PART II **– Aircraft Systems**

ABOUT THIS MANUAL

VERSION: 11 OCTOBER, 2011

WARNING:
THIS MANUAL IS FOR 757 CAPTAIN EXPANSION FOR MS FSX® ONLY. DO NOT USE FOR FLIGHT.
DO NOT USE FOR TRAINING, COMMERCIAL OR INSTITUTIONAL PURPOSES.

The '757 Captain' MANUAL is organized into five Parts:
Each Part is provided as a separate Acrobat® PDF document:

- Part I – User's Manual

- **Part II – Aircraft Systems** - this document.

- Part III – Normal Procedures

- Part IV – Flight Characteristics and Performance Data

- Part V - Flight Management System

All Parts of the Manual are available free of charge via Sim Ops.

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SYSTEMS DESCRIPTION

The '757 Captain' is one of the most advanced, complete and accurate airliner expansions for MSFS.

But the '757 Captain' (same as MSFS itself and any MSFS expansion) is a flight simulation software game. Therefore this product should not be used as flight training device (FTD) and/or simulator for flight training purposes.

All items should work as described in this manual. If something is not described as functional (therefore it does not work or does not exist in the model) it is not a system 'bug' but a reasonable simplification.

VC AND 2D PANEL CONTROLS AND INDICATORS

VC and 2D panel controls and indicators are almost identical but 2D and VC graphics quality may vary, and some of the 2D controls and indicators are not present in VC and vise versa. Some controls and indicators are available in VC only or in 2D only.

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PANELS LAYOUT

DO NOT USE FOR FLIGHT
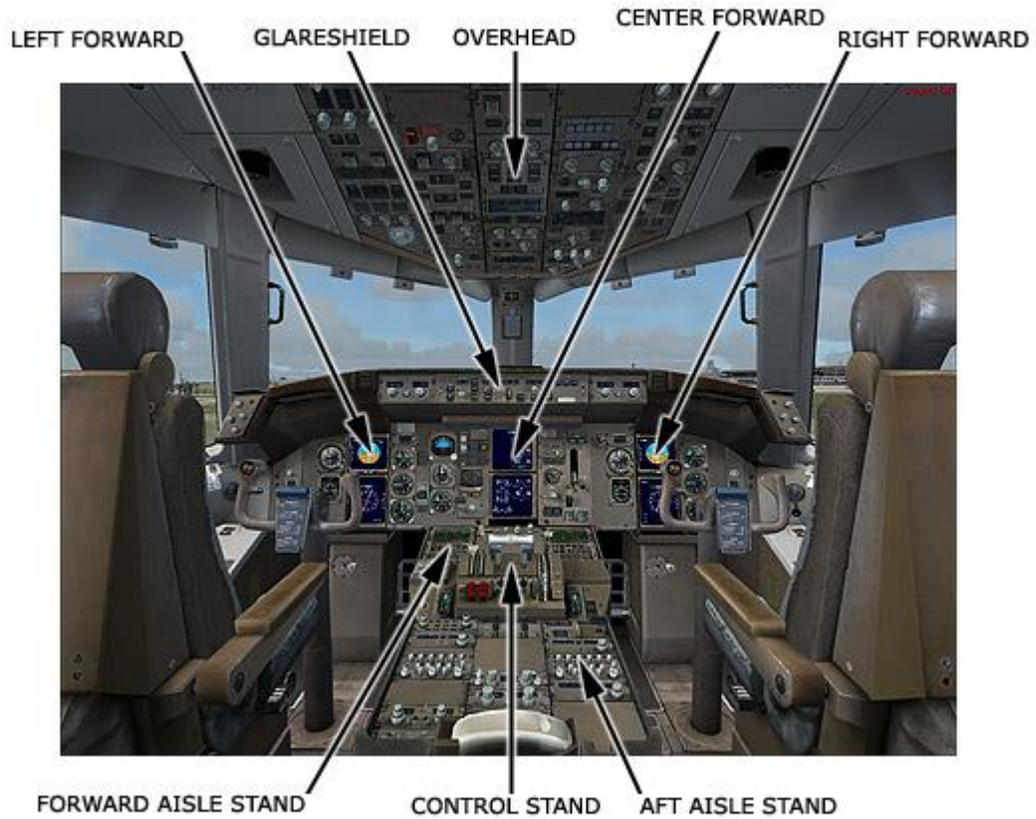
OVERHEAD PANEL

✚   Indicates that the panel in VC has 2D pop-up panel. Click on the top-left corner of the VC panel to call the 2D panel.

  O1. IRS Control Panel
  O2. Yaw Damper Control Panel
  O4. Hydraulic Control Panel
  O5. Timer Panel
  O6. Annunciator Panel
  O7. Evacuation Signal Control Panel
  O8. Battery/Standby Power Panel
  O9. Electrical Control Panel
  O10. APU Control Panel
  O11. Cockpit Voice Recorder Panel
  O12. Lights Control Panel Left
  O13. EMER Lights/Oxy Control Panel
  O14. Window Heat Control Panel
  O15. R.A.T./ENG Start and Ignition Panel
  O16. Fuel Control Panel
  O17. Fuel Quantity Indicator
  O18. Engine Anti-Ice Control Panel
  O19. Wiper Control Panel

O20. Exterior Lights Control Panel
O21. Crew Messages Player Panel
O22. Passenger Signs
O23. Pressurization Panel
O24. Equipment Cooling Indications
O25. Light Control Panel Right
O27. Temperature Indicators Panel
O28. Air Conditioning Panel
O29. Bleed Air Control Panel
O30. OBS Audio Panel

O1. IRS CONTROL PANEL

1.   IRS Display

2.   IRS Display Selector

3.   IRS Keyboard

4.   IRS System Display Selector

5.   Indicator Lights

6, 7, 8. IRS Mode Selector

1. IRS Display

Displays track, groundspeed, present position, wind or heading as controlled by display selectors or keyboard.

2. IRS Display Selector

Selects data for display when keyboard not in control.
- TK/GS - displays present true track and groundspeed
- PPOS - displays present position
- WEND — displays present true wind when in—flight
- HDG - displays present true heading.

3. IRS Keyboard

Push an alpha key to begin entry.
- pushing the N, S, E or W keys changes the IRS display to keyboard control and arms the keyboard for latitude or longitude entry
- pushing H changes the display to keyboard control and arms the keyboard for heading entry.

Enter (ENT) Key - push
- enters data from display into all three IRS systems
- restores display to the display selector setting

Clear (CLR) Key - push
- clears data keyed into display
- restores display to the display selector setting.

4. IRS System Display Selector

Selects system to display data when keyboard not in control.

5. Indicator Lights

ALIGN Lights

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.

ON DC Lights

Illuminated (amber) -
- normal AC power for the related IRS has failed and the IRS is operating on DC backup power from the 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
- EICAS advisory message L, C or R IRS ON DC is displayed
- momentary illumination is normal during alignment self—test.

DC FAIL Lights

Illuminated (amber) -
- DC backup power for the related IRS has failed
- if the other lights are extinguished, the IRS is operating normally on AC power.
- EICAS advisory message L, C or R IRS DC FAIL is displayed

FAULT Lights

Illuminated (amber) - a system fault affecting the related IRS ATT and/or NAV modes has been detected. The EICAS advisory message L, C or R IRS FAULT is also displayed.

6, 7, 8. IRS Mode Selectors

Rotate - controls mode of related IRS.
Must be pulled out to move from NAV position.

OFF-
- alignment is lost
- ALIGN light illuminates for 30 seconds as system goes through a shutdown sequence
- realignment requires about 30 seconds while the airplane is parked and entry of present position (latitude and longitude).

ALIGN-
- initiates alignment when parked
- initiates a quick alignment if selected when the system is in the navigation mode.

NAV-
- normal operational mode
- permits system to enter NAV mode after completing alignment
- initiates a 30 seconds alignment if selected from OFF.

ATT-
- provides only attitude and heading information
- position and ground speed information lost until system realigned on ground
- when selected airborne, ALIGN light illuminates for 30 seconds while system senses local level (requires level flight)

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- magnetic heading input required to initialize heading output
- the selector must be cycled through OFF to re-enter ALIGN or NAV mode.

IRS Alignment

An IRS must be aligned before it can enter NAV mode. Rotating the IRS mode selector from OFF to NAV begins the IRS alignment. The IRS performs a short power test, during which the ON DC light illuminates. When the ON DC extinguishes the ALIGN light illuminates. Alignment requires approximately 30 seconds, time frame intentionally set for quick alignment.

Present position (latitude and longitude) must be entered on the CDU position initialization page to complete the alignment. If the present position cannot be entered through CDU, it may be entered through the IRS mode selector keyboard.

If the latitude/longitude position is not near the original airport, the CDU scratchpad message VERIFY POSITION is displayed. If the entered latitude/longitude position does not pass the IRS internal comparison test, the scratchpad message ENTER IRS POSITION is displayed.

Alignment can be accomplished only when the airplane is parked. Alignment stops if an IRU detects motion during alignment. When the motion stops, some units restart the alignment automatically.

The IRS is aligned when all IRUs enter the navigation mode.

O2. YAW DAMPER CONTROL PANEL

1,2. Yaw Damper Switches

ON: Initiates a self test when at lease one IRS is in the NAV Mode, an associated hydraulics (left and center) are available. After the self test, the associated yaw damper is engaged.

OFF: Power is removed from the associated yaw damper system.

INOP Light: The associated yaw damper is inoperative due to a fault or because the switch was selected to OFF. With the INOP light ON, hydraulics are removed from the associated system. The INOP light can be reset by cycling the switch to OFF then ON.

O4. HYDRAULIC CONTROL PANEL
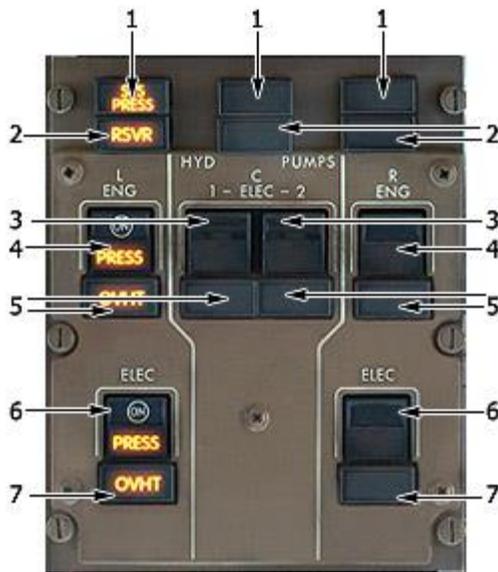
1. SYS Press Light

2. RSVR Light

3. ELEC HYD Pump Switch

4. ENG HYD Pumps Switch

5. OVHT Light

6. ELEC HYD Pump Switch Light

7. OVHT Light

1. SYS Press Light

An illuminated SYS Press light indicates low pressure in the associated hydraulic system.

2. RSVR Light

An illuminated RSVR light indicates one of the following:
- Less than 50% fluid quantity in the associated system reservoir.
- Low air pressure in the associated system reservoir.

3. ELEC HYD Pump Switch

ON: Turns on the associated center system electric hydraulic pump. When only one source of power is available, turning on both pump switches results in the number 2 pump turning off, to conserve electrical power, known as "load shed".

OFF: Turns off the associated center system electric hydraulic pump.
PRESS: Indicates that pump output pressure is low.

4. ENG HYD Pumps Switch

ON: The associated engine driven hydraulic pump supplies hydraulic pressure when the engine is running. The pump pressure valve is spring-loaded to the OPEN position and requires electrical power to close.

OFF: The associated engine driven pump is depressurized. This prevents pump output. Fluid continues to circulate through the pump for cooling and lubrication.
PRESS: Indicates that the associated pump output pressure is low.

5. OVHT Light

An illuminated OVHT light indicates an overheat in the associated hydraulic pump case drain cooling.

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O6. ANNUNCIATOR PANEL
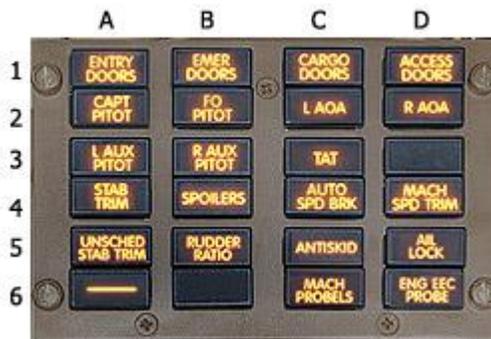
A1. Entry Doors Lights

This warning illuminates to indicate that an entry or service door is not closed and locked.
An EICAS message identifies the door if only the one on a side is not closed and locked.
EICAS indicates L or R ENT DOORS if more than one door on the associated a side is not closed and locked.

B1. EMER Doors Lights

This warning illuminates to indicate that an overwing exit or either off wing slide door is not closed and locked.
An EICAS message indicates which exit or door is affected.

C1. Cargo Doors Lights

This warning illuminates to indicate that a cargo door is not closed and locked.
An EICAS message indicates which cargo door is affected.
If more than one door is affected, EICAS indicates CARGO DOORS.

D1. Access Doors Lights

This warning illuminates to indicate that the radar bay door or forward door E/E compartment door is not closed or locked.
An EICAS message indicates the affected door. If more than one of access door is affected, EICAS indicates ACCESS DOORS.

C2, D2. AOA Lights

These warning lights illuminate to indicate that there is a failure in the associated angle of attack vane heater.
AOA heat turns on when either engine is running, and will receive high heat both on the ground and while inflight.

C3. TAT Lights

These warning lights illuminate to indicate that there is a failure in the associated Total Air Temperature heater.
TAT heat is inhibited on the ground, and comes on high while inflight.

A4. STAB TRIM Lights

Illuminates to indicate that one of the two stabilizer brakes failed to release when trimming with the stabilizer trim switches.
Trim rate is reduced to half rate.
In the event there is a problem in the electric trim consol system, full trim is still available with the manual trim handles.

B4. Spoilers Light

Illuminates to indicate that one or more spoiler system faults have been detected.

DO NOT USE FOR FLIGHT

C4. AUTO SPD BRK Light

Illuminates to indicate that there is a fault in the automatic speed brake system.
When this light is illuminated and the speed brake lever is down or armed, the speed brake may not automatically extend during landing or rejected takeoff.
If the speed brake lever is in armed while in flight, additional faults may cause the speed brakes to extend to the ground deployment angle.

D4. Mach SPD TRIM Light

Illuminates to indicate a fault in the Mach/Speed trim system.

A5. UNSCHED STAB TRIM Lights

Illuminates to indicate an un-commanded movement of the stabilizer trim.
This light can also illuminate to indicate that the stabilizer trim is moving in the direction opposite the one commanded by the autopilot elevator trim signal, or trim movement by Mach/Speed Trim, or autopilot opposite to elevator input.

B5. Rudder Ratio Light

Illuminates to indicate that there is a fault in the rudder ratio system, or there is no left hydraulic pressure to the rudder ratio actuator.

C5. Antiskid Lights

Illuminate to indicate that there is a fault in the antiskid system which may affect antiskid operation.
This light is inhibited when the parking brake handle is set.

A2,B2,A3,B3. Probe Heat Lights

These warning lights illuminate to indicate that there is a failure in the associated pitot probe heater.
Pitot heat turns on when either engine is running, and will receive low heat on the ground, and high heat while inflight.

O7. EVACUATION SIGNAL CONTROL PANEL
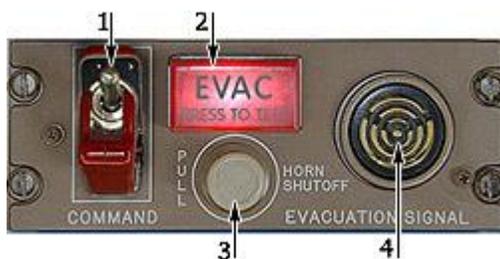
1.   Command Switch

2.   EVAC Light

3.   Horn Shutoff Switch

4.   Evacuation Signal Horn

1. Command Switch

Activates the evacuation light and aural signal on all signal panels.
In the event more than one command switch is on, the last switch turned off will turn off all lights and silence the aural signal.

2. EVAC Light

When the EVAC light is flashing, it indicates that the evacuation signal has been activated.
The EVAC light illuminates when the command switch on any evacuation signal panel is activated.

The EVAC light continues to flash until all command switches are off.

3. Horn Shutoff Switch

Pull this switch silence the evacuation audio signal at the individual panel.

4. Evacuation Signal Horn

The EVACUATION SIGNAL horn will emit an aural signal when the command switch on any evacuation signal panel is actuated.

O8. BATTERY/STANDBY POWER PANEL

1. BAT Switch

2. DISCH Light

3. STBY Power Switch

4. STBY Power Off Light

1. BAT Switch

ON: Placing the BAT switch ON will enable the battery to provide backup power to the battery bus and the standby buses.

The BAT switch must be ON for APU operation, including starting and continued operation on the ground.

OFF: The BAT OFF light indicates that the battery switch is OFF while the left DC bus is powered.

2. DISCH Light

An illuminated DISCH light indicates that the battery is discharging.

3. STBY Power Switch

OFF: Disconnects the standby buses from all power sources. This switch must be pushed in to move the switch from the AUTO to the OFF position.

AUTO: The standby buses are powered from the left main AC and DC buses.
If the BAT switch is ON, the battery will act as a backup power source.

BAT:
- The standby DC bus and the static inverter are powered from the battery if the BAT switch is in the ON position.
- The static inverter powers the standby AC bus.
- The battery charger is disconnected from the battery, and the DISCH light will illuminate as the battery is powering the Hot Bat Bus, the BATT Bus, and the Standby buses.
- Isolates the standby AC and DC buses from the main AC and DC buses.

4. STBY Power Off Light

The STBY POWER OFF light illuminates to indicate that one or both standby buses are not powered.

DO NOT USE FOR FLIGHT

O9. ELECTRICAL CONTROL PANEL
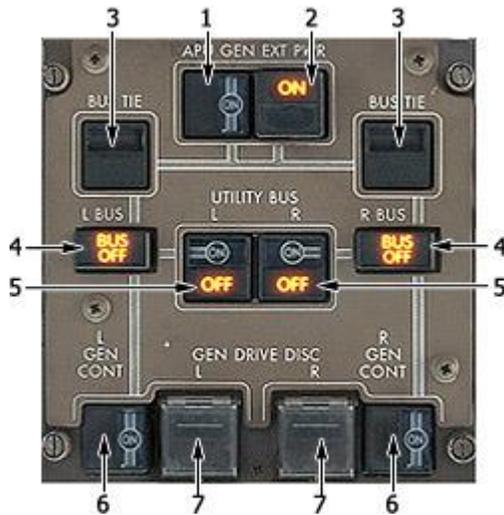
1.   APU GEN Switch

2.   EXT Power Switch

3.   BUS Tie Switch

4.   BUS OFF Light

5.   Utility BUS Switch

6.   GEN CONT Switch

7.   GEN Drive DISC Switch

1. APU GEN Switch

ON: Closes the APU generator field and Auxiliary Power Breaker (APB) to operate automatically.
The APB closes to power an AC bus if external power is not in use and the APU generator output is normal.

