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## Chapter 1: Aircraft General

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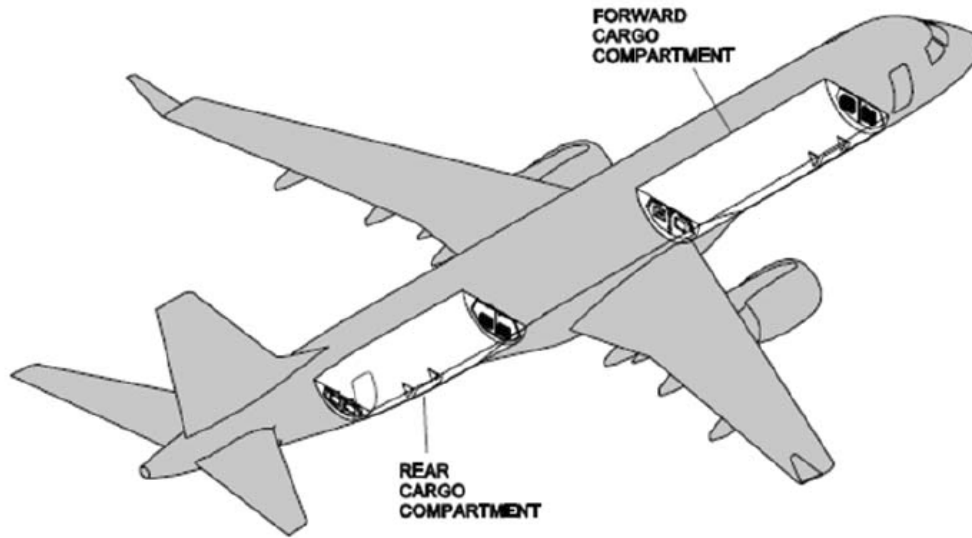
The Embraer 190 is a low wing, conventional tail, pressurized airplane, powered by two(2) high by-pass ratio wing-mounted turbofan engines. The tricycle landing gear is fully retractable, with dual tires on each strut.

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**1.1 Cargo Compartments System Description**

**1.1.1 General.** The E190 has two class C cargo compartments. Both are equipped with a fire detection and extinguishing system.



**Figure 1.1 Cargo Compartments**

## Doors System Description

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### 1.2 Doors System Description

**1.2.1 General.** The E190 has two passenger doors on the left side, two service doors on the right side, and a number of access doors for airplane systems along the fuselage.

An overwing emergency exit door is located on each side of the airplane.

**1.2.2 Passenger and Service Doors.** Passenger door operation is manual and it is identical for both passenger doors. Passenger doors are plug type.

Service doors are used for galley servicing and cabin cleaning between flights. They may also be used as an emergency exit. The operation of service and passenger doors is identical.

One external, three internal handles and one vent flap are installed in each door for opening and closing operation.

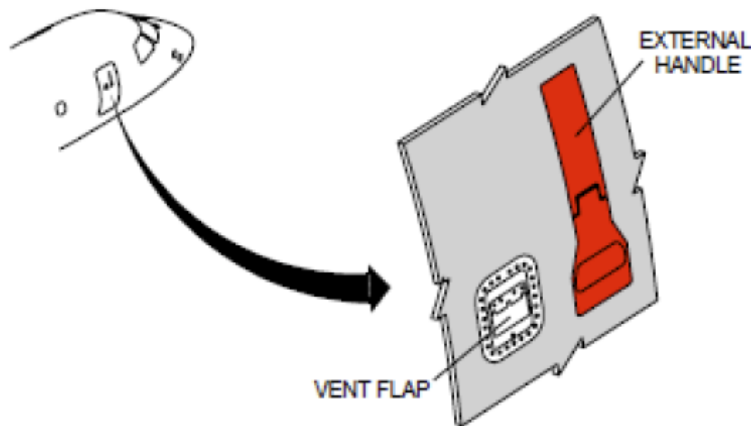
The doors support maximum wind gusts of 40 kts. when the doors are fully open or closed. When the doors are open and locked, the maximum wind load limit is 65 kts.

**Door External Handle.** The vent flap ensures the correct latching and locking of the door so the airplane can be pressurized and provides a means to relieve residual pressure before the door is opened on the ground.

The escape slide is automatically disarmed when door is opened from outside. The vent flap opens automatically when the lower part of the external handle is pulled.

**WARNING**

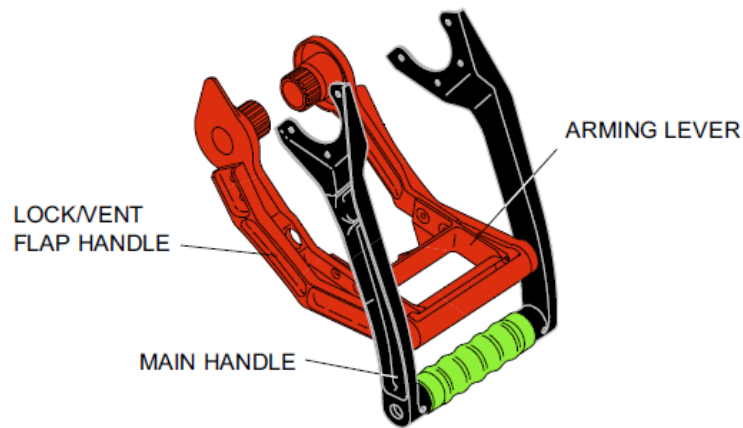
Make sure the vent flap is closed (flush with the door) before opening the door from the outside. If the external handle is used to open the door while the slide is armed and the vent flap is open, door emergency opening operation will occur and the escape slide will deploy.



**Figure 1.2 External Handle and Vent Flap**

**Door Internal Handles.** The main handle activates the latch mechanism.

Vent flap and the door lock mechanism are linked together. The airplane pressurization loads the vent flap against the door structure. The effort to unlock the door (lift the vent flap handle) increases with the airplane pressurization level. The arming lever arms/disarms the escape slide and engages/disengages the girt bar.



**Figure 1.3 Internal Handles**

**Door Indications.** One green latch and two green lock indications are provided to ensure the door is properly closed. An escape slide ARMED/DISARMED indication provides the escape slide armed/disarmed condition. A red indication in the bottom of the door provides means to verify the girt bar is engaged.



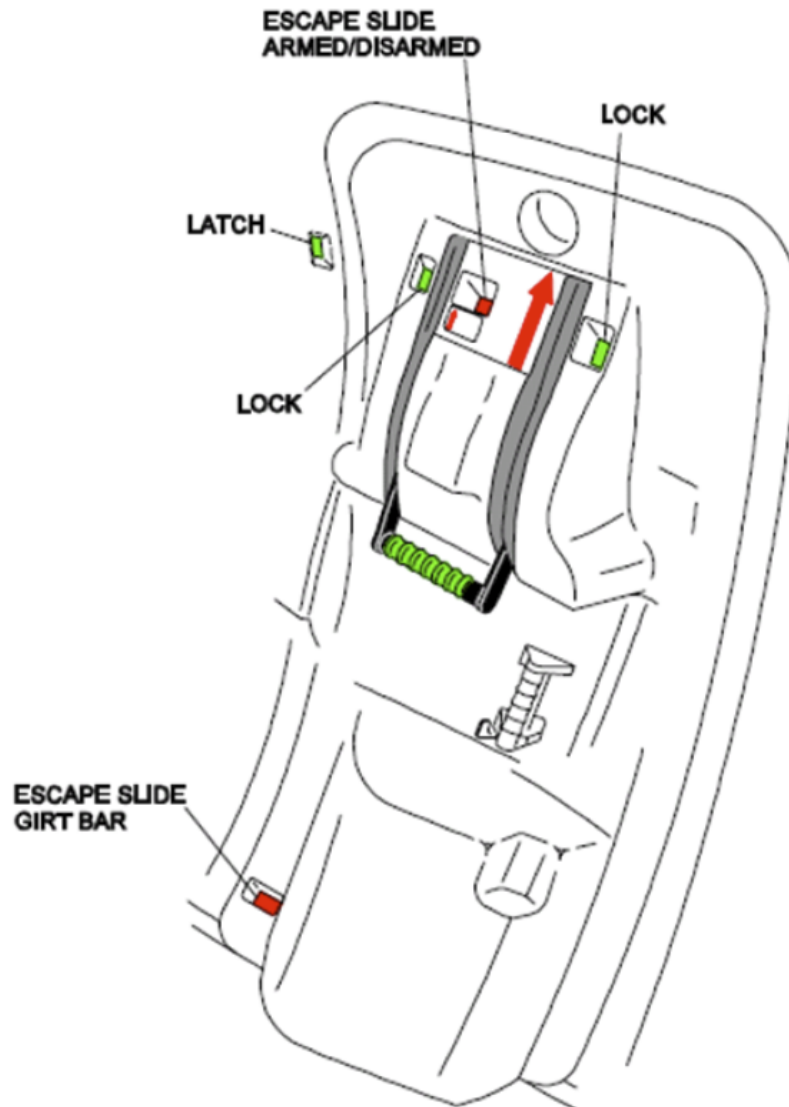


Figure 1.4 Door Indications

Door indications change according to the handle position.

**MAIN HANDLE DOWN**

- Door: Closed
- Latch indication: GREEN

**MAIN HANDLE UP**

- Door: Open
- Latch indication: no GREEN indication

**LOCK/VENT FLAP HANDLE DOWN**

- Vent flap: Closed
- Lock indications: GREEN

## Doors System Description

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**LOCK/VENT FLAP HANDLE UP**

- Vent flap: Open
- Lock indications: no GREEN indications

**ARMING LEVER DOWN**

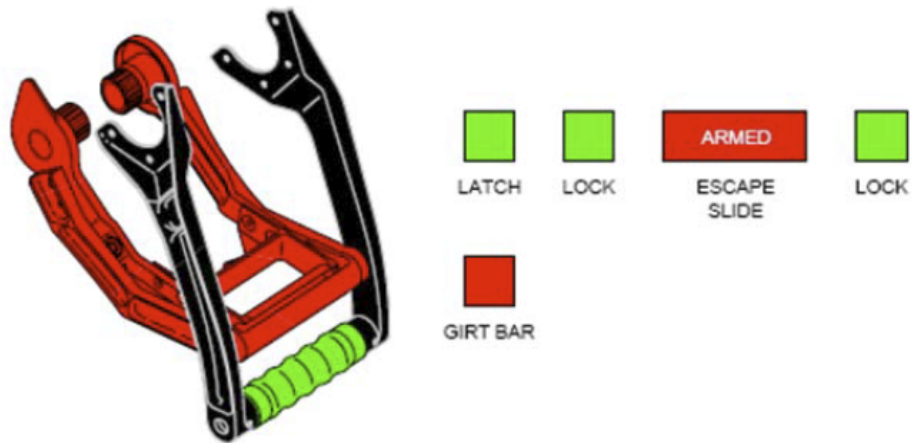
- Escape slide: Armed
- Escape slide indication: RED ARMED
- Girt bar indication: RED – girt bar connected to airplane.

**ARMING LEVER HANDLE UP**

- Escape slide: Disarmed
- Escape slide indication: GREEN DISARMED
- Girt bar indication: no RED indication – girt bar disconnected from airplane.

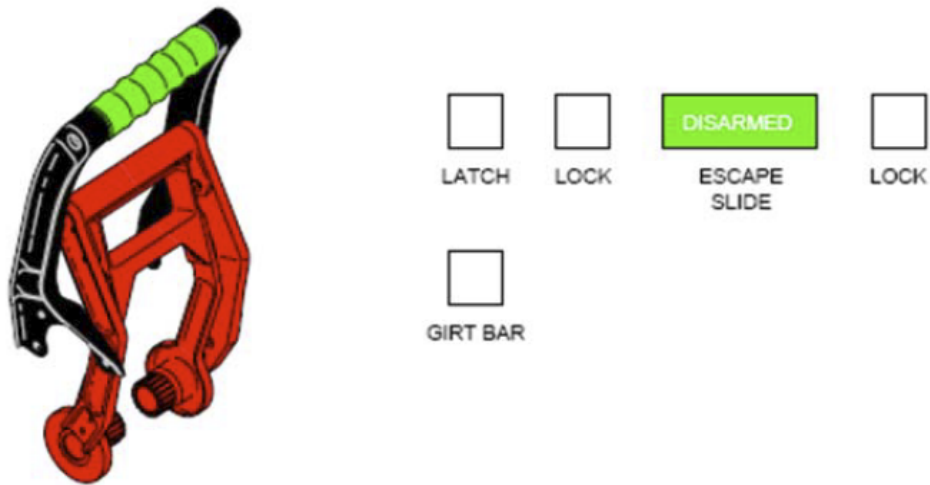
The following door indications are for different internal handles positions:

- Main handle DOWN (Door closed and latched)
- Lock/Vent Flap handle DOWN (Vent Flap closed and door locked)
- Arming lever DOWN (Escape Slide ARMED)



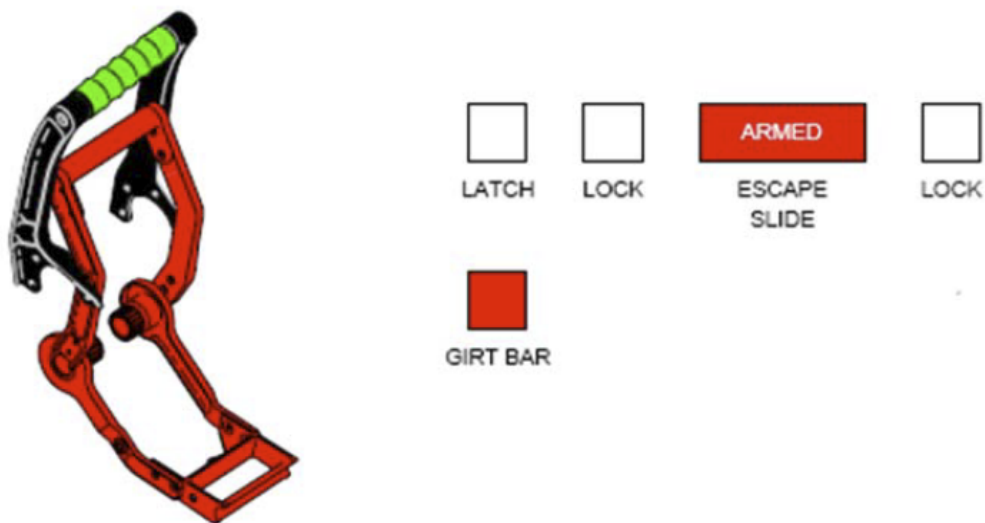
**Figure 1.5 Door Indications for Internal Handles Positions**

- Main handle UP (Door unlatched and opened)
- Lock/Vent Flap handle UP (Vent Flap opened and door unlocked)
- Arming lever UP (Escape Slide DISARMED)



**Figure 1.6 Door Indications for Internal Handles Position**

- Main handle UP (Door unlatched and opened)
- Lock/Vent Flap handle UP (Vent Flap opened and door unlocked)
- Arming lever DOWN (Escape Slide DEPLOYED)



**Figure 1.7 Door Indications for Internal Handles Positions**

- Main handle DOWN (Door closed and latched)
- Lock/Vent Flap handle UP (Vent Flap opened and door unlocked)
- Arming lever DOWN (Escape Slide ARMED)

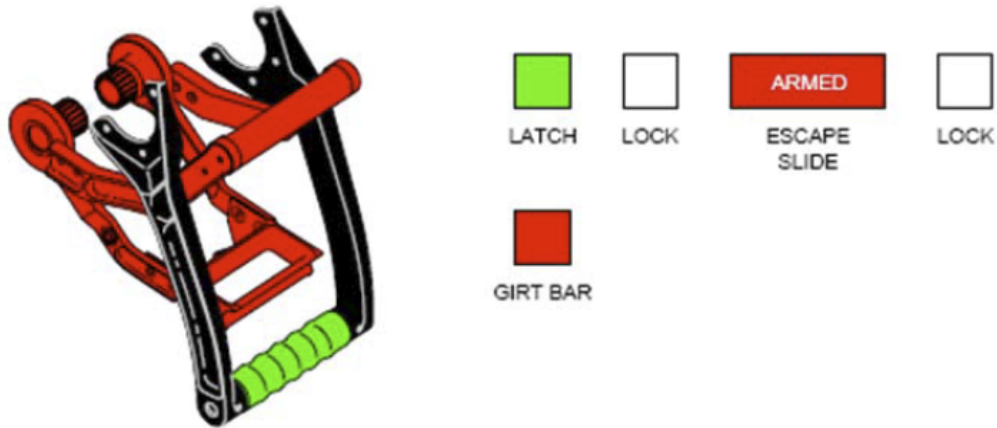


Figure 1.8 Door Indications for Internal Handles Positions

- Main handle DOWN (Door closed and latched)
- Lock/Vent Flap handle DOWN (Vent Flap closed and door locked)
- Arming lever UP (Escape Slide DISARMED)

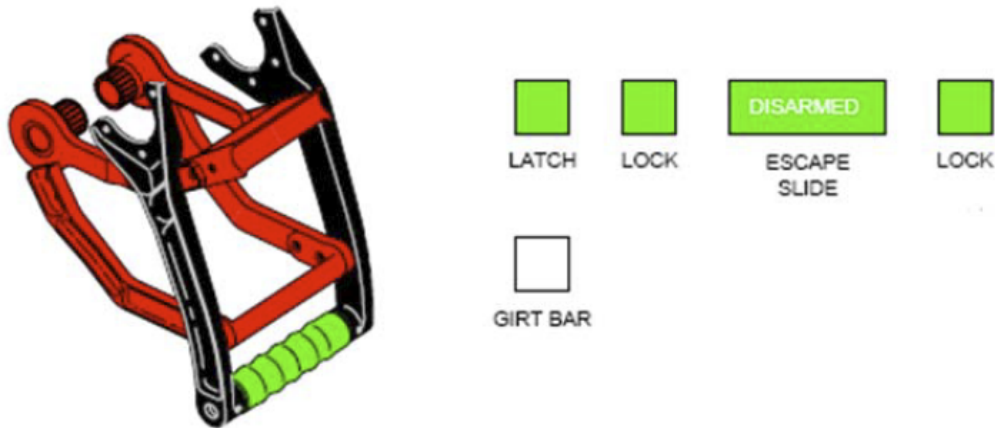


Figure 1.9 Door Indications for Internal Handles Positions

**1.2.3 Emergency Exits.** Both service and passenger doors are designed as emergency exits. Emergency slides are provided at both passenger and service doors. The side windows in the flightdeck are designed as emergency exits.

Opening the door with the slide armed will activate the Emergency Assistance System which will fully open the door after lifting the main internal handle. This feature is installed in the passenger and service doors.

In case of ditching, all emergency exits are supposed to be above the water line.

**1.2.4 Escape Slides.** The escape slides are designed to provide passengers and crew a means to safely egress from the airplane to the ground during an emergency evacuation. In the event of emergency evacuation, the slides deploy automatically when the exit door is opened.

Upon completion of the inflation sequence, the slide is ready to use for egress from the aircraft.

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## Doors System Description

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The escape slides are equipped with an independent lighting system. Slide deployment activates the lighting and illuminates the slide surface and surrounding area on the ground.

A dedicated battery powers the escape slide lights, which will be on for a minimum of 10 minutes even after escape slide disconnection.

The escape slides are armed by raising the slide arming lever cover located on the door and moving the slide arming lever to the “ARMED” position (DOWN). The lever movement attaches the girt bar to the cabin floor brackets. The escape slide is attached to the girt bar by means of a fabric girt.

Opening the door from the outside automatically disengages the girt bar from the floor fittings, disarming the slide.

**WARNING**

Make sure that the vent flap is closed (flush with the door) before opening the door from the outside. If the external handle is used to open the door while the slide is armed and the vent flap is open, door emergency opening operation will occur and the escape slide will deploy.

The escape slide may be used as a flotation device after disconnection from the airplane.

If the mooring line is not manually detached from the airplane in an emergency situation, the system is fail-safe in that the mooring line will break free from the slide if enough load is applied.

**1.2.5 Overwing Emergency Exits (OWE).** There are two Overwing Emergency Exits doors (OWE) in the center of the airplane for passenger evacuation in the event of an emergency. The OWE can be opened from the inside or outside the airplane, and can be only closed from the inside.

There is a green indication window to verify the door is locked.

**1.2.6 Cargo Doors.** The cargo doors, located on the right hand side of the fuselage, are manually operated from the outside. They have a locking mechanism controlled by an external handle, stowed in the lower half of the door. The doors also have depressurization vent flaps which prevent pressurization of the airplane above 0.5 psi when the door is not fully closed, latched and locked. The cargo doors open outwards, are hinged along the upper edge and are latched at the lower edge with four hooks.

Doors System Description

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Cargo Doors Opening.

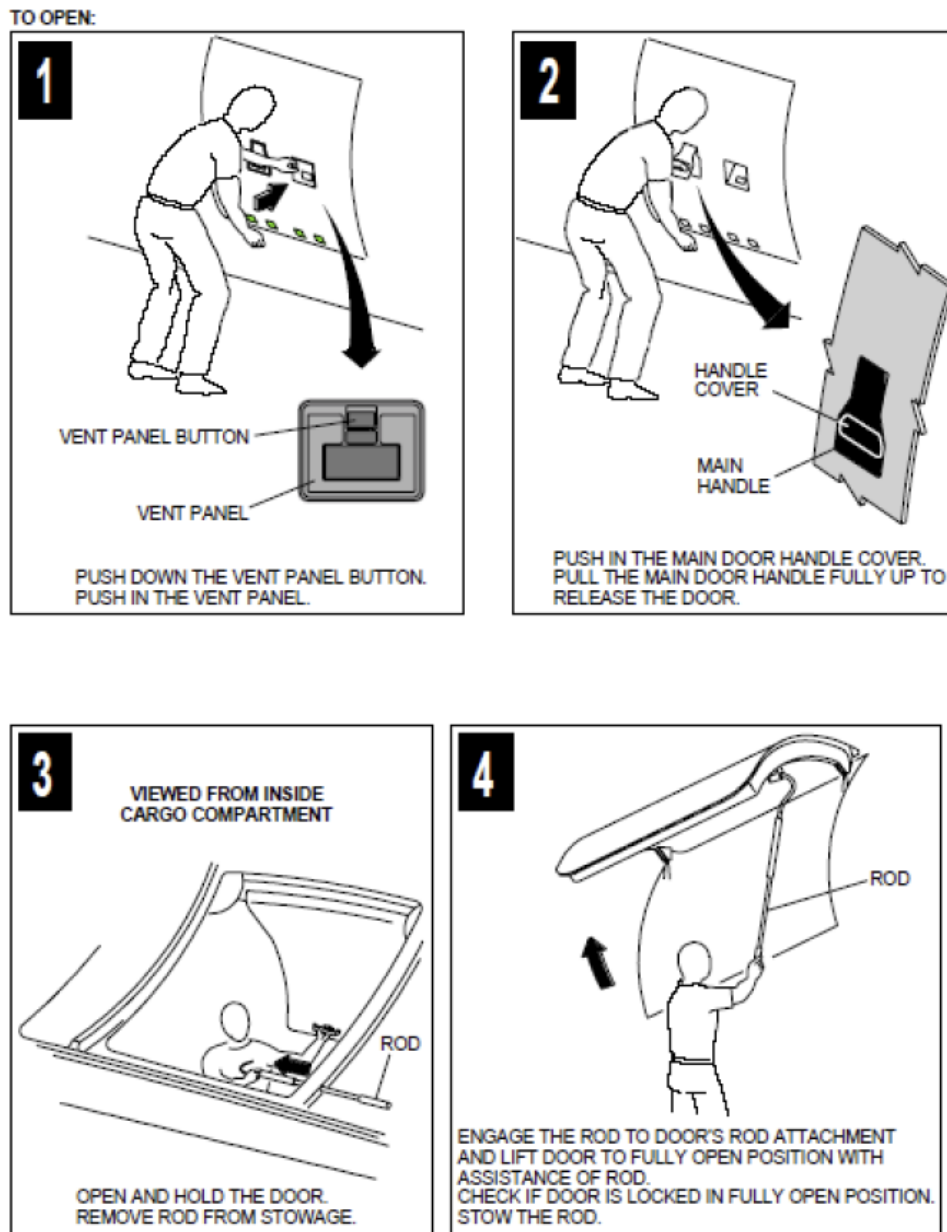


Figure 1.10 Cargo Doors Opening

Cargo Doors Closing.

