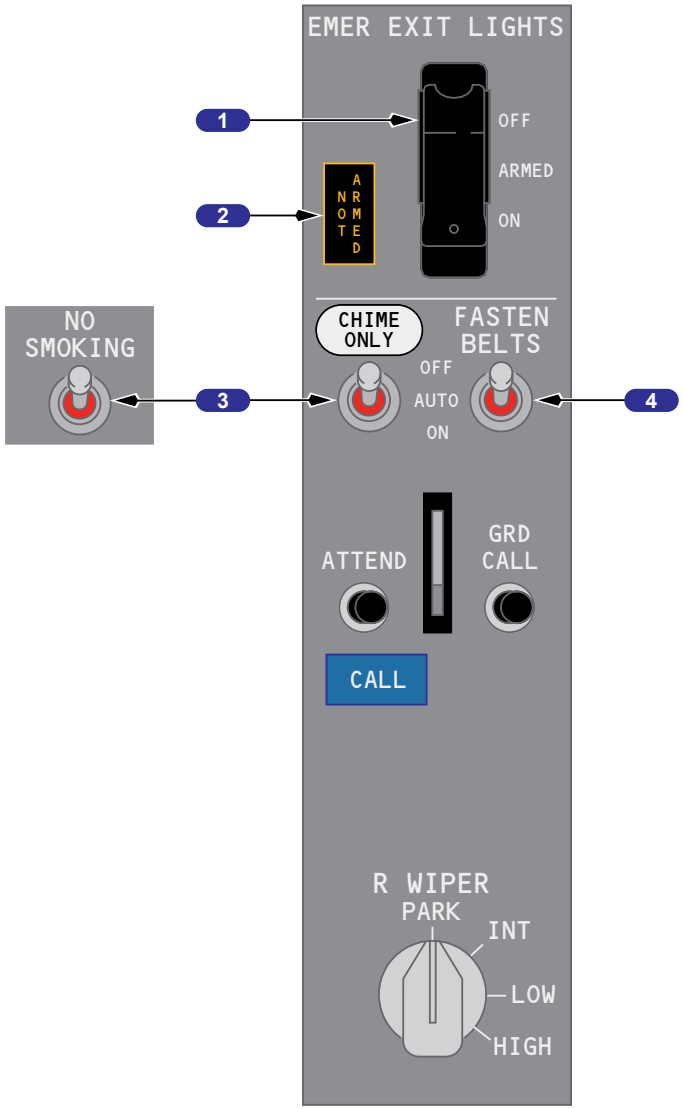
ON - a low chime sounds in the cabin.

4 FASTEN BELTS Switch

OFF – the FASTEN SEAT BELTS and RETURN TO SEAT signs are not illuminated.

AUTO – the FASTEN SEAT BELTS and RETURN TO SEAT signs are illuminated or extinguished automatically with reference to airplane configuration.

ON – the FASTEN SEAT BELTS and RETURN TO SEAT signs are illuminated.



FWD OVERHEAD PANEL (P5)

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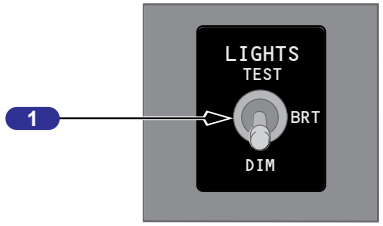
Master Lights Test and Dim Switch

1 Master LIGHTS TEST and DIM SWITCH

TEST – illuminates all system lights on forward and aft overhead panels, aft aisle stand, and some lights on Captain and First Officer instrument panels to full brightness.

BRT (bright) – sets all system lights on forward and aft overhead panels, aft aisle stand, and some lights on Captain and First Officer panels to full brightness.

DIM – sets all system lights on forward and aft overhead panels, aft aisle stand, and some lights on Captain and First Officer panels to low brightness.



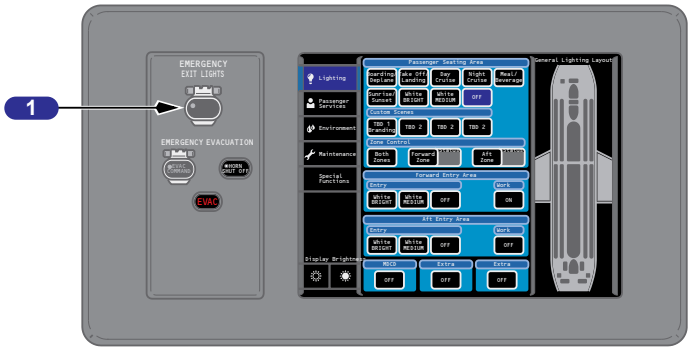
CAPTAINS INSTRUMENT PANEL (P1)

Note: Placing the Master Lights Test and Dim Switch in the TEST position will result in a master caution recall and any stored fault will cause the associated light to remain illuminated when the switch is released.

Passenger Cabin

1 Passenger Cabin Emergency Lights Switch (guarded)

On – illuminates all emergency lights and bypasses flight deck control.



AFT ATTENDANT CONTROL PANEL

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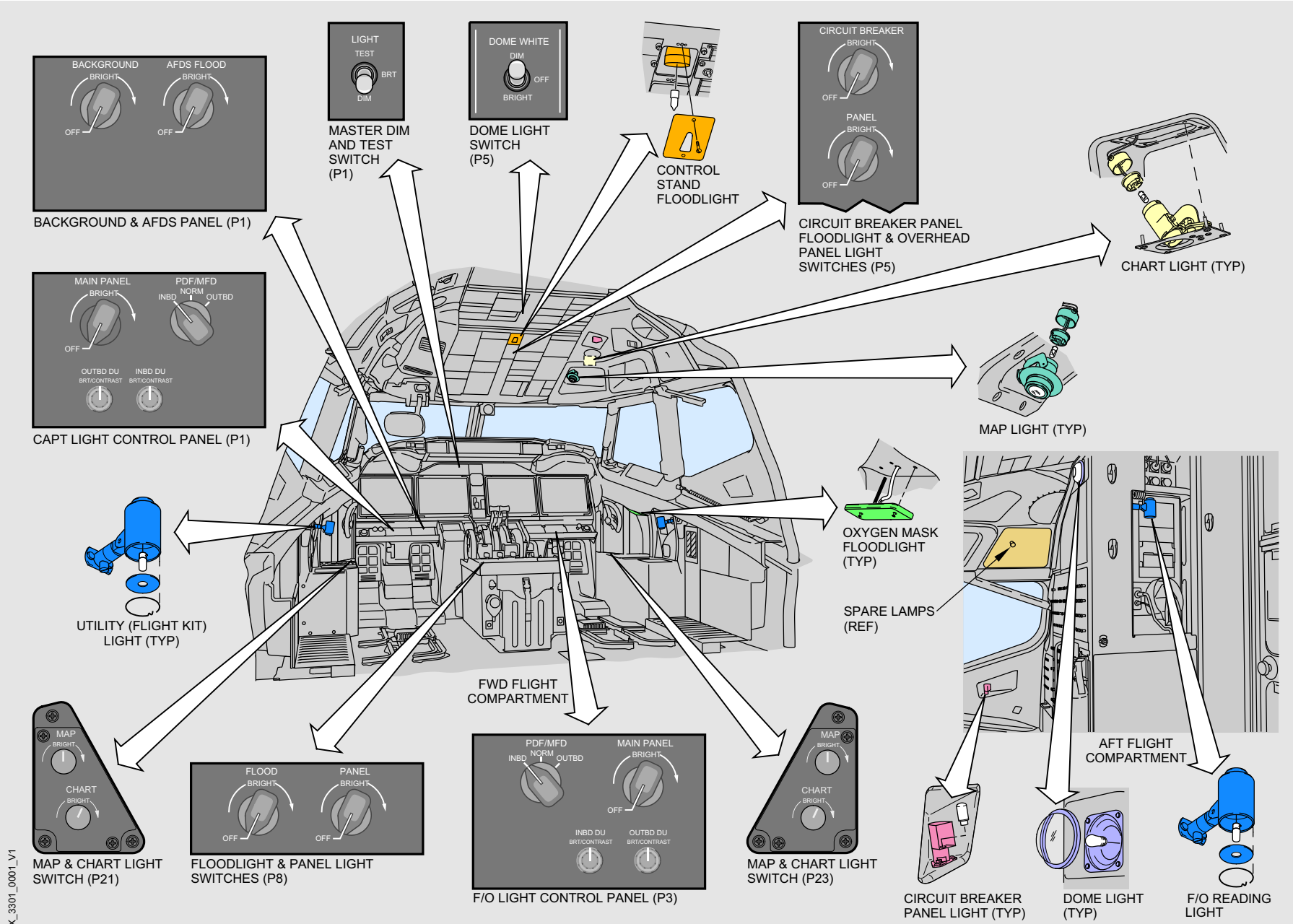

FLIGHT CREW LIGHTS / CONTROLS AND INDICATORS (33-17/18)

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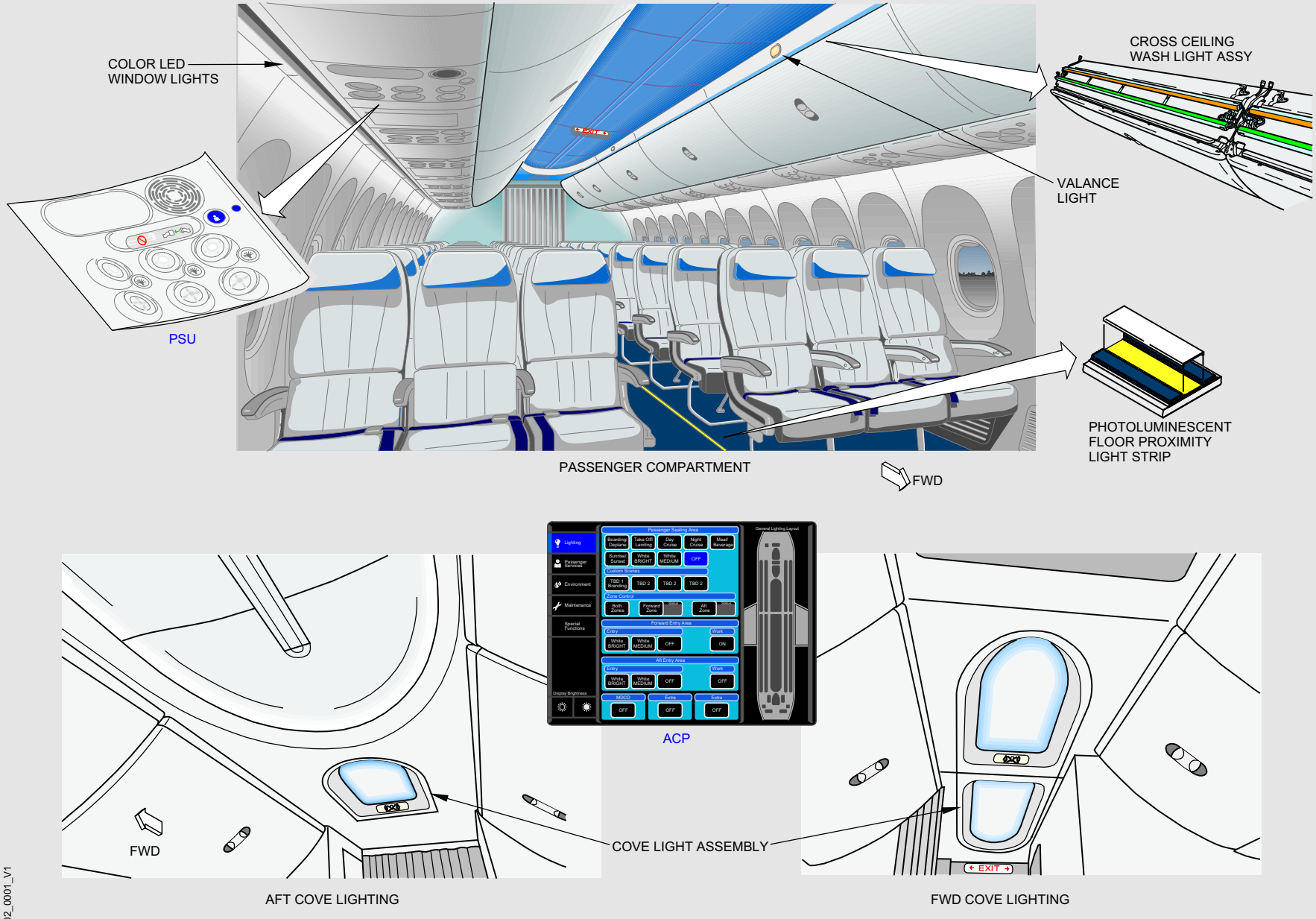

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PASSENGER CABIN LIGHTS (33-22/26/29/51)

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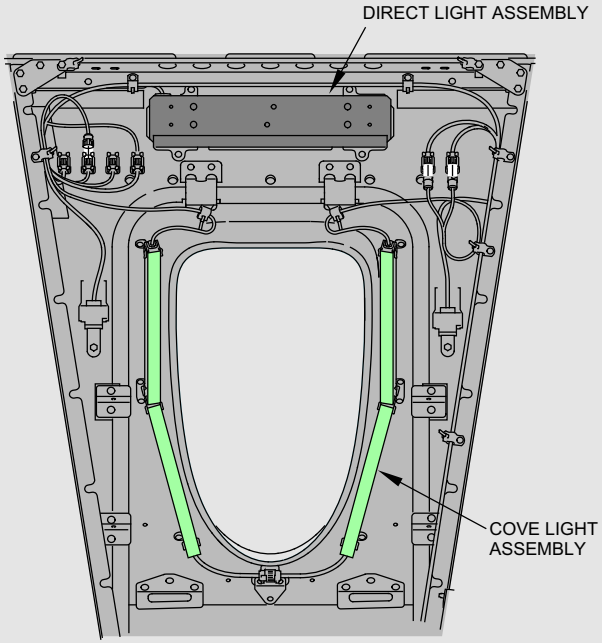
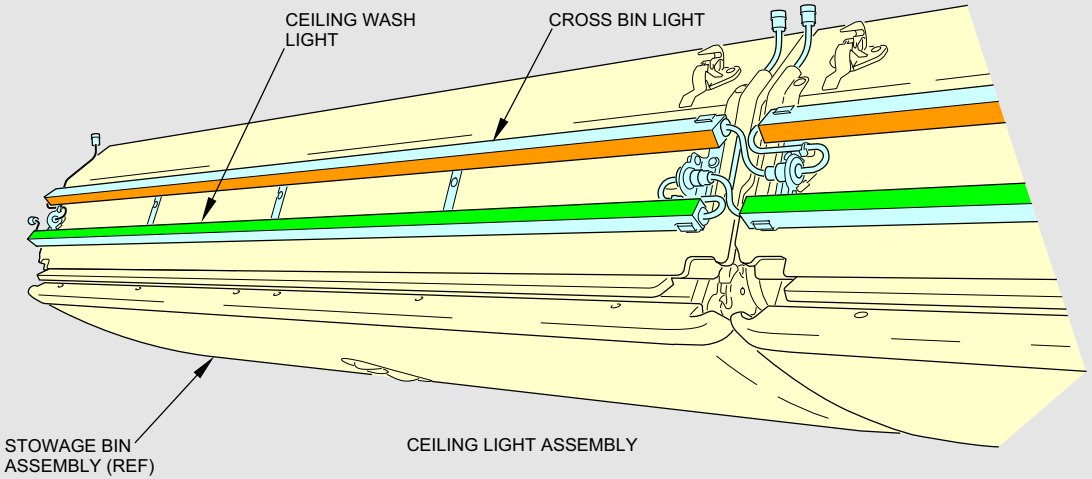
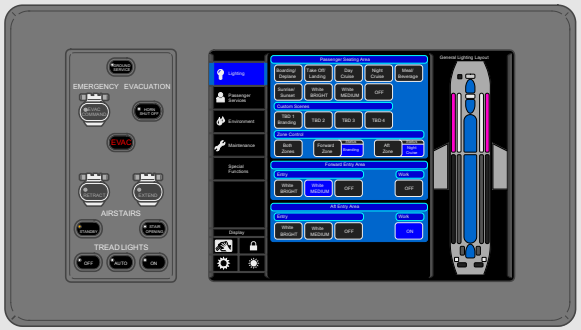


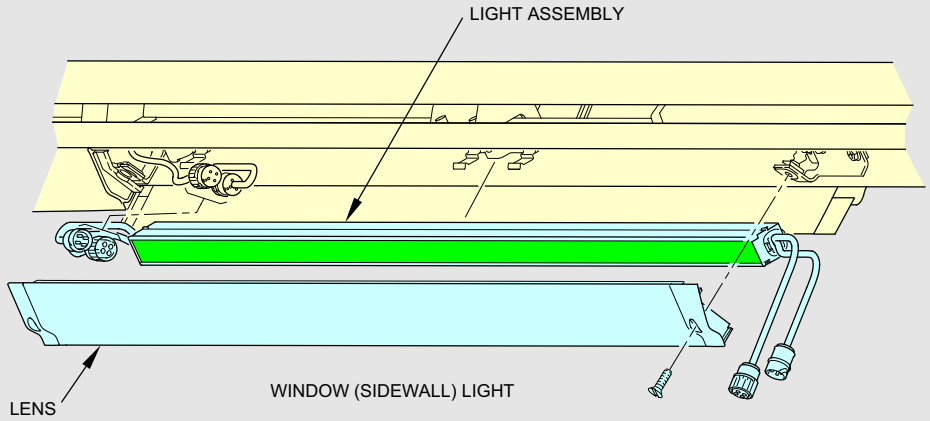
COVE AND DIRECT LIGHTS



CEILING LIGHT ASSEMBLY



ATTENDANT CONTROL PANEL



WINDOW (SIDEWALL) LIGHT

737-MAX_3303_0001_V1

WINDOW LIGHTS / CEILING LIGHTS (33-21/22)

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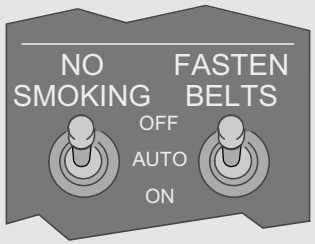
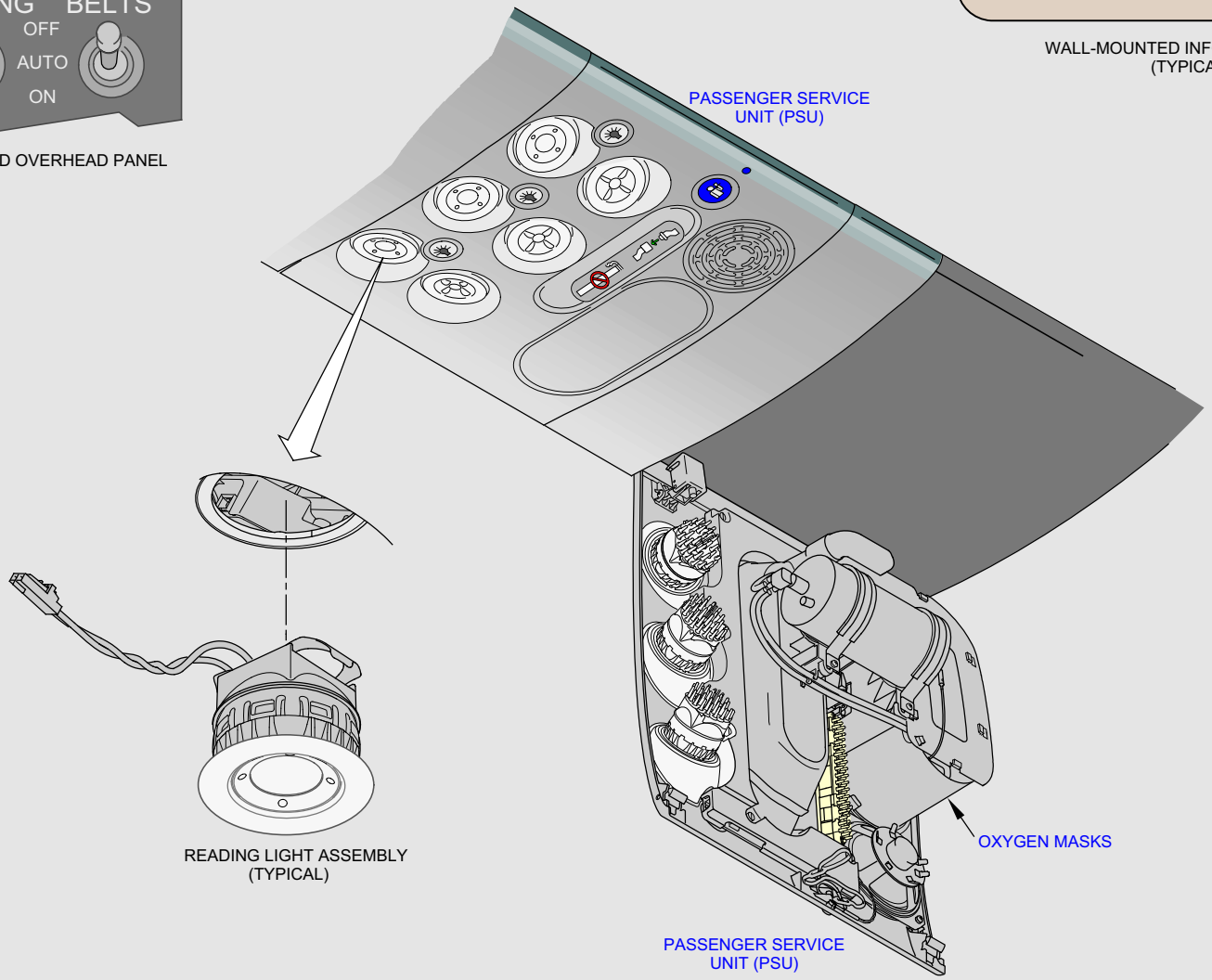


P5 FORWARD OVERHEAD PANEL

WALL-MOUNTED INFORMATION SIGN
(TYPICAL)



737-MAX_3304_0001_V1

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READING LIGHTS / INFORMATION SIGNS (33-23/25/27)

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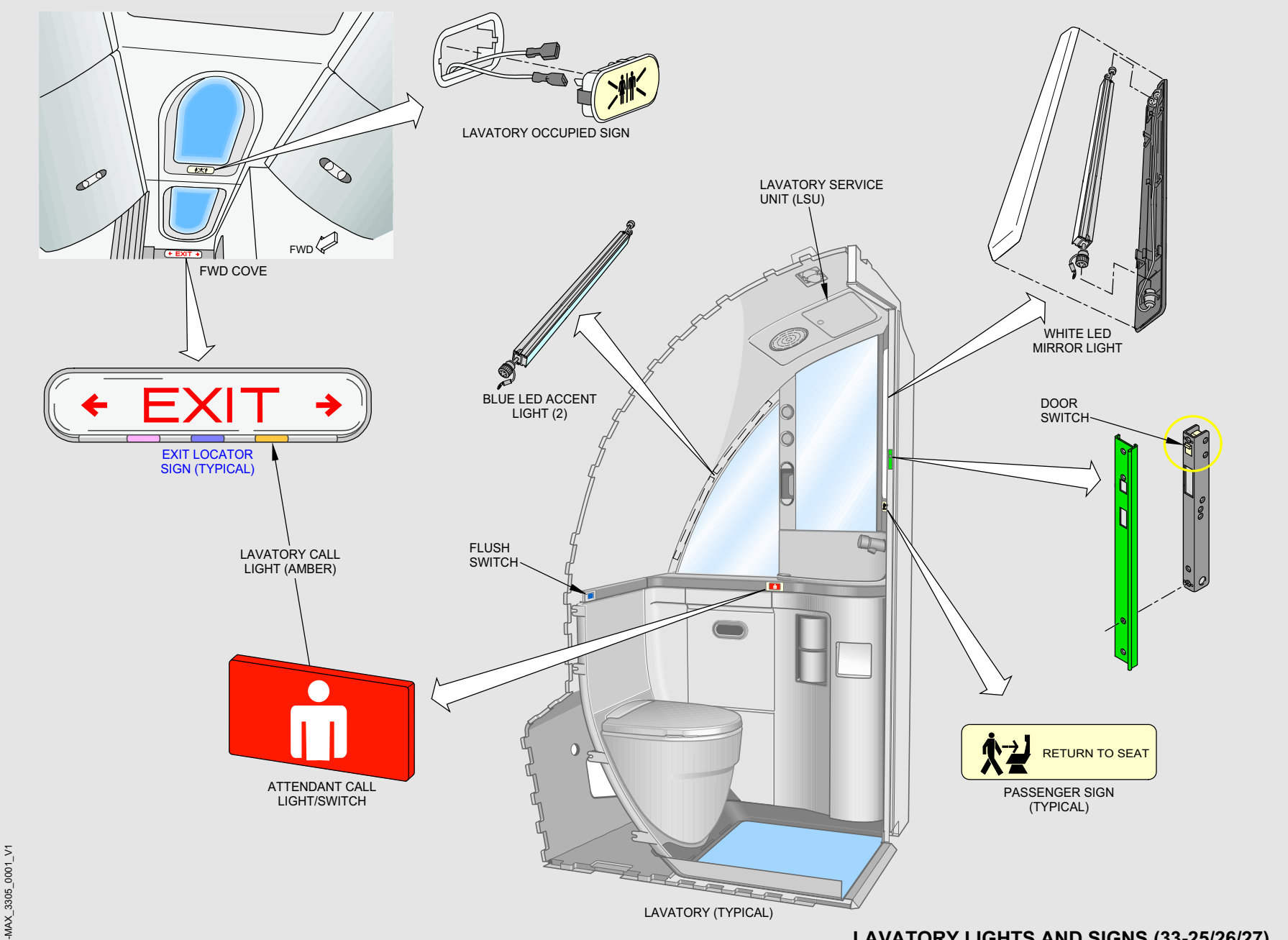

LAVATORY LIGHTS AND SIGNS (33-25/26/27)

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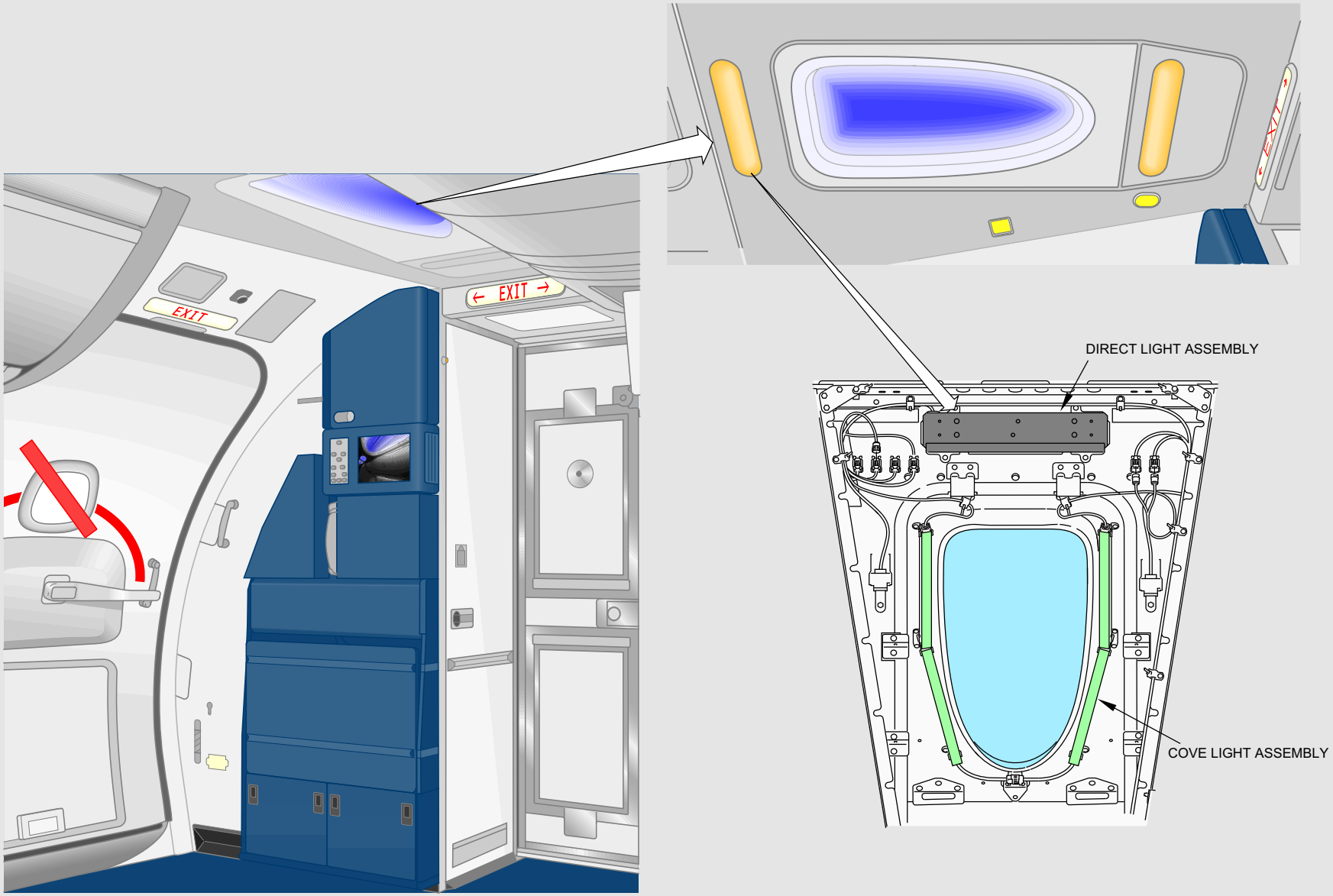

737-MAX_3306_0001_V1

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FWD ENTRY AREA LIGHTS (33-29/51)

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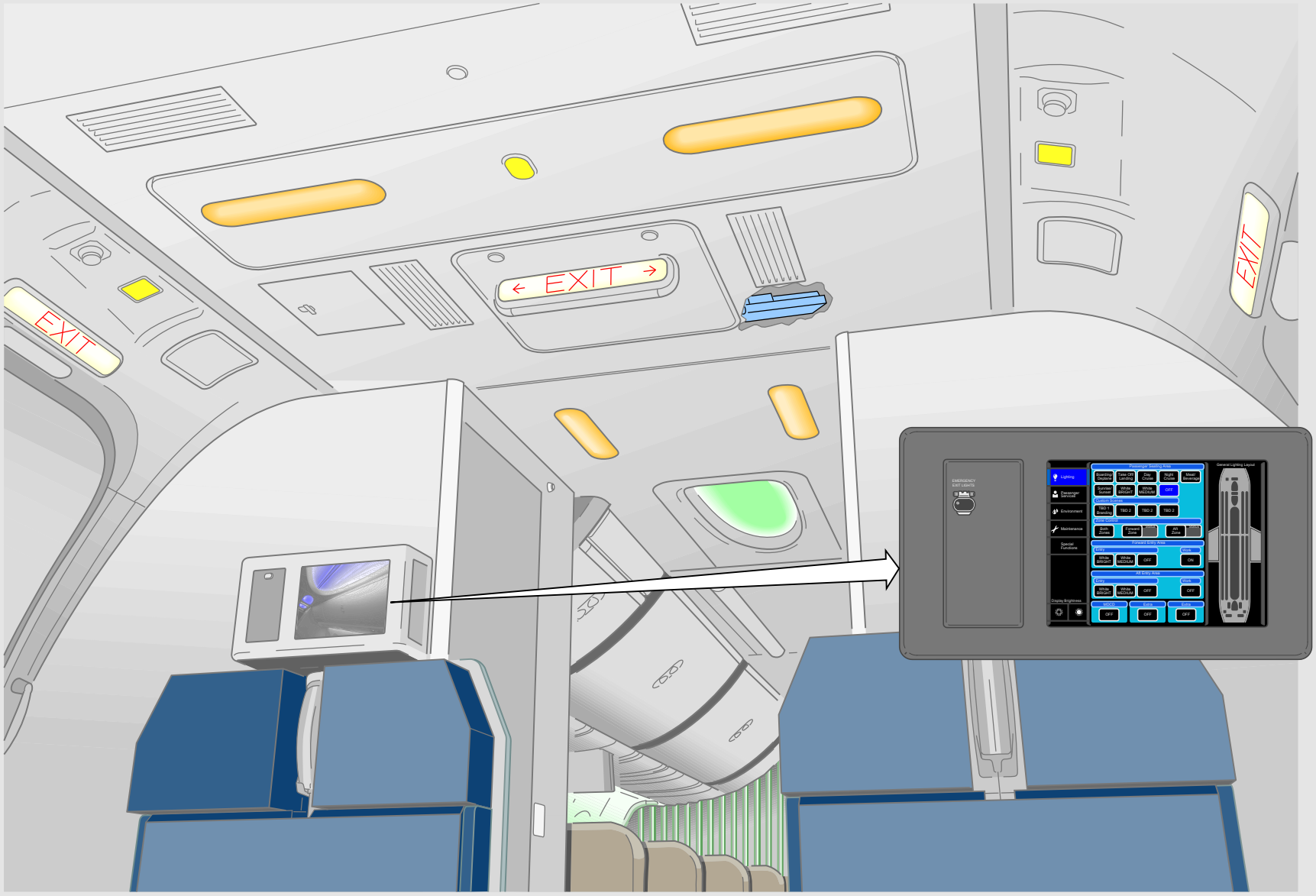

737-MAX_3307_0001_V1

AFT ENTRY AREA LIGHTS (33-29/51)

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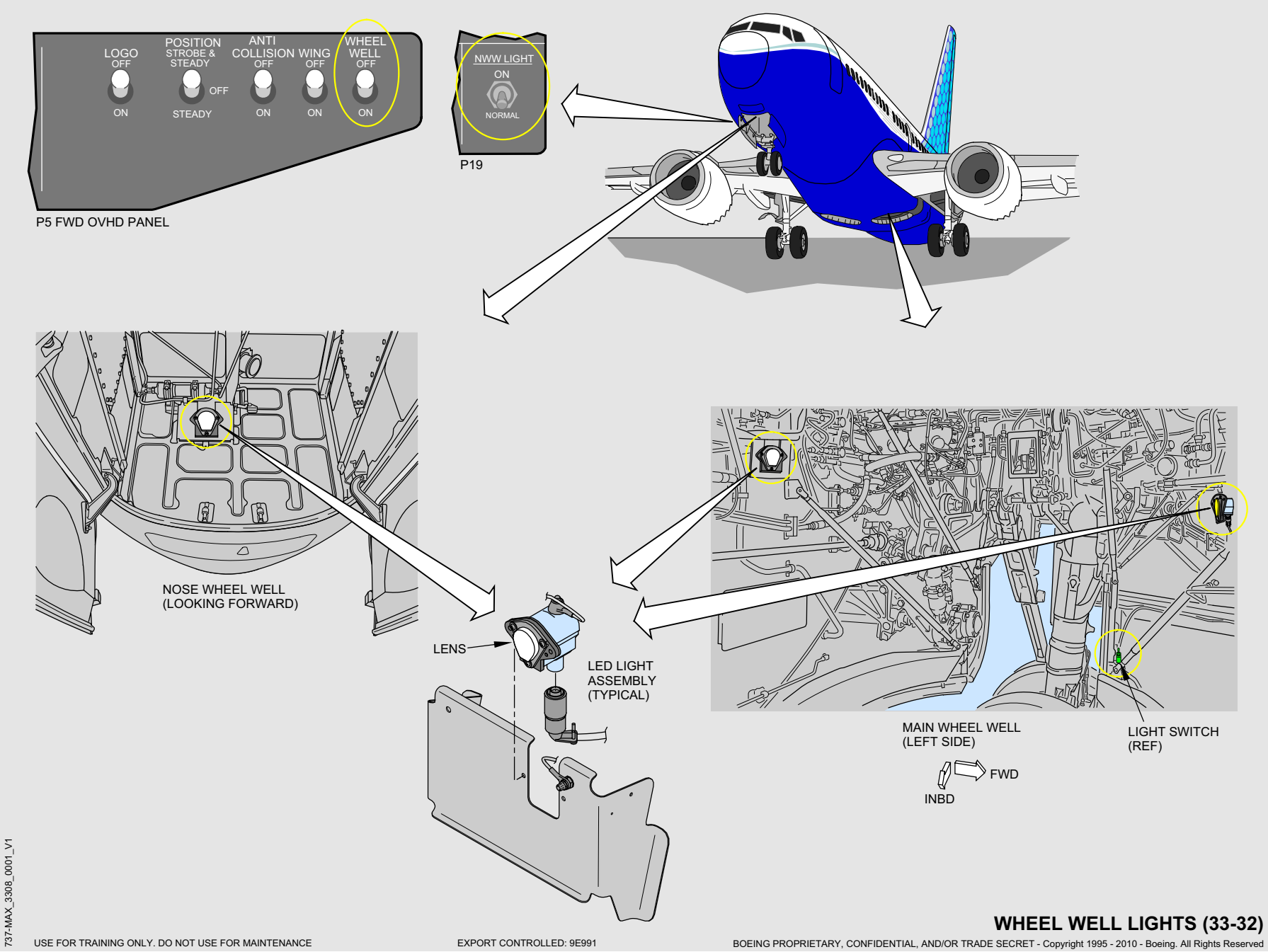

WHEEL WELL LIGHTS (33-32)

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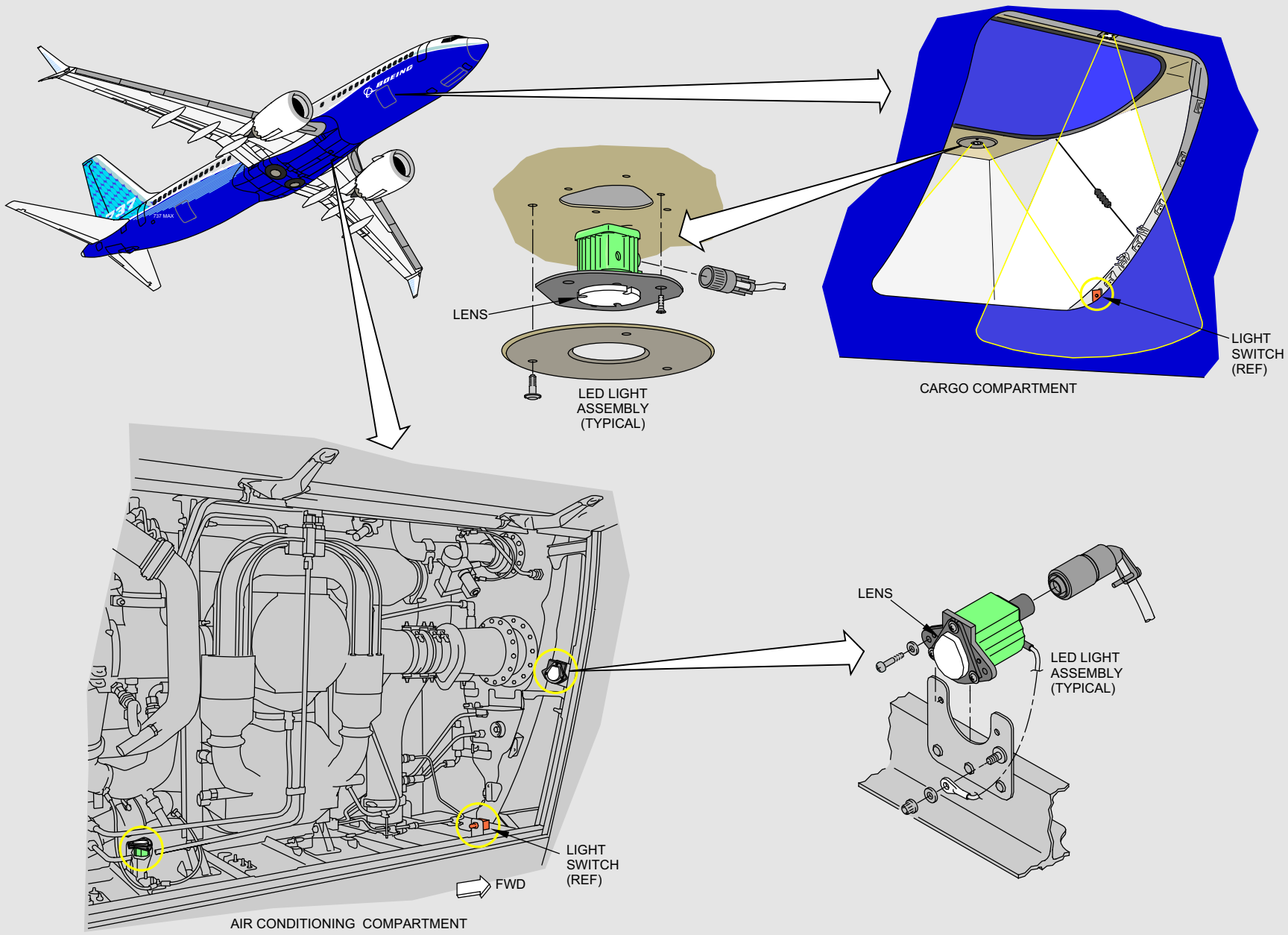

AIR CONDITIONING BAY LIGHTS / CARGO COMPARTMENT LIGHTS (33-33/36)