OFF: Opens the APU generator field and locks the APB in the open position.

2. EXT Power Switch

ON:
-    Closes the external power contactor (EPC).
-    Trips off the APU or Engine generators.
-    Ext power powers the AC tie bus.

OFF:
-    Opens the EPC.
-    External power no longer powers the AC tie bus.

AVAIL: External power is plugged* into the external power receptacle and is producing acceptable power.
When the AVAIL light is illuminated, external power is powering the ground handling bus.

- MSFS menu: Captain Sim > 757 Captain > Ground Power Supply

3. BUS Tie Switch

AUTO: The AC BUS Tie Breakers (BTB) are armed to close in the event power is lost to the respective AC bus, thus receiving power from the APU, if available, or the other AC bus.

With the associated BUS Tie switch in AUTO, loss of power to that AC bus will result in the respective Flight Instrument Transfer Bus receiving power from the opposite AC bus.

If both switches are in, the automatic DC bus tie system is armed. In this case, the DC tie breaker will close any time power is lost to a Main DC bus, so it can receive power from the opposite DC bus.

MANUAL ISLN: Manually opening the BUS Tie switch results in the AUTO portion of the switch disappearing, the ISLN light illuminates, and associated BTB opens. The following also happens:

-    Resets the automatic trip circuitry.

- The automatic DC bus tie transfer system is inhibited any time either switch is selected to ISLN.
- The associated Flight Instrument Transfer Bus will not transfer to the opposite AC bus.

ISLN Light: An illuminated ISLN light indicates that the associated BTB is locked open. This could be due to either a fault trip or turning the switch OFF.

4. BUS OFF Light

An illuminated BUS OFF light indicates that the associated MAIN AC bus is not powered.

5. Utility BUS Switches

ON: The associated utility bus and galley buses are connected to the respective MAIN AC bus in the event there are no load shed signals present.

OFF:
- Disconnects the associated utility bus and galley buses from the respective AC bus.
- Resets the load shed circuitry.

OFF Light: The associated utility bus is un-powered. This could be due to either a load shed or the associated utility bus switch is in the OFF position.

6. GEN CONT Switches

ON: Closes the associated generator field and arms the generator breaker for automatic operation. The OFF light will remain on until the generator breaker is closed.

OFF:
- Opens the associated generator field, which opens the generator breaker.
- Resets the automatic trip circuitry.

OFF Light: the associated generator breaker is open. This could be due to either an automatic trip or the GEN CONT switch is OFF. The generator field may or may not be open, depending on the fault or manual switch operation.

7. GEN Drive DISC Switches

Disconnects the associated generator from the engine. The disconnect occurs mechanically through engine rotation.

Reconnect can only occur through maintenance action.

DRIVE Light:
- Drive oil pressure is low.
- Oil temperature is high.

DO NOT USE FOR FLIGHT

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010. APU CONTROL PANEL
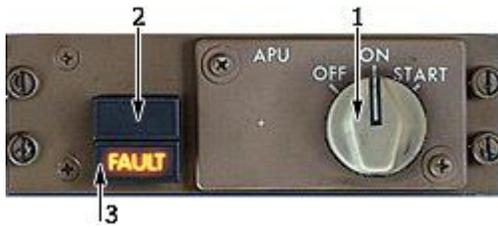
1.   APU Selector Switch

2.   APU Run Light

3.   APU Fault Light

1. APU Selector Switch

OFF:
-    Starts the APU shutdown sequence.
-    Closes the APU bleed valve and starts a 0 to 120 second cool down period.
-    At the end of the cool down period, the APU fuel valve closes.
-    Closes the APU door.
-    Resets the APU fault circuitry.

ON:
-    Opens the APU fuel valve and the APU door.
-    Arms the APU bleed valve.
-    Starts the left forward boost pump or DC fuel pump if AC power is not available. + APU will run after start.

START:
-    Starts the APU.

The APU Selector Switch is spring loaded to the ON position from the start position.

2. APU Run Light

Illuminated (white) – APU is at operating speed.

3. APU Fault Light

Illuminated (amber):
-    The APU has automatically shut down.
-    The APU fuel valve disagrees with the commanded position.

O11. COCKPIT VOICE RECORDER PANEL

1.   Test Button

2.   Erase Button

3.   Monitor Indicator

4.   Headphone Jack

5.   Area Microphone

O12. LIGHTS CONTROL PANEL LEFT
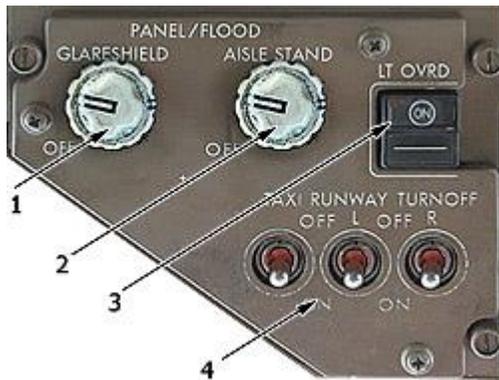
1. Glareshield Knob

2. Aisle Stand Knob

3. LT OVERD Switch

4. Runway Turnoff Lights

1. Glareshield Knob

Controls the glareshield flood lights.
Fully functional copy of the Glareshield Knob is available on the main Captain's panel as well.

All other interior lighting switches control default MSFS lighting (Shift+L)

4. Runway Turnoff Lights

ON: Turns the associated runway turn off light to on. This light is mounted on the fixed portion of the nose gear strut.

The runway turn off lights are angled outward. The runway turn off lights extinguish upon gear retraction regardless of the position of these switches.

OFF: Turns the associated runway turnoff light off.

O13. EMER LIGHTS/OXY CONTROL PANEL
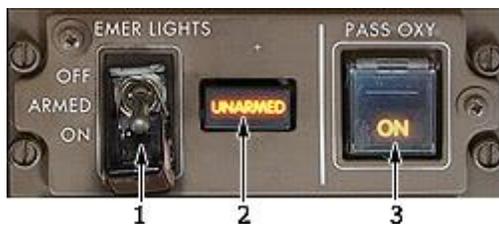
1.   EMER Lights Switch

2.   Unarmed Light

3.   PASS OXY Switch

1. EMER Lights Switch

OFF: The emergency lights system is disarmed.

ARMED:
-   All emergency lights will automatically illuminate in the event power is lost to the associated battery charging bus (Rt Main DC).
-   Exterior emergency lights on the associated side will automatically illuminate in the event an exit is opened with the slide armed.

ON: All emergency lights illuminate. Lights are powered from their respective battery pack.

The emergency lights batteries will charge as long as the associated charging bus is powered.

2. Unarmed Light

Illuminates to indicate that the emergency lights system is not armed for automatic operation.

3. PASS OXY Switch

Push to open all cabin oxygen module doors.

The cabin oxygen module doors automatically open if the cabin altitude reaches 14,000 feet.

ON Light: The circuit to open the cabin oxygen module doors has been activated. This can be due to either an automatic deployment command, or the PASS OXY switch was pressed.

O14. WINDOW HEAT CONTROL PANEL
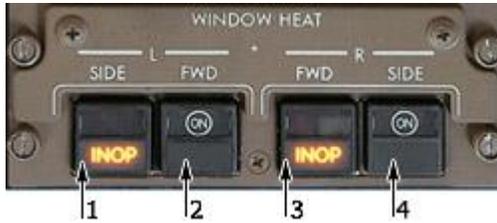
1,3. Window Heat Inoperative (INOP) Lights

2,4. Window Heat Switches

1,3. Window Heat Inoperative (INOP) Lights

Illuminated (amber) – the window is not being heated.

2,4. Window Heat Switches

Push to heat the associated cockpit window. The forward windshields are anti-iced while the side windshields are anti-fogged.

In the event of an overheat, push the switch off then on to reset the system.

INOP Light: Heat to the associated windows is OFF due to a power failure, overheat, ground test, or the associated switch is OFF.

DO NOT USE FOR FLIGHT

O15. R.A.T./ENG START AND IGNITION PANEL

1.	RAM Air TURB Switch
2.	Ignition Selector Switch
3.	Valve Lights
4.	ENG Start Selector

1. RAM Air TURB Switch

Press to deploy the Ram Air Turbine (RAT). Switch must be held for at least 2 seconds.

The RAT is armed to automatically deploy when both engines N2 RPM drops below 50%, and the airplane is above 80 knots.

UNLKD Light: Illuminates to indicate that the Ram Air Turbine is not locked in the retracted position.

PRESS Light: Illuminates to indicate that the Ram Air Turbine is supplying acceptable pressure to the center hydraulic system.

Once deployed, the Ram Air Turbine should be able to supply sufficient pressure to operate the flight controls down to 130 knots.

2. Ignition Selector Switch

Selects the ignition source to be used when the engine start selectors are in the GND, AUTO, or CONT positions AND the fuel control switches are out of CUTOFF.

3. Valve Lights

Illuminates to indicate that the respective start valve position disagrees with the position commanded by the associated start selector.

4. ENG Start Selectors

GND:
- Opens the start valve.
- Closes the bleed valve.
- Arms the selected ignition system.
- Increases APU bleed air pressure.
- Arms the starter cutout through the 50% N2 speed card.
- Initiates a load shed of the Utility buses if the APU is used for power and bleed air.

Push to rotate the switch from the AUTO to GND position. Switch is held in the GND position by a solenoid until 50% N2.

AUTO:
- Closes the start valve.
- Opens the bleed air valve (if bleed air pressure is available).

- Deactivates ignition for the associated engine.
- Selected ignition system for the associated engine will operate continuously when slats are extended OR engine anti-ice is ON if the associated fuel control switch is in the RUN position.

OFF: Turns off the ignition, arms the bleed valve to open, and closes the start valve.

CONT: Allows continuous operation of the selected ignitor if the fuel control switch is in RUN.

Note:

Do not start two engines simultaneously.

O16. FUEL CONTROL PANEL
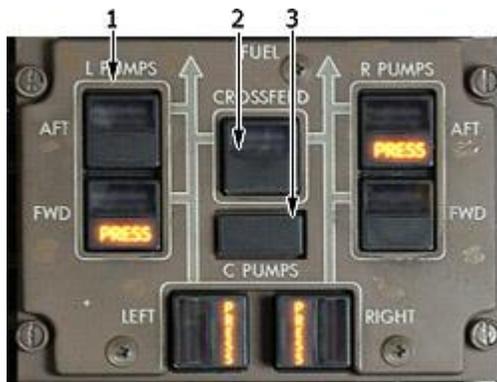
1. Pump Switches

2. Crossfeed Switch

3. Fuel CONFIG Light

1. Pump Switches

Press to turn on the associated fuel pump.

The Center tank pumps are inhibited when their associated engine is below 50%.

The left forward pump operates automatically when the APU selector is in START or ON AND AC power is available.

The pump operates regardless of the switch position.

PRESS Light: Illuminates to indicate that the pump output pressure is low. Light illuminates regardless of L and R pump switch positions.

The Center tank pump low pressure lights illuminate only if the associated center tank pump switch is selected ON.

2. Crossfeed Switch

Press to open or close the crossfeed valve.

VALVE Light: Valve position disagrees with switch position.

3. Fuel CONFIG Light

Illuminates for one of the following conditions:
- Center tank pump contains more than 1200 pounds of usable fuel with the center pump switches OFF.
- Imbalance in excess of 1800 pounds between the left and right tanks
- Quantity in either main tank is below approximately 2200 pounds.

DO NOT USE FOR FLIGHT

O17. FUEL QUANTITY INDICATOR
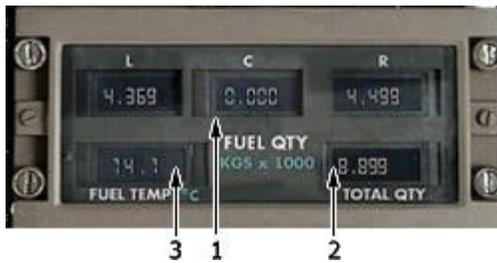
1. Fuel Quantity Indicator

2. Total Quantity Indicator

3. TEMP Indicator

Displays in kilograms x 1000:
1 US gallon of jet fuel = 3.785 Litres = 2.952 kilograms

1. Fuel Quantity Indicator

Each readout indicates the fuel quantity in the respective tank down to the nearest 100 KGs.

A blank indication indicates an inoperative or failed fuel quantity indicator.

2. Total Quantity Indicator

Indicates the total fuel quantity in all tanks.

3. TEMP Indicator

Indicates the fuel temperature in the right main tank.

O18. ENGINE ANTI-ICE CONTROL PANEL
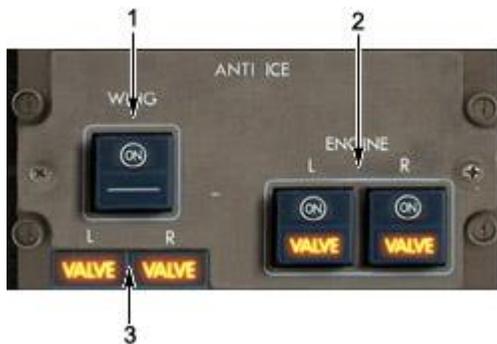
1. Wing Heat Switch

2. ENG Heat Switches

3. Valve Lights

1. Wing Heat Switch

Push to open both the left and right wing anti-ice valves while in flight. Hot pneumatic air flows to the three leading edge slats outboard of each engine.

Wing anti-ice is inhibited from operating on the ground.

2-3. ENG Heat Switches

Push to open the cowl anti-ice valve of the associated engine. If the engine is running, engine bleed air will flow to the inlet cowl.

3. Valve Light

Illuminates to indicate that the associated wing anti-ice valve disagrees with the position selected by the WING switch.

O19. WIPER CONTROL PANEL

1. Wiper Selector

OFF: The wipers are stowed at the base of the windows.

LOW: The wipers operate at low speed.

HIGH: The wipers operate at high speed.

O20. EXTERIOR LIGHTS CONTROL PANEL
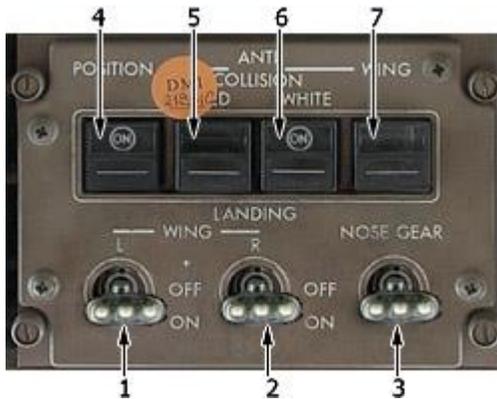
1,2. Wing Landing Light Switches

3. Nose Gear Landing Light Switch

4. Position Lights Switch

5,6. Anti-Collision Lights Switches

7. Wing Lights Switch

1-2. Landing Light Switches

Landing Lights: Turns on the landing lights. These lights are located in the associated wing fairings.

The landing lights automatically dim when the landing gear lever is out of the DOWN position.

3. Nose Gear Light Switches

ON: Illuminates the nose gear landing lights. These lights are mounted on the nose gear strut.

The nose gear lights extinguish whenever the landing gear is retracted, regardless of switch position.

4. Position Lights Switch

Turns on the wingtip position lights. These lights are red, green, and white.

5. Anti-Collision Lights Switch

Red turns on the red strobe lights. One strobe light is on the top of the fuselage, the other is on the bottom.

White turns on the white wingtip strobe lights.

O21. CREW MESSAGES PLAYER PANEL
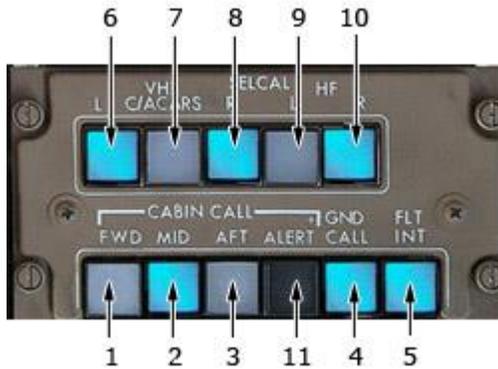
1-7. Stewardess Messages

8,9. Captain Messages

10. Selective Calling (SELCAL) Message

11. Blank

Stewardess Messages

1. Welcome Message
2. Refueling Message
3. Safety briefing Message
4. Night takeoff Message
5. Departure Message
6. Turbulence Message
7. Descent Message

Captain Messages

8. Welcome Message
9. Arrival Message

O22. PASSENGER SIGNS

1. No Smoking Switch.

2. Seat Belts Switch.

1. No Smoking Switch

OFF: Turns off the cabin NO SMOKING signs.

AUTO: The cabin NO SMOKING signs illuminate when the landing gear is down and extinguishes when the landing gear is up.

ON: Illuminates the cabin NO SMOKING signs.

2. Seat Belts Switch

OFF: Turns off the cabin SEAT BELTS signs.

AUTO: The cabin SEAT BELTS signs illuminate automatically when the landing gear is DOWN or flaps not UP. Lights extinguish when the landing gear AND flaps are up.

ON: Illuminates the cabin SEAT BELTS signs.

DO NOT USE FOR FLIGHT

O23. PRESSURIZATION CONTROL PANEL

1. Valve Indicator

2. LDG ALT Knob

3. LDG ALT Indicator

4. Manual Knob

5. Auto Rate Knob

6. Auto INOP Light

7-9. Pressurization Indicators

10. Mode Select Switch

1. Valve Indicator

Indicates the position of the outflow valve regardless of the mode of operation.

3. LDG ALT Indicator

Displays the LANDING field elevation as selected by the landing altitude knob. The altitude displayed in the window is used by AUTO 1 and AUTO 2 modes of operation.

If a landing is to be made back to the departure airport, the LDG ALT selector must be reset to the takeoff altitude, as the controller will not "remember" the takeoff field elevation.

4. Manual Knob

Controls the outflow valve when the mode selector is in manual. The knob is spring loaded to the center position.

Climb opens the outflow valve, descend closes the outflow valve.

5. Auto Rate Knob

Adjusts the cabin altitude rate of change limit when operating in AUTO 1 or AUTO 2.

The index mark sets a limit of approximately 500 FPM climb and 300 FPM descent.

6. Auto INOP Light

Illuminates to indicate that both automatic pressurization controllers are inoperative. In this case, the outflow valve freezes in position until the mode selector is placed in MAN. At this time, the outflow valve position can be manually changed.

The light also illuminates when the MODE SELECT switch is in the MAN position.

10. Mode Select Switch

AUTO 1/AUTO 2: Selects the associated pressurization controller. Should one system fail, the other will automatically take over.

MAN: Bypasses both automatic systems and arms the manual knob. In the manual mode, the outflow valve is moved at half the normal rate by a DC motor that operates by battery power.