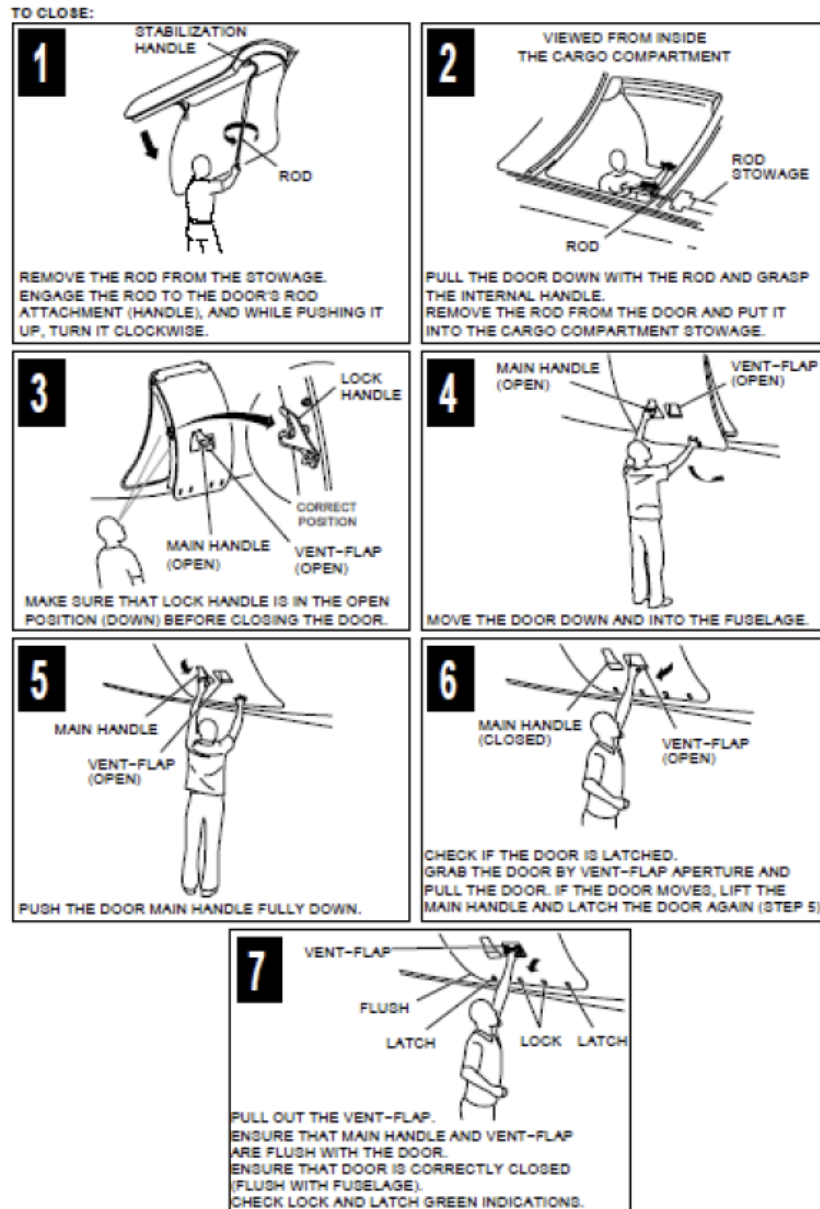
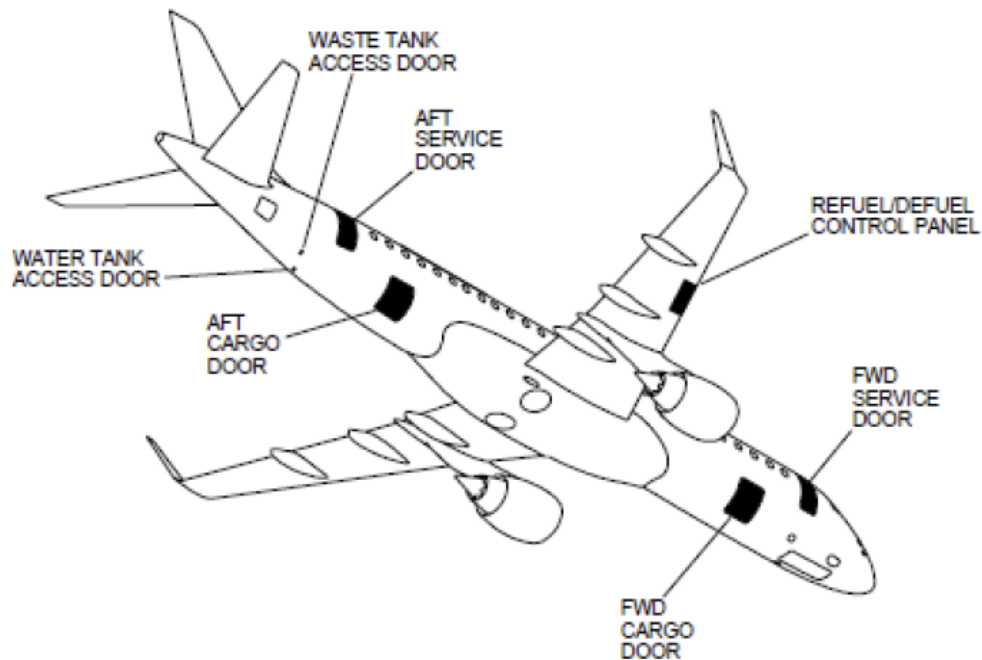


Figure 1.11 Cargo Doors Closing

**1.2.7 External Access Doors.** The following access doors for servicing the airplane systems and equipment are found along the fuselage:

- forward avionics compartment access door
- mid avionics compartment access door
- fueling/defueling compartment access door
- rear fuselage door



**Figure 1.12 Access Doors**

**1.2.8 Doors Warning System.** Door warnings are provided by proximity sensors for all doors and hatches. Proximity sensors send information to the proximity sensor evaluation modules (PSEM), to monitor the doors.

An EICAS message displays whenever an unlocked condition of any door has occurred. Additionally the MFD indicates the open door condition in a graphical representation.

**1.2.9 Flightdeck Door.** The reinforced flightdeck door is ballistic and intrusion resistant, designed in accordance with requirements issued by international airworthiness authorities. The door weighs approximately 56 lbs.

A flightdeck door control panel and a passenger cabin control panel command the door latch. The door's electro-mechanical latch installed on the flightdeck side can be remotely or manually operated.



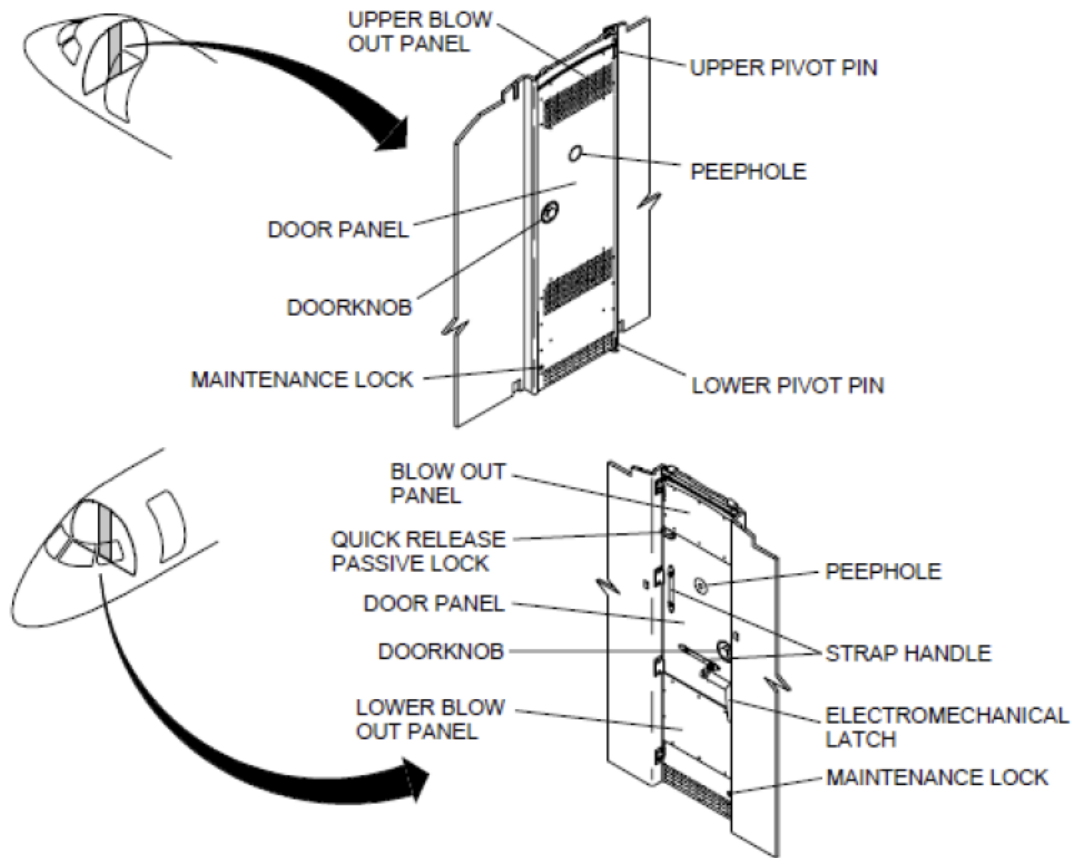


Figure 1.13 Reinforced Flightdeck Door

**Electromechanical Latch.** An electrically-actuated solenoid closes the electromechanical latch. The control panel in the flightdeck sends an electrical pulse to the electromechanical latch, which actuates a bolt and locks the door. The door is unlocked when a new electrical pulse is sent to the latch.

The door will not close if the electromechanical latch is locked while the door is opened. The latch must be unlocked to close the door.

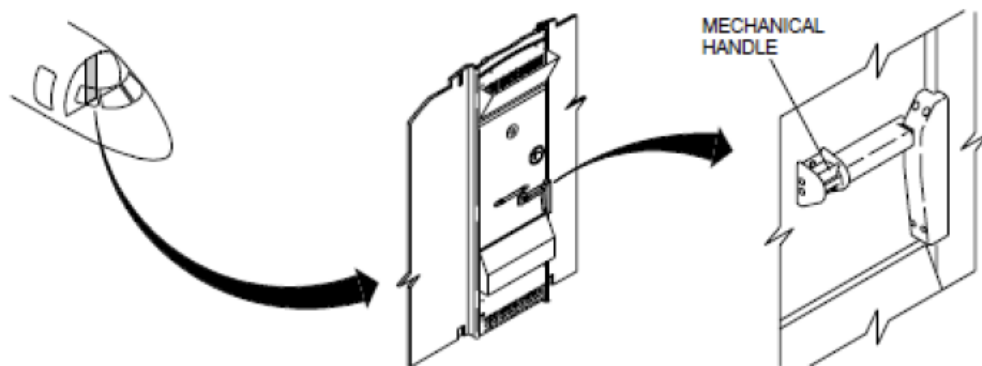


Figure 1.14 Electromechanical Latch

• Note •

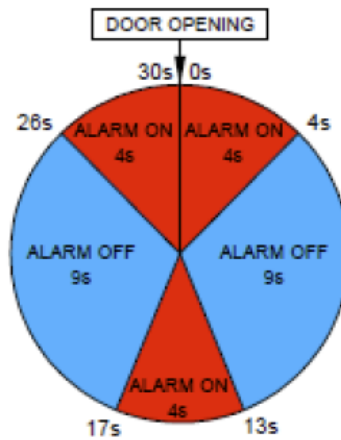
The electromechanical latch will not open if the flight crew commands the reinforced flightdeck door to UNLOCK while the door is pulled towards the cabin. It is recommended to wait for the latch to be unlocked before pulling the door open. The sound of mechanism is heard when the latch unlocks.

• Note •

A pre-flight test should be performed daily to check the System Logic.

**System Logic.**

**Emergency Entry.** Actuating the EMERG ENTRY push button starts the chime alarm sequence. The ding-dong sound chime remains on for 4 seconds and is repeated three times at 9-second intervals during which the sound chime remains paused. After the third chime cycle ends, the door will open if the INHIB push button is not pressed within 30 seconds after EMERG ENTRY push button actuation.



**Figure 1.15 System Logic**

In case of failure of the inhibit function, the inhibit knob may be rotated to lock the override switch and prevent the door from opening 30 seconds after the beginning of the system's logic.

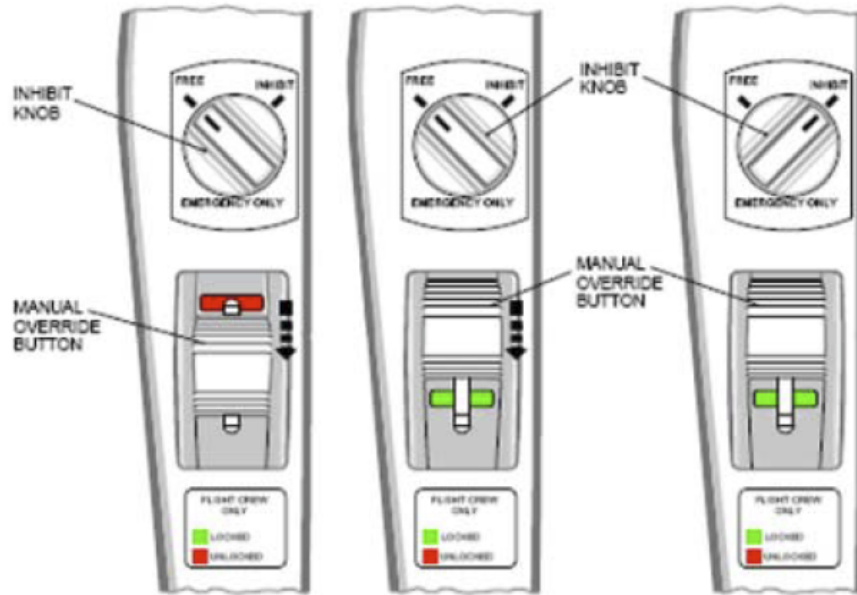


Figure 1.16 Inhibit Knob

**Manual Override.** The latch locking system can be overridden by actuating either a mechanical handle installed on the door or an override switch installed on the electromechanical latch.

The door lock bolt retracts by turning down the mechanical handle. It opens the door and allows an emergency egress. A red mark on the handle indicates that the door is unlocked.

Turning the handle upwards will set the bolt to the LOCKED position.

• Note •

Manual latch operation should only be used in the event of a system electrical failure.

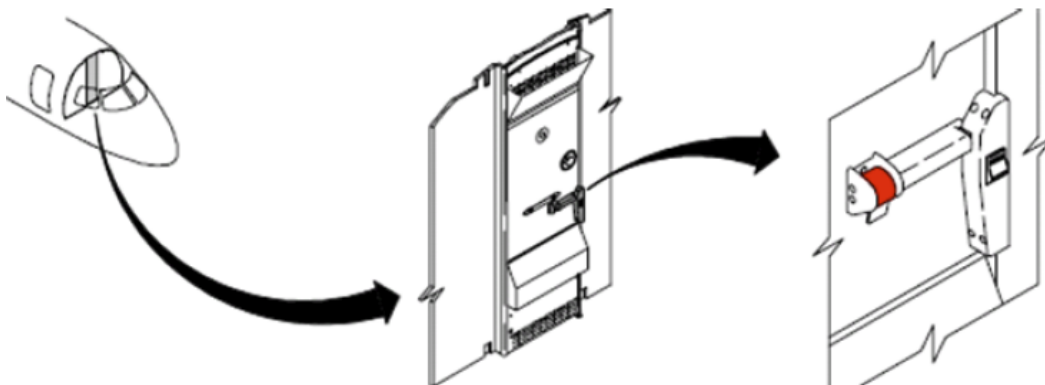


Figure 1.17 Manual Override

The override switch installed in the electromechanical latch manually unlocks the door. Actuating the override switch downwards cause the electromechanical lock to alternate between locked and unlocked status. If the door is unlocked, a red indication is shown on the switch. The door is locked when a green indication is shown.

## Doors System Description

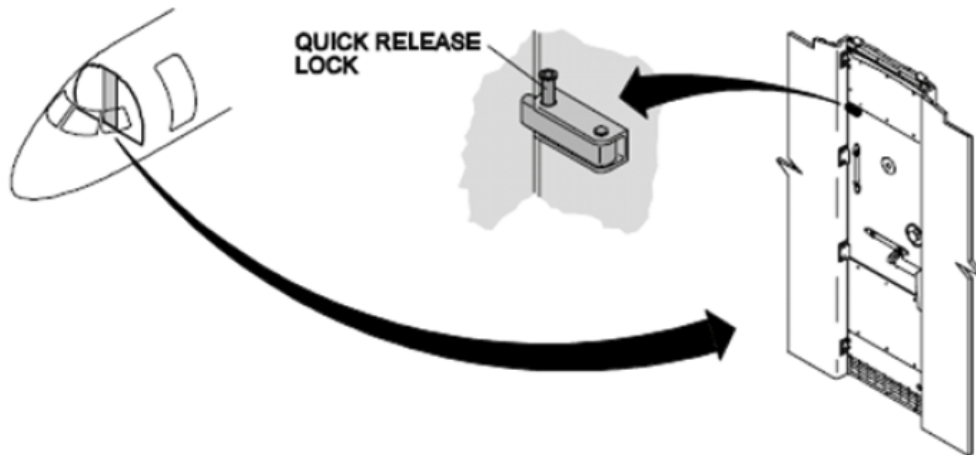
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**Auxiliary Locks.**

**Passive Lock.** A passive lock installed on the flightdeck door does not permit the door to be pushed towards the passenger cabin when the door is closed and locked. The normal position of the quick release pin is LOCKED. The passive lock is unlocked when the pin is removed.

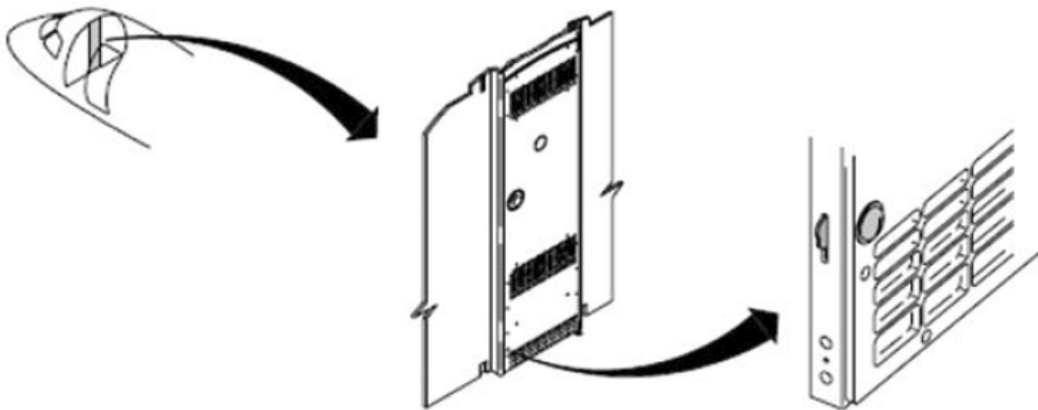
## • Note •

The passive lock must be unlocked only when an emergency egress of the flightdeck is required.



**Figure 1.18 Passive Lock**

**Maintenance Lock.** A maintenance lock blocks the door during the airplane's overnight parking. A key is necessary to lock and unlock it. The keyhole is located on the passenger cabin side of the door.



**Figure 1.19 Maintenance Lock**

**Blowout Panels.** The reinforced flightdeck door assembly has two blowout panels to equalize sudden decompression. When a sudden decompression occurs, the blowout bags automatically unfold and deploy forward. The blowout bags are installed within grill-protected openings that maintain the door's full ballistic and impact characteristics even when deployed. Both blowout bags can deploy with the observer seat in use without any hazard to the observer.

Doors System Description

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A door grill opening equalizes the pressure in the event of decompression in the passenger cabin area.

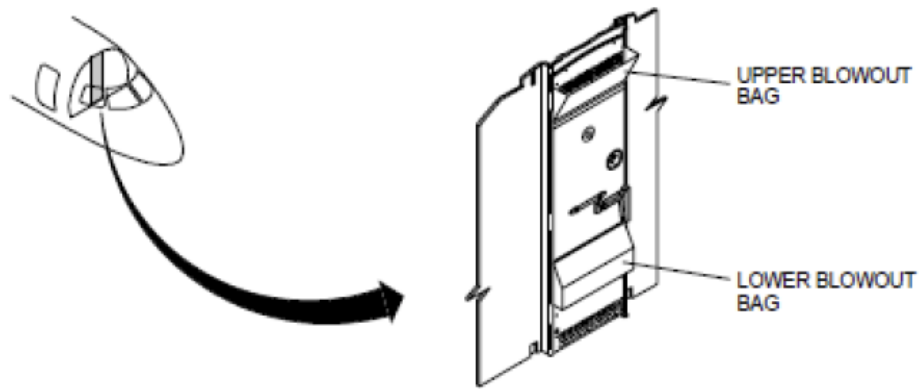


Figure 1.20 Blowout Panels

**Peephole.** The reinforced flightdeck door is equipped with a ballistic-resistant peephole. The peephole field of view minimizes any hiding threat.

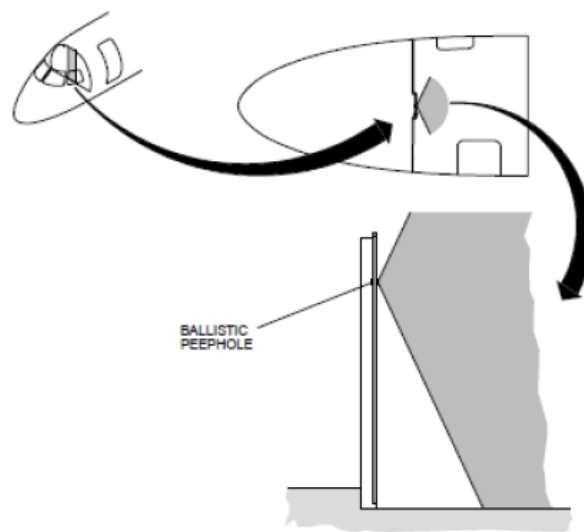


Figure 1.21 Peephole

### 1.3 Flightdeck General Arrangement

**1.3.1 General.** The flightdeck consists of a glass flightdeck panel with highly integrated onboard avionics. The Embraer 190 flightdeck is designed to:

- provide the necessary means to accomplish the required tasks
- provide acceptable and reasonable workloads
- minimize pilot errors and its consequences
- facilitate training and commonality among the Embraer 190 family airplane
- provide optimized ergonomics aimed at safety, ease of operation, control and comfort requirements

**Airplane Systems.** System failures are primarily monitored via EICAS message. The CCD and synoptics are included as an aid to pilot monitoring systems status.

The airplane systems provide protection for crew errors. These protections do not allow the airplane's limits and approved operational envelope to be exceeded. Therefore, an improper action does not lead to flight safety risk.

Critical systems give total authority to the pilot by employing intuitive procedures for maximum airplane performance with minimum workload. Efficient flightdeck design provides for increased control of situations and systems. Automation is used only to improve the task accomplishment, complementing but not substituting the crew.

**Dark and Quiet Flightdeck.** The concept used to design and operate the airplane was based on the assumption that while in flight, all systems are normal when:

- overhead, main, glareshield and control pedestal panels have no lights on
- no aural warnings are being issued
- the selector knobs are positioned at twelve o'clock

An illuminated white striped bar in any button, indicates that it is not in its normal position.

