



Overwing Emergency Exits

An overwing emergency exit is on either side of the passenger compartment adjacent to the wings (Figure 1-32). To open the emergency exit, remove the handle cover and pull the handle in and up from the internal side, or push the push plate in from the external side. Handle movement retracts latch pins from fittings on the adjacent structure. Then the overwing emergency exit is pulled in and down, then lifted off of the two hinge-support fittings and removed.

To install the emergency exit, the two hinge fittings on the bottom of the overwing emergency exit are positioned on the hinge-support fittings on the fuselage. The handle is pulled in and up to retract the latch pins. The overwing emergency exit is pushed up and out to the installed position. Replace the handle cover.

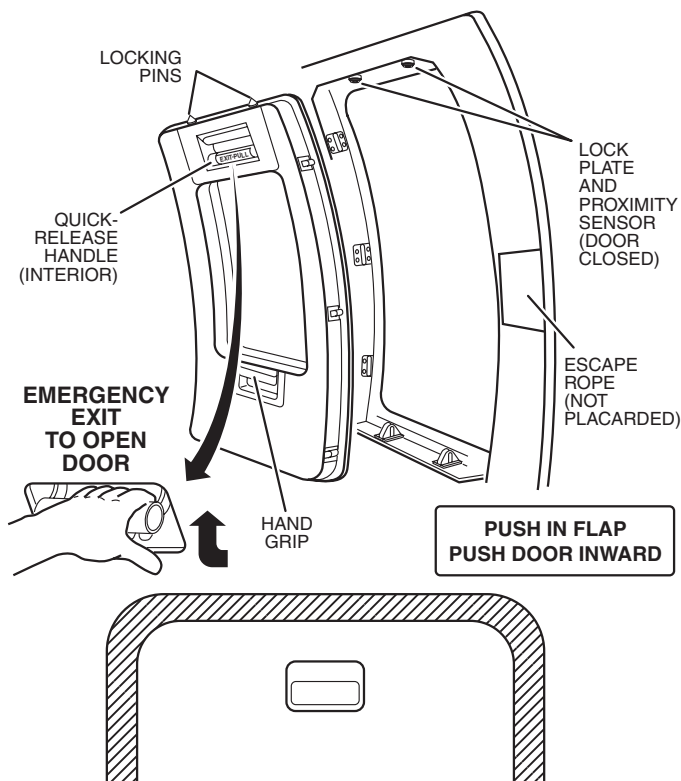


Figure 1-32 Overwing Emergency Exits



Aft Equipment Bay Door

The removable aft equipment bay door (Figure 1-33) mounts on the bottom of the aft fuselage on the aircraft center line and opens downward. With the handle unlocked and the trigger plate pushed, the handle ejects out from its recess in the door. Turning the handle 90° clockwise or counterclockwise disengages or engages two lock-pins from sockets on the adjacent fuselage structure. The door is manually opened or closed. To set the handle in its recess, align it with the recess then push it in until the push plate engages with the spring-loaded latch.

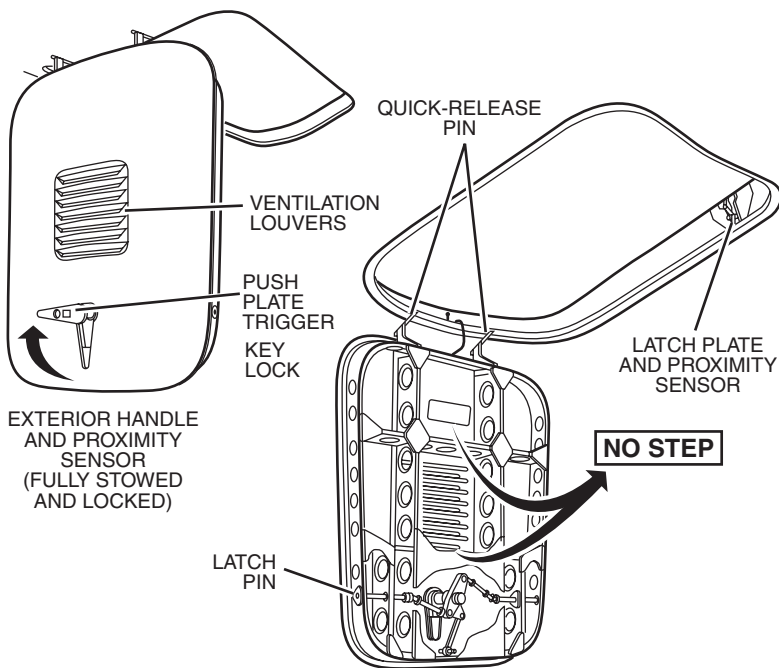


Figure 1-33 Aft Equipment Bay Door



Cargo Bay Door

The cargo bay door (Figure 1-34) is on the left side of the fuselage below the engine pylon. A spring assists the door to open inward and upward on tracks when operating the door handle. Pressing the push plate extends the door handle for operation. Rotating the handle counterclockwise (OPEN) or clockwise (CLOSE) disengages or engages latch pins interfacing with the adjacent fuselage. To close the door, it is manually closed, the handle rotates to the CLOSED position, and the handle pushed into its recess for stowage.

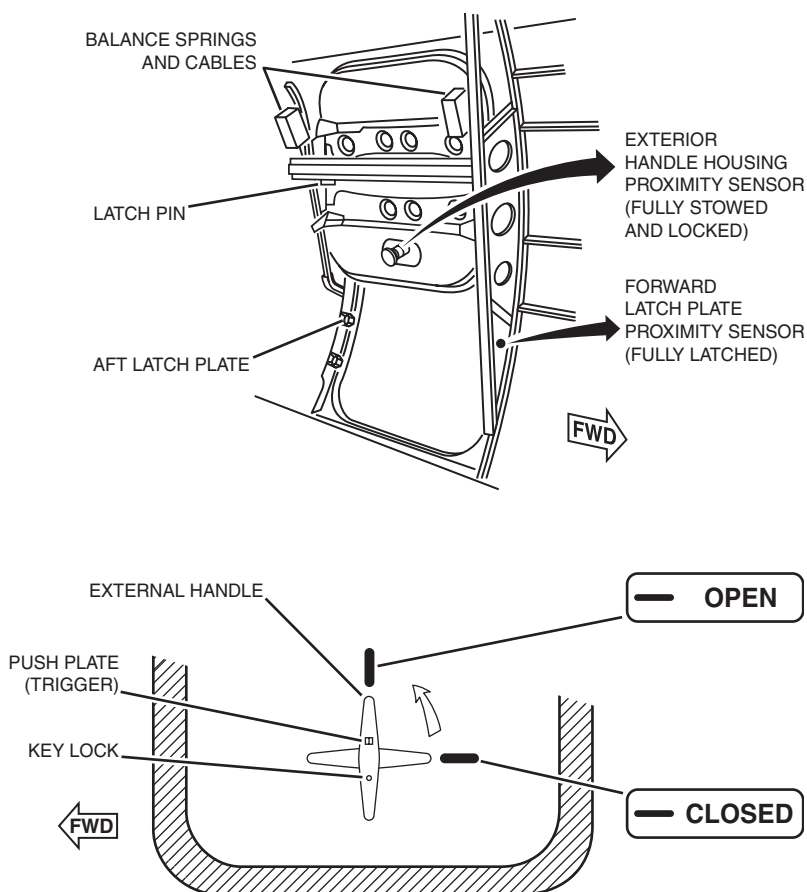


Figure 1-34 Cargo Bay Door



Door Warning System

The door warning system provides indications to the crew about the condition and safety of the following pressurized aircraft doors:

- Passenger door
- Galley service door
- Avionics bay door
- Overwing emergency exits
- Cargo bay door

Door warning system components include the following:

- Proximity sensor electronic unit (PSEU)
- Proximity sensors (12)
- Proximity switches (6)
- Microswitches (2)

The PSEU uses information from the proximity switches, sensors, and microswitches to send signals to the engine indication and crew alerting system (EICAS). Door warning system information displayed on the EICAS primary page includes warnings and cautions on individual doors that are improperly secured (Figure 1-35).

EICAS Indications

Primary Display—Primary Page (Figure 1-35)

Warning Messages (Red)

PASSENGER DOOR—This red warning message comes on to indicate that the passenger door is unsafe. **DOOR** aural comes on when engines are running.

Caution Messages (Amber)

SERVICE DOOR Caution—Comes on to indicate that galley/service door is unlocked/unsafe.

CARGO DOOR Caution—Comes on to indicate that cargo bay door is unsafe.

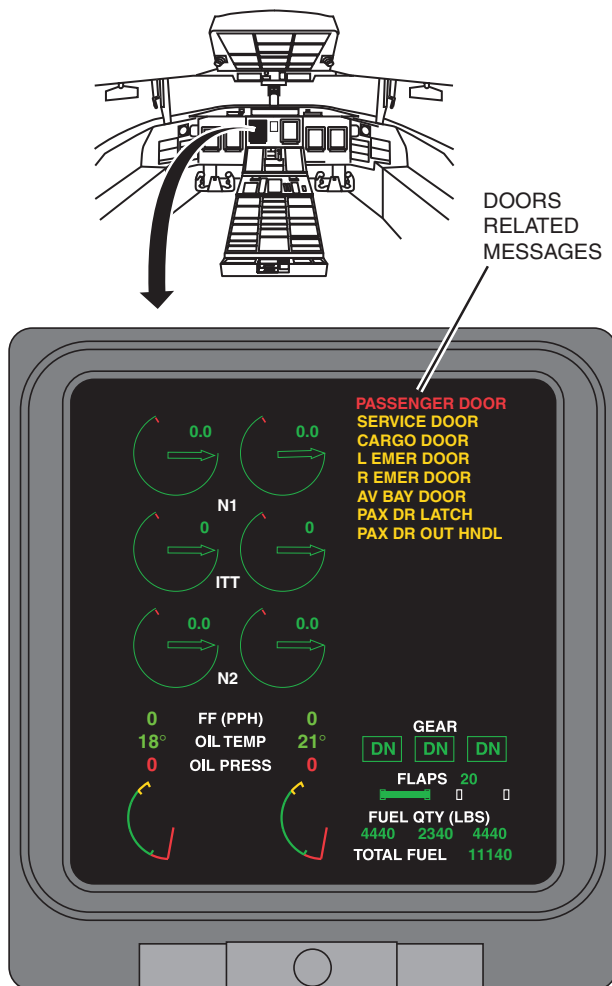


Figure 1-35 EICAS Primary Display—Primary Page

L(R) EMER DOOR Caution—Comes on to indicate that applicable emergency exit is unsafe

AV BAY DOOR Caution—Comes on to indicate that avionics bay door is unsafe



PAX DR LATCH Caution—Comes on to indicate that the passenger door is not fully latched

PAX DR OUT HNDL Caution—Comes on to indicate that the passenger door outer handle is not stowed

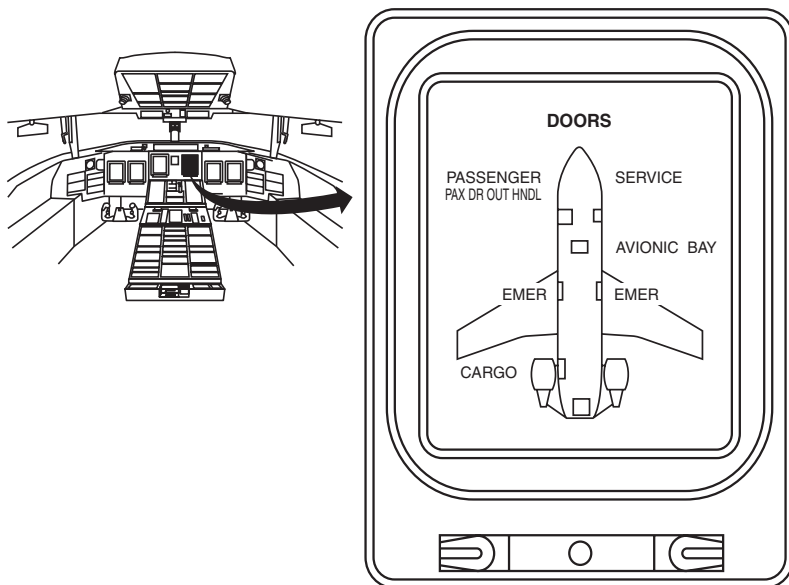


Figure 1-36 EICAS Secondary Page—DOORS Page

NOTE

Half-intensity magenta is displayed when the proximity sensors and weight-on-wheels (WOW) switches cannot agree on door state.



The EICAS secondary display DOORS page (Figure 1-36) provides a status display of the doors in the door warning system. Door outlines on the EICAS synoptic page provide an indication of the door condition. Outlines are usually the same color as the messages on the EICAS display.

WINDOWS

There is a right windshield and a left windshield (Figure 1-37). Each windshield mounts at the front of the flight compartment on either side of the aircraft center line. Each windshield is a bonded assembly and includes a heating-element film to prevent ice and condensation from forming on it.

