INTRODUCTION

The indicating and recording system consists of components that record and display critical aircraft information and system operation. Aural and visual warnings are provided by the engine indication and crew alerting system (EICAS).

The EICAS provides the following functions:

- Automatic system monitoring
- Integration of system information
- Color logic for visual presentation of operating limits
- Aural alert warning messages

Information is provided on four liquid crystal adaptive flight displays (AFDs). Master warning and caution lights on the glareshield enhance the indication system. Aural signals are generated within the data concentrator units (DCUs) and are heard through the flight deck speakers and headsets.

The cockpit voice recorder (CVR) is a crash survivable device that stores up to 2 hours of voice recordings.

The maintenance diagnostic computer (MDC) is used to record engine and line replaceable unit (LRU) status and parameters. MDC data can be downloaded for system diagnosis and fault identification.

ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS)

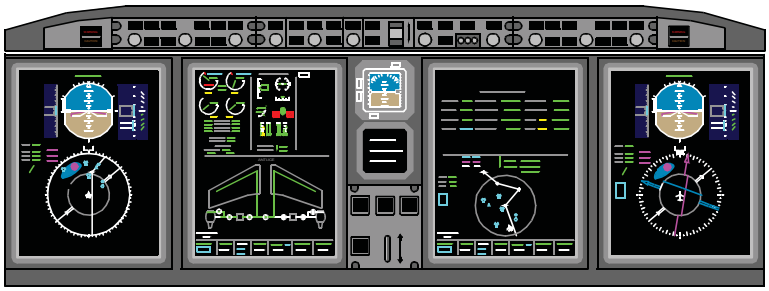
DESCRIPTION

The function of the EICAS is to display the engine instruments and give visual and aural crew-alert messages and real time interpretation of aircraft system operation.

Most EICAS information is normally displayed on the left and right multifunction displays (MFDs). Some display information is shown by default, other information is available through selection. The top half of the left MFD normally displays engine indications (EI) on the left, aircraft configuration (gear, flaps, spoilers, trim) in the middle, and Crew Alerting System (CAS) messages on the right. The top half of the right MFD normally displays the summary synoptic page, but the electronic crew checklist can be selected. Maintenance diagnostic information can also be displayed in this area by maintenance personnel. The bottom half of both MFDs can display navigation information or system synoptic pages as selected by the crew. Control of displayed information is provided by the MFD control panel (MCP) located on the center pedestal. A composite flight instrument/EICAS can be displayed in the event of display failure. Select PFD Rev or MFD Rev on the Reversion panel to access these displays. The FRMT button on the display control panel is used to select the SUMMARY synoptic page for display when PFD REV is selected on the reversion panel. The summary synoptic is only available when an on-side display is reverted.

Engine indications are provided on the left MFD. Color is used to depict normal (green), non-normal (amber or red) and loss of data (magenta).

The crew alerting system (CAS) provides visual and aural alerts when the data concentrator units (DCUs) detect a malfunction. The CAS prioritizes messages by order of order of importance and order of occurrence.



The order of importance of messages is accomplished by the use of color displays and aural alerts.

EICAS COLOR LOGIC AND SYNOPTIC PAGE PRESENTATION

The Challenger 300 uses a Quiet Dark Cockpit Philosophy for system indications.

Cockpit indications remain quiet and dark during the following:

- Normal operation (no abnormalities or failures)
- Daylight
- Visual meteorological conditions (VMC)
- Non-icing conditions
- Cruise flight

Color Logic is used to depict system values:

- Red — Warning condition or system limit exceeded
- Amber — Component or function failed or there is no flow, energy or pressure
- Green — Normal operation for digital values. Normal flow, energy or pressure in flowlines
- White — Normal status of component (pump, valve, etc.) or no flow through the flowline
- Magenta — Invalid or unknown data

COMPONENTS AND OPERATION

DISPLAYS

The PFDs and MFDs are computer controlled liquid crystal adaptive flight displays (AFDs). All four displays are identical and interchangeable.

DISPLAY LIGHTING ADJUSTMENT

Two separate concentric knobs (PFD and MFD) adjust display lighting intensity on the COCKPIT LIGHTS panel. They are located on the left and right side panels.