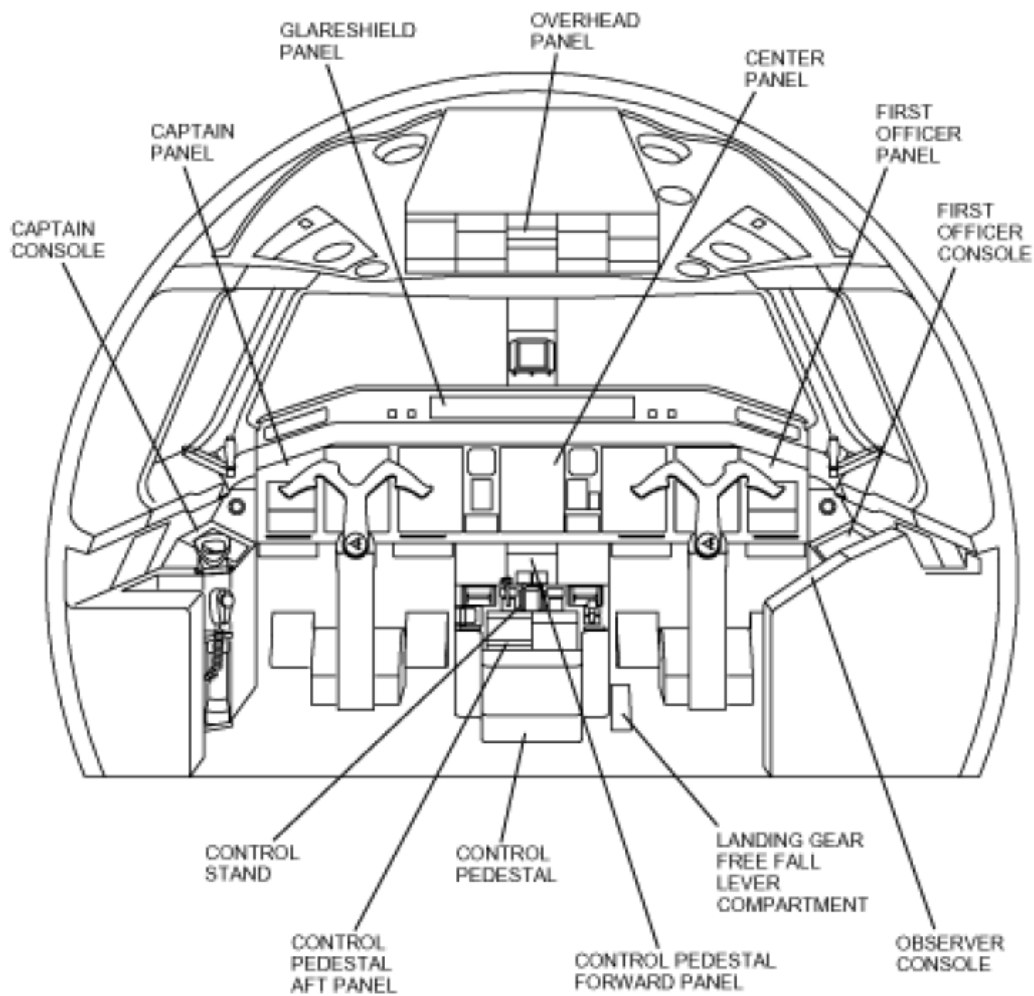


Figure 1.22 Flightdeck Arrangement (Typical)

1.3.2 Panel Layouts. Main/Glareshield/Control and Pedestal Panels. .

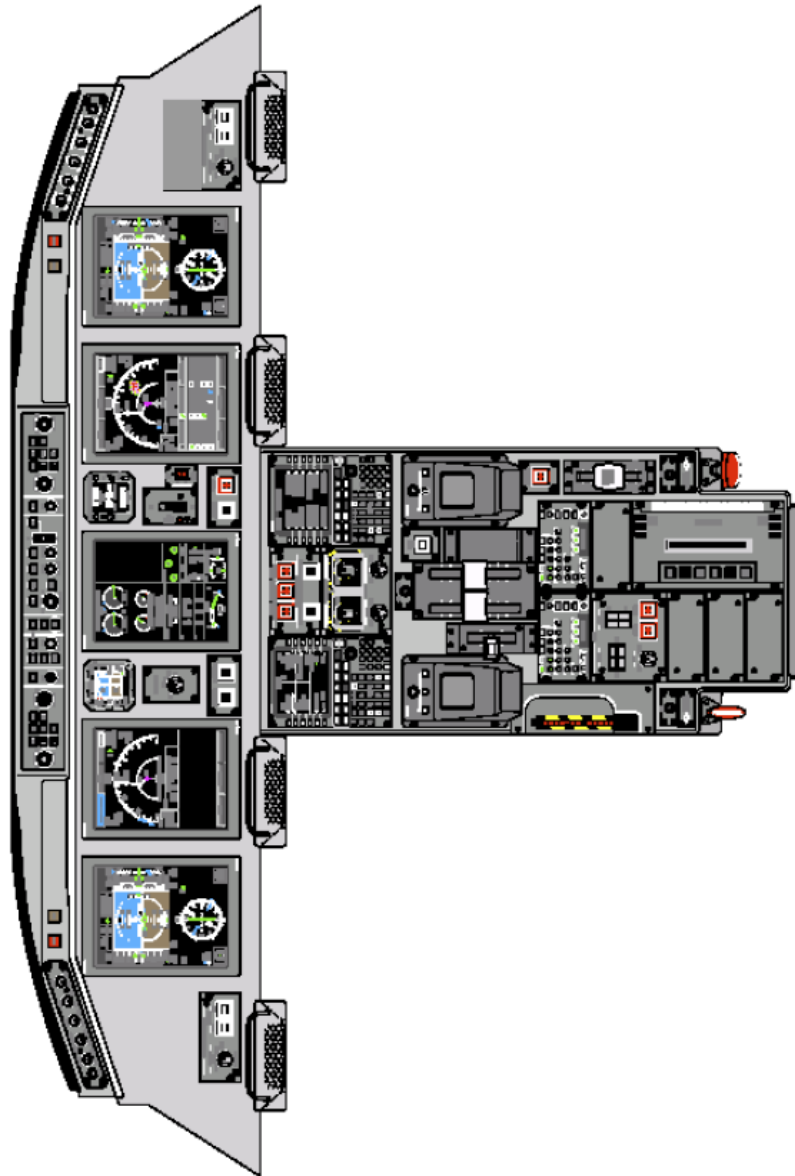
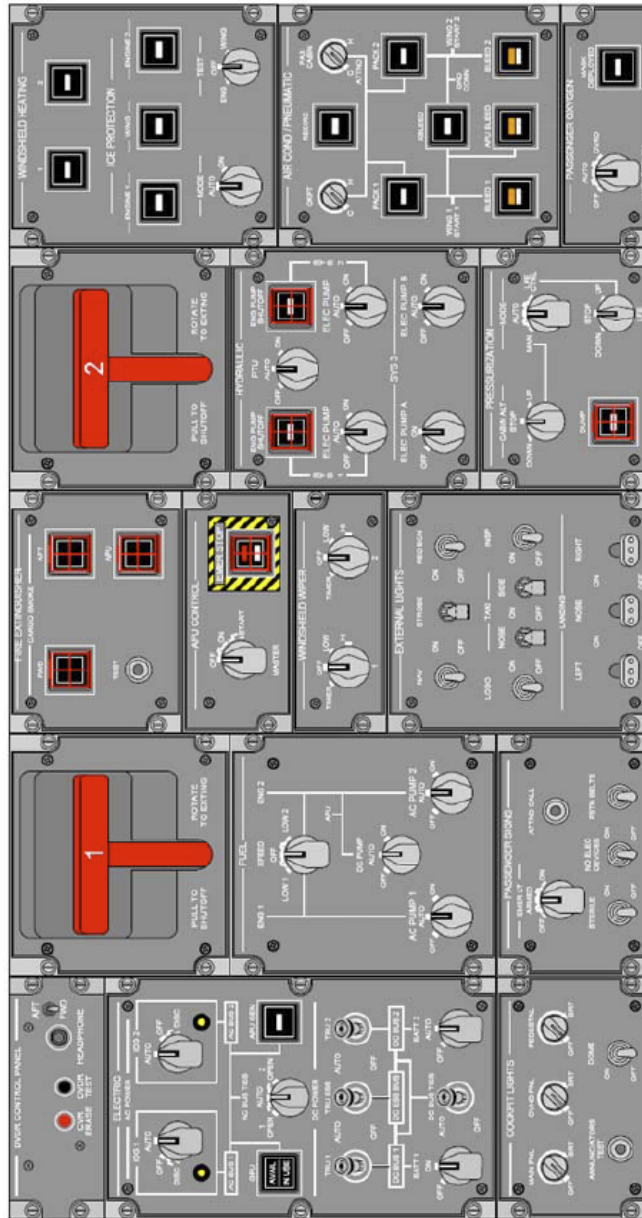


Figure 1.23 Main/Glareshield/Control Pedestal Panels (*Typical*)

Overhead Panel.



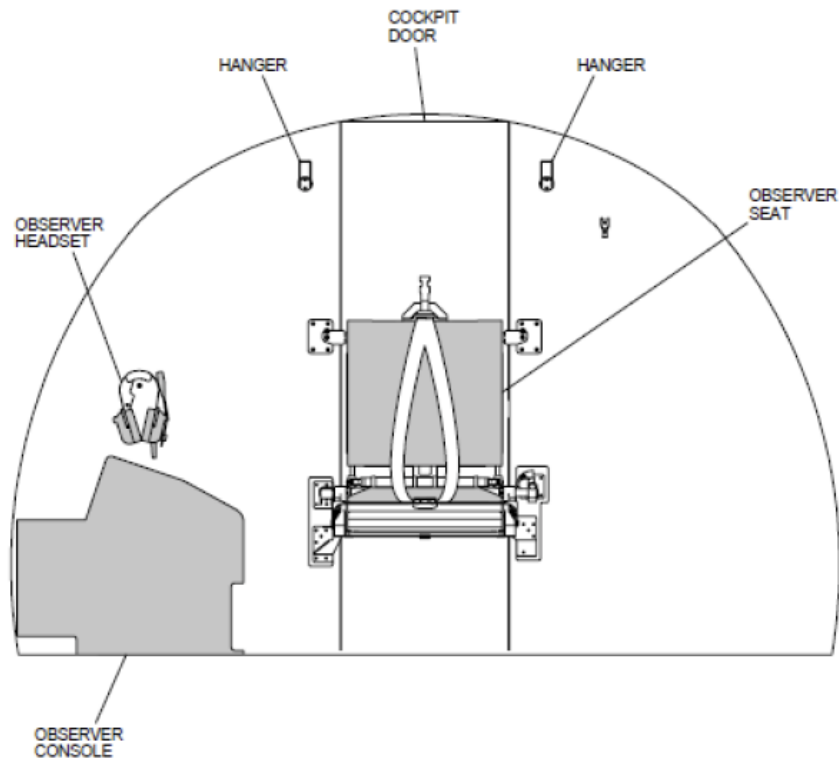


**Figure 1.24 Overhead Panel (Typical)**

Both pilots can access all the information and controls for safe aircraft operation. Control of the airplane’s systems is accomplished via the overhead panel.

Some knobs on the overhead panel have detent protection and must be pulled out to allow the knob rotation. This provides for protection against inadvertent knob rotation, and is indicated with a detent mark between knob positions. Knob stationary positions are marked with a white rectangle, and knob momentary positions are marked with a white triangle. For activation of momentary selector knobs, hold the knob in position for at least two seconds prior to release.

**1.3.3 Flightdeck Partition.**



**Figure 1.25 Flightdeck Partition (Typical)**

**1.3.4 Seats.** Pilot seats are fixed to slide rails that permit fore and aft adjustments. When the seats are in their aft most position, a lateral movement is also available in order to ease crew access to the seat.

Manual adjustments of the pilot seats are possible for vertical, lateral, and fore and aft movement. A crank handle is located under the seat and provides a manual backup for the electric vertical height adjustment. The crank handle is attached to the socket at the aft lower portion of the seat.

A manual control handle provides lateral control of fore and aft movement along the slide rails.

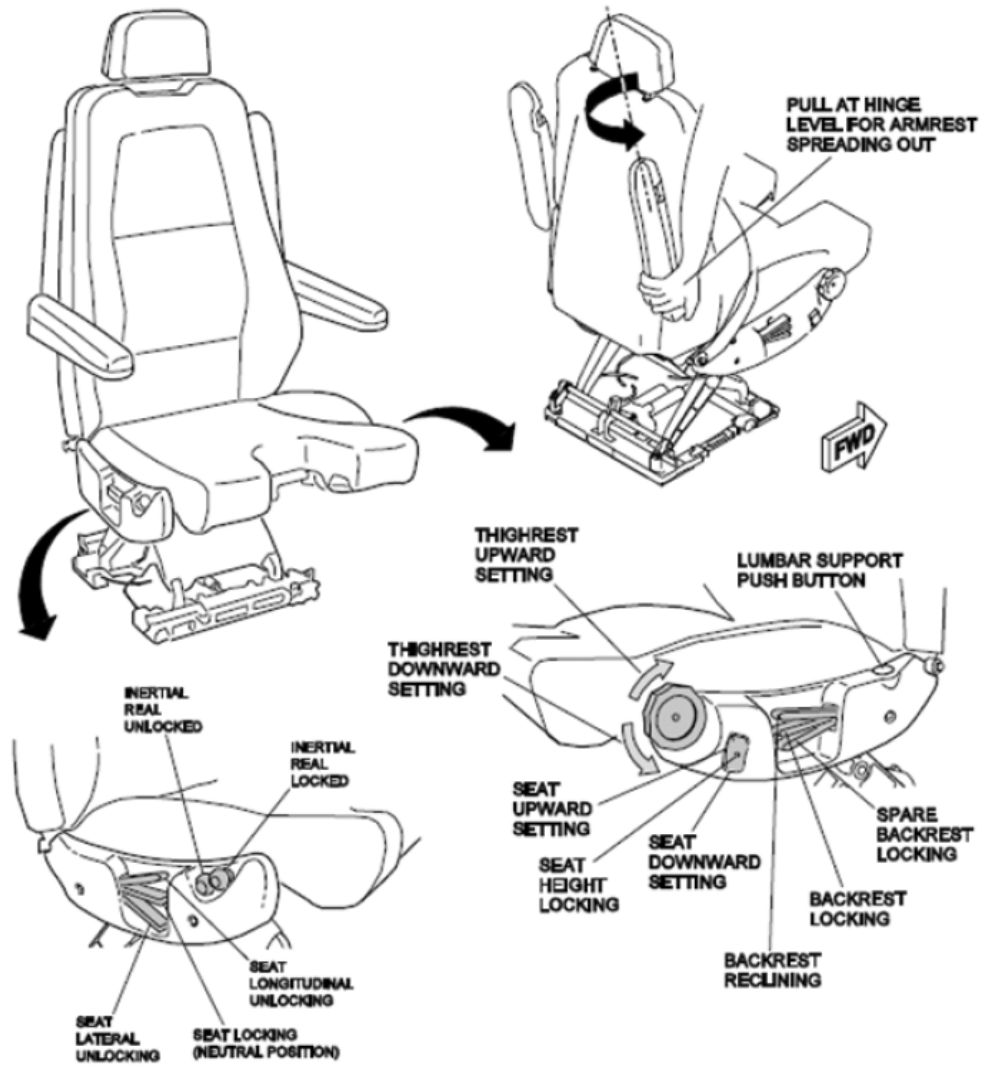


Figure 1.26 Pilot Seats

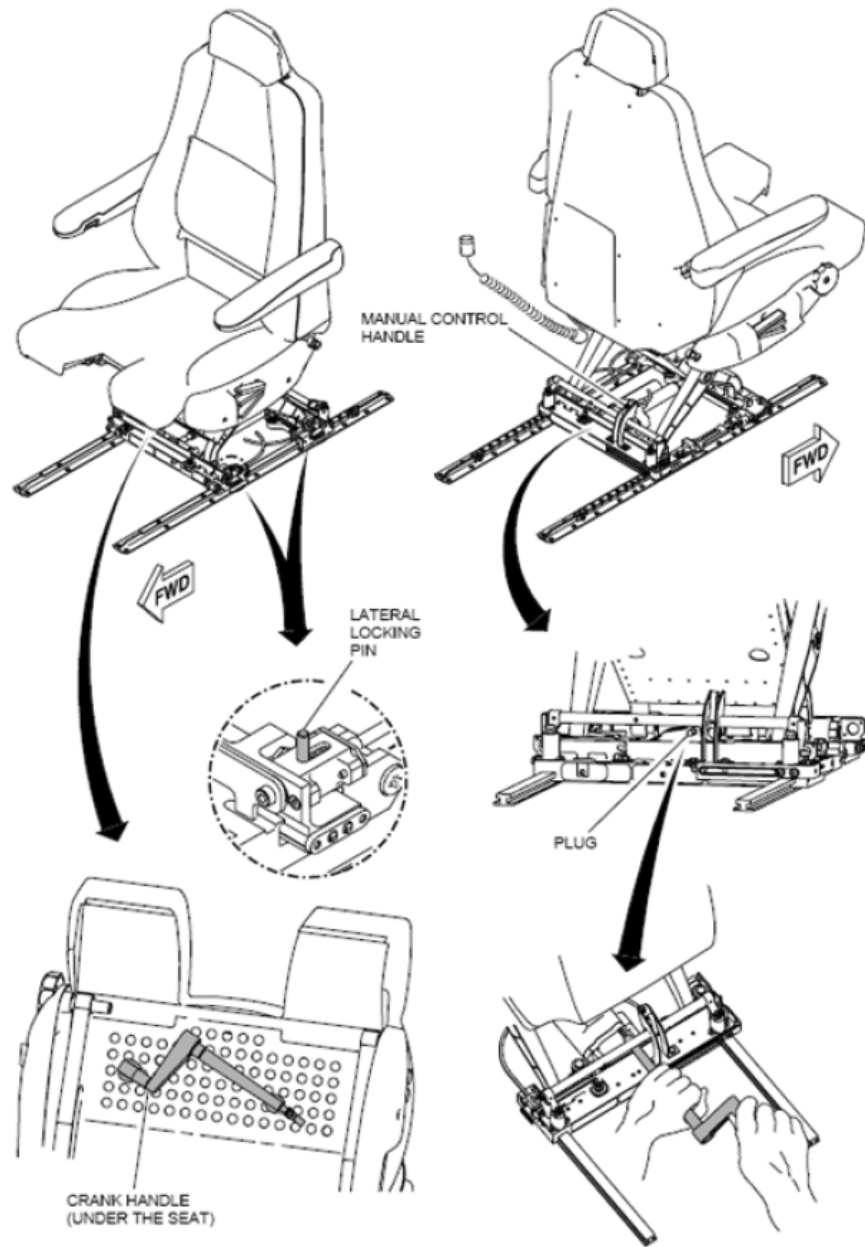


Figure 1.27 Pilot Seat Manual Adjustments

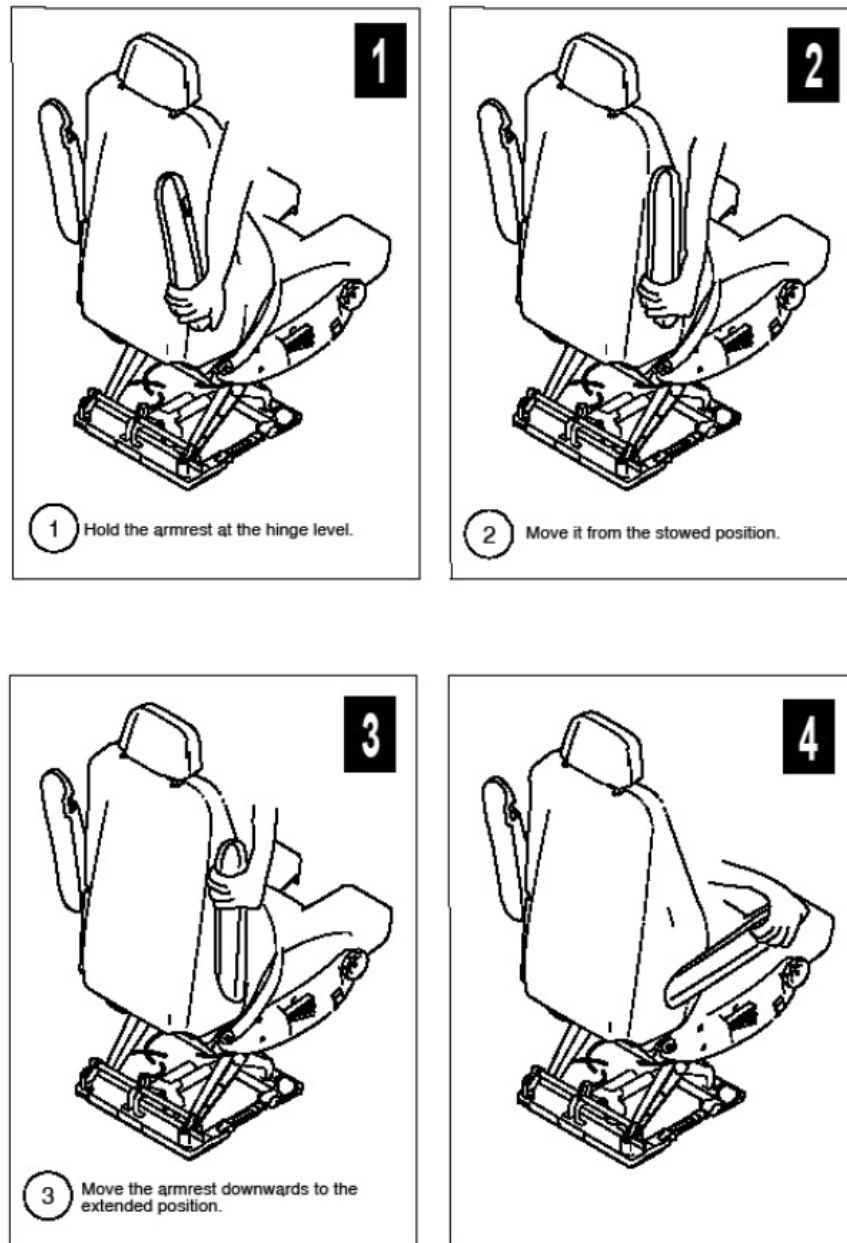
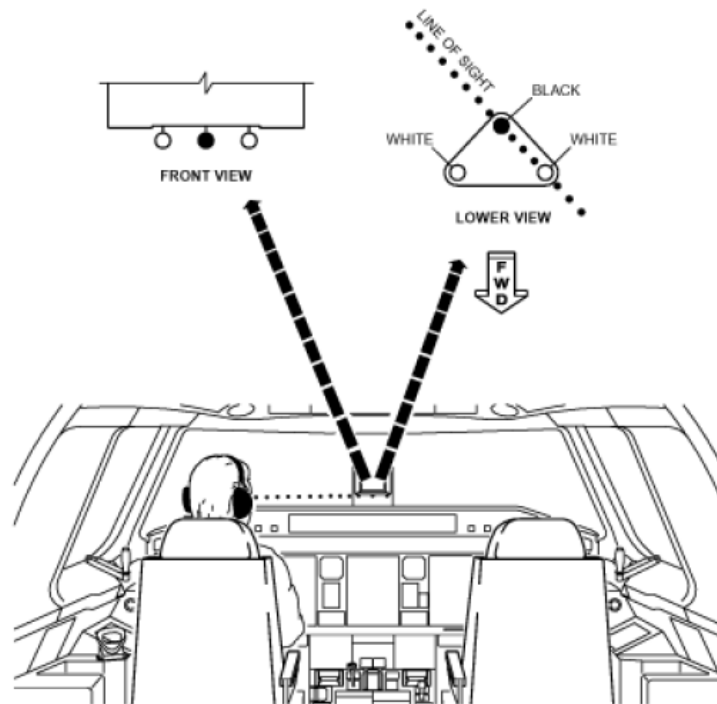


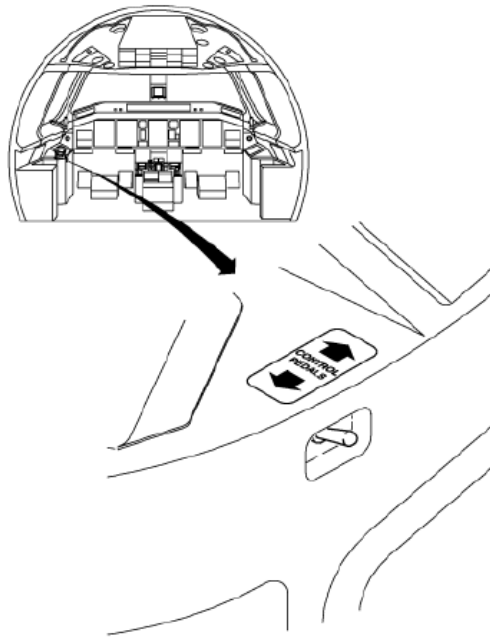
Figure 1.28 Flightdeck Seat Armrest Operation



**Figure 1.29 Adjusting the Pilot Seats**

**Pilot Seat Adjustment.** Move the seat up or down until the pilot's line of sight reaches the same horizontal plane as the sight device made up of two(2) white spheres and a black sphere. Then, move the seat fore or aft until the opposite white sphere is aligned with the black one. Manual adjustment of the height, lateral, and fore and aft movement of the pilot seat is available through a crank handle located under the seat.

**1.3.5 Rudder Pedals.** Spring loaded switches and electric actuators installed on the captain's and first officer's side panels allow rudder pedal adjustment fore or aft, to assure pilot comfort and full rudder throw.



**Figure 1.30 Adjusting the Rudder Pedal**

**1.3.6 Observer Seat.** The observer seat is located behind and between captain's and first officer's seats. When in use, it lies in front of the flightdeck door. Stow the seat by folding and rotating it away from door area, and securing it against the left side of the flightdeck partition. The flightdeck door can be opened or closed with the observer seat either in use or stowed.