O24. EQUIPMENT COOLING PANEL
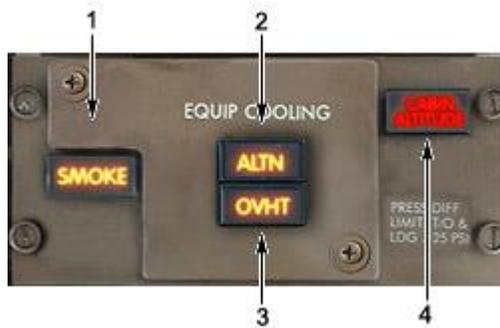
1. Smoke Light

2. ALTN Light

3. OVHT Light

4. Cabin Altitude Light

O25. LIGHT CONTROL PANEL – RIGHT

1. CKT BKR Knob

2. OVHD PNL Knob

3. Dome Light Knob

4. Logo Lights Switch

5. FLT DK Door Switch

6. IND LTS Switch

7. Flight Deck Door Lock Selector

1-4. All knobs control the same (the only one) interior light available in MSFS. (Shift L)

5. FLT DK Door Switch

Press to lock or unlock the cockpit door. The cockpit door automatically unlocks in the event of a loss of electrical power.

UNLKD: Illuminates to indicate that the cockpit door is unlocked.

7. Flight Deck Door Lock Selector

Spring loaded to AUTO. Selector must be pushed in to rotate from AUTO to UNLKD position. Selector must not be pushed to rotate from AUTO to DENY position.

UNLKD: Door unlocked while selector is 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.

O27. TEMPERATURE INDICATORS PANEL

1-3. Compartment Temperature Indicators

Display actual temperature sensed in the compartment.

O28. AIR CONDITIONING PANEL
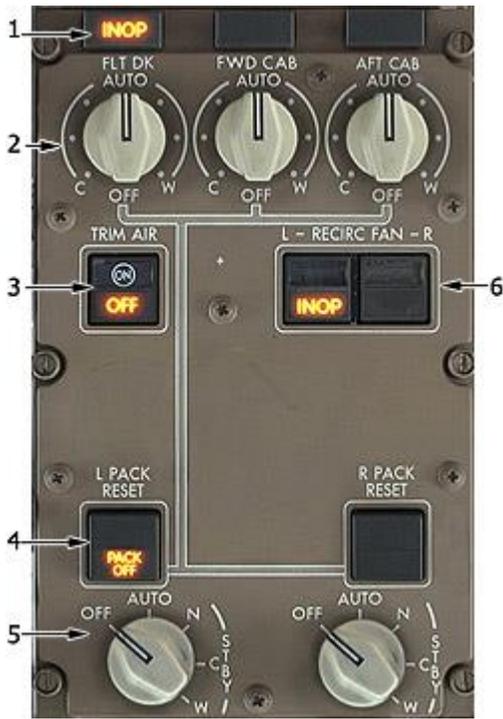
1. INOP Lights

2. TEMP Control Selectors

3. TRIM Air Switch

4. Pack Reset Switches

5. Pack Selector Switches

6. RECIRC Fan Switches

1. INOP Lights

Illuminates to indicate an overheat or fault in the associated zone temperature control system. The INOP light illuminates when the associated temperature control selector is OFF or the master trim air switch is OFF.

2. TEMP Control Selectors

OFF: Closes the associated zone trim air valve. The associated compartment air temperature is determined by the zones operating in AUTO.

AUTO: Selects the temperature to maintain in the associated compartment. The selector calling for the coolest temperature controls the output of both packs when both packs are operating in AUTO.

Trim air is added to increase the temperature in the selected compartment.

C - 65 degrees F.
W -85 degrees F.

3. TRIM Air Switch

ON: Enables the trim air valve to open and modulate to add hot trim air to the zone valves for zone temperature control.

OFF: Closes the trim air valve. Zone temperature selectors are deactivated and both packs operate to maintain approximately 75 degrees F in the passenger cabin.

OFF Light: Illuminates when the trim air switch is OFF.

4. Pack Reset Switches

INOP: Illuminates for:
- Excessive pack outlet temperature
- Fault in automatic pack temperature controller.

If the pack outlet temperature is excessive, the pack will automatically produce maximum cold air. You can reset the pack by pressing the RESET switch after the pack has cooled.

The pack cannot be reset in the event of a controller fault. Pack can be controlled in STDBY (also extinguishes the INOP light).

PACK OFF: Illuminates for:
- Pack selector in OFF.

- Loss of air to the pack.

If the INOP and PACK OFF lights illuminate simultaneously, the pack has shutdown due to excessive compressor outlet temperature.

You can attempt to reset the pack by pushing the RESET switch after the pack has cooled down.

The RESET switch is used to reset the associated pack after the pack has shutdown due to a temperature related problem.

The RESET switch will have no effect in the event the fault is in the pack controller.

5. Pack Selector Switches

OFF: Closes the associated pack valve.

AUTO: Associated pack operates in the automatic mode.

STBY N: (Normal) Associated pack outputs a constant moderate temperature.

STBY C: (Cool) Associated pack outputs full cool temperature.

STBY W: (Warm) Associated pack outlet temperature varies depending on the amount and temperature of air flowing across the pack heat exchangers.

6. RECIRC Fan Switches

ON: Turns on the associated re-circulating fan.

INOP Light: Illuminates when:
- Respective RECIRC switch OFF
- Respective RECIRC FAN has failed.
- Respective RECIRC FAN has been turned off automatically due to a load shed, equipment smoke or cargo fire ARM switch positioned to ARM.
- Turning off Recirc fan will place associated pack in HIGH flow mode, unless the other engine is inoperative.

O29. BLEED AIR CONTROL PANEL
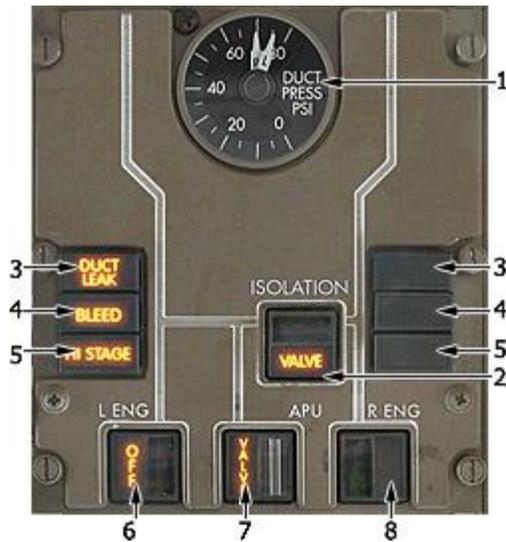
1.   DUCT Pressure Indicator

2.   Isolation Valve Light

3.   DUCT Leak Lights

4.   Bleed Lights

5.   HI Stage Lights

6, 8. ENG Bleed Valve Switches

7.   APU Bleed Valve Switches

1. Duct Pressure Indicator

Indicates the pressure in the left and right pneumatic ducts

3. Duct Leak Lights

Illuminates when there is a leak detected in the associated pneumatic duct. The left DUCT leak light can also indicate that there might be a leak in the center pneumatic duct.

The DUCT LEAK lights can also illuminate for a leak in the associated wing anti-ice duct.

4. Bleed Lights

Illuminates to indicate that the associated engine high stage and bleed air valves have closed due to the engine bleed air temperature exceeding the maximum temperature limit.

You can reset the bleed valve after the temperatures have cooled by turning the bleed air switches OFF then ON.

5. HI Stage Lights

Illuminates to indicate that the associated engine high stage bleed valve has closed due to an over pressure. When this happens, the valve is locked closed and can only be reset by maintenance personnel.

2. Isolation Valve Light

Illuminated (amber) – isolation valve position disagrees with commanded position.

7. Isolation Valve Switch

Press to open or close the bleed air isolation valve. Valve is electrically controlled and operated by the Standby AC and DC buses.

VALVE Light: Illuminates when the isolation valve position disagrees with the position commanded by the switch.

6,8. ENG Bleed Valve Switches

ON: Associated bleed air valve opens when air pressure is available and no faults exist.

OFF: The associated bleed air valve closes.

OFF Light: Illuminates when the associated bleed air valve is closed. This can happen when the switch is OFF or a fault exists.
The bleed air valve is electrically controlled, but requires pneumatic air pressure to open. The valve will close with either air pressure, or is spring-loaded closed in the absence of pressure.

7. APU Bleed Valve Switches

ON: Associated bleed air valve is electrically controlled and opens when air pressure is available and no faults exist.

OFF: The associated bleed air valve closes.

VALVE Light: Illuminates when the position of the APU bleed valve disagrees with the position of the APU bleed valve switch or the position commanded by the APU logic.

O30. OBS AUDIO PANEL
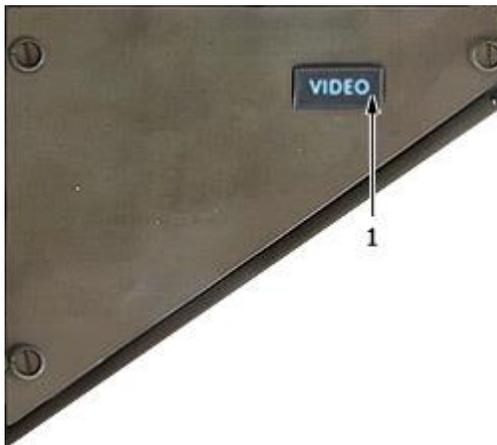
1. Video Light

Illuminates to indicate that the video system is powered.

DO NOT USE FOR FLIGHT

GLARESHIELD PANEL

✚ Indicates that the panel in VC has 2D pop-up panel. Click on the top-left corner of the VC panel to call the 2D panel.

G1 Cockpit Lights Control Panel
G2 Master Warning/Caution Light
G3 VOR/DME Control Panel
G4 Autopilot Control Panel

G1. COCKPIT LIGHTS CONTROL PANEL
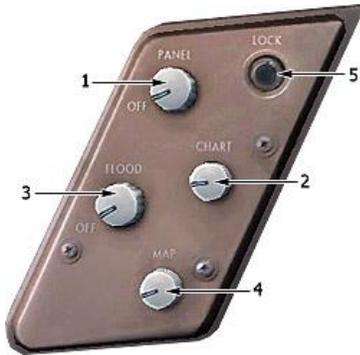
1. Panel Knobs

2. Chart Knob

3. Flood Knob

4. MAP Light Control

5. Clock Switch

1. Panel Knob

Controls panel's fx light effect.

3. Flood Knob

On left Cockpit Lights Control Panel - controls Captain's fx light effect.
On right Cockpit Lights Control Panel - controls First Officer's fx light effect.

G2. MASTER WARNING/CAUTION LIGHT

1. Warning/Caution Lights

The two warning/caution lights illuminate any time a warning or caution occurs. The lights remain illuminated as long as the waning/caution exists or until one of the lights are pushed in.

Pushing in either Warning/Caution light will extinguish both lights and resets the lights for future warnings/cautions. In addition, pushing in either light will silence certain aural warnings.

DO NOT USE FOR FLIGHT

G3. VOR/DME CONTROL PANEL
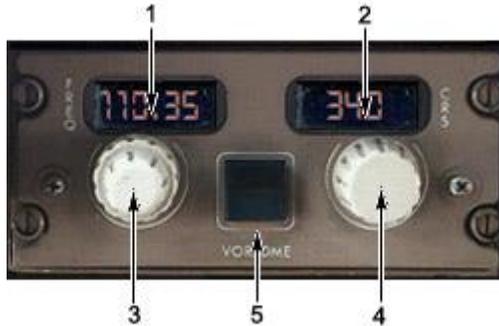
1. VOR Freq Indicator

2. Course Indicator

3. FREQ Knob

4. Course Selector Knob

5. VOR/DME Switch

1. VOR FREQ Indicator

Indicates the VOR frequency manually tuned on the associated VHF NAV receiver.

Dashes indicate that the associated VHF NAV receiver is being tuned by the FMS for position updating.

2. Course Indicator

Indicates the selected course

3. FREQ Knob

Twist to select a frequency for the associated VOR/DME panel. In order to tune the VOR/DME frequency, the associated HSI must be in the VOR mode.

The frequency selector knob is inactive when the associated HSI is in the MAP, PLAN, or ILS mode.

4. Course Selector Knob

Twist to select the desired VOR course. The selected course appears on the associated course indicator and on the associated HSI as long as it is in the VOR mode

5. VOR/DME Switch

Push-
- alternates VOR and DME tuning between the FMC automatic (AUTO) and VOR frequency selector manual (MAN) when the HSI mode selector is in MAP or PLAN.

AUTO light illuminated (white) -
- FMC is tuning related VOR and DME

MAN light illuminated (white) —
- VOR frequency selector is tuning VOR
- VOR frequency selector also tunes the DME
- if the HSI is selected to an ILS display, the ILS frequency selector tunes the DME.

G4. AUTOPILOT CONTROL PANEL
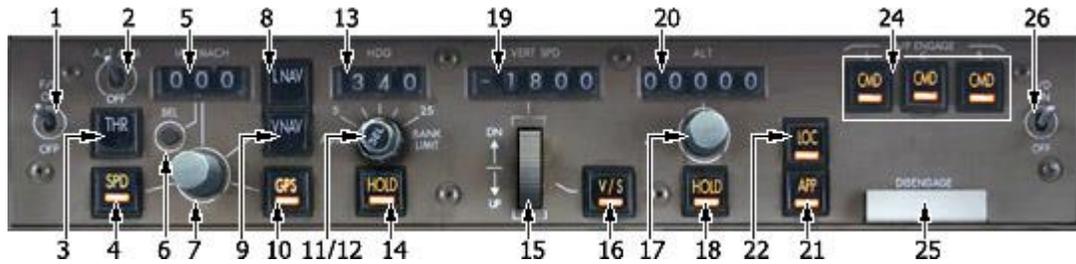
1. F/D Switch	14. Heading Hold Switch
2. A/T ARM Switch	15. Vertical Speed Selector
3. EPR Switch	16. Vertical Speed Switch
4. SPD Switch	17. Altitude Knob
5. IAS/MACH Indicator	18. Altitude Hold Switch
6. SEL Switch	19. Vertical Speed Indicator
7. Speed Knob	20. Altitude Indicator
8. LNAV Switch	21. APP Switch
9. VNAV Switch	22. LOC Switch
10. FLCH Switch	24. A/P Engage Switch
11/12. Heading Select Knob/Bank Limit Selector	25. Disengage Bar
13. Heading Indicator	26. F/D Switch

1,26. F/D Switch

ON: Displays the flight director command bars on the associated ADI.

Turn on a F/D switch on the ground with no autopilots engaged and the opposite F/D switch off activates the flight director Takeoff Mode.

In flight, the first F/D switch turned on engages the associated flight director in the current autopilot mode, if one is engaged. If no autopilot is engaged, the flight director defaults to heading hold and vertical speed mode. F/D Switch
OFF: The command bars are removed from the associated ADI.

2. A/T ARM Switch

A/T ARM: Arms the autothrottle for engagement.
Engagement requires you to push the EPR or SPD switch and activation of the VNAV, FLCH or GA modes.

OFF: Disarms the autothrottle.

3. EPR Switch

Pushing the EPR switch will cause the autothrottle to maintain the reference EPR displayed on EICAS, subject to a maximum limit.

EPR is displayed on each ADI as the autothrottle mode.

4. SPD Switch

Pushing the SPD switch will cause the autothrottle to hold the speed/mach displayed on the airspeed indicator, subject to the maximum speed limits.

SPD is displayed on each ADI.

Pushing the SPD switch in a climb or descent will engage the VERT SPD mode at the present vertical speed, and will attempt to hold the present speed, if possible.

5. IAS/MACH Indicator

Indicates the current or selected speed if VNAV is not engaged.

The IAS/MACH indicator is blank when VNAV is engaged and the command airspeed bugs are under control of the FMCs.

The IAS/MACH indicator automatically changes to MACH at 0.80 during the climb and to speed at 300 knots during descent.

6. SEL Switch

Changes the IAS/MACH indicator between IAS and MACH when the speed is within the indicator range.

7. Speed Knob

Twist to change the value displayed in the IAS/MACH indicator.

When VNAV is engaged, pushing the speed knob transfers control of the aircraft speed to the FMS from the speed knob. A subsequent push transfers the speed control from the speed knob to the FMS.

When the speed knob has control, the IAS/MACH indicator displays the selected speed. A blank display indicates that the FMS has control of the speed.

Manual speed selection (speed intervene) does not disengage VNAV.

When FLCH or SPD is pushed, or altitude capture engages in VNAV, the speed window opens at the existing speed. The speed knob can then be used to select a different speed.

8. LNAV Switch

Arms or engages the lateral navigation mode of the FMS.

When engaged, roll and heading are controlled by the FMS.

A white LNAV on the ADI indicates that the LNAV mode is armed. Green indicates that it is engaged.

LNAV can be disengaged by:
-   Selecting HDG HOLD or HDG SEL
-   Localizer capture
-   FMC related to the active autopilot fails.

9. VNAV Switch

Engages the vertical navigation mode of the FMS if above 400 feet RA.

When engaged, speed, pitch, and autothrottle are controlled by the FMS. VNAV PTH or VNAV SPD is displayed on each ADI.

A white VNAV on the ADI indicates that the VNAV mode is armed. Green indicates that it is engaged.

VNAV can be disengaged by:
- Selecting V/S or ALT HOLD.
- Selecting SPD or EPR.
- Selecting FLCH.
- Glide slope capture.
- Altitude capture if not the same as the FMC cruise altitude.
- FMC failure.
- Selecting GA mode.

10. FLCH Switch

Engages the flight level change mode to integrate pitch control and autothrottle functions for altitude change.

FL CH is displayed on each ADI.

When the FL CH mode is engaged, the command airspeed bug moves to the existing speed and the AFDS holds that speed using pitch. The autothrottle holds selected thrust for climb, or idle, or throttle hold for descent.

11. Heading Select Knob

Twist to change the heading. The selected heading is displayed in the Heading indicator.

Push to engage the heading select mode. HDG SEL is displayed on the ADI.

12. Bank Limit Selector

The outer knob selects the bank angle limit.

AUTO: Limits the bank angle to 15 degrees at true airspeeds above 250 KIAS. This limit increases to 25 degrees as true airspeed decreases below 250 KIAS to 200 KIAS.

5, 10, 15, 20, 25: Bank angle limits at all true airspeed.

The Bank Limit Selector does not limit the bank angle in L NAV or LOC

13. Heading Indicator

Displays the selected magnetic heading. The heading bugs on the HSI's are driven to indicated value.

The Heading Indicator automatically slews to the selected front course or back course at LOC or B/CRS capture.

14. Heading Hold Switch

Press to engage the heading hold mode. HDG HOLD is displayed on each ADI.

When pressed, the autopilot will automatically roll out of any turn to hold the magnetic heading value at wings level.

15. Vertical Speed Selector

Changes the vertical speed which is displayed in the vertical speed indicator.

16. Vertical Speed Switch

Press to engage the vertical speed mode. V/S is displayed on each ADI. When pressed, the autopilot/FD will maintain the vertical speed displayed in the vertical speed indicator.

17. Altitude Knob

Twist to change the value selected in the Altitude indicator.

18. Altitude Hold Switch

Push to engage the altitude hold mode. ALT HOLD is displayed on each ADI.

The AFDS will capture and hold the altitude existing when the switch was pushed.

19. Vertical Speed Indicator

Displays the Vertical Speed selected by the Vertical Speed Selector.