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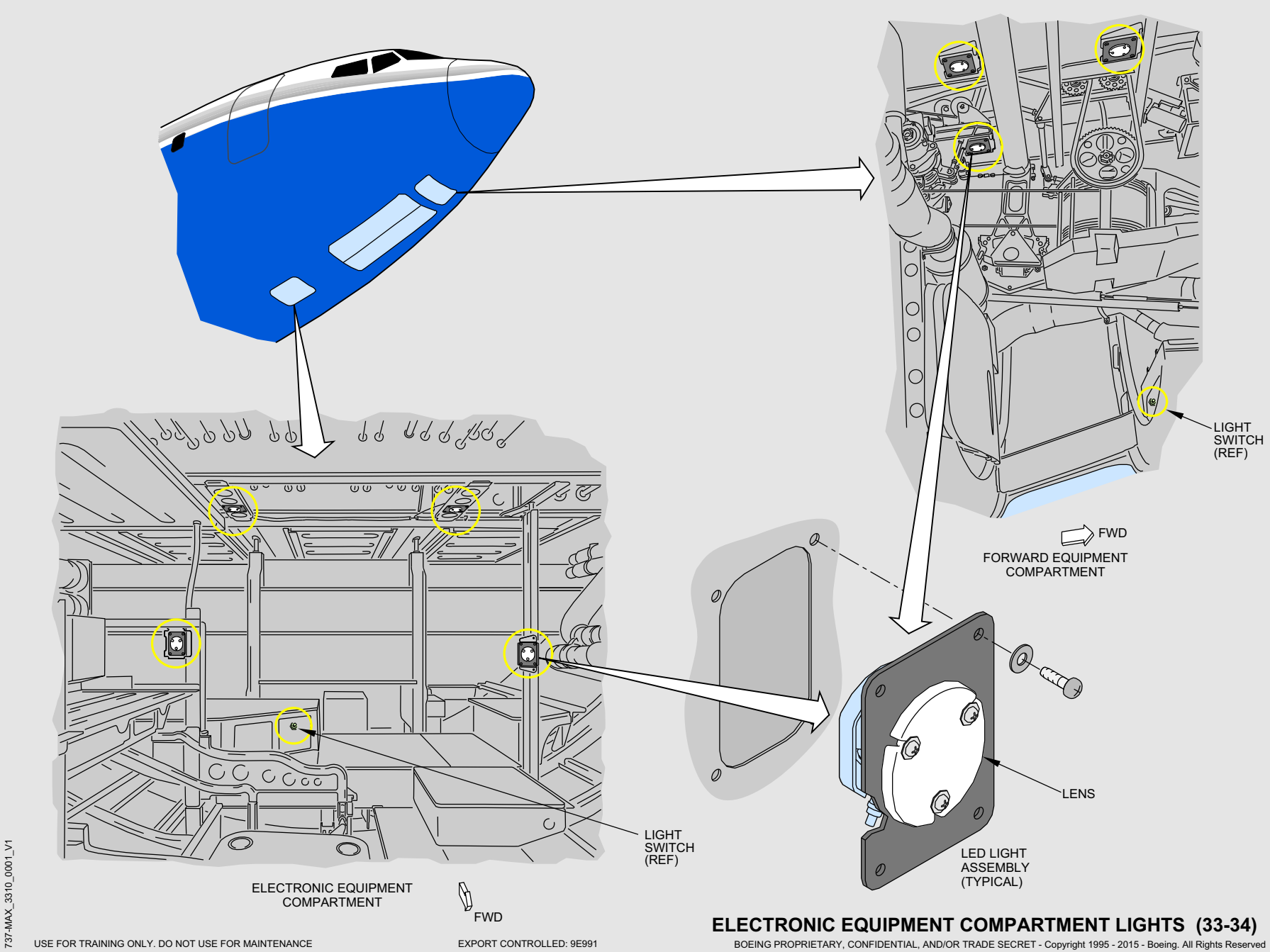

ELECTRONIC EQUIPMENT COMPARTMENT LIGHTS (33-34)

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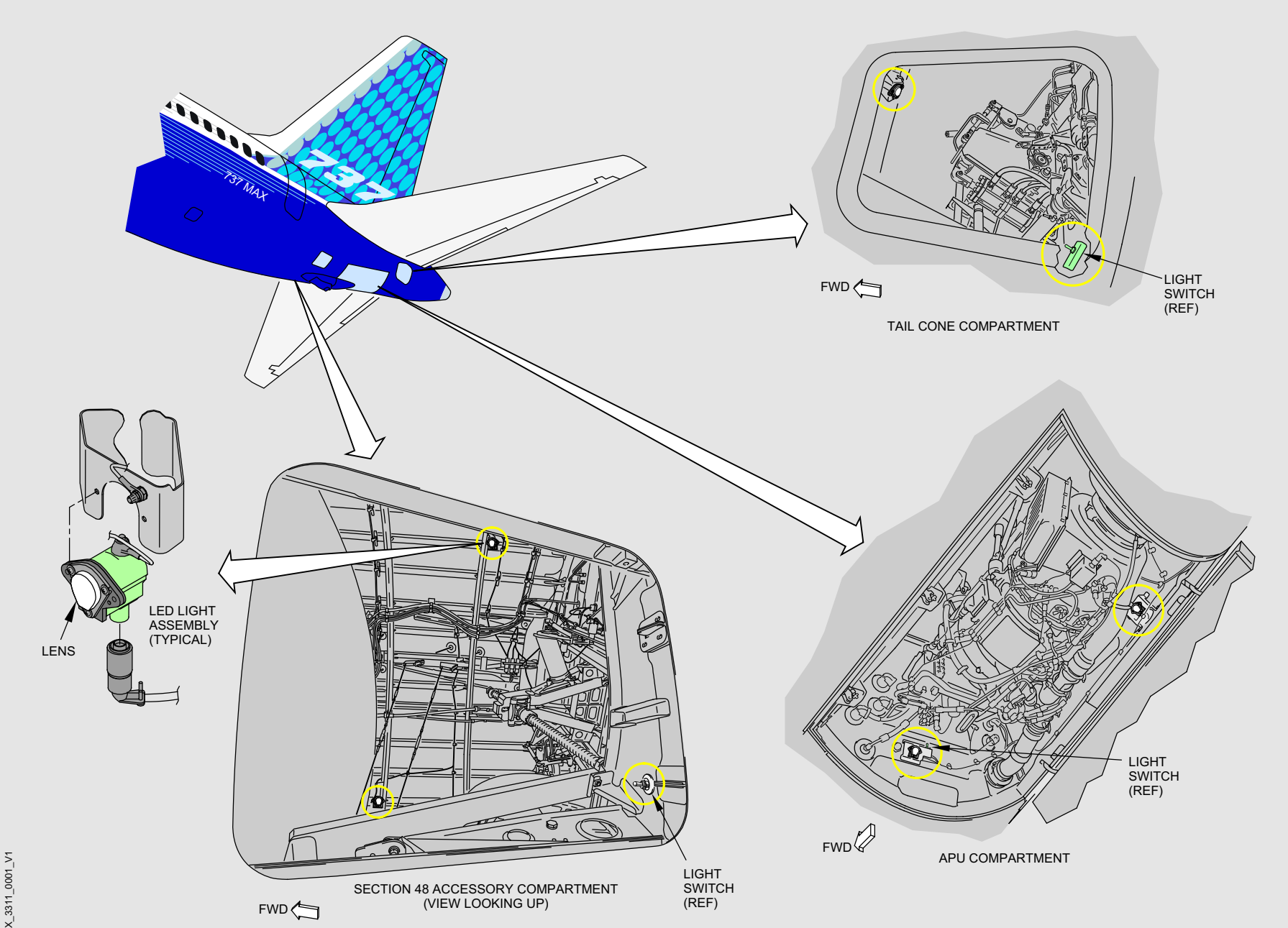

ACCESSORY COMPARTMENT LIGHTS (33-35)

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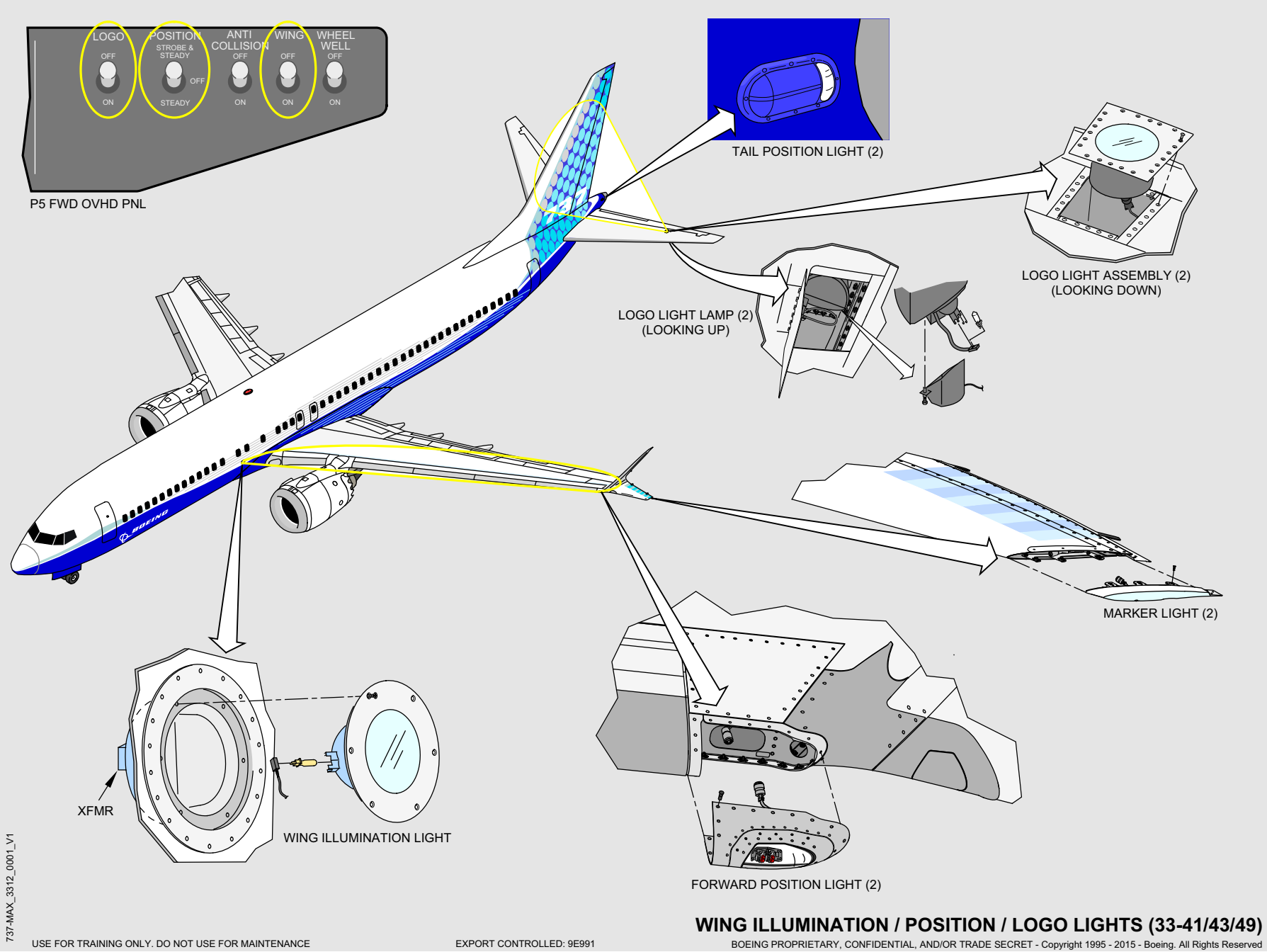

WING ILLUMINATION / POSITION / LOGO LIGHTS (33-41/43/49)

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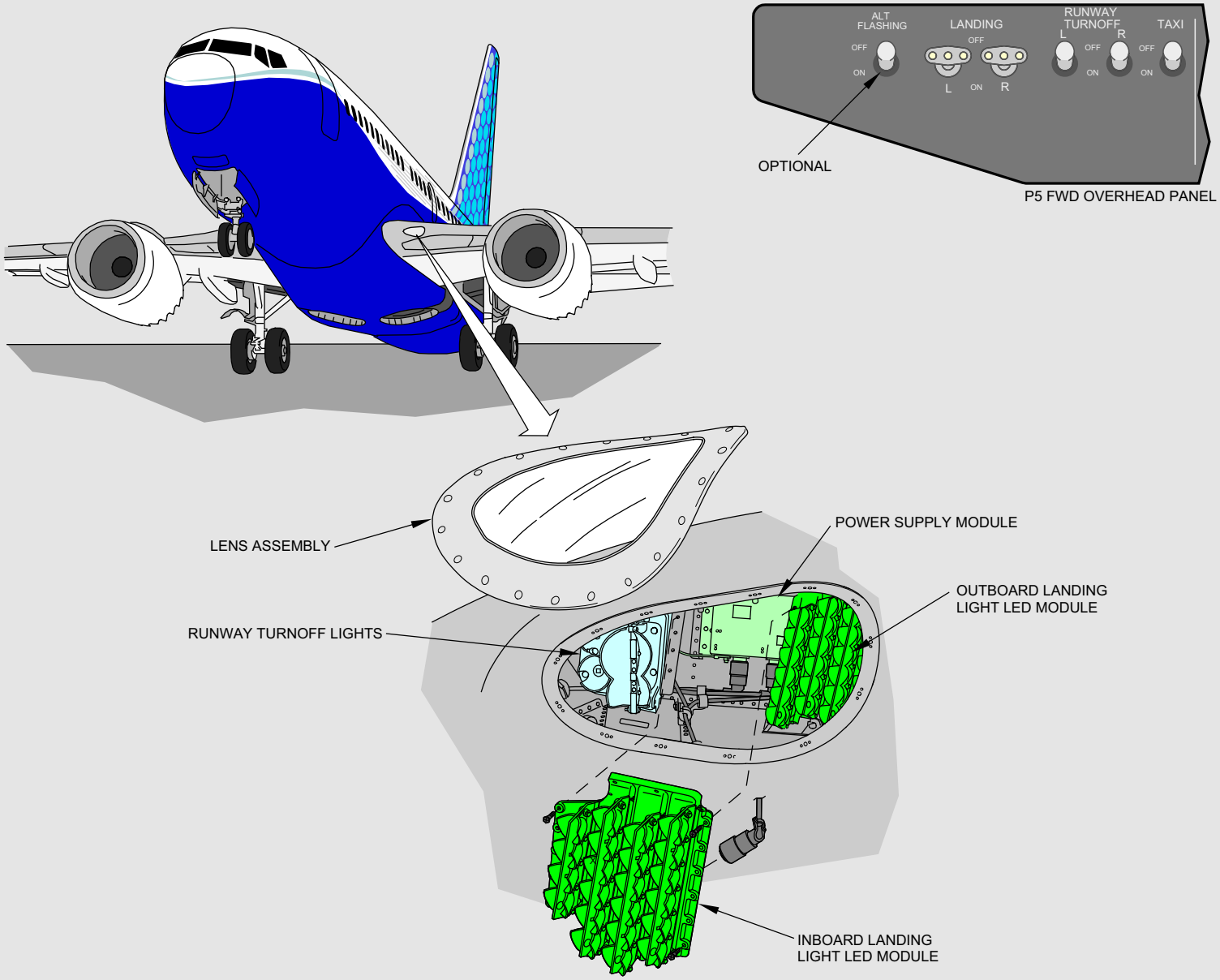

737-MAX_3313_0001_V1

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LANDING / TAXI / RUNWAY TURNOFF LIGHTS (33-42/45)

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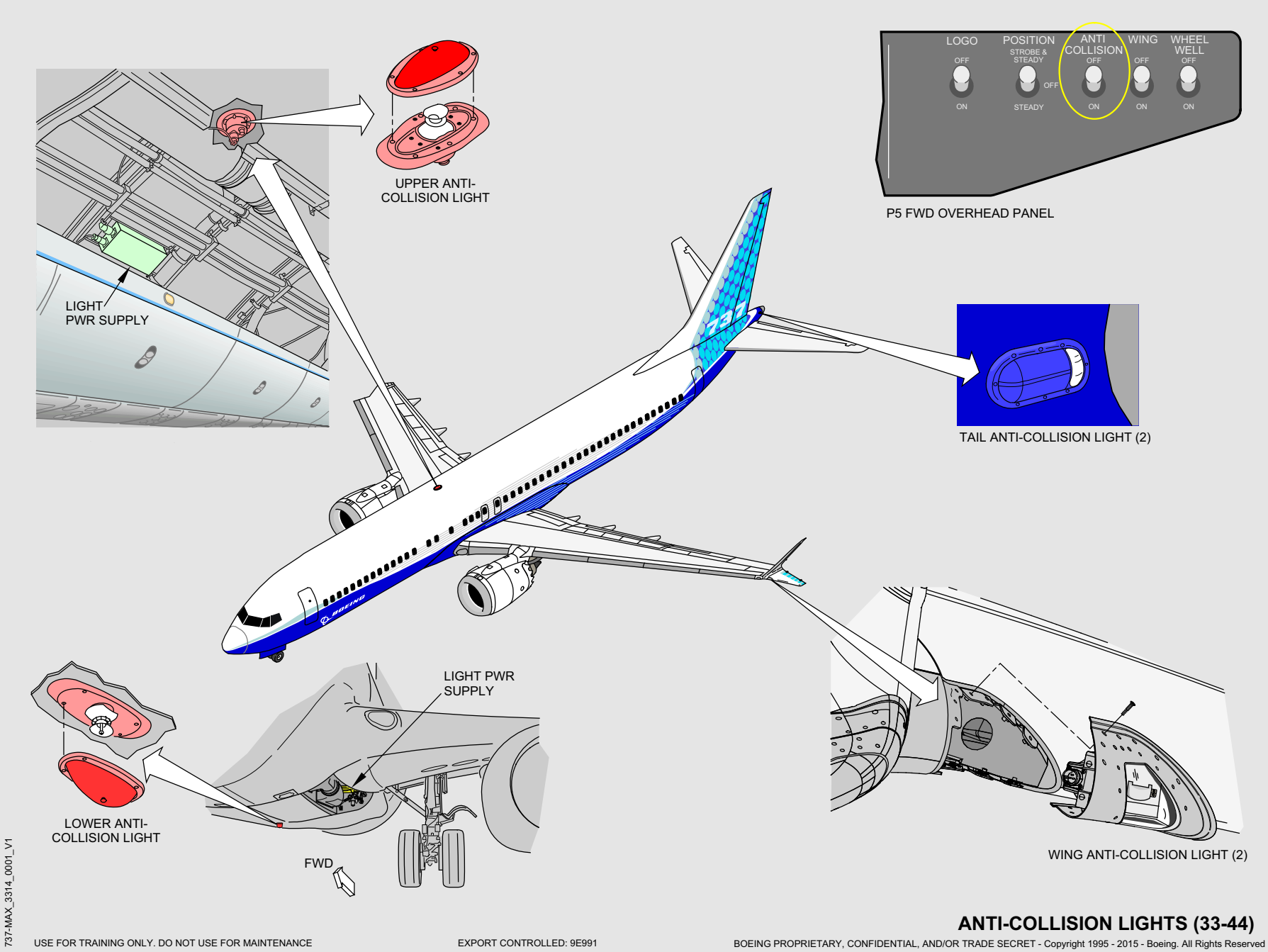

ANTI-COLLISION LIGHTS (33-44)

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EMERGENCY LIGHTS (33-51)

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ATA 34

Navigation

Navigation (ATA 34)

Control Display Unit (CDU)

1 Control Display Unit (CDU) Display

Shows FMS data pages.

2 Line Select Keys

Push –

- moves data from scratchpad to selected line
- moves data from selected line to scratchpad
- selects page, procedure, or performance mode as applicable
- deletes data from selected line when DELETE is shown in scratchpad.

3 Brightness (BRT) Control

Rocker switch (plus or minus) – controls display brightness.

Note: New CDU/MCDU faceplate graphics have been added to depict the updated rocker arm style brightness control switch. Functionality and location of all keys remains the same.

4 Message (MSG) Light

Illuminated (white) – scratchpad message is shown.

5 Offset (OFST) Light

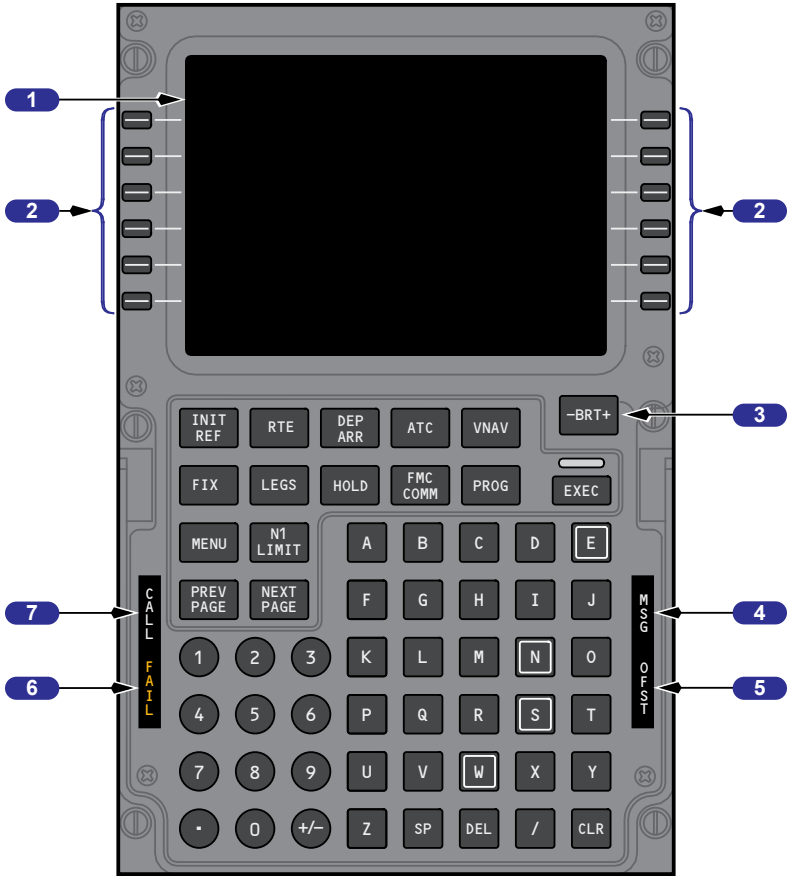
Illuminated (white) – LNAV gives guidance for lateral route offset.

6 FAIL Light

Illuminated (amber) for test purposes only. The MCDU FAIL lamp will not illuminate for an FMC failure.

7 CALL Light

Illuminated (white) – a subsystem other than the FMC is requesting control of the CDU.



FWD ELECTRONIC PANEL (P9)
(Liquid Crystal Display MCDU)

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Function and Execute Keys

1 CDU Function Keys

Push –

- INIT REF – shows page for data initialization or reference data
- RTE – shows page to input or change origin, destination, or route
- DEP ARR – shows page to input or change departure and arrival procedures
- ATC (option) – displays appropriate ATC page
- VNAV –
  - shows currently active performance page (CLB, CRZ, DES)
  - CLB page is displayed if no active phase exists
- FIX – shows page to create reference points on map display
- LEGS –
  - shows page to evaluate or modify lateral and vertical data
  - shows page to control PLAN mode display
- HOLD – shows page to create holding patterns and show holding pattern data
- FMC COMM (option) – displays FMC COMM status page
- PROG – shows page to view dynamic flight and navigation data, including waypoint and destination ETAs, fuel remaining, and arrival estimates
- MENU – shows page to choose subsystems controlled by CDU
- N1 LIMIT – shows page to view or change N1 thrust limits
- PREV PAGE – shows previous page of related pages (for example, LEGS pages)
- NEXT PAGE – shows next page of related pages.

2 Execute (EXEC) Key

Push –

- makes data modification(s) active
- extinguishes execute light.

3 Execute Light

Illuminated (white) – active data is modified but not executed.

FWD ELECTRONIC PANEL (P9)
(Liquid Crystal Display MCDU)

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Alpha/Numeric and Miscellaneous Keys

1 Alpha/Numeric Keys

Push –

- puts selected character in scratchpad
- Slash (/) key – puts “/” in scratchpad
- Plus Minus (+/–) key – first push puts “–” in scratchpad. Subsequent pushes alternate between “+” and “–”.

2 Delete (DEL) Key

Push – puts DELETE in scratchpad.

3 Clear (CLR) Key

Push –

- clears the last scratchpad character
- clears scratchpad message.

Push and hold – clears all scratchpad data.

4 Space (SP) Key

Push – puts space in scratchpad.

FWD ELECTRONIC PANEL (P9)
(Liquid Crystal Display MCDU)

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CDU Page Components

1 Page Title

Subject or name of data shown on page.

ACT (active) or MOD (modified) shows whether page contains active or modified data.

2 Line Title

Title of data on line below.

3 Line

Shows –

- prompts
- selections
- options
- data.

4 Scratchpad

Shows messages, alpha–numeric entries or line selected data.

5 Page Number

Left number is page number. Right number is total number of related pages.

6 Boxes

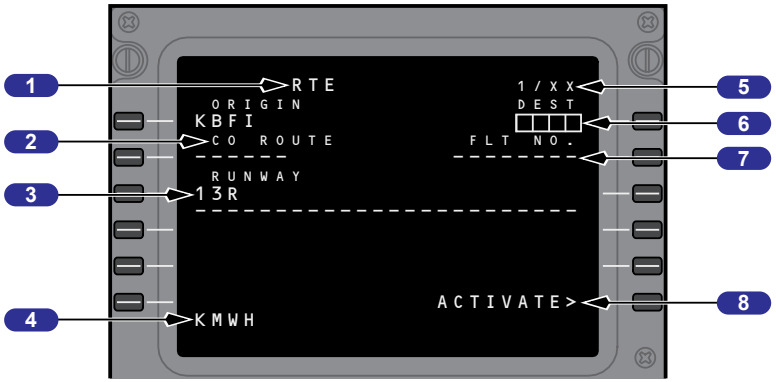
Data input is mandatory.

7 Dashes

Data input is optional. The data is not mandatory.

8 Prompts

Show pages, select modes, and control displays. Caret “<” or “>” is before or after prompt.



CDU Page Color

Color is used as follows:

- black – background color of page
- cyan –
  - inactive RTE, RTE LEGS and RTE HOLD page titles
- green –
  - actively tuned VOR, ILS, or DME data (frequency, station ID, course)
  - active state of two–position and three–position selectors.
- magenta – data used by FMC for lateral and vertical flight commands
  - active waypoint
  - active airspeed
  - active altitude
  - holding pattern inbound course, direction of turn, and leg time or leg distance
  - speed and or altitude restrictions targeted next, restriction may be several waypoints down the route from the active waypoint.

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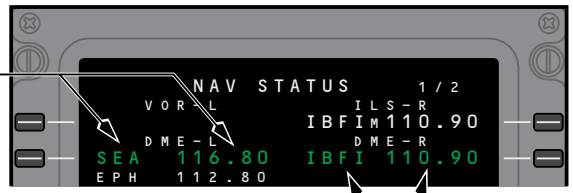
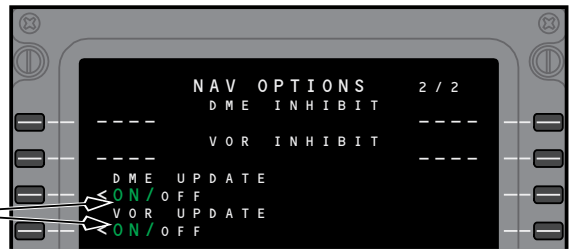
- shaded white –
  - modifications
  - MOD precedes page titles of modified pages
- white – most data

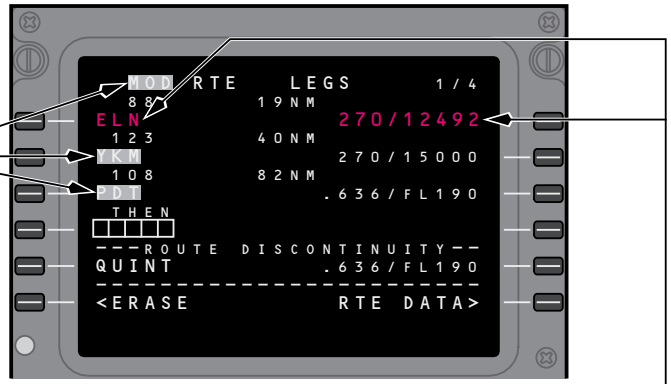
Inactive RTE page title (cyan)



Navaids being used in navigation solution (green)



Active state (green)



Flight plan modification not yet executed (shaded white)

Active airspeed, altitude, waypoint name (magenta)

Holding pattern inbound course, direction of turn, leg distance or leg time (magenta)

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Instrument Switching Module

1 VHF NAV Transfer Switch

The VHF NAV transfer switch changes the source of the data that the DPCs use for the navigation displays. The switch transfers the following data: DME, ILS, VOR, and MCP course.

Example:

BOTH ON 1 – the DPCs use Multimode Receiver 1 as the source for the captains display and first officers display.

NORMAL – Multimode Receiver 1 supplies data for the captains display and Multimode Receiver 2 supplies data for the first officers display.

BOTH ON 2 – the DPCs use Multimode Receiver 2 as the source for the captains display and first officers display.

Note: The Digital Flight Control System cannot use VOR/ILS data that is not shown on the displays. Thus, when the Autopilot (A/P) system is engaged the VHF Navigation Control must match the primary Autopilot system that is ENGAGED for proper ILS/VOR operations; i.e. (CMD A uses VHF NAV 1 for control and CMD B uses VHF NAV 2 for control).

2 Inertial Reference System (IRS) Transfer Switch

BOTH ON L – switches the flight instruments attitude and heading source to left IRS.

NORMAL – flight instruments attitude and heading source is from default IRS.

BOTH ON R – switches the flight instruments attitude and heading source to right IRS.

3 FMC Source Select Switch

BOTH ON L –

- selects left FMC for all FMC operations
- right map will annunciate “FMC L.”

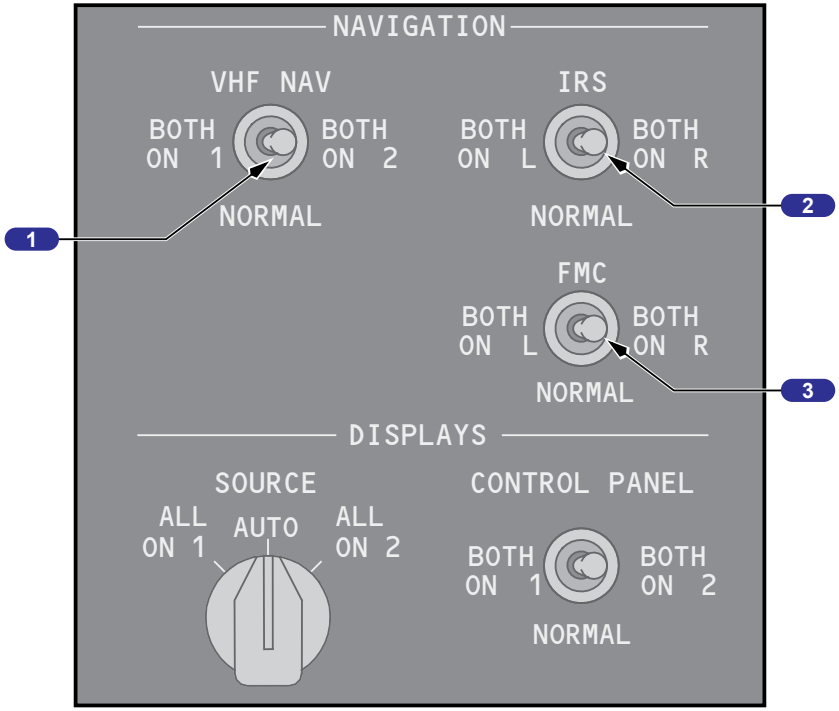
NORMAL –

- left FMC controls CDU’s and provides input to the autothrottle system
- right FMC operates in synchronization with left FMC
- maps display composite information from both FMC’s

BOTH ON R –

- selects right FMC for all FMC operations
- left map will annunciate “FMC R.”

Note: Moving the source select switch will cause LNAV and VNAV to disengage.



FWD OVERHEAD PANEL (P5)

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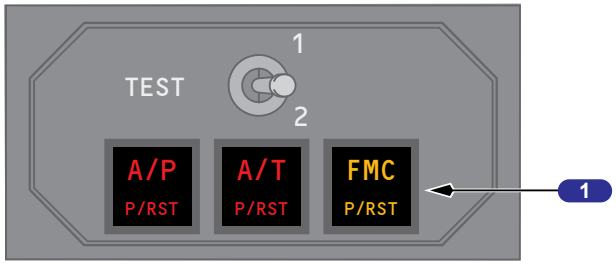
FMC Alert Light

1 FMC Alert Light

Illuminated (amber) –

- an alerting message exists for both CDUs, or
- test switch is in position 1 or 2.

Push – both pilots' FMC alert lights extinguish.



CAPT INSTRUMENT PANEL (P1)
F/O INSTRUMENT PANE (P3)

IRS Mode Selector Unit

1 Instrument Landing System (ILS) Light

Illuminated (amber) –

- indicates failure of both ILS sensor units
- indicates failure of a single ILS sensor unit when either system annunciator panel is pushed to initiate a recall
- with single ILS sensor failure, light extinguishes when the system recall is reset.

2 Global Positioning System (GPS) Light

Illuminated (amber) –

- indicates failure of both GPS sensor units
- indicates failure of a single GPS sensor unit when either system annunciator panel is pushed to initiate a recall
- with single GPS sensor failure, light extinguishes when the system recall is reset.

3 GNSS Landing System (GLS) Light

Illuminated (amber) –

- indicates failure of both GLS sensor units
- indicates failure of a single GLS sensor unit when either system annunciator panel is pushed to initiate a recall
- with single GLS sensor failure, light extinguishes when the system recall is reset.

4 ALIGN Light

Illuminated (white) –

- steady – the related IRS is operating in the ALIGN mode, the initial ATT mode, or the shutdown cycle
- flashing – alignment cannot be completed due to IRS detection of:
  - significant difference between previous and entered positions or an unreasonable present position entry
  - no present position entry.

Extinguished –

- IRS not in ALIGN mode
- with mode selector in NAV, alignment is complete, and all IRS information is available
- with mode selector in ATT, attitude information is available. Heading information is available following entry of initial magnetic heading.

5 FAULT Light

Illuminated (amber) – a system fault affecting the related IRS ATT and/or NAV modes has been detected.

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6 Inertial Reference System (IRS) Mode Selector

OFF –

- alignment is lost
- all electrical power is removed from the system after a 30 second shutdown cycle.

ALIGN –

- rotating the selector from OFF to ALIGN initiates the alignment cycle
- rotating the selector from NAV to ALIGN automatically updates alignment and zeroes ground speed error.

NAV (detented position) –

- system enters the NAV mode after completion of the alignment cycle and entry of present position
- in NAV mode, all IRS information is available to airplane systems for normal operations.

ATT – provides only attitude and heading information:

- attitude information is invalid (attitude flag in view) until ALIGN light is extinguished
- heading information is invalid (heading flags in view) until the actual magnetic heading is manually entered after the ALIGN light is extinguished
- position and ground speed information is not available until the IRS is aligned on the ground
- the selector must be cycled to OFF before reselecting ALIGN or NAV.

7 ON DC Light

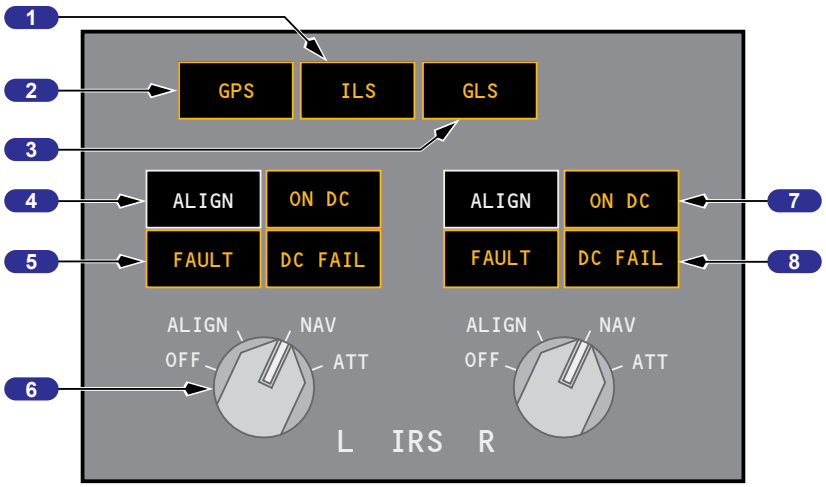
Illuminated (amber) –

- the related IRS is operating on DC power from the switched hot battery bus (AC power not normal)
- if on the ground, the ground–call horn in the nose wheel well sounds, providing an alert that a battery drain condition exists
- momentary illumination is normal during alignment self–test.

8 DC FAIL Light

Illuminated (amber) –

- DC power for the related IRS is not normal
- if the other lights are extinguished, the IRS is operating normally on AC power.



AFT OVERHEAD PANEL (P5)

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Inertial System Display Unit (ISDU)

1 Display Selector (DSPL SEL)

TEST (spring–loaded to TK/GS) –

- all lights in data displays and on the mode selector unit momentarily illuminate, followed by a 10 second self–test
- use only during alignment.

TK/GS –

- left window displays true track (course)
- right window displays present ground speed (knots).

PPOS –

- left window displays present latitude
- right window displays present longitude.

WIND –

- left window displays present inflight true wind direction
- right window displays present inflight wind speed (knots).

HDG/STS –

- left window displays present true heading
- right window displays any applicable maintenance status codes
- during alignment, right window displays minutes remaining until alignment is complete. For alignments greater than 15 minutes, the window displays 15 until the time remaining reaches 14 minutes. The display then counts down in one minute intervals.

2 Brightness (BRT) Control

Rotate – adjusts brightness of the data displays.

3 System Display (SYS DSPL) Selector

L – selects left IRS for the data displays.

R – selects right IRS for the data displays.

4 Enter (ENT) Key

Illuminated (white) – N, S, E, W, or H entries are being keyed.

Push – keyed data is entered into IRS following completion of valid self–test for reasonableness.

5 Data Displays

Two windows display data for the IRS selected with the system display selector

- type of data displayed is normally determined by the display selector
- keyboard entry of present position or magnetic heading overrides the selected display
- last digit of each window is for a decimal place (tenths).

6 Keyboard

Push –

- alpha keys:
  - data displays are controlled by the keyboard when the N, S, E, W (latitude/longitude) or H (heading) keys are pushed
  - pushing an alpha key arms the keyboard for numeric entries.
- numeric keys:
  - permit manual entry of present position when ALIGN light is illuminated
  - permit manual entry of magnetic heading when either mode selector is in ATT.

7 Clear (CLR) Key

Illuminated (white) – an ENT attempt has failed (entry not accepted by IRS).

Push – clears data display of any data not yet entered or accepted. If illuminated, cue lights extinguish.

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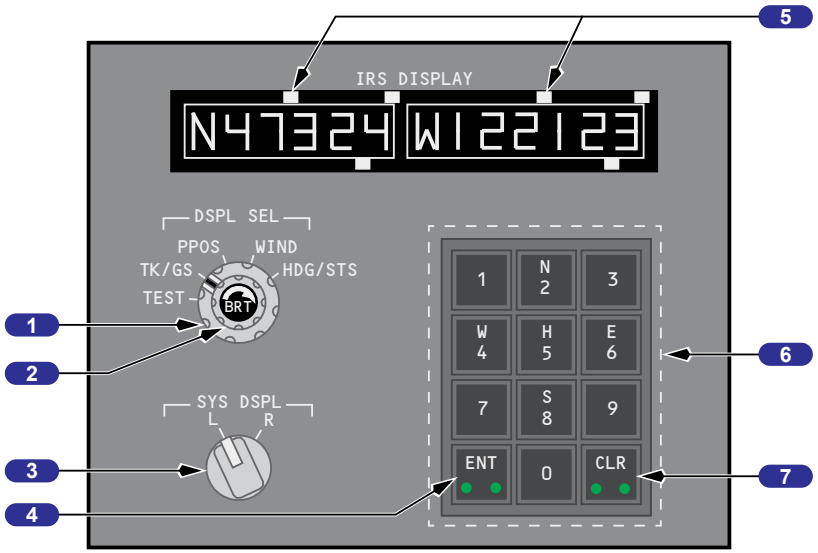


AFT OVERHEAD PANEL (P5)

Transponder Panel

1 Transponder (ATC) Selector

1 – selects transponder No. 1.

2 – selects transponder No. 2.

2 Air Traffic Control (ATC) Code Selector

Rotate – sets transponder code in transponder.

3 Air Traffic Control (ATC) Code Indicator

Shows transponder code.

Shows operating transponder (1 or 2).

4 Transponder Mode Selector

TEST – starts ATC transponder functional test.

STBY (standby) – does not transmit.

ALT (altitude reporting) OFF – transponder operates without altitude reporting.

ALT (altitude reporting) ON – transponder operates with altitude reporting.

TA (traffic advisory) – enables the display of traffic advisory (TA) targets.

TA/RA (resolution advisory) – enables the display of traffic advisory (TA) and resolution advisory (RA) targets.

5 Identification (IDENT) Switch

Push – transmits an identification signal.