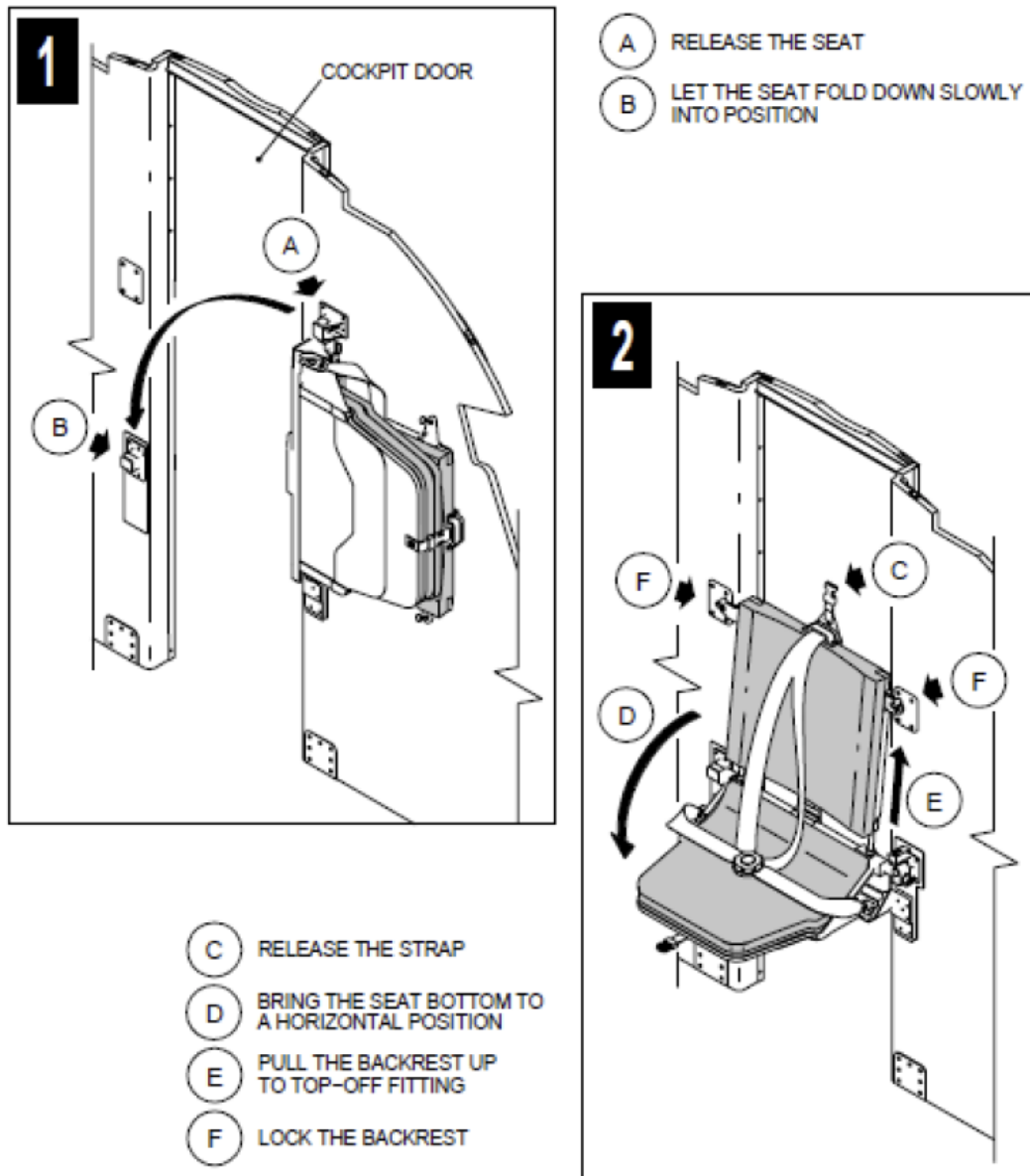
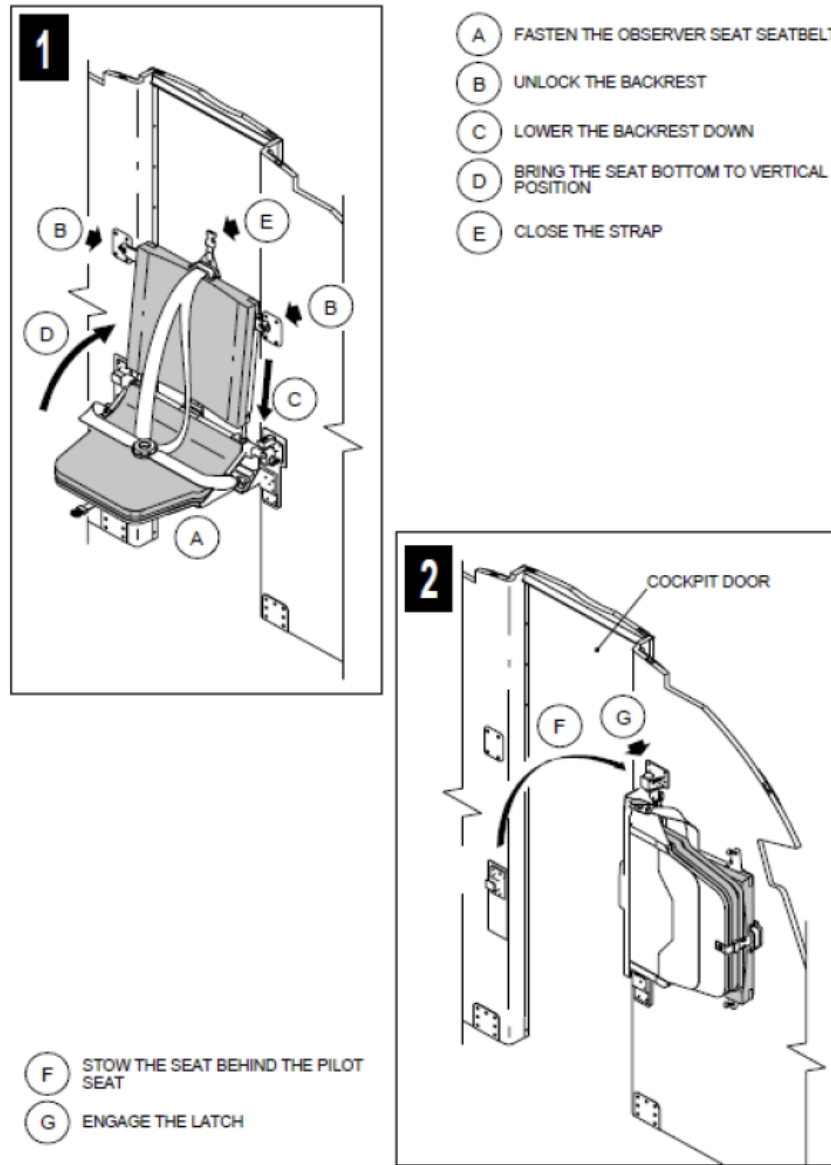


Figure 1.31 Observer Seat (Typical)





**Figure 1.32 Observer Seat Fold Procedure**

**1.3.7 Flightdeck PC Power System.** The personal computer (PC) power system is designed to supply two outlets installed in the flightdeck, and/or two outlets installed in the forward and mid electronic compartments with 110 VAC/60 Hz. The PC power outlets are used by the flight crew or maintenance personnel to connect laptop computers or other PED (portable electronic devices). Each PC power outlet unit is connected to an AC converter supplied by the AC BUS 2. The PC power control switch is installed above the right hand side PC power outlet and a striped bar illuminates when the AC power is available (pushed in). PC outlets located in the electrical compartments are for ground use only; flightdeck PC outlets may be used on the ground or in flight.

• Note •

The use of flightdeck PC power outlets in flight is restricted to approved equipment and procedures only.

• **Note** •

Ensure laptop batteries are well charged (above 75%) before plugging them into the outlets. Low battery levels may require power greater than the designed limit for the outlet. In this case the power to the outlet will be disabled and maintenance action required to reset the system.

**Flightdeck PC Power Outlet.** Pushing IN the PC Power Outlet Control button illuminates the striped bar and the green LED. Inserting the plug totally into the outlet makes the AC power available. The LED is turned off when the system is not energized. The outlet provides power for use only when the PED power is enabled.

The LED is shown in red when a fault is detected or an over-temperature limit is exceeded.

• **Note** •

Ensure the plug is not inserted into the outlet before powering up the airplane. If this occurs the power outlet unit will not be energized. Remove the plug from the outlet and re-insert.

**Flightdeck PC Power Protections.** The system provides protection against under-voltage, over-voltage, over-current, short circuit and over temperature. The PC power system controls the power available to the AC outlet units and monitors the total electrical current in use and, if necessary, disables or enables the power outlets. The system is turned off automatically in case of cabin decompression. Pressing the PC power control switch resets the system.

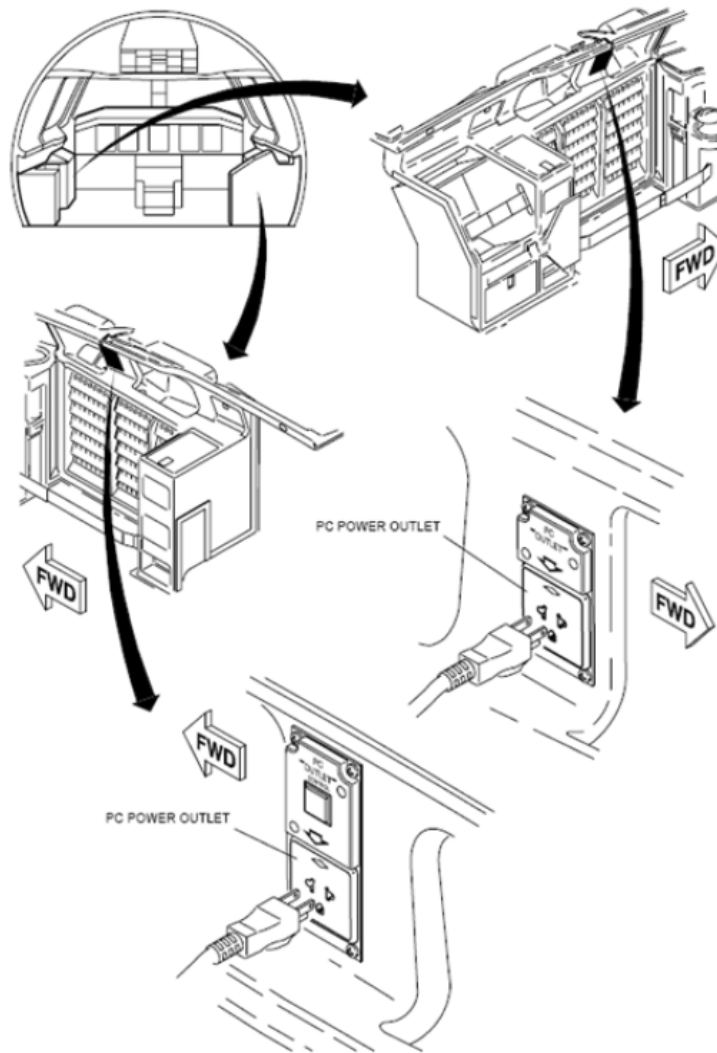


Figure 1.33 PC Power Outlets

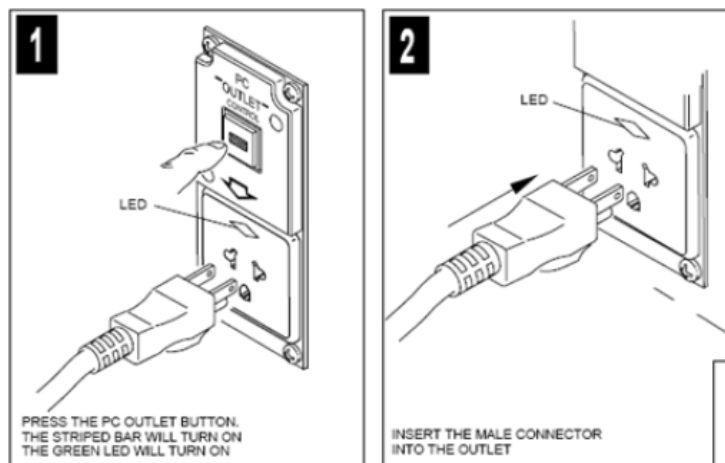


Figure 1.34 Energizing the PC Power Outlets

**1.3.8 Flightdeck Window.** The flightdeck window may be opened on the ground, in case of loss of visibility through the windshield or for flightdeck emergency evacuation. A pin protrudes near the opening handle when the window is not properly locked in the closed position.

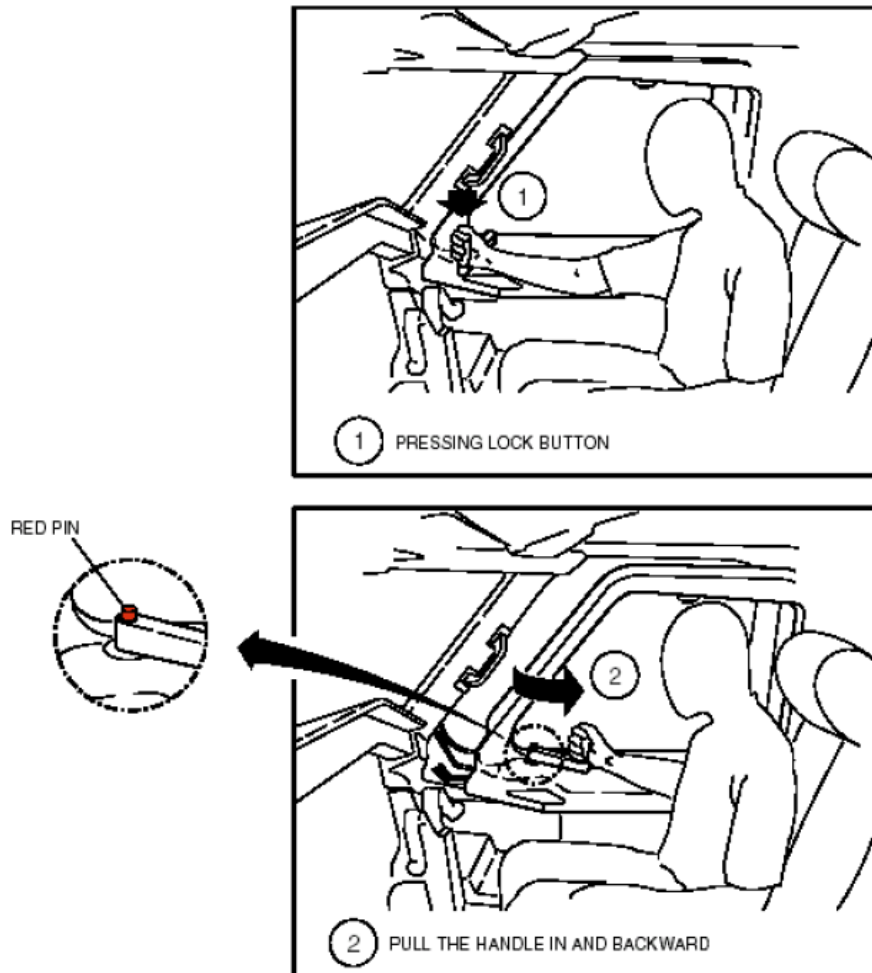


Figure 1.35 Normal Opening

**Not Locked.** A red pin protrudes near the opening handle when the window is not properly locked in the closed position.

**1.3.9 Ramp Horn.** The ramp horn buttons installed on the captain's and first officer's consoles allow the cockpit crew to call the ground personnel attention. While the button is pressed, a continuous horn sounds.

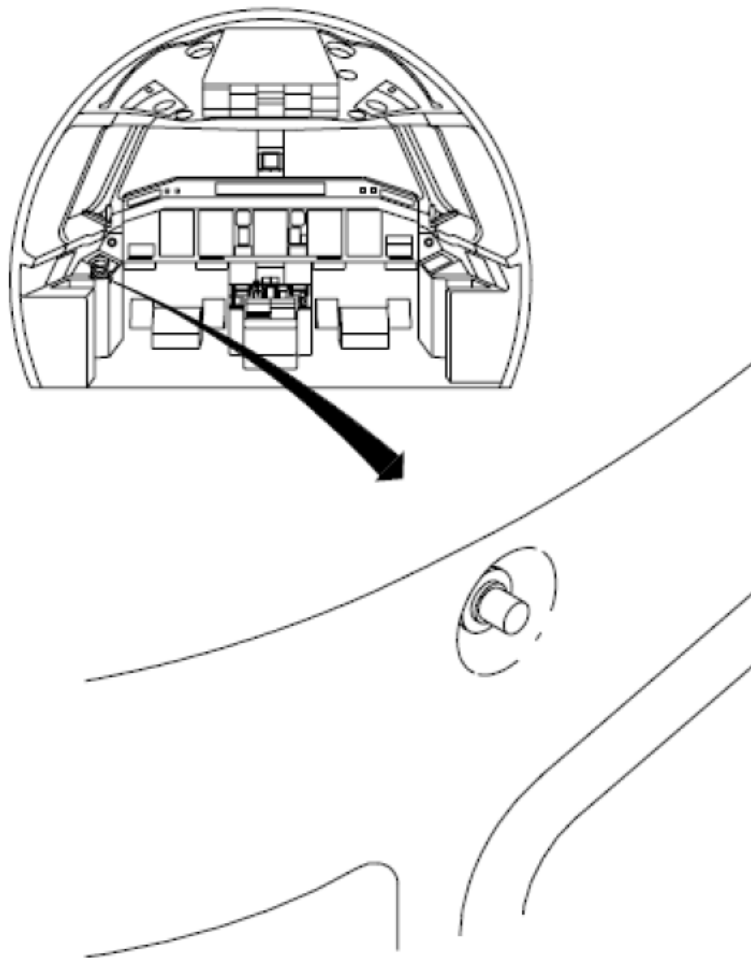


Figure 1.36 Ramp Horn Button

1.4 Interior Dimensions

1.4.1 Passenger Cabin. The aircraft is configured with two classes. 11 first class seats in a 2 on 1 configuration, and 88 coach seats with a 2 on 2 configuration. Convenient accommodation is provided for the flight crew along with a front and rear galley and lavatory.

Coach Cabin.

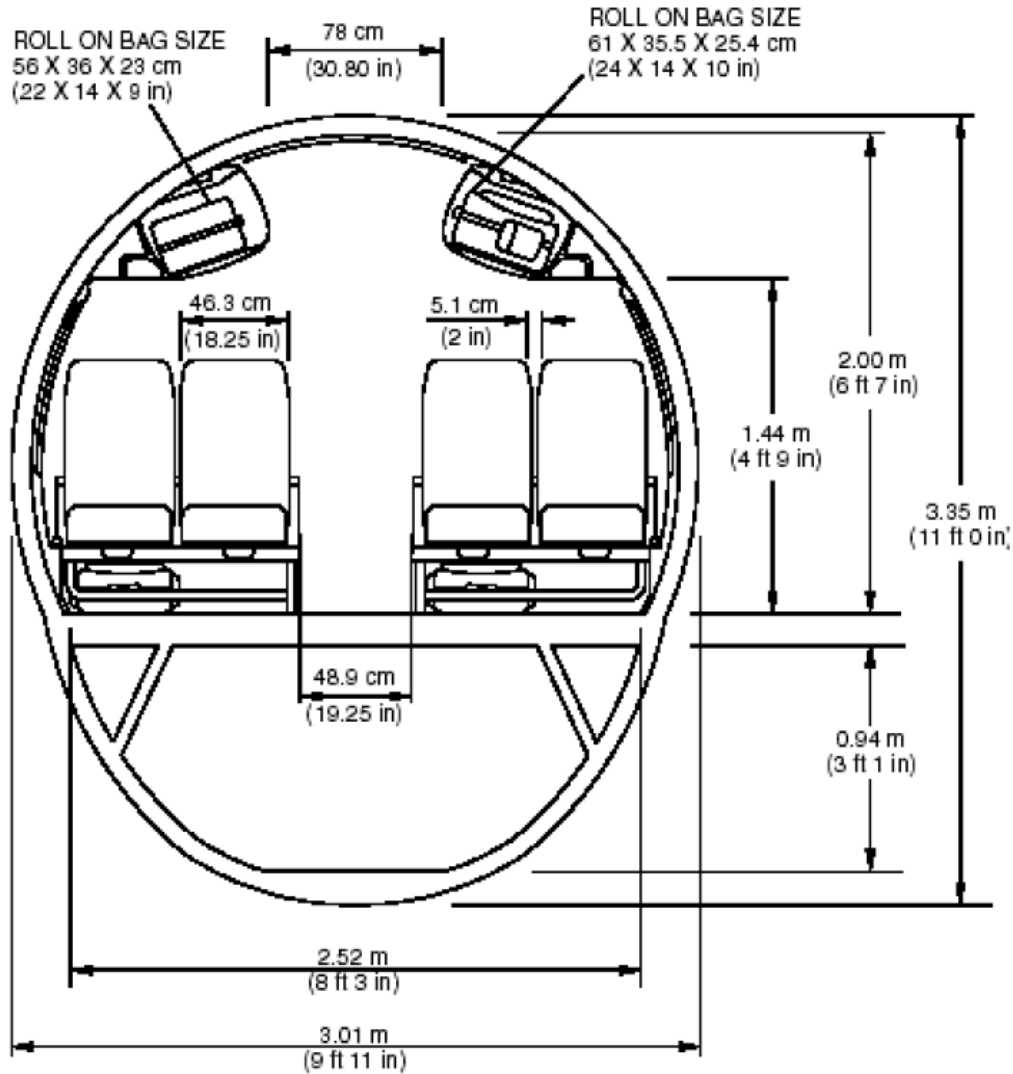
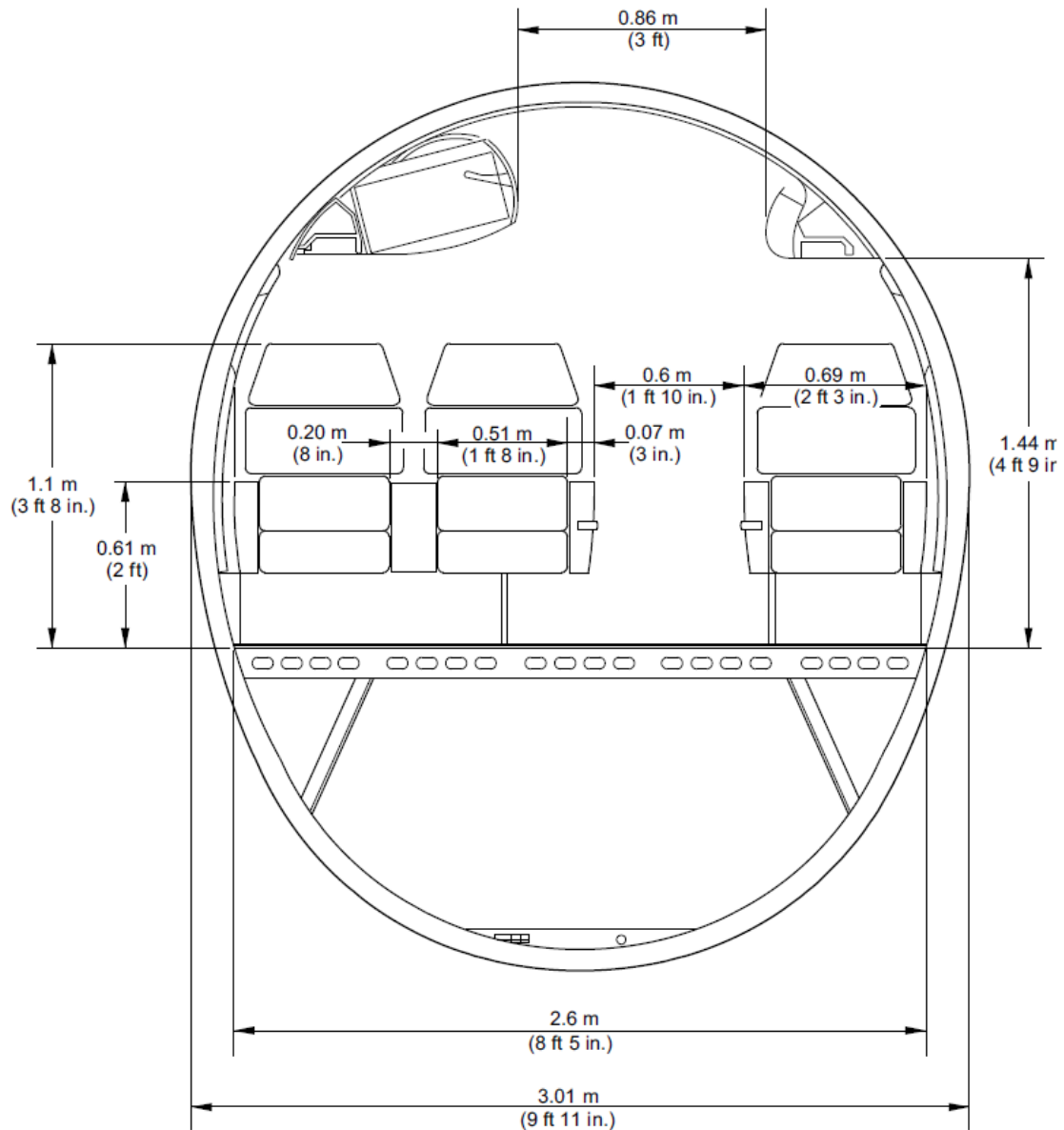


Figure 1.37 Coach Cabin Cross Section Dimensions

First Class.