20. Altitude Indicator

Displays the altitude selected by the altitude knob.
The value displayed in the indicator is a target altitude for climbs and descents and provides altitude alert functions. The Flight Directors, autopilots, and FMS cannot fly through the indicated altitude.

21. APP Switch

Arms the AFDS to capture and fly the localizer and glide slope. LOC and G/S are displayed in white on each ADI prior to localizer and glide slope capture.

Glide slope will not capture if the intercept angle is greater than 80 degrees.

The APP mode allows multiple autopilots to be armed for autoland and rollout.

22. LOC Switch

When pushed, the LOC switch arms the AFDS to capture and fly the localizer front course. The switch must be pushed prior to localizer capture.

LOC is displayed in white on each ADI prior to capture.

The localizer will not capture if the intercept angle is greater than 120 degrees or 2.5 NM.

The current lateral nav mode (LNAV, heading select, or heading hold) remains engaged until localizer capture.

24. A/P ENGAGE Switches

CMD: Engages the associated autopilot in the vertical speed and heading hold mode if neither flight director is on.

CMD is displayed on each ADI.

If either flight director is on at the time the A/P ENGAGE switch is pressed, the autopilot will engage in the same mode as the flight director.

Pushing the second autopilot CMD switch when in the APP mode arms the autoland system. The second autopilot will engage below 1500 feet AGL. Arms the runway alignment, flare, and roll out modes.

Pushing the third A/P Engage switch while in the APP mode separates the three electrical systems. The second and third autopilots engage when the aircraft is below 1500 feet.

25. Disengage Bar

Pull down to disconnect all three autopilots from the flight control servos, thereby preventing autopilot engagement.

DO NOT USE FOR FLIGHT

FLIGHT INSTRUMENTS

LEFT FORWARD PANEL

- 5. INSTR SEL Source Panel
- 6. Airspeed Indicator
- 7. RDMI
- 8. Attitude Director Indicator (ADI) Display
- 9. Horizontal Situation Indicator (HSI) Display
- 10. Autoland Status Annunciator
- 11. Altimeter
- 12. Vertical Speed Indicator
- 13. Clock
- 14. Marker Beacon Lights
- 15. Reserve Brakes
- 16. Standby Attitude Indicator
- 17. Standby Airspeed Indicator
- 18. Standby Altimeter

6. AIRSPEED INDICATOR
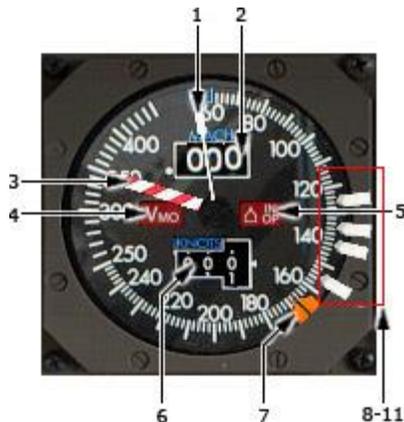
1. Airspeed Pointer

2. Mach Indicator

3. Vmo Pointer

4-5. INOP flags

6. Knots Indicator

7. Command Airspeed Bug

8-11. Airspeed Bugs

1. Airspeed Pointer

Points to the value corresponding to the airspeed computed by the selected Air Data Computer.

The needle points to 0 when input information is unreliable.

2. Mach Indicator

Indicates the mach number. The value displayed is computed by the selected Air Data Computer (ADC).

The display is blank when the airspeed is below M0.40.

A mach Flag indicates that the selected ADC has failed.

3. Vmo Pointer

Points to the maximum operating speed.

If the Vmo warning flag is displayed, the Vmo pointer points to 260 knots.

6. Knots Indicator

Displays the Indicated Airspeed (IAS) in knots.

The value displayed is computed by the selected Air Data Computer.

The presence of an AS flag indicates that the input to the indicator and the airspeed pointer is unreliable.

7. Command Airspeed Bug

Indicates the airspeed set in the IAS/MACH selector or the value selected by the FMC when VNAV is engaged.

The Command Airspeed bug automatically moves to the speed existing at the time FL CH mode is engaged, the SPD switch is pushed, or altitude capture engages while in VNAV mode.

8-11. Airspeed Bugs

These bugs can slide on the outside of the airspeed indicator to mark certain speeds.

7. RDMI

Note
IRS alignment must be complete before RDMI checks.
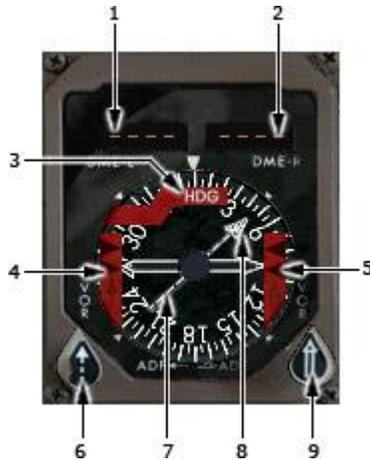
1. L Distance Indicator

2. R Distance Indicator

3. RMI Card

4-5. INOP flags

6,9. NAV/ADF Selector

7,8. No 1/No 2 Pointers

1,2. Distance L/R Indicators

Displays the distance to the next active waypoint or radio facility.

The prefix can be one of the following:
- F - Horizontal distance to the next active waypoint when the associated HSI is in MAP or PLAN.
- L - Slant distance to the ILS/DME tuned on the ILS/DME receiver when the associated HSI is in the ILS mode.
- No prefix - Slant distance to the VOR/DME tuned on the associated VOR receiver when the associated HSI is in VOR mode.
- Blank indication - No DME input or DME input is unreliable.

3. RMI Card

The card rotates to indicate the magnetic or true heading as determined by the IRS selected on the opposite IRS INSTR SOURCE SELECT switch.

The position of the heading reference switch indicates the type of heading information displayed by the RMI card.

6,9. NAV/ADF Selector

ADF: Selects ADF as the source of data for the associated pointer.

NAV: Selects the FMC as the source of data when the associated HSI is in the MAP or PLAN mode. If the associated HSI is in the VOR mode, the associated VOR is the source of data for the pointer.

7,8. No I/No 2 Pointers

Indicates the bearing to the next active waypoint or the VOR tuned.

The number one needle points to the left FMC waypoint or left VOR station. The number two needle points to the right FMC waypoint or right VOR station.

DO NOT USE FOR FLIGHT

8. ATTITUDE DIRECTOR INDICATOR (ADI) DISPLAY

Note
IRS alignment must be complete before ADI checks.
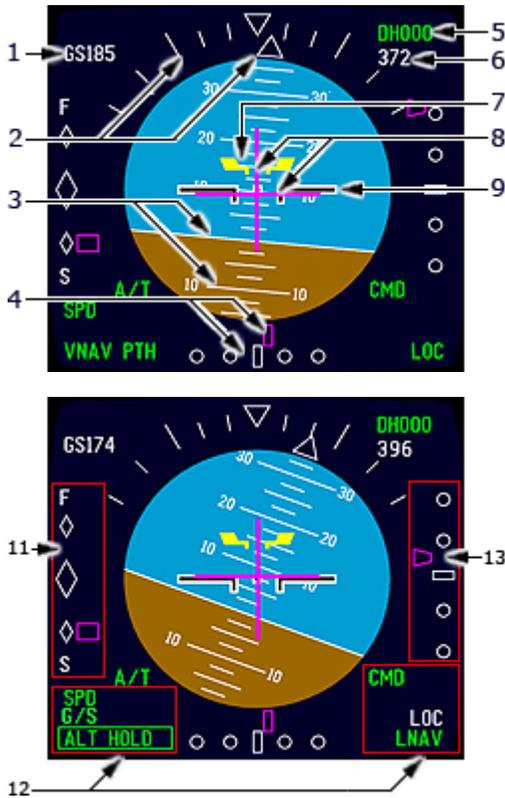
1. Ground Speed

2. Bank Pointer and Scale

3. Horizon Line and Pitch Angle Scale

4. Localizer Pointer and Deviation Scale

5. Decision Height

6. Radio Altitude

7. Pitch Limit Indicator

8. Flight Director Command Bars

9. Airplane Symbol

10. Slip Indicator

11. Fast/Slow Indicator

12. Flight Mode Annunciations

13. Glide Slope Pointer and Deviation Scale

1. Ground Speed

Indicates ground speed in knots.

2. Bank Pointer and Scale

Indicates IRS bank in reference to the bank scale.

3. Horizon Line and Pitch Angle Scale

Indicates the IRS horizon relative to the airplane symbol. Pitch scale is in 2.5 degree increments.

4. Localizer Pointer and Deviation Scale

The localizer pointer indicates position relative to the airplane.
- scale indicates deviation
- pointer not displayed when localizer is unusable
- scale and pointer not displayed when an ILS frequency is not selected

5. Decision Height

Displays selected decision height.

Blank when negative decision height is selected.
- decision height alert is reset automatically - if airplane climbs 75 feet or more above the selected decision height, or after the airplane lands
- decision height alert is reset manually - if the RST switch is pushed.

6. Radio Altitude

Displays radio altitude below 2500 feet AGL.
- blank above 2500 feet AGL

7. Pitch Limit Indicator

Indicates pitch limit (stick shaker activation point for the existing flight conditions).
- displays when flaps are extended.

8. Flight Director Command Bars

Indicates flight director pitch and roll steering commands.
- displays when the respective F/D switch is ON, valid command steering is available
- blanks when the respective FD switch is OFF, or when command steering becomes invalid

9. Airplane Symbol

Indicates airplane attitude with reference to the IRS horizon.

10. Slip Indicator

Indicates coordinated flight.

11. Fast/Slow Indicator

Displays airspeed information.
- indicates deviation from the airspeed selected by the FMC or the IAS/MACH selector, or limit speed
- small diamonds indicate 10 knots fast (F), or slow (S).

13. Glide Slope Pointer and Deviation Scale

The glideslope pointer indicates glideslope position relative to the airplane.
- scale indicates deviation
- pointer not displayed when glide slope unusable
- scale and pointer not displayed when an ILS frequency is not selected

ADI FLIGHT MODE ANNINCIATIONS (FMA'S)
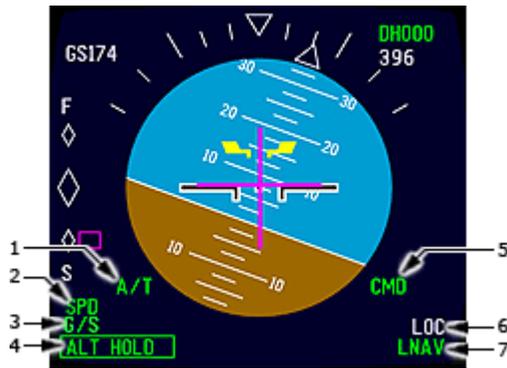
1. Autothrottle Status

2. Autothrottle Modes (Active)

3. AFDS Pitch Modes (Armed)

4. AFDS Pitch Modes (Active)

5. AFDS (Active)

6. AFDS Roll Modes (Armed)

7. AFDS Roll Modes (Active)

1. Autothrottle Status

Displayed (green) A/T

2. Autothrottle Modes (Active)

Displayed (green)
- EPR
- SPD
- FLCH
- GA
- IDLE
- THRHOLD

3. AFDS Pitch Modes (Armed)

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

4. AFDS Pitch Modes (Active)

Displayed (green)
- TO
- ALT HOLD
- V/S
- VNAVPTH
- VNAVSPD
- SPD
- G/S
- FLARE
- ALT CAP
- GA

5. AFDS (Active)

Displayed (green)
- CMD
- FD

6. AFDS Roll Modes (Armed)

Displayed (white)
- LOC
- ROLLOUT
- LNAV
- B/CRS

7. AFDS Roll Modes (Active)

Displayed (green)
- HDGHOLD
- HDGSEL
- LNAV
- LOC
- ROLLOUT
- TO
- GA
- B/CRS

9. HORIZONTAL SITUATION INDICATOR (HSI) DISPLAY

Note
IRS alignment must be complete before HSI checks.

HSI APP MODE
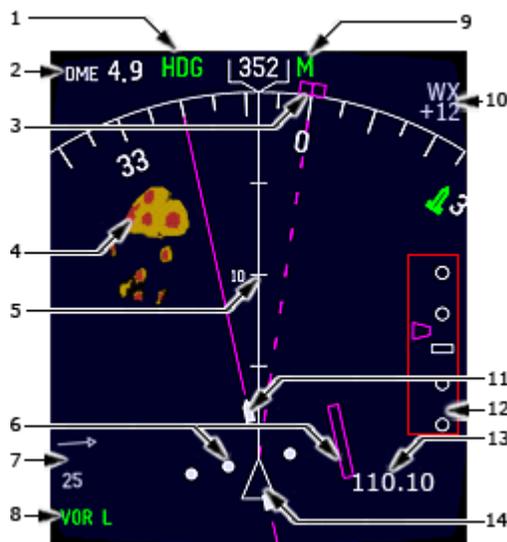
1.	Current Heading
2.	Reference ILS DME
3.	Selected Heading Bug
4.	Weather Radar Returns
5.	Track Line
6.	Course Deviation Indicator and Deviation Scale
7.	Wind Direction and Speed
8.	Reference ILS Receiver
9.	Magnetic/True Reference
10.	Weather Radar Annunciations
11.	Selected Course Pointer
12.	Glideslope Pointer and Deviation Scale
13.	Reference ILS Frequency
14.	Airplane Symbol

DO NOT USE FOR FLIGHT

HSI CTR APP MODE
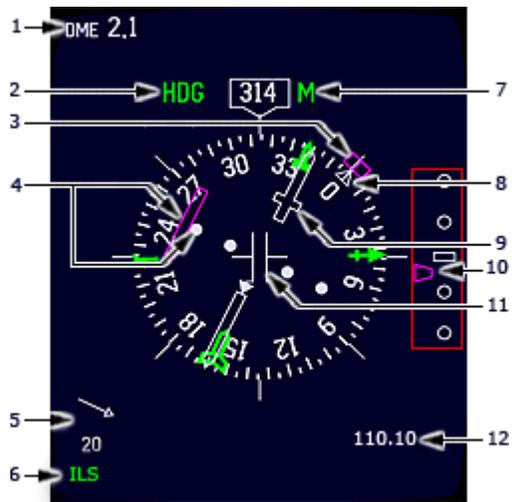
1.   Reference ILS DME

2.   Current Heading

3.   Selected Heading Bug

4.   Course Deviation Indicator and Deviation Scale

5.   Wind Direction and Speed

6.   Reference ILS Receiver

7.   Magnetic/True Reference

8.   Drift Angle Pointer

9.   Selected Course Pointer

10.   Glideslope Pointer and Deviation Scale

11.   Airplane Symbol

12.   Reference ILS Frequency

HSI VOR MODE
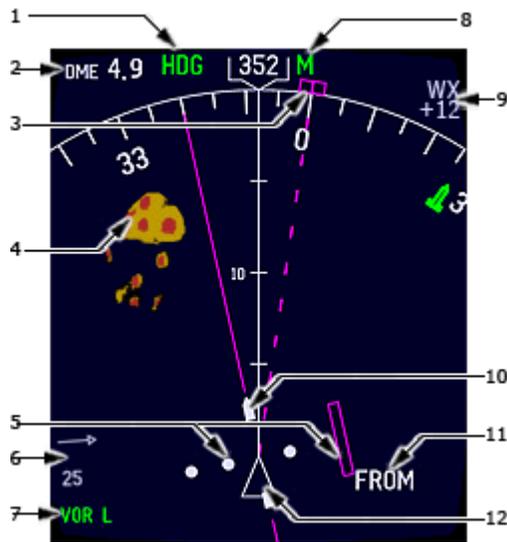
1.	Current Heading
2.	Reference VOR DME
3.	Selected Heading Bug
4.	Weather Radar Returns
5.	Course Deviation Indicator and Deviation Scale
6.	Wind Direction and Speed
7.	Reference VOR Receiver
8.	Magnetic/True Reference
9.	Weather Radar Annunciations
10.	Selected Course Pointer
11.	TO/FROM Indication
12.	Airplane Symbol

DO NOT USE FOR FLIGHT

HSI CTR VOR MODE
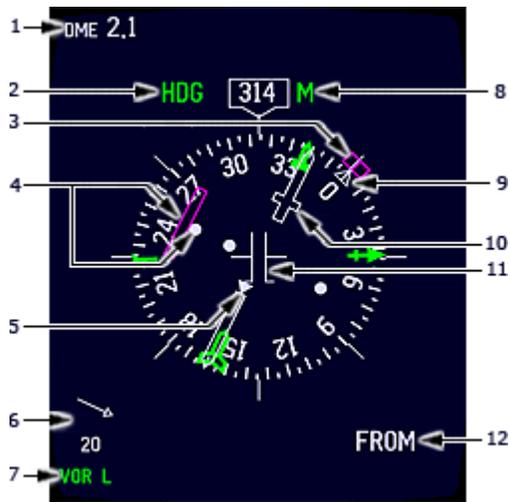
1.   Reference VOR DME

2.   Current Heading

3.   Selected Heading Bug

4.   Course Deviation Indicator and Deviation Scale

5.   To/From Pointer

6.   Wind Direction and Speed

7.   Reference VOR Receiver

8.   Magnetic/True Reference

9.   Drift Angle Pointer

10.   Selected Course Pointer

11.   Airplane Symbol

12.   TO/FROM Indication

HSI MAP MODE
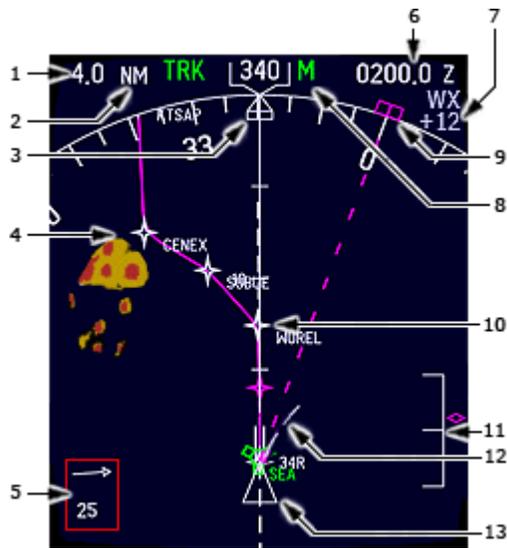
1. Distance to the Active Waypoint

2. Current Track

3. Heading Pointer

4. Weather Radar Returns

5. Wind Direction and Speed

6. Estimated Time of Arrival at the Active Waypoint

7. Weather Radar Annunciations

8. Magnetic/True Reference

9. Selected Heading Bug

10. Active LNAV Route

11. Vertical Pointer and Deviation Scale

12. Position Trend Vector

13. Airplane Symbol

HSI PLAN MODE

1. Distance to the Active Waypoint

2. Current Track

3. Heading Pointer

4. Magnetic/True Reference

5. Estimated Time of Arrival at the Active Waypoint

6. Selected Heading Bug

7. Airport and Runway

8. Active LNAV Route

9. True North Pointer

<u>**TCAS DISPLAYS**</u>
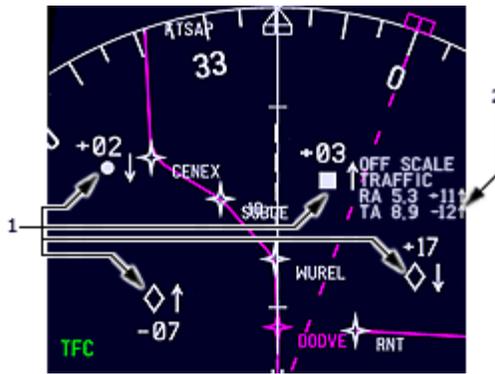
1. Traffic Aircraft Symbology

2. No-Bearing Symbology

1. Traffic Aircraft Symbology

Indicates the relative position of traffic aircraft.