There is a left side window and a right side window immediately aft of the left and right windshields. Each side window is a bonded assembly and includes a heating-element film to prevent condensation from forming on it.

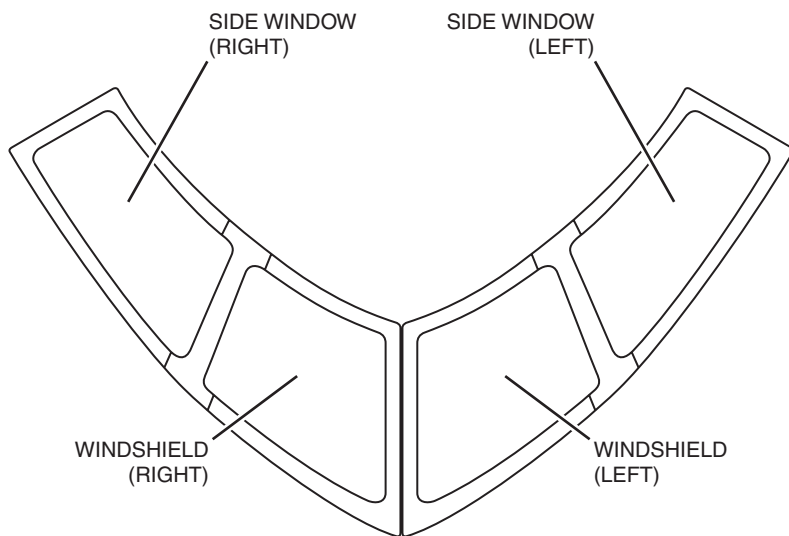


Figure 1-37 Flight Compartment Windows



The 26-passenger compartment windows include 12 on the left side, 11 on the right side, one in each overwing emergency exit door, and one in the galley service door.

NACELLES/PYLONS

Each nacelle (Figure 1-38) forms an aerodynamic, protective structure around an engine. It also provides aerodynamic surfaces to direct air into, through, and out of the structure.

The pylons are aerodynamic fairing containing the engine-mounting structure and all connections between the aircraft and the power plant. Pylon elements include the primary and secondary structures.

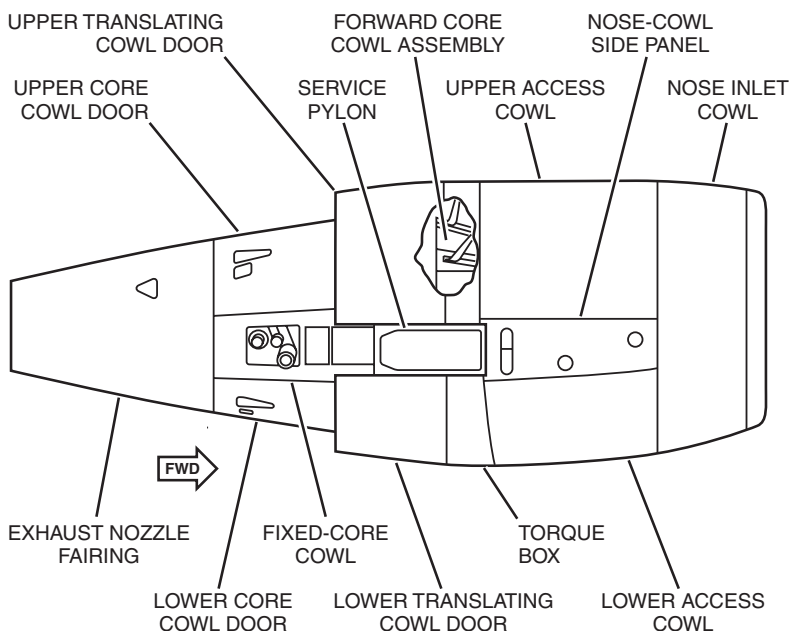


Figure 1-38 Cowling Components



WINGS

The fully-cantilevered, one-piece, sweptback wing (Figure 1-39) is the primary load-carrying aircraft structure. At the bottom of the fuselage midsection, the wing attaches to the fuselage-keel longerons and fuselage frames. The wing attaches to the fuselage-keel longerons at the center of the front and rear spars. It also attaches to the fuselage frames at three locations on each side of the wing center section and at two locations on the rear spar. Each wing also includes attachments for flight control surfaces as well as integral fuel tanks.

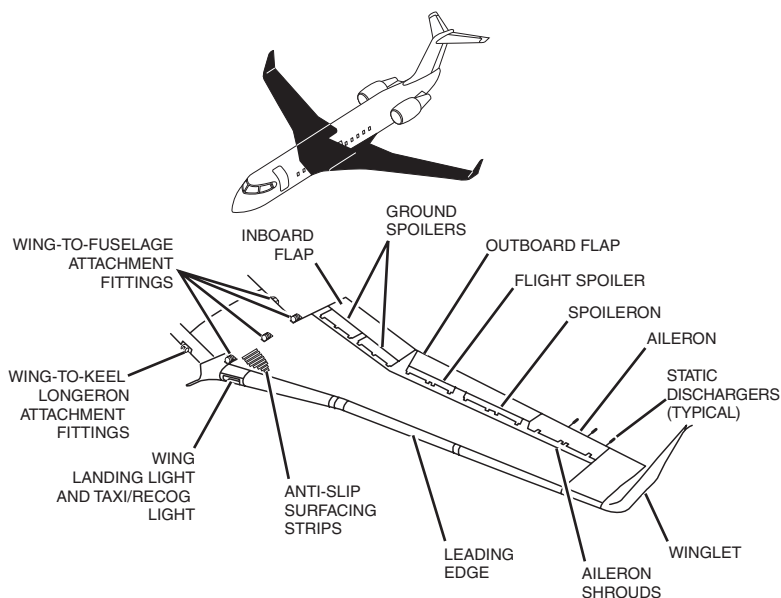


Figure 1-39 Wings



STABILIZERS

The stabilizers (Figure 1-40) are aerodynamic structures, which provide stability around the aircraft's lateral and vertical axis. The stabilizers make a T-shaped empennage with the horizontal stabilizer mounted at the top of the vertical stabilizer. Subassemblies of the stabilizer group includes the following:

- Horizontal stabilizer
- Elevators
- Vertical stabilizer
- Rudder

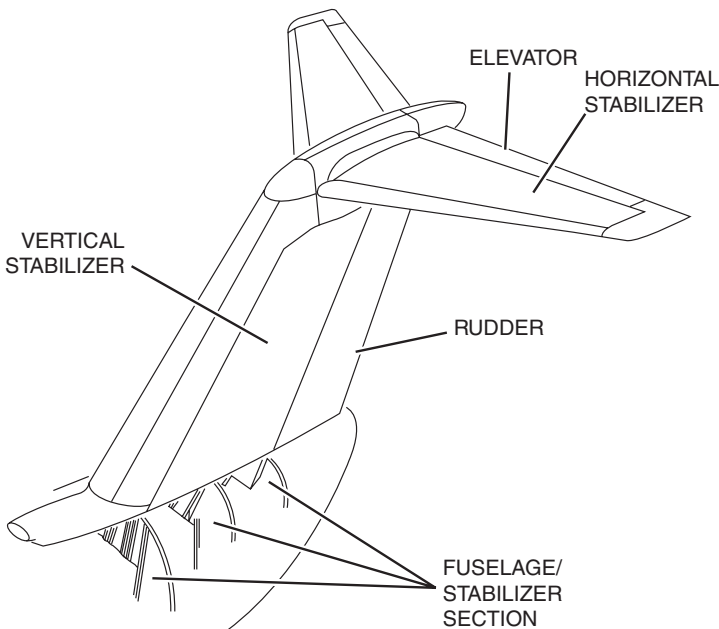


Figure 1-40 Stabilizers



AIRPLANE SYSTEMS

GENERAL

The following is a brief introduction to the major aircraft systems for the Canadair Regional Jet. Detailed descriptions of the systems are in individual chapters of this manual.

AIR-CONDITIONING/PRESSURIZATION SYSTEM

The environmental control system (ECS) (Figure 1-41) provides temperature and pressure regulated air for ventilating and pressurizing the cockpit and passenger cabin. The system also provides cooling air for the avionics and equipment racks. Exhaust air, from the cabin and cockpit areas, is used to ventilate and pressurize the

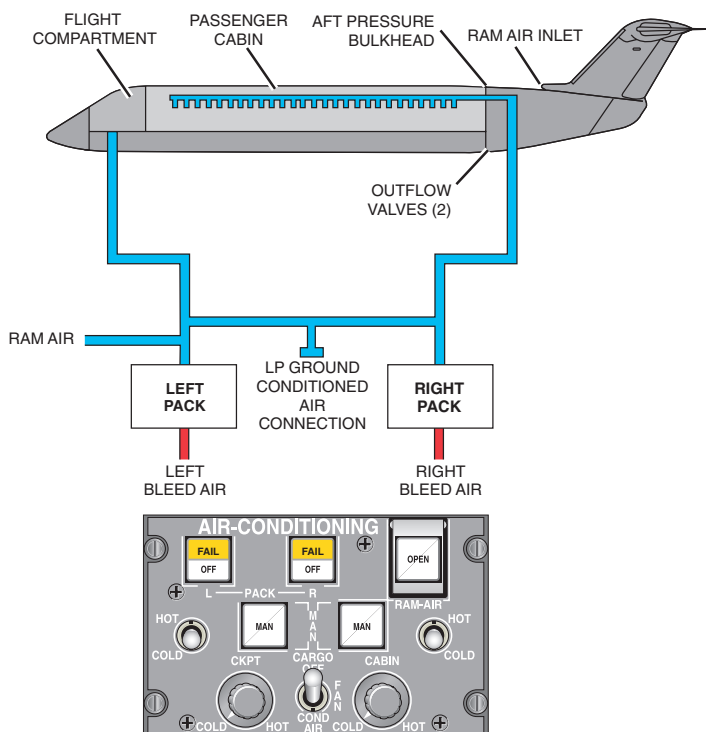


Figure 1-41 Environmental Control System



compartments containing avionics equipment, before being exhausted through two outflow valves.

During ground operations, pneumatic air to operate the ECS can be obtained from any of the following:

- Ground power cart connected to the airplane
- Auxiliary power unit (APU)
- Either or both engines

During flight, normally the engines supply bleed air (10th stage) for operating the air-conditioning, pressurization, and avionics cooling systems.

ECS warnings and cautions are presented on the EICAS primary display. ECS advisory and status messages are presented on the EICAS secondary display. General views of airplane temperature and pressure information are presented through synoptic diagrams on the EICAS secondary display (after selecting the ECS page on the EICAS control panel).

AURAL/VISUAL WARNING SYSTEM

The aural and visual warning system provides aural, visual, and/or tactile indications. These indications warn of potentially unsafe operating conditions or airplane configurations, system malfunctions, and non-normal situations.

Indications can be generated by the following:

- Crew alerting subsystem within the EICAS
- Enhanced ground proximity warning system
- Traffic alert and collision avoidance system
- Altitude alert portion of the air data computer
- Stick shaker portion of the stall protection system

The crew alerting system portion of the EICAS continually monitors all airplane systems. If an operationally significant fault occurs on a system, the EICAS displays a crew alerting message on the left (primary) EICAS display unit (Figure 1-42). All crew



alerting system messages are divided into one of four categories: warnings, cautions, advisories, or status.

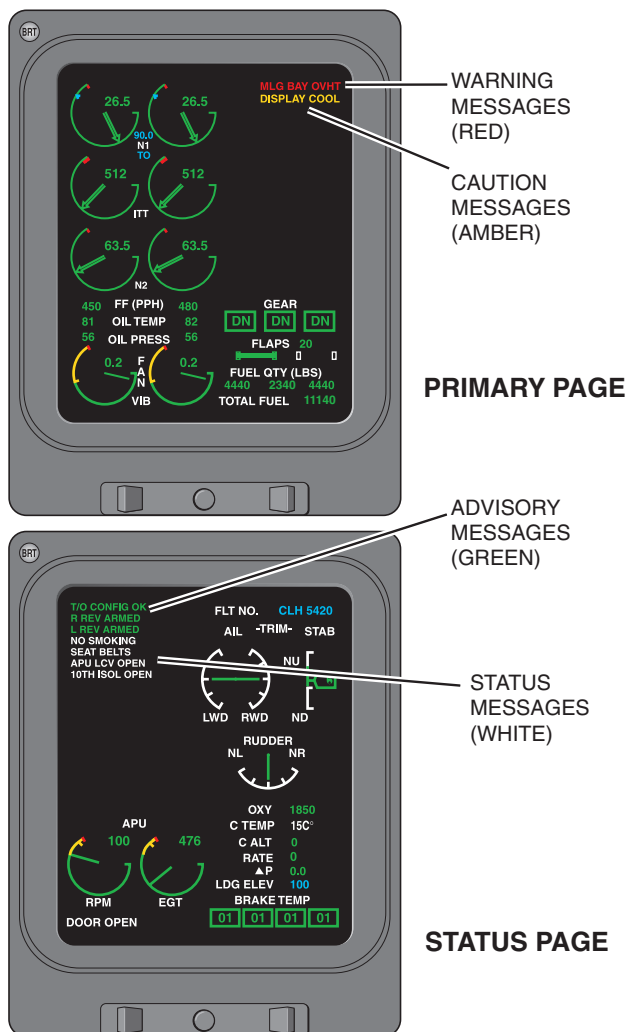


Figure 1-42 EICAS Crew Alerting Messages



In addition to the display messages, some crew alerts are also indicated by aural tones, voice advisories, and MASTER WARNING and MASTER CAUTION lights. EICAS can also illuminate the appropriate switchlight on the system control panel to prompt corrective crew action. The stall warning system generates the stick shaker indication under certain unsafe flight conditions.