**Figure 1.38 First Class Cross Section Dimensions**

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**Lights System Description**

14AUG20

**1.5 Lights System Description**

**1.5.1 General.** The lighting system provides lighting to all essential areas of the aircraft.

The lighting system consists of:

- external lights
- flightdeck lights
- passenger cabin lights
- emergency lighting
- baggage and service compartment lighting

**1.5.2 External Lighting.** External lighting consists of:

- landing and taxi lights
- navigation and anti-collision lights
- wing inspection, tail logo lights, and overwing emergency exit lights

**Landing and Taxi Lights.** Landing and taxi lights are fitted to each wing root behind glazed covers. A third landing light and a third taxi light are mounted on the nose gear structure.

The landing light units provide adequate lighting during final approach and landing flare, as well as for the takeoff. The taxi light provides sufficient intensity and beam spread to aid pilots during all taxi operation phases, covering the runway and adjacent areas.

Different switches for nose and wing root landing and taxi lights are located on the overhead panel.

**Navigation and Anti Collision Lights.** There is a red and green navigation light on the left and right wing respectively, and a white navigation light on both wing tips. A switch located on the overhead panel controls the lights.

Two white strobe (anti-collision) lights are fitted to each wing tip and two red beacon lights are mounted on the upper and lower fuselage in order to provide illumination for visual recognition and collision avoidance during all flight/taxi operations. Two different switches, one for the strobe lights and the other for the red beacon lights are located on the overhead panel.

Each navigation light assembly contains two bulbs, while the strobe light assembly contains only one. Only one navigation light bulb is in use at a time, while the second is on standby. A maintenance panel in the flightdeck allows maintenance personnel to manually switch the navigation bulbs in the case of a failure.

**Wing Inspection, Tail Logo, and Overwing Emergency Exit Lights.** Wing lights provide proper illumination of the engine intake and the wing leading edges for inspection of ice formation. A switch located on the overhead panel controls the engine and wing illumination system.

The tail logo lights are installed in the upper surface of both horizontal stabilizers and are directed towards the vertical fin perpendicular to the centerline of the airplane to provide adequate illumination of the airplane's logo during operation on the ground and in flight.

A switch located on the overhead panel controls the logo lights.

The overwing emergency exit lights are composed of three lights on each side which illuminate the emergency exit route, and are located near the overwing emergency exits.

The EMER LT knob at the overhead panel controls the overwing emergency lights.



## Lights System Description

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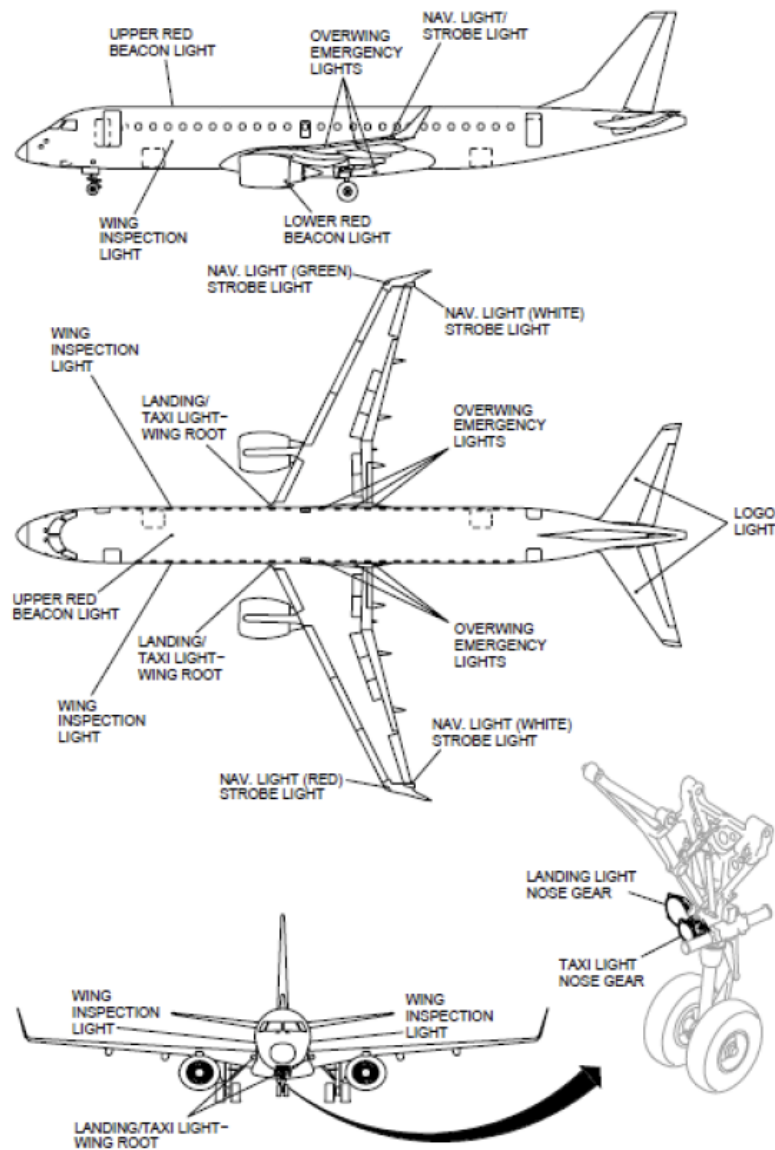


Figure 1.39 External Lighting

**1.5.3 Flightdeck Lights.** The system provides lighting for instruments, control panels and buttons.

Flightdeck lighting consists of:

- chart lights
- dome lights
- fluorescent flood/storm lights
- reading lights

**Chart Lights.** Provides variable intensity lights to illuminate chart holders located at the flightdeck side windows.

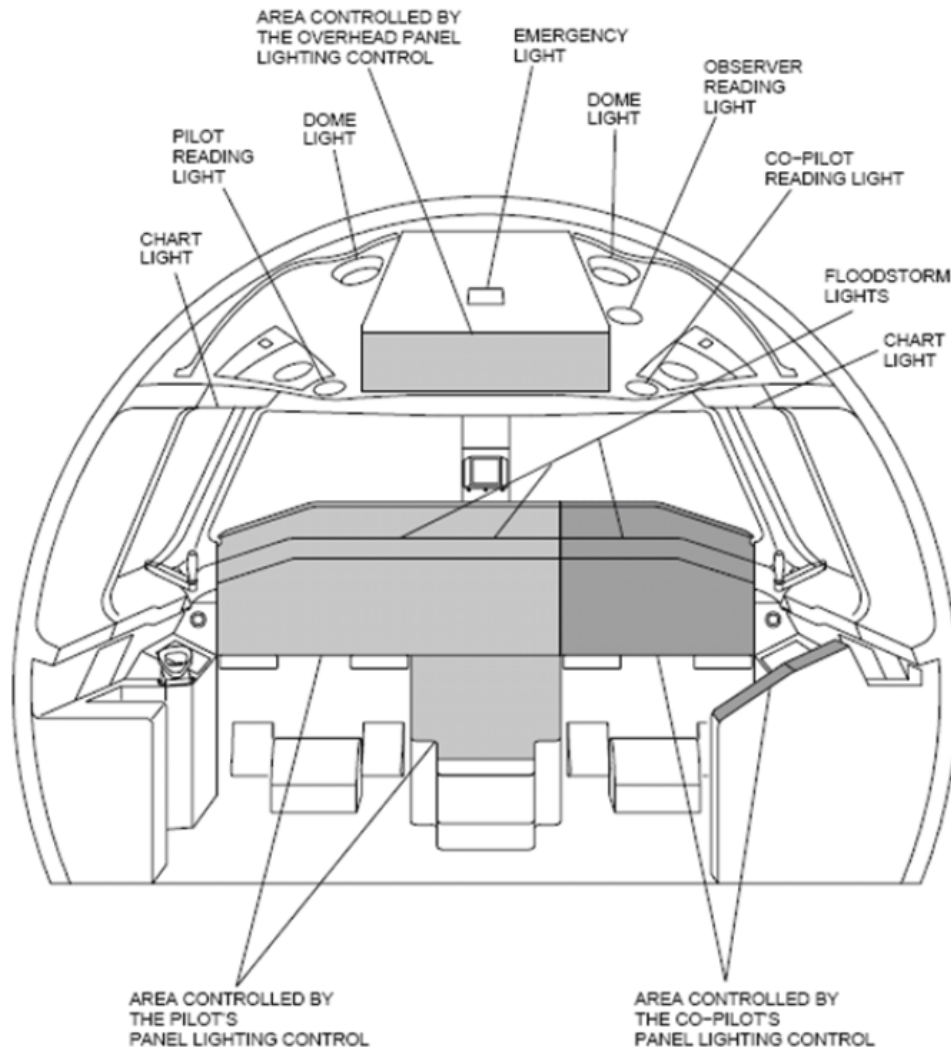
**Dome Lights.** Provides fixed intensity flightdeck illumination above captain and first officer's seats.

## Lights System Description

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**Fluorescent Flood/Storm Light.** Provides high quality illumination to ensure panel readability under high intensity ambient lighting.

**Reading Lights.** Provides variable intensity illumination to help the pilots read maps, checklists and manuals.



**Figure 1.40 Flightdeck Lighting**

**1.5.4 Passenger Cabin Lights.** Passenger cabin lighting, reading lights in the passenger service units, lavatory lights, galley lights, and cabin signs make up the passenger cabin lighting.

**Passenger Cabin Signs.** Passenger cabin signs provide passengers and flight attendants with the signs:

- TURN OFF ELECTRONIC DEVICES
- FASTEN SEAT BELTS
- RETURN TO SEAT
- LAVATORY OCCUPIED

## Lights System Description

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The signs are available on every passenger service unit (PSU). An aural signal sounds whenever any passenger sign is turned on or off by the crew. TURN OFF ELECTRONIC DEVICES and FASTEN SEAT BELTS signs are also illuminated when the oxygen masks drop.

**Sterile Lights.** Amber sterile lights located in the passenger cabin rainbow light indicate that sterile flightdeck operations are in progress.

**Courtesy and Stairs Lights.** Courtesy and stairs lights provide lighting for safe boarding of crewmembers and passengers. Courtesy and stair lights consist of the main door light (entry area), service door light (galley area), stairway lights, and a flightdeck step light.

**Service Compartment Lights.** Service compartment lights provide lighting in the service compartments. Service lights are installed in the refueling panel, mid and forward electronic bays, APU, tail cone and rear hydraulic compartment.

The lights are controlled by door micro-switches or dedicated standard switches installed in each compartment, which turn on the associated light when the access door is open.

**Attendant Lights (Rainbow Lights).** The attendant lights located on the forward and aft main ceiling panel areas provide a visual indication to attendants when there is a call from the flight crew or passengers. These lights are also called “rainbow lights”.

The rainbow lights consist of following colored indicator lights:

- **ORANGE:** a steady orange light illuminates when a passenger calls from the lavatory; a flashing orange light illuminates when smoke is detected in the lavatory
- **BLUE:** a steady blue light illuminates when a passenger calls from the main cabin area
- **RED:** a flashing red indicator illuminates when the flight crew makes an emergency call to the flight attendant from the flightdeck. The light stops flashing after the call is taken.
- **GREEN:** a flashing green indicator illuminates when the pilot calls the flight attendant from the flightdeck. The light stops flashing when the pilot responds.
- **AMBER:** a steady amber light illuminates for a sterile light call

An audible tone is sounded over the passenger address system when a passenger presses:

- any attendant call switch located in a PSU
- the attendant call switch in the lavatory
- the flight crew call switches

There is a steady blue light on the cabin ceiling, indicating which cabin area the passenger call was made.

• **Note** •

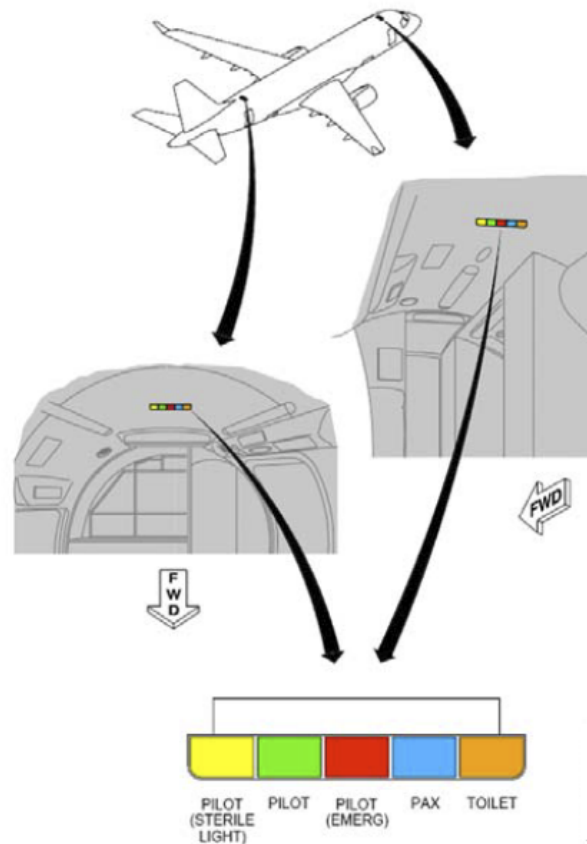
There is no indication on the rainbow lights when a flight attendant calls another flight attendant station. It only flashes green on both handset cradles.

| Call System         |                      |                          |                   |
|---------------------|----------------------|--------------------------|-------------------|
| Visual Indication   | Aural Indication     | From                     | To                |
| Steady ORANGE light | Single hi tone chime | Respective lavatory call | Attendant station |

## Lights System Description

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| Call System                                       |  |                                     |   |
|---|--|-------------------------------------|---|
| Visual Indication                                 | Aural Indication                               | From                                | To                                      |
| Flashing ORANGE light                             | Lavatory fire protection alarm                 | Respective lavatory smoke detection | Attendant station                       |
| Steady BLUE Light                                 | Single hi tone chime                           | Passenger PSU                       | Attendant station                       |
| Flashing RED Light                                | Triple hi/lo tone chime in the passenger cabin | Flightdeck                          | Attendant station                       |
|   | Triple hi/lo tone chime in the flightdeck      | Attendant Station                   | Flightdeck                              |
| Flashing GREEN light                              | Single hi/lo tone chime in the passenger cabin | Flightdeck                          | Attendant station                       |
|   | Single hi/lo tone chime in the flightdeck      | Attendant station                   | Flightdeck                              |
| Steady AMBER sterile flightdeck                   | light Single hi tone chime                     | Flightdeck                          | Attendant station                       |
| No PED or FASTEN BELT signs illuminate/extinguish | Single lo tone chime                           | Flightdeck                          | Passenger cabin, lavatories and galleys |



**Figure 1.41 Attendant Lights (Rainbow Lights)**

**Passenger Service Unit.** The PSU provides:

- reading light at each passenger seat
- FASTEN SEAT BELTS graphic and TURN OFF ELECTRONIC DEVICES signs
- push button and indicator for attendant call
- air gasper for each individual passenger seat
- oxygen mask dispensing unit
- loudspeaker for internal communication

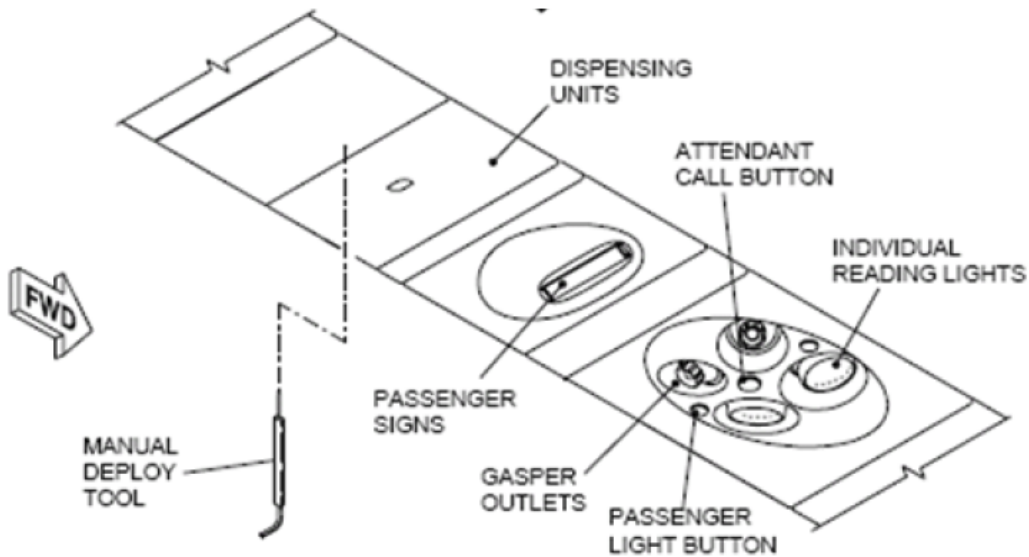


Figure 1.42 PSU Display

**1.5.5 Emergency Lighting.** Emergency lighting consists of internal and external lights powered by six dedicated Emergency Lights Power Units (ELPU) with internal batteries charged by DC BUS 1. The charge of the batteries is sufficient to supply all emergency lights for approximately 10 minutes. External emergency lighting is provided by three over wing lights on each side of the airplane and LED lights on each escape slide. They turn on automatically with the loss of DC BUS 1.

Internal emergency lights consist of: the exit locator signs, exit marker signs, exit identifier signs, cabin/flightdeck emergency floodlights and passageway emergency exit floodlights. A flightdeck light is located at the flightdeck ceiling and provides general emergency illumination of the flightdeck area.

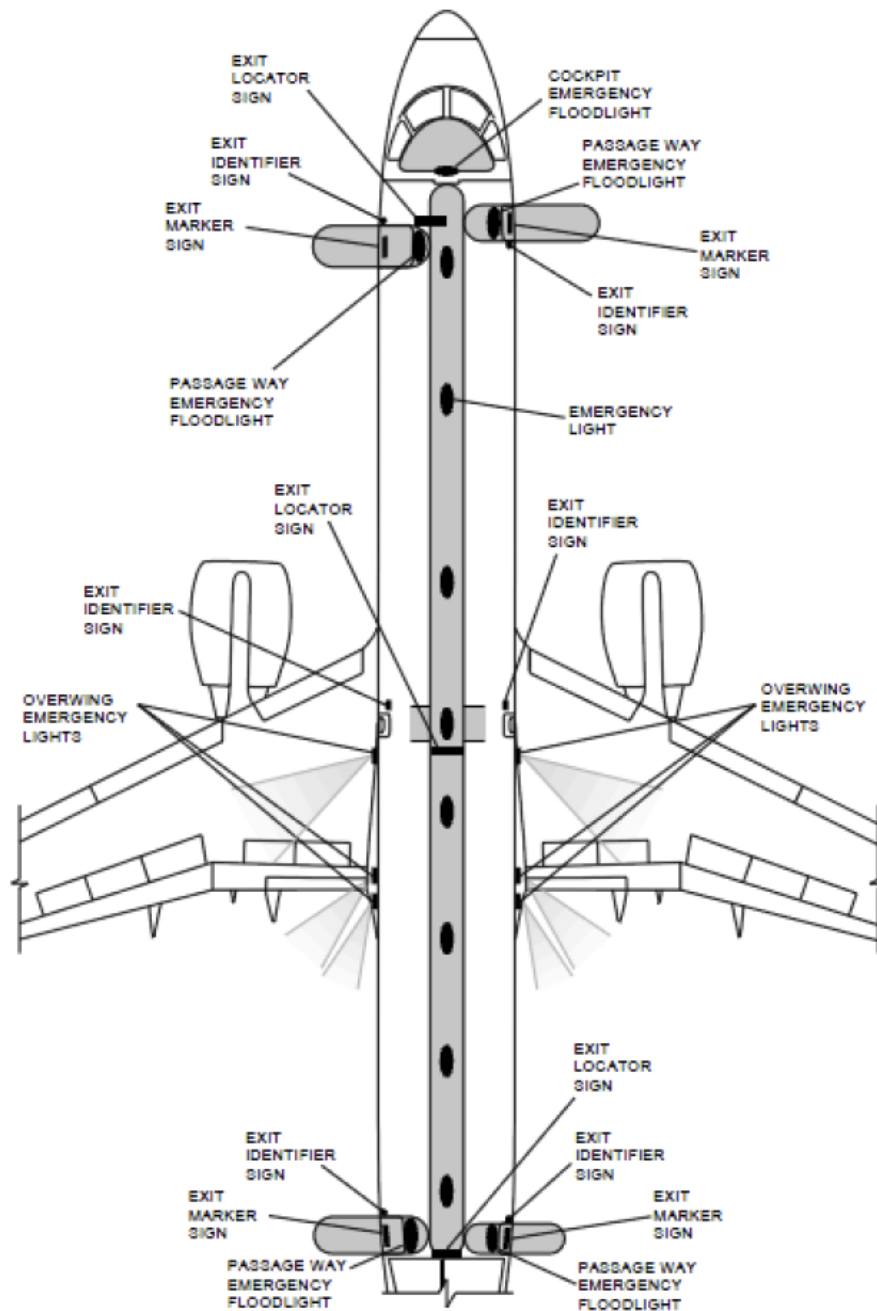
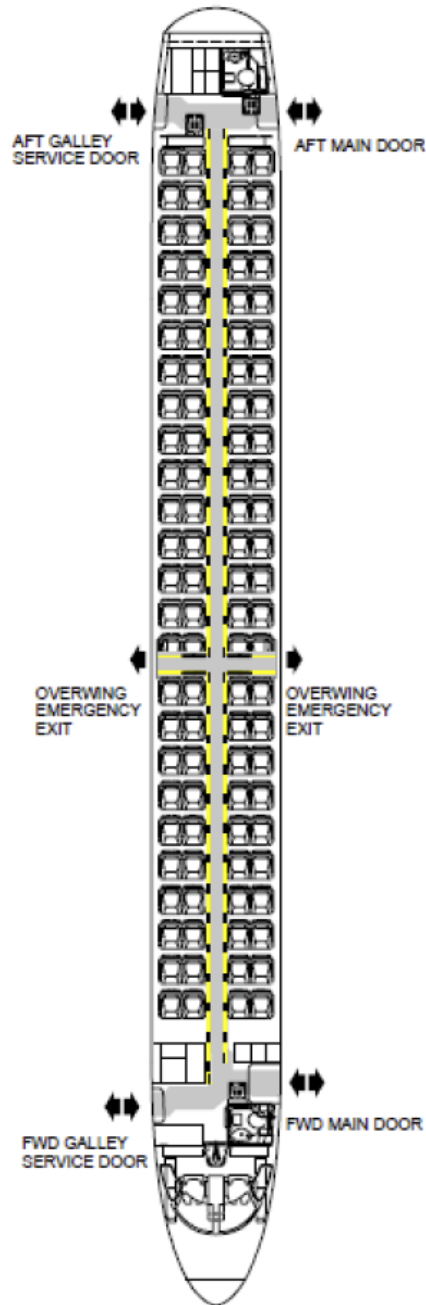


Figure 1.43 Emergency Lighting

**Photoluminescent Strips.** Photoluminescent strips are installed along the passenger cabin floor to provide means of identifying the emergency escape path even in dense smoke conditions. Double red dots on the strips indicate the end of each exit path.

Photoluminescent escape path strips must be charged prior to the first flight of the day by interior cabin lighting.

Fifteen minutes of ceiling and entrance cabin lighting exposure, in **BRIGHT** modes, ensures the strip luminescence will be available for 7 hours.



**Figure 1.44 Photoluminescent Strips**

**1.5.6 Cargo Compartment Lights.** The forward cargo bay has 6 cargo lights and 1 loading light. The aft cargo bay has 5 cargo lights and 1 loading light.

There is a manual switch located at each cargo door that has AUTO and OFF selections. In AUTO mode, the cargo lights come on when the cargo door is opened and turn off when the door is closed. The OFF mode turns off the lights regardless of the door position.

The cargo lights have protective grills installed to protect them against damage.