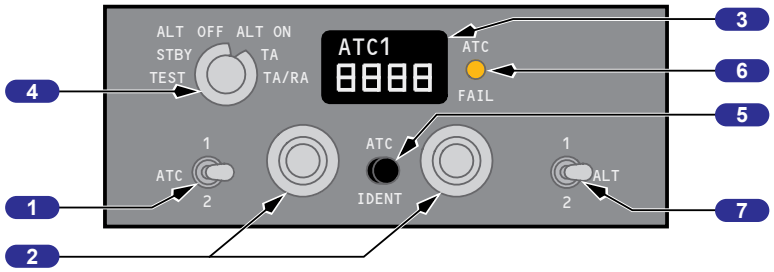
6 Transponder (ATC) FAIL Light

Illuminated (amber) – indicates transponder malfunction.

7 Altitude (ALT) Selector

1 – enables altitude reporting from air data computer No. 1.

2 – enables altitude reporting from air data computer No. 2.



AFT ELECTRONIC PANEL (P8)

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Automatic Direction Finding (ADF) Control Panel

1 Frequency Indicator

Shows the frequency selected with the related frequency selector.

Shows if the system is in the ADF or antenna (ANT) mode.

2 Frequency Selector

Rotate –

- outer knob sets the hundreds number
- middle knob sets the tens number
- inner knob sets the tenths and ones number.

3 Mode Selector Switch

ADF –

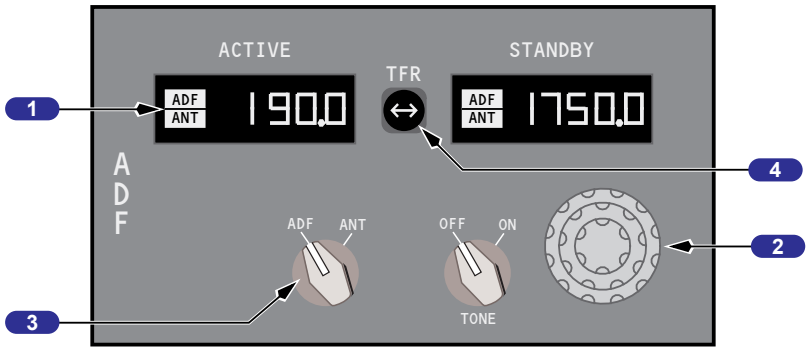
- audio reception possible
- ADF bearing sent to the DU's and the standby radio magnetic indicator.

ANT –

- audio reception optimized
- no ADF bearing data available.

4 TFR Switch

Push – The STANDBY frequency will show in the ACTIVE display window.



AFT ELECTRONIC PANEL (P8)

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Navigation Control Panel

1 Active (ACT) Mode and Frequency Indicator

Indicates the active mode and frequency.

2 Transfer Switch

Push – standby mode and frequency moved to active indicator window; active mode and frequency moved to standby indicator window.

3 Standby (STBY) Mode and Frequency Indicator

Indicates the standby mode and frequency.

4 TEST Switch

With a VOR frequency tuned and a course of 000 selected:

- shows VOR fail flag
- deviation bar biases out of view and then returns to centered position
- bearing pointer slews to 180 degrees
- DME displays:
  - DME fail flag
  - dashes
  - normal DME distance.

With ILS frequency tuned and a course within 90 degrees of airplane heading:

- pointers disappear and LOC and G/S flags appear momentarily
- pointers appear and display one dot up and one dot left
- pointers then display one dot low and one dot right
- pointers then return to normal display
- DME displays:
  - DME fail flag
  - dashes
  - normal DME distance.

With GLS frequency tuned and a course within 90 degrees of airplane heading:

- pointers disappear and LOC and G/S flags appear momentarily
- pointers appear and display one dot up and one dot left
- pointers then display one dot low and one dot right
- pointers then return to normal display

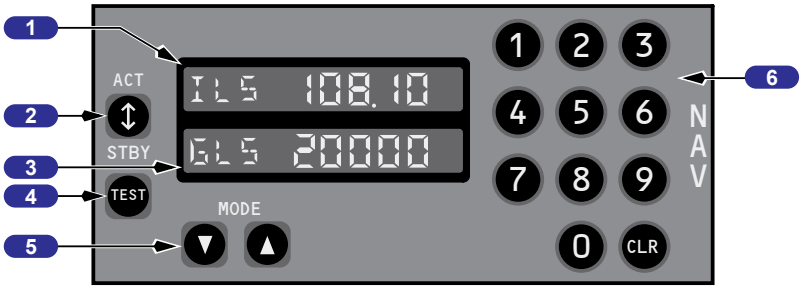
5 Mode Switches

Push – manually inserts ILS, VOR or GLS into the standby indicator window.

6 Frequency Selection Keypad

Push – manually selects the standby frequency.

CLR – clears the standby frequency.



AFT ELECTRONIC PANEL (P8)

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Weather Radar Control Panel

1 Mode Selector Switch

MAP – displays full coverage ground map.

AUTO – automatic weather presentation mode provides display of windshear out to 5 nm, turbulence out to 60 nm, and weather out to 320 nm. Secondary weather returns are shown with black stripes through them.

MAN – manual constant altitude (Weather Analysis) mode. The altitude slice defaults to current altitude upon MAN selection.

Note: In both AUTO and MAN mode of operation, the weather radar automatically increases the gain as the aircraft passes into the freezing layer to help compensate for the decease in radar reflectivity in this area.

2 Manual Altitude (ALT) Control Switch

ALT – controls weather analysis altitude from 0 to 60,000 ft. MDSL in increments of 1,000 ft. Selected altitude is shown on the Electronic Flight Display. Active when MAN mode is selected.

3 GAIN Control Switch

CAL –

- rotate to the CAL position for automatic gain control. The CAL position results in a calibrated map or weather radar display. Gain control does not affect turbulence or windshear
- rotating out of the CAL position varies the gain between MIN and MAX. VAR is shown on the display, indicating that the gain has been changed from the calibrated position.

MIN – position reduces gain approximately 16 dBz below the CAL setting. Rotating the switch toward MIN reduces precipitation intensity thresholds, requiring greater intensity precipitation levels to display in red.

MAX – position increases gain 10 dBz over the CAL setting. Rotating the switch toward MAX increases precipitation intensity thresholds, allowing lesser intensity precipitation levels to display in red. MAX gain should only be used at cruise altitudes to help see less reflective frozen storm tops.

4 System Control

NORMAL – normal weather operation.

TEST – with WXR selected on at least one EFIS Control panel, places radar in test mode. When selecting TEST, weather radar panel lighting increases to full bright, dims, then returns to the brightness setting selected prior to selecting TEST.

Time TEST Selected	Approximately 2 Seconds	Approximately 4 Seconds	Approximately 6 Seconds
PWS FAIL/INOP	On	OFF (“ON” if failure detected)	
PWS VISUAL ALERTS	Off	Amber WINDSHEAR on both NDs	Red WINDSHEAR on both NDs and PFDs
PWS AURAL ALERTS	None	Tone “Monitor Radar Display”	“Go Around, Windshear Ahead, Windshear Ahead, Windshear Ahead”
DISPLAY	Normal Test Pattern (No PWS Icon)		

No fault indications shown after completion of the test sequence indicates full radar system operation is available.

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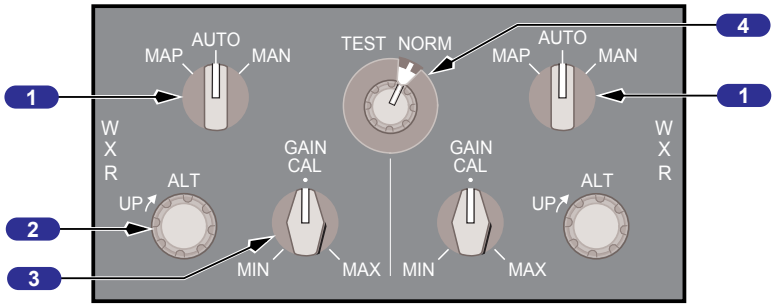


AFT ELECTRONIC PANEL (P8)

Stall Warning Test and Mach/Airspeed Warning Switches

1 STALL WARNING TEST Switches

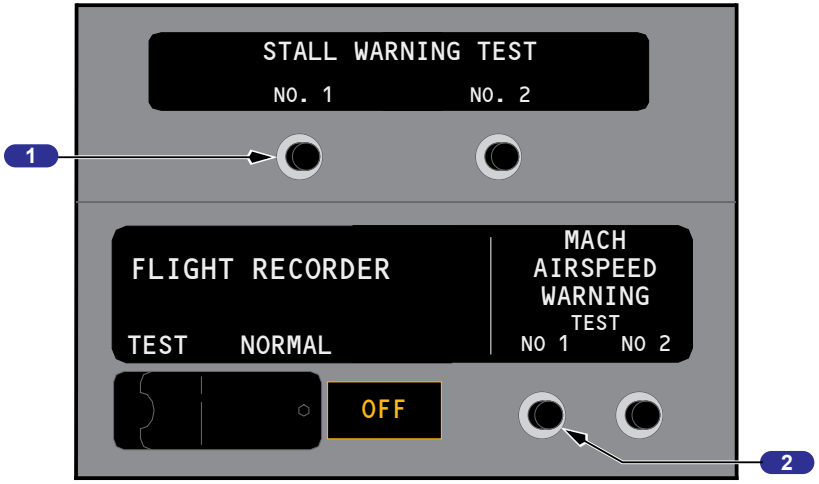
Push – on ground with AC power available: each test switch tests its respective stall management yaw damper (SMYD) computer. No.1 SMYD computer shakes Captain's control column, No.2 SMYD computer shakes First Officer's control column. Vibrations can be felt on both columns

- inhibited while airborne.

2 MACH AIRSPEED WARNING TEST Switches

Push – tests respective mach/airspeed warning system

- clacker sounds
- inhibited while airborne.



AFT OVERHEAD PANEL (P5)

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Ground Proximity Warning System (GPWS) Controls

1 BELOW Glide Slope (G/S) light

Illuminated (amber) – below glide slope alert is active.

Push – inhibits ground proximity GLIDE SLOPE alert when below 1,000 feet radio altitude.

2 Inoperative (INOP) light

Illuminated (amber) – GPWS computer malfunction or power loss

- invalid inputs are being received from radio altimeter, ADIRU, ILS receiver, IRS, FMC, stall management computers, or EFIS control panel.

3 Ground Proximity System Test (SYS TEST) Switch

Push –

- momentarily on ground:
  - BELOW G/S and GPWS INOP lights illuminate
  - TERR FAIL and TERR TEST show on navigation displays
  - PULL UP and WINDSHEAR alerts illuminate
  - GLIDE SLOPE, PULL UP, and WINDSHEAR aurals sound
  - terrain display test pattern shows on navigation displays
  - CAUTION TERRAIN aural sounds and TERRAIN caution message shows on navigation displays.
  - AIRSPEED LOW (airplanes with AIRSPEED LOW aural).
- until self-test aurals begin, on ground, above indications always occur first, followed by these additional aurals, as described in section 15-20:
  - radio altitude based alerts
  - bank angle alert
  - approach callouts
  - windshear alert
  - look ahead terrain alerts
- system test inhibited in-flight.

4 Ground Proximity FLAP INHIBIT Switch

FLAP INHIBIT – inhibits ground proximity TOO LOW FLAPS alert.

NORM (guarded position) – Normal TOO LOW FLAPS alert active.

5 Ground Proximity GEAR INHIBIT Switch

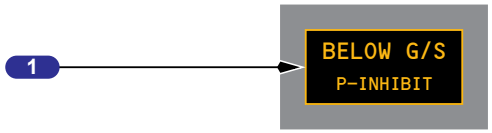
GEAR INHIBIT – inhibits ground proximity TOO LOW GEAR alert.

NORM (guarded position) – Normal TOO LOW GEAR alert active.

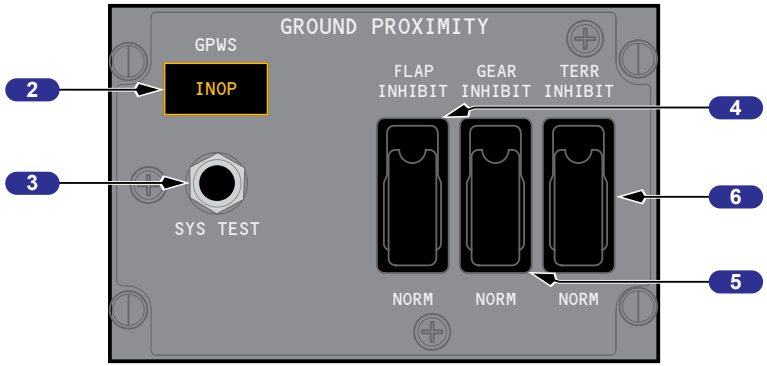
6 Ground Proximity Terrain Inhibit (TERR INHIBIT) Switch

TERR INHIBIT – inhibits look–ahead terrain alerts and terrain display.

NORM (guarded position) – Normal terrain alerts and terrain display active.



CAPT AND F/O INSTRUMENT PANELS (P1,P3)



F/O INSTRUMENT PANEL (P3)

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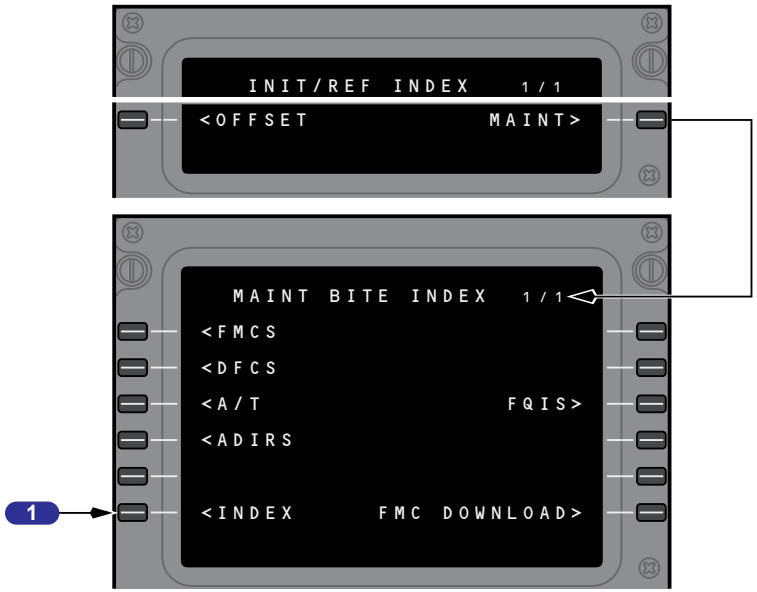
Maintenance Index Page

The MAINT BITE INDEX page is available only on the ground and provides access to data for use by maintenance personnel.

1 INDEX

Push – displays the INIT/REF INDEX page.



Navigation Position

The FMC determines present position from the IRS, GPS, and navigation radios. The FMC uses its calculated present position to generate lateral steering commands along the active leg to the active waypoint.

When the FMC Source Select Switch is positioned to NORMAL, the left FMC becomes primary, however, data from both FMC's is combined to determine a composite position and velocity for guidance and map displays.

FMC Position Update

On the ground, the FMC calculates present position based on GPS data. If GPS data is not available, the FMC calculates present position based on IRS data.

If GPS UPDATE is OFF, the FMC updates position to the takeoff runway threshold when a TO/GA switch is pushed. When making an intersection takeoff, the intersection data must be entered on the TAKEOFF REF page. If GPS UPDATE is ON, the TO/GA update is inhibited. GPS UPDATE is on the NAV OPTIONS page.

In flight, the FMC position is continually updated from the GPS, navigation radios, and IRS. Updating priority is based on the availability of valid data from the supporting systems.

FMC position updates from navigation sensor positions are used in the following priority order:

- GPS
- two or more DME stations
- one VOR with a collocated DME
- one localizer and collocated DME
- one localizer.

The station identifiers and frequencies of the selected radio navigation aids are displayed on the NAV STATUS page 1/2.

FMC logic selects the GPS position as the primary update to the FMC position. If all GPS data becomes unavailable, the FMC reverts to radio or IRS updating.

The dual frequency–scanning DME radios are automatically tuned by the FMC. The stations to be tuned are selected based upon the best available signals (in terms of geometry and strength) for updating the FMC position, unless a specific station is required by the flight plan. Radio position is determined by the intersection of two DME arcs.

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Standby Flight Instruments

The standby flight instruments include the:

- standby magnetic compass
- integrated standby flight display

Standby Magnetic Compass

A standard liquid – damped magnetic standby compass is provided. A card located near the compass provides correction factors.

1 Standby Magnetic Compass

Displays magnetic heading.

2 Standby Magnetic Compass Correction Card

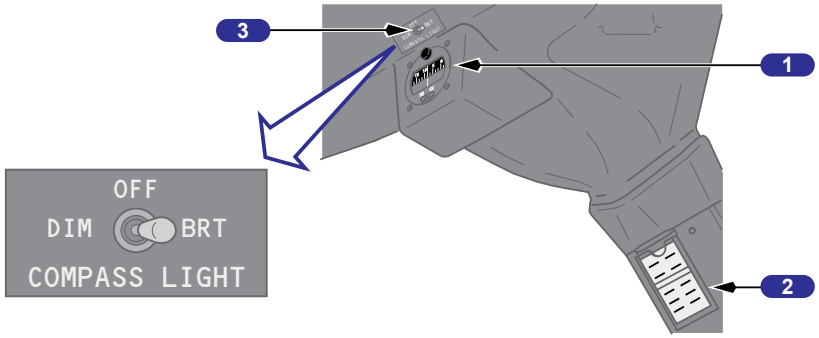
Provides appropriate heading corrections.

3 Compass Light Switch

OFF – compass light is extinguished.

BRT – sets compass light to full brightness.

DIM – sets compass light to low brightness.



CENTER POST ABOVE GLARESHIELD

Integrated Standby Flight Display (ISFD)

1 Approach (APP) Switch

Push –

- when blank, selects APP
- when APP displayed, selects BCRS
- when BCRS displayed, blanks.

2 Approach Mode Annunciation

Indicates approach mode selected.

- Blank – no approach deviation data displayed
- APP – ILS localizer and glideslope deviation data displayed
- BCRS (Back course) – reverses sensing for localizer pointer during back course approaches.

3 Attitude Display

Displays airplane attitude.

- Indicates bank in reference to the bank scale
- Indicates the horizon relative to the airplane symbol
- Beyond 30 degrees pitch, large red arrowheads (V-shaped) indicate the attitude has become excessive, and the direction to the horizon line.

4 Display Brightness Switches

Push –

- + increases display brightness
- – decreases display brightness.

5 Airplane Symbol

Indicates airplane attitude with reference to the horizon.

6 Airspeed Indications

Indicates current airspeed when above 30 knots.

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7 Attitude Reset (RST) Switch

Push and hold at least two seconds

- aligns horizon with the airplane symbol
- reset takes approximately ten seconds
- starts new initialization sequence if previous attempt failed (ground only).

8 Hectopascal/Inch (HP/IN) Switch

Push – changes the units of the barometric reference.

9 Barometric Setting

Indicates the barometric setting selected with the barometric selector.

STD is displayed when selected with the barometric selector.

10 Ambient Light Sensor

Automatically adjusts display intensity for ambient lighting condition.

11 Glideslope Pointer and Deviation Scale

The glideslope pointer indicates glideslope position relative to the airplane.

- the pointer is in view when the glideslope signal is received
- the scale is in view when the APP mode is selected.
- the pointer and scale are removed when the BCRS mode is selected

12 Current Altitude

13 Localizer Pointer and Deviation Scale

The localizer pointer indicates localizer position relative to the airplane.

- the pointer is in view when the localizer signal is received
- the scale is in view when either the APP or BCRS mode is selected

14 Barometric (BARO) Selector

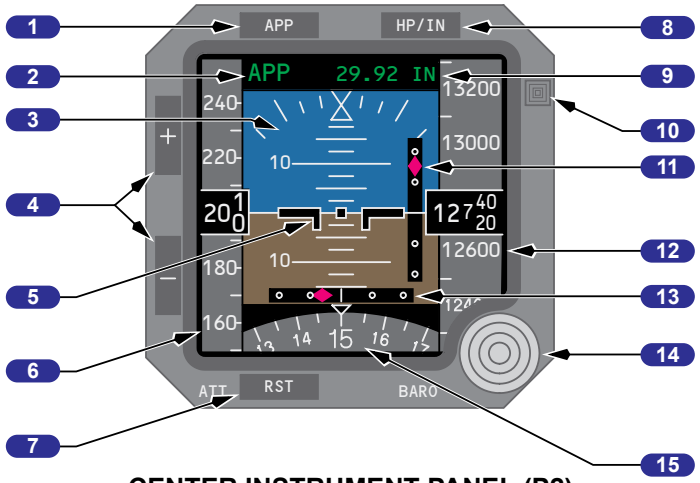
Rotate – changes barometric setting

Push –

- selects standard barometric setting (29.92 inches Hg/1013 HPA)
- if STD is displayed, selects the preselected barometric setting.

15 Heading Indication

Displays airplane heading.



CENTER INSTRUMENT PANEL (P2)

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ISFD Messages

1 Attitude Messages

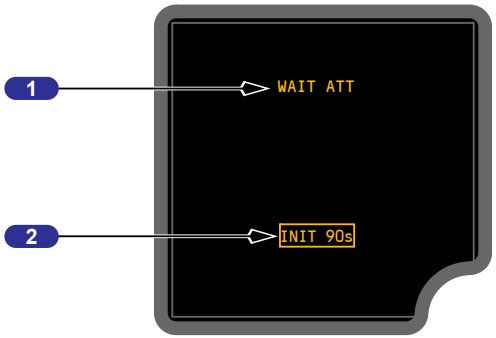
Indicates attitude display status.

- ATT:RST (amber) – attitude must be reset using the attitude reset switch
- ATT 10s (amber) – 10 second attitude realignment in progress
- WAIT ATT (amber) – indicates temporary self correcting loss of attitude.

2 Initialization Message

INIT 90s (amber) – 90 second initialization countdown.

- countdown stops if excessive motion is detected
- countdown resumes when motion stops
- ATT:RST displays if initialization is not complete within six minutes.



ISFD

ISFD Failure Flags

The OUT OF ORDER annunciation replaces the display when a total ISFD system failure occurs.

1 Airspeed flag

Airspeed information has failed.

2 ILS localizer failure flag

ILS localizer has failed.

3 ILS glideslope failure flag

ILS glideslope has failed.

4 Altitude flag

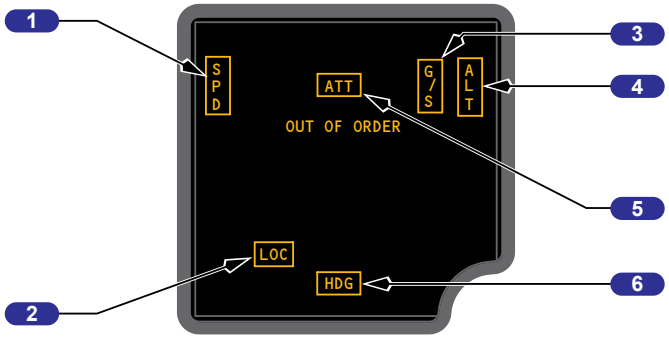
Altitude information has failed.

5 Attitude flag

Attitude information has failed.

6 Heading flag

Heading data has failed.



ISFD

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HUD System Components

1 Overhead Unit

Contains the CRT and projection optics to display the symbolic image on the combiner.

2 Combiner

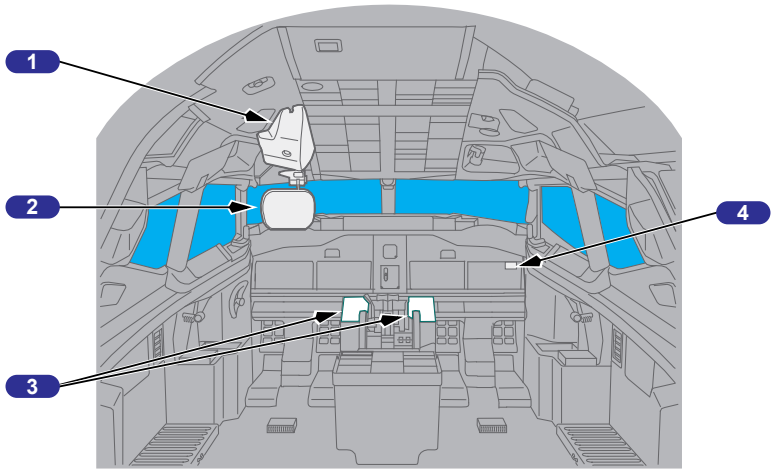
Combines displayed flight symbology with the pilot's view through window
No. 1.

3 Multipurpose Display and Control Unit (MCDU)

Used for data entry and to select modes of operation.

4 Annunciator

Provides system status and warning annunciations during a CAT III approach.



Combiner Display

The combiner displays symbology and fault indications for the HUD system. Display modes of operation include:

- Primary (PRI)
- AIII approach
- Instrument Meteorological Conditions (IMC) approach
- Visual Meteorological Conditions (VMC) approach.

Note: Typical display modes are shown. Not all symbols are represented in this section.

Primary (PRI) Mode Display

The primary mode can be used for all phases of flight from takeoff to landing including low visibility takeoff operations.

1 Bank Scale and Pointer

2 Flight Mode Annunciations (FMAs)

3 Airspeed Indications

4 Navigation Indications

5 Attitude Indications

6 Altitude Indications

7 TO/GA Pitch Target Line

8 Ground Localizer Line

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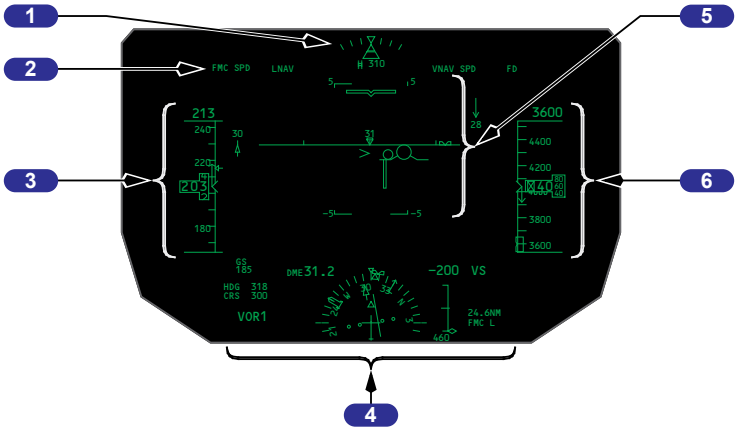
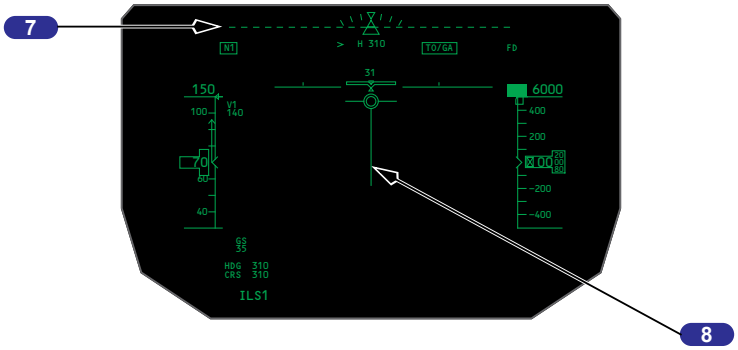


PRI (IN FLIGHT) MODE



PRI (GROUND) MODE

TCAS Controls (Transponder Panel)

1 Transponder Mode Selector

TA (traffic advisory - enables the display of traffic adisory (TA) targets.

TA/RA (resolution advisory) - enables the display of traffic advisory (TA) and resolution advisory (RA) targets.

AFT ELCTRONIC PANEL (P8)

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Multi-purpose Control Display Unit (MCDU)

The HUD uses the Multi-purpose Control Display Unit (MCDU) as a control panel to control panel to control modes of operation, display values, and system test and status information.

Either pilot's MCDU can be used to operate the Head-up Guidance System. HGS operation is accessible by pushing the MENU function key at any time to go immediately to the Menu page. On the Menu page, push the HGS line select key to open the HGS DATA page.

1 HGS MODES – MCDU Control Panel Display Window

Displays selected modes, entered values, system test and system status. Use the line select keys on the HGS Modes page to change the HGS modes.

2 Primary (PRI) Mode

- Push – HGS MODES < PRI line select key
- This selects primary mode, and the mode indicated on the MCDU HGS MODES page will change to Primary.

3 Instrument Meteorological Conditions (IMC) Mode

The IMC mode is an alternate approach mode primarily intended for autopilot approaches. Like the PRI mode, the IMC mode guidance cue utilizes AFDS derived guidance. The guidance cue is displayed when the pilot's flight director is active and both pitch and roll commands are valid.

Altitude and airspeed data is displayed as digital values and navigation raw data is displayed in close proximity to the flight path vector.

4 Visual Meteorological Conditions (VMC) Mode

The VMC mode is intended for visual approach operations. No flight director or HUD guidance is displayed. The flight path vector is used to control the approach to a runway.

Approach symbology format for the VMC mode is similar to the IMC mode. However, navigation data is not displayed.

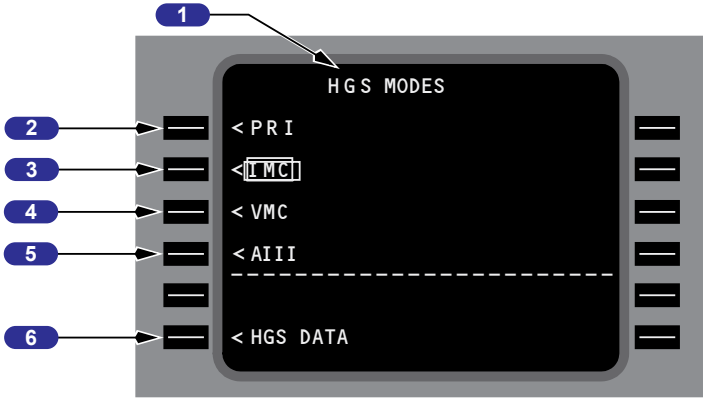
5 AIII Approach Mode

The HGS AIII mode is specifically designed for manual ILS approach and landing operations to CAT IIIa minimums. In the AIII mode, the guidance cue gives flight path guidance derived from the HGS internal approach and landing guidance algorithms.

6 HGS DATA

The HGS Data line select key gives access to guidance derived from the HGS internal approach and landing guidance algorithms.

- Runway Data
- CLR HGS
- HGS MODES
- HGS TEST.



FWD ELECTRONIC PANEL (P9)

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AUX Display HGS Annunciator Panel

The HGS Annunciator Panel is displayed at the top of the First Officer's AUX display when the MDS is in the normal configuration. When the First Officer's PFD is displayed in a Reversion mode, the HGS Annunciator Panel is displayed at the top of the PFD. The HGS Annunciator Panel provides HGS status and warning annunciations to the First Officer during CATIII approach, landing, and rollout operations.

To test the HGS Annunciator Panel, set the master BRT/DIM/TEST switch to TEST. When the BRT/DIM/TEST switch is in the TEST position, all legends on the Annunciator Panel come on and stay on.

1 Engaged Modes:

- AIII (green) – AIII mode is active and all required systems and equipment are valid. It is displayed concurrently with the AIII mode annunciation on the Combiner
- TO (Takeoff) (green) – displayed only during maintenance test.

2 Engaged Submodes:

- FLARE (green) – system derived flare guidance is active. It is displayed when the flare guidance symbol (+) is displayed on the Combiner. If AIII mode is lost, the FLARE annunciation will not illuminate
- RO (Rollout Guidance) (green) – rollout guidance is active.

3 Armed Modes:

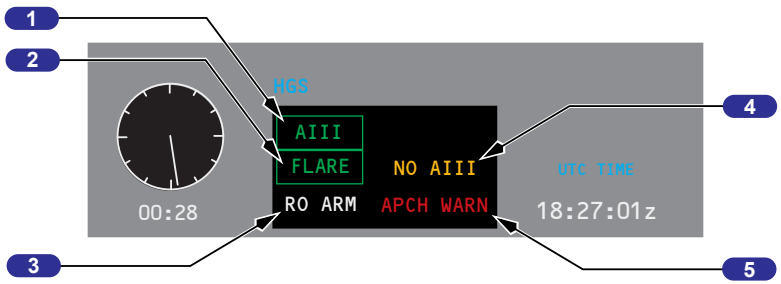
- RO ARM (Rollout Guidance Armed) (white) – system capable of providing ground roll guidance during rollout. Displayed prior to touchdown during an AIII approach.

4 Cautions:

- RO CTN (Rollout Guidance Caution) (amber) – loss of rollout guidance below 500 feet AGL
- TO CTN (Takeoff Caution) (amber) – displayed only during maintenance test
- NO AIII (amber) – loss of AIII capability above 500 feet AGL. The NO AIII indication shows concurrently on the Combiner.

5 Warnings:

- APCH WARN (Approach Warning) (red) – system or approach conditions out of tolerance
- TO WARN (Takeoff Warning) (red) – displayed only during maintenance test
- TAILSTRIKE (red)
- HGS FAIL – indicates HGS failure below 500 feet AGL.



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HUD Combiner

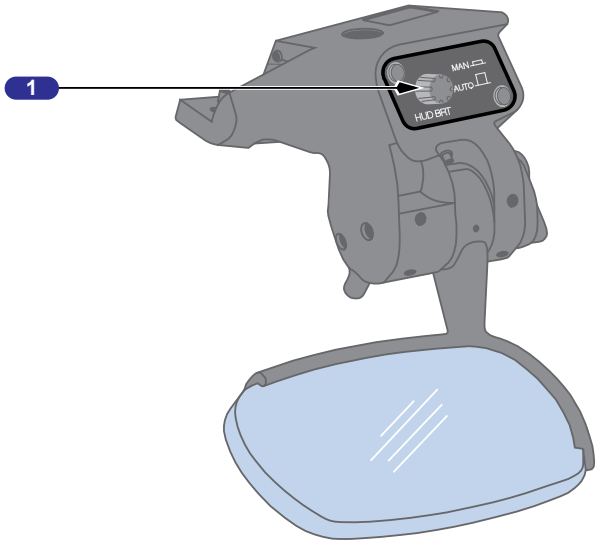
Brightness and Stow Controls

1 Brightness Control Knob

MAN – push knob in for manual brightness adjustment.

AUTO – pull knob out for automatic brightness adjustment. Display intensity varies based on ambient light detected by a sensor on the combiner.

HUD BRT – rotate knob clockwise to increase display intensity. Rotate knob counter-clockwise to decrease display intensity.



OVERHEAD FLIGHT DECK

2 Stow Lever

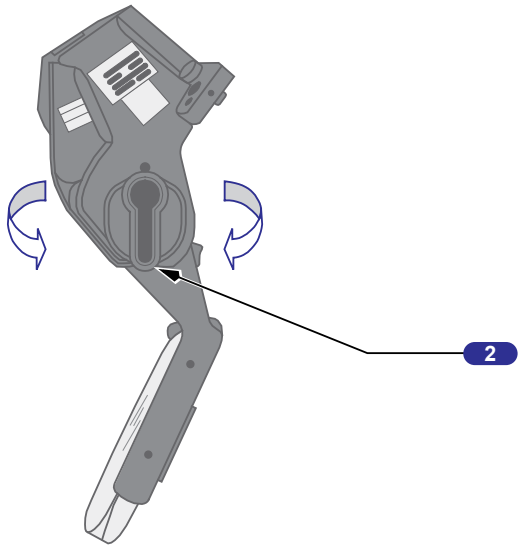
There are three positions for the combiner:

- Stow – AFT/UP
- Normal operating detent – DOWN
- Breakaway – FWD

Pull lower portion of the stow lever toward the pilot and rotate the glass down and forward to the normal operating detent. To stow the combiner glass, grasp and rotate toward the pilot, aft and up, until it locks in the stowed position.

The forward breakaway position allows the combiner glass to be displaced forward from its normal operating position. The combiner glass can be returned from the breakaway position by rotating the stow lever away from the pilot and rotating the glass aft to the normal operating detent.

Note: If the combiner glass is not in the normal operating position (detent) the ALIGN HUD message will display when in IMC and VMC modes. If the ALIGN HUD message can not be extinguished by grasping and moving the combiner glass forward or aft, then back into its normal operating detent, IMC and VMC modes should not be used.