A filled red square indicates a RA.

A filled amber circle indicates a TA.

A filled white diamond indicates Proximate Traffic.

An unfilled white diamond indicates Other Traffic.

The traffic aircraft data tag provides relative altitude (hundreds of feet) and vertical motion (in excess of 500 feet per minute).

2. No-Bearing Symbology

Displayed (red or amber) -
- a TA (amber) or RA (red) is occurring
- bearing information is not available
- maximum of two messages
- data tag provides distance (nm), relative altitude (hundreds of feet), and vertical motion (in excess of 500 feet per minute)

TCAS MESSAGES

1. Mode Annunciations

- TFC (green)
TFC selected on EFIS control panel in the VOR, APP, MAP or CTR MAP mode
Not displayed when TCAS TEST, TCAS FAIL, or TCAS OFF is annunciated

- TA ONLY (green)
TCAS Mode Selector in TA
Displayed in all HSI modes regardless whether TFC is selected
All TAs and RAs are processed and displayed as TAs

- TCAS OFF (white)
TCAS Mode Selector is not in TA or TA/RA
Displayed when TFC is selected
Not displayed when TCAS FAIL is annunciated

- TCAS FAIL (amber)
TCAS system is inoperative
Displayed when TFC is selected

- TCAS TEST (white).
TCAS is in the test mode
Displayed in all HSI modes regardless whether TFC is selected

2. OFFSCALE

Displayed (red or amber) - TA (amber) or RA (red) is occurring outside the selected display range.

3. TRAFFIC

Displayed (red or amber) -
- a TA (amber) or RA (red) is occurring
- in all HSI modes and ranges regardless whether TFC is selected

10. AUTOLAND STATUS ANNUNCIATOR

2,4. Status Annunciators

3,5. Test Switches

2,4. Status Annunciators

The upper indication displays LAND 3 when three autopilots and the required airplane system inputs are operable in the approach mode.

LAND 2 is displayed when only two autopilot systems and required airplane system inputs are operable in the approach mode.

This indication is blank until approach mode is selected and the requirements are met below 1500 feet radio altitude with the localizer and glide slope captured.
The lower indication displays NO LAND 3 when only two autopilots are operable for autoland.

Displays NO AUTOLAND when there is no autoland capability. Remains blank if there are no faults.

3,5. Test Switches

Press to test the operation of the associated autoland status annunciator.

TEST 1: LAND 3 and NO LAND 3 appear in the upper and lower indications.

TEST 2: LAND 2 and NO AUTOLAND appear in the upper and lower indications.

11. ALTIMETER

1. Altitude Reference Bug

2. Altitude Indicator

3. Alt Light

4. NEG Flag

5,6. Altimeter Setting Indicators

7. BARO Knob

8. 100x Foot Pointer

9. Reference Altitude Control Knob

1. Altitude Reference Bug

Used to remind the pilot of a specific altitude. The bug is set with the Altitude Bug Set Knob.

2. Altitude Indicator

Displays the corrected altitude in 20 foot increments. The data displayed is computed by the selected Air Data Computer.

"NEG" indicates that the altitude is below zero

3. ALT Light

Illuminates when the aircraft is within 900 feet of the altitude set in the MCP altitude indicator. Light extinguishes when the altitude is within 300 feet of the MCP altitude.

4. NEG Flag

The NEG Flag appears when altitudes below zero feet is displayed

5,6. Altimeter Setting Indicators

Displays the selected altimeter setting. The left displays the information in millibars; the right displays the information in inches of mercury.

7. BARO Knob

Use the BARO Knob to adjust the altimeter setting.

8. 100 Foot Pointer

Indicates the altitude in hundreds of feet.

9. Reference Altitude Control Knob

Positions the Altitude Reference Bug

12. VERTICAL SPEED INDICATOR

1. VS pointer - displays the vertical speed in feet per minute. The speed is calculated by the selected IRS.

2. OFF flag

Note
IRS alignment must be complete before VSI checks. The Vertical Speed indicator displays zero if the selected IRS information is unreliable.

13. CLOCK
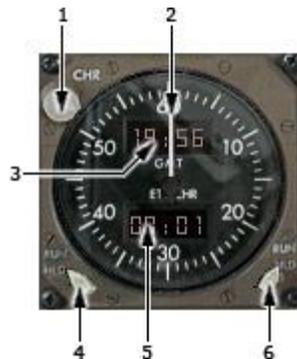
1. CHR Button

2. Sweep Second Needle

3. GMT Indicator

4. ET Selector

5. ET/CHR Indicator

6. GMT Selector

1. CHR Button

Press to start, stop, or reset the CHR indicator and the sweep second hand.

2. Sweep Second Needle

Displays the elapsed time in seconds when the CHR or CLOCK button is pushed.

3. GMT Indicator

Displays the GMT time in 24 hour format.

The Captain's clock provides the time input to both FMC's and the flight recorder.

If the Captain's clock is inoperative, the F/O's clock provides the information.

4. ET Selector

RUN: Starts the ET indicator. Continues to count from HLD time when reselected from HLD.

HLD: Stops ET indicator at existing time.

RESET: Resets ET indicator to zero.

5. ET/CHR Indicator

ET: Indicates the elapsed time from 0 to 99 hours and 59 minutes since the ET selector was moved to RUN.

CHR: Indicates the elapsed time from 0 to 99 minutes and 59 seconds since CHR or CLOCK button was pushed to start time.

6. GMT Selector

RUN: Starts the GMT indicator.

HOLD: Stops the GMT indicator and input to FMC and flight recorder.

SS: Sets seconds to zero and advances the minutes.

FS: Freezes the minutes and advances the hours.

14. MARKER BEACON LIGHTS

Respective marker beacon light illuminates when the aircraft passes over the associated beacon as detected by the left VOR/Marker receiver.

15. RESERVE BRAKES
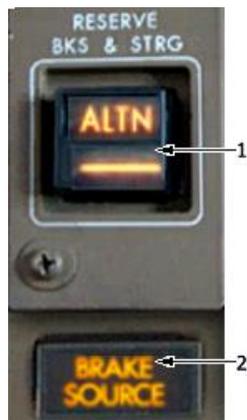
Press to activate the reserve brakes system.

- Turns on the right system electric hydraulic pump regardless of pump switch position.
- Provides a reserve fluid supply from the right reservoir.
- Electric pump output is isolated from the other right system components and is supplied exclusively to the brakes.

16. STANDBY ATTITUDE INDICATOR
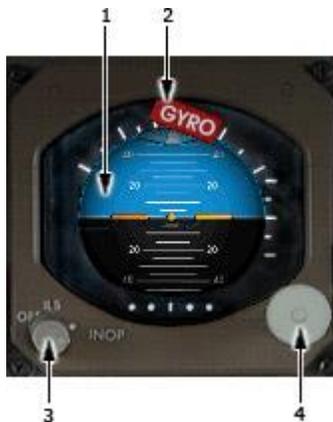
A self contained Standby Attitude Indicator will be supplied with electrical power from the Standby DC Bus for approx. 30 minutes.

1. Horizon Line and Pitch Angle Scale

2. GYRO flag

3. Mode Selector Knob

4. Cage Knob

5. G/S flag (not shown)

17. STANDBY AIRSPEED INDICATOR

1. Airspeed Pointer

Displays the airspeed derived from uncorrected pilot-static information.

The standby airspeed indicator is directly connected to the right aux pitot and alternate static sources.

18. STANDBY ALTIMETER

1. Altitude Reference Bug

2. Altitude Indicator

3. Alt Light

4. NEG Flag

5,6. Altimeter Setting Indicators

7. BARO Knob

8. 100x Foot Pointer

9. Reference Altitude Control Knob

1. Altitude Reference Bug

Used to remind the pilot of a specific altitude. The bug is set with the Altitude Bug Set Knob.

2. Altitude Indicator

Displays the corrected altitude in 20 foot increments. The data displayed is computed by the selected Air Data Computer.

"NEG" indicates that the altitude is below zero

3. ALT Light

Illuminates when the aircraft is within 900 feet of the altitude set in the MCP altitude indicator. Light extinguishes when the altitude is within 300 feet of the MCP altitude.

4. NEG Flag

The NEG Flag appears when altitudes below zero feet is displayed

5,6. Altimeter Setting Indicators

Displays the selected altimeter setting. The left displays the information in millibars; the right displays the information in inches of mercury.

7. BARO Knob

Use the BARO Knob to adjust the altimeter setting.

8. 100 Foot Pointer

Indicates the altitude in hundreds of feet.

9. Reference Altitude Control Knob

Positions the Altitude Reference Bug

RIGHT FORWARD PANEL

- 5. INSTR SEL Source Panel
- 6. Airspeed Indicator
- 7. RDMI
- 8. Attitude Director Indicator (ADI) Display
- 9. Horizontal Situation Indicator (HSI) Display
- 10. Autoland Status Annunciator
- 11. Altimeter
- 12. Vertical Speed Indicator
- 13. Clock
- 32. Brake Pressure Indications

32. BRAKE PRESSURE INDICATIONS

1. Pointer

Indicates the pressure of parking brake accumulator.

Indicates the accumulator pre-charge if the parking brake accumulator is depleted.

The accumulator can only be pressurized by the right hydraulic system.

The accumulator provides at least one brake application, and normal anti-skid is available with the accumulator.

CENTER FORWARD PANEL

19. Warning Caution Lights
20. Standby Engine Indicator
21. Oil Pressure Lights
22. Auto Brakes Control Panel
23. EICAS Display
24. Secondary Engine Display
25. EICAS Caution/Advisory Switches
26. Heading Preference Switch
27. Thrust Mode Select Panel
28. Flap Indicator
29. Alternate Flap Controls
30. Landing Gear Control
31. Landing Gear Indications
32. Brake Pressure Indications
33. Ground Prox Override Switches

19. WARNING/CAUTION LIGHTS

1. Fire Light
2. CONFIG Light
3. Pull Up Light
4. A/P DISC Light
5. Cabin ALT Light
6. OVSPD Light
7. ALT Alert light
8. Auto Pilot Light
9. GND PROX Light
10. A/T DISC Light
11. FMC Light
12. G/S INHIB Switch
13. Lighting Sensors

1. Fire Light

Illuminates when an engine, APU, wheel well, or cargo fire has been detected.

2. CONFIG Light

On the ground: Either throttle is near takeoff thrust with the associated engine running and there is a configuration error.
-   Speedbrake lever not down.
-   Stabilizer trim not in the green band.
-   Parking brake set.
-   Flaps or slats not in the takeoff configuration.
-   Slats or flaps not in the position commanded.

In flight: The gear is not down below 800 feet RA with a throttle near idle, or the gear is not down with flaps in the landing range (beyond 20).

4. A/P DISC Light

Any autopilot has disengaged either automatically (due to a malfunction) or manually (either the electric trim was activated with one autopilot engaged, the disengage bar was pulled down, or an autopilot disconnect button was pushed).

A warning horn sounds.

5. Cabin ALT Light

Cabin altitude is above 10,000 feet.

-   Warning horn sounds.
-   No Smoking Signs illuminate.
-   Fasten Seat Belt Signs illuminate.

Light extinguishes when the cabin altitude drops below 8,500 feet.

6. OVSPD Light

Aircraft has exceeded Vmo or Mmo.

7. ALT Alert Light

Illuminates when the aircraft altitude deviates more than 300 feet from the altitude set in the MCP. The light extinguishes when the deviation exceeds 900 feet.

8. Auto Pilot Light

At least one autopilot is operating in a degraded mode. The AUTO PILOT light can also indicate one of the following: + Vertical speed mode is engaged without being selected on the MCP

- Angle of attack exceeds 6 degrees in V/S, ALT HOLD, or ALT CAP modes.
- Loss of G/S and/or LOC signals after a delay of several seconds.

9. GND PROX Light

At least one GPWS mode has been activated.

10. A/T Disc Light

The autothrottle is disconnected.

11. FMC Light

The FMC is displaying a message on the CDUs.

12. G/S INHIB Switch

Inhibits or cancels the below glide slope aural warning and turns off the GRND PROX light when pushed below 1000 feet or descends below 500 feet radio altitude.

20. STANDBY ENGINE INDICATOR

Provides backup indications for engine EPR, N1, EGT, and N2.

1. Maximum Limit Indicator

2. EPR Indicator

3. N1 Indicator

4. EGT Indicator

5. N2 Indicator

21. OIL PRESSURE LIGHTS

Illuminates when the associated engine oil pressure is below 70 PSI.

All oil related indications for both engines appear automatically on EICAS.

22. AUTO BRAKES CONTROL PANEL

1. Auto Brakes Selector

2. Auto Brakes Light

1. Auto Brakes Selector

RTO: Arms the auto brake system to provide maximum braking for rejected takeoff when both throttles are retarded to idle when the aircraft is above 80 knots.

The system disarms and the selector remains in the RTO position if brake pedals are pushed, either throttle is advanced, speed brake lever is moved out of the UP position after speed brakes have deployed on the ground, or a fault has been detected.

Selector moves to OFF after liftoff.

OFF: Removes power from the auto brake system.

DISARM:
Disarms the auto brake system.
Releases all auto brake pressure to the wheels.

1, 2, 3, 4, or AUTO: Selects the aircraft deceleration rate for automatic braking during landing.

Auto braking occurs when:
-        Both main gear are on the ground.
-        Both throttles are at idle.
-        Wheel spinup occurs.
-        IRS pitch is 1 degree or less. If pitch is not met, up to 8 second delay in braking can occur.

2. Auto Brakes Light

Illuminates for one of the following:

-        Auto Brake system has disarmed.
-        Selector in the OFF position and the auto brake valve is not closed.
-        Selector is in the RTO position and auto brakes have disengaged.
-        Anti-skid failure.

23. EICAS DISPLAY

PRIMARY EICAS DISPLAY
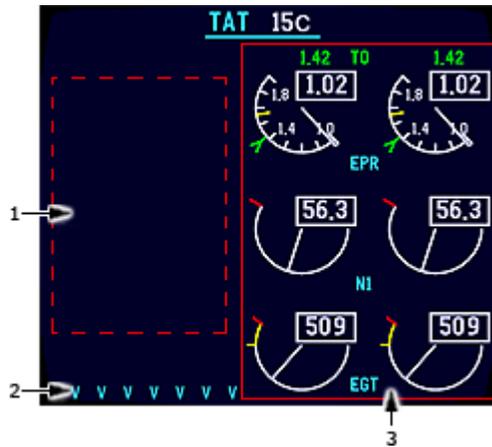
1. EICAS Message Field

Eleven lines are available for system and communications alerts. Additional pages are available.

2. Engine Secondary Data Cue

Displays (cyan) - secondary engine data should be displayed on lower CRT.

3. Primary Engine Indications

Displays full time on the EICAS display.

SECONDARY EICAS DISPLAY
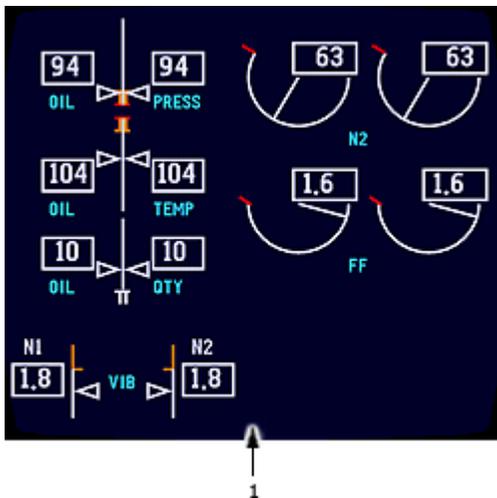
1. Status Cue

Displays when a new status message exists. Removed when the status page is displayed.

EICAS MESSAGES

1. Warning Messages

2. Caution Messages

3. Advisory Messages

4. Recall Indication

5. Page Number

6. Communication Messages

1. Warning Messages

Displays (red) - the highest priority alert messages.

2. Caution Messages

Displays (amber) - the next highest priority alert messages after warning messages.

3. Advisory Messages

Displays (amber) -
-           the lowest priority alert messages
-           indented one space.

4. Recall Indication

Displays when the RECALL switch is pushed.

Remains displayed for one second after the switch is released.

5. Page Number

Displays (white) -
-           more than one page of alert or communication messages exists
-           indicates the number of the page selected.

6. Communication Messages

Displays (white) -
-           indicates incoming communication messages
-           preceded by a white dot
-           COMM LOW messages are indented one space.

EICAS STATUS DISPLAY
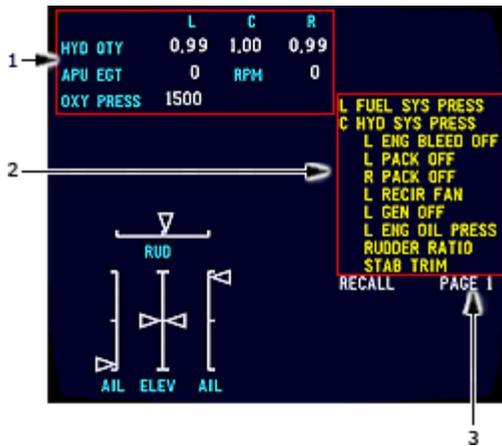
1. Status Display

2. Status Messages

3. Page Number

1. Status Display

System indications are displayed.

The systems indications shown above are representative of the fleet configuration. If the SECONDARY EICAS DISPLAY indications are not standard throughout the fleet, certain aircraft will display fewer system indications than those shown above. Refer to the appropriate chapter for system and configuration information.

2. Status Messages

Status messages indicate conditions requiring minimum equipment list (MEL) reference for dispatch.

3. Page Number

A page number appears if additional pages of status messages exist.

PRIMARY ENGINE INDICATIONS

1. Primary Engine Indications

Displayed full time on the EICAS display:
- EPR
- N1
- EGT.

MODE INDICATIONS

1. Total Air Temperature (TAT)

2. Thrust Reference Mode

3. Thrust Reverser Indication

1. Total Air Temperature (TAT)

Displayed (cyan/white) - TAT (degrees C).