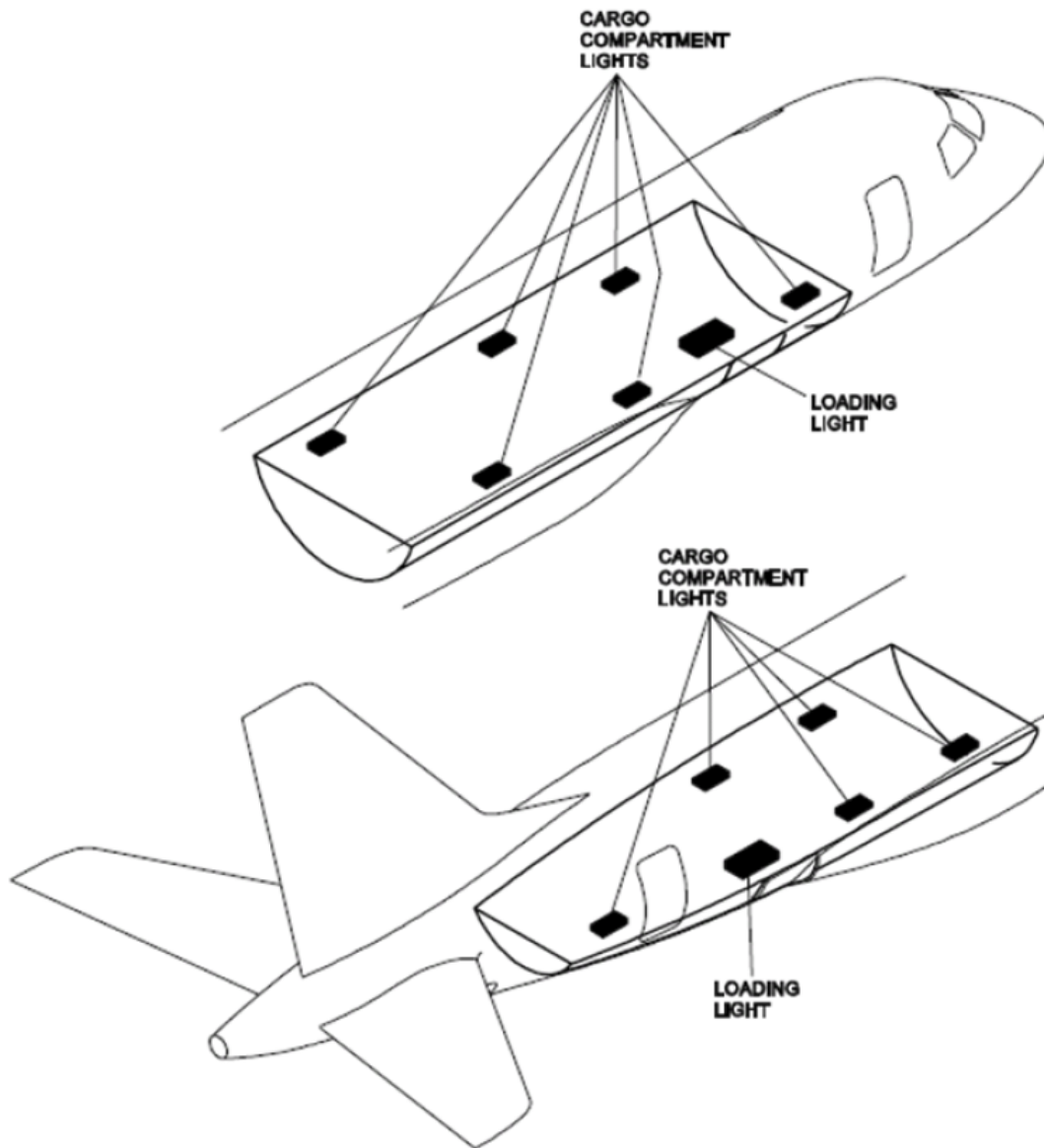


Figure 1.45 Cargo Compartment Lights

## 1.6 Doors Controls & Indicators

**1.6.1 MFD Synoptic Page.** Door information is displayed on the synoptic status page. It can be selected by flight crew on either MFDs.

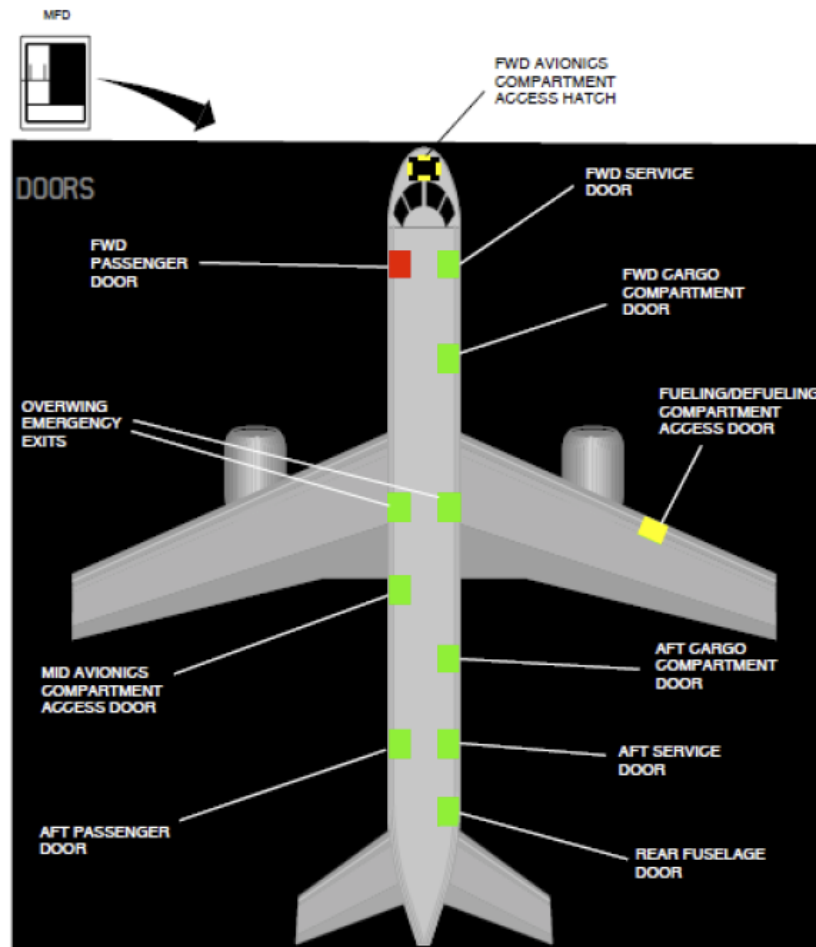


Figure 1.46 Synoptic Status Page

**Door.** On the synoptic page, the door is shown as a colored solid square.

**GREEN:** the associated door is closed

**RED:** the associated passenger, service or cargo door is open

**AMBER:** the associated access door is open

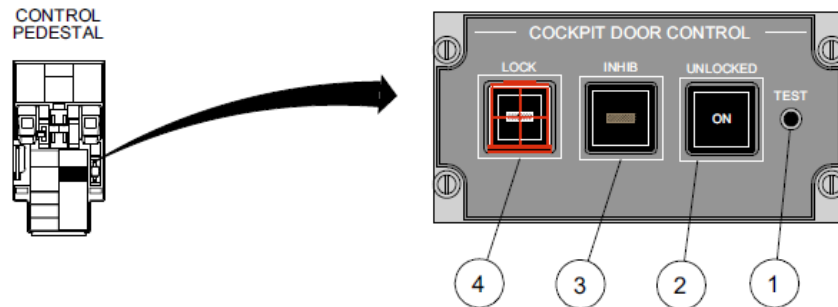
**AMBER DASHED:** the associated door status is undetermined

• **Note** •

A DOOR OPEN annunciation is displayed at the top right of the doors status window whenever any door is not properly closed.

### 1.6.2 Reinforced Flightdeck Door.

**Flightdeck Control Panel.**



**Figure 1.47 Cockpit Control Panel Display**

**① TEST Button**

Continually tests the chime while the test button is pressed.

**② UNLOCKED Indication**

- turns on when door is unlocked
- starts flashing when the EMERG CALL push button on the passenger cabin control panel is pressed
- turns off when the INHIB push button is pressed

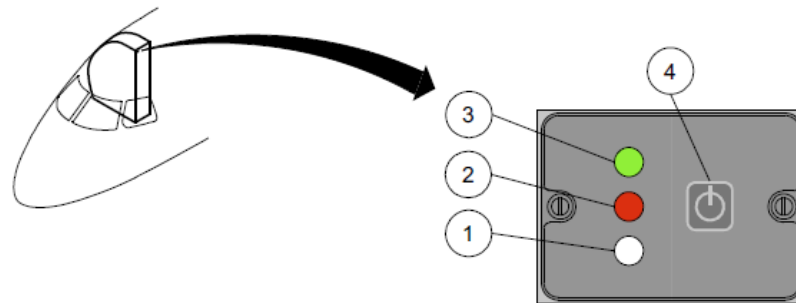
**③ INHIB Push button**

- inhibits, for 8 minutes and 20 seconds, the emergency call command from cockpit door control panel in the passenger cabin
- lights up the red LED in the passenger cabin control panel
- the flightdeck door unlocks if the INHIB push button is not pressed within 30 seconds after the EMERG CALL push button on the passenger cabin control panel is pressed

**④ LOCK Push button (Guarded)**

- controls the flightdeck door's power supply
- activates and deactivates the electromechanical door latch
- deactivates the inhibition control
- resets the chime and EMERG ENTRY command
- resets the green LED on the door's control panel in the passenger cabin
- if the INHIB push button is not pushed within 30 seconds after the EMERG CALL push button on the passenger cabin control panel is pressed, the white striped bar turns on 4 seconds before the flightdeck door unlocks

**Control Panel in the Passenger Cabin.**



**Figure 1.48 Passenger Cabin Control Panel Display**

- ① **White LED:** Indicates that the unlock sequence has been started
- ② **Red LED:** Indicates that the INHIB push button in the flightdeck was pressed and EMERG ENTRY is temporarily inhibited
- ③ **Green LED:** Indicates the flightdeck door is unlocked.
- ④ **Emergency Call push button:** Push button needs to be pressed for 3 seconds to begin the unlock sequence and activate the chime alarm sequence in the flightdeck.

## Lights Controls &amp; Indicators

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## 1.7 Lights Controls &amp; Indicators

## 1.7.1 Flightdeck Lighting.

## Cockpit Lights Control Panel.

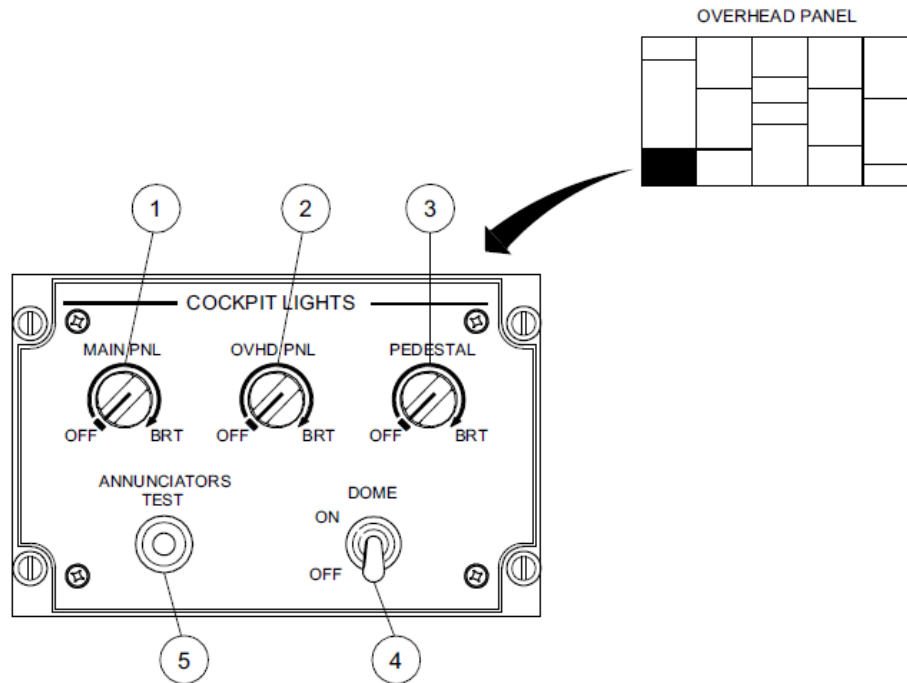


Figure 1.49 Cockpit Lights Control Panel Display

## ① MAIN PNL Knob

Turns on/off and regulates the lighting brightness of the main panel.

## ② OVHD PNL Knob

Turns on/off and regulates the brightness of the overhead panel's integral lighting.

## ③ PEDESTAL Knob

Turns on/off and regulates pedestal lighting brightness.

## • Note •

When the PEDESTAL knob is in the OFF position, the button/window indications default to full bright.

## ④ DOME Light Switch

Turns on/off the two cockpit dome lights.

## ⑤ ANNUNCIATORS TEST Button

## Lights Controls &amp; Indicators

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When actuated to the TEST position (momentary position) allows checking of the striped bars and caption indications in push buttons located on the main panel, overhead panel, control pedestal, allowing verification of lamp integrity.

## Glareshield Lights Control Panel.

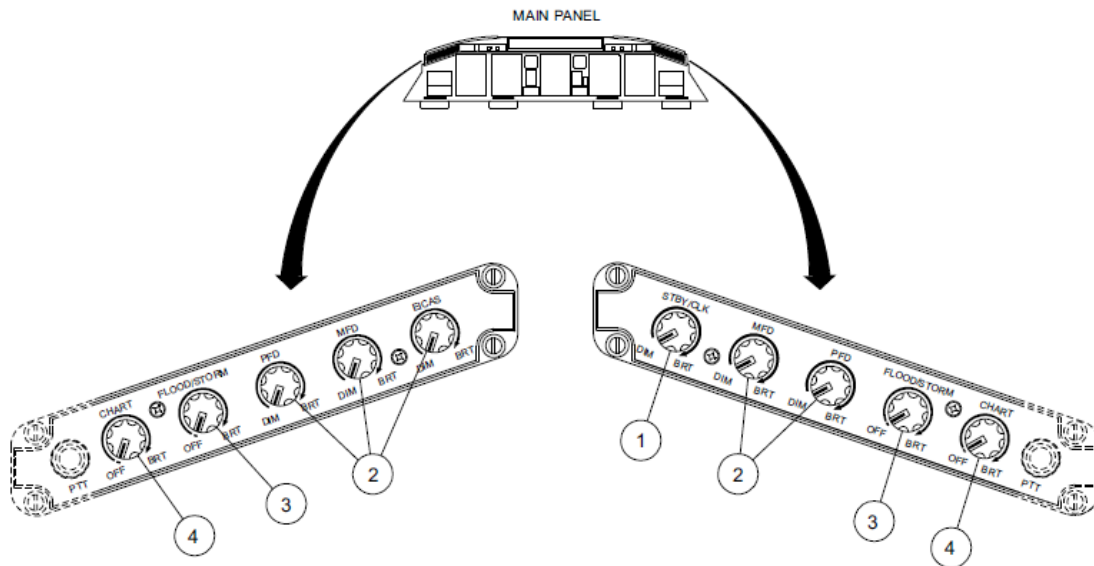


Figure 1.50 Glareshield Lights Control Panel Display

① **STBY/CLK Control Knob**

Regulates the brightness of the standby compass/clock lighting.

② **MFD/PFD Control Knob**

Regulates the brightness of the associated electronic display.

③ **FLOOD/STORM Lights Control Knob**

Turns on/off and regulates the brightness of the flood/storm panel lighting.

Provides maximum brightness for storm conditions at BRT position.

④ **CHART Holder Lighting Control Knob**

Turns on/off and regulates the brightness of associated chart holder lighting.

**Flight Crew Reading Lights.**

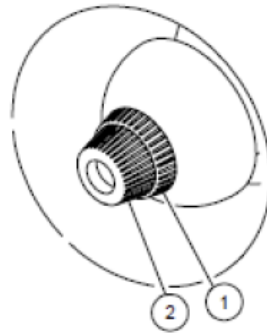


Figure 1.51 Flight Crew Reading Lights

- ① **Outer Ring**  
Turns on/off and provides dimming control.
- ② **Inner Ring**  
Adjusts aperture size of light pattern.

1.7.2 Passenger Cabin.

Passenger Signs Control Panel.

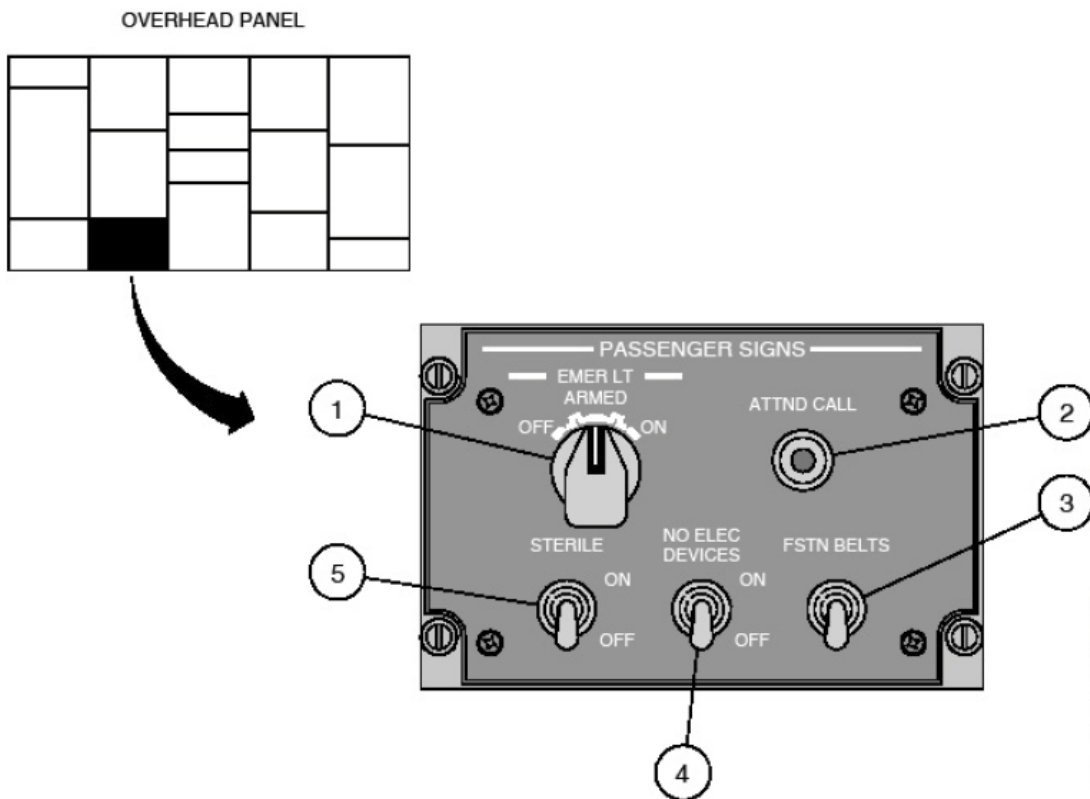


Figure 1.52 Passenger Signs Control Panel Display

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**Lights Controls & Indicators**

14AUG20

**① EMER LT Selector Knob**

**OFF:** prevents all emergency lights from illuminating if the airplanes electrical power is turned off or fails

**ARMED:** automatically illuminates all emergency lights if DC buses lose electrical power or if airplane electrical power is turned off

**ON:** turns on all emergency lights

**② ATTND CALL Button**

Pressing this button sounds a single high/low chime in passenger cabin.

**③ FSTN BELTS Toggle Switch**

**ON:** illuminates the FSTN BELTS signs

**OFF:** turns off the FSTN BELTS signs

**④ NO ELEC DEVICES Switch**

**ON:** illuminates the NO PED signs

**OFF:** turns off the NO PED signs

**⑤ STERILE Toggle Switch**

**ON:** illuminates the amber light rainbow light

**OFF:** turns off the amber light rainbow light

**Forward Attendant Control Panel.**



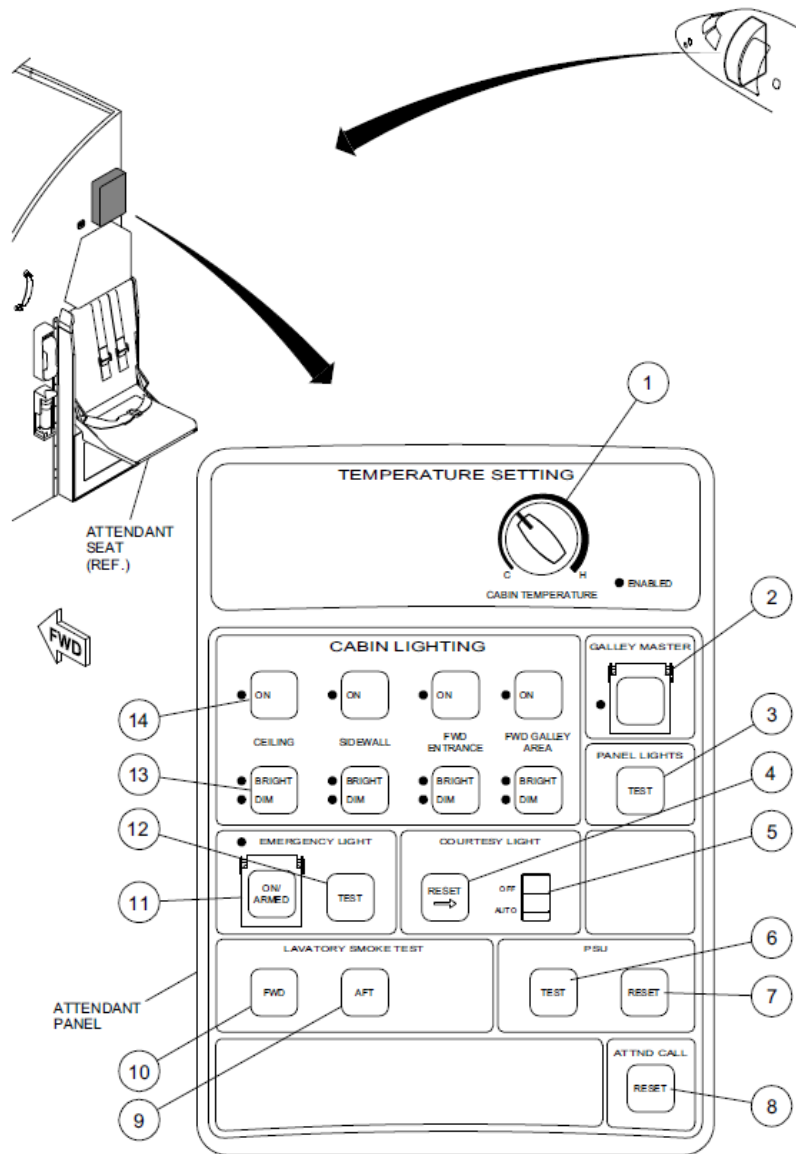
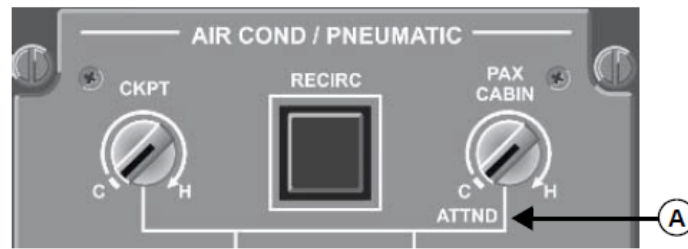


Figure 1.53 Forward Attendant Control Panel Display

① CABIN TEMPERATURE Control

Controls cabin temperature.

The “ENABLED” LED turns on to indicate the knob controls the cabin temperature. The LED turns on only if the Passenger Cabin Temperature Rotating Knob in the flightdeck is set to ATTND position (A)



- ② **GALLEY MASTER Switch (Guarded)**  
Turns off all galleys (AC power OFF).
- ③ **PANEL LIGHTS Test Switch**  
Provides a test in the attendant panel lights.
- ④ **COURTESY LIGHT RESET Switch**  
Turns on all courtesy lights for a 5-minute period.
- ⑤ **COURTESY LIGHT Switch**  
**AUTO:** turns on or off the courtesy lights according to passenger door position (OPEN or CLOSED)  
**OFF:** turns off the courtesy lights regardless of passenger door position
- ⑥ **PSU TEST Switch**  
Allows the testing of the following lights:
  - flight attendant reading lights
  - passenger reading lights
  - lavatory dome light
  - lavatory fluorescent light (from DIM to BRT mode)
  - attendant call indicator lights
  - lavatory occupied signs
- ⑦ **PSU RESET Switch**  
Turns off the lights previously turned on by the PSU TEST switch.
- ⑧ **ATTND CALL RESET Switch**  
Turns off the attendant call indicator lights, zonal lights and PSU switch lights, previously turned on due to an attendant call.
- ⑨ **AFT LAVATORY SMOKE TEST Switch**  
Provides a smoke test in the aft lavatory.  
Generates aural and CAS message in flightdeck.
- ⑩ **FWD LAVATORY SMOKE TEST Switch**  
Provides a smoke test in the forward lavatory.  
Generates aural and CAS message in flightdeck.
- ⑪ **EMERGENCY LIGHT ON/ARMED Switch (Guarded)**  
**ON:** turns on all emergency lights  
**ARMED:** automatically illuminates all emergency lights in case of DC bus electrical power loss or if airplane electrical

**Lights Controls & Indicators**

14AUG20

power is turned off

**⑫ EMERGENCY LIGHT TEST Switch**

Provides a one-minute test of all passenger cabin emergency lights.