OVERHEAD FLIGHT DECK

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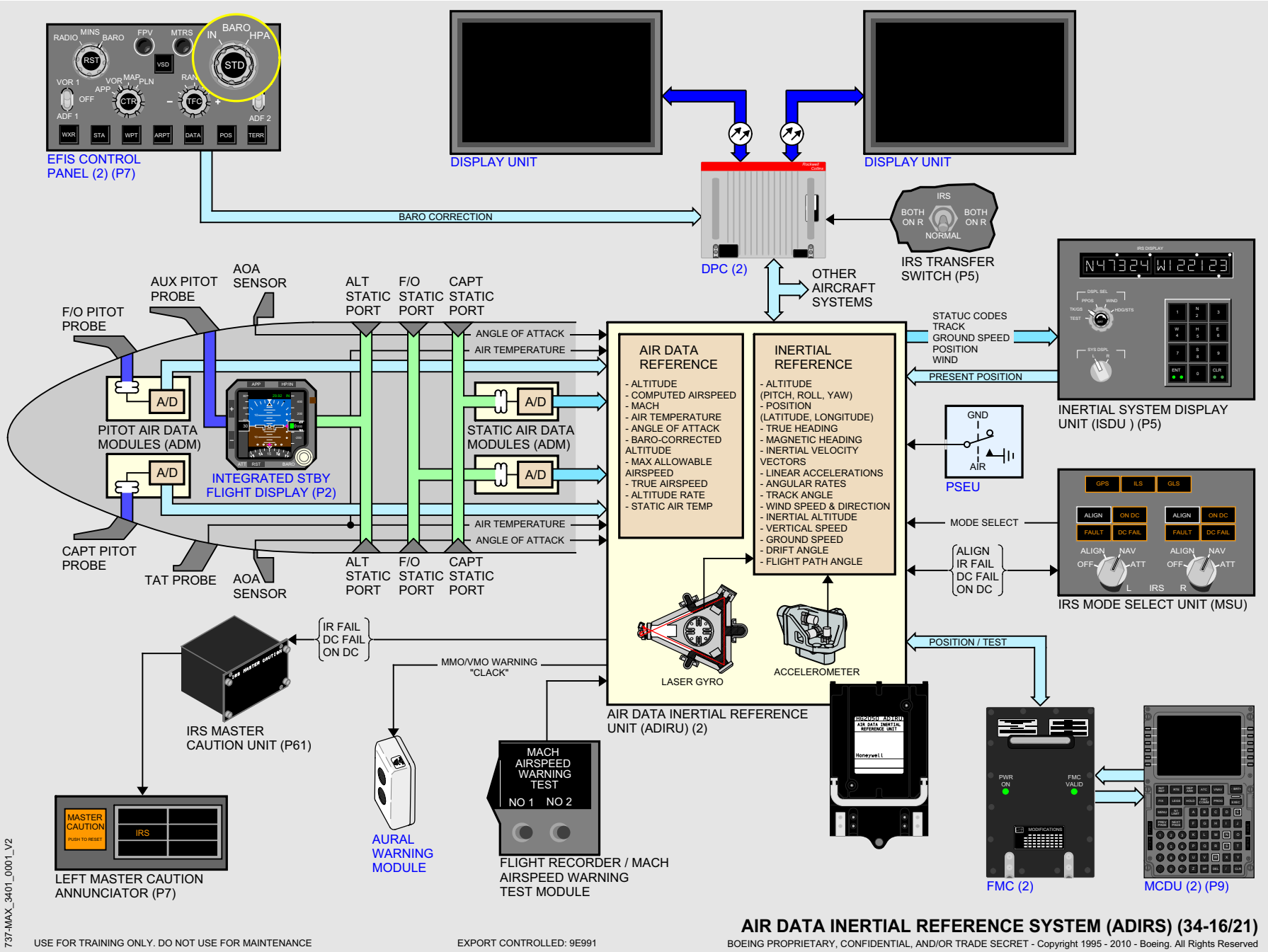

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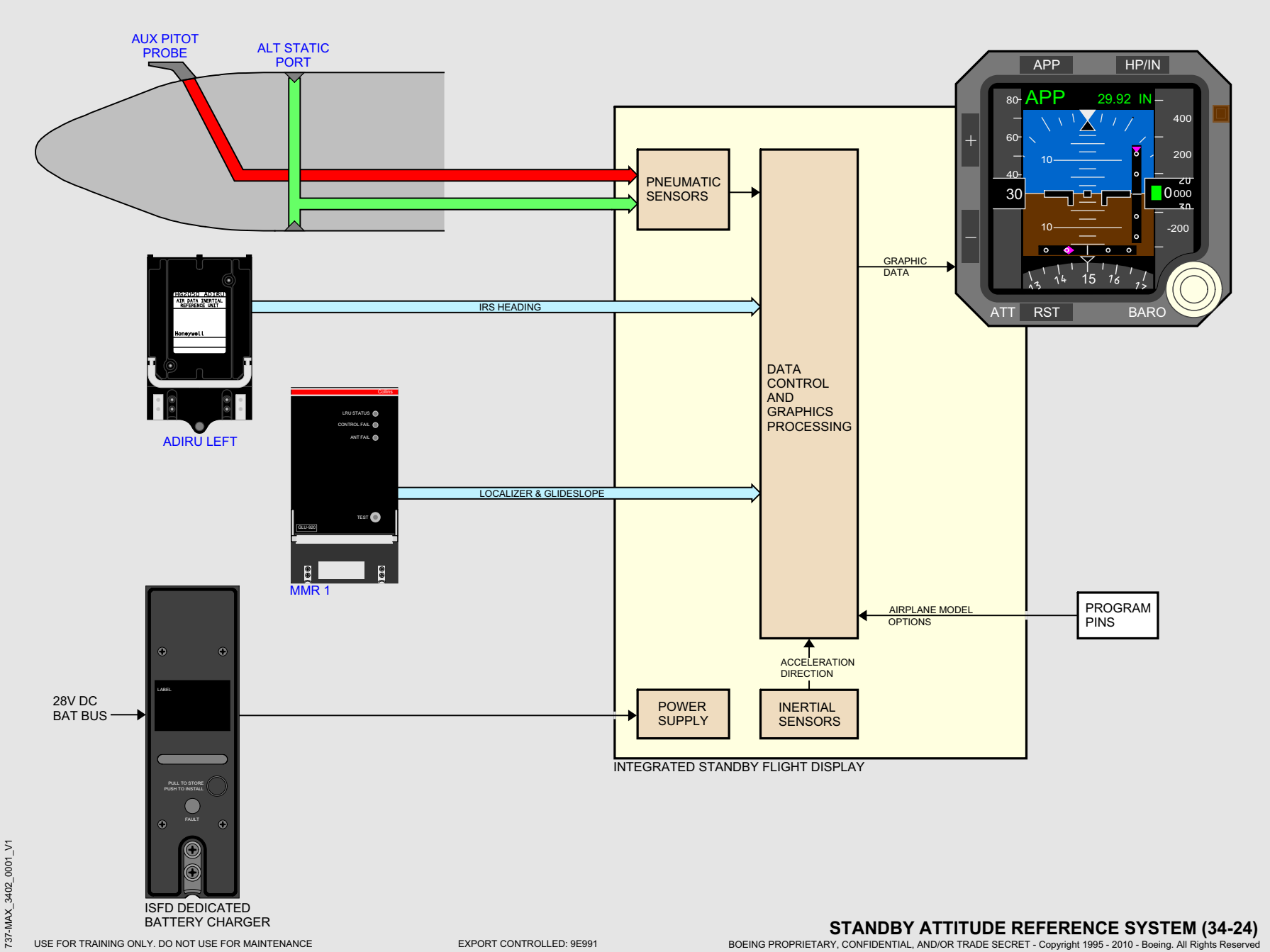

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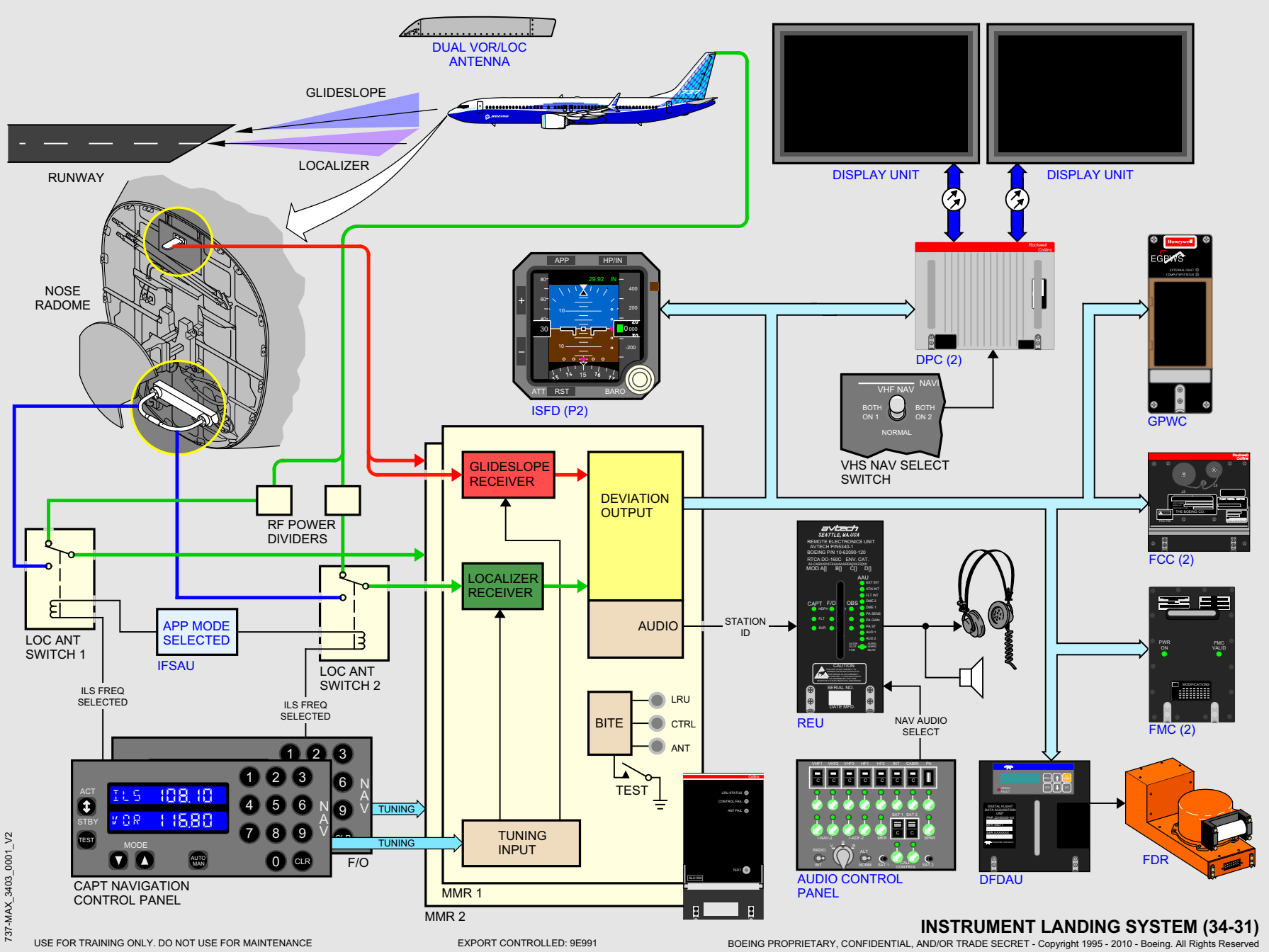

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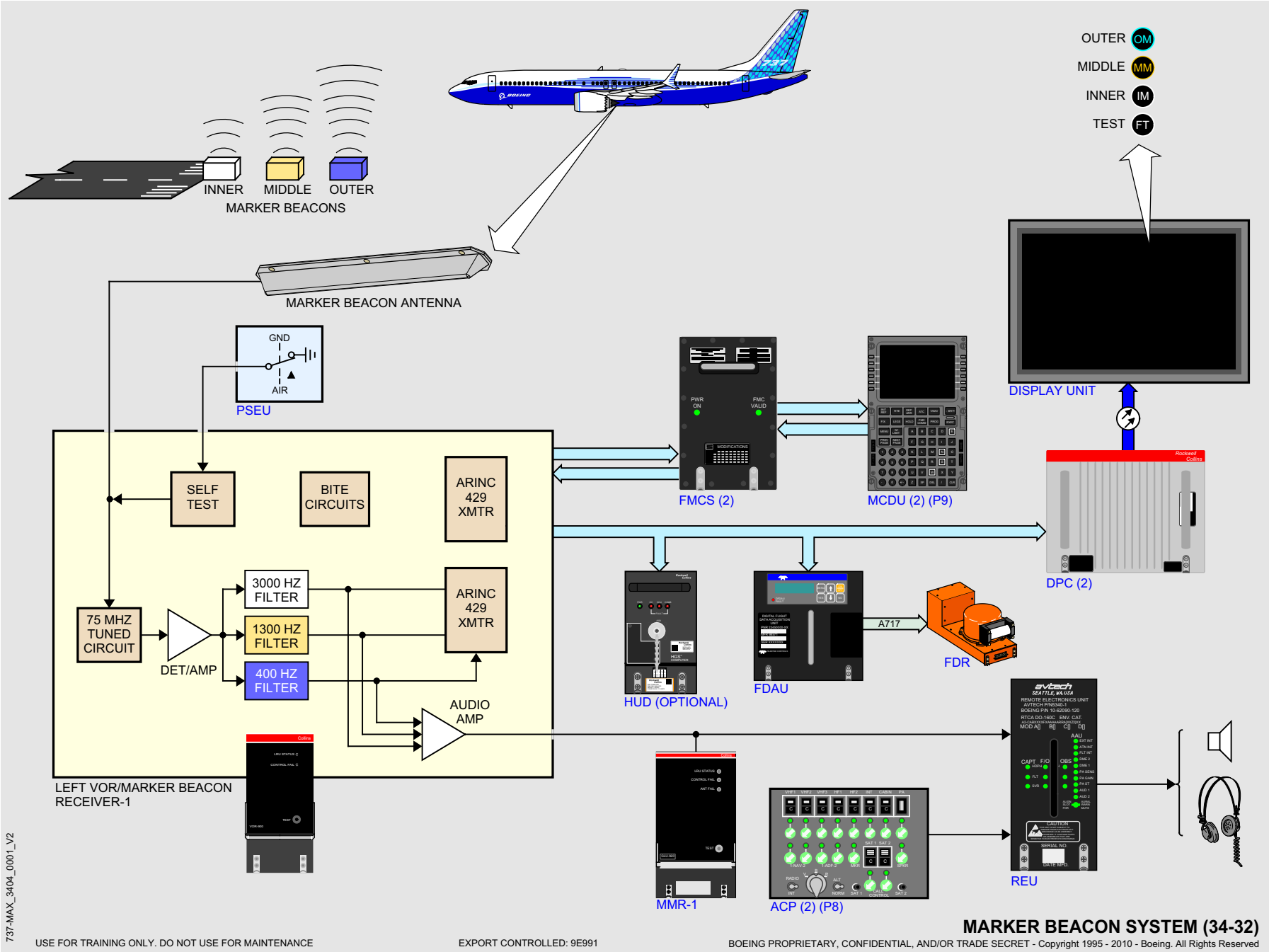

MARKER BEACON SYSTEM (34-32)

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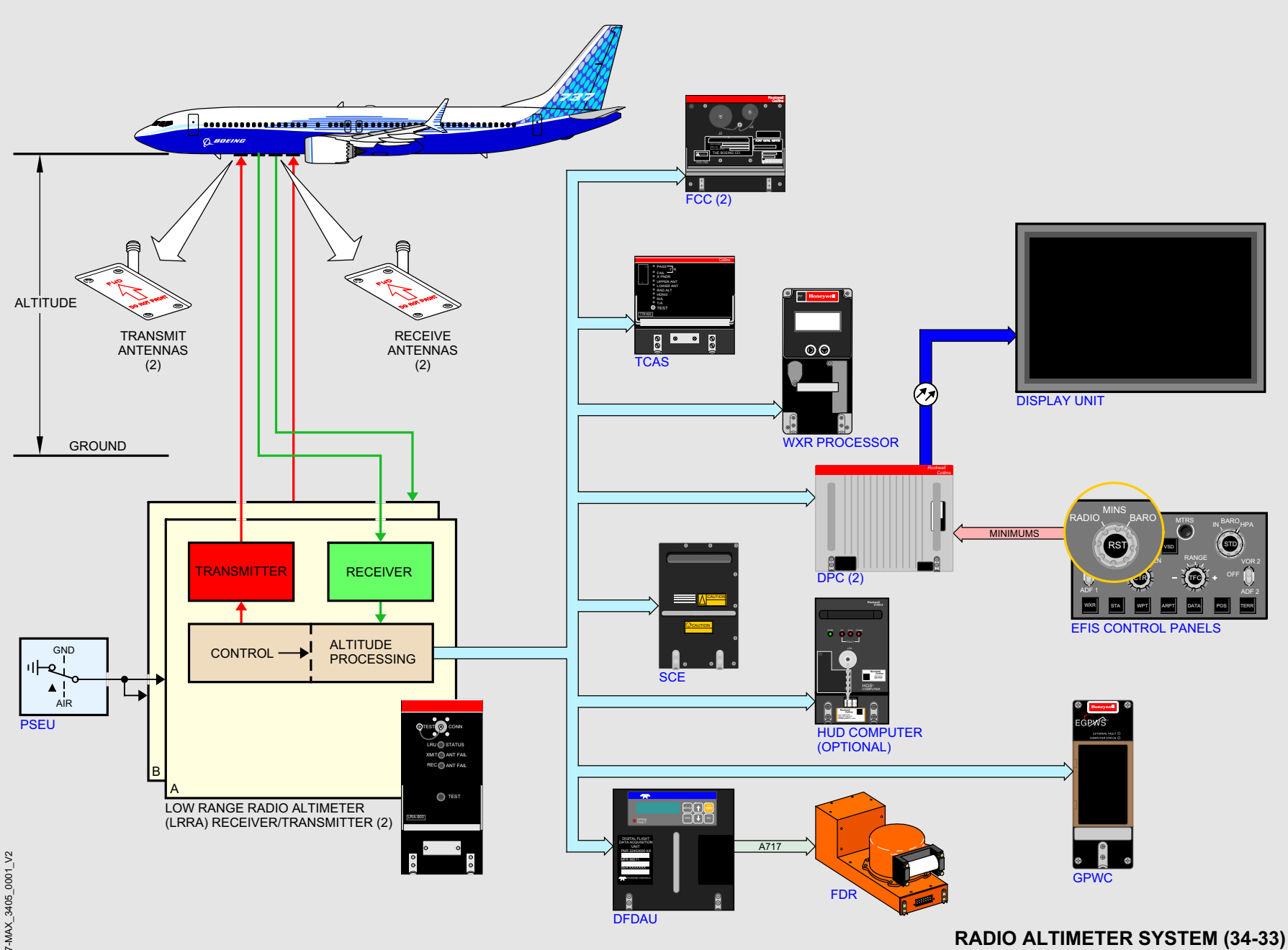

RADIO ALTIMETER SYSTEM (34-33)

737-MAX_3405_0001_V2

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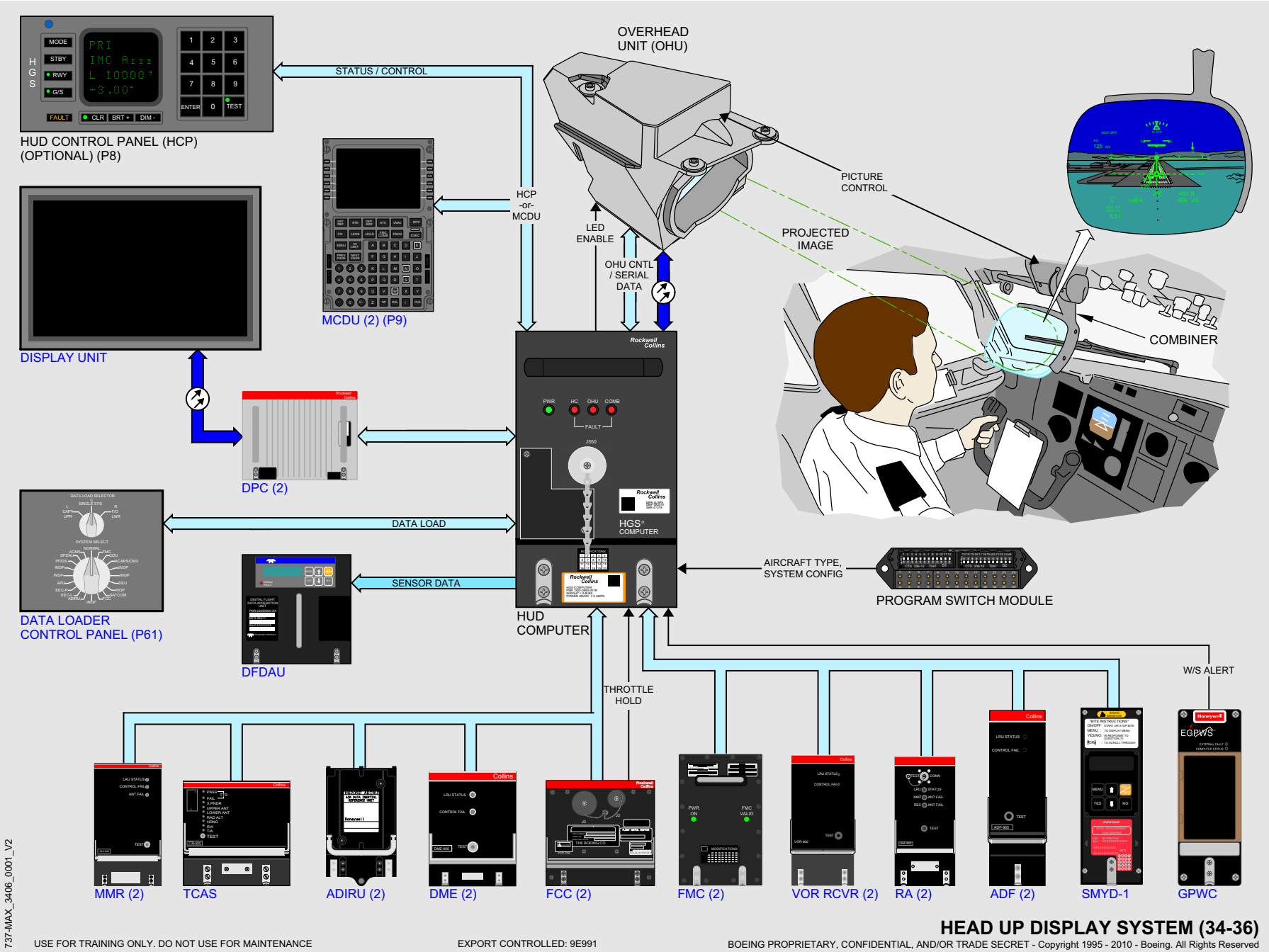

HEAD UP DISPLAY SYSTEM (34-36)

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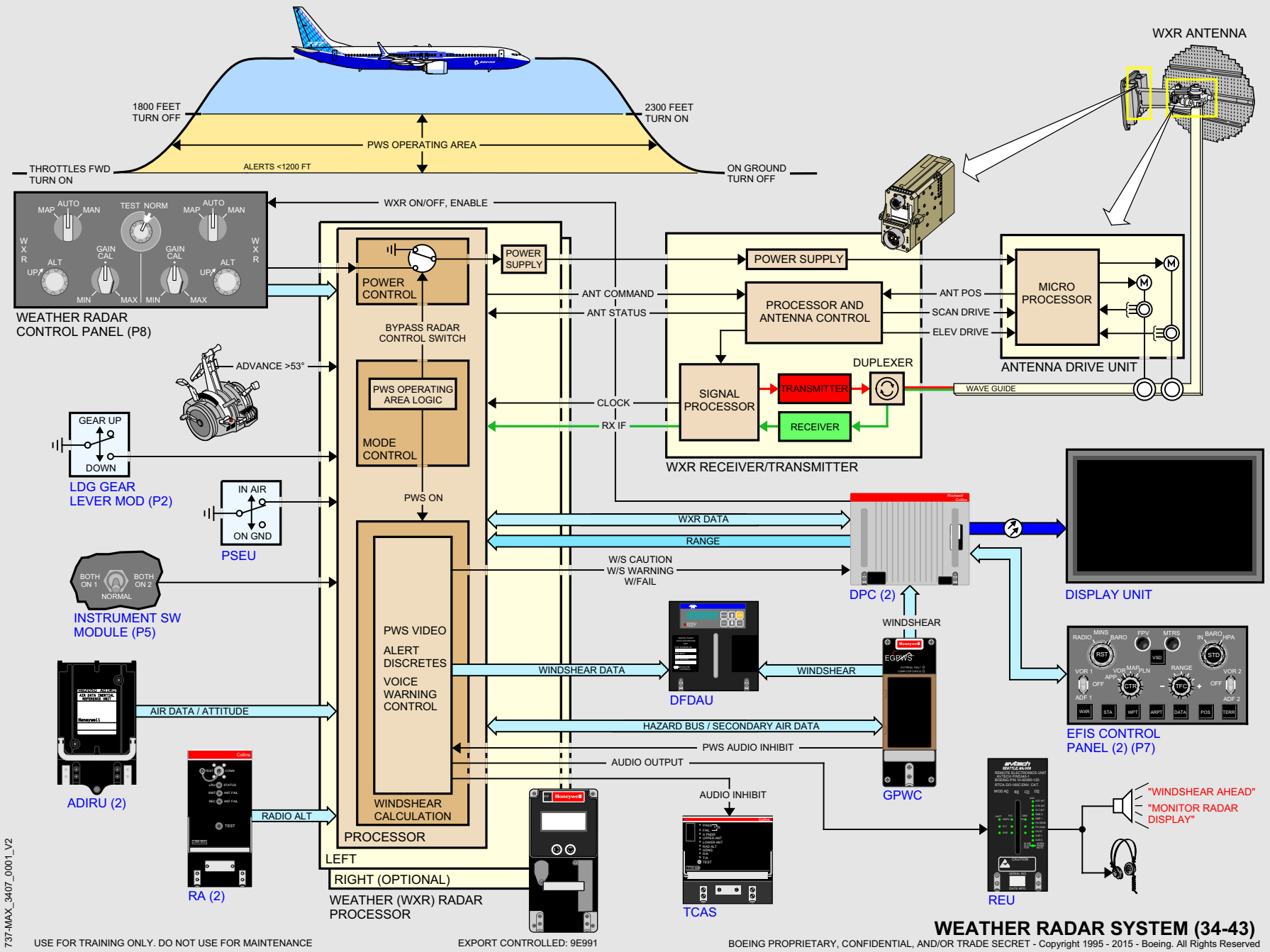

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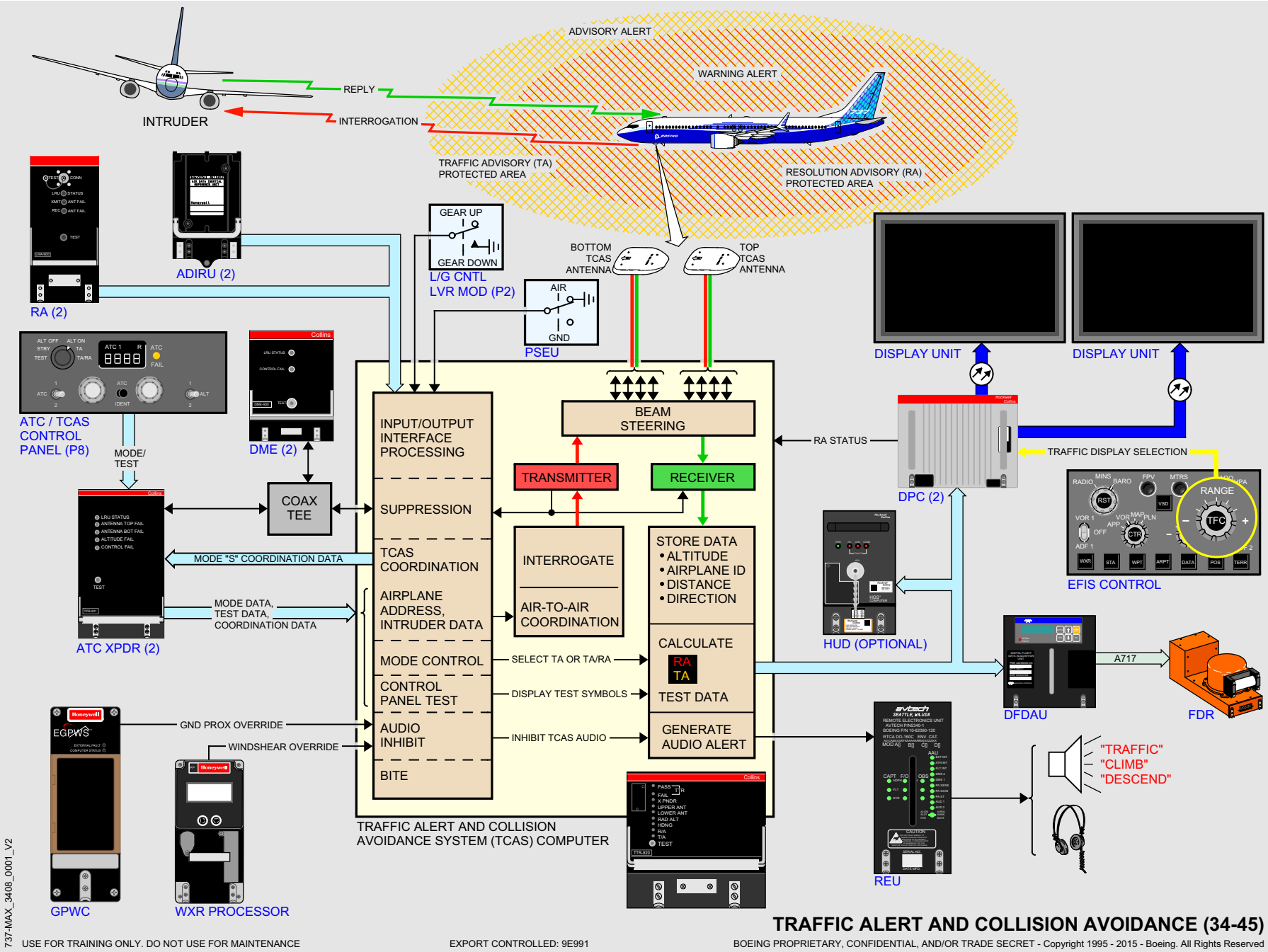

TRAFFIC ALERT AND COLLISION AVOIDANCE (34-45)

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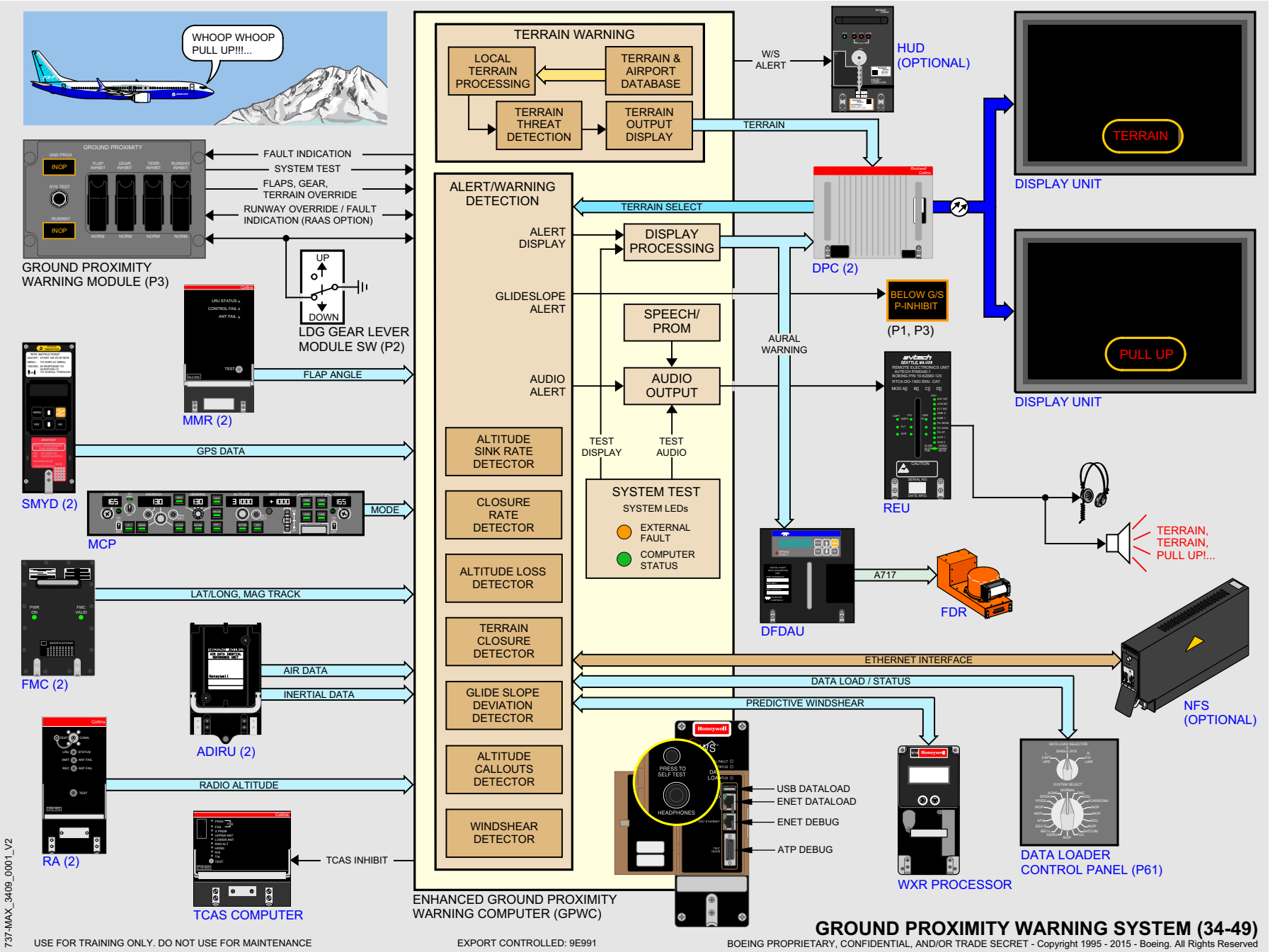

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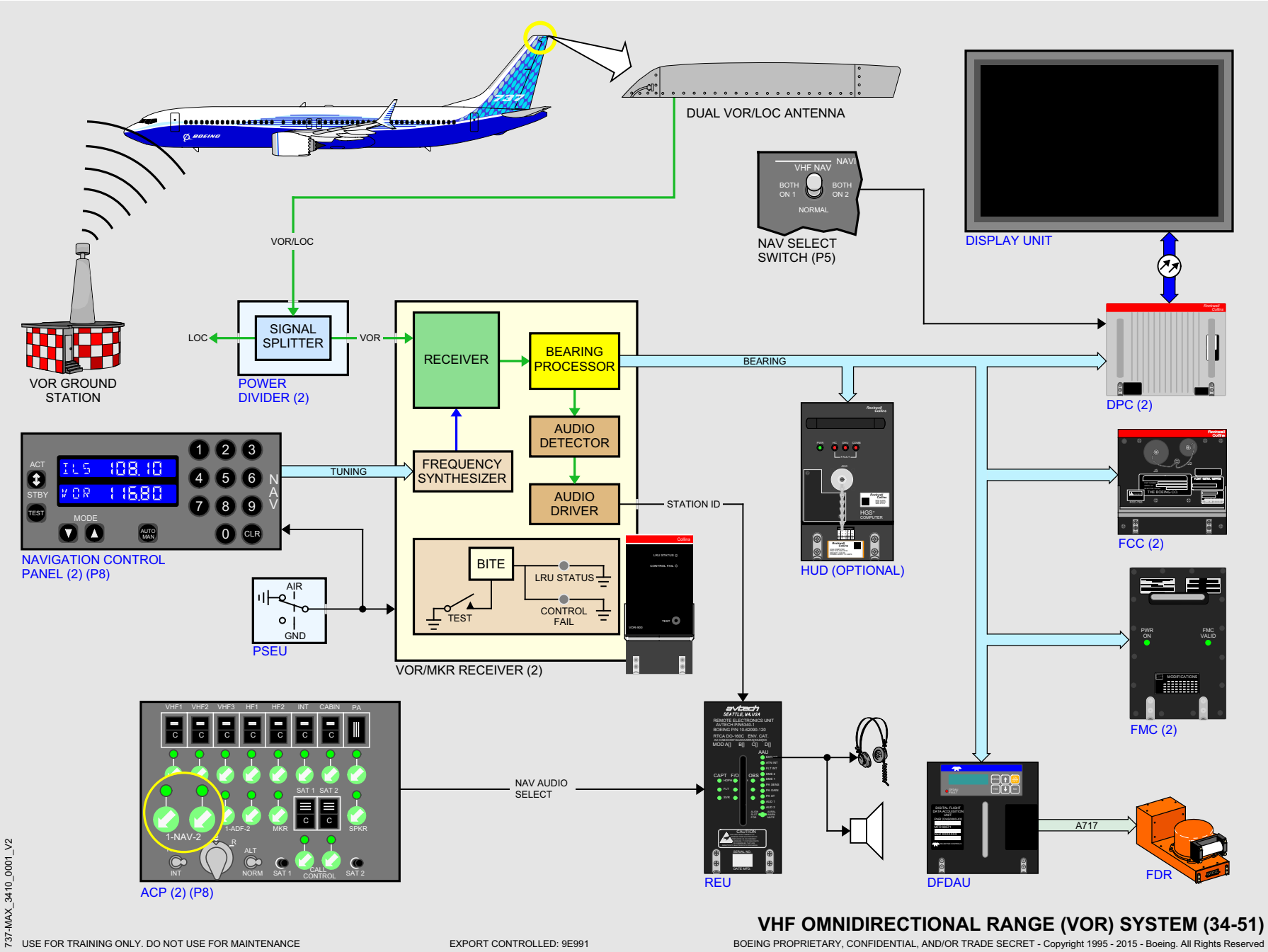

VHF OMNIDIRECTIONAL RANGE (VOR) SYSTEM (34-51)

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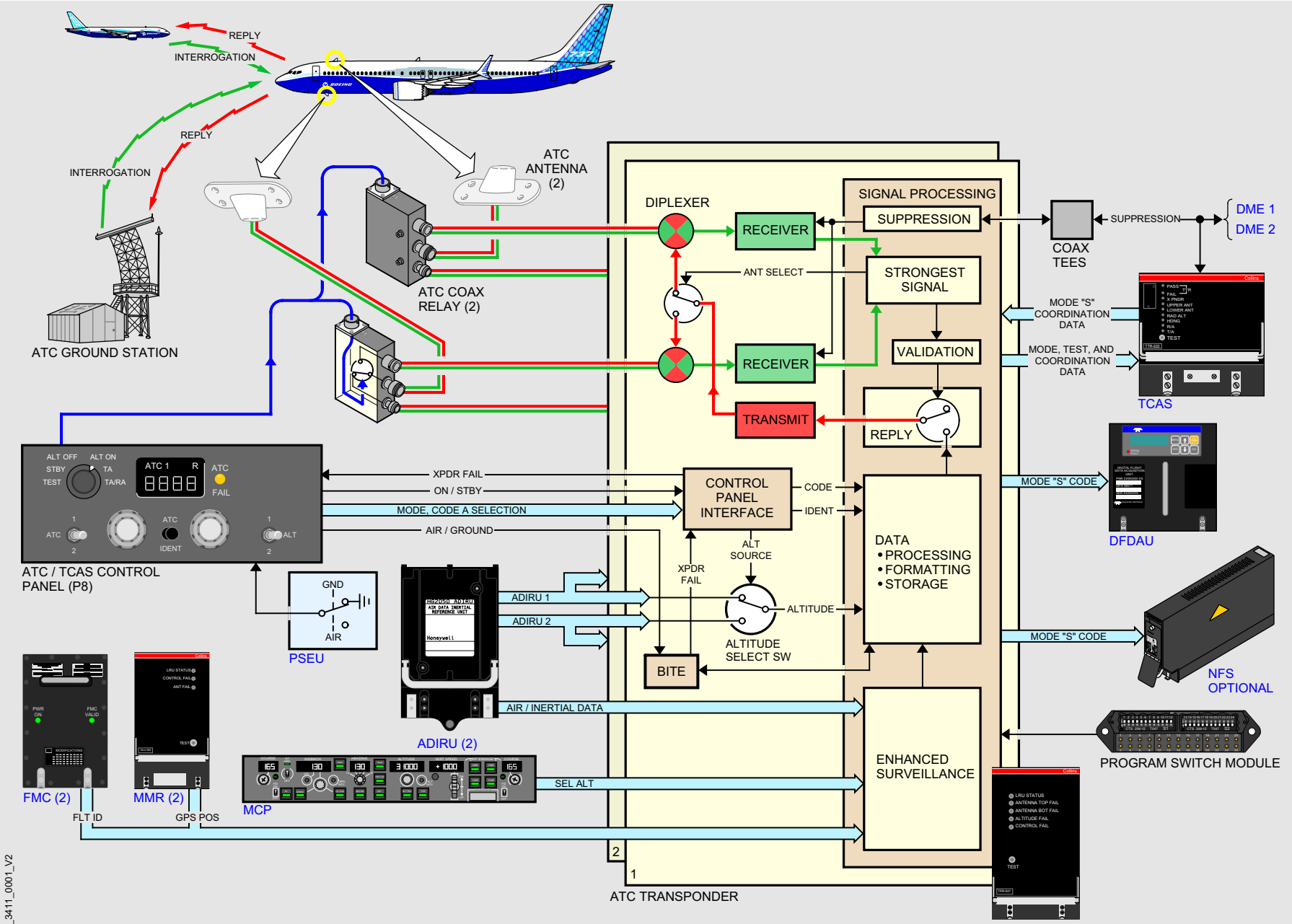

737-MAX_3411_0001_V2

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AIR TRAFFIC CONTROL (ATC) SYSTEM (34-53)

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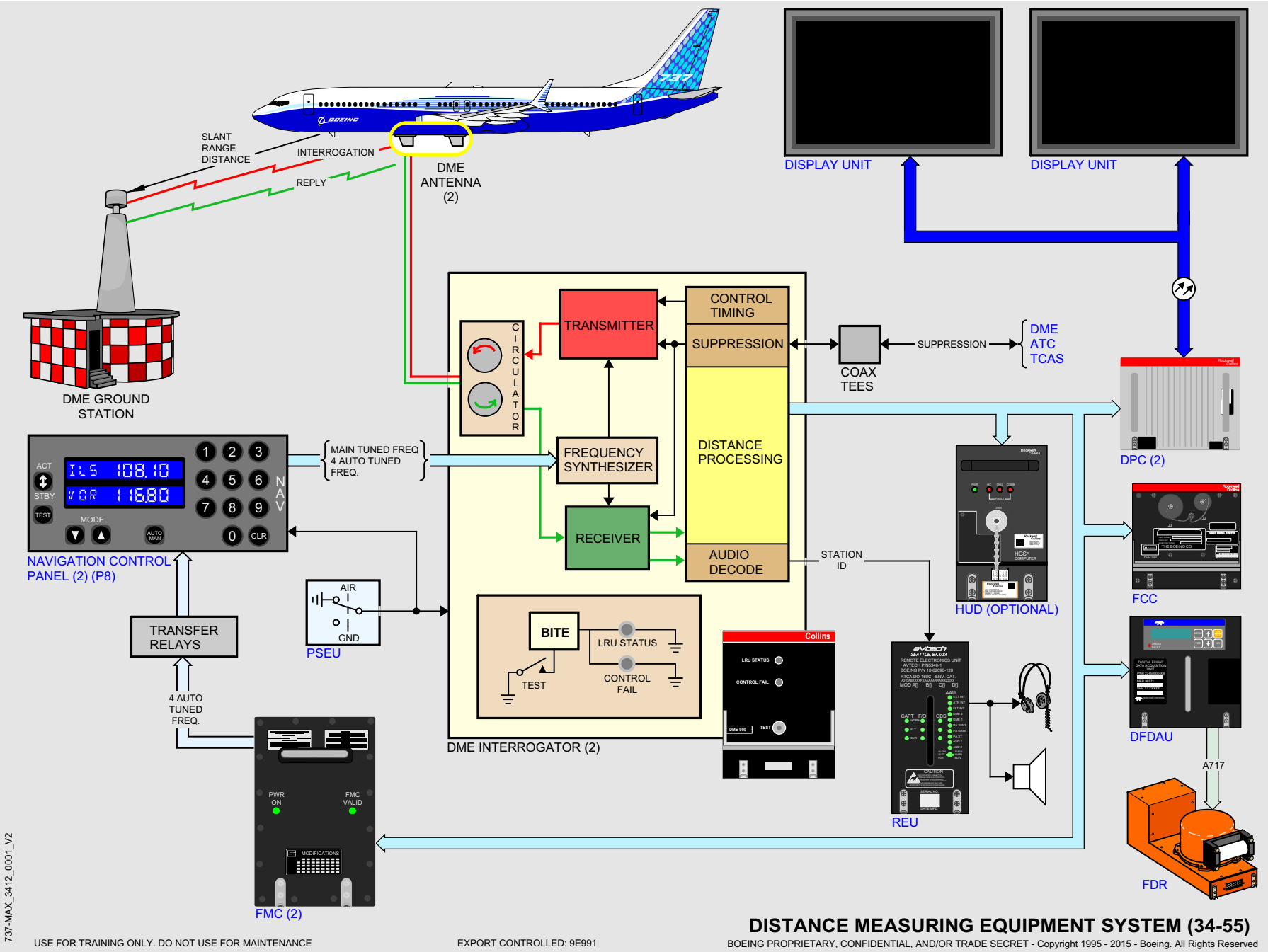