2. Thrust Reference Mode

Displayed (green) - selected FMS thrust reference mode:

Takeoff:
- TO - maximum rated takeoff thrust
- TO 1 - maximum rated takeoff thrust, climb one preselected
- TO 2 - maximum rated takeoff thrust, climb two preselected

Assumed Temperature Takeoff:
- D-TO - assumed temperature derated takeoff thrust
- D-TO 1 - assumed temperature derated takeoff thrust, climb one preselected
- D-TO 2 - assumed temperature derated takeoff thrust, climb two preselected

Climb:
- CLB — maximum rated climb thrust
- CLB 1 - derate one climb thrust
- CLB 2 - derate two climb thrust

Cruise:
- CRZ - maximum rated cruise thrust
- CRZ 1 - maximum rated cruise thrust, climb one preselected
- CRZ 2 - maximum rated cruise thrust, climb two preselected

Continuous:
- CON - maximum rated continuous thrust
- CON 1 - maximum rated continuous thrust, climb one preselected
- CON 2 - maximum rated continuous thrust, climb two preselected

Go-around and Manual:
- G/A - maximum go-around thrust
- MAN - reference EPR manually selected.

3. Thrust Reverser Indication

Displayed REV (amber) - reverser in transit. Displayed REV (green) - reverser fully deployed.
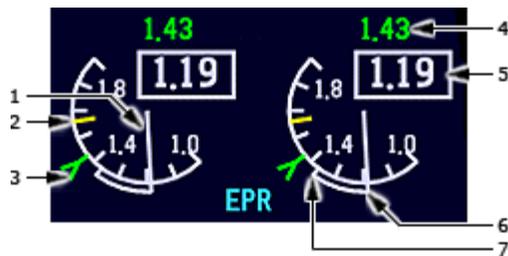
EPR INDICATIONS

1.	EPR Pointer
2.	Maximum EPR Line
3.	Reference/Target EPR indication
4.	Reference EPR
5.	Actual EPR
6.	Commanded EPR Sector
7.	Command Thrust Level

Note: When reverse thrust is activated, the following indications are not displayed:

- reference/target EPR indication;
- thrust reference mode;
- reference EPR.

1. EPR Pointer

Displayed (white).

2. Maximum EPR Line

Displayed (amber).

3. Reference/Target EPR indication

Displayed (green) — reference EPR limit.
Displayed magenta — target FMC commanded EPR when VNAV is engaged.

4. Reference EPR

Displayed (green).

5. Actual EPR

Displayed (white).

6. Commanded EPR Sector

Displays momentary difference between engine EPR and EPR commanded by thrust lever position.

7. Command Thrust Level

Displayed (white):
- end of command sector
- appears as extension of EPR pointer when engine stabilized
- EPR commanded by thrust lever position.

N1 INDICATIONS
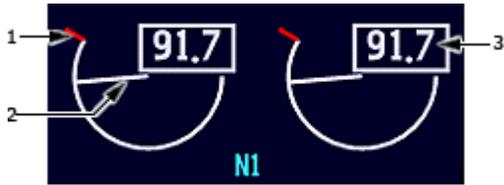
1. N1 Red Line Limit

2. N1 Pointer

3. N1

1. N1 Red Line Limit

Displayed (red) –N1 RPM operating limit.

2. N1 Pointer

- (white) - points at value equal to that shown in the N1 counter
- (red) - operating limit reached or exceeded.

3. N1

N1 RPM (%), displayed:
- (white) — normal operating range
- (red) - operating limit reached or exceeded.

EGT INDICATIONS

1. EGT Red Line

2. EGT Amber Band

3. EGT

4. EGT Pointer

1. EGT Red Line

Displayed (red) - maximum takeoff EGT limit.

2. EGT Amber Band

Displayed (amber) — maximum continuous EGT limit.

3. EGT

EGT (degrees C), displayed:
- (white) — normal operating range
- (amber) — maximum continuous limit reached*
- (red) - maximum start or takeoff limit reached.

Note: * Pointer and counter remain white during TO or GA for 5 minutes after amber band is entered.

4. EGT Pointer

Displayed:
- (white) - normal operating range
- (amber) — maximum continuous limit reached

DO NOT USE FOR FLIGHT

- (red) - maximum start or takeoff limit reached.

ANTI-ICE INDICATIONS
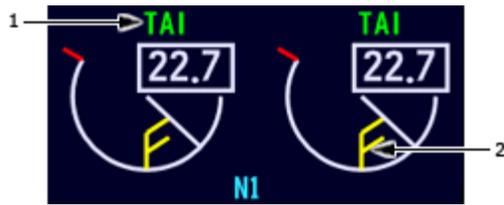
1. Thermal Anti-Ice (TAI) Indication

2. TAI Bug

1. Thermal Anti-Ice (TAI) Indication

Displayed (green) - engine anti-ice is on.

2. TAI Bug

Displayed when engine anti-ice is ON and only a single engine bleed source is available. Appears on N1 indicator of engine supplying bleed air. Displays minimum N1 RPM required for engine anti-ice operation.
- (green) – N1 RPM is at or above minimum.
- (amber) — N1 RPM is below minimum.

IN-FLIGHT START ENVELOPE

1. In-Flight Start Envelope

Displayed (magenta) - airspeed range for an inflight start for the closest starting flight level and two descending flight levels at two thousand foot intervals when the respective engine fire switch is in and:
- a FUEL CONTROL switch is in CUT OFF, and
- engine N2 RPM is below idle, and
- primary and secondary EICAS displayed.

24. SECONDARY ENGINE DISPLAY
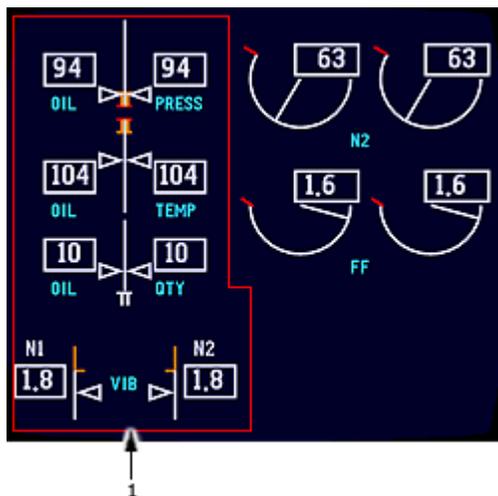
1. Secondary Engine Display

Displays:
- N2 RPM
- fuel flow (FF)
- oil pressure
- oil temperature
- oil quantity
- vibration

N2 INDICATIONS
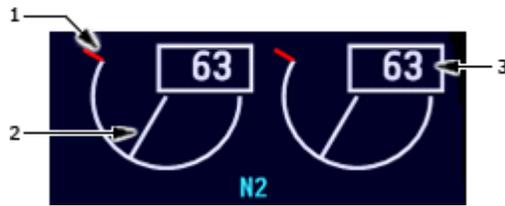
1.	N2 Red Line
2.	N2 Pointer
3.	N2

1. N2 Red Line

N2 RPM operating limit, displayed (red).

2. N2 Pointer

N2 RPM, displayed:
- (white) - normal operating range.
- (red) - operating limit reached or exceeded.

3. N2

N2 RPM (%), displayed:
- (white) - normal operating range.
- (red) - operating limit reached.

FUEL FLOW INDICATIONS

1. Fuel Flow Pointer
2. Fuel Flow (FF)

1. Fuel Flow Pointer

Displayed (white) - points at a value equal to that shown in the Fuel Flow.

2. Fuel Flow (FF)

Displayed (white) - fuel flow to the engine (pounds per hour x 1000).

OIL PRESSURE INDICATIONS
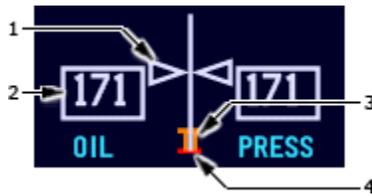
1. Oil Pressure Pointer

2. Oil Pressure (OIL PRESS)

3. Oil Pressure Amber Band

4. Oil Pressure Red Line

1. Oil Pressure Pointer

Engine oil pressure, displayed:
1.   (white) - normal operating range.
2.   (amber) - caution range reached.
3.   (red) - operating limit reached.

2. Oil Pressure (OIL PRESS)

Engine oil pressure (psi), displayed:
-   (white) - normal operating range.
-   (amber) - caution range reached.
-   (red) - operating limit reached.

3. Oil Pressure Amber Band

Displayed (amber) - caution range for low oil pressure.

4. Oil Pressure Red Line

Displayed (red) - low oil pressure operating limit.

OIL TEMPERATURE INDICATIONS
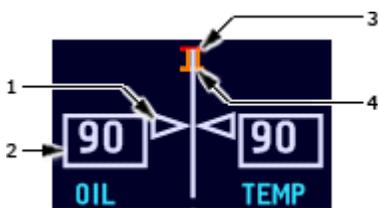
1.   Oil Temperature Pointer

2.   Oil Temperature

3.   Upper Oil Temperature Red Line

4.   Oil Temperature Amber Band

1. Oil Temperature Pointer

Engine oil temperature, displayed:
1.   (white) - normal operating range
2.   (amber) - caution range reached
3.   (red) - operating limit reached.

2. Oil Temperature

Engine oil temperature (degrees C), displayed:
-   (white) — normal operating range
-   (amber) - caution range reached
-   (red) - operating limit reached.

3. Upper Oil Temperature Red Line

Displayed (red) - oil temperature operating limit.

4. Oil Temperature Amber Band

Displayed (amber) - oil temperature caution range.

OIL QUANTITY INDICATIONS
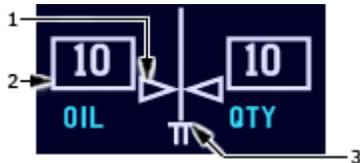
1. Oil Quantity Pointer

2. Oil Quantity

3. Low Oil Quantity Band

1. Oil Quantity Pointer

Displayed (white) - points at a value equal to that shown in the Oil Quantity.

2. Oil Quantity

Usable oil quantity (quarts), displayed:
-    (white) — normal quantity.

3. Low Oil Quantity Band

Displayed (white) - awareness range for low oil quantity.

ENGINE VIBRATION INDICATIONS
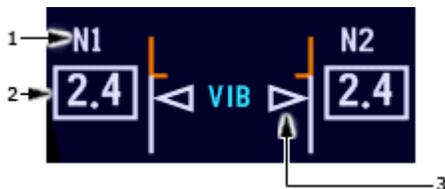
1. Vibration Source

2. Engine Vibration

3. Engine Vibration Pointer

1. Vibration Source

Identifies the vibration source being displayed.

Displayed (white) - vibration source with the highest vibration:
1.   N1 rotor vibration.
2.   N2 rotor vibration.

If the vibration source BB (broad band vibration) is displayed, the source is unknown and average vibration is displayed.

2. Engine Vibration

Displayed (white) - normal operating range.

3. Engine Vibration Pointer

Displayed (white) - engine vibration.

COMPACT ENGINE INDICATIONS

1. Compact Engine Indications

The following changes to EICAS and the normal secondary engine display occur:
- EGT and N2 change from round dial displays to digital displays. The EGT digital display and box turn amber or red if the limit is exceeded. The N2 digital display turns red if the limit is exceeded
- FF, OIL PRESS and OIL TEMP are displayed as digital readouts only. The OIL PRESS and OIL TEMP digital displays turn amber or red if limits are exceeded
- OIL QTY and VIB are displayed as digital readouts only. Low oil quantity and high vibrations are displayed the same as in the normal format.

EICAS STATUS DISPLAY
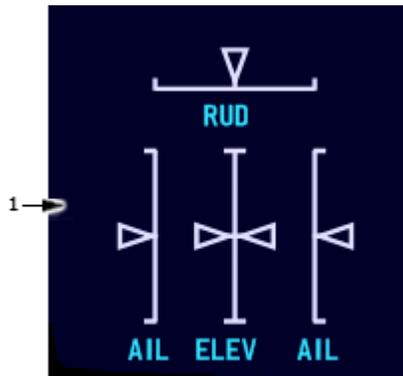
1. Rudder, Aileron, and Elevator (RUD, AIL, ELEV) Position

Indicates rudder, aileron, and elevator flight control surface deflection.

25. EICAS CAUTION/ADVISORY SWITCHES

1. Cancel Switch

Removes the existing caution and advisory messages from the EICAS display.

Press to display the next page of messages.

2. Recall Switch

Press to display any caution and advisory messages that were removed with the CANCEL switch if the associated fault still exists.

26. HEADING PREFERENCE SWITCH

NORM: The HSI's, RDMIs, AFDs and FMCs are referenced to magnetic north when the aircraft is between 73 degrees north and 60 degrees south.

Outside of this envelope, the HSI's and FMCs are referenced to TRUE north, and the RDMI HDG flag is displayed.

TRUE: The HSI's, RDMIs, AFDS, and FMCs are referenced to TRUE north regardless of latitude.

The AFDS uses true heading only when the Heading Reference switch is in the TRUE position.

27. THRUST MODE SELECT PANEL
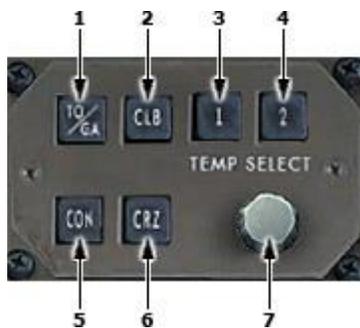
1-4. THRUST MODE SELECT Switches

5,6. Derate Switches

7. TEMP SEL Knob

1-4. THRUST MODE SELECT Switches

Press to select the desired thrust mode to be used by the Thrust Management Computer (TMC).

TO/GA: Selects the takeoff mode on the ground, or Go Around mode in flight.

CLB: Press to select the climb mode. If 1 or 2 is preselected, CLB 1 or CLB 2 will be selected. Deactivates the TO mode for the autothrottle and flight directors.

CRZ: Selects the cruise mode.

CON: Selects maximum continuous mode

5,6. Derate Switches

Press to select one of two possible climb derated thrust.

1: Selects approximately 93% of climb thrust.

2: Selects approximately 85 of climb thrust.

Switches can be used to preselect reduced climb thrust in conjunction with TO, D-TO, CON, and CRZ modes.

DO NOT USE FOR FLIGHT

7. TEMP SEL Knob

Selects the assumed temperature for reduced takeoff thrust.

The first click of the knob causes a flat temperature to be displayed on EICAS. Further clockwise rotation increases the assumed temperature by 1 degree C per click.

Assumed temperature takeoff thrust is limited to a 25% reduction of the maximum takeoff thrust or selected climb thrust, whichever is the greater thrust value.

28. FLAP INDICATOR

1. Leading Edge light

2. Trailing Edge Light

3. Flap Position Indicator

1. Leading Edge Light

Illuminates to indicate that one or more leading edge slats have failed to reach the position commanded by the flap handle.

The precise nature of the problem is identified on the EICAS by a LE SLAT ASYM or LE SLAT DISAGREE message.

The light extinguishes when the ALTN LE switch is pushed if the problem is due to a disagreement.

2. Trailing Edge Light

Illuminates to indicate that one or more trailing edge flaps have failed to reach the position commanded by the flap handle.

The precise nature of the problem is identified on the EICAS by a TE FLAP ASYM or TE FLAP DISAGREE message.

The light extinguishes when the ALTN TE switch is pushed if the problem is due to a disagreement.

The light may also indicate that the flap load relief system has failed.

3. Flap Position Indicator

Indicates the position of the left and right flaps and slats.

UP: Flaps and slats are retracted.

1: Flaps are at position 1 and slats are in the takeoff position.

5, 15, 20, 25, 30: Flaps are in the indicated position. Slats extend to the landing position (or retract to the takeoff position) when the flaps are between 20 and 25 degrees.

DO NOT USE FOR FLIGHT

29. ALTERNATE FLAP CONTROLS

1. ALTN Flaps Selector

Extends or retracts the flaps and/or slats to the selected position using the alternate electric drive system when the associated LE or TE arming switch is in ALTN.

There is slat asymmetry protection, but no flap asymmetry. There is no flap load relief or autoslats

2. ALTN Switches

Shuts off hydraulic power to both the flap and slat hydraulic drive systems.

ALTN appears in the switch when armed.

The selected devices (flaps or slats) are controlled electrically by the ALTN FLAPS Selector switch.

30. LANDING GEAR CONTROL

1. Landing Gear Lever

2. Lock Override Button

3. ALTN Gear EXTEN Switch

1. Landing Gear Lever

UP: Retracts the landing gear.

OFF: Shuts off hydraulic pressure to the landing gear and ports pressure to return.

DN:
- Releases the door and gear up latches.
- Pressurizes the down hydraulic lines.
- Extends the landing gear.

2. ALTN Gear EXTEN Switch

OFF: Resets the alternate gear extension system.

DN: Activates the alternate gear electric hydraulic pump powered from the Hot Battery Bus. This hydraulically releases the gear door locks and gear up-locks, allowing the landing gear to free fall. Springs are used to help the side brace move to the locked position.

Hydraulic fluid for alternate gear extension is supplied by existing fluid in the gear hydraulic lines, so complete evacuation of reservoir fluid does not preclude lowering the landing gear alternately.

Alternate (ALTN FLAPS) Flaps Selector

NORM – normal flap operation, alternate system not in use.
UP – the slats and flaps are retravted.

1 –
- the slats extend to the midrange position
- the flaps remain retracted
5 to 20 –
- the slats remain in the midrange position
- the flaps extand to the commanded position

Alternate flaps switches must be in ALTN for the slats and flaps to move.

Alternate (ALTN) Flaps Switches

ALTN –
-        arms the selected LE slat or TE flap alternate drive unit
-        shuts off hydraulic power to the selected LE slat or TE flap drive system.

Off (ALTN not visible) – alternate flaps and slats command inactive.

---

32. LANDING GEAR INDICATIONS

1. Gear Light

2. Doors Light

3. Gear Lights

4. Wheel Well Fire Light

1. Gear Light

Illuminates to indicate that the landing gear position disagrees with the position commanded by the landing gear lever.

GEAR DISAGREE message is displayed on the EICAS.

2. Doors Light

Illuminates to indicate that one or more landing gear doors are not locked in the closed position.

GEAR DOORS message appears on the EICAS.

3. Gear Lights

Illuminates to indicate that the associated gear is down and locked.