DISPLAY COOLING

Cooling and ventilation of the PFD and MFD displays is achieved by the cockpit air distribution system. The avionics cooling fan and cockpit air conditioning systems is designed to maintain the ambient temperature of the displays.

DATA CONCENTRATOR UNITS

The two data concentrator units (DCU A and DCU B), are essential to the EICAS. The DCUs collect data from various aircraft systems, process the information and relay it to the proper component or display.

SYSTEMS TEST CONTROL PANEL

DESCRIPTION

The SYSTEMS TEST control panel is installed in the center pedestal. The switch is used to start a pilot initiated test of several systems. The switch is momentarily pushed to start the applicable test.

The aural warnings other than TCAS and TAWS occur in sequence of importance. Once the test has started, the switch may be released. Pressing the switch again will cancel the test.

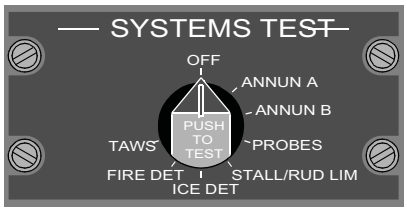
COMPONENTS AND OPERATION

Selecting ANUN A or ANUN B on the SYSTEMS TEST panel and pressing and holding the switch for 15 seconds illuminates all panel lights and gives the aural warnings as follows:

- Triple or single chimes
- Aural warning tones
- Voice alarms

The other systems tests are as follows:

- PROBES — tests air data probes and sensors
- STALL RUD/LIM — tests the stall protection system
- ICE DET — tests the ice detection system
- FIRE DET — tests the fire detection and extinguishing (FIREX) system
- TAWS — tests the terrain avoidance warning system



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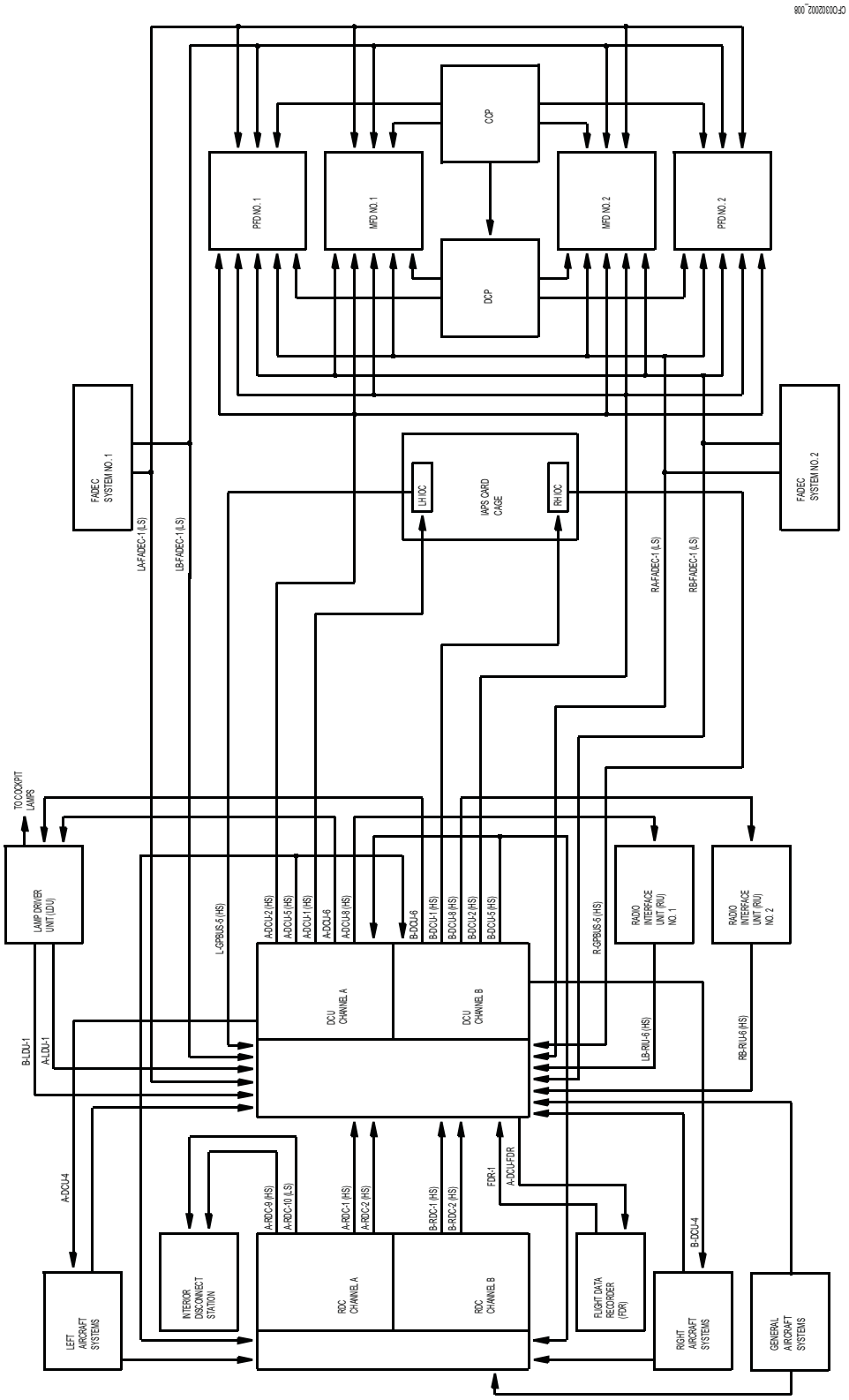
ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) (Cont)



ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) (Cont)

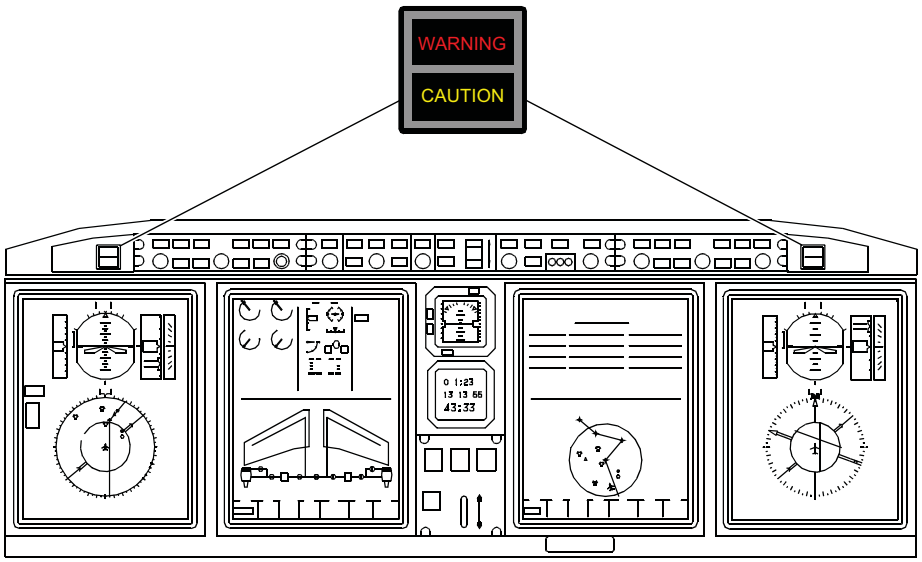
MASTER WARNING/MASTER CAUTION SWITCHES

The master warning/master caution switches are located on the glareshield. When the DCUs generate a warning message, the master warning half of the two switches flash red. A triple chime accompanies the master warning lights. In addition, dedicated tones or voice messages may sound.

When the switch is pressed, the flashing light and the audio alerts are reset.

When the DCUs generate a caution message, the master caution half of the two switches flash amber. A single chime will accompany the master caution lights.

When the switch is pressed, the flashing light in the switches will reset.



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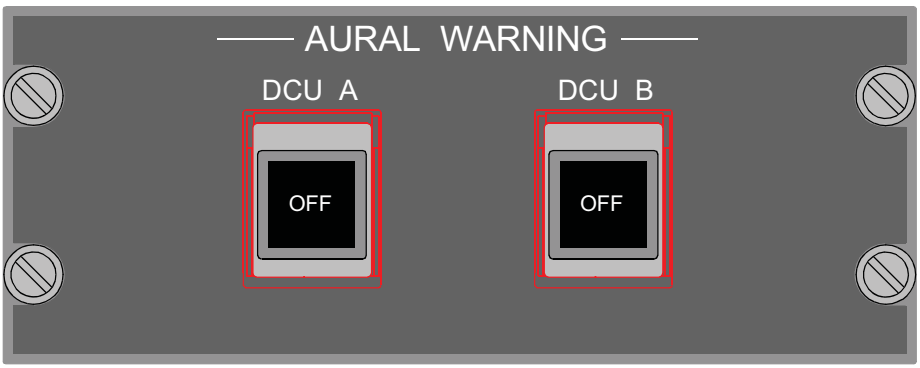
AURAL WARNING DISABLE