**⑬ CABIN LIGHTING BRIGHT/DIM Switch**

Momentary press

**BRIGHT:** sets the lights of the respective area to full brightness

**DIM:** reduces lights of the respective area brightness

**⑭ CABIN LIGHTING ON Switch**

Momentary press

**ON:** turns on/off the respective lights

**AFT Attendant Control Panel.**

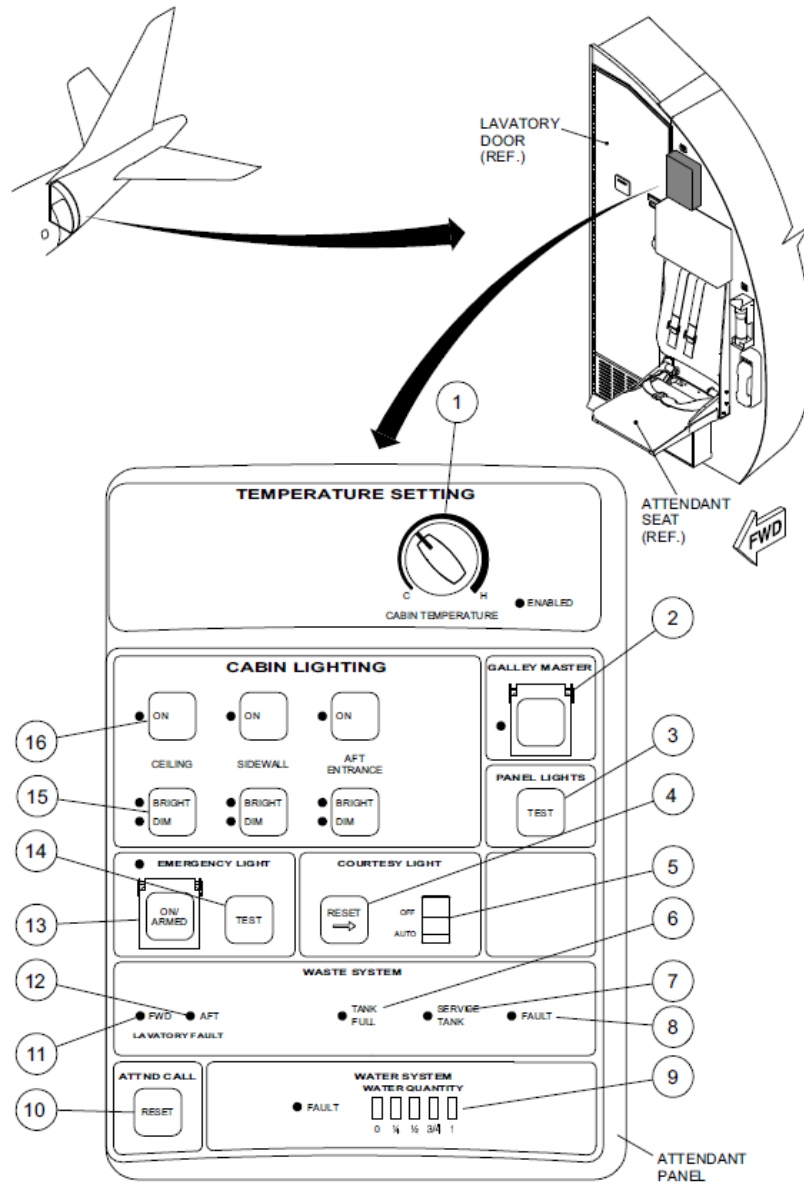


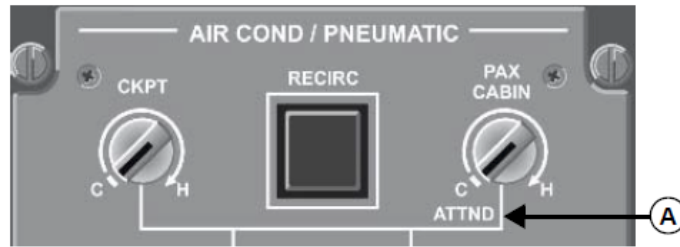
Figure 1.54 AFT Attendant Control Panel Display

① Cabin Temperature Control

Controls cabin temperature.

The “ENABLED” LED turns on to indicate the knob controls the cabin temperature.

The LED turns on only if the Passenger Cabin Temperature Rotating Knob in the flightdeck is set to ATTND position (A).



② **GALLEY MASTER Switch (Guarded)**

Turns off all galleys (AC power off).

③ **PANEL LIGHTS TEST Switch**

Provides a test of the attendant panel lights.

④ **COURTESY LIGHT RESET Switch**

Turns on all courtesy lights for a 5-minutes period.

⑤ **COURTESY LIGHT Switch**

**AUTO:** turns on or off the courtesy lights according to passenger door position (OPEN or CLOSED)

**OFF:** turns off the courtesy lights despite of passenger door position

⑥ **TANK FULL Indication**

Illuminates to indicate the waste tank has reached 100% of its capacity.

⑦ **SERVICE TANK Indication**

Illuminates to indicate the waste tank has reached 75% of its capacity.

⑧ **FAULT Indication**

Illuminates to indicate that a fault in the waste system has been detected.

• **Note** •

Some FWD/AFT LAVATORY FAULT indications may be cleared by means of repeated toilet flush cycles. If the FAULT indication extinguishes the toilet may be operated normally. If the FAULT indication does not extinguish, report it to maintenance.

⑨ **WATER SYSTEM/WATER QUANTITY FAULT Indication**

Indicates the water tank capacity. The fault light indicates one of the following conditions:

- a fault in the respective (FWD or AFT) drain valve is detected
- water level indication is not available
- in-flight drainage is not available due to a fault in the drain valve or in the drain mast heater

⑩ **ATTND CALL RESET Switch**

Turns off the attendant call indicator lights, zonal lights and PSU switch lights, previously turned on due to an attendant call.

⑪ **FWD LAVATORY FAULT Indication**

Illuminates to indicate the forward lavatory is out of order.

⑫ **AFT LAVATORY FAULT Indication**

Illuminates indicating the AFT lavatory is out of order.

**Lights Controls & Indicators**

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**⑬ EMERGENCY LIGHT ON/ARMED Switch (Guarded)****ON:** turns on all emergency lights**ARMED:** automatically illuminates all emergency lights in case of DC bus electrical power loss or if airplane electrical power is turned off**⑭ EMERGENCY LIGHT TEST Switch**

Provides a one-minute test of all passenger cabin emergency lights.

**⑮ CABIN LIGHTING BRIGHT/DIM Switch**

Momentary press

**BRIGHT:** sets the lights of the respective area to full brightness**DIM:** reduces light brightness of the respective area**⑯ CABIN LIGHTING Switch**

Momentary press

**ON:** turns on/off the respective cabin lights

1.7.3 External Lights Control Panel.

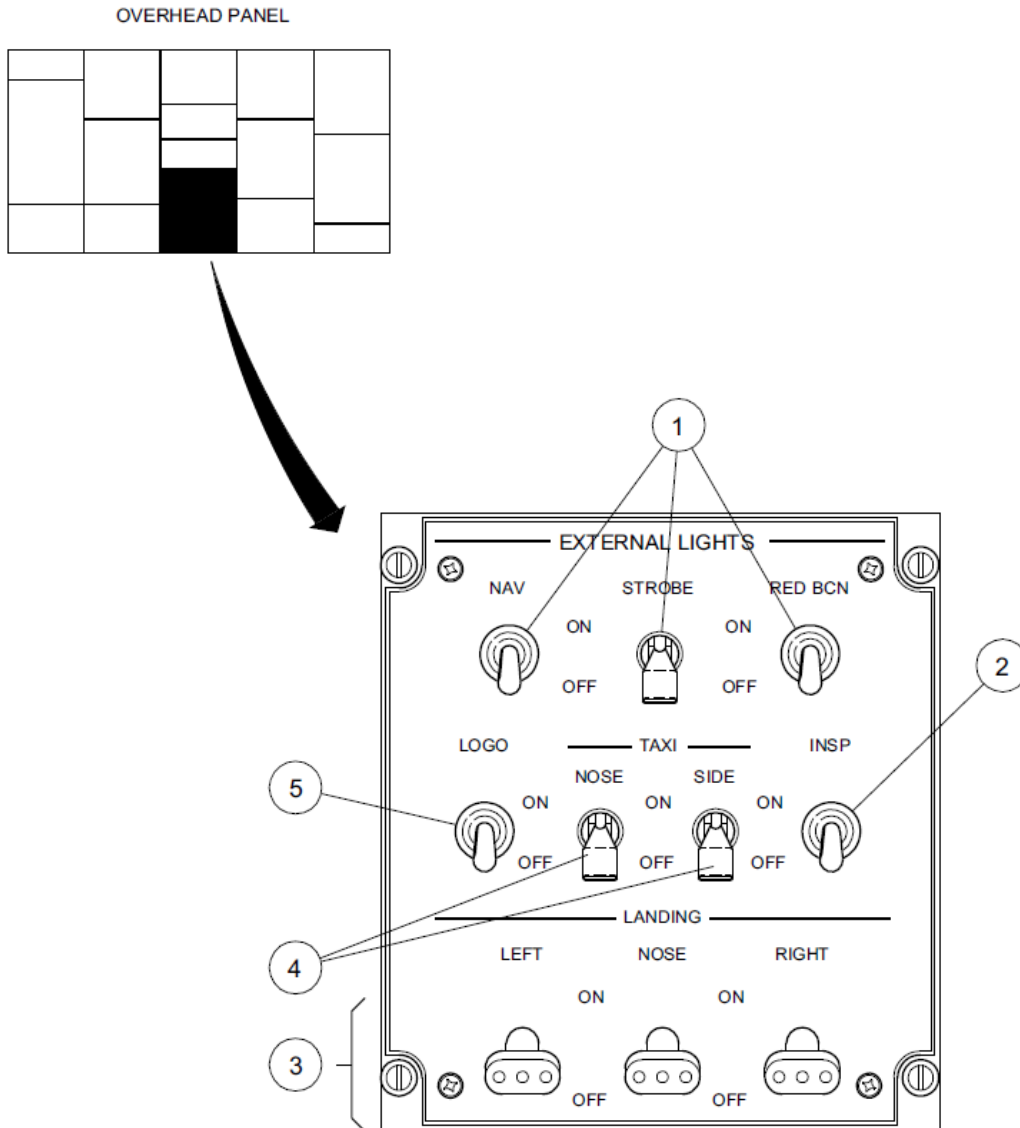


Figure 1.55 External Lights Control Panel Display

- ① **NAV, STROBE AND RED BCN Switches**  
Turns on/off the associated light.
- ② **INSP Light Switch**  
Turns on/off the inspection lights.
- ③ **LANDING Light Switches**  
Turns on/off the associated landing light.
- ④ **TAXI Light Switches**  
Turns on/off the taxi lights.
- ⑤ **LOGO Light Switch**  
Turns on/off the logo lights.

## 1.8 EICAS Messages

Warning, Caution and Advisory.

| Type    | Message                  | Meaning  |
|---------|--------------------------|--|
| WARNING | DOOR CRG AFT (FWD)OPEN   | Associated baggage door open or not properly locked.   |
|         | DOOR EMER LH (RH) OPEN   | Associated overwing emergency door open or <u>not</u> properly locked.   |
|         | DOOR PAX AFT (FWD) OPEN  | Main door is open or <u>not</u> properly locked either on the ground with either engine running or in flight.    |
|         | DOOR SERV AFT (FWD) OPEN | Service door is open or <u>not</u> properly locked either on the ground with either engine running or in flight. |



## EICAS Messages

14AUG20

| Type     | Message                       | Meaning   |
|----------|-------------------------------|---|
| CAUTION  | APM FAIL                      | At least three APMs have failed.  |
|          | APM MISCOMP                   | One or more APMs do <u>not</u> match.   |
|          | AVNX MAU 1 (2) (3) A (B) FAIL | All functions in the associated MAU channel have failed.  |
|          | AVNX MAU 1 (2) (3) A (B) OVHT | None of the functions in the associated MAU channel is available.                                   |
|          | AVNX MAU 1 (2) (3) FAN FAIL   | Associated fan cannot be turned on.   |
|          | CMS FAIL                      | Both CMS's have failed. No dispatch relief.   |
|          | DOOR CENTER (FWD) EBAY OPEN   | Associated electronic bay is open or not properly locked.   |
|          | DOOR HYD OPEN                 | Hydraulic system 3 access door is open or <u>not</u> properly locked.                               |
|          | EICAS FAULT                   | DU has a failure condition(s) that affect the functionality.  |
|          | EICAS OVHT                    | DU has an over temperature condition. Continued operation may result in the loss of DU.             |
|          | EMER LT NOT ARMED             | Emergency lighting system is not armed.   |
|          | EMER LT ON                    | Emergency lighting system is on.  |
|          | MFD 1 (2) FAULT               | DU has a failure condition(s) that affect the functionality.  |
|          | MFD 1 (2) OVHT                | Respective MCDU has an over temperature condition. Continued operation may result in the loss of DU |
|          | PFD 1 (2) FAULT               | DU has a failure condition(s) that affect the functionality.  |
|          | PFD 1 (2) OVHT                | DU has an over temperature condition. Continued operation may result in the loss of DU.             |
|          | SYS CONFIG FAIL               | Automatic configuration monitoring system has found non-dispatchable configuration miscompare.      |
| ADVISORY | APM FAULT                     | One or two APMs have failed.  |

| Type | Message                        | Meaning  |
|------|--------------------------------|--|
|      | AVNX DB MODULE FAIL            | On board database module has failed.   |
|      | AVNX MAU 1 (2) (3) A (B) FAULT | The associated MAU channel failure condition(s) that does not affect its functionality, but may cause loss of redundancy |
|      | CCD 1 (2) FAULT                | Cursor control of one or more DU's has been lost.  |
|      | CMS FAULT                      | 1 CMS has failed, dispatch relief possible.  |
|      | DOOR FUELING OPEN              | Fueling door open or not properly locked.  |
|      | EMER LT BATT FAULT             | One of the four emergency batteries is not working properly.   |

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**Chapter 2: Auxiliary Power Unit (APU)**

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System Description

15APR24

2.1 System Description

**2.1.1 General.** The Auxiliary Power Unit (APU) is a gas turbine engine located in the airplane tailcone. The APU provides pneumatic and electrical AC power. The pneumatic power is used for engine starting and to supply bleed air to the air conditioning packs. An electrical AC generator supplies 115 Volts 40 KVA to the electrical system.

The APU is automatically monitored and controlled through a dedicated Full Authority Digital Electronic Control (FADEC) unit.

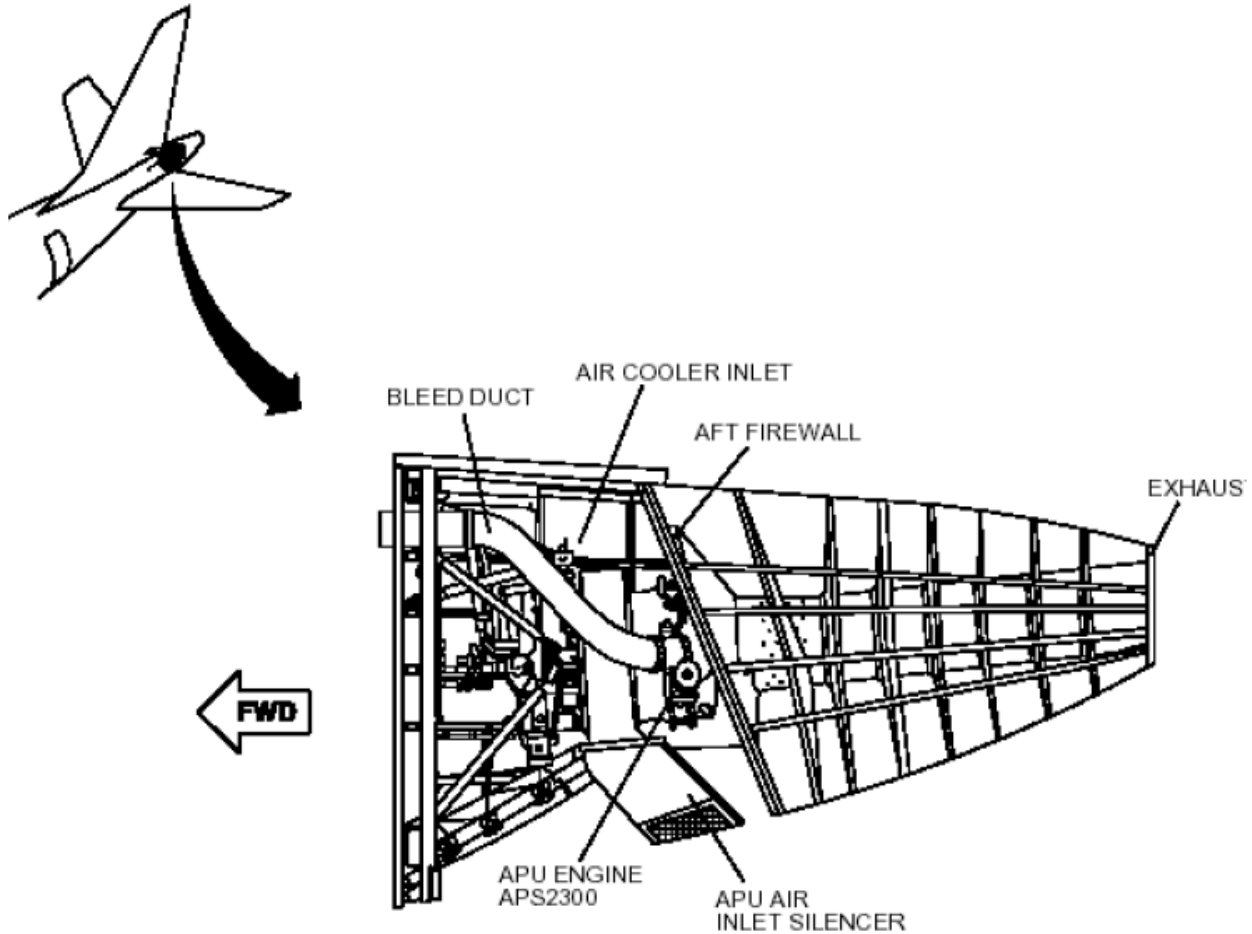


Figure 2.1 APU Location

**2.1.2 APU Fuel Supply.** When DC power is the only electrical power available, the DC fuel pump, located in the right wing tank, feeds the APU. If AC power is available and the #2 engine is not running, fuel feeding will be provided by the AC fuel pump from the right wing tank.

When the number 2 engine is operating, the ejector fuel pump feeds the APU from the right wing tank. It is also possible to feed the APU from the left wing tank via the crossfeed valve.

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**System Description**

| 01MAY24

**2.1.3 APU Bleed.** The APU provides bleed air for engine start, and environmental control. It may also be used in flight for pressurization up to an altitude of 15,000 feet.

APU bleed air may also be used in-flight to assist engine start up to 21,000 feet. The air management system logic controls operation of the APU bleed valve.

**2.1.4 APU Operation.** A full authority digital electronic control (FADEC) monitors and controls the start/shutdown sequence, fault detection and APU status. The flight crew controls the APU start/shutdown sequence, using the APU MASTER switch. APU status information is located on the EICAS display.

In a non normal condition, the flight crew can shut down the APU through a dedicated EMER STOP button.

The APU is able to supply:

- electrical AC power up to 33,000 ft.
- bleed air for engine starting up to 21,000 ft.
- bleed air for air conditioning and pressurization up to 15,000 ft.

Maximum altitude for APU start is 30,000 ft.

**2.1.5 APU Start.** Rotating the APU MASTER switch to ON powers the FADEC and the APU fuel shut off valve opens.

• **Note** •

The SPDA power is available to the APU FADEC approximately 30 seconds after BATT 1 and BATT 2 are selected to ON/AUTO. During this time, the APU start will not be available.

Wait 5 seconds after placing the APU start switch to ON, before selecting start.

Rotating the APU MASTER switch from ON to START initiates the APU automatic starting cycle. During the starting cycle, the FADEC commands the electronic starter controller to energize the starter generator, initiating APU rotation.

Three seconds after the APU has reached 95%, electrical and pneumatic loading are available. If the APU does not reach proper speed or acceleration rate within the starting cycle time, the APU will automatically shut down.

**Ground Start.** The FADEC, powered by DC ESS BUS 1 initiates ignition at approximately 6% RPM, and fuel flow after 5 seconds. Battery 2 energizes the electronic starter controller. After light off occurs, the FADEC commands the starter to cut out at approximately 50% RPM.

**In-flight Start.** The FADEC initiates ignition at approximately 7 - 17% RPM, and fuel flow 0.5 seconds later. After a light off occurs, the FADEC commands the starter to cut out at approximately 50% RPM.

### 2.1.6 APU Shutdown.

**Normal APU Shutdown.** Rotating the APU MASTER switch from ON to OFF initiates a normal APU shutdown, which is monitored and controlled by the FADEC. During a normal shutdown sequence, a one minute cool down period is initiated. APU pneumatics is removed and the generator will remain connected to prevent draining of the batteries.

• **Note** •

Turning the APU selector back to ON during the shutdown sequence cancels the shutdown.

**Emergency APU Shutdown.** In the event that the APU emergency stop button has been pushed in, the APU fuel shut off valve closes and the APU shuts down without a one-minute cooldown period.

**System Description**

15APR24

**2.1.7 APU Protection.** The FADEC provides automatic APU shutdown protection on the ground and in flight. The appropriate EICAS message is displayed for each situation.

| <b>On the ground</b>  | <b>In flight</b>                                |
|---|---|
| Overspeed<br>Underspeed<br>FADEC critical fault<br>APU fire<br>APU EGT overtemperature<br>APU high oil temperature<br>APU low oil pressure<br>Sensor fail | Overspeed<br>Underspeed<br>FADEC critical fault |

2.2 Controls & Indicators

2.2.1 APU Control Panel.

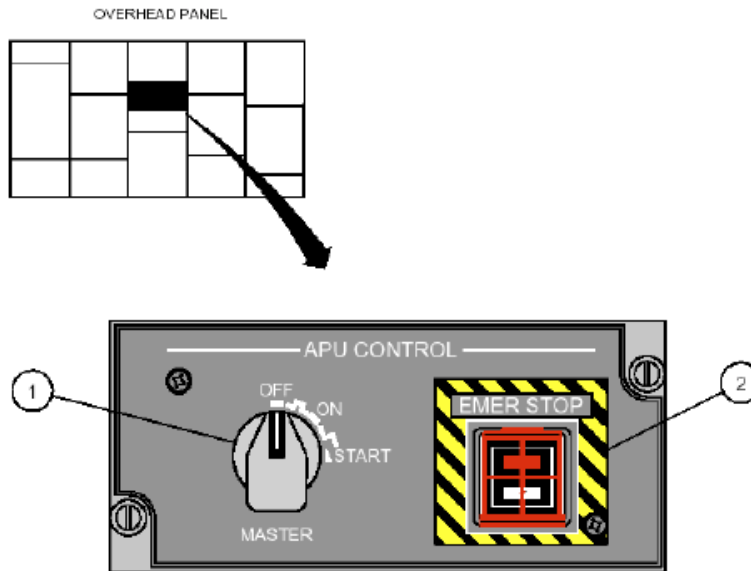


Figure 2.2 APU Control Panel

① APU MASTER Switch (Rotary Action)

**OFF:** initiates normal APU shutdown

**ON:** normal position when the APU is running

**START:** (momentary action) initiates the APU start cycle. When released, the switch moves to the ON position.

② APU EMER STOP Button (Guarded)

**PUSH IN:** closes the APU fuel shut off valve, shutting down the APU with no cooldown period.

When pushed in, a white striped bar illuminates on the lower half of the button.

**PUSH OUT:** normal position

• Note •

In case of fire, a red striped bar illuminates on the upper half of the button.

2.2.2 EICAS Indication.



Figure 2.3 EICAS Indication

① APU RPM Indication

Displays the APU RPM (%).

**GREEN:** normal operating range

**AMBER:** cautionary operating range

**RED:** operating limit exceeded

② APU EGT (Exhaust Gas Temperature) Indication

Displays the APU temperature in degrees Celsius (°C).