4. Wheel Well Fire Light

Illuminates to indicate that there is a fire in the main wheel well areas.
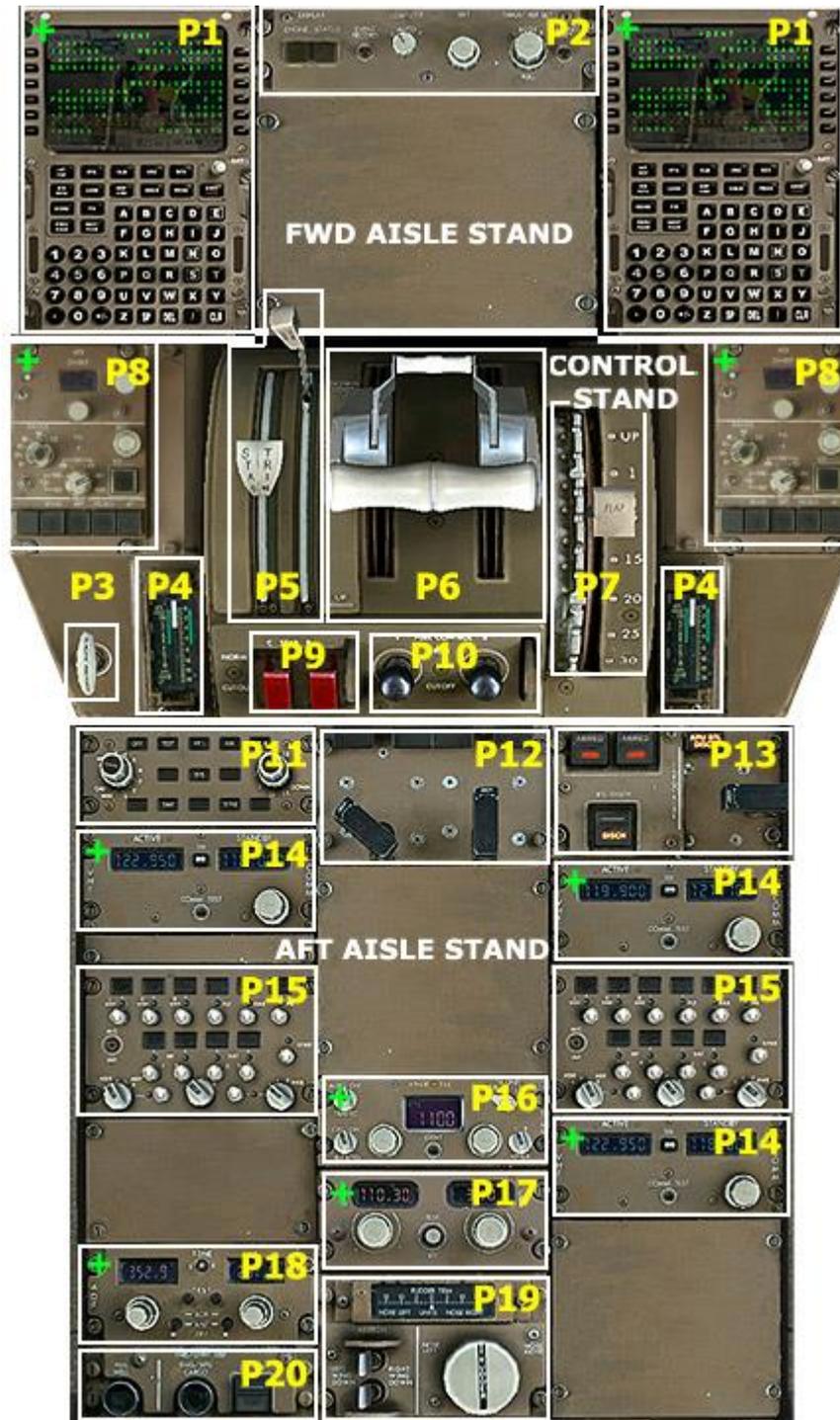
AISLE STAND

DO NOT USE FOR FLIGHT

Forward Aisle Stand
P1 Control Display Unit
P2 Control Panel

Control Stand
P3 Parking Brake
P4 Stab Trim Indicator
P5 Speed Brake/Trim Controls
P6 Throttles
P7 Flap Handle
P8 EFIS Control Panel
P9 Stab Trim Cut Out Switches
P10 Fuel Control Panel

Aft Aisle Stand
P11 Radar Control Panel
P12 Engine Fire Control Panel
P13 APU/Cargo Fire Control Panel
P14 VHF Control Panel
P15 Audio Control Panel
P16 Transponder Panel
P17 ILS Control Panel
P18 ADF Control Panel
P19 Trim Control Panel
P20 Fire/Overheat Test Panel

FORWARD AISLE STAND

P1. CONTROL DISPLAY UNIT

The Control Display Units (CDU) are used to enter lateral and vertical flight plan and performance data into the Flight Management Computers.

The CDUs are used by the FMCs to display data and messages to the crew. CDU data is displayed in the form of pages.

The various CDU keys are used to call up the various pages as well as manipulate the information.

See Manual Part V – Flight management System for details.

P2. CONTROL PANEL

1. Engine Switch

2. Status Switch

5. Brightness Knobs

1. Engine Switch

Press to display secondary engine data on the lower CRT if it is blank.

If engine data is already displayed, pressing the ENGINE switch will blank the lower CRT.

2. Status Switch

Press to display status information if the lower CRT is blank or contains secondary engine data.

If the lower CRT is already displaying status information, pressing the status switch advances the message list (if there are more messages) or blanks the lower CRT.

5. Brightness Knobs

Inner Knob: Sets the brightness of the upper EICAS CRT.

Outer Knob: Sets the brightness of the lower EICAS CRT.

CONTROL STAND

P3. PARKING BRAKE/P4. STAB TRIM INDICATOR
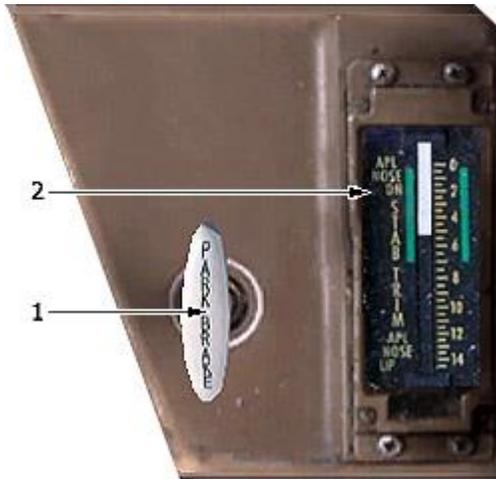
1. Park Brake Handle

Pull up to set the parking brake. You must push on the brake pedals to set the brakes.

Push on either pair of brake pedals to release the parking brake.

2. Stab Trim Indicator

Visually indicates the position of the stabilizer. The green band indicates the normal takeoff trim range.

The indicator will be inoperative on battery power only.

P5. SPEED BRAKE/TRIM CONTROLS

1. STAB TRIM Levers

2. Speed Brake Lever

1. STAB TRIM Levers

Mechanically controls the hydraulic trim control modules for stabilizer trimming

Overrides all other trim signals.

The left handle controls the trim direction.

The right handle controls the trim modules.

On newer airplanes, the handles are replaced by trim switches, which electrically overrides all other trim inputs, and is available with battery power.

2. Speed Brake Lever

DOWN: Retracts all spoiler panels. The lever moves to UP, extending the ground spoilers if either reverser lever is moved into reverse and all other conditions for automatic deployment exist.

ARMED: Arms the speed brake lever to move UP, extending the ground spoilers when:
- Both trucks detect no tilt conditions.
- Both throttles are in idle.
- Hydraulic pressure is available to the landing gear truck tilt actuators.

This ensures the trucks will not untilt inflight.

The lever moves to the DOWN position when either throttle is advanced.

UP: Extends all 12 spoiler panels on the ground to a high angle, and 10 panels in flight. Panels 4 and 9 only deploy on the ground.
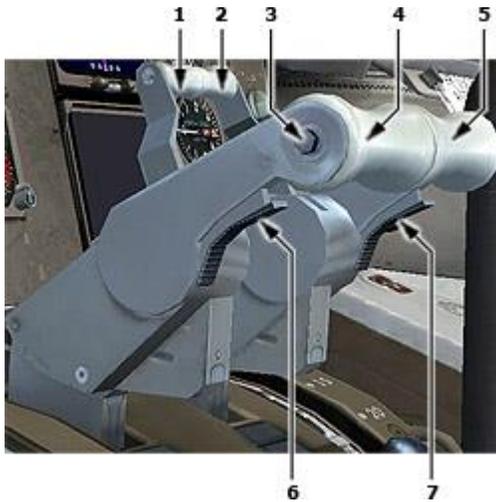
P6. THRUST LEVERS

1,2. Reverse Thrust Levers

3. Autothrottle Disengage Switch

4,5. Forward Thrust Levers

6,7. Go-Around Switch

1,2. Reverse Thrust Levers

Control engine reverse thrust.
Reverse thrust can only be selected when the forward thrust levers are closed.
Actuates automatic speedbrakes.
Do not deploy reverse without hydraulic.

3. Autothrottle Disengage Switch

Disengage the autothrottle.

4,5. Forward Thrust Levers

Controls engine forward thrust.
The thrust levers can only be advanced if the reverse thrust levers are down.

6,7. Go-Around Switch

Activate the go-around mode of the autothrottle and autopilot/flight director systems, provided the go-around mode is armed.

P7. FLAP HANDLE

Controls the trailing edge flaps and the leading edge slats.

UP: Retracts all leading edge slats and trailing edge flaps.

1: Selects position 1 for the flaps and places the leading edge slats in the takeoff position.

5, 15, 20: Selects the indicated position for the flaps. Slats remain in the takeoff position if extending the flaps, or retracts them to the takeoff position if retracting the flaps.

25, 30: Selects the indicated position for the flaps. Slats extend fully if extending the flaps, or remain fully extended if retracting the flaps.

P8. EFIS CONTROL PANEL

1. ADI Brightness (BRT) Control

2. Decision Height Reference (DH REF) Window

3. Decision Height Reset (RST) Switch

4. Decision Height Selector

5. Range Selector

6. HSI Brightness (BRT) Control

7. HSI Mode Selector

8. Weather Radar (WXR) Switch

9. Map Switches

The left EFIS control panel controls the left ADI and HSI. The right EFIS control panel controls the right ADI and HSI.

1. ADI Brightness (BRT) Control

Rotate - adjusts brightness of ADI display.

2. Decision Height Reference (DH REF) Window

- displays selected decision height.
- displays on ADI (ADI blanks when a negative decision height is selected).

3. Decision Height Reset (RST) Switch

Push-
- resets DH alert on related ADI.
- changes RA display from amber to white.
- blanks height alert on related ADI.

4. Decision Height Selector

Rotate - selects decision height for DH alerting.

5. Range Selector

Selects the desired range for the associated HSI. Also selects the same range for the radar display. Pushing the switch in the center of the selector toggles the TCAS traffic display on the HIS.

6. HSI Brightness (BRT) Control

Rotate -
- outer control - adjusts overall brightness of HSI display.
- inner control - adjusts brightness of weather radar or terrain display.

7. HSI Mode Selector

VOR, CTR VOR-
- displays VOR navigation information.
- selects manual VOR and DME tuning on the VOR/DME panel (automatic tuning inhibited) APP, CTR
    APP-
- displays ILS navigation information.
- selects manual VOR and DME tuning on the VOR/DME panel (automatic tuning inhibited).

MAP, CTR MAP -
- displays a dynamic map.
- allows selection of manual or automatic VOR and DME tuning on the VOR/DME panel.
- allows remote manual VOR and DME tuning on the PROGRESS page.

PLAN-
- displays static FMC map in true-north-up orientation
- displays heading information in heading-up form
- allows selection of manual or automatic VOR and DME tuning on the VOR/DME panel
- allows remote manual VOR and DME tuning on the PROGRESS page.
- activates the MAP CTR STEP prompt on the LEGS page for stepping through the displayed route.

8. Weather Radar (WXR) Switch

Push - displays weather radar information.
Note: Weather Radar must be ON before EFIS checks.

9. Map Switches

NAV AID -
- displays only high altitude VHF navigation aids when HSI range is 80nm or greater.

- displays all VHF navigation aids when HSI range is 40nm or less.

Airport (ARPT) -
Displays all airports in the display range.
DATA-
Displays estimated time of arrival and any altitude constraint for each waypoint in the displayed flight path.

Waypoint (WPT) -
- displays all waypoints when HSI range is 40nm or less.
- those waypoints associated with NDBs are displayed at any selected range as long as the NDBs are within 80nm of the airplane.

## P10. FUEL CONTROL PANEL
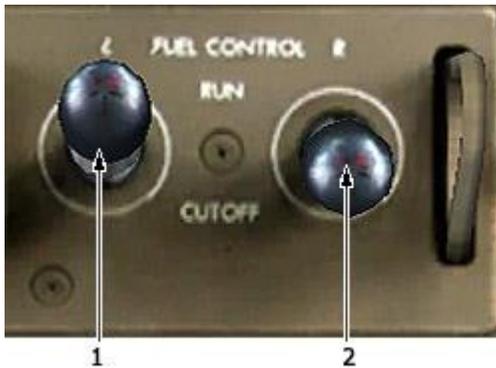
1.2.   Fuel Control Switches

Control the fuel and ignition to the associated engine.

RUN:
- Opens the engine and spar valve
- Supplies normal fuel flow
- Completes the ignition circuit CUTOFF:
- Closes the engine and spar valve
- Shuts off fuel
- Deactivates the ignition

With both switches off, most cautions are inhibited due to the engines being shut down.

P11. WEATHER RADAR CONTROL PANEL
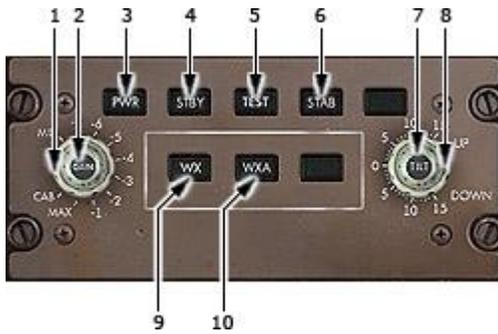
1,2. Gain Control

3. Power Button

4. STBY Mode Button

5. TEST Mode Button

6. STAB Button

7,8. Tilt Control Knob

9. Wx Mode Button

10. WxA Mode Button

1, 2. GAIN Control

The gain control adjusts the radar gain from 0 to -20 dB (CCW rotation reduces gain).

3. Power Button
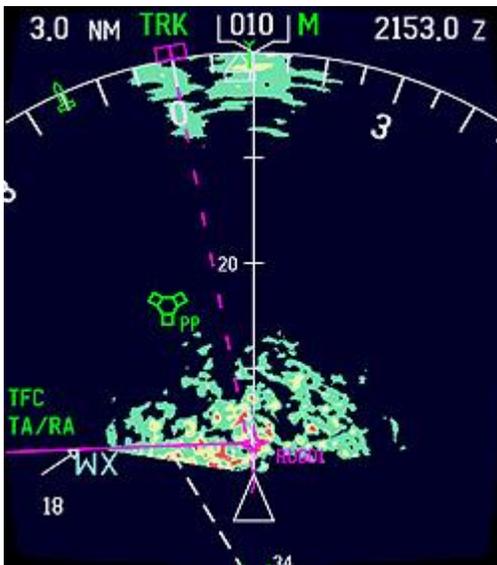
Provides power supply to radar. The radar system initializes to the standby mode.

4. STBY Mode Button

Fully energizes the system circuitry but no radar transmissions occur in the SBY mode of operation. The antenna is parked at 0 degrees azimuth and 30 degrees tilt down with the antenna drive motors locked. SBY will appear in the lower left of the display.

5. Test Mode Button
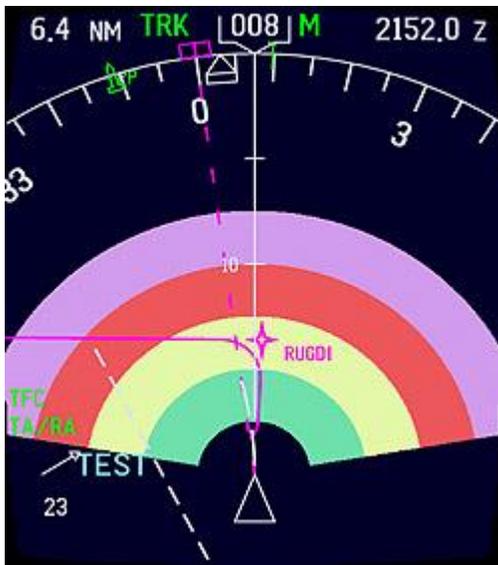
The multicolored arc display test pattern is displayed in this mode of operation. Can be scaled with the Range Selector on EFIS CONTROL PANEL. No radar transmissions occur while TEST is selected. TEST will appear in the lower left of the display.

6. STAB Button

The On position provides normal stabilization. The Off position disables and the stabilization antenna tilt angle is controlled by the tilt control only.

7,8. TILT Control Knob

Permits manual adjustment of antenna tilt 15° up or down for best indicator presentation.

9. Wx Mode Button

Selects the Wx (weather) mode of operation. "Wx" will appear in the lower left of the display. Wx colors are: Black for no returns, Green for weak returns, Yellow for moderate returns, Red for heavy returns and Magenta for intense returns.

10. WxA Mode Button

Selects the WxA (weather-alert) mode of operation. "WxA" will appear in the lower left of the display. WxA colors are: Black for no returns, Green for weak returns, Yellow for moderate returns, Red for heavy returns and Magenta for intense returns. When the WxA mode is selected, magenta areas of storms flash between magenta and black at a 1 HZ rate.

THEORY OF OPERATION

The primary use of this radar is to aid the pilot in avoiding thunderstorms and associated turbulence. Since each operator normally develops specific operational procedures for use of weather avoidance radar, the following information is presented for use at the operator's discretion.

Operational techniques for the radar are similar to earlier generation weather avoidance radars. The proficient operator manages antenna tilt control to achieve best knowledge of storm height, size, and relative direction of movement.

RADAR PRINCIPLES

Radar is fundamentally a distance measuring system using the principle of radio echoing. The term RADAR is an acronym for Radio Detecting and Ranging. It is a method for locating targets by using radio waves. The transmitter generates microwave energy in the form of pulses. These pulses are then transferred to the antenna where they are focused into a beam by the antenna. The radar beam is much like the beam of flashlight. The energy is focused and radiated by the antenna in such a way that it is most intense in the center of the beam with decreasing intensity near the edge. The same antenna is used for both transmitting and receiving. When a pulse intercepts a target, the energy is reflected as an echo, or return signal, back to the antenna. From the antenna, the returned signal is transferred to the receiver and processing circuits located in the receiver transmitter unit. The echoes, or returned signals, are displayed on an indicator.

Radio waves travel at the speed of 300 million meters per second and thus yield nearly instantaneous information when echoing back. Radar ranging is a two-way process that requires 12.36 micro-seconds for the radio wave to travel out and back for each nautical mile of target range. As shown in the distance illustration below, it takes 123.6 micro-seconds for a transmitted pulse of radar energy to travel out and back from an area of precipitation 10 nautical miles away.
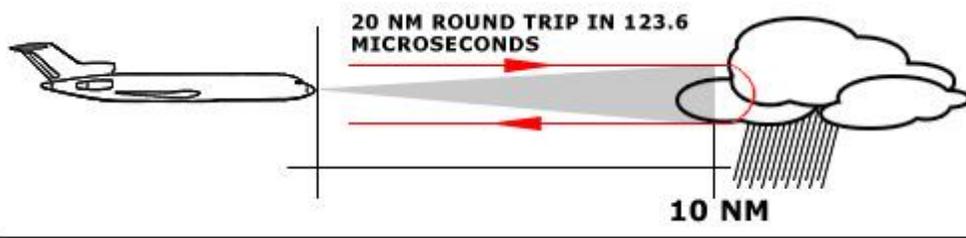
WEATHER RADAR PRINCIPLES

Airborne weather avoidance radar, as its name implies, is for avoiding severe weather, not for penetrating it. Whether to fly into an area of radar echoes depends on echo-intensity, spacing between the echoes, aircraft capabilities and pilot experience. Remember that weather radar detects only precipitation drops; it does not detect minute cloud droplets, nor does it detect turbulence. Therefore, the radar provides no assurance of

avoiding instrument weather in clouds and fog. The indicator may be clear between intense echoes; this clear area does not necessarily mean it is safe to fly between the storms and maintain visual sighting of them.