Two AURAL WARNING disable switches located on the AURAL WARNING panel on the copilot aft cockpit bulkhead above the circuit breaker panel are used to disable and silence the aural warnings of a malfunctioning DCU. When DCU A is selected to OFF, DCU B provides the aural warning function. Selecting both DCU switches to OFF disables all EICAS aural warnings. These should only be used if problems with the aural warning system is encountered, or as directed by AFM procedure



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ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) (Cont)

MFD CONTROL PANEL (MCP)

The MFD Control Panel is located on the center pedestal and the operation of each control is described below. Illustration is shown with the optional 3D map display switches (refer to Chapter 11-01-25 for further description).

L/R TOGGLE

The L/R toggle switch allows the flight crew to select control to the left or right MFDs.

CAS

Pressing the CAS switch once removes the caution, advisory, and status messages, and a white MSGS icon will display. Pressing the CAS switch a second time causes the messages to reappear.

When a new message is generated, it appears above the MSGS icon. Pressing the CAS switch hides the new message. Warning messages can not be paged out of view.

CKLST

Selecting the CKLST switch displays the electronic checklist on the right MFD.

SKIP

This switch skips checklist items on the display.

FRMT

The FRMT switch selects the MFD format. The available selections are present position (PPOS, heading at top), PLAN (North at top), TCAS only.

TFC

The TFC switch selects the TCAS overlays on the MFD.

TR/WX

The TR/WX switch selects terrain, weather, and lightning overlays on the MFD.

ENTER

The ENTER switch is used in conjunction with the joystick for entering waypoints, completing checklist items, or while in the maintenance mode.

SUMRY

Selecting the SUMRY switch displays the summary synoptic on the bottom part of the MFD.

ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) (Cont)

MFD CONTROL PANEL (MCP) (Cont)

A/ICE

Selecting the A/ICE switch displays the anti-ice synoptic page.

ECS

Selecting the ECS switch displays the environmental control system synoptic page.

ELEC

Selecting the ELEC switch displays the electrical system synoptic page.

FLT

Selecting the FLT switch displays the flight control system synoptic page.

FUEL

Selecting the FUEL switch displays the fuel system synoptic page.

HYD

Selecting the HYD switch displays the hydraulic system synoptic page.

MULTIFUNCTION DISPLAY (MFD)

ENGINE INDICATIONS

Engine indications are presented as digital readouts and also in an analog scale format for N_1 and ITT. The indications are located on the top half of the left MFD.

Displayed engine parameters include:

- N_1 speed (%)
- Interturbine temperature (ITT) (°C)
- N_2 speed (%)
- Oil pressure (psi)
- Oil temperature (°C)
- Fuel flow (lb/hr-kg/hr)

The following engine indications are presented “as required”:

- Reverse thrust icons (REV) are displayed within the N1 analog gage when the thrust reversers are in transition (white), deployed (green), or red (unsafe)
- A VIB (amber) icon is displayed below the N_1 gage when the vibration exceeds a predetermined value and has an associated CAS message
- SYNC or MACH HOLD display shows between the N1 analog displays when either the engine sync or Mach hold mode is selected (green when active and white when armed)
- The ignition icon (IGN) is displayed below the ITT gage when the ignitor is operating (green) or failed (amber)
- The START icon is displayed vertically outside of the digital displays of N2, oil pressure, oil temperature, and fuel flow when the FADEC is commanding a start

AUXILIARY POWER UNIT

The APU digital RPM and EGT displays (green) are presented below the engine instruments on the top half of the left MFD.

FUEL QUANTITY

Fuel quantities are displayed below the APU RPM and EGT information in green on the EICAS. Fuel quantities presented include left, right, and total.