AUTOMATIC FLIGHT CONTROL SYSTEM

The automatic flight control system (AFCS) is an integrated autopilot and flight director. The AFCS data is supplied to dual independent flight directors, two-axis autopilot, and automatic pitch trim system for speed and altitude correction. The AFCS also controls automatic yaw damping. Working in conjunction with the AFCS, the integrated avionics processor system (IAPS) operates as a data concentrator for the avionics system. AFCS controls are on the flight control panel, YAW DAMPER panel, and each control wheel (Figure 1-43).

The AFCS has two primary modes of operation:

- Autopilot—Used to automatically control the aircraft flight control surfaces
- Flight director—Provides flight guidance commands, which the pilots use to control the aircraft flight control surfaces

The IAPS interfaces with the flight control, flight management, and maintenance diagnostic computers. Concentrated data is then provided to the avionics system.

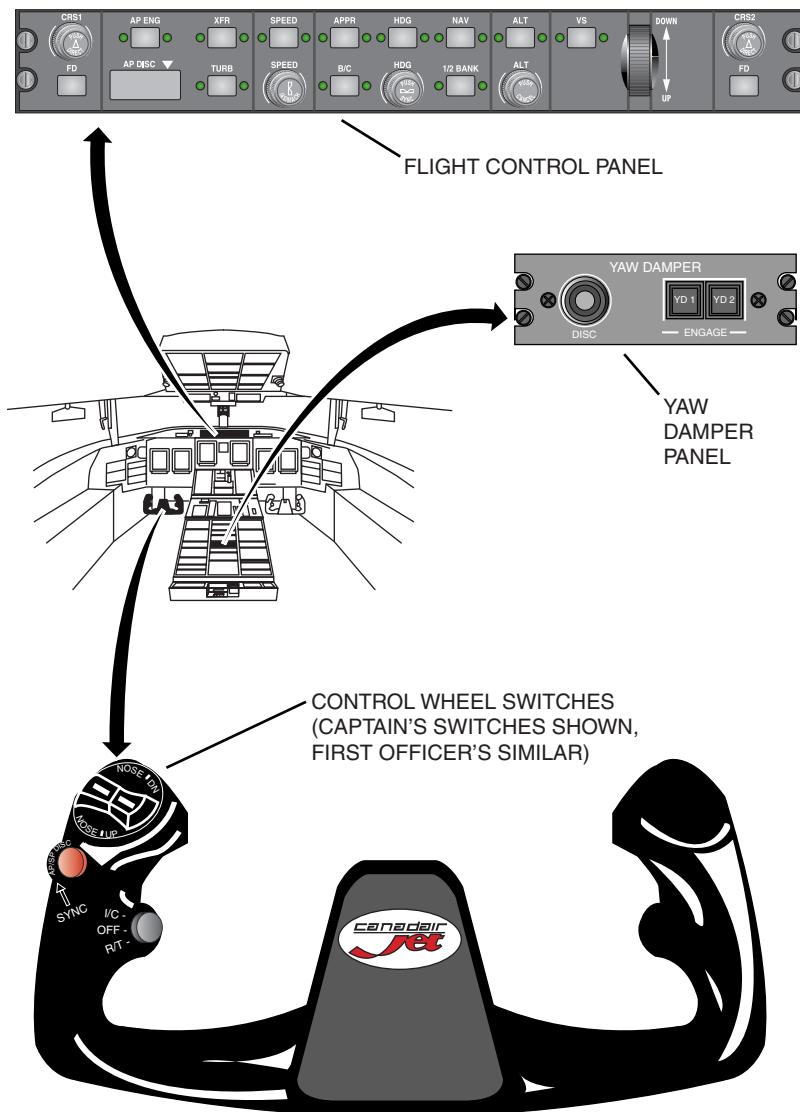


Figure 1-43 AFCS Controls



AUXILIARY POWER UNIT

The auxiliary power unit (APU) is a gas-turbine engine equipped with a gearbox driving an oil-cooled 30-kVA, AC generator. The APU's primary function is to drive the AC electrical generator. The APU has an integral bleed port, supplying pneumatic power to drive the main engine air-turbine starters or the air-cycle machines within the air-conditioning packs (Figure 1-44).

The APU is in a fireproof enclosure in the tail of the airplane. An APU air-inlet door is on the top of the fuselage. APU exhaust gases pass through a muffler to an outlet beneath the right engine. Oil cooler air exhaust exits through the APU exhaust. Electrical power from the APU battery starts the APU. Fuel from both wing tanks is used to operate the APU. The APU's control circuits are fed from the main battery.

An electronic control unit (ECU) controls the APU. The ECU monitors all sensors and switches, sets up the appropriate fuel acceleration and temperature schedules, and relays appropriate operating data to the EICAS displays. The APU control system ensures electrical load priority by reducing bleed airflow when exhaust gas temperature limits are approached.

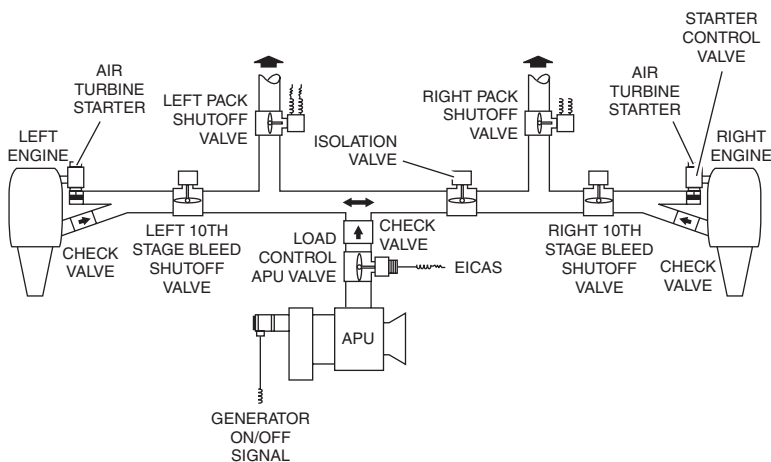


Figure 1-44 APU Bleed-Air Distribution



COMMUNICATIONS

The aircraft communication system provides communication between the crewmembers, crewmembers and passengers, two-way communication with ground stations, and communication with other aircraft or the ground crew. The very high frequency communication system provide speech communication between ground and air radio stations.

A few passenger-related systems provide public addressing functions within the aircraft. The audio integrating system ties all the radio functions between the independent systems together for use within the aircraft.

A cockpit voice recorder provides two hours (30 minutes for older model aircraft) of continuous recording of radio transmissions and cockpit sounds. The radio tuning unit tunes and changes frequencies for the airplane radios. The standby control system functions as a backup to the radio tuning unit.



ELECTRICAL POWER SYSTEM

The electrical power system has 115-VAC and 28-VDC systems, which generate and distribute power to the electrical components (Figure 1-45). The electrical system operates on airplane-generated power, or on external AC or DC power supplied from ground power equipment.

Two AC, integrated-drive generators (one on each engine) supply primary airplane-generated power. The auxiliary AC generation system consists of an APU in the tail of the aircraft. The emergency AC generation system is powered by an air-driven generator (ADG).

DC power is obtained from five 100-amp transformer rectifier units (TRUs), which convert AC power into DC power. The TRUs supply all aircraft DC buses except the battery-direct buses. Only the batteries supply the battery-direct buses.

The battery system includes the main battery, APU battery, and battery buses. Two battery chargers keep the main and APU batteries charged.

Both AC and DC power is distributed throughout the aircraft by the electrical power distribution systems. Backup emergency systems supply power to essential systems as needed in emergency situations. AC and DC power are controlled, distributed, and monitored through separate control panels circuit breakers, busses, and gages.

EMERGENCY EQUIPMENT

Emergency equipment refers to the systems and equipment which are essential to the safety of passengers and crew during a fire, rapid decompression, ditching, and emergency evacuation. These include the following equipment:

- Oxygen equipment (portable and fixed)
- Evacuation devices (crash axe, escape path marking system, emergency lighting and emergency exits)
- Fire fighting equipment (portable and fixed)
- Over water emergency equipment (life vests and seat cushion flotation devices)

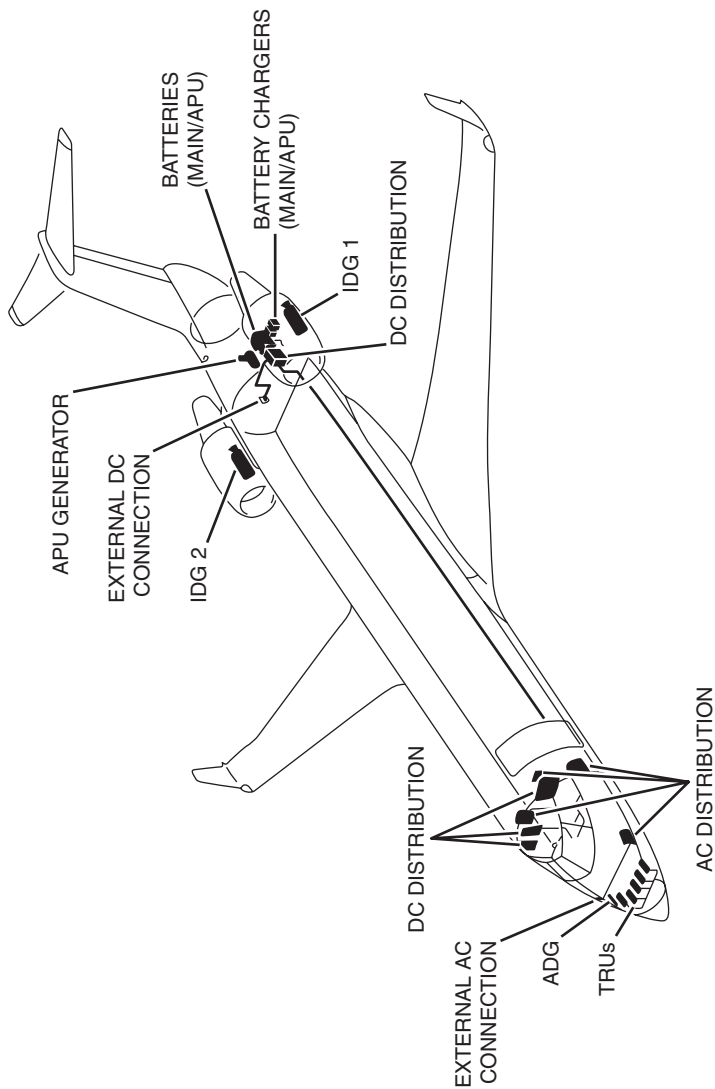


Figure 1-45 Electrical Power System



FIRE PROTECTION SYSTEM

Fire protection includes those fixed and portable components that identify fire and overheat conditions, as well as provide warnings of fire, overheat, and smoke in the airplane. The fire protection system also stores the fire extinguishing agent and applies it to all protected areas of the airplane when needed.

The fire protection system allows the flight crew to detect and extinguish a fire in the engine nacelles and in the auxiliary power unit (APU) compartment. Smoke detection and fire extinguishing are provided in the cargo compartment. An overheat detection system, in each engine jetpipe and pylon, permits the flight crew to monitor any overheat condition in those areas.