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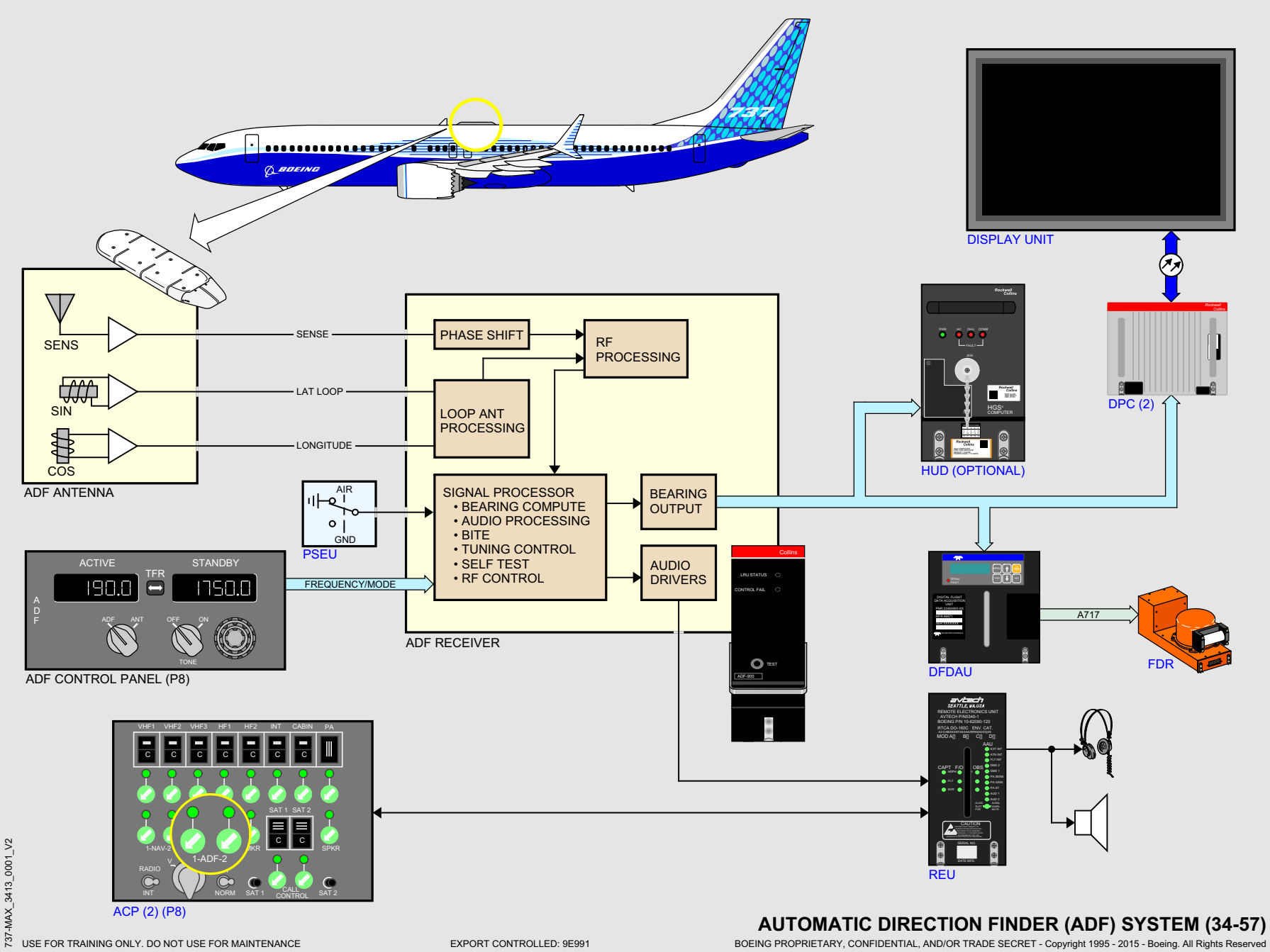

AUTOMATIC DIRECTION FINDER (ADF) SYSTEM (34-57)

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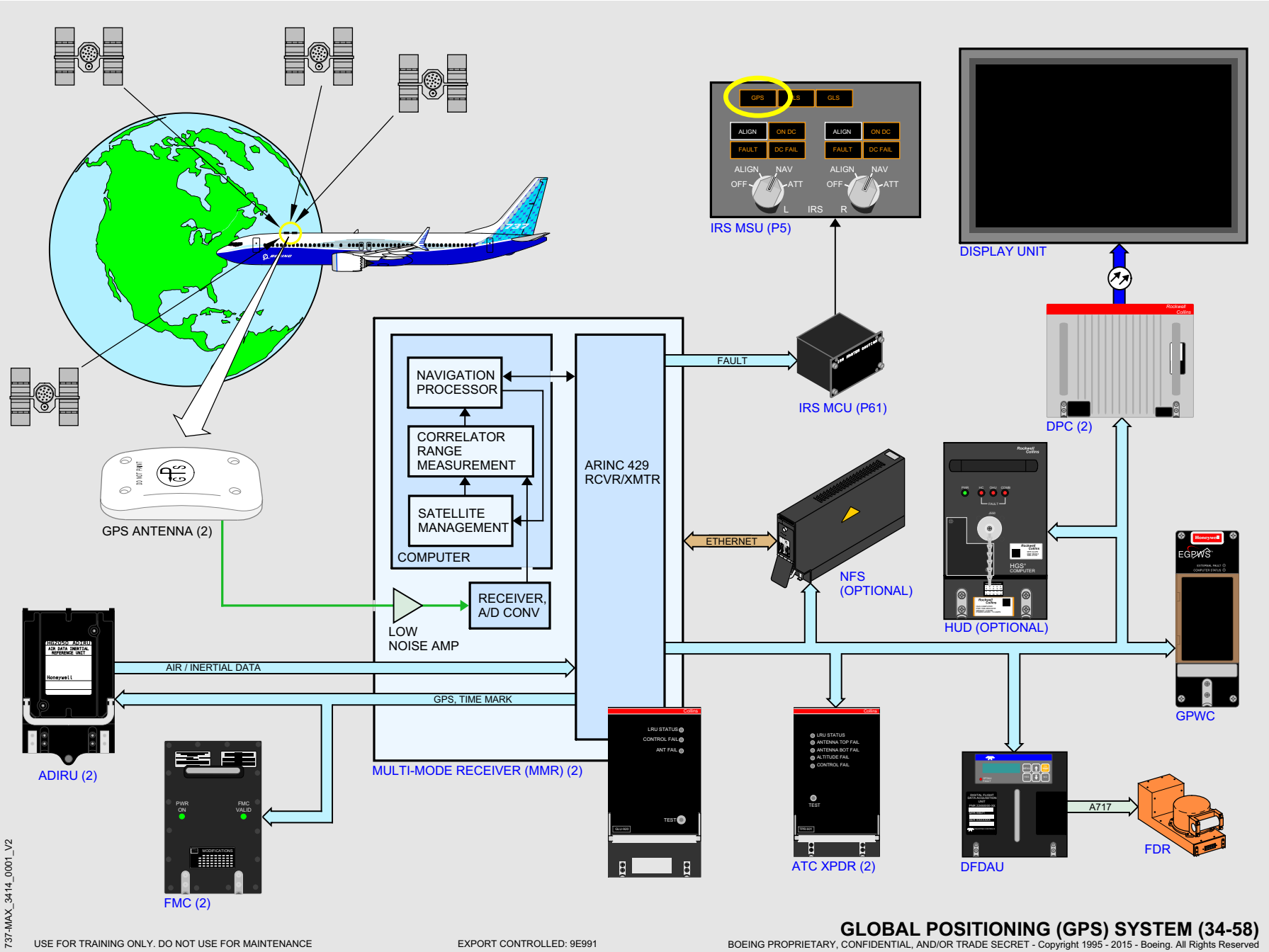

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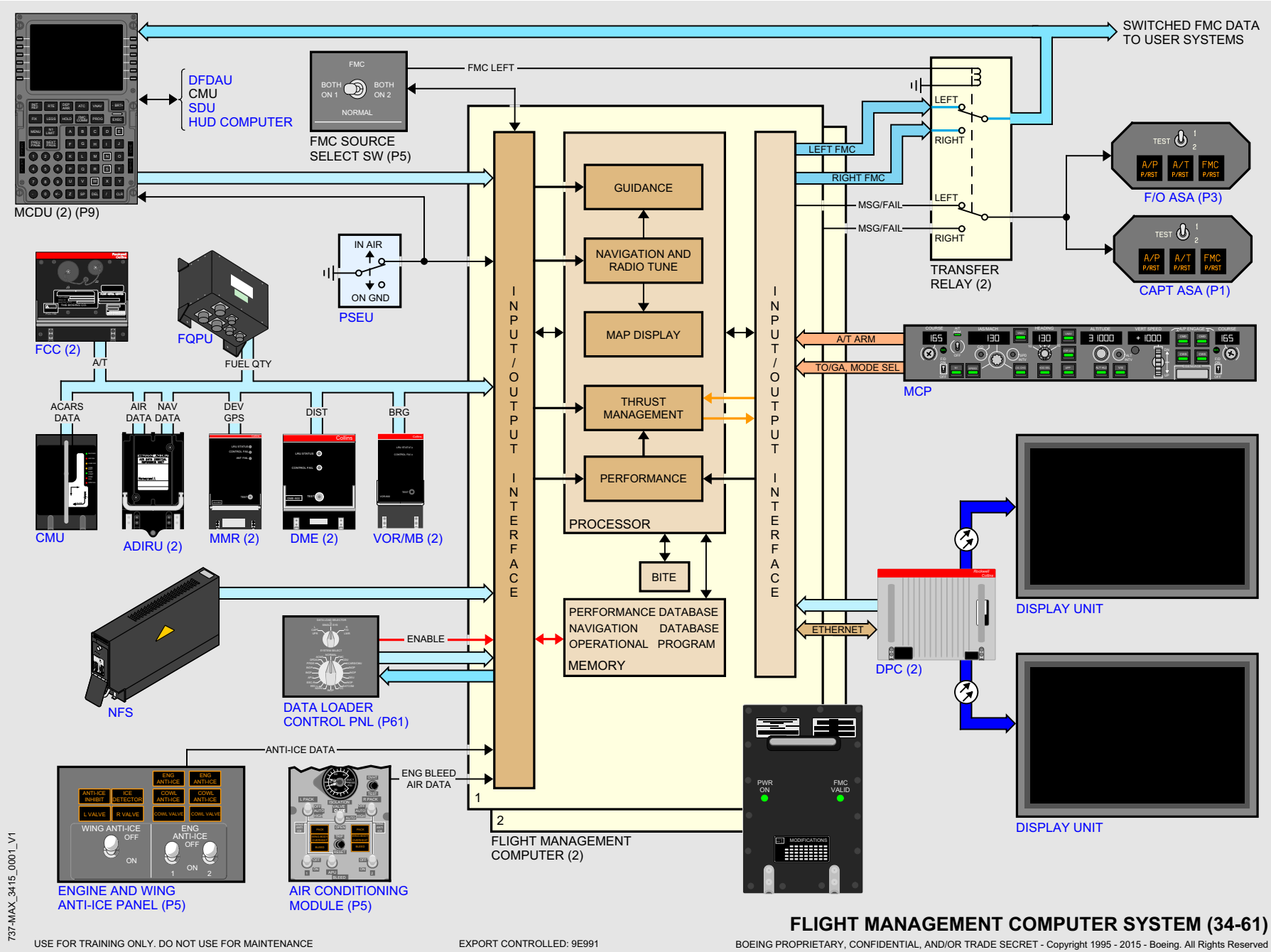

FLIGHT MANAGEMENT COMPUTER SYSTEM (34-61)

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ATA 35

Oxygen

Oxygen (ATA 35)

Oxygen System Module

1 Flight CREW OXYGEN Pressure Indicator

Indicates pressure at the crew oxygen cylinder.

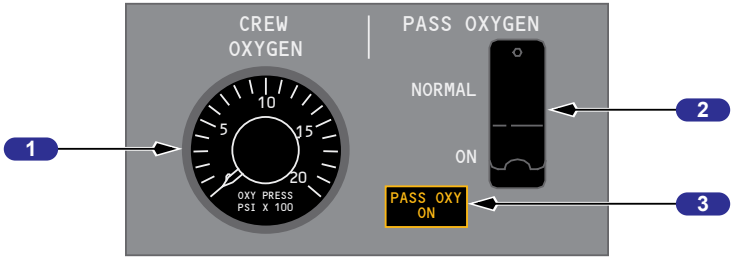
2 Passenger Oxygen (PASS OXYGEN) Switch

NORMAL – (guarded position) passenger masks drop and passenger oxygen system activated automatically if cabin altitude climbs to 14,000 feet

ON – activates system and drops masks if automatic function fails.

3 Passenger Oxygen On (PASS OXY ON) Light

Illuminated (amber) – passenger oxygen system is operating and masks have dropped.



OXYGEN SYSTEM MODULE (AFT P5)

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Crew Oxygen Mask/Stowage Box

1 Oxygen Flow Indicator

Indicates a colored cross when oxygen is flowing.

2 TEST/RESET Switch

Push –

- with the left oxygen mask panel door closed and the OXY ON flag not displayed, turns oxygen on momentarily to test the regulator
- with the left oxygen mask panel door closed and the OXY ON flag displayed will turn oxygen off and disable the mask microphone and enable the boom microphone.

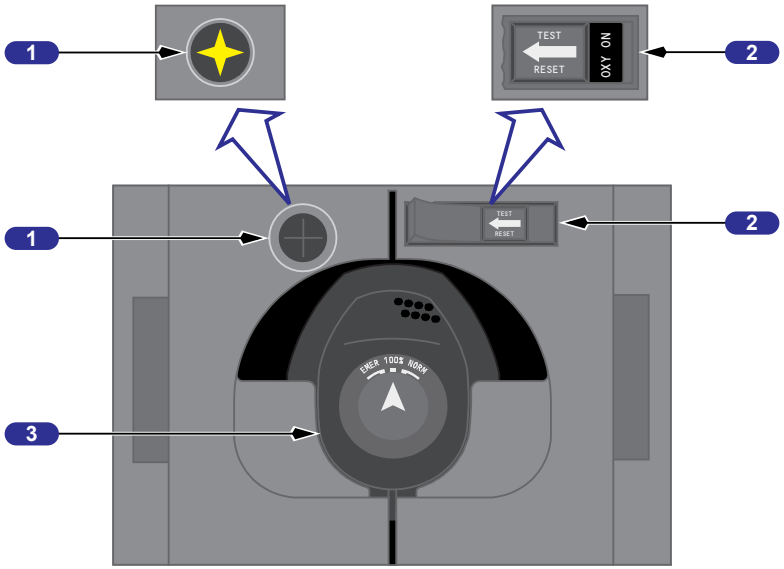
3 Regulator and Inflation Lever (Hidden)

Grasp Regulator and pull up –

- allows mask removal from stowage box
- activates oxygen and microphone when stowage box doors open

Squeeze Inflation Lever –

- inflates harness.



CREWMEMBER STATION

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Crew Oxygen Mask/Stowage Box

1 Oxygen Flow Indicator

Indicates a yellow cross when oxygen is flowing.

2 RESET/TEST Switch

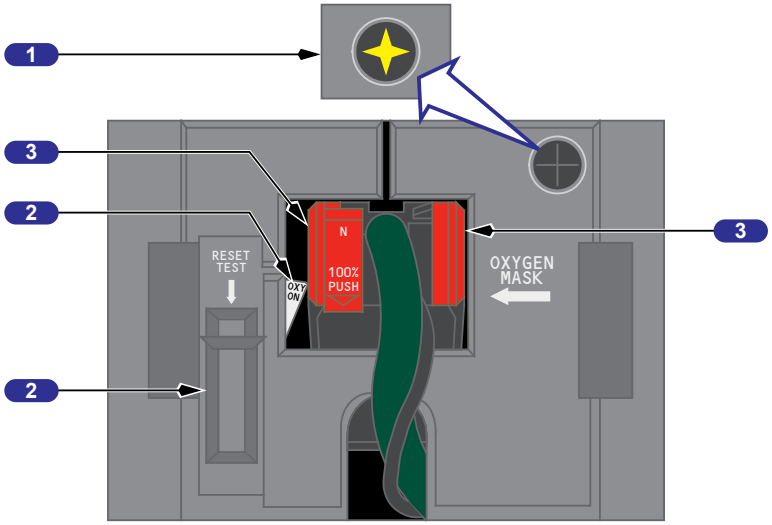
Push –

- if mask is stowed, activates oxygen flow momentarily to test regulator
- if mask is not stowed and stowage box doors are closed, retracts OXY ON flag, shuts off oxygen.

3 Oxygen Mask Release Lever

Squeeze and pull up –

- releases mask from stowage box
- releases OXY ON flag when stowage box doors open
- initiates oxygen flow
- inflates mask harness when inflation lever is squeezed
- flow indicator shows a yellow cross momentarily as harness inflates.



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Oxygen Mask and Regulator

1 Regulator Selector

Rotate –

CAUTION: Use of EMER mode depletes oxygen supply at higher rate than 100% or NORM mode. Use EMER mode only as conditions require.

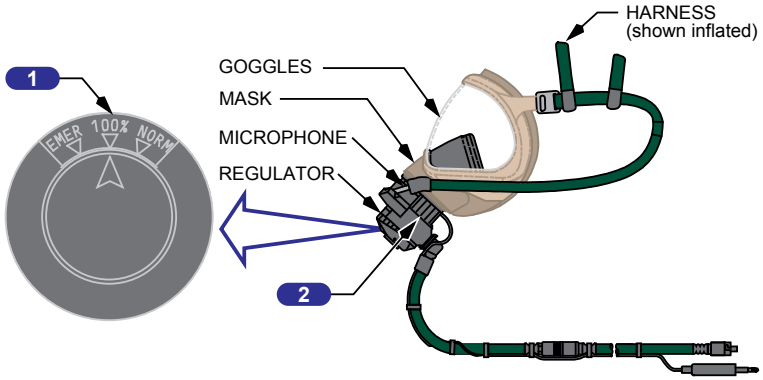
- EMER - supplies 100% oxygen under positive pressure at all cabin altitudes. Use to purge contaminants from mask and to remove condensation or fogging from interior of mask lens.
- 100% - supplies 100% oxygen on demand
- NORM - supplies air/oxygen mixture on demand (ratio depends on cabin altitude)

Note: Communications in EMER mode may be difficult. Switch to 100% or NORM if conditions allow.

2 Inflation Lever

Squeeze –

- inflates mask harness
- flow indicator shows a colored cross momentarily as harness inflates.
- enables the mask microphone when the left oxygen mask panel door is opened
- disables the boom microphone.



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Oxygen Mask and Regulator

1 NORMAL/100% Switch

N (normal) – supplies air/oxygen mixture on demand (ratio depends on cabin altitude).

100% – supplies 100% oxygen on demand.

2 Oxygen Mask Release Lever

Squeeze and Pull –

- inflates mask harness
- flow indicator shows a colored cross momentarily as harness inflates
- enables the mask microphone when the left oxygen mask panel door is opened
- disables the boom microphone.

3 EMERGENCY/PRESS TO TEST Selector

Normal (non-emergency) position - supplies air/oxygen mixture or 100% oxygen on demand, depending upon the position of the Normal/100% switch. Automatically supplies 100% oxygen under positive pressure when cabin altitude is above a preset value.

CAUTION: Use of EMER mode depletes oxygen supply at higher rate than 100% or NORM mode. Use EMER mode only as conditions require.

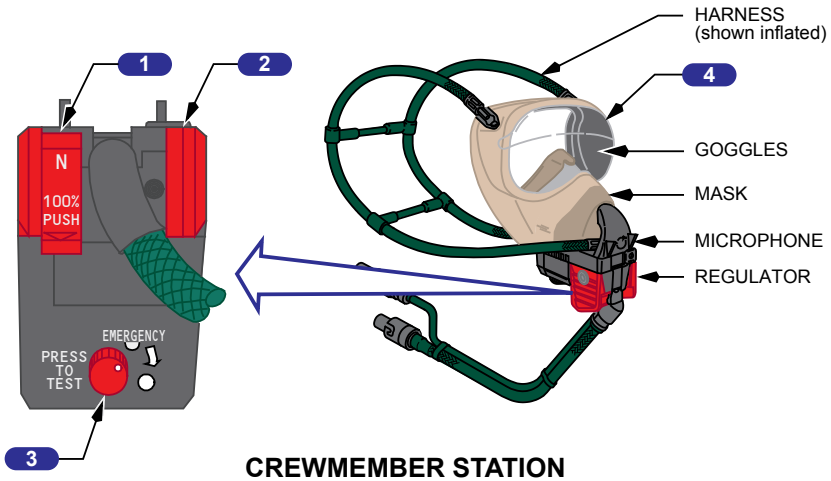
EMERGENCY position (rotate in the direction of the arrow) - supplies 100% oxygen under positive pressure at all cabin altitudes (protects against smoke and harmful vapors). Use to purge contaminants from mask and to remove condensation or fogging from interior of mask lens.

Note: Communications in EMER mode may be difficult. Switch to 100% or NORM if conditions allow.

PRESS TO TEST – tests positive pressure supply to regulator.

4 Protective Strip

There is a protective strip of clear plastic on the top portion of the lens. This strip can be peeled off using the tab on the right side in case of icing caused by a rapid depressurization.



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Oxygen Mask and Regulator

1 NORMAL/100% Switch

N (normal) – supplies air/oxygen mixture on demand (ratio depends on cabin altitude).

100% – supplies 100% oxygen on demand.

2 Oxygen Mask EMERGENCY/Test Selector (rotary)

Normal (non-emergency) position - supplies air/oxygen mixture or 100% oxygen on demand, depending upon the position of the Normal/100% switch. Automatically supplies 100% oxygen under positive pressure when cabin altitude is above a preset value.

CAUTION: Use of EMER mode depletes oxygen supply at higher rate than 100% or NORM mode. Use EMER mode only as conditions require.

EMERGENCY position (rotate in the direction of the arrow) - supplies 100% oxygen under positive pressure at all cabin altitudes (protects against smoke and harmful vapors).

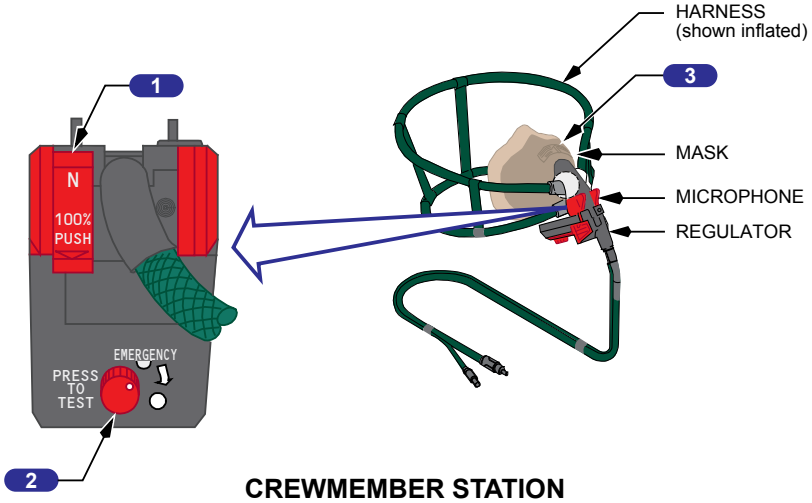
Note: Communications in EMER mode may be difficult. Switch to 100% or NORM if conditions allow.

PRESS TO TEST – tests positive pressure supply to regulator.

3 Smoke Vent Valve Selector

Up - vent valve closed.

Down - vent valve open, allowing oxygen flow to smoke goggles.



CREWMEMBER STATION

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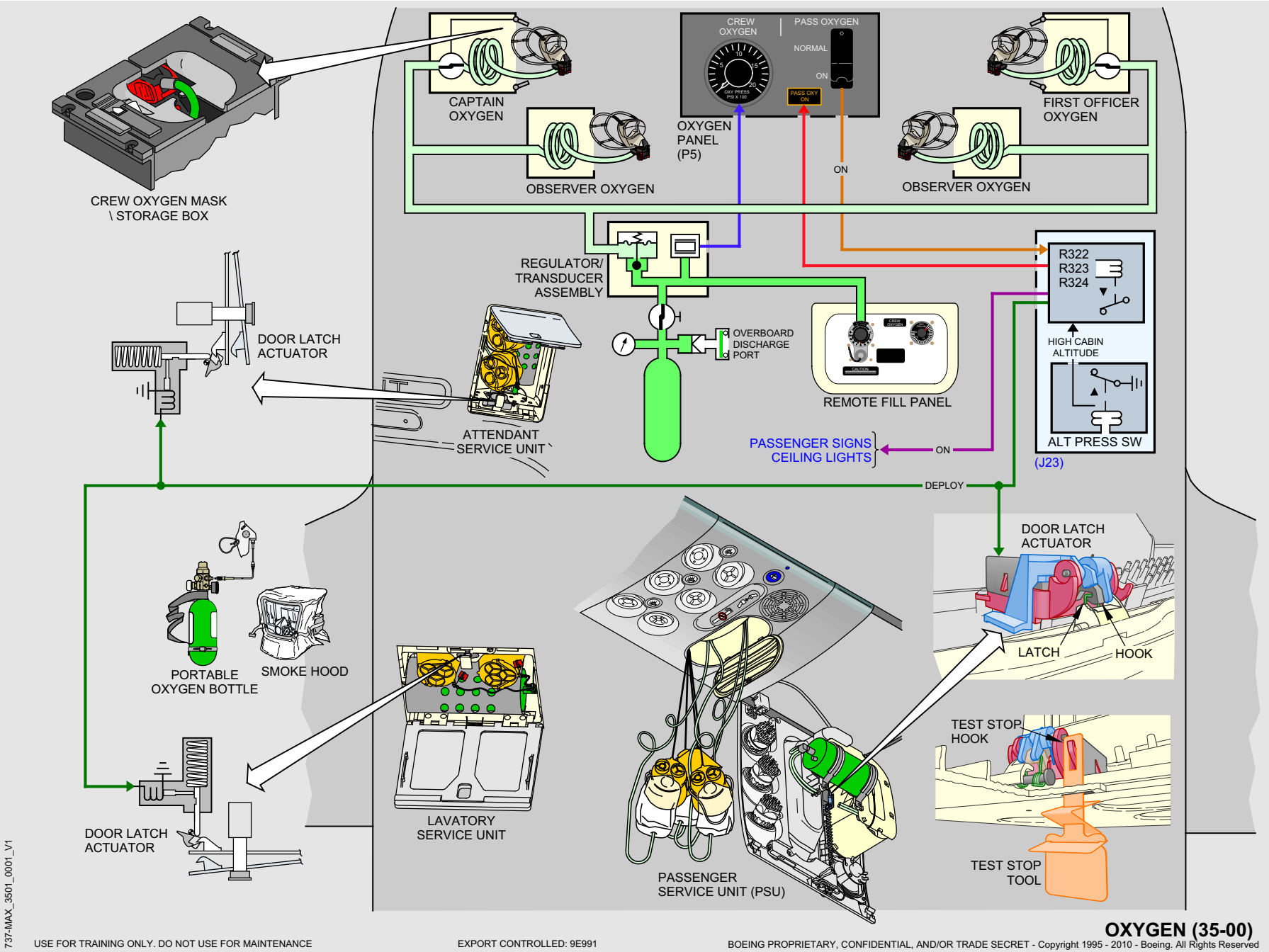

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OXYGEN (35-00)

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ATA 36

Pneumatics

Pneumatics (ATA 36)

Bleed Air Controls and Indicators

1 DUAL BLEED Light

Illuminated (amber) – APU bleed air valve open and engine 1 BLEED air switch in the ON position, or engine 2 BLEED air switch in the ON position, APU bleed air valve and isolation valve open.

2 ISOLATION VALVE Switch

CLOSE – closes isolation valve.

AUTO –

- closes isolation valve if both engine BLEED air switches are in the ON position and both PACK switches are in the AUTO or HIGH position
- opens isolation valve automatically if either engine BLEED air or PACK switch is in the OFF.

OPEN – opens isolation valve.

3 WING–BODY OVERHEAT Light

Illuminated (amber) –

- left light indicates overheat from pneumatic manifold duct leak in left engine strut, left inboard wing leading edge, left air conditioning bay, keel beam or APU bleed air duct
- right light indicates overheat from pneumatic manifold duct leak in right engine strut, right inboard wing leading edge or right air conditioning bay.

4 Engine BLEED Air Switches

OFF – closes related pressure regulator and shutoff valve (PRSOV).

ON – opens related PRSOV when engines are operating.

5 APU BLEED Air Switch

OFF – closes APU bleed air valve.

ON – opens APU bleed air valve when APU is operating.

6 Bleed Air DUCT PRESSURE Indicator

Indicates pressure in L and R (left and right) bleed air ducts.

7 Wing–Body Overheat (OVHT) TEST Switch

Push –

- tests wing–body overheat detector circuits
- illuminates both WING–BODY OVERHEAT lights.

8 BLEED Light

Illuminated (amber) – excessive engine bleed air temperature, over-pressure, or under-pressure

- related PRSOV closes automatically
- requires reset.

9 TRIP RESET Switch

Push (if fault condition is corrected) –

- resets BLEED TRIP OFF, PACK and ZONE TEMP lights
- related engine bleed valve opens, or related pack valve opens, or related trim air modulating valve opens
- lights remain illuminated until reset.

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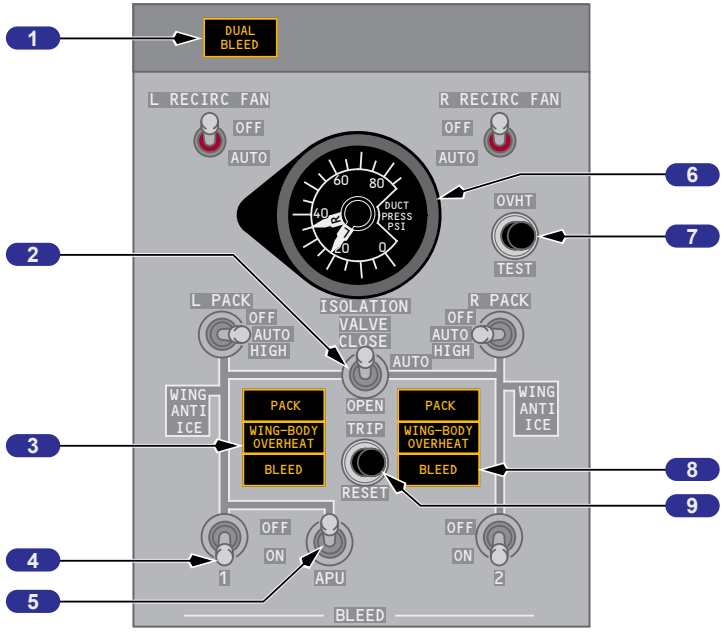

AIR CONDITIONING MODULE (FWD P5)

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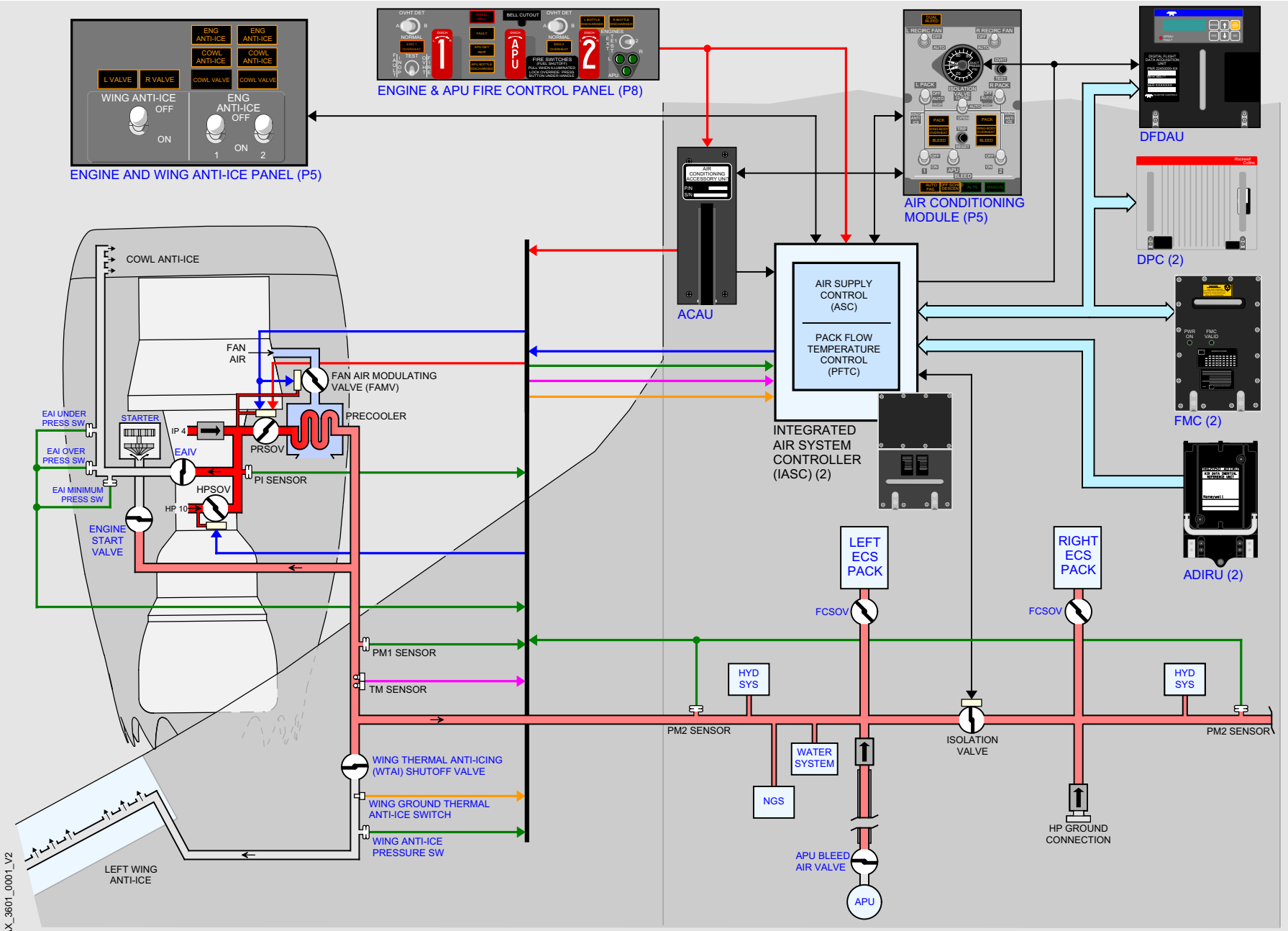

PNEUMATIC - ENGINE BLEED AIR (36-00)

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ATA 38

Water/Waste

Water/Waste (ATA 38)

Water System Controls

1 Potable Water Indicator

Indicates quantity of potable water in the water tank.

2 Water Service Panel

3 Fill Fitting

Used to fill tank.

4 Fill and Overflow Valve Handle

Open – enables filling or gravity draining water tank.

Closed – normal position.

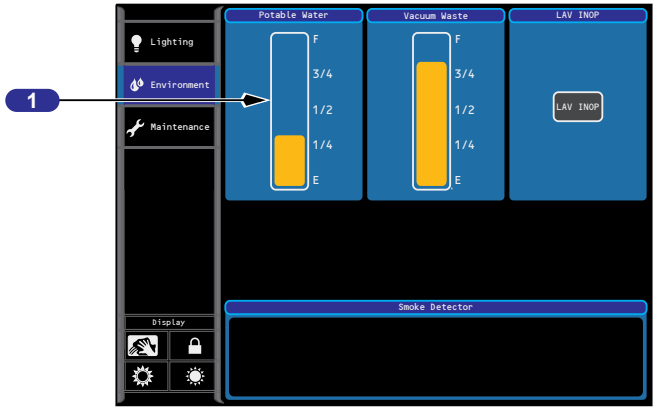
5 Water Tank Drain Valve Handle

Open – drains water from tank.

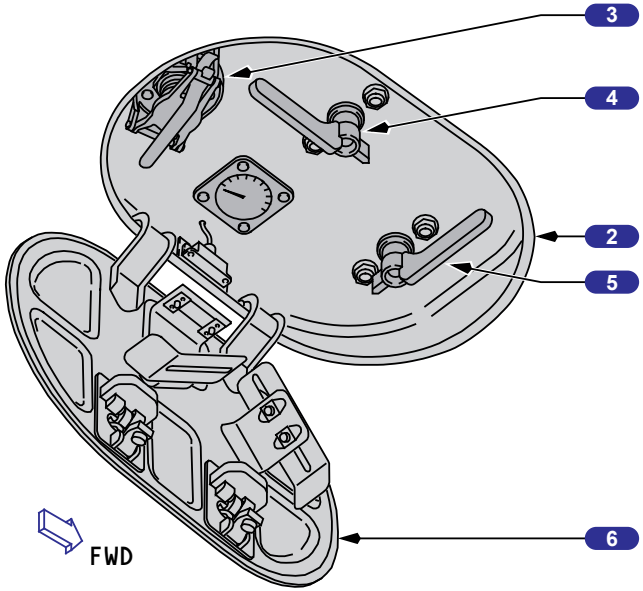
Closed – normal position.

6 Water Service Panel Door

Cannot be closed unless the Fill and Overflow Valve and Tank Drain Valve Handles are in the closed position.



AFT ATTENDANT CONTROL PANEL



WATER SERVICE PANEL

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Lavatory Controls

1 Water Heater Power Switch

On – activates the water heater.

2 Water Heater Power Indicator Light

Illuminated – heater operating.

3 Water Heater Temperature Selector Switch

4 Lavatory Water Supply Shutoff Valve

Each lavatory has a Lavatory Water Supply Shutoff Valve. The Valve has four positions, and is located in the cabinet below the sink.

SUPPLY ON – Normal operating position. When the water system is depressurized, all lavatories except “A” will drain. In this lavatory, the drain valve must be opened to drain the lavatory

FAUCET ONLY – In this position, water is supplied to the faucet, but not to the toilet

TOILET ONLY – In this position, water is supplied to the toilet, but not to the faucet

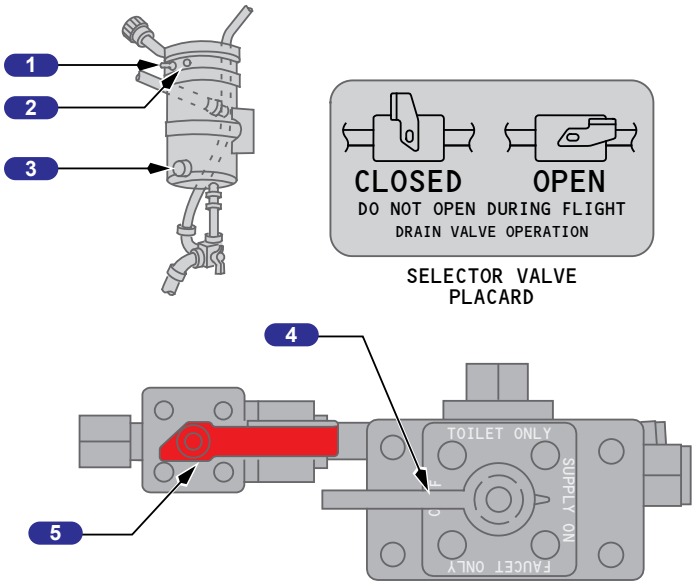
OFF – No water is supplied to the lavatory.

5 Forward Lavatory Drain Valve (red)

Located in the forward lavatory only.

OPEN – lets the potable water in the forward lavatory and forward section of the plane drain overboard.

CLOSED – prevents potable water draining overboard.



LAVATORY SINK CABINET

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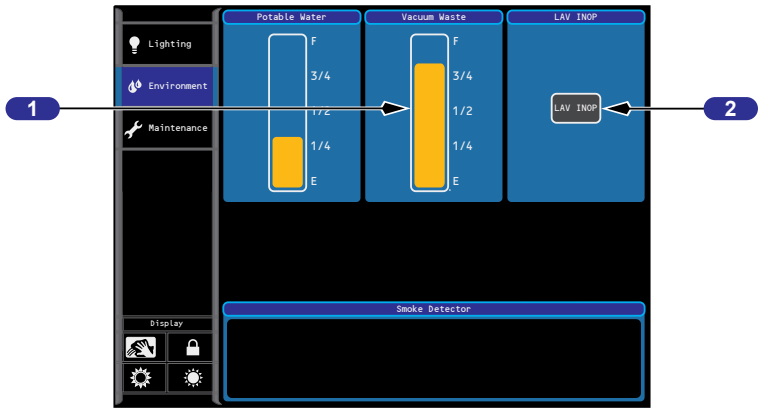
Aft Attendant Control Panel

1 Vacuum Waste Indicator

Indicates quantity of waste in the waste tank.

2 Lavatory Inoperable (LAV INOP)

Illuminated – toilets are not operable.



AFT ATTENDANT CONTROL PANEL

Waste Service Panel

1 Service Panel Waste Quantity Indicator

Indicates quantity of waste in the waste tank.

2 Service Panel Sensor Fouled Indicator (amber)

Illuminated – sensors require cleaning.

3 Waste Drain Ball Valve Control Handle

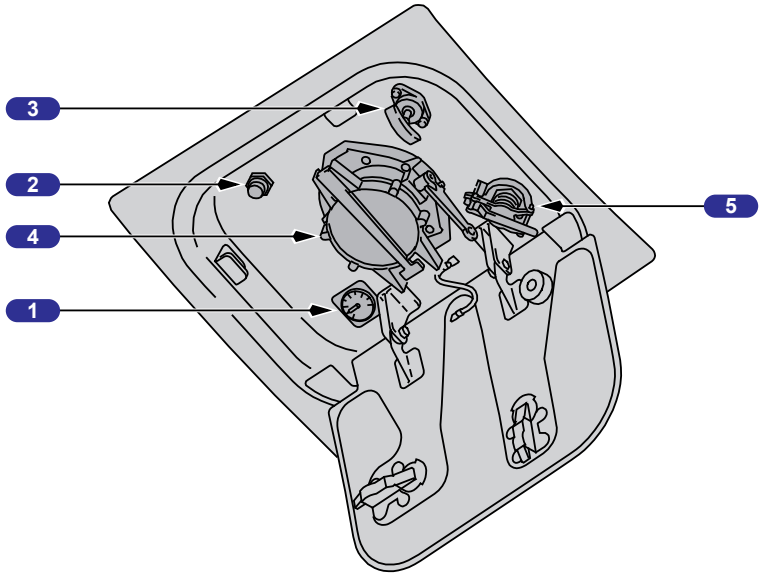
Pull to open the waste tank drain ball valve.