TRIM SETTINGS

Aileron, horizontal stabilizer, and rudder trim settings are continuously displayed on the upper middle of the left MFD.

Aileron, horizontal stabilizer and rudder trim indications are green when trims are set in the takeoff range when on the ground and in red for a configuration warning. In flight, the indicators are white.

ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) (Cont)

MULTIFUNCTION DISPLAY (MFD) (Cont)

FLAPS, LANDING GEAR AND SPOILERS

Flaps, landing gear and spoilers information is presented graphically (green), with flaps also presented in a digital format. The flaps, gear, and spoiler information are decluttered (removed) from the display when this equipment is retracted or stowed.

CABIN PRESSURIZATION

Cabin altitude and cabin rate of climb/descent are displayed below the spoiler information. An arrow displays climb or descent.

CREW ALERTING SYSTEM MESSAGES (CAS)

CAS messages are displayed on the right side of the top half of the left MFD. All red messages are displayed at the top, in order of occurrence (last message at top). Amber, cyan, and then white messages are displayed below the red messages, in that order.

EICAS MESSAGES

The Crew Alerting System (CAS) provides visual and aural alerts during a malfunction. The CAS prioritizes messages by order of importance and order of occurrence.

The order of importance is accomplished by the use of color and aural alerts. The four levels of CAS message importance are: Warning, Caution, Advisory, and Status.

For order of occurrence, the most recent message is displayed at the top of its associated list.

WARNING (W) MESSAGES

The most urgent messages are warnings and red in color. Red warning messages are presented on the top of the CAS page and remain in view until the problem is resolved.

Warning messages require immediate action and are always accompanied by:

- Triple chime
- Flashing master warning lights

Warning messages, in addition to the above indications, can also generate:

- Voice message

Pressing either master warning switch:

- Silences the aural alerts (except for a non-mutable gear warning)
- Stops the flashing of the master warning lights

CAUTION (C) MESSAGES

Caution messages are second in order of importance. Amber caution messages appear directly below any warning messages that may be displayed.

Caution messages require prompt action and are always accompanied by:

- Single chime
- Flashing master caution lights

Pressing either master caution switch:

- Stops the flashing of the master caution lights

ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) (Cont)

MULTIFUNCTION DISPLAY (MFD) (Cont)

ADVISORY (A) MESSAGES

Cyan advisory messages appear directly below any caution messages that may be displayed. Advisory messages are generated when crew awareness is required and subsequent crew action may be required. Advisory messages indicate:

- Non-pilot selected automatic activation of certain critical systems (L or R FUEL PUMP ON)
- Loss of system redundancy
- Needed information not related to a change of system status (SELCAL)
- May have a tone associated (i.e. cabin call or voice SELCAL)

STATUS (S) MESSAGES

White status messages appear directly below any advisory messages that may be present.

White status messages:

- Indicate the state of a specific system that has been manually activated

INHIBITED EICAS MESSAGES

Takeoff and landing are the most critical phases of flight, and the most workload intensive. Accidents can occur during these phases of flight due to the crew becoming distracted by minor non-relevant system problems. To reduce the possibility of this occurring, some warning messages, most caution messages, and all advisory messages are inhibited during the takeoff and landing phase.

Selected messages are inhibited for takeoff when airspeed is above 80 kts, and the aircraft reaches 400 ft AGL.

Selected messages are inhibited during landing when the aircraft descends below 400 ft AGL and airspeed decreases to less than 40 kts. Inhibited messages are indicated with a X in the respective column.

When a message is triggered during an inhibit period, the message and the master/caution (if appropriate) illuminates as the aircraft exits the inhibit envelope.

SYNOPTIC PAGES

The synoptic pages can be selected for presentation on the bottom half of either MFD by using the individual switches located on the MCP control panel. The synoptic pages provide the pilot real-time indication of aircraft system operation. Each synoptic page displays the aircraft systems as a schematic diagram.

ANTI-ICE

The anti-ice synoptic page displays the operation of the following systems:

- Bleed air system
- Wing anti-ice system
- Engine anti-ice system

ECS

The ECS synoptic page displays information for the following systems:

- Bleed air
- Air conditioning
- Pressurization

ELECTRICAL

The electrical synoptic page displays the system using a block diagram.

FLIGHT CONTROLS

The flight control synoptic page displays the positions of the ailerons, elevator, rudder and spoilers.