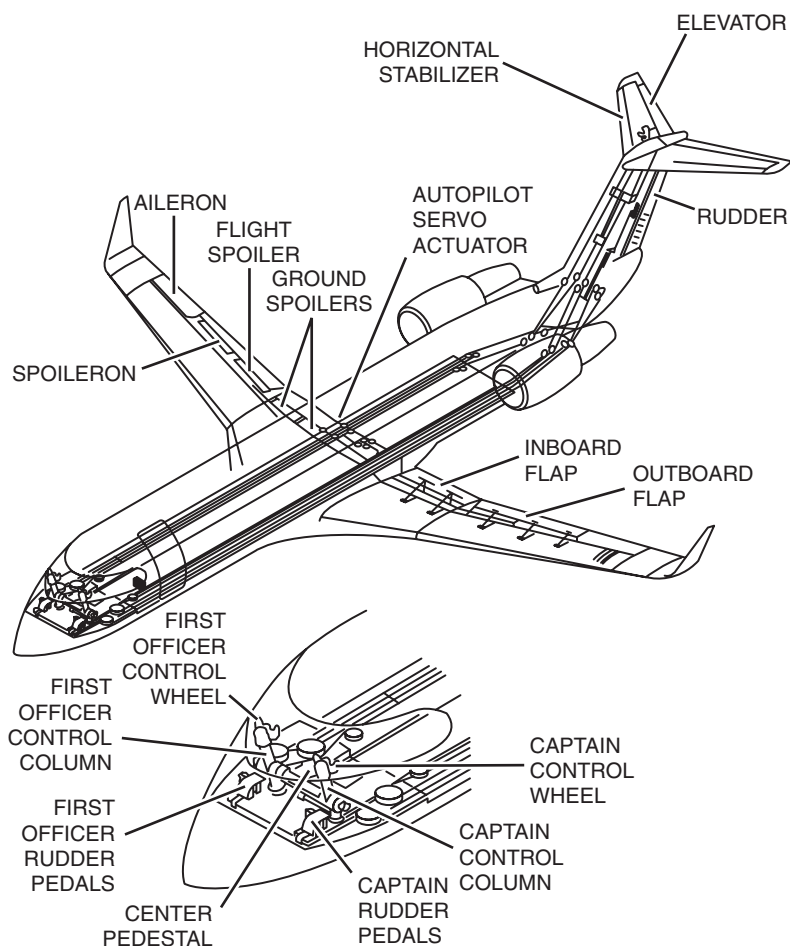
The main gear wheel wells have a similar overheat detection system. The airplane is equipped with a lavatory smoke detector and an automatic built-in fire extinguisher. Both the detection and extinguishing systems permit the flight crew to test and monitor for possible system faults.

FLIGHT CONTROL SYSTEM

The flight controls (Figure 1-46) are divided into primary flight controls, secondary flight controls, and the stall protection system. The primary flight controls (aileron, rudder, and elevator) are manipulated by the flight crew to control the aircraft in the vertical and horizontal planes. The secondary flight controls consist of horizontal stabilizer, primary flight control trim systems, ground and flight spoilers, and high lift devices (flaps). The stall prevention system is an automatic system that warns the crew of dangerously high pitch attitudes and near-stall conditions.

The ailerons and elevator move in response to positioning the captain and first officer control columns and control wheels. The rudder is positioned through the captain and first officer rudder pedals.

The trim systems augment the primary flight controls by compensating for varying aerodynamic forces at different airspeeds and gross weights. For the rudder and aileron, this is done by using trim to

**Figure 1-46 Flight Controls**

adjust the neutral position of the primary flight control, which reduces the force required to move the control surfaces. For the elevator, the entire horizontal stabilizer is moved.



FLIGHT INSTRUMENTS

The flight instruments (Figure 1-47) includes pitot-static data, air data, attitude and heading data, and electronic flight instruments system information. This also includes the basic flight instruments (digital/analog) and related components, which provide the following information to the flight crew:

- Altitude (barometric/radio)
- Airspeed (MACH/KIAS)
- Airspeed trend
- Vertical speed
- Overspeed warning
- True airspeed
- Temperature data
- Airplane attitude
- Heading information
- Navigation information

Each primary flight display (PFD) and multifunction display (MFD) receives altitude, heading, airspeed, and attitude data from the on-side sensors. Flight crew access to display format and display controls is through the display control panels (DCP).

Each integrated display (PFD and MFD) is capable of generating any of the various display formats as determined by flight crew selection at the reversionary panels. If a PFD fails, the PFD format may be displayed on the adjacent MFD by actuation of the reversionary mode switch (PFD/NORM/EICAS). If an EICAS display fails, the EICAS secondary display may be displayed on the adjacent MFD.

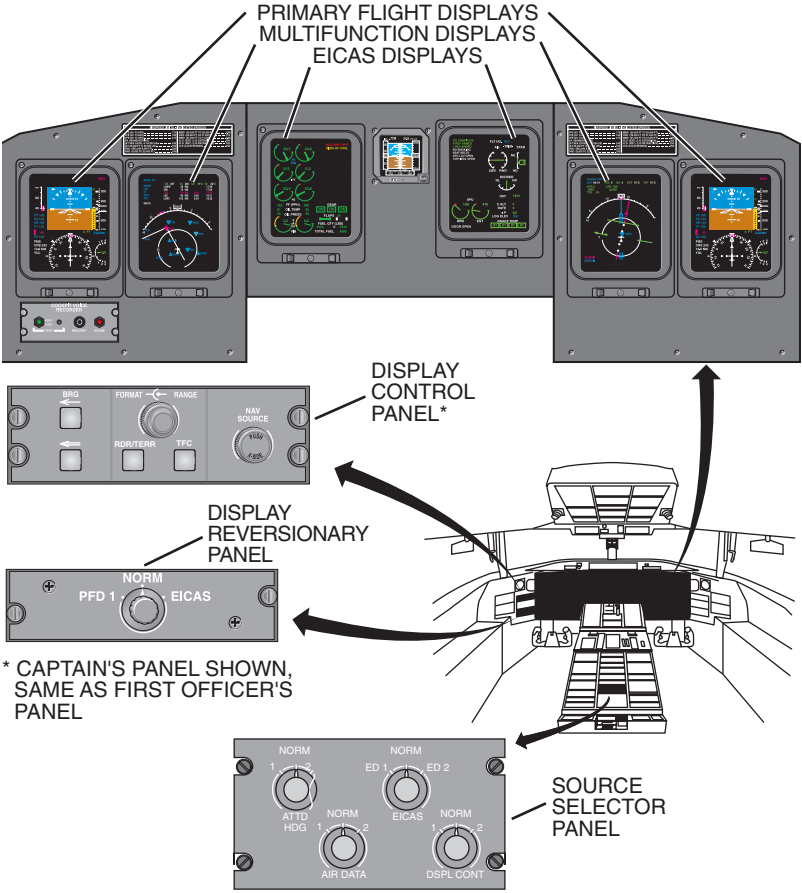


Figure 1-47 Flight Instruments



Display capability is also maintained when sensor data failure occurs. Either PFD (or MFD when in PFD format) can be configured to display data from either attitude and heading source or either air data source by operating the corresponding reversionary switch.

Display source selector switches (ATT HDG and AIR DATA) route output from the air data computer (ADC), and attitude and heading source to the flight compartment displays.

FUEL SYSTEM

The aircraft fuel system (Figure 1-48) includes provisions for fuel storage, distribution, and indicating. The storage system has two main tanks, a center tank, and collector tanks, which contain and supply constant fuel flow to the engines. Each fuel tank has overwing fill ports that permit gravity refueling. A system of air scoops, vent lines, and vent valves control pressure in the fuel tanks. This system also moves fuel between the tanks to maintain aircraft lateral balance.

The distribution system controls refueling, defueling, and the flow of fuel to the engines and the APU. It supplies motive flow pressure to operate the ejector pumps of the fuel system. The distribution system supplies standby engine feed in case of a fuel system failure.

The indicating system monitors the fuel level in the fuel system. The fuel system computer uses this information to display fuel quantity and to control the automatic operation of the fuel system.

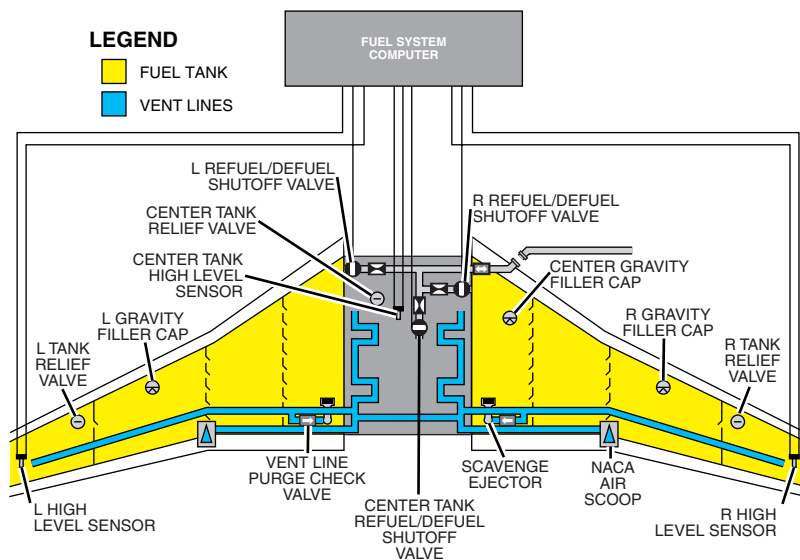


Figure 1-48 Fuel System



HYDRAULIC POWER SYSTEM

The airplane has three separate and independent systems (Figure 1-49). These systems supply hydraulic power to operate the flight controls, main and nose landing gear, nosewheel steering, and brakes. The three systems are identified as the No. 1, No. 2, and No. 3 hydraulic systems.

Each of the three hydraulic systems operate at a nominal pressure of 3,000 psi. The systems provide flight compartment indications of system pressure, quantity, temperature, and shutoff valve position.

ICE AND RAIN PROTECTION SYSTEM

The airplane has an anti-icing detection system and related anti-icing equipment that prevents ice from collecting on the airplane. Electrical power and engine bleed air provide the anti-icing capabilities. Wiper controls also allow greater visibility during rain. Additional heater elements prevent frozen drain lines during waste disposal.

Electric heating element prevent ice formation on the air data system (ADS) probes and sensors and remove condensation from the flight compartment windshields and side windows. Bleed air provides anti-icing heat for the wing and engine cowl areas.

Anti-ice controls are on the ANTI-ICE control panel in the flight compartment. Wiper switches are on each captain and first officer side panel. The galley control panel has the switch for controlling drain line heating. Anti-ice warning, caution, status, and advisory messages appear on the primary or secondary EICAS displays.

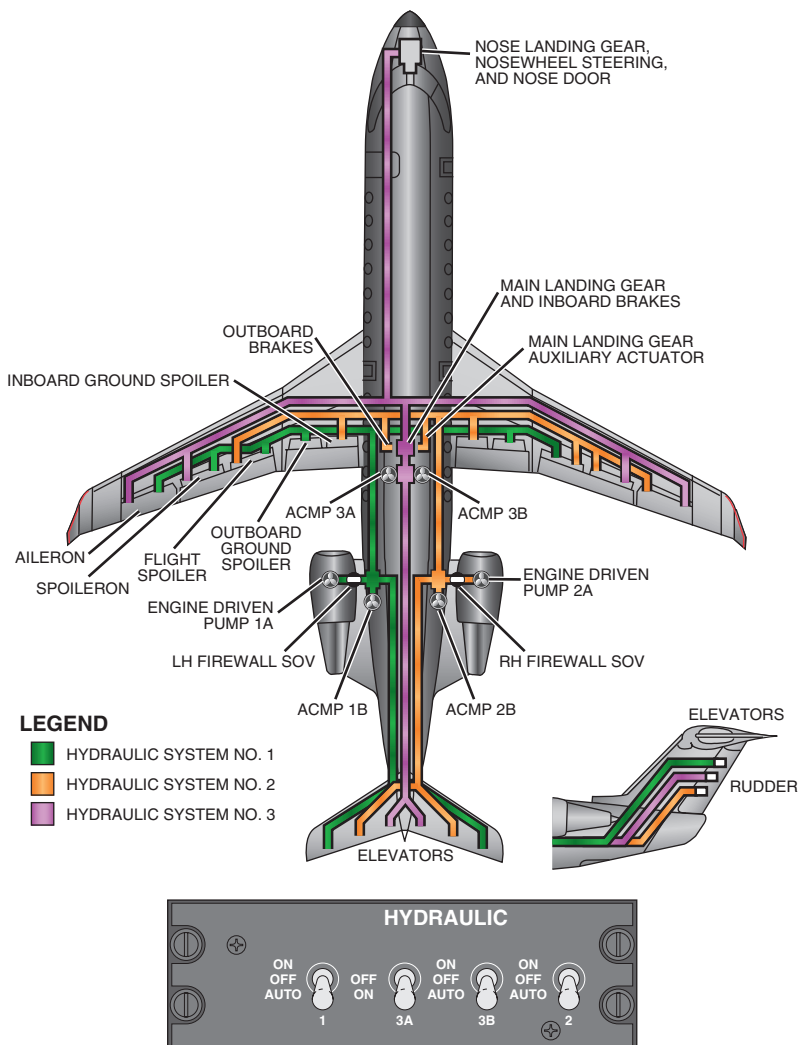


Figure 1-49 Hydraulic System



LANDING GEAR

The landing gear system is the retractable, tricycle-type consisting of two main landing gear assemblies and a nose landing gear assembly (Figure 1-50). Each assembly has a nitrogen/oil shock strut. On the ground, all three landing gear assemblies are secured with gear locking pins.