4 Waste Drain Valve Assembly

Open cap to connect external drain line.

5 Waste Tank Rinse Fitting Assembly

Connection for rinse water hose to put chemical precharge in the tank.



WATER SERVICE PANEL

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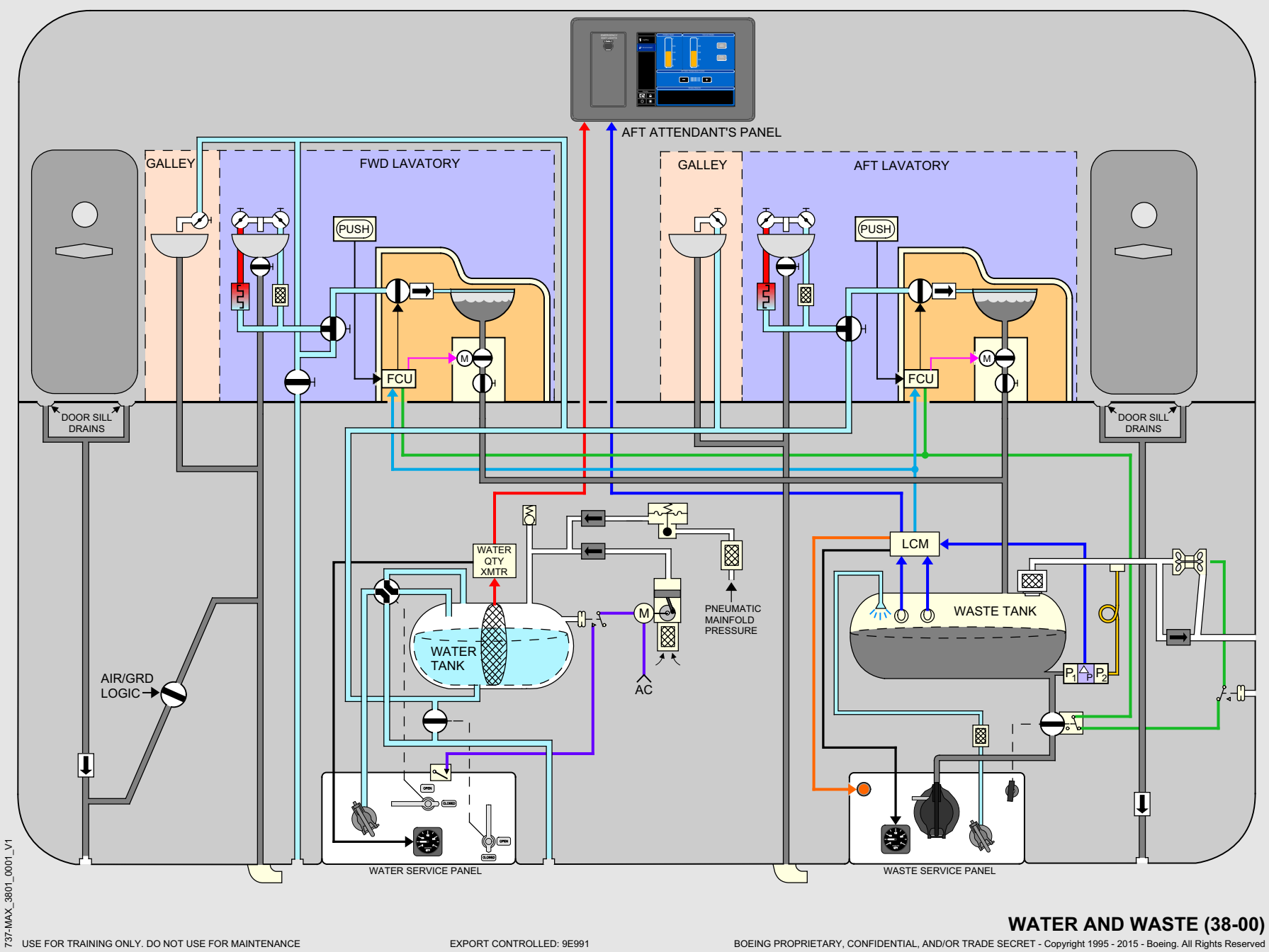

WATER AND WASTE (38-00)

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ATA 46

Information Systems

Information Systems (ATA 46)

Introduction

The Onboard Network System (ONS) is a computer information system that supports flight, maintenance, and cabin operations.

The main hardware component of this system is the Network File Server (NFS). The server controls communication between connected airplane systems. With optional communications equipment installed, the NFS can support network connections between airplane systems and ground-based networks.

The NFS hosts the mass storage device (MSD) function that gives software parts and data storage capacity. The NFS can also operate installed applications that support maintenance actions and cabin operations.

An approved Maintenance Laptop (ML), or other Portable Maintenance Device (PMD) gives access to the ONS user interface. Also, the two inboard Max System Displays in the flight compartment give access to the ONS user interface. The tool is connected to a network data port using an Ethernet cable, and can also connect wirelessly is optional equipment is installed. The NFS operates as a web server, and hosts the ONS maintenance browser interface.

1 Data Loader Control Panel

2 MAINT SELECTOR (outer)

L – Left Multi-Function Display

R – Right Multi-Function Display.

3 MAINT (SEL) SELECTOR (inner)

ROTATE – tabs through the selectable display screen elements

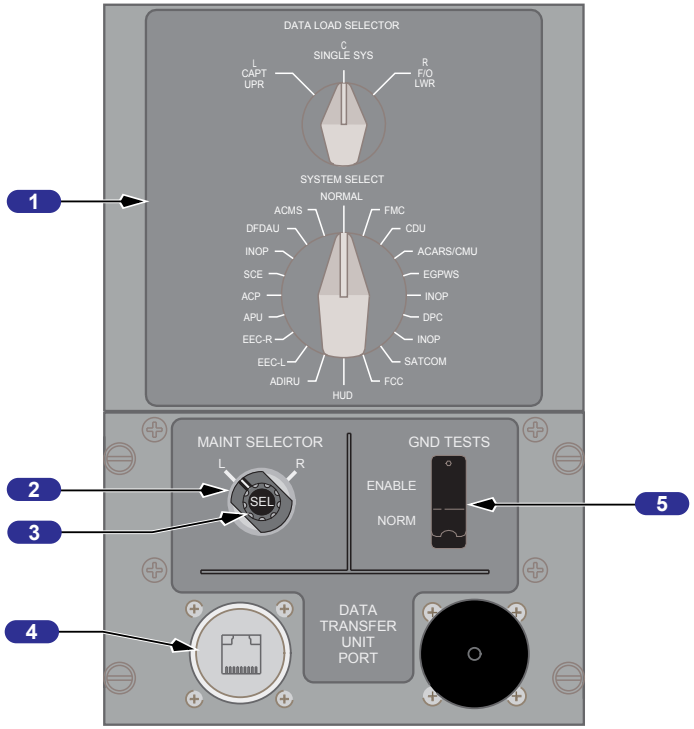
PUSH – activates the screen element's intended behavior.

4 DATA TRANSFER UNIT (ONS) Port

5 Ground (GND) TESTS switch

ENABLE – enables ground testing

NORM – normal position.



(P61) PANEL

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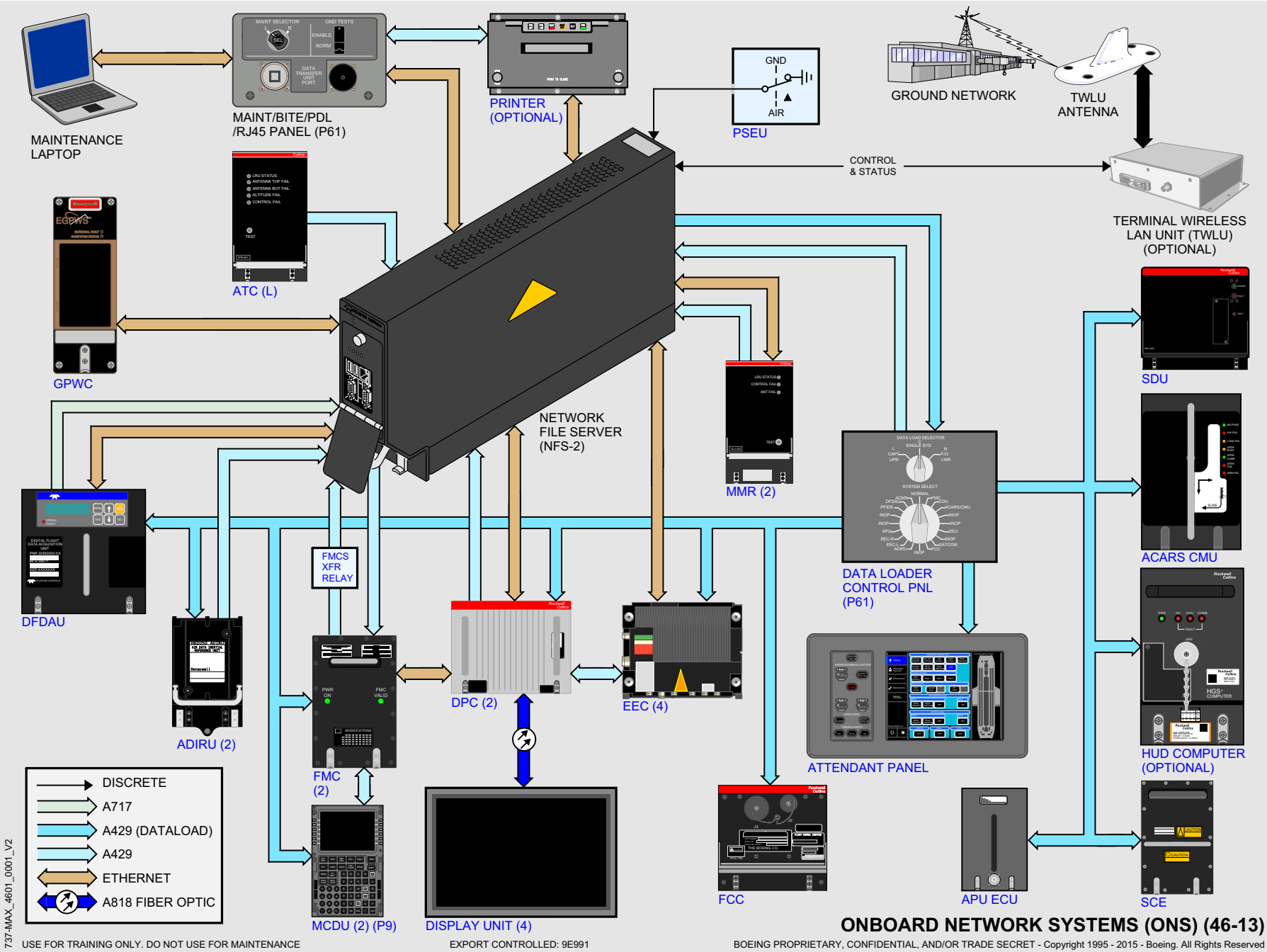

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ATA 47

Nitrogen Generation System (NGS)

Nitrogen Generation System (NGS) (ATA 47)

Nitrogen Generation System (NGS) Operability Indicator

1 OPERATIONAL Light (green)

NGS is fully operational.

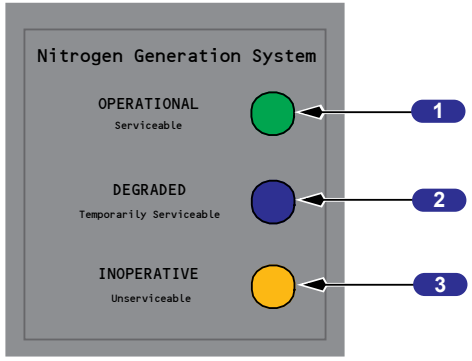
2 DEGRADED Light (blue)

NGS is operational, but is operating in a degraded condition.

3 INOPERATIVE Light (amber)

NGS is inoperative.

Note: No lights illuminated also indicates NGS is inoperative.



OPERABILITY INDICATOR (RIGHT MAIN WHEEL WELL)

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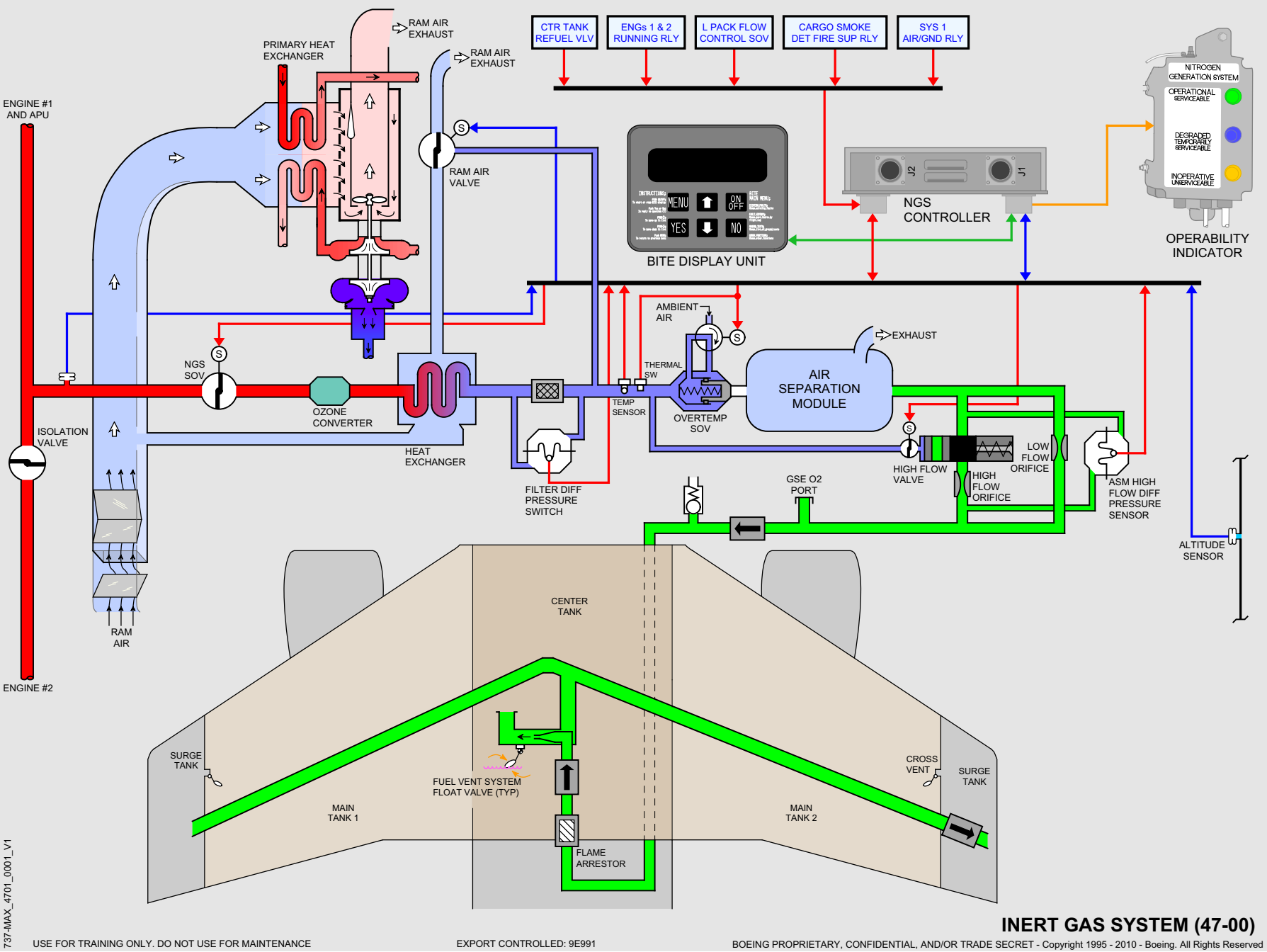

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ATA 49

Auxiliary Power Unit (APU)

Auxiliary Power Unit (APU) (ATA 49)

APU Controls

1 APU Door (DOOR) Light

Illuminated (amber) – APU door is not in the commanded position:

- APU door is open when APU is shut down (in air or on ground)
- APU door is open to ground detent or any position other than flight detent while the airplane is in-flight.

2 APU OVERSPEED Light

Illuminated (amber) –

- APU RPM limit has been exceeded resulting in an automatic shutdown
- overspeed shutdown protection feature has failed a self–test during a normal APU shutdown
- if light is illuminated when the APU switch is placed to OFF, light extinguishes after 5 minutes
- light is disarmed when the APU switch is in OFF position.
- fuel solenoid valve remains open

3 APU FAULT Light

Illuminated (amber) –

- a fault is detected which caused a protective shutdown
- if the light is illuminated when the APU switch is placed to OFF, light extinguishes after 5 minutes
- light is disarmed when the APU switch is in the OFF position.

4 APU LOW OIL PRESSURE Light

Illuminated (amber) –

- during start until the APU oil pressure is normal
- after the APU start is complete low oil pressure caused a protective shutdown
- if light is illuminated when the APU switch is placed to OFF, light extinguishes after 5 minutes
- light is disarmed when the APU switch is in OFF position.

5 APU Switch

OFF – normal position when APU is not running

- with the APU running trips the APU generator off the bus(es), and closes the APU bleed air valve. after a 60 second cool down the fuel shutoff valve closes and then the APU inlet door closes

ON – normal position when the APU is running, opens the fuel shutoff valve and the APU air inlet door.

START (momentary) – positioning the APU switch from OFF to START and releasing it to ON, initiates an automatic start sequence.

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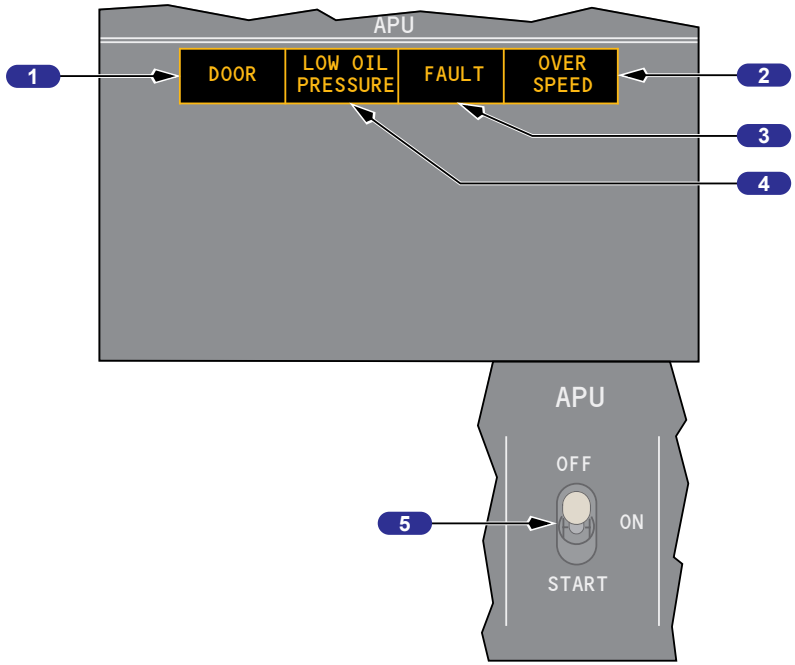

FWD OVERHEAD PANEL (P5)

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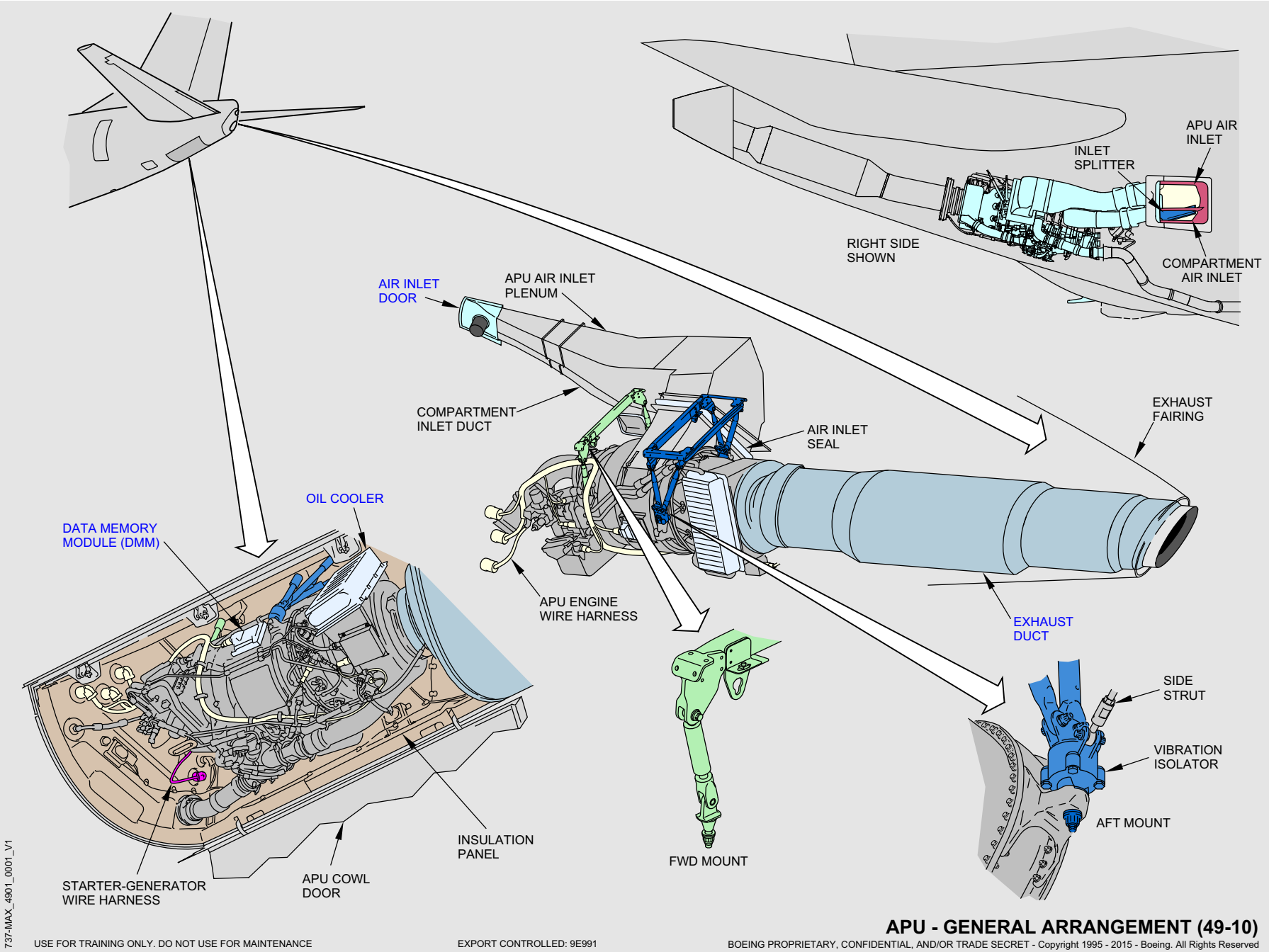

APU - GENERAL ARRANGEMENT (49-10)

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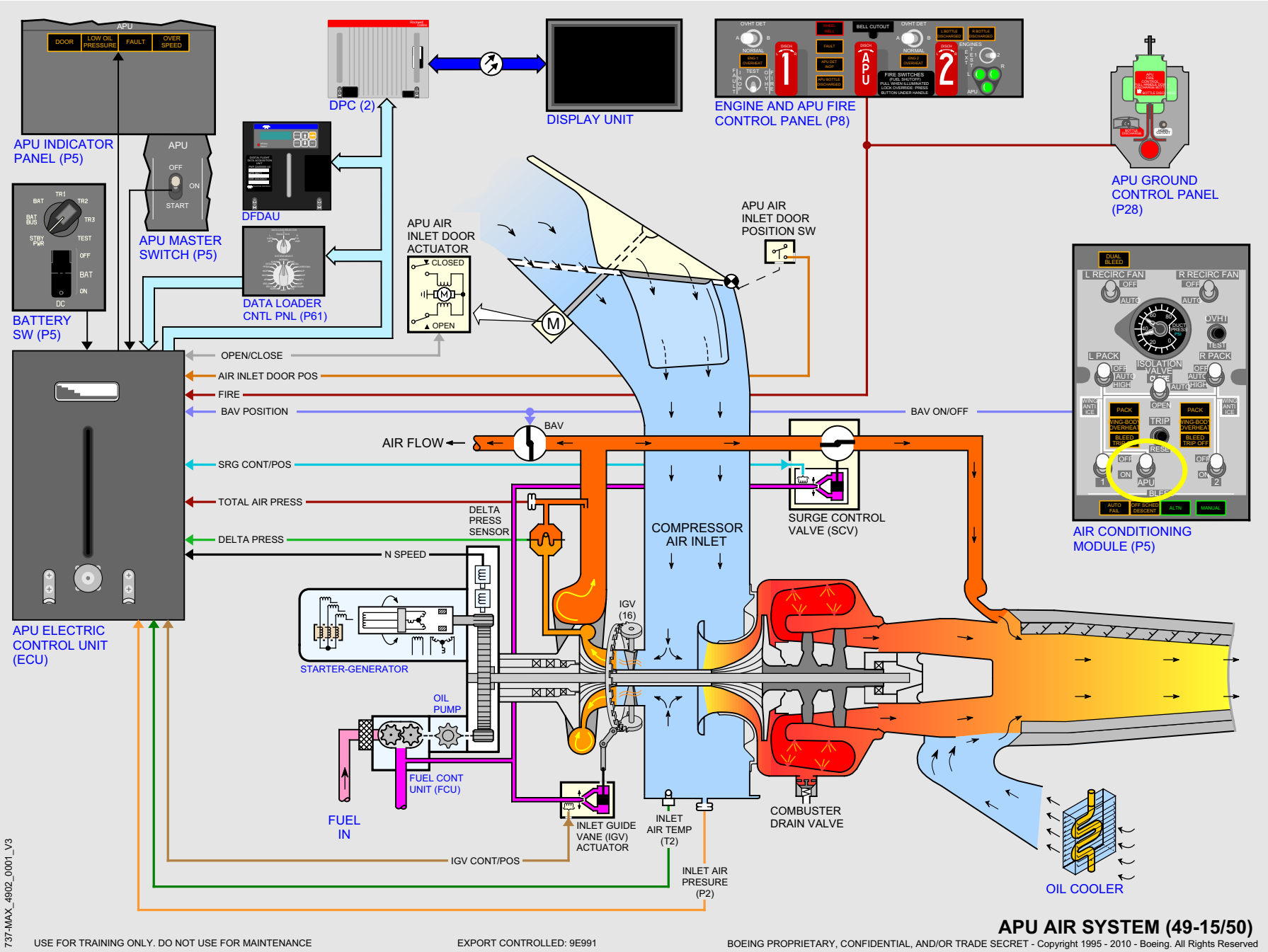

APU AIR SYSTEM (49-15/50)

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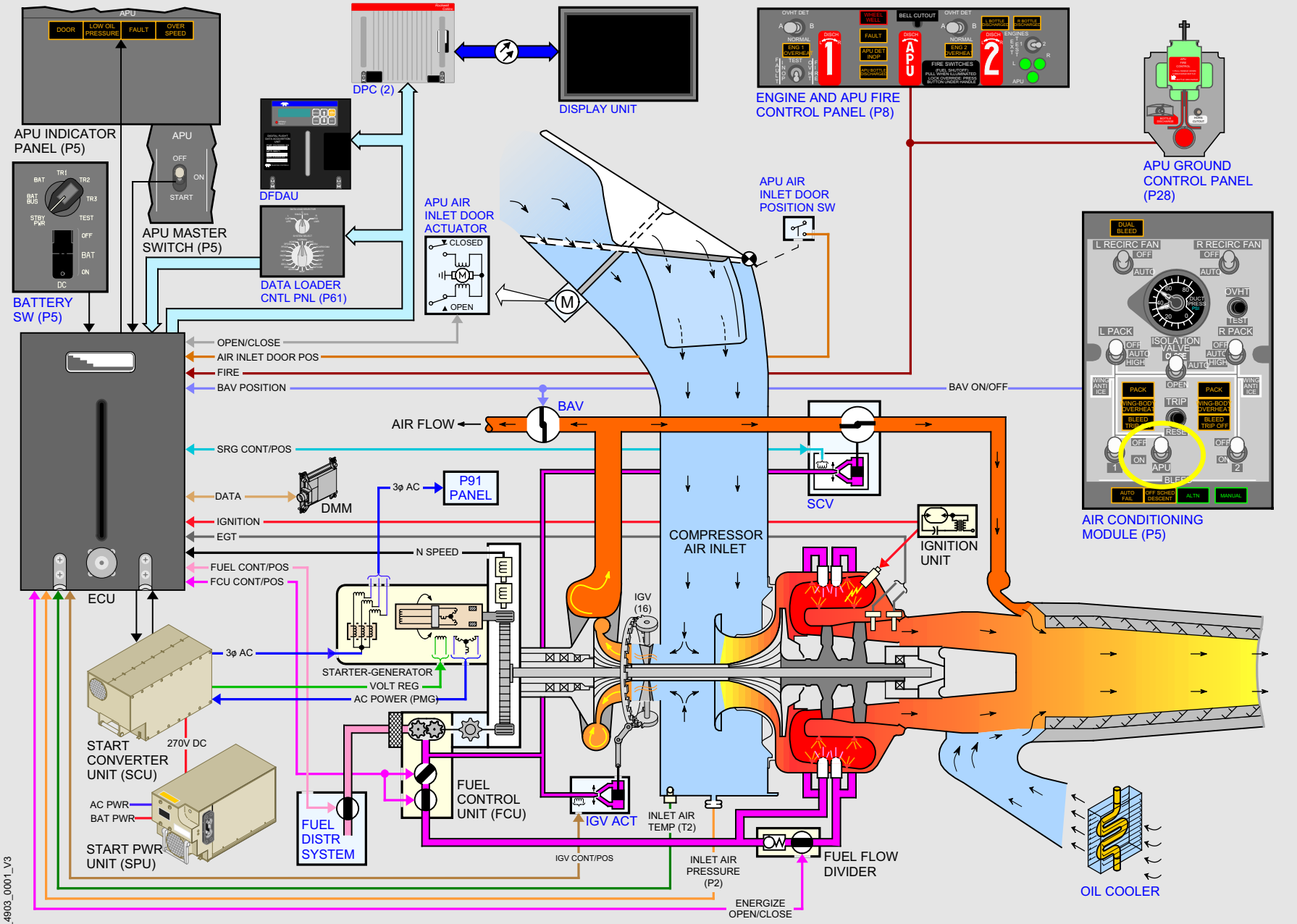

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APU FUEL, IGNITION, CONTROL AND INDICATION (49-30/40/60/70)

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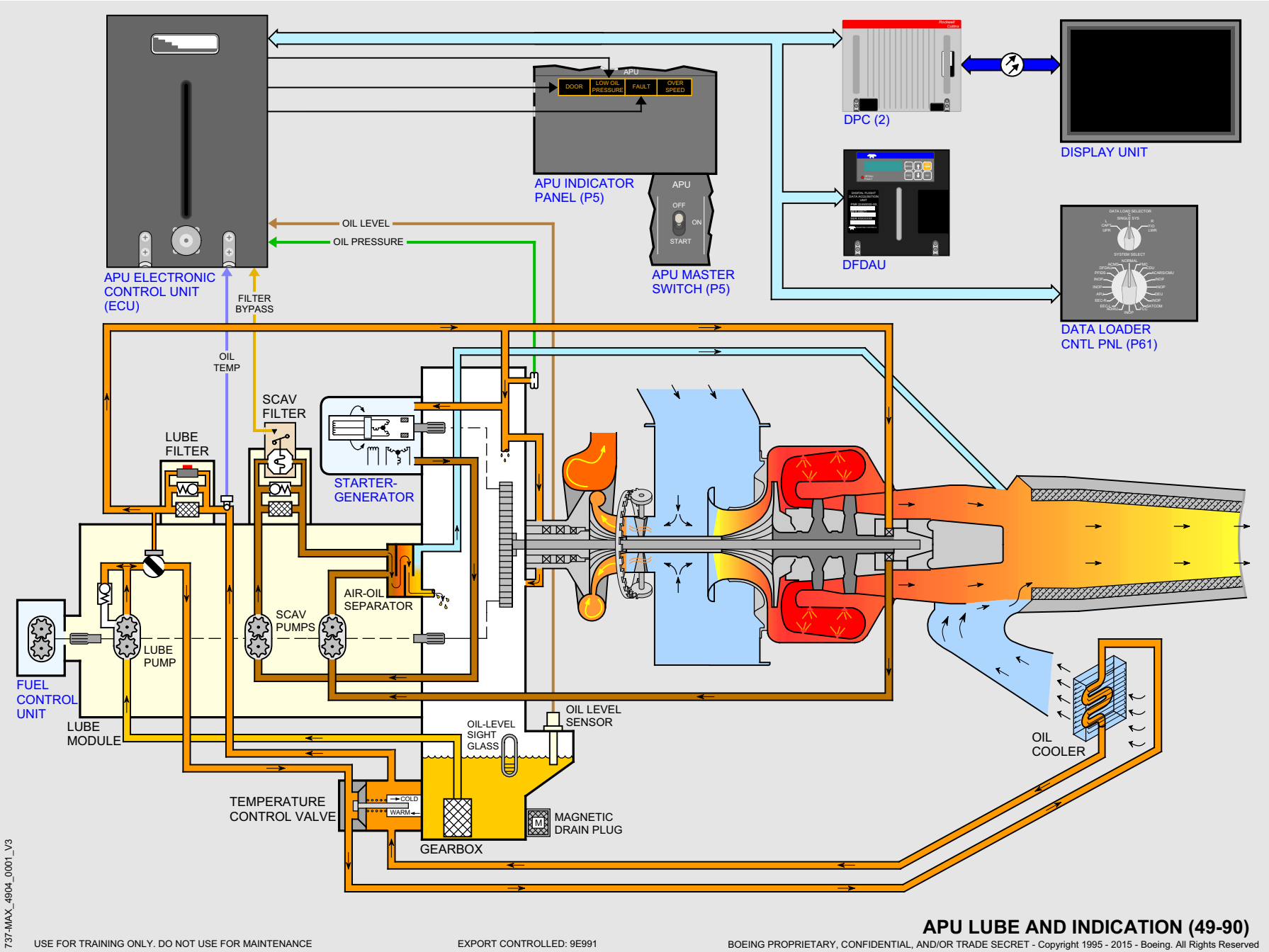

APU LUBE AND INDICATION (49-90)

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ATA 52

Doors

Doors (ATA 52)

Flight Deck Door

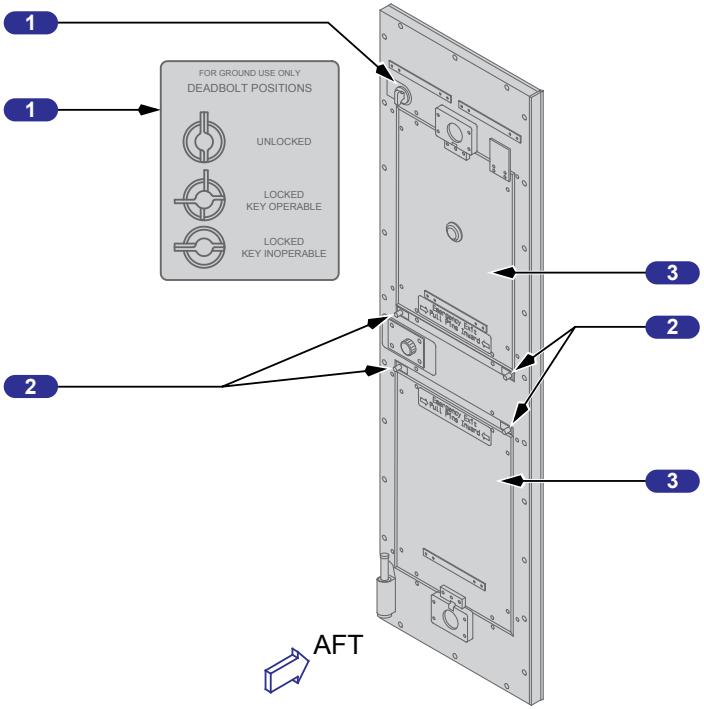
1 Deadbolt and Deadbolt Placard

2 Release Pins

Pull pins inward – manually separates decompression panel from a jammed door to allow panel opening and egress.

3 Decompression Panel

Provides emergency egress path and automatically opens during airplane decompression.



FLIGHT DECK DOOR

Flight Deck Emergency Access Panel

1 Keypad

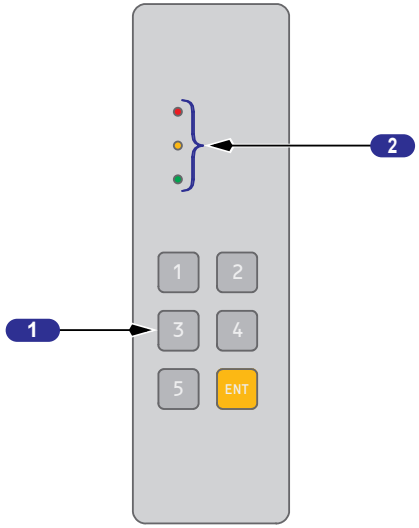
Push – enters 3 to 8 digit emergency access code by pressing numeric then “ENT” keys. Entry of correct emergency access code sounds flight deck chime.

2 Access Lights

Illuminated (red) – door locked or Flight Deck Access System switch OFF.

Illuminated (amber) – correct emergency access code entered.

Illuminated (green) – door unlocked.



PASSENGER SIDE DOOR POST

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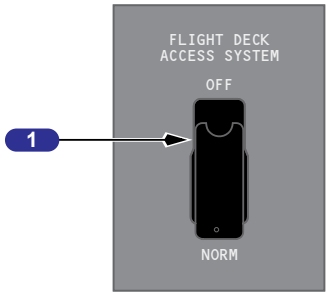
Flight Deck Access System Switch

1 Flight Deck Access System Switch

OFF – removes electrical power from door lock.

NORM (Normal) – flight deck access system configured for flight.



FLIGHT DECK SIDE DOOR POST

Flight Deck Door Lock Panel

1 LOCK FAIL Light

Illuminated (amber) – Flight Deck Door Lock selector in AUTO and door lock has failed or Flight Deck Access System Switch is OFF.

2 AUTO Unlock (UNLK) Light

Illuminated (amber) – correct emergency access code entered in keypad. AUTO UNLK light flashes and continuous chime sounds before timer expires and door unlocks.

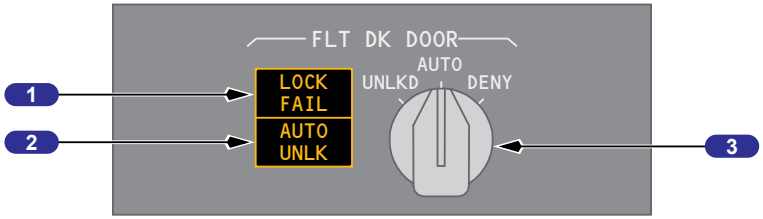
3 Flight Deck (FLT DK) Door Lock Selector

Spring loaded to AUTO. Selector must be pushed in to rotate from AUTO to UNLKD. Selector must not be pushed in to rotate from AUTO to DENY.

UNLKD – door unlocked while selector in UNLKD.

AUTO – door locked. Allows door to unlock after entry of emergency access code and expiration of timer, unless crew takes action.

DENY – rejects keypad entry request and prevents further emergency access code entry for a time period.



AFT ELECTRONIC PANEL (P8)

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Door Warning Annunciator Panel

1 Exterior Door Annunciations

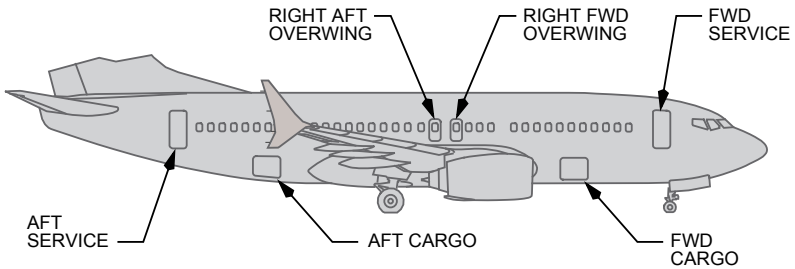
Illuminated (amber) – related door is not closed and locked.