**GREEN:** normal operating range

**AMBER:** cautionary operating range

**RED:** operating limit exceeded



**2.2.3 EICAS Messages.**

**Warning, Caution and Advisory.**

| Type    | Message             | Meaning   |
|---------|---------------------|---|
| CAUTION | APU FAIL            | An APU automatic shutdown has occurred. APU <u>cannot</u> be restarted unless the shutdown occurred during the start cycle. |
|         | APU FAULT           | APU automatic shutdown inhibited in-flight. An anomaly has been detected. Maintenance action is required.                   |
|         | APU OIL HI TEMP     | APU automatic shutdown inhibited in-flight. Oil pressure is below the minimum operating limit.                              |
|         | APU OIL LO PRESS    | APU automatic shutdown inhibited in-flight. Oil temperature operating limit has been exceeded.                              |
|         | APU ALTITUDE EXCEED | APU operational ceiling has been exceeded. The airplane is flying at or above 33500 ft. with the APU running.               |
| STATUS  | APU SHUTTING DOWN   | A normal APU shutdown has been commanded via the APU MASTER Switch.   |

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## Chapter 3: Oxygen

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**Systems Description**

16AUG20

**3.1 Systems Description**

**3.1.1 General.** The oxygen system provides oxygen to the flight crew and passengers.

The flight crew and passenger oxygen systems operate independently and are supplied by different oxygen sources.

Flight crew oxygen is stored in a rechargeable cylinder, and chemical oxygen generators supply the passenger oxygen system. Portable oxygen cylinders are located throughout the airplane for first aid use. Protective breathing equipment is for emergency use only.

**3.1.2 Systems.** The E190 oxygen system consists of the following:

- flight crew oxygen system
- passenger oxygen system
- protective breathing equipment (PBE)
- portable oxygen cylinders

The oxygen system parameters and indications are displayed on both MFD status synoptic pages. System messages are displayed on the EICAS display.

**3.1.3 Flight Crew Oxygen System.** Flight crew oxygen is provided via a conventional, high-pressure, gaseous-type system. The re-chargeable cylinder is pressurized up to 1850 psi and is installed in the forward cargo compartment.

A green discharge indicator disc blows out in the event of an overpressure. The disk is located in the fuselage skin, above the oxygen filling port, to the right of the forward cargo compartment door.

Flight crew and observer full-face, quick-donning masks and regulators are stowed in oxygen mask boxes near each seat. Remove the mask from the stowage box and press the harness inflation control valve. Oxygen will flow into the mask and inflate the harness automatically when the doors open. Releasing the valve will deflate the harness to fit it to the head. Oxygen will flow until the stowage box doors are closed.

An oxygen supply control knob is used to set the oxygen flow to normal, 100%, or emergency mode. The emergency mode can also be used to purge toxic smoke and fumes.

**Flight Crew Full-Face Masks Operation.** Opening the stowage box automatically initiates oxygen flow. Pressing the harness inflation control valve inflates the harness for quick donning. Releasing the button deflates the harness fitting it to the head. The mask is designed to be donned within 5 seconds. Oxygen will flow until the stowage box's doors are closed.

***Full Face Mask Operating Modes.***

**Normal:** The Normal Mode supplies supplemental oxygen diluted with cabin air on demand based on cabin pressure altitude. At a pre-set cabin altitude, 100% oxygen is supplied.

**100%:** Supplies 100% pure oxygen at all cabin altitudes.

**Emergency:** The EMER setting provides 100% pure oxygen under positive pressure regardless of cabin altitude. EMER can also be used to purge smoke and fumes from the mask. Unless conditions require continuous use of EMERG mode, returning the mask to 100% or NORMAL mode after clearing the mask of smoke/ fumes/condensation will make communications easier.

**• Note •**

In the EMER mode, communication may be difficult do to the increased air pressure and flow.

## Systems Description

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**Test.** The masks are tested utilizing the TEST/RESET button. With the mask stowed and the regulator knob set to 100%, pressing and holding the TEST/RESET button will cause a short blink of the flow indicator and an oxygen flow sound will be audible in the speakers. On the radio panel, the SPKR indicator will illuminate. Once the mask fully pressurizes, the indicator must go out showing the system is leak free. Releasing the TEST/RESET button will terminate the test.

**Communication.** The mask is also connected to the communications system. Removing it from the stowage box automatically activates the microphone and speakers. Whenever the mask microphone is activated, the headset boom microphone is deactivated. When the mask stowage box is closed and the TEST/RESET switch is pressed, the headset boom microphone is re-activated and the mask's microphone is turned off.

**3.1.4 Protective Breathing Equipment (PBE).** The PBE is vacuum-sealed in a small bag inside a box. The unit is for emergency use only, providing the crew with positive pressure oxygen for respiratory and visual protection from fire, smoke and other harmful gases at altitudes up to 40000 ft. The oxygen supply will last at least 15 minutes.

The equipment hood isolates the head from the external ambient atmosphere with an elastic neck seal. Pulling the chemical oxygen generator actuation ring initiates the oxygen flow.

**Carrying Case.** The carrying case has an inspection window, which allows inspection of a "good condition indicator." In case of leakage, the indicator will turn from blue to pink, indicating that the unit is unserviceable. In case of a vacuum loss, with the condition indicator blue, the unit is also unserviceable.

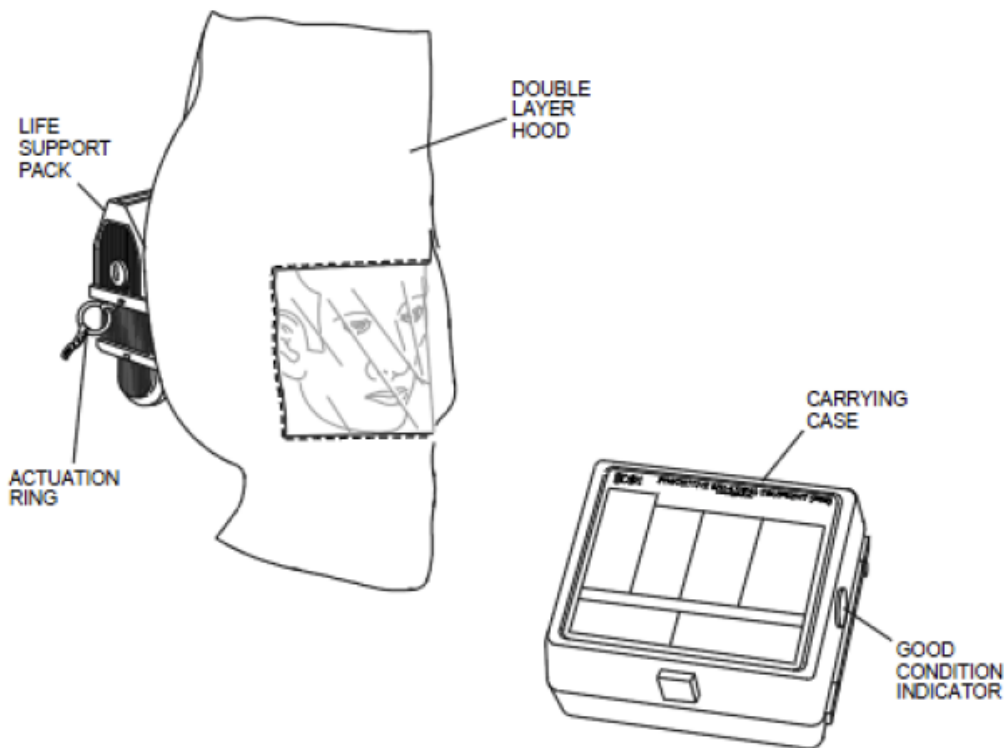


Figure 3.1 Protective Breathing Equipment



Figure 3.2 PBE Usage Procedure

**3.1.5 Cabin Oxygen System.** Individual chemical oxygen generators supply the passenger oxygen system during an emergency descent in the event of cabin decompression. The passenger oxygen system provides oxygen to the following: passenger service units (PSU), flight attendant stations, and galley areas. Oxygen may not be available in the lavatories.

The chemical oxygen generators and passenger oxygen masks are located in the dispensing units, above the passenger seats, at the PSU. Each passenger dispensing unit contains three masks and each flight attendant dispensing unit contains two masks, which all supply oxygen for approximately 12 minutes. The masks do not provide smoke protection and once they begin supplying oxygen, they cannot be shut off.

## Systems Description

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Oxygen flows whenever any mask hanging from the dispensing unit is pulled downward. Pulling the mask downward causes all the masks in that particular unit to drop, with 100% oxygen flow. A green, in-line flow indicator is visible in the transparent oxygen hose whenever oxygen is flowing to the masks. The masks automatically drop from the dispensing unit when the cabin altitude is between 14000 and 14750 feet. Manual deployment can be performed from the flightdeck by positioning the PASSENGER OXYGEN selector knob to OVRD.

When the passenger mask doors are automatically or manually activated, the system automatically turns on the FSTN BELTS and NO ELEC DEVICES signs regardless of switch position.

The switch normal operation is inhibited until the MASKS DEPLOYED switch is set to OFF position.

A manual release tool located near each flight attendant station can be used in case the dispensing unit door fails to open when commanded.

The flight crew monitors the passenger oxygen mask deployment status through EICAS messages. When the masks are deployed, an ON light illuminates on the PASSENGER OXYGEN panel.

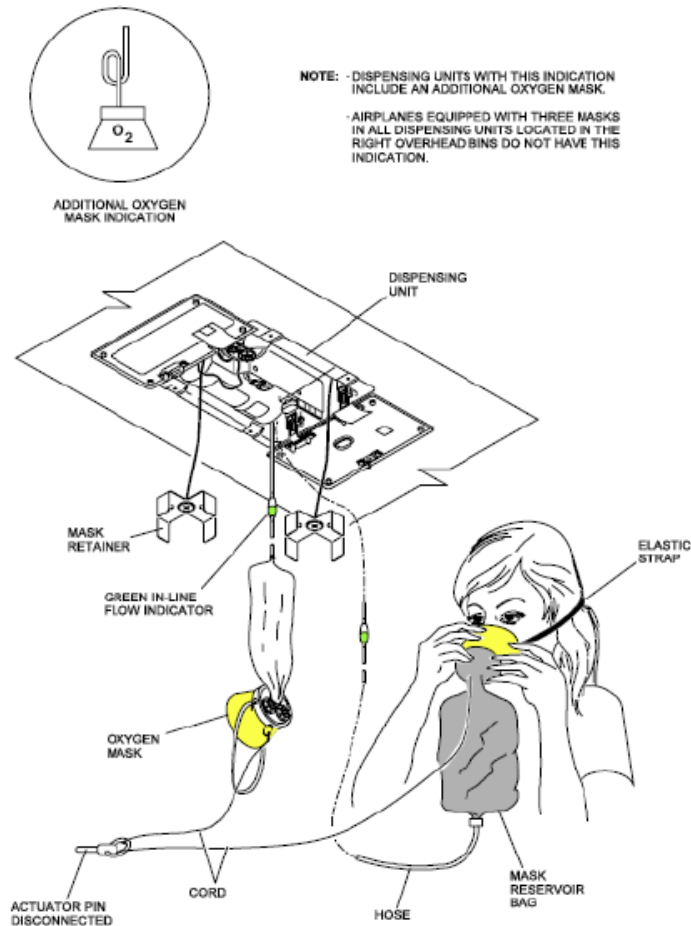


Figure 3.3 Dispensing Units/Passenger Tasks

**3.1.6 Portable Oxygen Cylinder.** The portable oxygen cylinders are for the use of flight attendants to assist passengers in case of sudden decompression or first aid purposes.

Systems Description

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The cylinders are fitted with a pressure gauge, a pressure regulator and an ON/OFF valve. The cylinders have a normal pressure of 1800 psi. Two continuous flow outlets are available; one provides low flow for walk-around, and lasts for approximately 60 minutes, and the second provides high flow for first aid use.

A high-pressure frangible safety disk ruptures if the cylinder pressure exceeds 2500 to 2775 psi. For dispatch, the pressure must be at least 1550 psi.

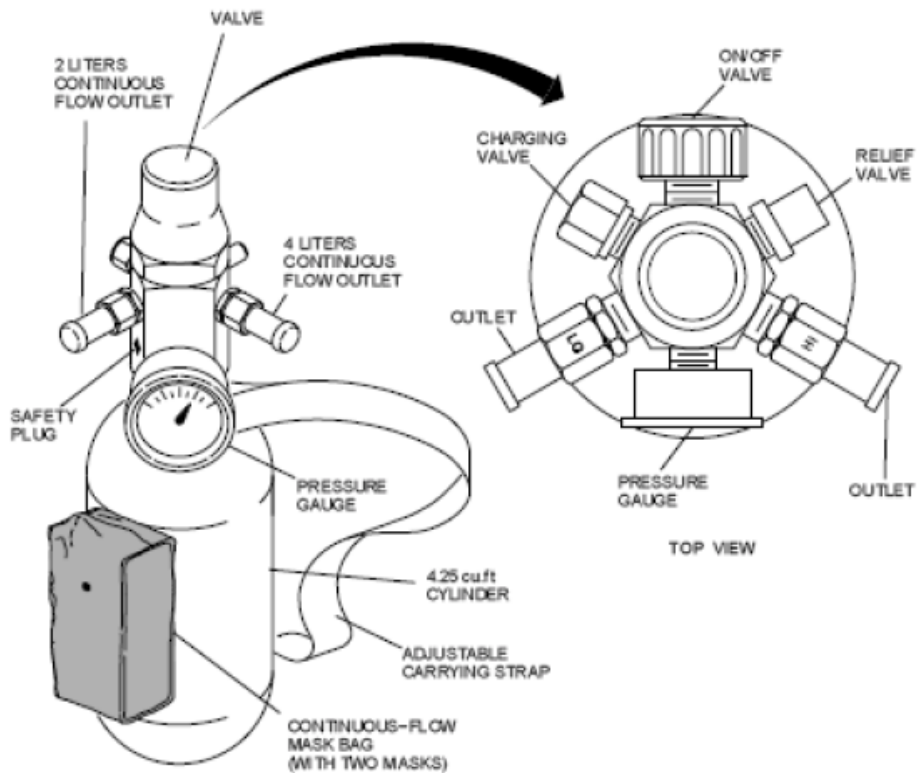
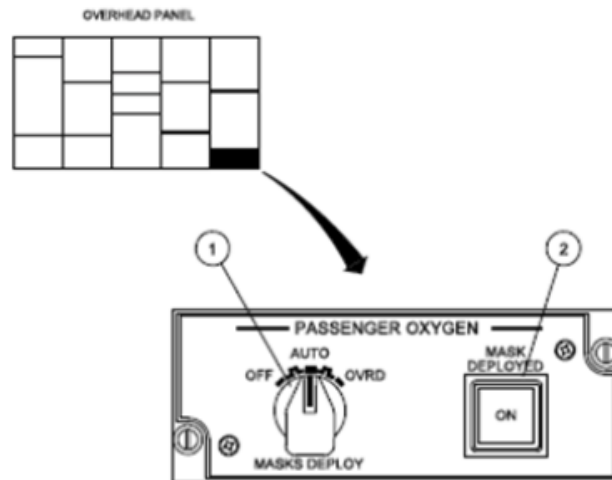


Figure 3.4 Portable Oxygen Cylinder

## 3.2 Controls & Indicators

### 3.2.1 Oxygen Control Panel.



**Figure 3.5 Oxygen Control Panel**

① MASKS DEPLOY Selector Knob (Rotary Action)

**OFF:** disables automatic deployment of passenger oxygen masks

**AUTO:** enables automatic deployment of passenger oxygen masks when cabin pressure altitude exceeds 14000 ft.

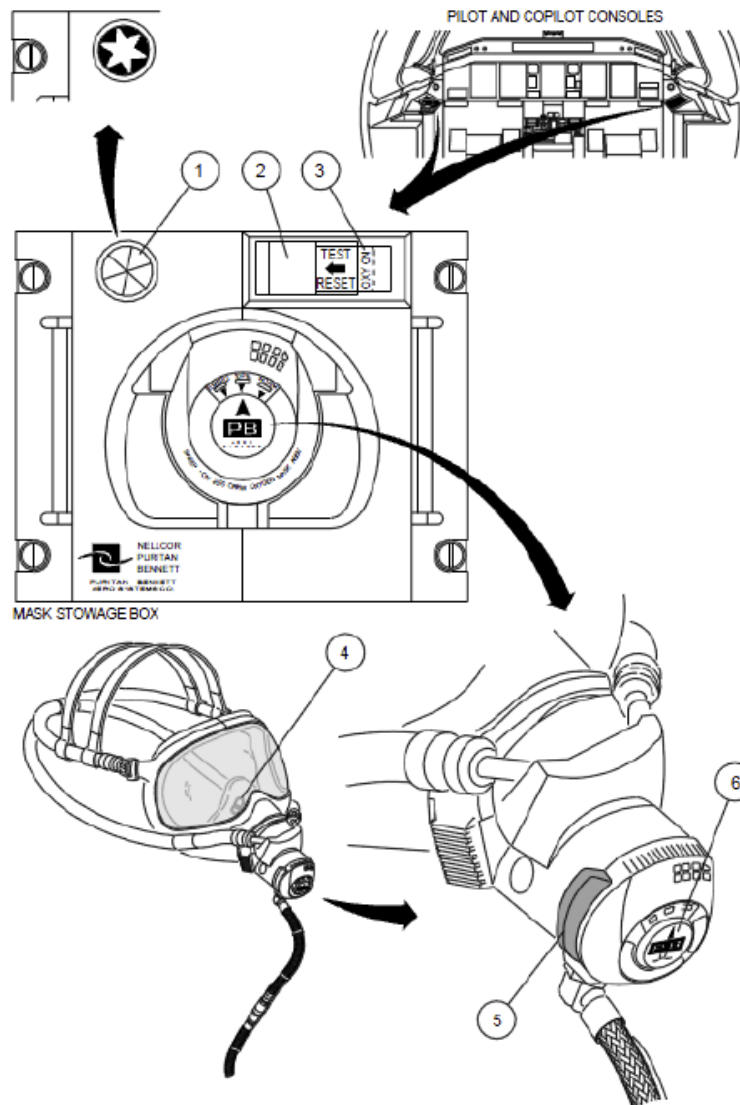
**OVRD:** deploys the passenger oxygen masks regardless of cabin altitude

② MASK DEPLOYED Indicator Light

An ON light illuminates, indicating a signal has been sent to the passenger cabin to open the oxygen mask doors.

### 3.2.2 Mask Stowage Box and Crew Mask.





**Figure 3.6 Mask Stowage Box and Crew Mask**

① Flow Indicator

A bright yellow star illuminates, indicating that oxygen is flowing.

② Test/Reset Button (Spring Loaded)

Pressing this button with the mask stowed tests the oxygen mask and activates the microphone and speaker. The flow indicator star momentarily appears, and oxygen flow will be audible through the speakers.

Pressing this button with the mask not stowed and the mask box door closed shuts off the oxygen flow, turns off the mask's microphone and returns the communication from the speakers to the headsets.

③ OXY ON Flag

Appears whenever oxygen is supplied to the mask.

④ Purge Valve

Allows oxygen flow into the face seal, purging any smoke and fumes.

Automatically opens when the oxygen supply control knob is rotated to the emergency mode position.

## Controls &amp; Indicators

16AUG20

- ⑤ Harness Inflation Control Valve  
Pressing this valve inflates the harness so that the mask may be donned. Releasing the button deflates the harness.
- ⑥ Oxygen Supply Control Knob (Rotary Action)  
Rotating the knob selects the mode of oxygen supply.

## • Note •

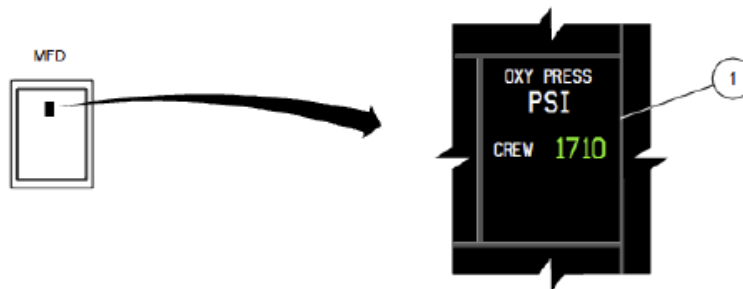
When the mask is donned, rotate the knob towards the left to select EMERG oxygen.

**EMERG:** supplies pure oxygen under positive pressure

**100%:** supplies pure oxygen at all cabin altitudes

**NORM:** supplies an oxygen/air mixture on demand (the ratio depends on cabin altitude)

**3.2.3 MFD Synoptic Page.** The status synoptic page provides a digital oxygen pressure indication.



**Figure 3.7 Flightdeck Oxygen Pressure Indication**

- ① Flightdeck Oxygen Pressure Indication (PSI)
  - Green:** normal operating range (minimum for three crew members in the flightdeck)
  - Cyan:** advisory operating range (minimum for two crew members in the flightdeck)
  - Amber:** cautionary operating range (no dispatch)
  - Amber Dashed:** invalid information or a value out of the valid range operating range (no dispatch)

## • Note •

A difference in pressure indication between the MFD and the oxygen pressure gauge outside the airplane may be observed. The difference occurs due to a temperature correction in the MFD that does not occur on the oxygen pressure gauge.

## 3.2.4 Oxygen Cylinder and Refill Point Location.

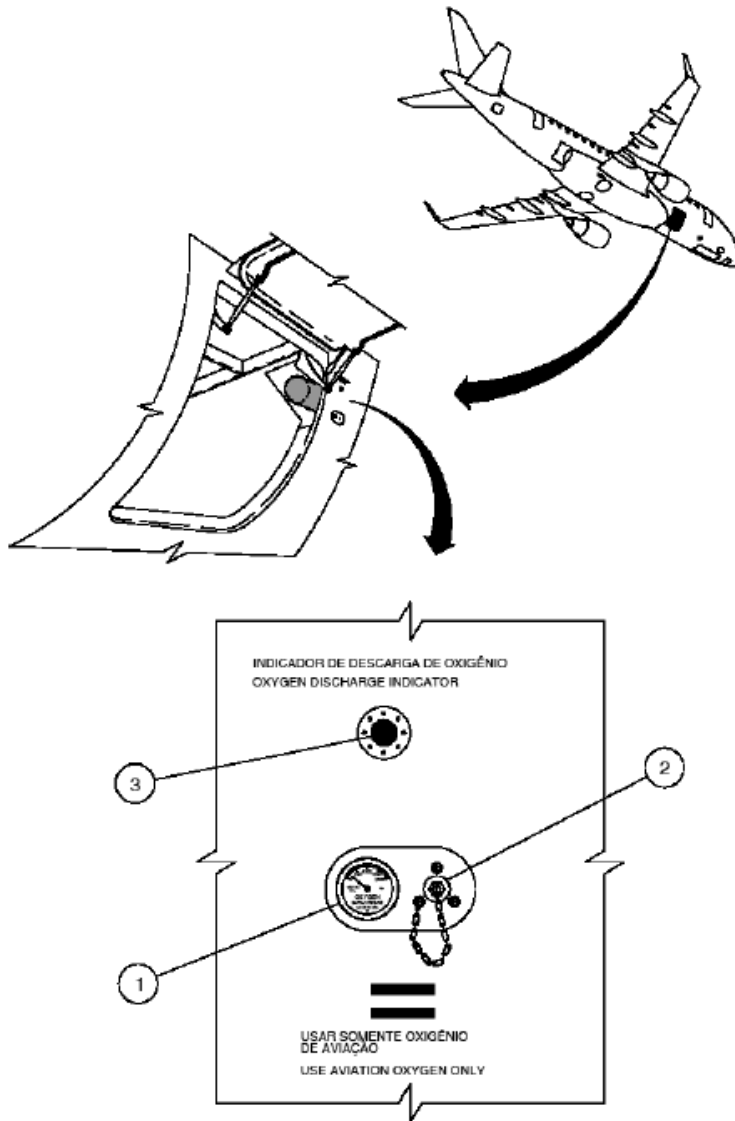


Figure 3.8 Oxygen Cylinder and Refill Point Location

- ① Oxygen Pressure Gauge  
Displays the cylinder static pressure
- ② Oxygen Recharge Valve  
The valve is used to recharge the cylinder by maintenance
- ③ Discharge Indicator Disc  
**GREEN:** normal operating range  
The green oxygen cylinder pressure relief disc blows out in the event of an overpressure.

**Controls & Indicators**

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**3.2.5 EICAS Messages.****Warning, Caution and Advisory.**

| Type     | Message                     | Meaning  |
|----------|-----------------------------|--|
| CAUTION  | CREW OXY LO PRESS           | Oxygen cylinder pressure is below accepted safety limits, or pressure sensor failure.                    |
|          | PAX OXY <u>NOT</u> DEPLOYED | Masks not deployed after automatically or manually commanded.  |
| ADVISORY | PAX OXY SW <u>NOT</u> AUTO  | Passenger oxygen selector set to the OFF position.   |
|          | OBSERVER OXY LO PRESS       | Oxygen cylinder pressure is below accepted safety limits for 3 crew members, or pressure sensor failure. |

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