The functions and subsystems associated with the landing gear system are:

- Landing gear and door retraction and extension
- Alternate landing gear extension
- Main landing gear overheat detection
- Brake system
- Brake temperature monitoring system (BTMS)
- Antiskid
- Nose wheel steering system
- Proximity sensing electronic unit (PSEU)

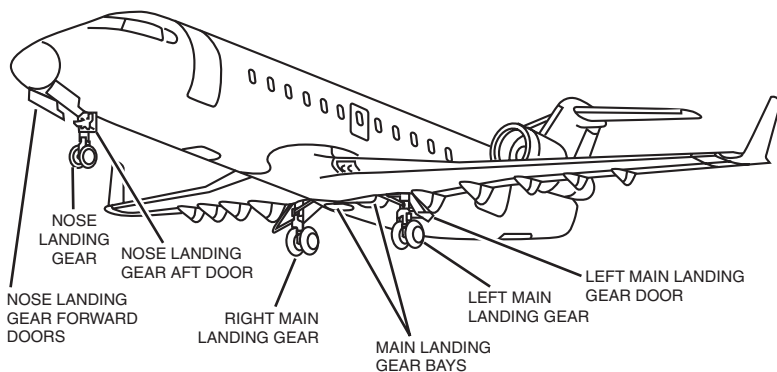


Figure 1-50 Landing Gear



Normal landing gear retraction or extension initiates through the landing gear control lever. The retraction or extension signal is sent to the PSEU which monitors various landing gear proximity sensing inputs and weight-on-wheels (WOW) inputs. Landing gear door's automatically sequence with landing gear operation.

Should a failure occur in the landing gear control system or in the No. 3 hydraulic system, landing gear extension is still possible by pulling the landing gear manual release handle.

Each wheel of the main landing gear is equipped with self-adjusting, multi-disc brakes. Pulling the parking brake handle, then rotating 90°, while fully depressing both ruder pedals secures the brakes in the applied position. The BTMS monitors each brake and provides temperature readouts on the EICAS secondary display.

The nose wheel steering system is a steer-by-wire system. Steering control is initiated by the steering tiller and/or by the rudder pedals and powered by the No. 3 hydraulic system pressure.

LIGHTING SYSTEM

The major areas of the airplane lighting system are flight compartment lighting, passenger cabin lighting, baggage compartment and service compartment lighting, and exterior lighting.

Flight compartment area lighting is provided by a dome light at the flight compartment door threshold area. CRT display fluorescent flood, integral instrument and instrument panel lights provide instrument lighting. Chart and map lights are provided for miscellaneous lighting requirements.



Controls for the flight compartment lights (Figure 1-51) are on the overhead panel, left and right side instrument panels, and at the rear of the center pedestal. The intensity of the indicator lights on the overhead, glareshield, side panels and pedestal panels, are controlled by an IND LTs intensity selector on the center pedestal. A LAMP TEST switch is also provided to test the indicator lights. Limited lighting is available from battery power for flight compartment instrument panels and floor lighting.

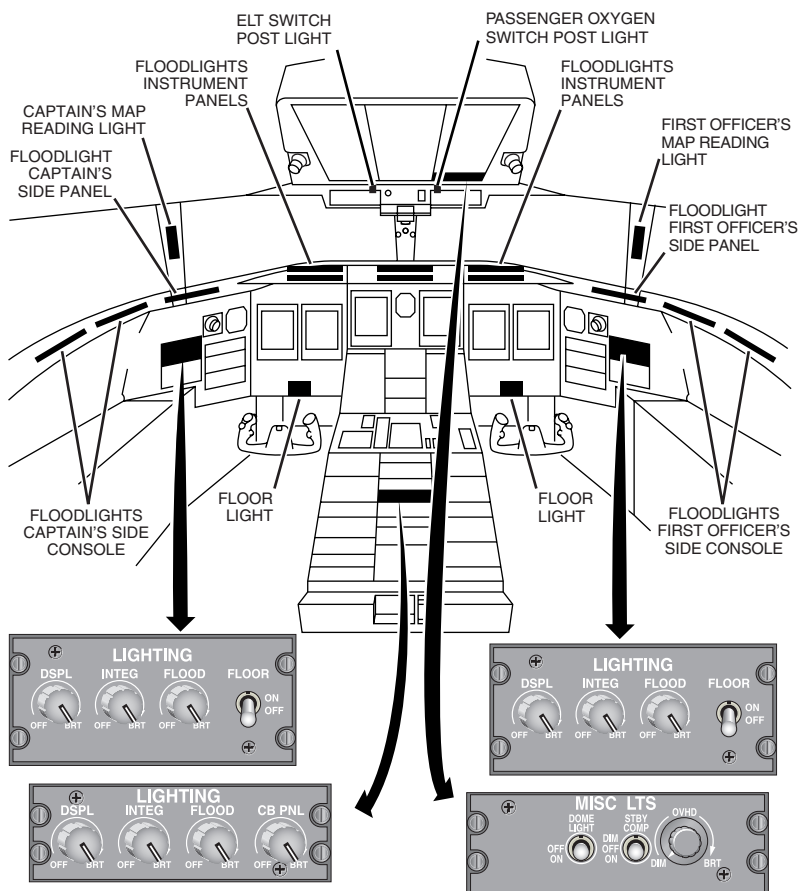


Figure 1-51 Lighting



NAVIGATION SYSTEM

The navigation system includes those units and components which provide the following data to the flight crew:

- **Position Systems**—Dual VHF navigation systems (providing VOR, LOC, GS, and MB signals), dual ADF systems, dual DME, and ATC transponder systems
- **Independent Position Systems**—Weather radar, traffic alert and collision avoidance, and enhanced ground proximity warning systems (with windshear detection)

The navigation receivers are tuned by CRT-based radio tuning units (RTUs) and navigation data is displayed on the PFDs and MFDs. Navigation data is displayed on the two MFDs in a full compass rose format (HSI mode) or 120° compass rose format (navaid sector or VOR map modes). The partial (120°) compass rose on the PFDs echoes the MFD bearing information for the navigation aid selected on the DCP and tuned at the RTU. VOR, DME, ADF, and MB audio monitoring is provided at three audio control panels.

Display control panels are on the captain's and first officer's side panels. These panels permit control over PFD and MFD format navigation source and bearing source display.



POWERPLANT

The airplane is equipped with two General Electric CF34-3B1, high-bypass ratio turbofan engines, which have a normal takeoff thrust rating of 8,729 pounds (Figure 1-52). An automatic performance reserve (APR) system is installed. If an engine fails, the APR system, when operating, increases thrust on the remaining engine to 9,220 pounds (thrust increase equivalent to 169 rpm N_1).

The engine is a dual-rotor assembly consisting of a fan rotor (N_1) and a compressor rotor (N_2). The N_1 rotor consists of a single-stage fan connected through a shaft to a 4-stage, low-pressure turbine. The N_2 rotor is a 14-stage, axial-flow compressor connected through a shaft to a 2-stage, high-pressure turbine. Engine airflow passes through the single-stage fan and is divided into two airflow systems: core air and bypass air. A thrust reverser system deflects fan discharge (bypass) air to assist in airplane braking on the ground.

When at high thrust settings, the engine is controlled by an electronic control unit (ECU) which works in tandem with a fuel control unit (FCU). The data concentrator units (DCUs) perform engine signal analog/digital conversion, signal processing, and engine system failure detection. The DCU monitors all engine parameters during normal operation. Engine operating times, conditions, and all limits are recorded through the DCUs.

WATER/WASTE SYSTEM

The water system supplies potable water to the water dispenser and coffee maker in the galley, and wash water to the sink in the lavatory. A waste system drains, rinses, primes, and flushes the toilet. The toilet has a holding tank, which is serviced at an external servicing panel. The waste water disposal system empties through heated drain masts.

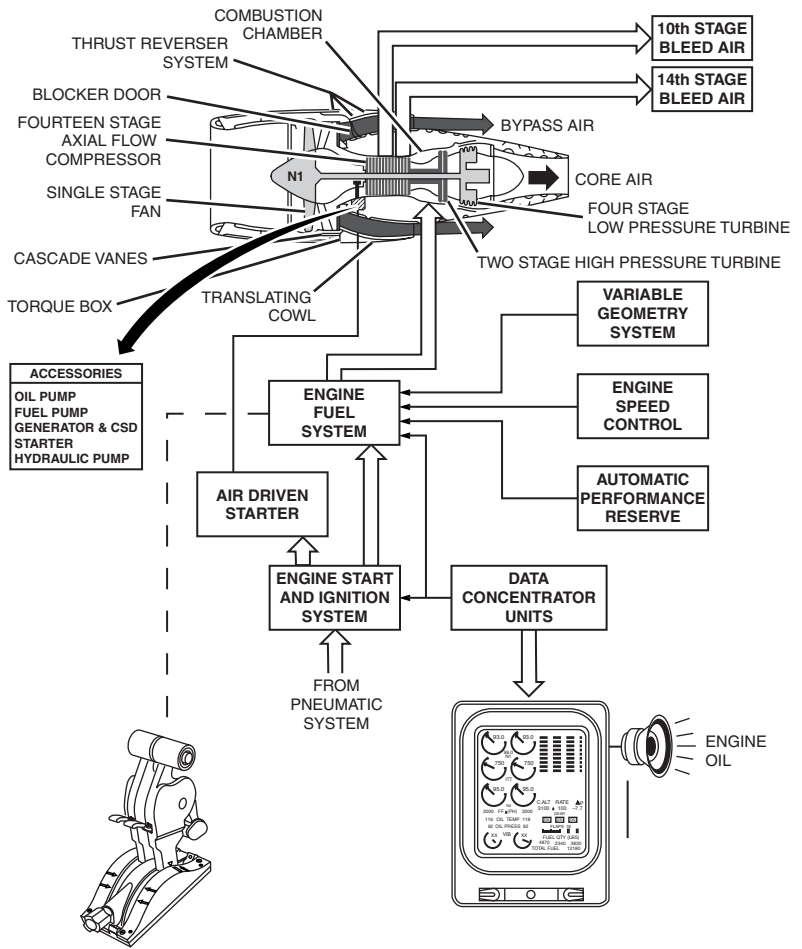


Figure 1-52 Powerplant



A temperature control system, operated from the flight attendant's galley panel (Figure 1-53), prevents freeze up of the water system. Heaters and thermoswitches in the tanks, water lines, drain lines, and drain masts prevent ice formation. Two water system servicing panels are on the exterior lower fuselage. These panels permit filling and draining of the water system.

MISCELLANEOUS

HAZARD AREAS

Aircraft hazard areas are shown in Figure 1-54 and Figure 1-55.