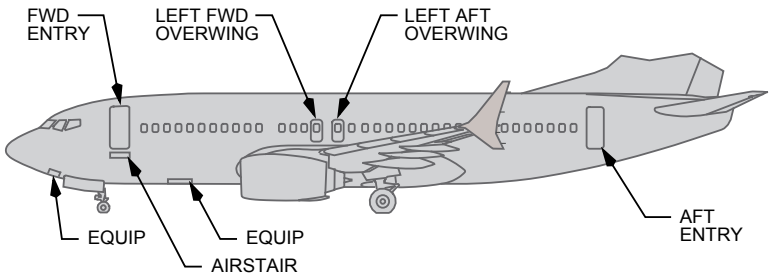
2 Overwing/Mid Exit Annunciations

Illuminated (amber) –

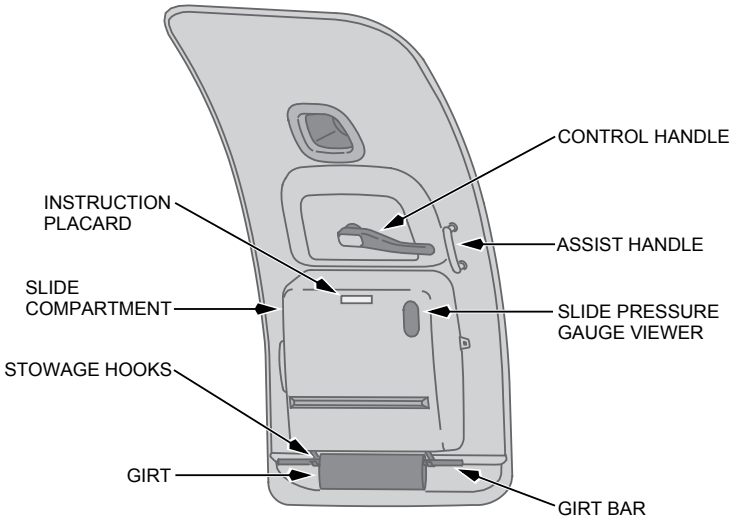
- related overwing exit is not closed and locked
- related flight lock failed to engage when commanded locked.

DOOR WARNING ANNUNCIATOR PANEL (FWD P5)





Passenger Entry/Galley Service Doors



PASSENGER CABIN

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Interior Airstair Control Forward Attendant Control Panel

1 RETRACT Switchlight

Push (hold) - retracts the airstair and closes the airstair door.

2 EXTEND Switchlight

Push (hold) - opens the airstair door and extends the airstair.

3 STANDBY Switchlight

Push (hold) - operates the airstair door and airstair with dc power.

4 STAIRS OPERATING Light

Illuminated - indicates airstair door and airstair operation.

5 Tread Lights OFF Light

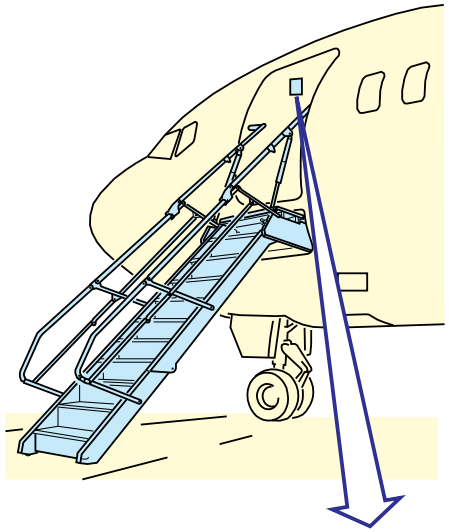
Illuminated - airstair tread lights extinguished.

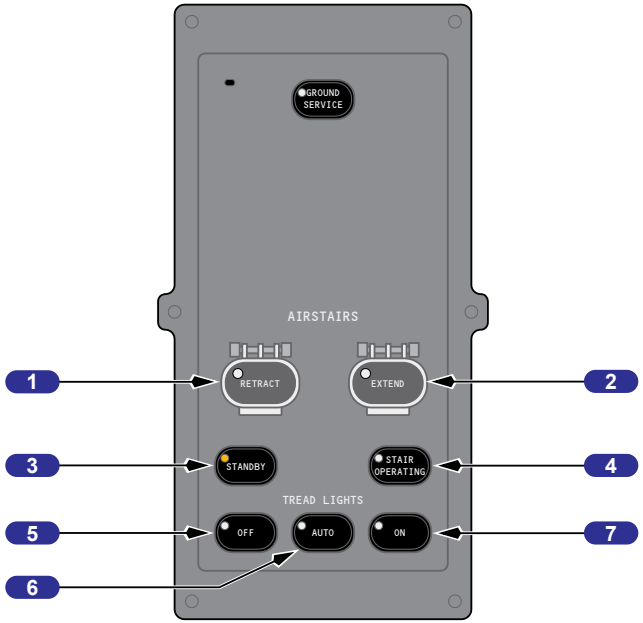
6 Tread Lights AUTO Light

Illuminated - airstair tread lights illuminate when airstair is fully extended.

7 Tread Lights ON Light

Illuminated - airstair tread lights are illuminated.





FWD ATTENDANT CONTROL PANEL

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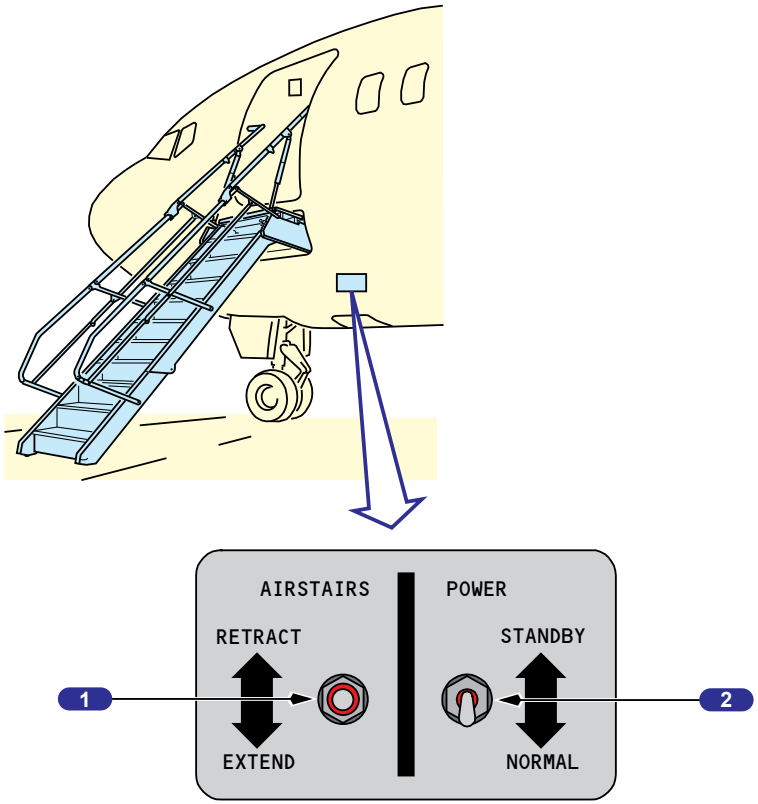
Forward Airstairs Exterior control

1 AIRSTAIRS RETRACT/EXTEND Switch

Hold switch to operate airstair door and airstairs.

2 POWER STANDBY/NORMAL Switch

(spring loaded to NORMAL) - hold switch in STANDBY to operate airstair door and airstair with dc power.



FORWARD AIRSTAIRS EXTERIOR CONTROL (FUSELAGE SKIN)

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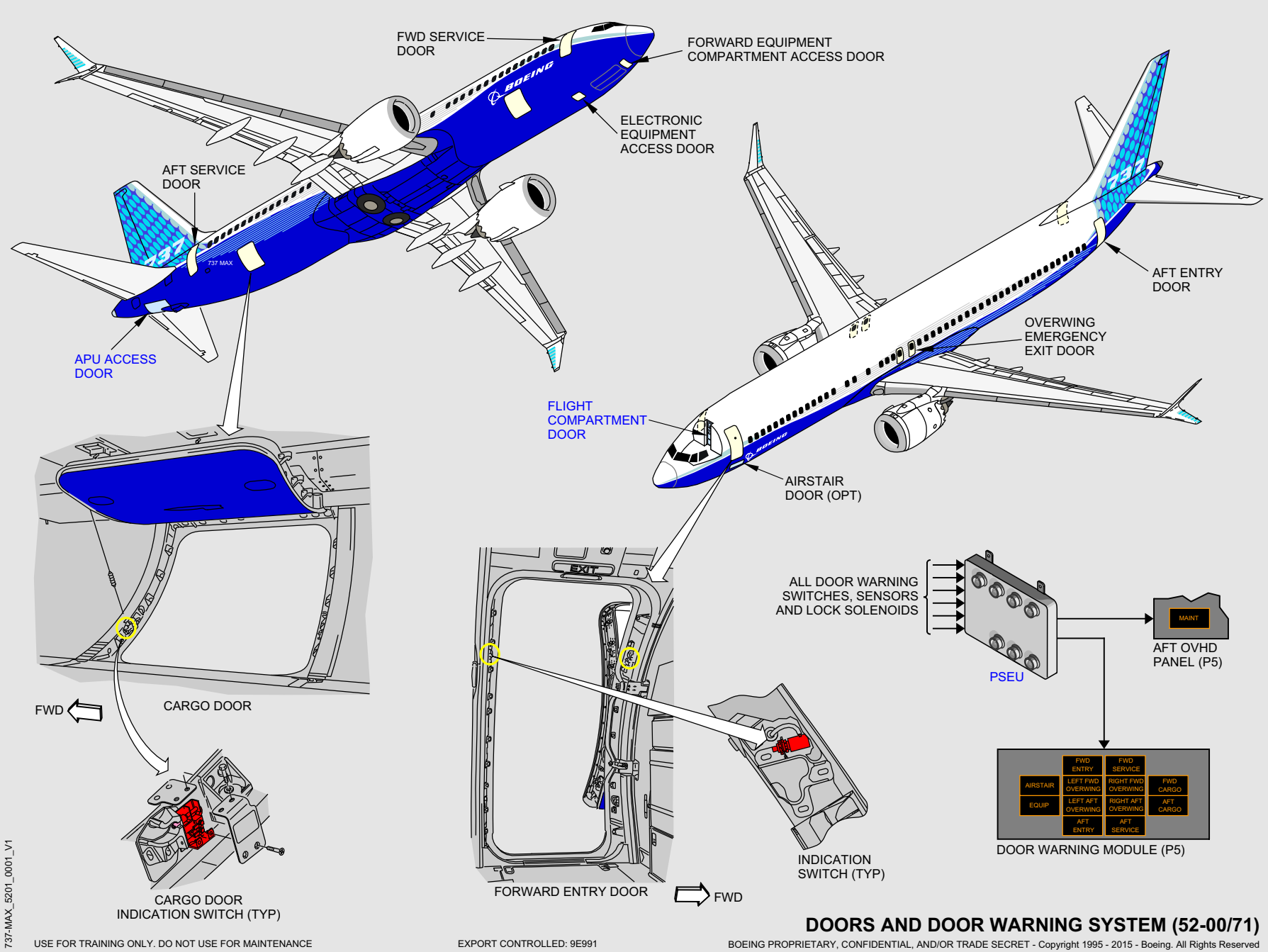

DOORS AND DOOR WARNING SYSTEM (52-00/71)

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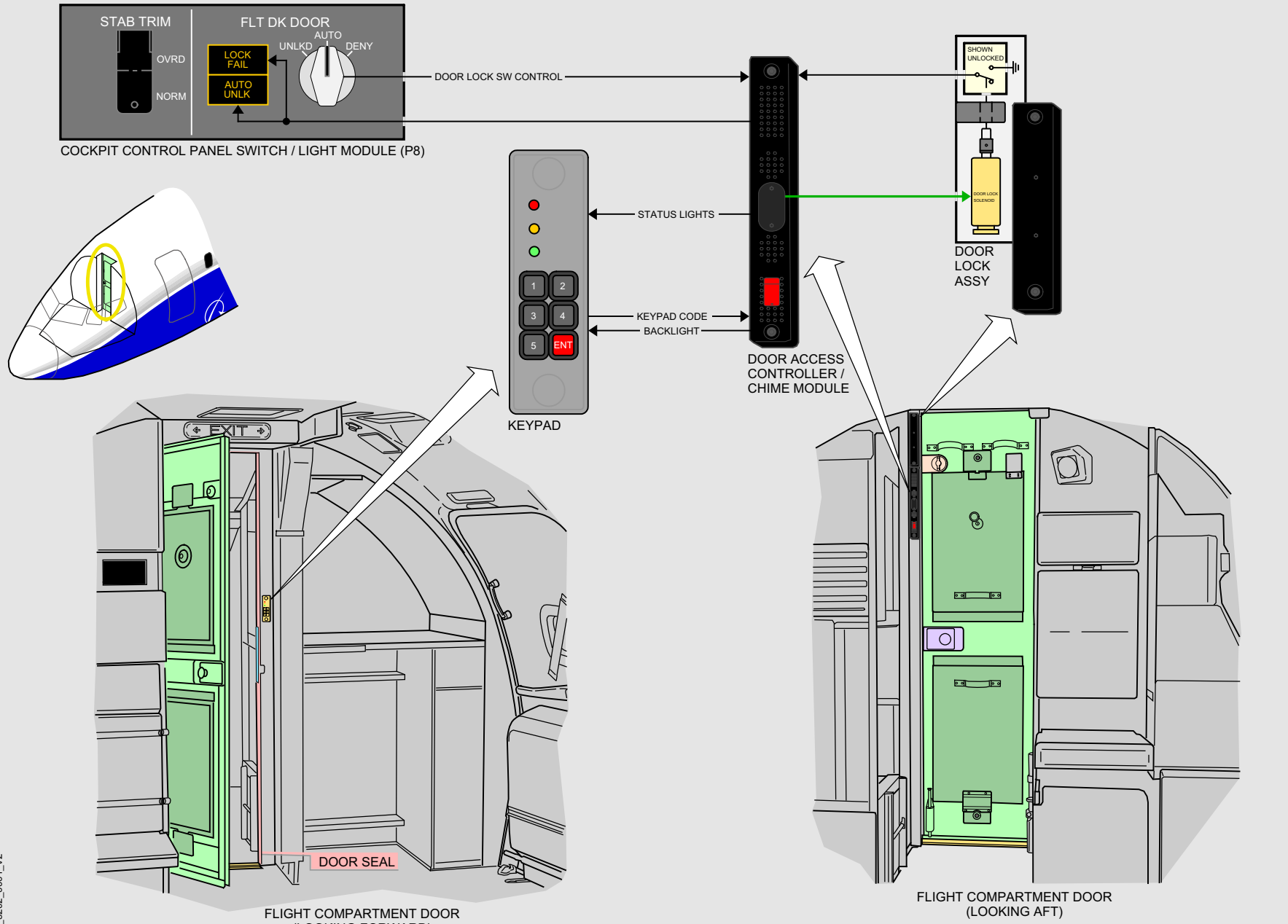

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ENHANCED SECURITY FLIGHT COMPARTMENT DOOR (52-51)

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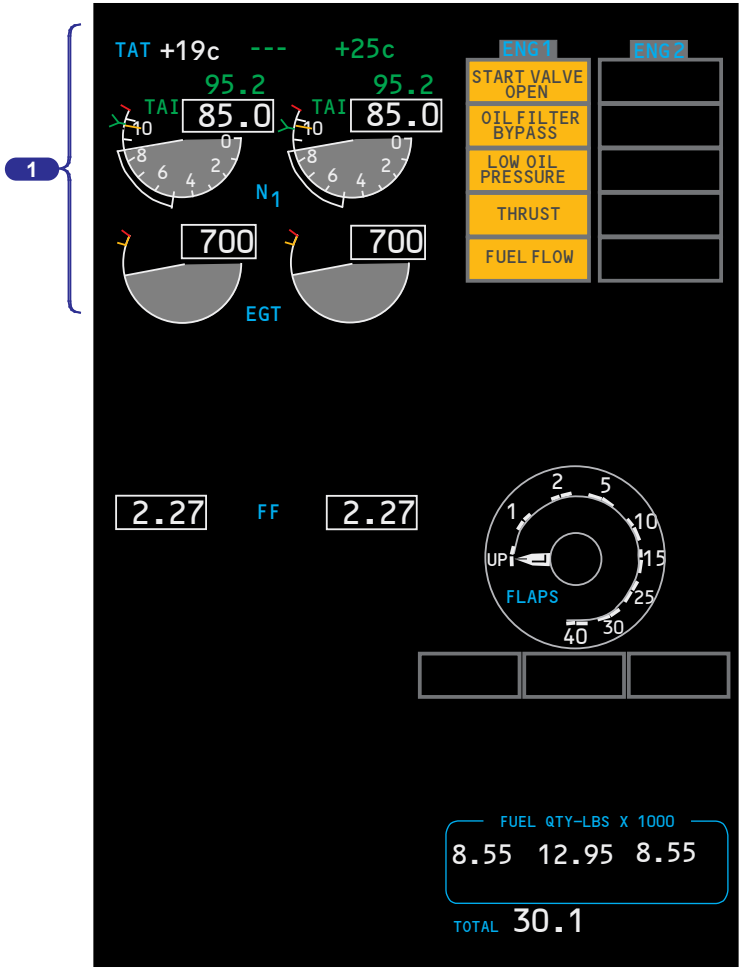
ATA 70-80

Engines

Engines (ATA 70)

Primary Engine Display

1 Primary Engine Indications



CAPT OR F/O INBOARD DU

Multi-Function Panel

1 FUEL FLOW Switch

2 MFD Engine (ENG) Switch

Push – ENG

- displays secondary engine indications on MDS
- second push removes secondary engine indication from MDS.

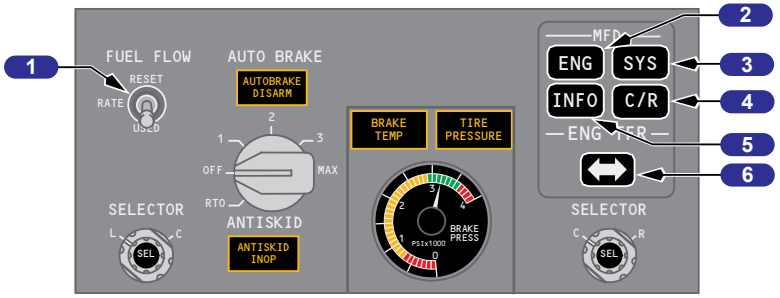
3 MFD System (SYS) Switch

4 MFD Cancel/Recall (C/R) Switch

5 MFD Information (INFO) Switch

6 Engine Transfer (ENG TRF) Switch

Push – moves the Engine indications to either the Capt's or F/O's inboard DU.



FWD ELECTRONIC PANEL (P9)

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N1 Indications

1 Reference N1 Bugs

Displayed (green) – with N1 SET outer knob in AUTO, 1, 2 or BOTH position.

Position corresponds to digital value on the Reference N1 Readout.

2 N1 Redlines

Displayed (red) – N1% RPM operating limit.

3 N1 Command Sectors

Displayed (white) – momentary difference between actual N1 and value commanded by thrust lever position.

4 N1 Maximum (Option - with Double Bug)

Displayed (amber) –

- N1 value for full rated thrust
- computed by the ECC through all phases of flight
- upper limit for auto-throttle operation.

5 N1 RPM Readouts (digital)

Displayed (white) – normal operating range.

Displayed (red) –

- operating limit exceeded
- on the ground with both engines shutdown (EEC de-energized), red box indicates an exceedance has occurred.

6 Reference N1 Readouts

Displayed (green) –

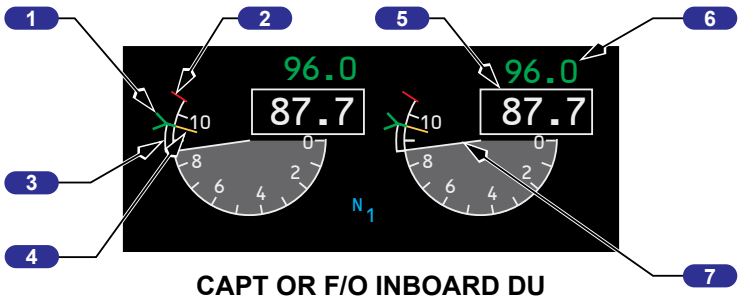
- manually set N1% RPM when N1 SET outer knob is in BOTH, 1, or 2 position
- – – – – when N1 SET outer knob is in AUTO position and FMC source invalid
- blank when N1 SET outer knob is in AUTO position.

Not Displayed when Reverse Thrust is selected.

7 N1 RPM Indications

Displays N1% RPM:

- displayed (white) – normal operating range
- displayed (red) – operating limit exceeded.



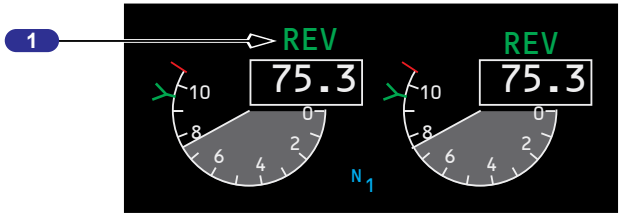
CAPT OR F/O INBOARD DU

Thrust Reverser Indications

1 Thrust Reverser (REV) Indications

Displayed (amber) – thrust reverser is moved from stowed position.

Displayed (green) – thrust reverser is deployed.



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EGT Indications

1 Exhaust Gas Temperature (EGT) Redlines

Displayed (red) – maximum takeoff EGT limit.

2 Exhaust Gas Temperature (EGT) Amber Bands

Displayed (amber) – lower end of band displays maximum continuous EGT limit.

3 Exhaust Gas Temperature (EGT) Start Limit Lines

Displayed (red) – until the engine achieves stabilized idle (approximately 59% N2).

4 Exhaust Gas Temperature (EGT) Readouts (digital)

Displayed (white) – normal operating range (degrees C)

Displayed (amber) – maximum continuous limit exceeded; color change inhibited for up to 5 minutes during takeoff or go-around

Displayed (red) – maximum EGT limit or start limit exceeded

On the ground with both engines off and EEC de-energized, a red box indicates an exceedance has occurred

Displayed (white-flashing) EEC senses conditions that may lead to hot start or stall during ground starting. EEC will automatically cut fuel for an impending hot start or stall during ground starting.

5 Exhaust Gas Temperature (EGT) Indications

Displayed (white) – normal operating range.

Displayed (amber) – maximum continuous limit exceeded; color change inhibited for up to 5 minutes during takeoff or go–around

Displayed (red) – maximum EGT limit or start limit exceeded.

CAPT OR F/O INBOARD DU

Engine Fail Message

1 Engine Fail (ENG FAIL) Alert

Displayed (amber) –

- engine operating below sustainable idle (less than 50% N2); and
- engine start lever in IDLE position.

Message remains until –

- engine recovers; or
- start lever moved to CUTOFF; or
- engine fire warning switch pulled.

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Crew Alerts

1 START VALVE OPEN Message

Illuminated (amber) –

- steady – engine start valve open and air is supplied to starter
- flashing – uncommanded opening of start valve. The alert message and entire amber box will flash for 10 seconds, and then the alert only will remain steady until the condition no longer exists.

2 LOW OIL PRESSURE Message

Illuminated (amber) –

- steady – oil pressure at or below red line
- flashing – with a condition of low oil pressure. The alert message and entire amber box will flash for 10 seconds, and then the alert only will remain steady until the condition no longer exists.

3 OIL FILTER BYPASS Message

Illuminated (amber) –

- steady – indicates an impending bypass of scavenge oil filter
- flashing – with an impending bypass. The alert message and entire amber box will flash for 10 seconds, and then the alert only will remain steady until the condition no longer exists.

4 THRUST Message

Illuminated (amber) –

- steady – engine is not producing commanded thrust (N1) or not responding to thrust command while in flight
- flashing – engine is not responding to thrust commands. The alert message and entire amber box will flash for 10 seconds, and then the alert only will remain steady until the condition no longer exists.

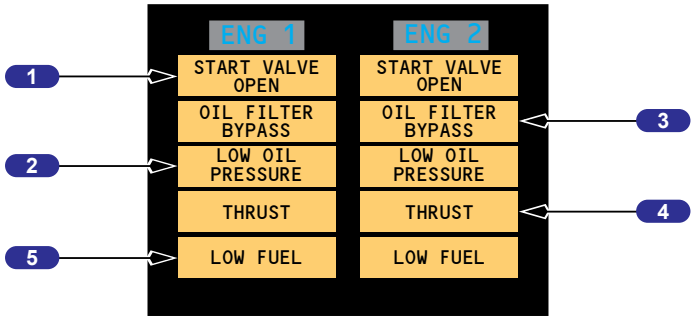
5 FUEL FLOW Message

Illuminated (amber) –

- steady – engine fuel flow disagrees with predicted values
- flashing – engine fuel flow disagree occurs. The alert message and entire amber box will flash for 10 seconds, and then the alert only will remain steady until the condition no longer exists.

Flashing is inhibited:

- during takeoff from 80 knots to 400 feet RA, or 30 seconds after reaching 80 knots, whichever occurs first
- during landing below 200 feet RA until 30 seconds after touchdown
- during periods when flashing is inhibited, alert messages illuminate steady.



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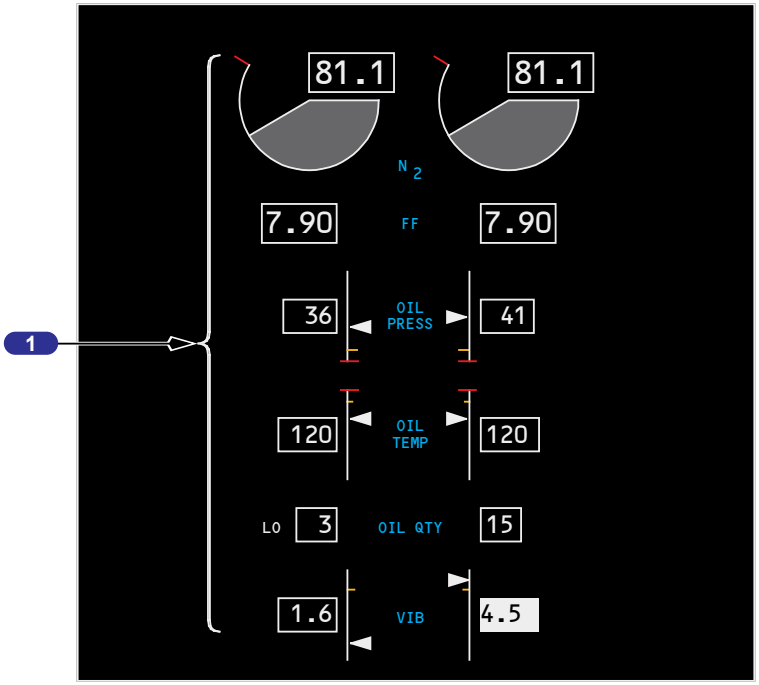
Secondary Engine Indications

1 Secondary Engine Indications

Secondary engine indications are displayed:

- when MDS initially receives power
- when selected by the Multi-Function Display (MFD)
- in flight when a Engine Start Lever is moved to CUTOFF
- in flight when an engine N2 rpm is below idle rpm (ENG FAIL)
- when a secondary engine parameter exceeds normal operating range.



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N2 Indications

1 N2 Redlines

Displayed (red) – N2% RPM operating limit.

2 N2 RPM Indications

Displays N2% RPM

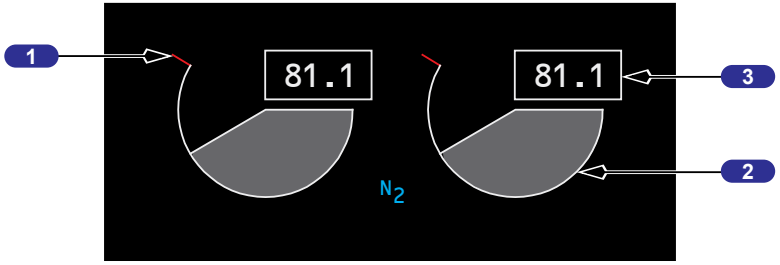
- displayed (white) – normal operating range
- displayed (red) – operating limit exceeded.

3 N2 Readouts (digital)

Displayed (white) – normal operating range.

Displayed (red) –

- operating limit exceeded
- on the ground with both engines off and EEC de-energized, a red box indicates an exceedance has occurred



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Fuel Flow/Fuel Used Indications

1 FUEL FLOW Switch (spring-loaded to RATE)

RATE – displays fuel flow to engine.

USED –

- displays fuel used since last reset
- after 10 seconds, display automatically reverts to fuel flow.

RESET –

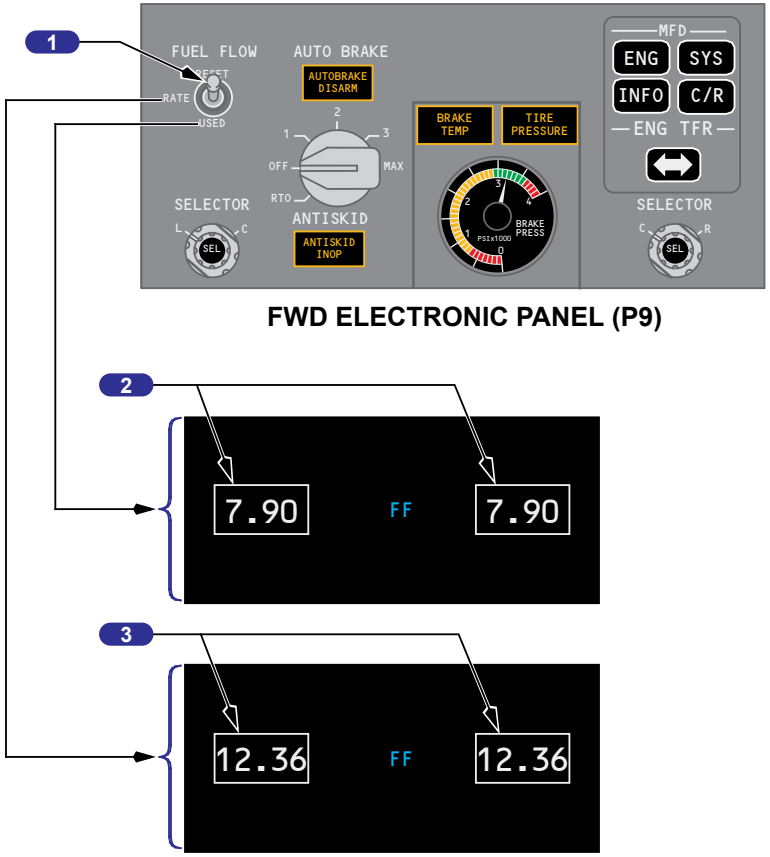
- resets fuel used to zero
- displays fuel used for 1 second, then decreases to zero, then displays fuel flow.

2 Fuel Used Readout (digital)

Displayed (white) – when FUEL FLOW switch moved to USED or RESET.

3 Fuel Flow (FF) Readout (digital)

Displayed (white) – fuel flow to engine with FUEL FLOW switch in RATE position (kilograms per hour x 1000 or pounds per hour x 1000).



FWD ELECTRONIC PANEL (P9)

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Oil Pressure Indications

1 Oil Pressure (OIL PRESS) Readout

Displays engine oil pressure (psi)

- displayed (white) – normal operating range
- displayed (amber) – caution range
- displayed (red) – operating limit reached.

2 Oil Pressure (OIL PRESS) Pointer

Displays engine oil pressure:

- displayed (white) – normal operating range
- displayed (amber) – caution range reached
- displayed (red) – operating limit reached.

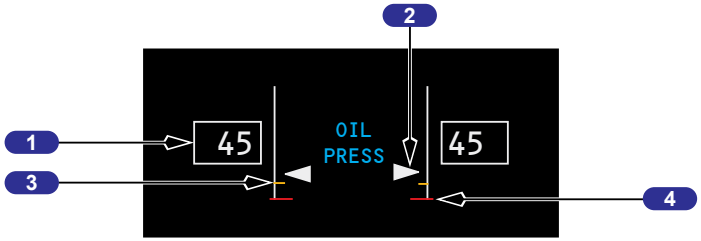
3 Low Oil Pressure (OIL PRESS) Amber Band

Displayed (amber) – low oil pressure caution range beginning at red line.:

- variable depending on N2% RPM above 65% N2
- amber band not displayed below 65% N2.

4 Low Oil Pressure (OIL PRESS) Redline

Displayed (red) – oil pressure operating limit.



CAPT OR F/O INBOARD DU

Oil Temperature Indications

1 Oil Temperature (OIL TEMP) Readout

Displays oil temperature (degrees C):

- displayed (white) – normal operating range
- displayed (amber) – caution range reached
- displayed (red) – operating limit reached.

2 Oil Temperature (OIL TEMP) Pointer

Displays oil temperature (degrees C):

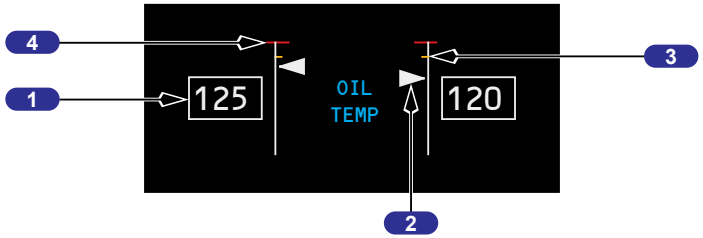
- displayed (white) – normal operating range
- displayed (amber) – caution range reached
- displayed (red) – operating limit reached.

3 High Oil Temperature (OIL TEMP) Amber Band

Displayed (amber) – oil temperature caution range.

4 High Oil Temperature (OIL TEMP) Redline

Displayed (red) – oil temperature operating limit.



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Oil Quantity Indications

1 Oil Quantity (OIL QTY) Readout

Displays usable oil quantity in quarts.

Video is reversed and LO (white) displayed for low oil quantity.

CAPT OR F/O INBOARD DU

Engine Vibration Indications

1 Vibration (VIB) Digital

Displayed (white) – engine vibration level.

Video is reversed for high vibration.

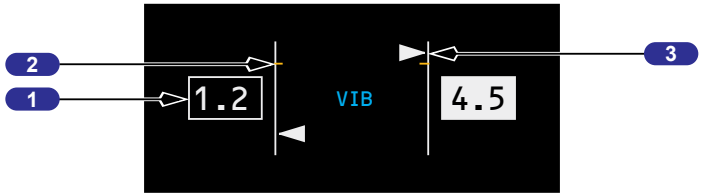
2 High Limit

Displays an amber tick mark.

3 Vibration (VIB) Pointer

Displayed (white) – engine vibration level below 4.0 units.

Displayed (amber) - engine vibration is above 4.0 units.



LOWER DISPLAY UNIT (P9)

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Engine Start Switches

1 ENGINE START Switches

GRD –

- opens start valve
- closes PRSOV
- arms the selected igniter(s) to provide ignition when engine start lever is moved to IDLE
- releases to OFF at start valve cutout.

OFF –

- ignition normally off
- both igniters are activated when engine start lever is in IDLE and:
  - an uncommanded rapid decrease in N2 occurs or,
  - N2 is between 57% and 50%.

CONT –

- provides ignition to selected igniters when engine is operating and engine start lever is in IDLE.

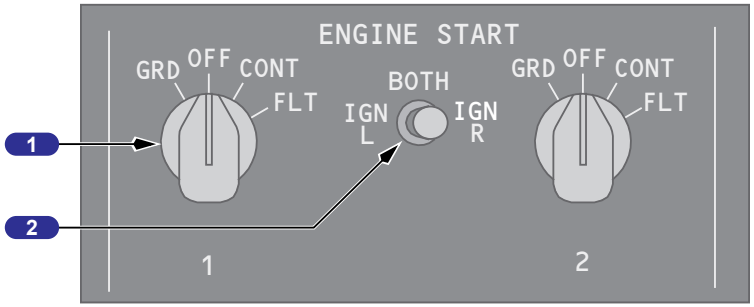
FLT – provides ignition to both igniters when engine start lever is in IDLE.

2 Ignition Select Switch

IGN L – selects the left igniter for use on engine 1 and 2.

BOTH – selects both igniters for use on engine 1 and 2.

IGN R – selects the right igniter for use on engine 1 and 2.



FORWARD OVERHEAD PANEL (P5)

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Engine Panel

1 REVERSER COMMAND Light

Illuminated (amber) – reverser has been commanded in flight.

2 REVERSER AIR/GRD Light

Illuminated (amber) – reverser air/ground protection has been lost.

3 REVERSER LIMITED Lights

Illuminated (amber) –

- in flight and on ground greater than 80 knots - thrust reverser is inhibited. Thrust Reverser will not deploy when commanded, or the reverser will deploy but thrust may be limited to idle
- on ground and below 80 knots - the Thrust Reverser control system may have a reduced level of safety for preventing an uncommanded deployment or lost position indication.

4 ENGINE CONTROL Lights

Illuminated (amber) – engine control system is not dispatchable due to faults in system.

Light operates when:

- engine is operating and EEC is powered,
- airplane on ground and:
  - below 80 kt prior to takeoff or,
  - approximately 30 seconds after touchdown.

5 Electronic Engine Control (EEC) Switches

ON – in view (white)

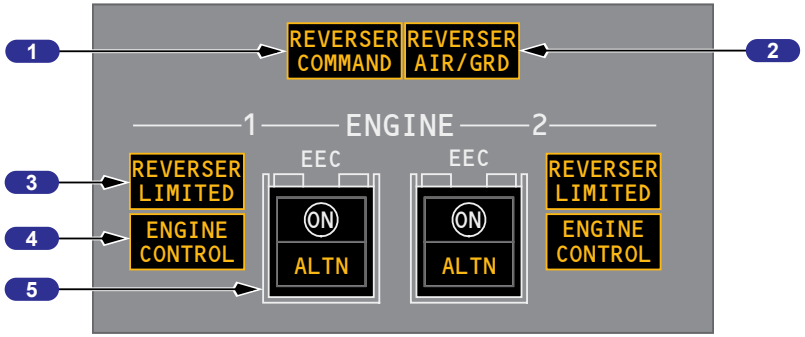
- indicates normal control mode is selected
- engine ratings calculated by EEC from sensed atmospheric conditions and bleed air demand
- when ON is not in view, the EEC switch has been deselected and the EEC is in an alternate mode.

ALTN – in view (amber)

- the EEC is operating in an alternate mode
- the EEC provides rated thrust or higher.

Note: Both ON and ALTN may be in view if EEC has automatically switched to soft alternate mode.

Note: EGT limits must be observed in both normal and alternate control modes.



AFT OVERHEAD PANEL (P5)

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Engine Controls

1 Forward Thrust Levers –

- controls engine thrust
- cannot be moved forward if the reverse thrust lever is in the deployed position.

2 Reverse Thrust Levers –

- controls engine reverse thrust
- cannot select reverse thrust unless related forward thrust lever is at IDLE.

Note: Reverse thrust lever movement is limited at reverse idle position until related thrust reverser is more than 60% deployed.

Note: Movement of reverse thrust lever into reverse thrust engages locking pawl preventing forward thrust lever from moving. Terminating reverse thrust removes locking pawl and restores forward thrust lever movement ability.

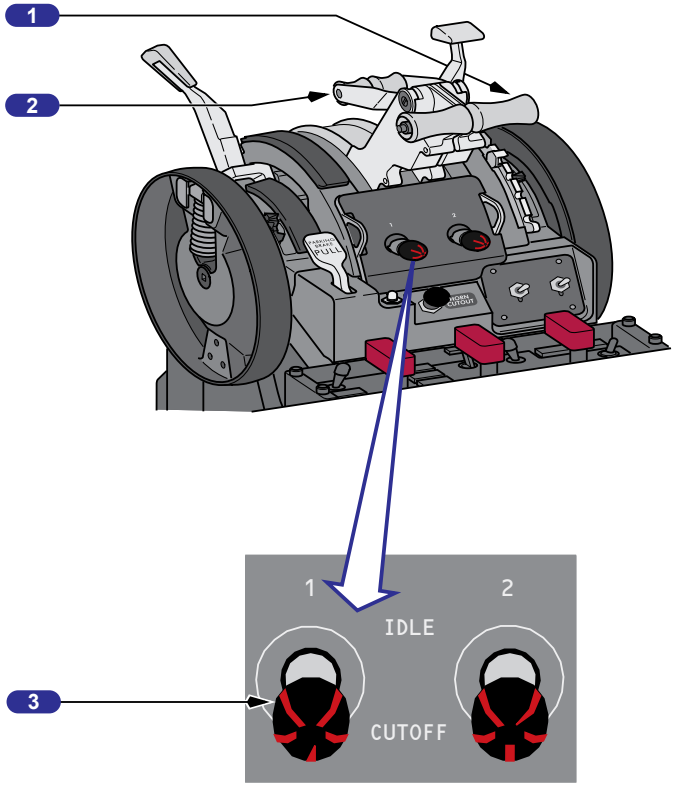
3 Engine Start Levers

IDLE –

- energizes ignition system through EEC
- opens the fuel spar shutoff valve
- opens the high pressure shutoff valve (HPSOV).

CUTOFF –

- closes both the fuel spar valve and the HPSOV
- de–energizes ignition system.