RADAR BEAM ILLUMINATION

Probably the most important aspect of a weather radar is the antenna beam illumination characteristic. To make a proper interpretation of what you are seeing on the display, you must have an understanding of what the radar beam "is seeing". The following figure is a side view of the radar beam characteristic with a storm depicted at a distance that causes the size of the storm to just fill the 3 dB beamwidth. This would be the typical situation for a storm at approximately 40 nautical miles with a 12 inch diameter antenna. It's important to understand and visualize this situation, to enhance your understanding of the rest of this manual.
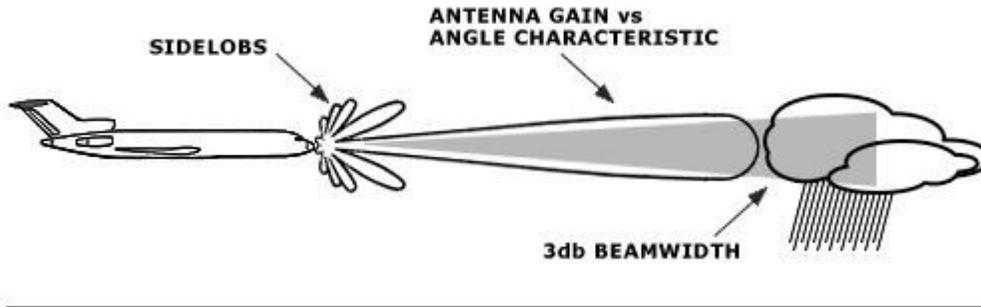
RADAR REFLECTIVITY

What target will reflect the radar's pulses and thus be displayed on the indicator? Only precipitation will be detected by an X-band weather radar. Therefore weather radar does not detect clouds, thunderstorms or turbulence directly. Instead, it detects precipitation which may be associated with dangerous thunderstorms and turbulence. The best radar reflectors are raindrops and wet snow or hail. The larger the raindrop the better it reflects. Because large drops in a small concentrated area are characteristic of a severe thunderstorm, the radar displays the storm as a strong echo. Drop size is the most important factor in high radar reflectivity.

The radar display has been calibrated to show five levels of target intensity: Black (level 0), Green (level 1), Yellow (level 2), Red (level 3), and Magenta (level 4).

PREFLIGHT PROCEDURES

The system never transmits in the SBY or TST modes.

Accomplish the following procedures completely and exactly.

1) Place the radar controls in the following positions:
   - PWR Button - ON
   - TEST Button - ON
   - Tilt to UP 7 (will be shown on the indicator display, upper right corner).
The test pattern will appear.

2) With the function switch in TST or SBY, taxi to a clear area where there are no people, aircraft, vehicles, or metallic buildings within approximately 100 yards.

3) WX Button ON. Weather targets will be displayed in green, yellow, red, or magenta. (Note: A 60 second warm up time period is required before the system will transmit).

4) Press the WxA button and observe that magenta areas (if any) flash.

5) Repeat the manual tilt adjustment, this time between the 0 and down 15 degrees positions.

6) Return to TST or SBY mode before taxiing!

7) When you are ready for weather detection (after takeoff or just before), select the Wx or WxA mode of operation.

OPERATION IN-FLIGHT - GENERAL

It is the purpose of this section to help you become a proficient radar operator as soon as possible. However, it is realized that proficiency can only improve with usage. It is, therefore, recommended that the operator become familiar with the operation of the system during fair weather instead of while trying to penetrate a storm front.

This section concerns itself with a more detailed discussion of some of these controls and how to make the most efficient use of them.

Note
Your radar is a weather-avoidance device. It should never be used for weather-penetration. It will help you see and plan avoidance maneuvers around significant weather encountered during flight.

TILT MANAGEMENT

Effective antenna tilt management is the single, most important key to more informative weather radar displays. The prime factors must be kept in mind for proper tilt management:
  • The center of the radar beam is referenced to the horizon by the aircraft vertical reference system.
  • Adjusting the antenna tilt control will cause the center of the radar beam to scan above or below the plane of the attitude reference system.

When flying at high altitudes, the use of proper tilt management ensures observation of weather targets without over scanning. For example, a low altitude storm detected on the long range setting may disappear from the display as it is approached. While it may have dissipated during your approach toward the storm, don't count on it. It may be that you are directing the radiated energy from the antenna above the storm as you get closer. Judicious management of the antenna tilt control will avoid over-scanning a weather target.

EARLY DETECTION OF ENROUTE WEATHER

To set the antenna tilt to optimize the radar's ability to quickly identify significant weather, follow these steps:
1) Select the Wx (weather) mode of operation. Adjust Brightness control as desired.
2) Select the 50 or 80 nm range.
3) Adjust the antenna tilt to watch the strongest returns seen on the display.

TARGET RESOLUTION

The ability of a weather avoidance radar system to resolve and display two or more closely spaced targets is limited in range by the transmitted pulse width and display range and in azimuth by the antenna beam width.

RANGE RESOLUTION

The transmitter pulse width in the radar is 4 micro-seconds, yielding a receiver range resolution of approximately 1/3 nautical mile.

AZIMUTH RESOLUTION

The ability of the radar to resolve adjacent targets in azimuth is a function of the beam width of the antenna and the range to the target. The diameter of this radiated beam increases as it gets further away from the aircraft.

Targets separated by a distance less than the beam diameter (at the target distance) will merge and appear on the indicator as "one."

DO NOT USE FOR FLIGHT

PATH PLANNING

Remember to plan a deviation path early. Simply skirting the red or magenta portion of a cell is not enough. Plan an avoidance path for all weather echoes which appear beyond 100 nautical miles since this indicates they are quite intense.

The most intense echoes are severe thunderstorms. Remember that hail may fall several miles from the cloud, and hazardous turbulence may extend as much as 20 nautical miles; therefore, echoes should be separated by at least 40 nautical miles before you fly between them. As echoes diminish in intensity, you can reduce the distance by which you avoid them.

PATH PLANNING CONSIDERATIONS

• Avoid cells containing magenta and red areas by at least 20 nautical miles.
• Do not deviate downwind unless absolute necessary. Your chances of encountering severe turbulence and damaging hail are greatly reduced by selecting the upwind side of the storm
• If looking for a corridor, remember corridors between two cells containing magenta and/or red areas should be at least 40 nautical miles wide from the outer fringes of the radar echo. The magenta displays areas of very heavy rainfall and statistically indicates a high probability of hail.

Note:
Do not approach a storm cell containing magenta and red any closer than 20 nautical miles. Echoes should be separated by at least 40 nautical miles before attempting to fly between them.
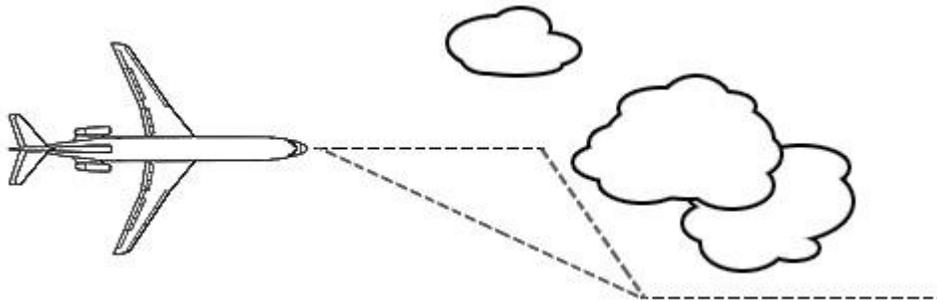

Cells beyond 75 nautical miles are areas of substantial rainfall, do not wait for red or magenta to appear. Plan and execute evasive action quickly to minimize "doglegging."
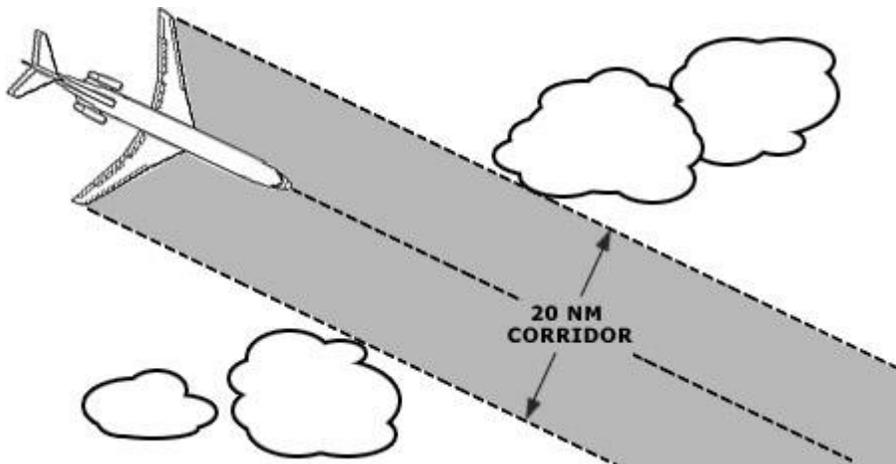
When a complete detour is impractical, penetration of weather patterns may be required. Avoid adjacent cells by at least 20 nautical miles.

AFT AISLE STAND

P12 ENGINE FIRE CONTROL PANEL
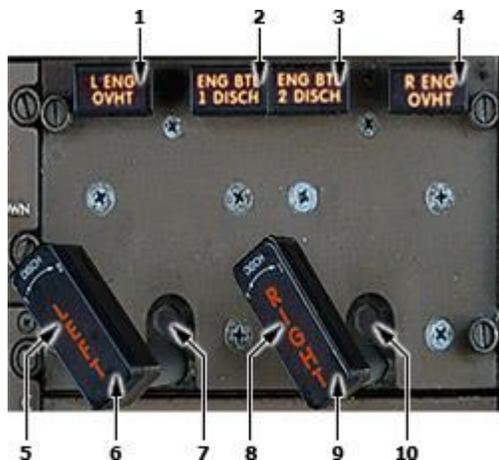
1,4. Engine Overheat (L/R ENG OVHT) Lights

2,3. Engine Fire Bottle Discharged (ENG BTL DISCH) Lights

5,8. Engine Fire Warning Lights

6,9. Engine Fire Switches

7,10. Engine and APU Fire Override Switches

1,4. Engine Overheat (L/R ENG OVHT) Lights

Illuminated (amber) - engine overheat is detected.

2,3. Engine Fire Bottle Discharged (ENG BTL DISCH) Lights

Illuminated (amber) - the extinguisher bottle is discharged or has low pressure.

5,8. Engine Fire Warning Lights

Illuminated (red) - an engine fire is detected.

6,9. Engine Fire Switches

In — normal position, mechanically locked; unlocks if fire warning activated.
Out - closes the associated engine and spar fuel valves, and
-     closes the associated engine bleed air valves
-     trips the associated engine generator off
-     shuts off hydraulic fluid to the associated engine-driven hydraulic pump
-     arms both engine fire extinguisher bottles
Rotate to position 1 or 2 - discharges the selected fire extinguisher into the engine.

7,10. Engine and APU Fire Override Switches

Push - unlocks the respective engine or APU fire switch.

P13. APU/CARGO FIRE CONTROL PANEL
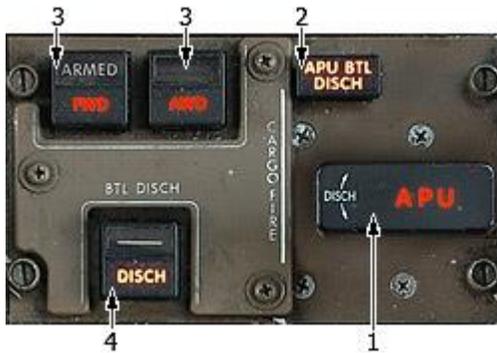
1. APU Fire Shutoff Handle

2. APU BTL DISCH Lights

3. Cargo Fire EXT ARM Switches

4. BTL DISCH Switches/Lights

1. APU Fire Shutoff Handle

Illuminates to indicate that there is a fire in the APU or APU compartment.

The APU automatically shuts down.

Pulling the APU fire handle results in:
- Initiates APU shutdown, bypassing the 90 second delay.
- Arms the fire extinguisher bottle.
- Silences the fire bell.

The APU fire handle is locked in position until it is released by the fire warning or manually by a button under the handle.

2. APU BTL DISCH Light

Illuminates to indicate that the pressure in the APU fire extinguisher bottle is low.

3. Cargo Fire EXT ARM Switches

The red FWD or AFT light illuminates to indicate a fire in the associated cargo compartment.
Pushing the respective switch silences the bell, arms the fire extinguishing system to the associated compartment, and:

FWD:
- Turns off the forward cargo heat fan.
- Turns off both recirculation fans.
- Opens the overboard exhaust valve.
- Switches both air conditioning packs to high flow.

AFT:
- Turns off the aft cargo heat fan.
- Turns off the aft cargo heater.
- Turns off the right recirculation fan.
- Switches the right air conditioning pack to high flow.

ARMED appears in the switch when pushed. If both switches are armed, the extinguishing agent will be discharged in both compartments.

4. BTL DISCH Switches/Lights

Push to discharge the associated fire extinguisher to the compartment selected by the CARGO EXTINGUISHER ARM Switch.

The DISCH light illuminates to indicate low pressure in the associated fire extinguisher bottle.

P14. VHF CONTROL PANEL

1. Frequency Indicator

2. Transfer Switch

3. COMM Test Button

4. Frequency Selector

1. Frequency Indicator

Displays the frequency selected by the Frequency Selector Knob.

2. Transfer Switch

Selects the frequency in the left or right display for transmission and reception.

3. COMM Test Button

When pressed displays all 8888888 on the Frequency Indicator

4. Frequency Selector

Tunes VHF receiver.

P16 TRANSPONDER PANEL

1. TRAFFIC AUTO-ON Selector

2. ATC FAIL Light

3. ATC Indicator

4. Transponder Mode Selector

5. ATC Switch

6. ATC Code Selectors

7. ATC Ident Switch

8. L-R Selector

2. ATC FAIL Light

Illuminates when the transponder malfunction has been detected

3. ATC Indicator

Displays Code set by ATC Code Selectors

4. Transponder Mode Selector

TA – enables the following:

-       Display of Traffic Advisory (TA) symbols.
-       Voice alerts.

TA/RA - enables the following:

-       Display of Traffic Advisory (TA) and Resolution Advisory (RA) symbols.
-       Voice alerts.
-       Vertical guidance for RAs.

5. ATC Switch

Turns ON-OFF the transponder

6. ATC Code Selectors

ROTATE – sets code in ATC Code indicator

7. ATC Ident Switch

PUSH – transmits ident signal

8. L-R Selector

Selects transponder for operation

DO NOT USE FOR FLIGHT

| P17. ILS CONTROL PANEL |

1. Frequency Indicator

2. ILS Front Course Indicator

3. Frequency Selector

4. Test Switch

5. Course Selector

1. Frequency Indicator

Displays the frequency tuned by ILS Frequency Selector.
Displays dashes when the frequency selector is in the standby position. The frequency is dialed in using the frequency selector knob.

2. ILS Front Course Indicator

Displays the front course for the ILS.

The course is dialed in using the front course selector knob.

### 3. ILS Frequency Selector

Tunes ILS receiver

4. Test Switch

Tests ILS receivers and associated systems.

5. Course Selector

ROTATE – sets course in ILS Course Indicator and EFIS

DO NOT USE FOR FLIGHT

P18. ADF CONTROL PANEL
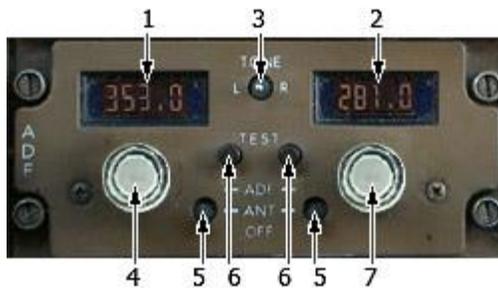
1,2. Frequency Indicators

4,7. Frequency Selector

3. Tone Switch

5. Mode Control Switch

6. Test Switch

1,2. Frequency Indicators

Display the frequency selected with the related frequency selector.

4,7. Frequency Selectors

Rotate:
- Outer knob sets the hundreds number.
- Middle knob sets the tens number.
- Inner knob sets the tenths and ones number.

P19. TRIM CONTROL PANEL
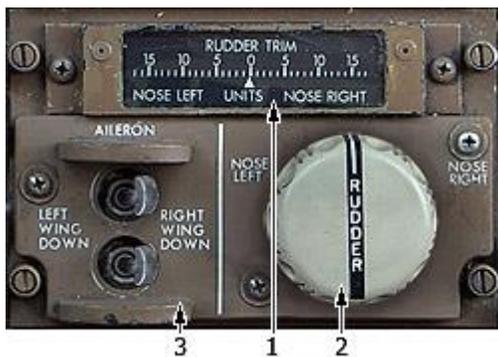
3. Rudder Trim Indicator

4. Rudder Trim Control

5. Aileron Trim Switches

1. Rudder Trim Indicator

Indicates the number of units of rudder trim.

2. Rudder Trim Control

Repositions the rudder neutral point. The rudder pedals are displaced in the direction of trim if hydraulic power is available. The rudder trim control is spring loaded to the neutral position.

3. Aileron Trim Switches

Repositions the aileron control system neutral position. Both switches must be operated simultaneously.

The switches are spring loaded to the neutral position

DO NOT USE FOR FLIGHT

P20. FIRE/OVERHEAT TEST PANEL

1. Wheel Well Test Switch

2. ENG/APU/Cargo Test Switch

3. SYS Fail Switch

1. Wheel Well Test Switch

Tests the wheel well fire detector system.

- Fire bell sounds
- Both master warning lights illuminate
- FIRE Light Illuminates
- WHL WELL FIRE Light illuminates

2. ENG/APU/Cargo Test Switch

Tests the engine fire, engine overheat, APU fire, and cargo fire/smoke fire detector systems.

- Fire bell sounds in the cockpit and on the external APU fire protection panel
- The caution aural sounds if either fuel control switch is out of cutoff.
- Both master warning lights illuminate.
- Both master caution lights illuminate if either fuel control switch is out of cutoff.
- FIRE Light illuminates in the cockpit and on the external APU fire protection panel.
- Both ENG OVHT lights illuminate.
- Engine and APU fire handles illuminate.
- Both fuel control switches illuminate.
- FWD and AFT CARGO FIRE lights illuminate.

3. SYS Fail Switch

Push to reset the fault monitoring system and turn off the FAIL light.

The FAIL light illuminates to indicate that there is a failure or fault in both loops of the engine fire, engine overheat, APU fire, or cargo fire detection system.

DO NOT USE FOR FLIGHT

CUSTOMER CARE

We encourage you to visit the one-stop resource for the 737 Captain flightsim operations: the Sim Ops

TECHNICAL SUPPORT

If you have trouble with this product, please use our Ticket based support system and an extensive Knowledge Base at: https://www.captainsim.com/support

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