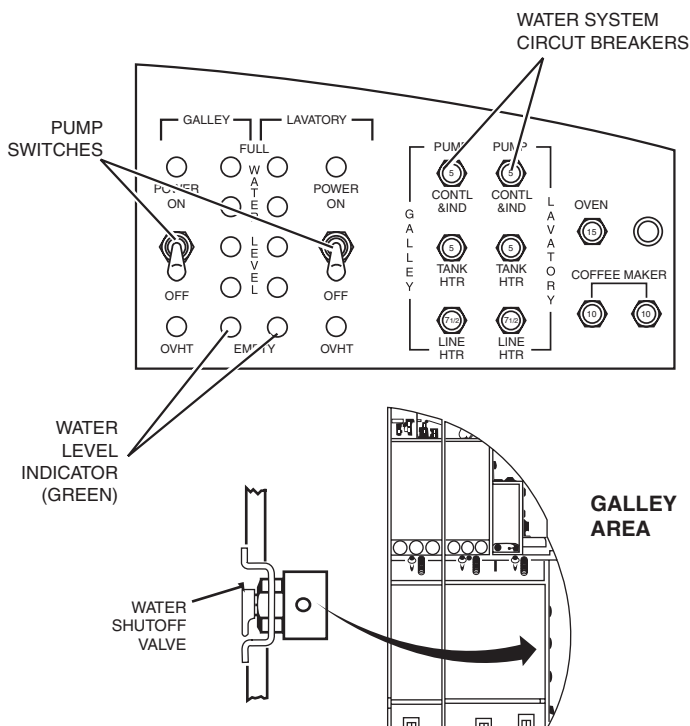


Figure 1-53 Water/Waste System Controls

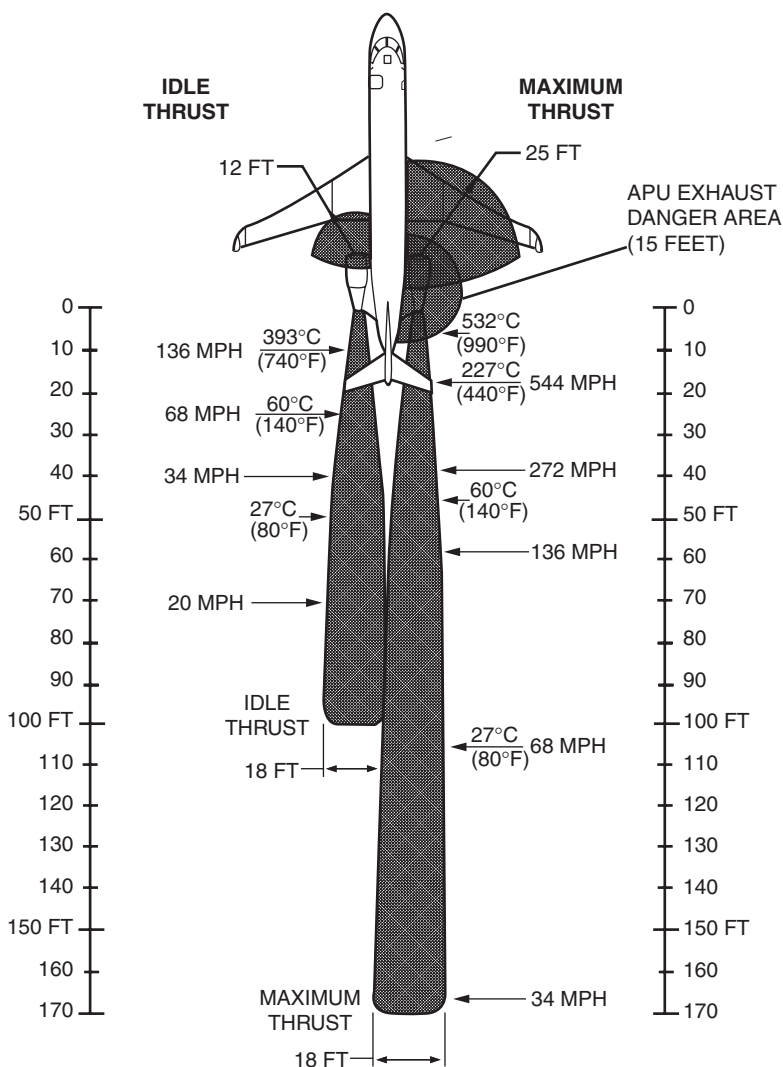


Figure 1-54 Hazard Areas—Engine and APU

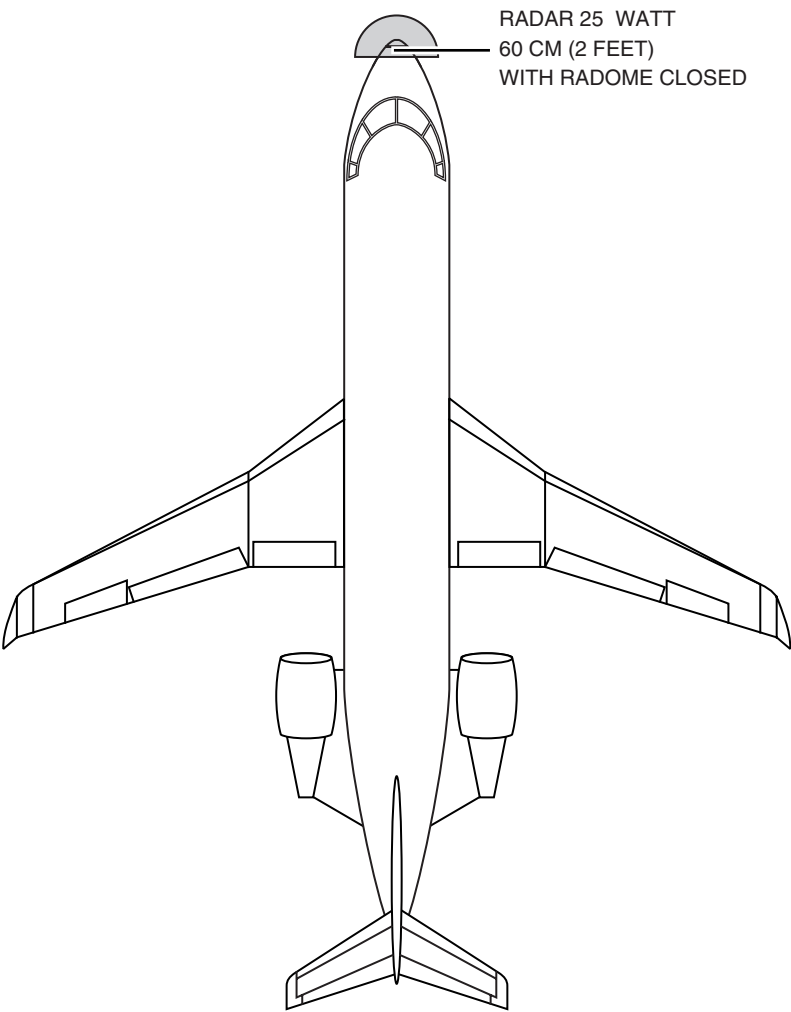


Figure 1-55 Hazard Area—Radar



CONVERSION FACTORS

Table 1-5 CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
Centimeters	0.3937	Inches
Centimeter ²	0.155	Inches ²
Centimeters ³	0.061	inches ³
Cubic feet ³	0.0283	Meters ³
Feet	0.3048	Meters
Feet ²	0.0929	Meters ²
Imperial gallons	1.201 4.546	U.S. gallons Liters
U.S. gallons	3.785 0.8327	Liters Imperial gallons
Inches	2.54	Centimeters
Inches ²	6.452	Centimeters ²
Inches ³	16.387	Centimeters ³
Kilograms	2.205	Pounds
Kilometers	0.6214 0.54	Miles Nautical miles
Kilometers per hour	0.54 0.6214	Knots Miles per hour
Knots	1.151 1.852	Miles per hour Kilometers per hour
Kilopascals	0.145	Pounds per square inch
Liters	0.2642 0.22	U.S. gallons Imperial gallons
Meters	3.281	Feet



Table 1-5 CONVERSION FACTORS (Cont)

MULTIPLY	BY	TO OBTAIN
Meters ²	10.76	Feet ²
Meters ³	35.3115	Feet ³
Miles	5,280 1.609 0.869	Feet Kilometers Nautical miles
Miles per hour	1.609 0.869	Kilometers per hour Knots
Nautical miles	1.151 1.852	Miles Meters
Pounds	0.45	Kilograms
Pounds per square inch	6.895	Kilopascals



CRJ VARIATIONS

Pinnacle Airlines operates two versions of the CRJ, which include the 200LR configured for 50 seats and the 440LR configured with 44 seats.

The 44-seater has additional underbin wardrobe and storage space in the forward cabin that contains either of the following configurations (Figure 1-56).

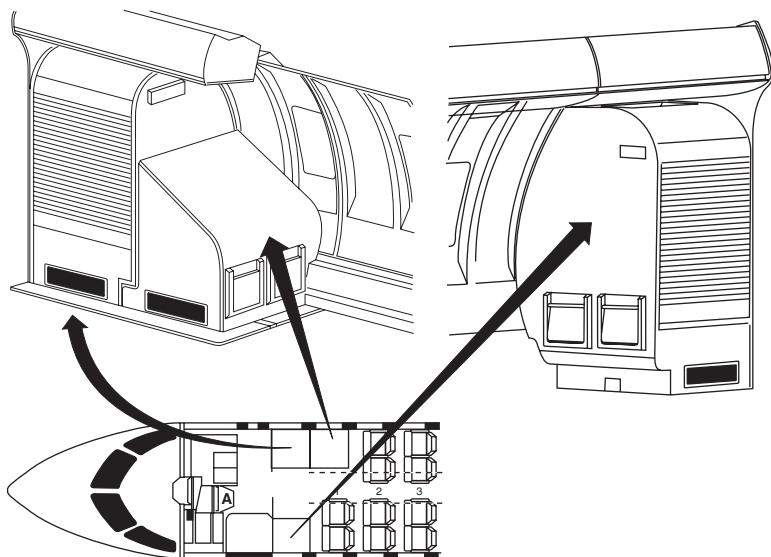
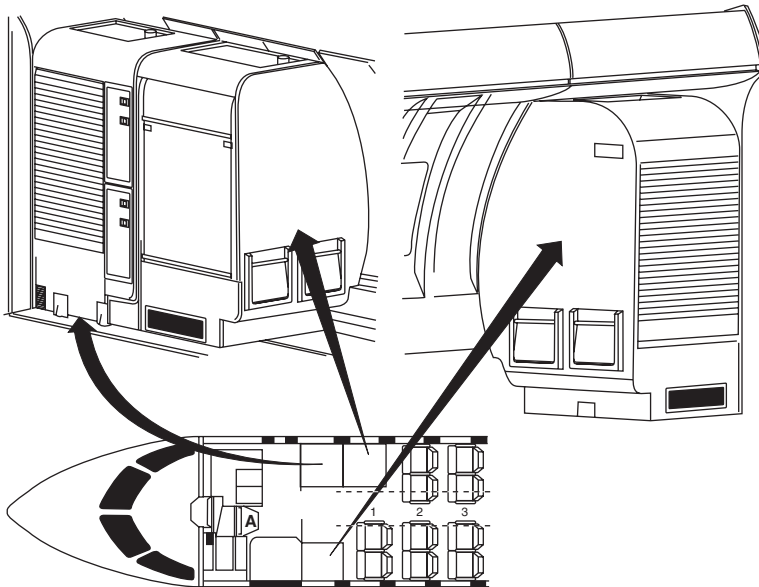


Figure 1-56 Underbin Wardrobe and Storage Space
(1 of 2)



**Figure 1-56 Underbin Wardrobe and Storage Space
 (2 of 2)**

The 44-seater may also include any or all of the following options:

- New flight attendant's intercom and lighting control panel with pushbutton switches and a sterile cockpit light (currently disabled) (Figure 1-57)
- Two portable oxygen bottles located in the right side forward overhead bin, instead of the flight attendant's forward compartment (Figure 1-58)
- Updated flight attendant's forward compartment (Figure 1-59)
- Digital public address/music system (Figure 1-60)
- Flightdeck sterile light system (currently disabled) (Figure 1-61)
- Flightcrew/observer single-piece integrated oxygen masks (Figure 1-62)

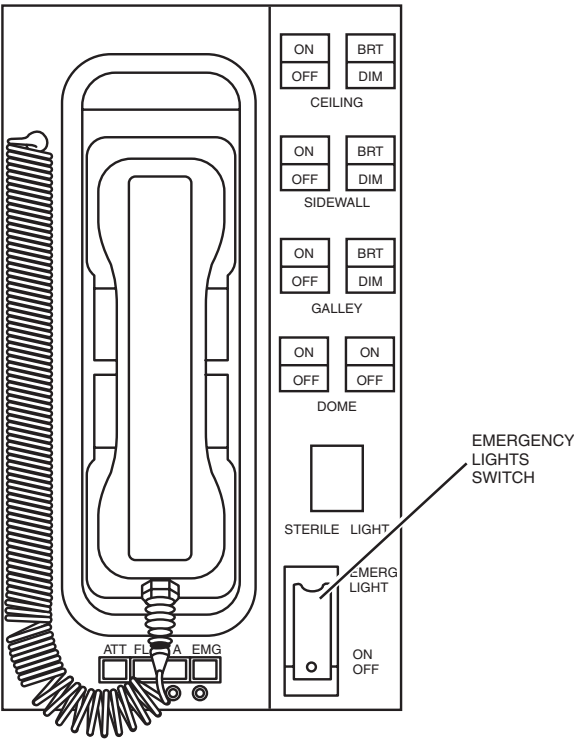
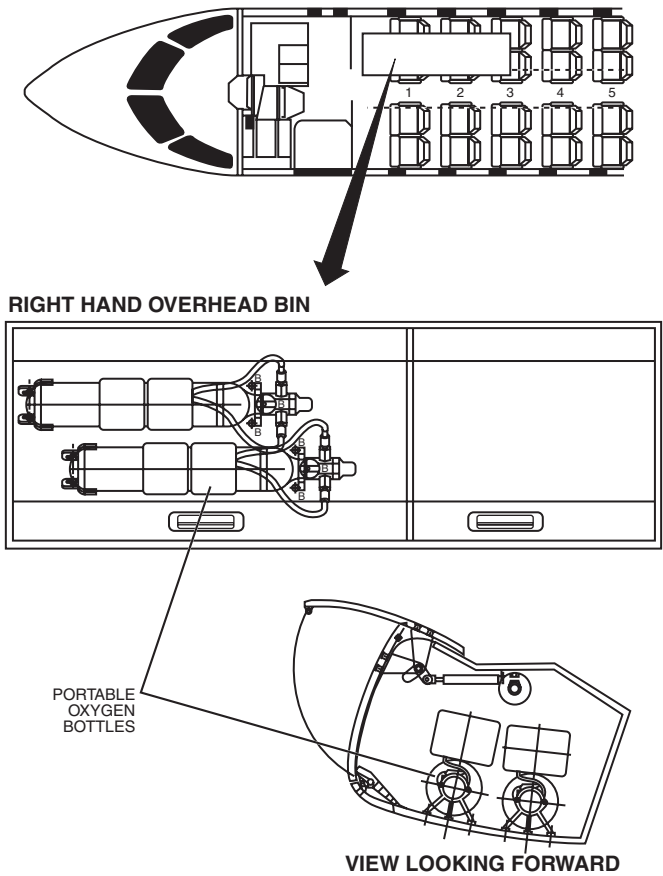