CONTROL STAND

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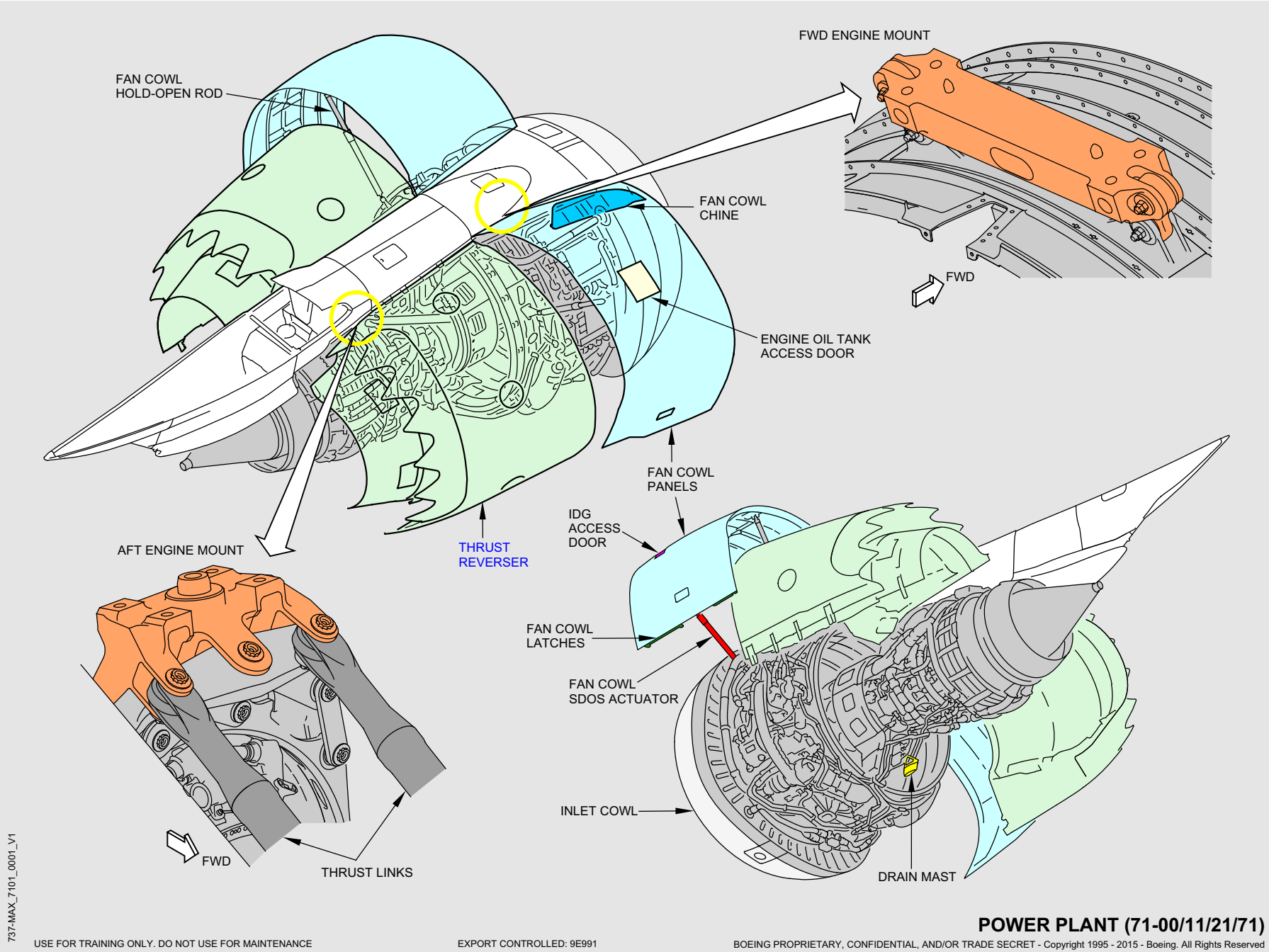

POWER PLANT (71-00/11/21/71)

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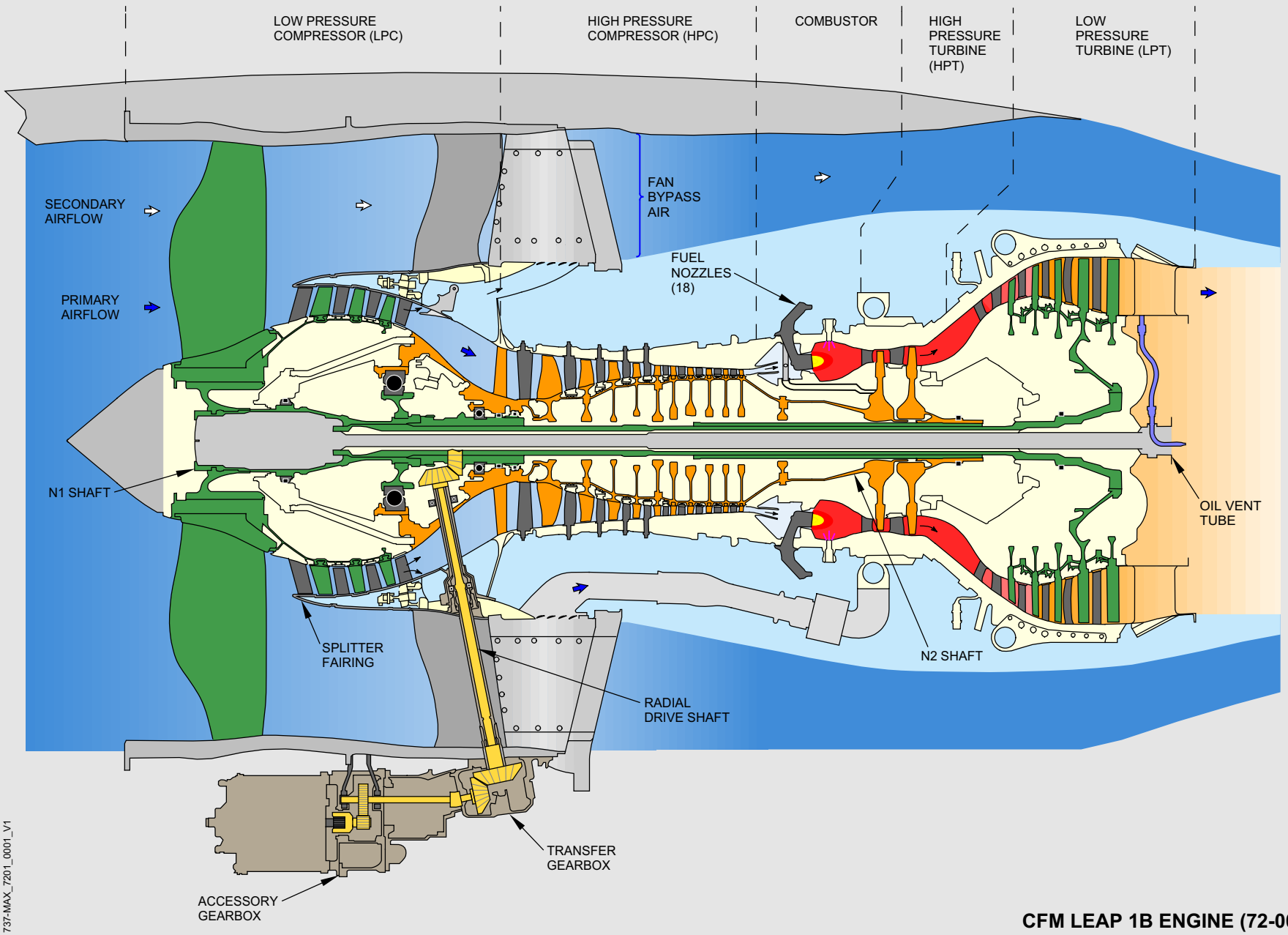

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CFM LEAP 1B ENGINE (72-00)

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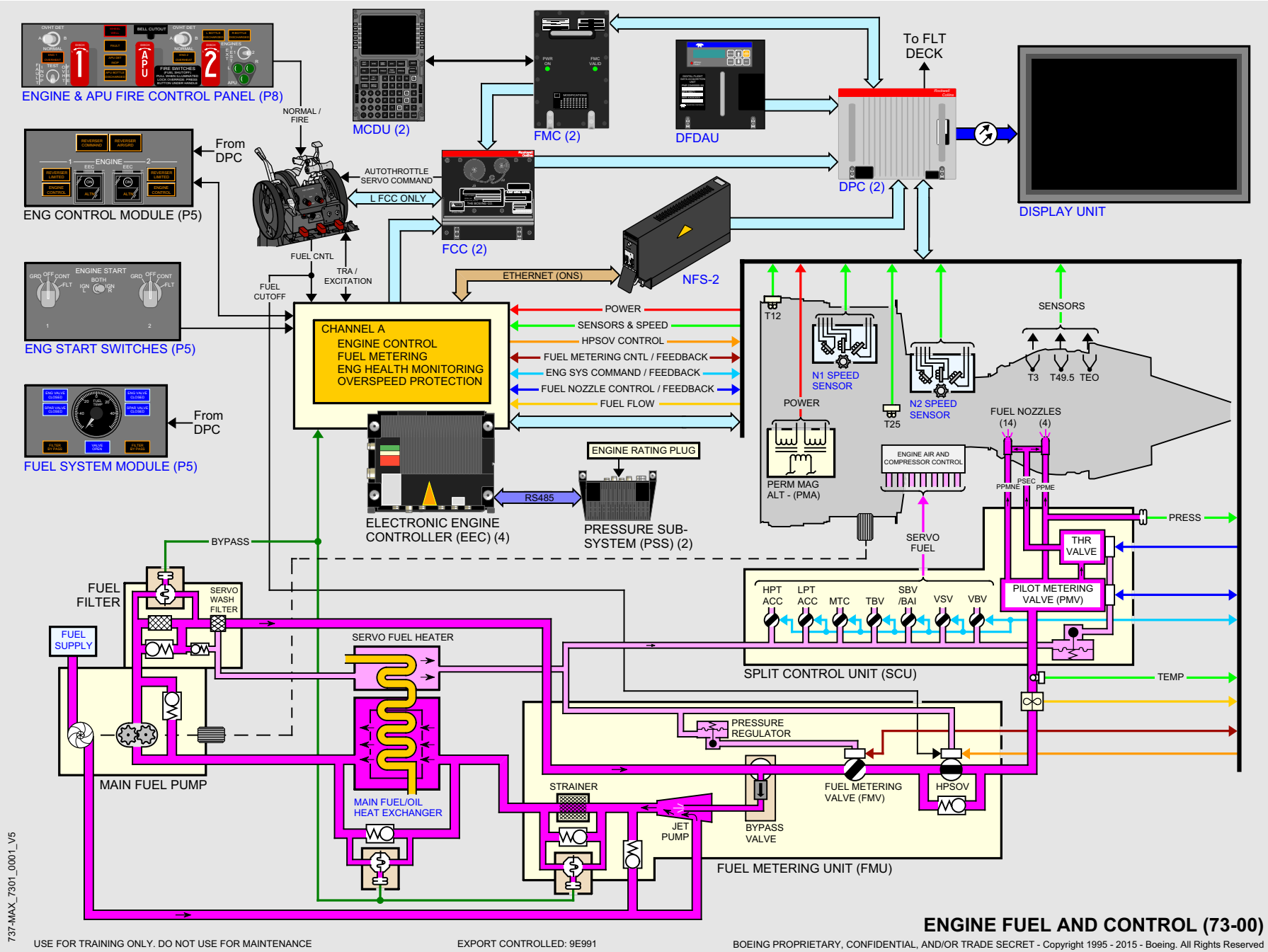

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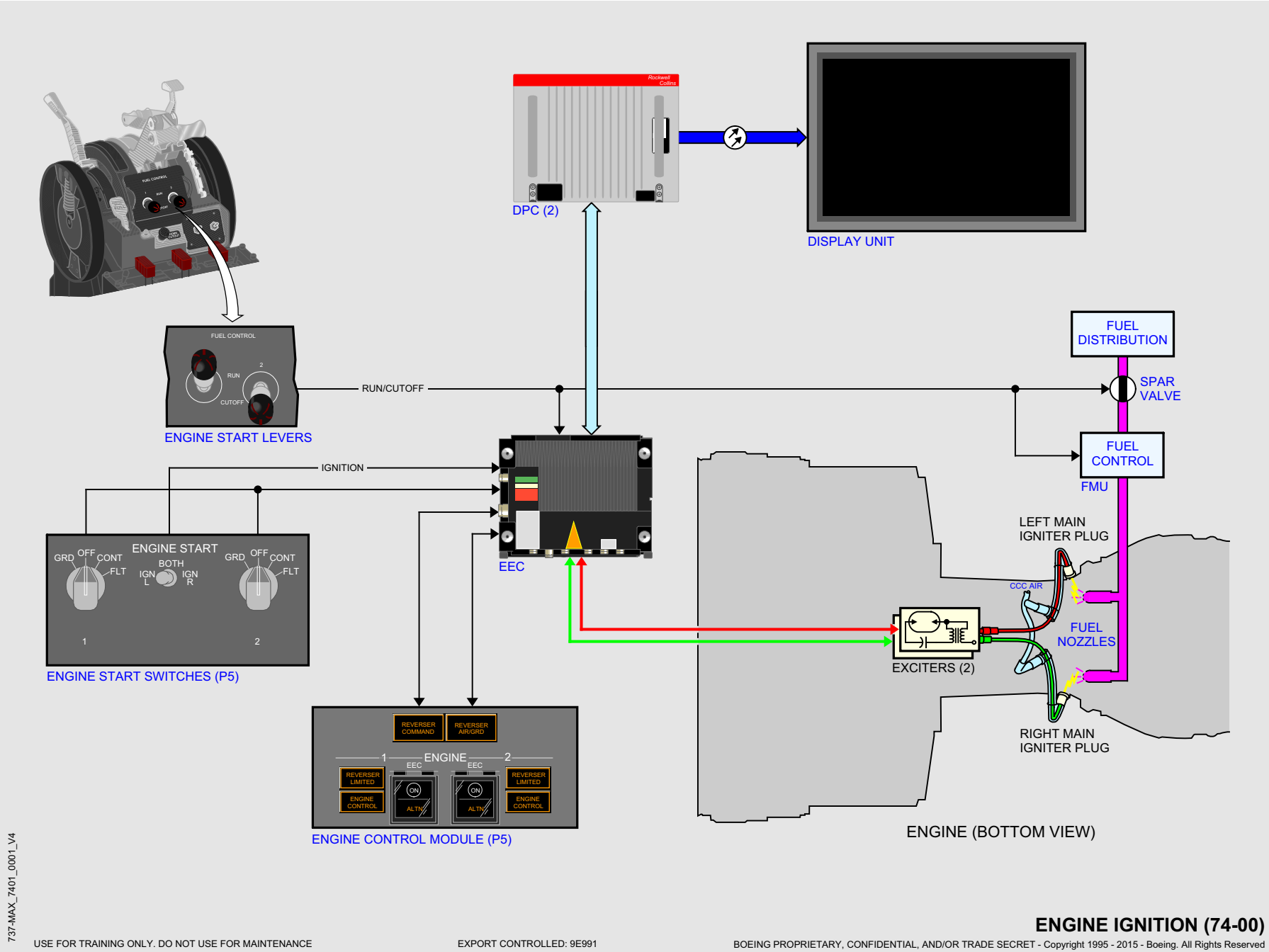

ENGINE IGNITION (74-00)

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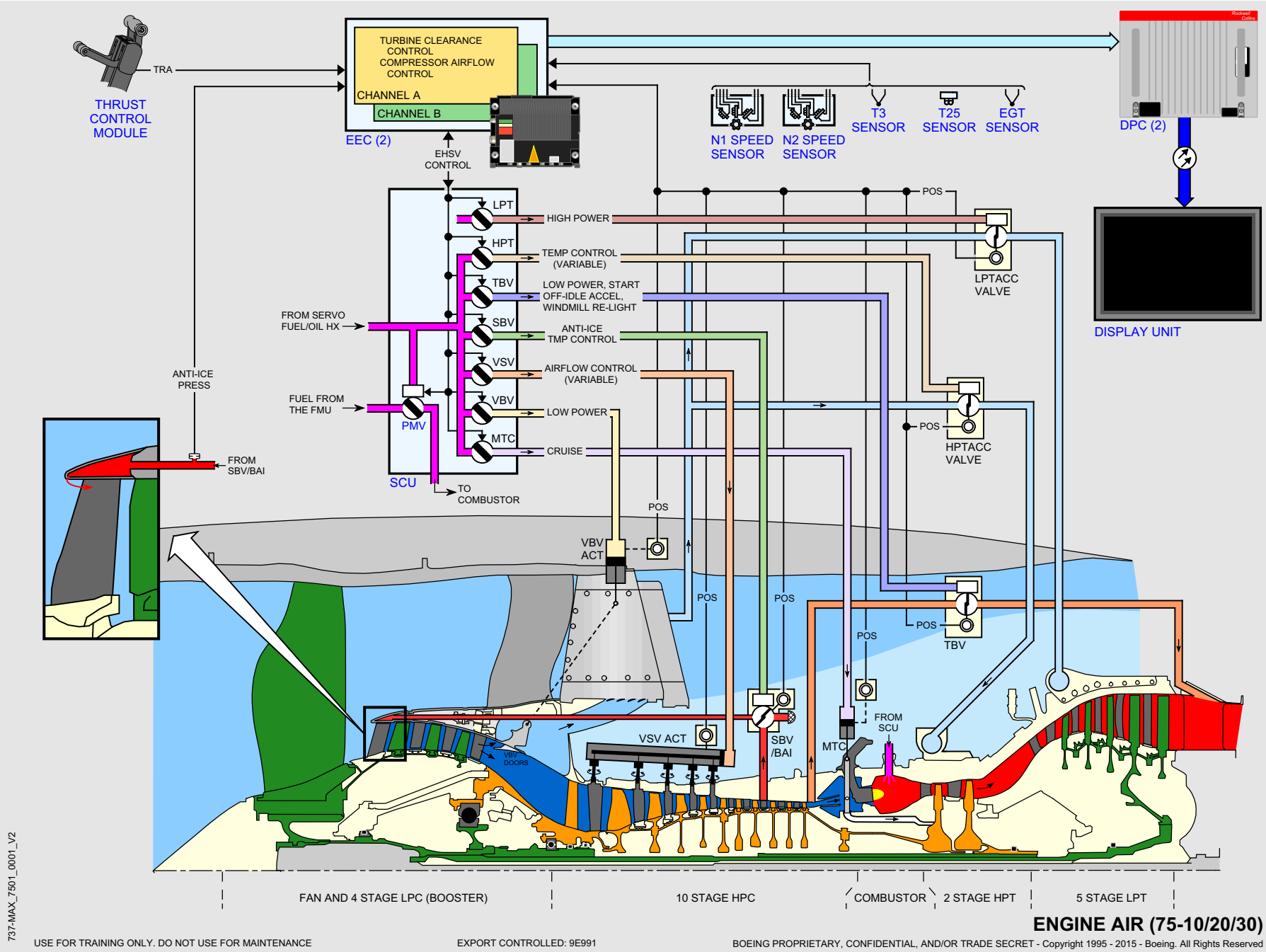

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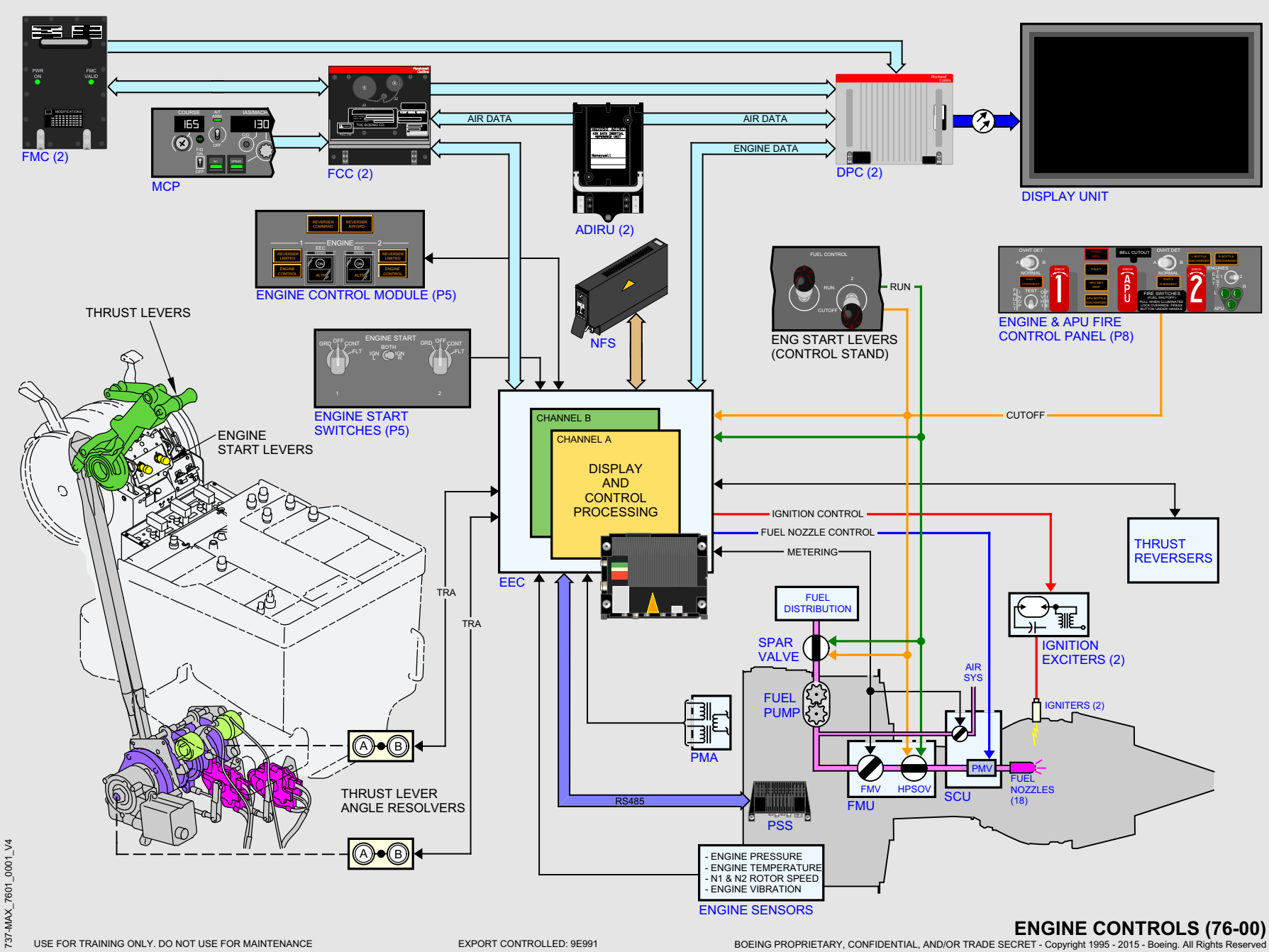

ENGINE CONTROLS (76-00)

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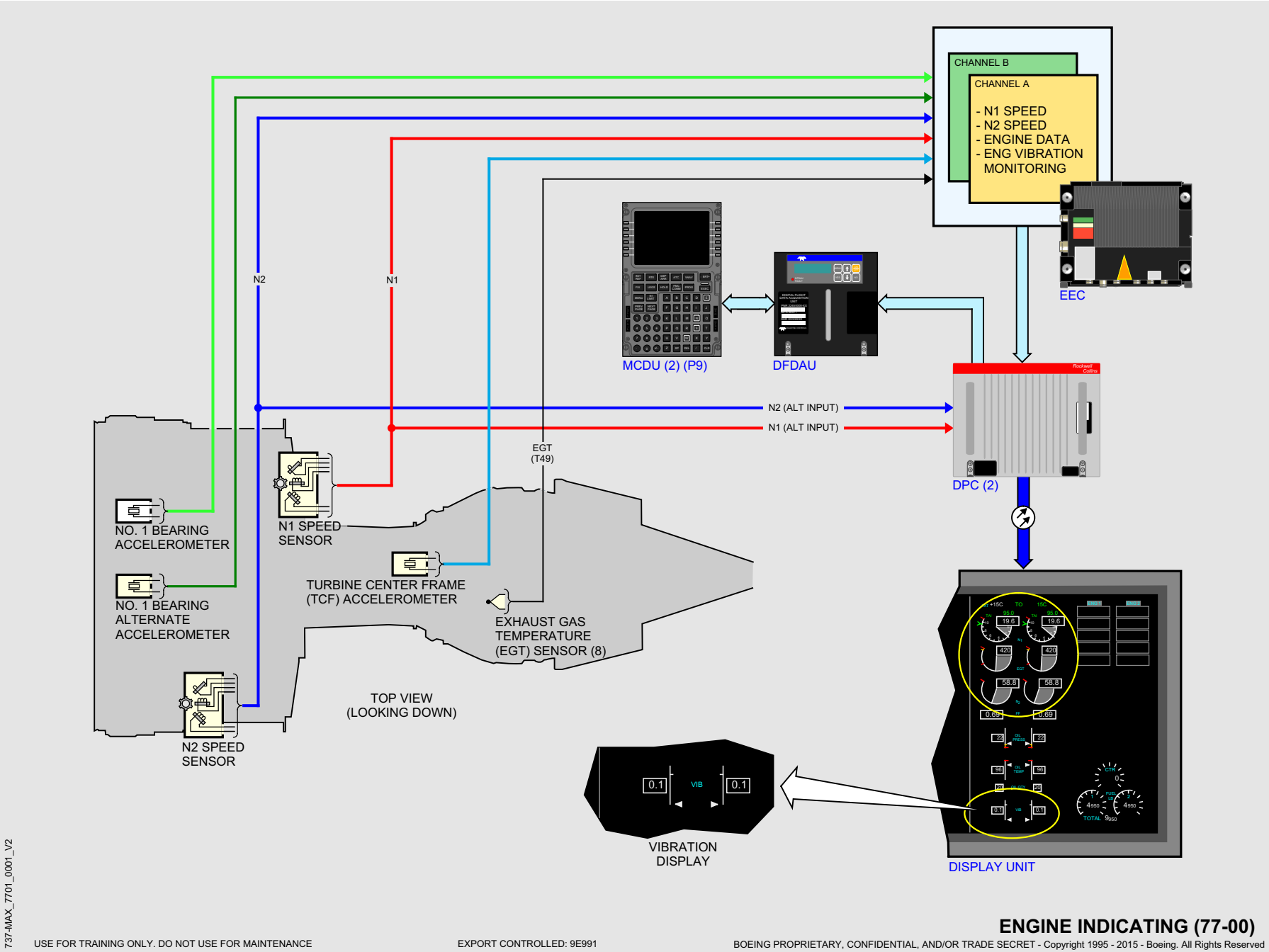

ENGINE INDICATING (77-00)

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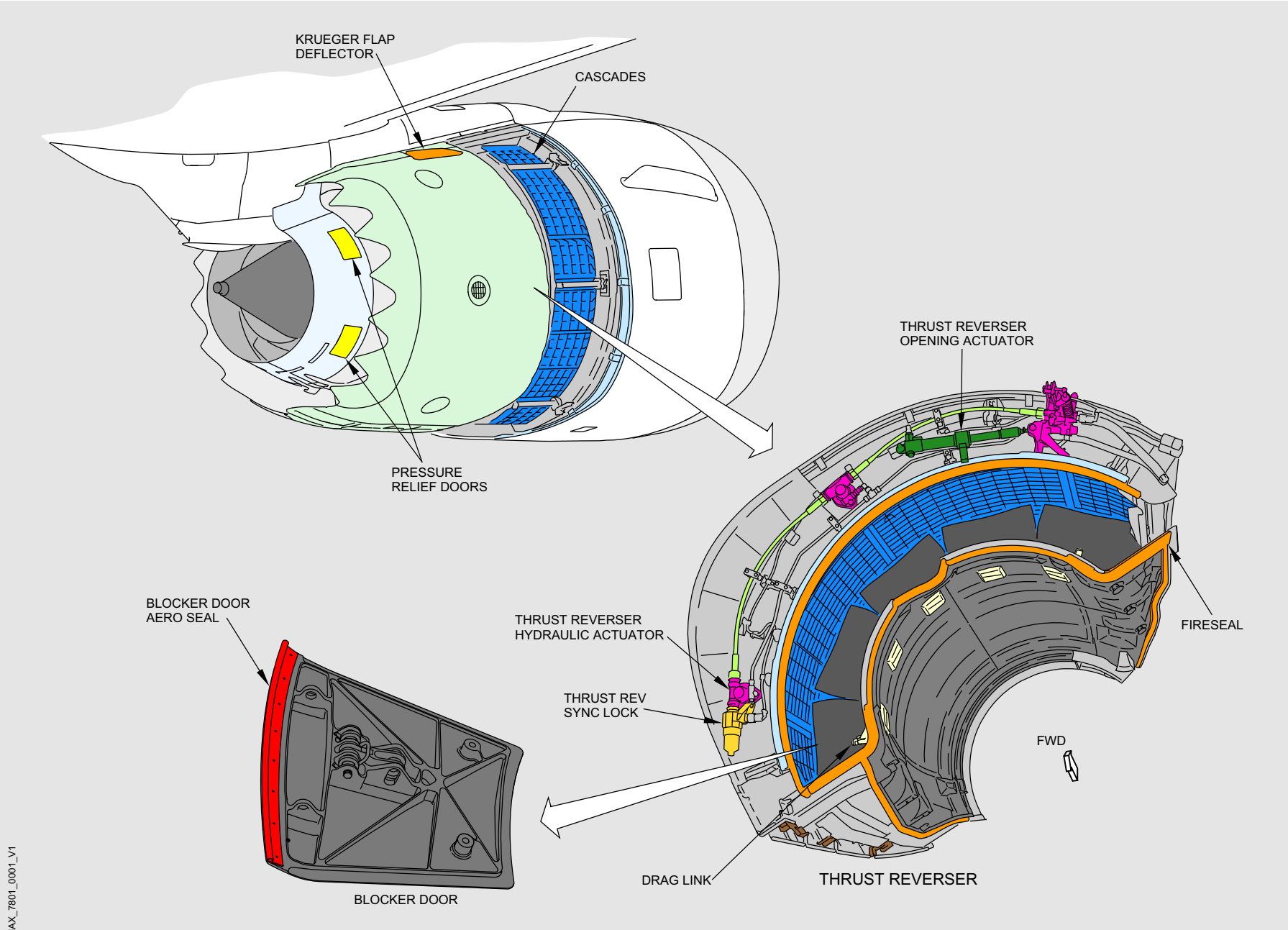

ENGINE EXHAUST (78-11/31)

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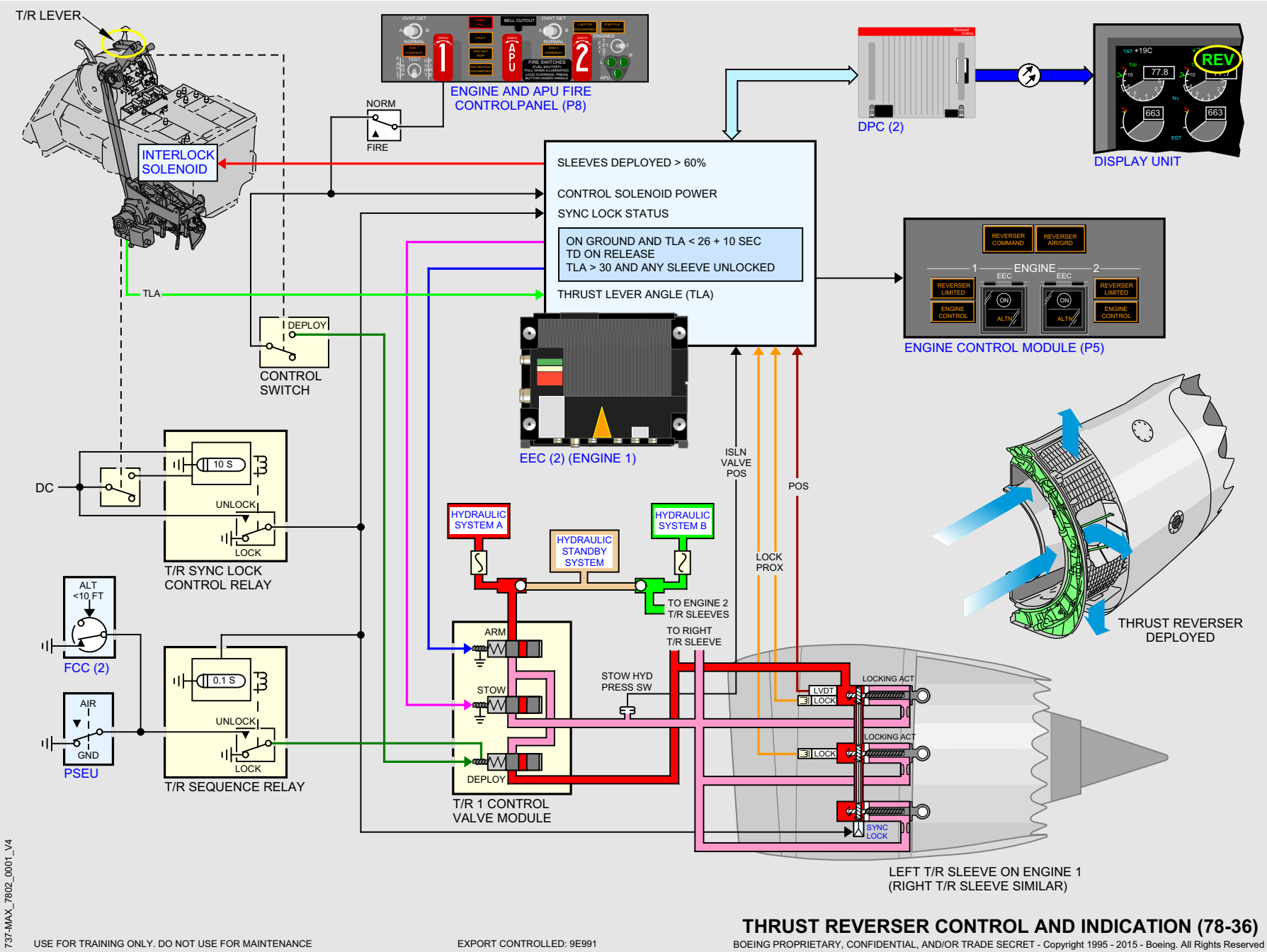

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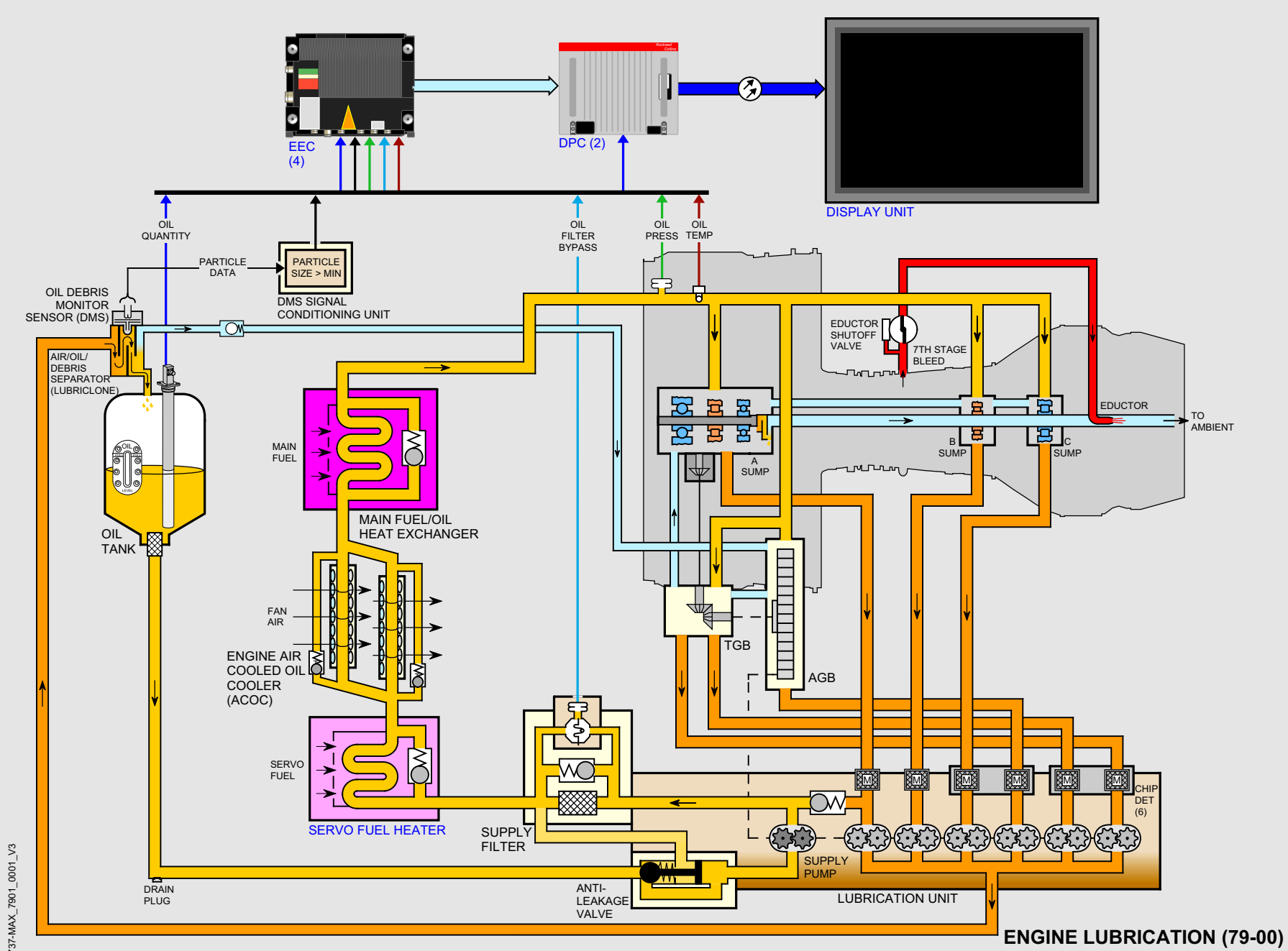

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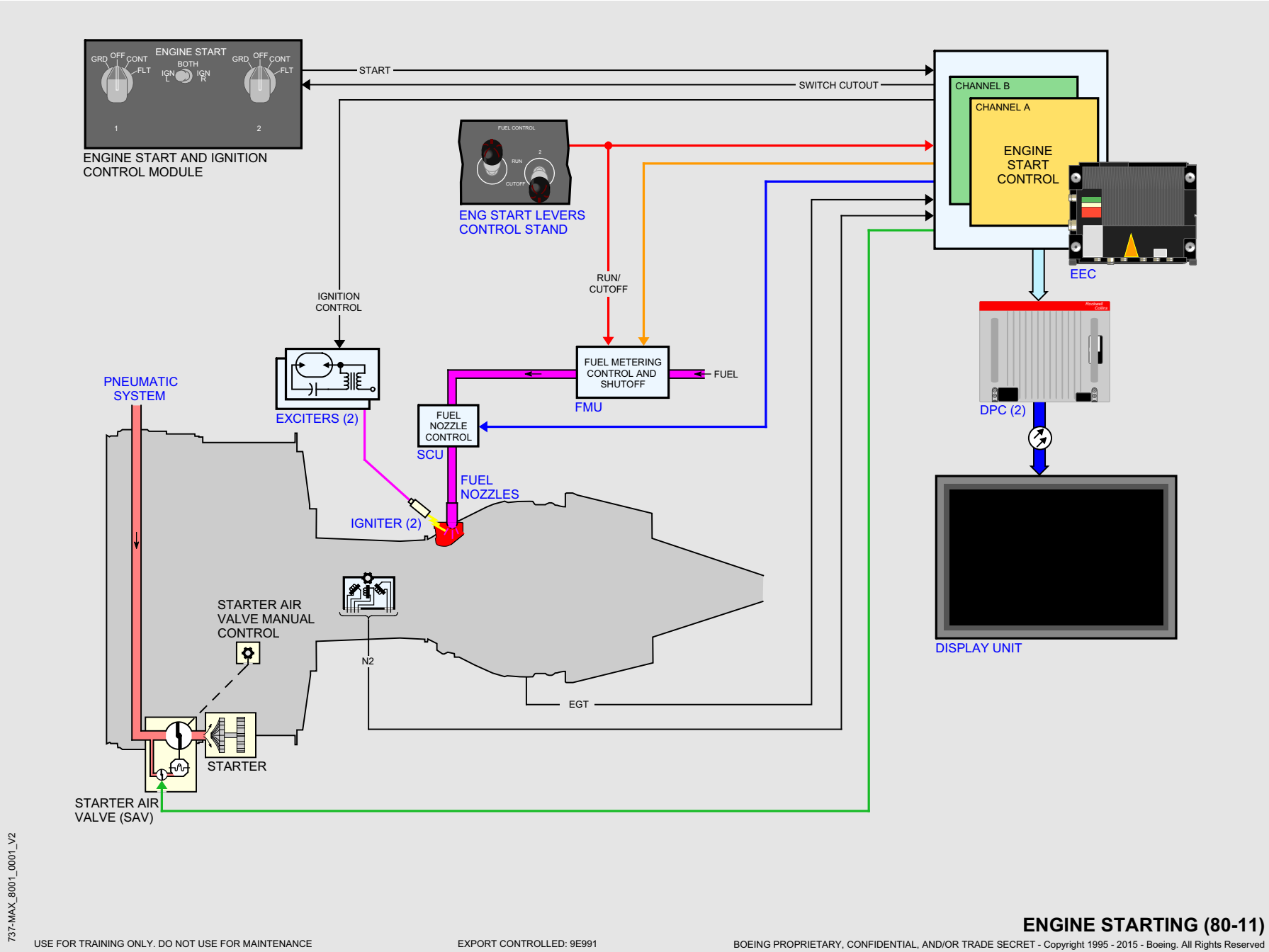

ENGINE STARTING (80-11)

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