Figure 1-57 Flight Attendant's Intercom and Lighting Control Panel



**Figure 1-58 Two Portable Oxygen Bottles—
Right Forward Overhead Bin**

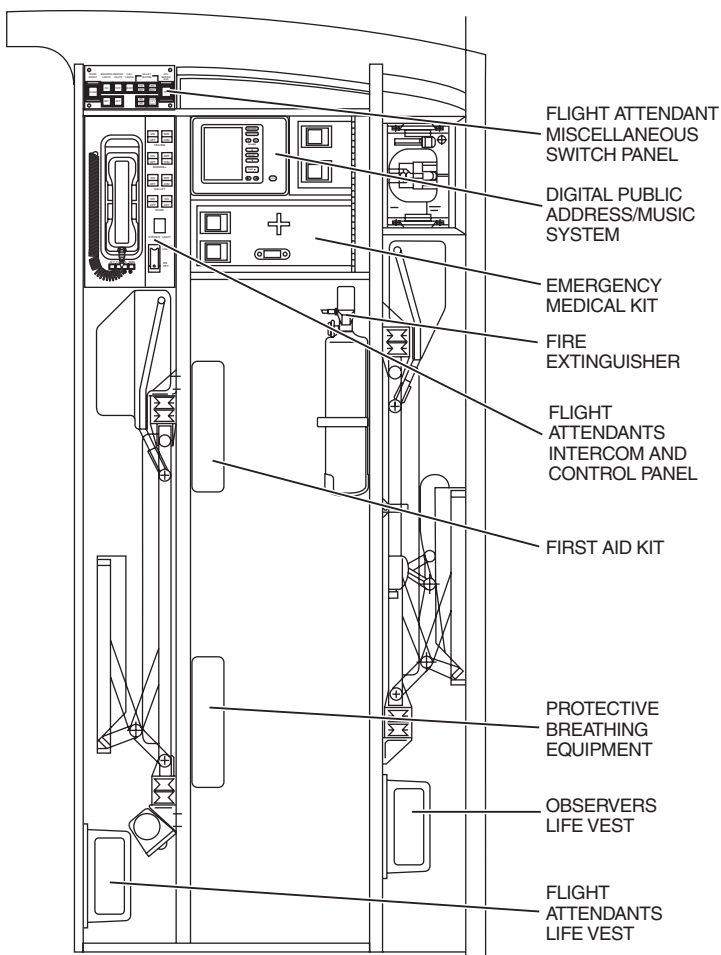


Figure 1-59 Flight Attendant's Forward Compartment

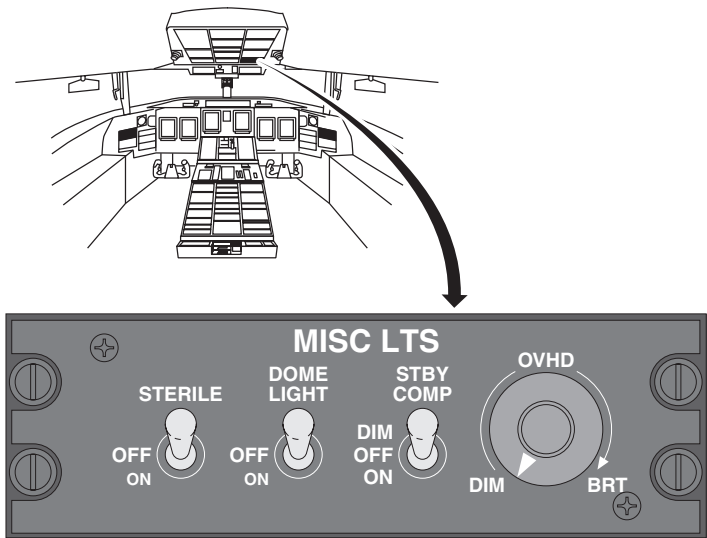


Figure 1-60 Flightdeck Sterile Light System

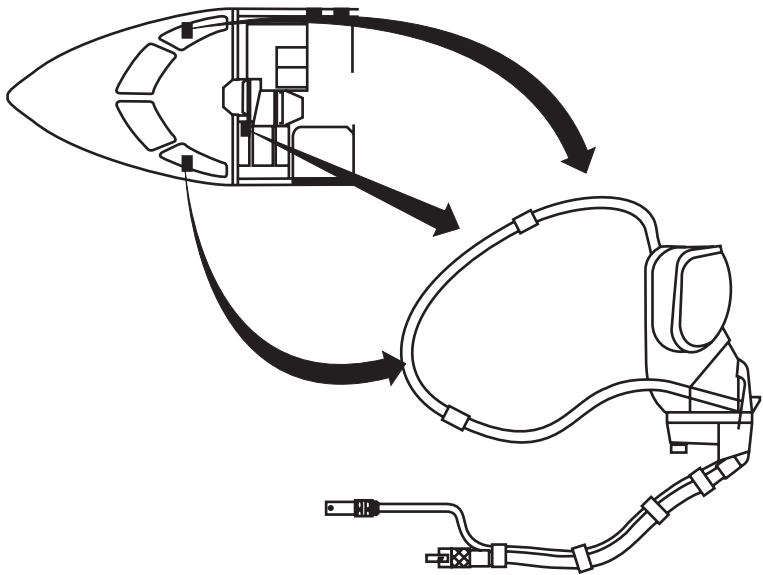


Figure 1-61 Single-Piece Integrated Mask and Goggles



INTEGRATED STANDBY INSTRUMENT SYSTEM

For aircraft 8891 and subsequent, Bombardier has replaced the existing standby electronic instrument with a new integrated standby instrument and improved stall protection computers (Figure 1-62).

The new integrated standby instrument (ISI) provides standby attitude, altitude and airspeed information to the flight crew. To retain full operational capability under emergency conditions the ISI is powered by the battery bus. The ISI uses inputs from the alternate pitot probe and static ports. The ISI displays the following information: attitude displays, ILS deviation, altitude display (corrected), V_{MO} display, airspeed display, static source error protection, Mach number, barometric pressure, and slip-skid indication.

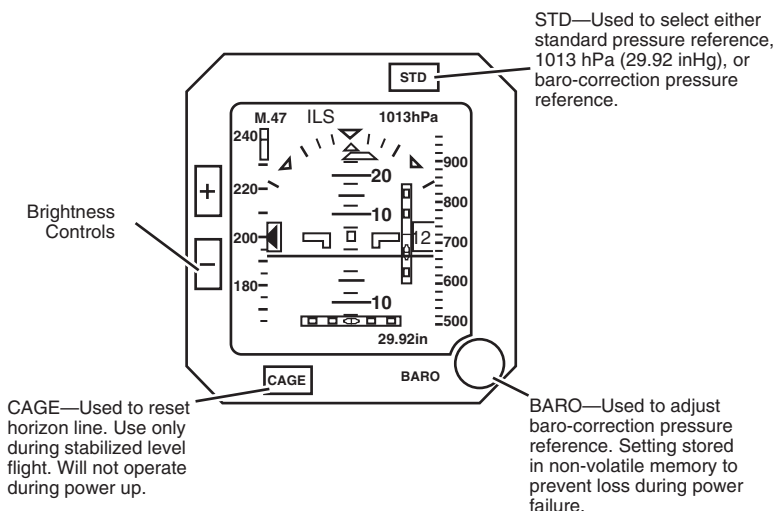


Figure 1-62 Integrated Standby Instrument System



FLAP LEVER DEVIATION

On selected aircraft, the flap lever includes an 8° position. (Figure 1-63).

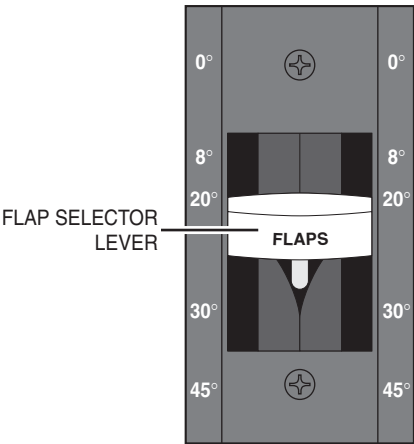


Figure 1-63 Flap Selector Lever



INTENTIONALLY LEFT BLANK



INTENTIONALLY LEFT BLANK



INTENTIONALLY LEFT BLANK



INTENTIONALLY LEFT BLANK



INTENTIONALLY LEFT BLANK



INTENTIONALLY LEFT BLANK



ABBREVIATIONS

The following abbreviations may be used by flight compartment displays, radio tuning units, and flight management system, or may be found throughout the manual. Some abbreviations may also appear in lower case letters. Abbreviations having very limited usage are explained in the systems chapters where they are used.

A

A/C	Air-conditioning
A/G	Air/ground
A/ICE	Anti-ice
A/P	Autopilot
A/S	Airspeed
A/SKID	Anti-skid
ABS	Absolute
AC	Alternating current
ACARS	Aircraft communications, addressing and reporting system
ACCEL	Acceleration, accelerate(d), accelerometers
ACM	Air-cycle machine
ACMP	Alternating current motor pump/electric hydraulic pump
ACT	Active
ACU	Air-conditioning unit
ADC	Air-data computer
ADDR	Address
ADF	Automatic direction finder
ADG	Air-driven generator
ADI	Attitude director indicator
ADS	Air-data system
AFCS	Automatic flight control system
AFT	Afterward
AGL	Above ground level
AHC	Attitude heading computer



AHRS	Attitude heading reference system
AIL	Aileron
ALIGN	Aligning, alignment
ALPHA	Alpha
ALT	Altitude, altimeter
ALT	Altitude hold (PFD/FD)
ALT CAP	Altitude capture (PFD/FD)
ALT HOLD	Altitude hold
ALTN	Alternate
ALTS	Selected altitude arm/abort (PFD/FD)
AM	Amplitude modulation
AMB	Ambient
AMP	Ampere
ANNUN	Annunciator
ANT	Antenna
AOA	Angle of attack
AP	Autopilot
APC	Auxiliary power control
APP	Approach
APPROX	Approximately
APR	Automatic performance reserve
APU	Auxiliary power unit
ARINC	Aeronautical Radio Incorporated
ARP	Air-data reference panel
ASYM	Asymmetrical
ATA	Air Transport Association
ATC	Air traffic control
ATT	Attitude
ATTD	Attitude
ATTND	Attendant
AUTO	Automatic
AUTO BAL	Automatic balance
AUTO XFER	Automatic transfer
AUX	Auxiliary



AV	Avionics
AVAIL	Available
AZ	Azimuth

B

B/AIR	Bleed air
B/C	Back course
B/CRS	Back course
B/LEAK	Bleed leak
BARO	Barometric
BAT	Battery
BATT	Battery
BDI	Bearing/distance indicator
BFO	Beat frequency oscillator
BITE	Built-in-test equipment
BK	Brake
BLD	Bleed
BOOM	Headset microphone
BRG	Bearing
BRKR(s)	Breaker(s)
BRT	Bright
BTL	Bottle
BTMS	Brake temperature monitoring system
BTMU	Brake temperature monitoring unit
BYPS	Bypass

C

C	Center, caution, cabin
CAA	Civil Aviation Authority (UK)
CAL	Calibrate
CAP	Capture
CAPT	Captain
CAS	Calibrated air speed
CAT	Category



CB, C/B	Circuit breaker
CBP	Circuit breaker panel
CCW	Counterclockwise
CDL	Configuration deviation list
CDP	Compressor discharge pressure
CDU	Control display unit
CFM	Cubic feet per minute
CG	Center of gravity
CH	Chapter, channel
CHAN	Channel
CHGR	Charger
CHR	Chronograph
CHRT	Chart
CK	Check
CKPT	Cockpit
CKT	Circuit
CLB	Climb
CLK	Clock
Cm	Centimeters
CMD	Command
CMPS	Compass
CMPTR	Computer
CO ₂	Carbon dioxide
COM	Communication
COMM	Communication
COMP	Compressor, comparator
COMPT	Compartment
COND	Condition, continued
CONFIG	Configuration
CONN	Connection
CONT	Control, continuous, contactor, controller
COOL	Cooling
CORR	Correction
CPAM	Cabin pressure acquisition module



CPLT	Copilot
CRS	Course
CRT	Cathode-ray tube
CRZ	Cruise
CSD	Constant speed drive
CTR	Center
CVR	Cockpit voice recorder
CW	Clockwise
CYL	Cylinder

D

DA	Drift angle
DBU	Data base unit
DC	Direct current
DCP	Display control panel
DCU	Data concentrator unit
DECEL	Decelerate(d)
DECR	Decrease
DEFL	Defuel
DEG	Degree
DEPR	Depressurize
DEPT	Departure
DEST	Destination
DET	Detector
DEV	Deviation
DFDAU	Digital flight data acquisition unit
DFDR	Digital flight data recorder
DG	Directional gyro
DH	Decision height
DIFF	Differential
DIM	Dimming
DIR	Direct
DIS	Distance (to way point), disconnect
DISC	Disconnect
DISCH	Discharge



DISP	Dispatch, display
DIST	Distance
DME	Distance measuring equipment
DN	Down
DOT	Department of Transport (Canada)
DR	Door
E	
EAS	Equivalent airspeed
ECP	EICAS control panel
ECS	Environmental control system
ECU	Electronic control unit
ED	EICAS display
EDP	Engine-driven pump, engine primary hydraulic pump
EFIS	Electronic flight instrument system
EGT	Exhaust gas temperature
EICAS	Engine indication and crew alerting system
EL	Elevation
ELEC	Electrical
ELEV	Elevator, elevation
ELT	Emergency locator transmitter
EMER(G)	Emergency
ENG	Engine
EPC	External power contactor
EQUIP	Equipment
ERP	Eye reference position datum
ESS	Essential
ET	Elapsed time
ETA	Estimated time of arrival
EVAC	Evacuation
EXH	Exhaust
EXTIN	Extinguish(ed)

**F**

F/CTL	Flight controls
FAA	Federal Aviation Administration (USA)
FAIL	Failure
FCC	Flight control computer
FCU	Fuel control unit
FD, F/D	Flight director
FDAU	Flight data acquisition unit
FDR	Flight data recorder (digital)
FECU	Flaps electronic control unit
FECU	Fuel electronic control unit
FEED	Feeder
FF, F/F	Fuel flow
FIRE BTL	Fire bottle
FIREX	Fire extinguisher
FL CH	Flight level change
FLD	Field
FLT	Flight
FLT DIR	Flight director
FLUOR	Fluorescent
FM	Fan marker
FMS	Flight management system
FPM	Feet per minute
FREQ	Frequency
FT	Feet, foot
FW	Fire wall
FWD	Forward

G

G (+/-)	Receiver gain
G/S	Glide slope
GA	Go-around
GAL	Gallon
GALY	Galley
GCS	Ground clutter suppression



GCU	Generator control unit
GE	General Electric
GEN	Generator
GLD	Ground lift dumper (ing)
GMT	Greenwich mean time
GND	Ground
GPM	Gallons per minute
GPWS	Ground proximity warning system
GR	Gear
GRAV	Gravity
GS	Ground speed
GUIDE	Guidance
GW	Gross weight
H	
HDG	Heading
HDG HOLD	Heading hold
HDG SEL	Heading select
HEAT	Heater
HF	High frequency (3–30 MHz)
Hg	Mercury
HI	High
HLDR	Holder
HOR, HORIZ	Horizontal
HOT	High oil temperature
HP	High pressure
HP _A	Hecto pascals
HSI	Horizontal situation indicator
HSTA	Horizontal stabilizer trim actuator
HSTCU	Horizontal stabilizer trim control unit
HTR	Heater
HUD	Heads-up display
HYD	Hydraulic
Hz	Hertz

**I**

I/B	Inboard
I/C	Intercom, inspection check
IAPS	Integrated avionics processor system
IAS	Indicated air speed
ICAO	International Civil Aviation Organization
ICS	Idle corrected speed
ID	Identification
IDENT	Identification
IDG	Integrated-drive generator
IFR	Instrument flight rules
IGN	Ignition
ILS	Instrument landing system
IM	ILS inner marker
IMC	Instrument meteorological conditions
IMP	Imperial
IN	Inch, inches
IN Hg	Inches of Mercury
INBD	Inboard
INCR	Increase
IND	Indication, indicator
INFLT	In flight
INHIB	Inhibit
INOP	Inoperative
INPH	Interphone
INSP	Inspection
INST(S)	Instrument(s)
INST, INSTR	Instrument
INT	Internal, integral, intersection
INTEG	Integral
IRS	Inertial reference system
IRU	Inertial reference unit
ISA	International standard atmosphere
ISO	International Standard Organization



ISOL	Isolation, isolated
ITT	Interturbine temperature

J

JAA	Joint Airworthiness Authority (Europe)
-----	--

K

K, KT, KTS	Knots
Kg (s)	Kilogram(s)
kHz	Kilohertz
KIAS	Knots indicated airspeed
kW(s)	Kilowatt(s)

L

L	Left, landing
L/T	Landing/taxi
LAV	Lavatory
LB(s)	Pound(s)
LCN	Load classification number
LCV	Load control valve
LDG	Landing
LDG GR	Landing gear
LDU	Lamp driver unit
LE	Leading edge
LG	Landing gear
LGC	Landing gear controller
LGW	Landing gross weight
LH	Left hand
LIM	Limit
LK	Leak
LN	Left nose
LNAV	Lateral navigation
LOC	ILS localizer
LOGO	Logo graphic
LOM, MM	Compass locator at outer marker
LOP	Low oil pressure



LP	Low pressure
LPM	Liters per minute
LR	Left rear
LRC	Long range cruise
LSB	Lower side band
LT(s)	Light(s)
LW	Left wing
LWD	Left wing down
LWR	Lower
M	
M	Mach number
m	Meter
MAA	Maximum authorized IFR altitude
MAC	Mean aerodynamic chord
MAG	Magnetic
MAINT	Maintenance
MALF	Malfunction
MAN	Manual
MAP	Ground map (WXR)
MAX	Maximum
MAZ	MLS azimuth
MB	Millibars
MCA	Minimum crossing altitude
MCT	Maximum continuous thrust
MDA	Minimum descent altitude
MEA	Minimum enroute IFR altitude
MECH	Mechanic
MED	Medium
MEL	Minimum equipment list
MFD	Multifunction display
MGP	MLS glideslope
MHz	Megahertz
MI	Miles
MIC	Microphone



MID AFT	Middle afterward
MID FWD	Middle forward
MILS	.001 of an inch
MIN	Minimum
MISC	Miscellaneous
MKR	Marker
MLG	Main landing gear
MLS	Microwave landing system
MLW	Maximum landing weight
MM	ILS middle marker
MMEL	Master minimum equipment list
MMO	Maximum operating speed in Mach number
MOCA	Minimum obstruction clearance altitude
MOD	Module
MON	Monitor
MPH	Miles per hour
MRA	Minimum reception altitude
MSG	Message
MSL	Mean sea level
MTG	Miles to go
MTOW	Maximum takeoff weight
MTW	Maximum taxi weight
MZFW	Maximum zero fuel weight
N	
N/A	Not applicable
N ₁	Low pressure rotor
N ₂	High pressure rotor
NAV	Navigation
ND	Nose down, navigation display
NDB (ADF)	Nondirectional beacon (automatic direction finder)
NEG	Negative



NEUT	Neutral
NL	Nose left
NLG	Nose landing gear
NM	Nautical mile(s)
No.	Number
NOPT	No procedure turn required
NORM	Normal
NOSE	Nose wheel
NR	Nose right
NU	Nose up
OAT	Outside air temperature
OB/OUTBD	Outboard
OBS	Observer
OEI	One engine inoperative
OEW	Operating empty weight
OH, OVHD	Overhead
OK	Okay
OM	ILS outer marker
OVBD	Overboard
OVHT, OH	Overheat
OVL	Overload
OVSP	Overspeed
OVSPD	Overspeed
OVTEMP	Over temperature
OXY, O ₂	Oxygen
P	
P#6	Panel 6
P/S	Pitot/static
PA	Passenger address
PASS	Passenger
PBE	Protective breathing equipment (smoke hood)
PCU	Power control unit



PF	Pilot flying
PFD	Primary flight display
PLA	Power lever angle
PLT(s)	Pilot(s)
PNF	Pilot not flying
PNLS(s)	Panel(s)
PO	Outside air pressure
POS	Position
PPH	Pounds per hour
PRESS	Pressure, pressurization
PRI	Primary
PRIM	Primary
PROC	Procedure
PROT	Protection
PROX	Proximity
PSEU	Proximity sensor electronics unit
PSI	Pounds per square inch
PSIG	Pounds per square inch gage
PSS	Proximity sensor system
PSU	Passenger service unit
PT ₂	Engine inlet pressure and temperature
PTCT	Protect
PTT	Push-to-talk
PWR	Power
Q	
QAR	Quick access recorder
QEC	Quick engine change
QFE	Local station pressure
QNH	Altimeter setting
QTY	Quantity

**R**

R	Right
RA	Radio altitude
RAI	Registro Aeronautico Italiano (Italy)
RAT	Ram-air turbine
RCCB	Remote controlled circuit breaker
RCDR	Recorder
RCVR	Receiver
RDR	Radar
REC	Receiver, recorder
RECOG	Recognition
REF(s)	Reference(s)
REFL	Refuel
REV	Reverse
RH	Right hand
RMI	Radio magnetic Indicator
ROT	Rotation
RPM	Revolutions per minute
RT, R/T	Receiver-transmitter
RTE	Route
RTE DATA	Route data
RTO	Rejected takeoff
RTU	Radio tuning unit
RUD	Rudder
RVR	Runway visual range
RVSR	Reverser
RW	Right wing
RWD	Right wing down
RWY	Runway

S

S	Status
SAT	Static air temperature
SCAV	Scavenge
SEC	Second, secondary



SECS	Spoiler electronic control system
SECU	Spoiler electronic control unit
SEL	Select, selector
SELCAL	Selective call
SENS	Sensitivity, sensor
SERV, SVCE	Service
SMKG	Smoking
SOV	Shutoff valve
SP, SPD	Speed
SPC	Stall protection computer
SPKR	Speaker
SPLR(s)	Spoiler(s)
SQL	Squelch
SSB	Single side band
STA	Station
STAB	Stabilizer
STAT	Status
STBY	Standby
STEER	Steering
SUPPL	Supply
SW(s)	Switches
SYN	Synchronize
SYNC	Synchronous
SYS, SYST	System
T	
T/C	Top of climb
T/D	Top of descent
T/R	Thrust reverser
TACAN	UHF tactical air navigation aid
TAS	True airspeed
TAT	Total air temperature
TCAS	Traffic alert and collision avoidance system



TE	Trailing edge
V_{FTO}	Final Takeoff Speed
TEMP	Temperature
TGT	Target
TO, T/O	Takeoff
TOL	Tolerance
TRB, TURB	Turbulence
TRK	Track
TRM	Trim
TRU	Transformer rectifier unit
T_2	Engine inlet temperature
U	
UNSCHD	Unscheduled
USB	Upper side band
USG	United States gallons
UTIL	utility
V	
V	Volt
V_A	Design maneuvering speed
V_B	Design speed for maximum gust intensity
V_C	Design cruising speed
V_D	Design diving speed
V_{DF}/M_{DF}	Demonstrated flight diving speed
V_{EF}	Engine failure speed
V_F	Design flap speed
V_{FC}/M_{FC}	Maximum speed for stability characteristics
V_{FE}	Maximum flap extended speed
V_{LE}	Maximum landing gear extended speed
V_{LO}	Maximum landing gear operating speed
V_{LOF}	Liftoff speed



V_{MC}	Minimum control speed with the critical engine inoperative
V_{MO}/M_{MO}	Maximum operating limit speed
V_{MU}	Minimum unstick speed
V_R	Rotation speed on takeoff
V_S	Stalling speed or minimum steady flight speed at which the airplane is controllable
V_{SO}	Stalling speed or the minimum steady flight speed in the landing configuration
V_{S1}	Stalling speed or minimum steady flight speed obtained in a specific configuration
V_T	Final takeoff speed (same as V_{FTO})
V_1	Takeoff decision speed (formerly denoted as critical engine failure speed)
V_2	Takeoff safety speed
$V_{2\text{ MIN}}$	Minimum takeoff safety speed
V/S	Vertical speed
VERT	Vertical
VFR	Visual flight rules
VG	Vertical gyro
VHF	Very high frequency (30–300 MHz)
VIB	Vibration
VMC	Visual meteorological conditions
VNAV	Vertical navigation
VOL	Volume
VOLT	Voltage
VOR	VHF omnidirectional range station
VORTAC	VOR and TACAN co-located
VSI	Vertical speed indicator
W	
W	Warning
W/C	Wind component
W/S	Wind shear
W/W	Wheel well



WARN	Warning
WF	Runway length limited weight
WGT	Weight
WHLS	Wheels
WIND	Window
WOW	Weight-on-wheel
WPT(s)	Waypoint(s)
WRN	Warning
WS	Second segment limited weight
WSHLD	Windshield
WX	Weather
WXR	Weather radar

X

X	Cross transfer
XFER, XFR	Transfer
XFLOW	Cross flow
XMIT	Transmit
XPNDR	Transponder
XTK	Cross track
XWC	Cross wind component

Y

YD, Y/D	Yaw damper
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Z

ZFW	Zero fuel weight
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