ENGINE INDICATING AND CREW ALERTING SYSTEM (EICAS) (Cont)

MULTIFUNCTION DISPLAY (MFD) (Cont)

FUEL

The fuel synoptic page displays fuel quantities, fuel temperature, and fuel system operation.

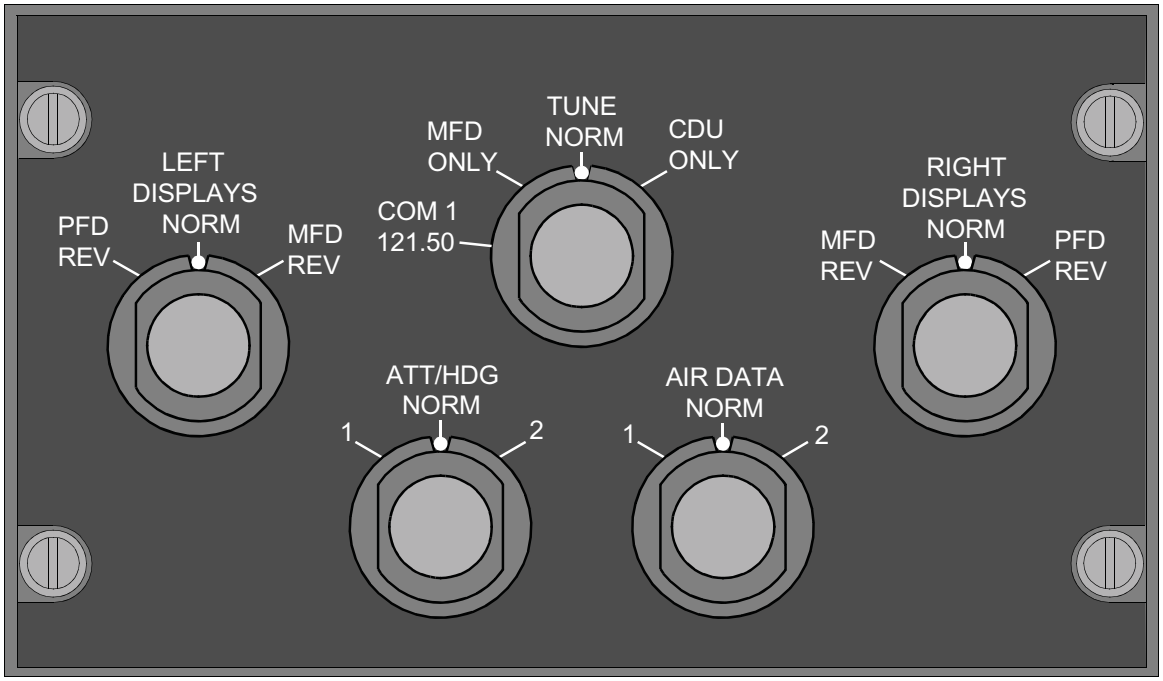
HYDRAULIC

The hydraulic system synoptic page displays the engine pumps, auxiliary pumps, status of reservoirs, and hydraulic fluid temperature and pressure. The synoptic pages represent actual valve operation using color to identify the state and serviceability of the valve. Red indicates failure, yellow indicates a cautionary status, white indicates normal with no dynamic flow, green indicates normal with dynamic flow, and magenta invalid or unknown status. Each valve has an outline and a flowline.

REVERSION SWITCH PANEL

DESCRIPTION

A reversion switch panel, located on the pilot's side of the center pedestal above the spoiler handle, provides an alternate method of displaying EICAS information should one of the EICAS displays fail.



COMPONENTS AND OPERATION

The following is a brief description of the reversion panel switches:

LEFT DISPLAYS REVERSION SWITCH

The LEFT DISPLAYS reversion switch is a three-position switch, enabling the reversion of the left side PFD/MFD displays.

PFD REV

L-PFD displays compressed format. L-MFD is shut down.

NORM

L-PFD format is normal. L-MFD format is normal.

MFD REV

L-PFD is shut down. L-MFD displays compressed format.

REVERSION SWITCH PANEL (Cont)

RIGHT DISPLAYS REVERSION SWITCH

The RIGHT DISPLAYS reversion switch is a three-position switch, enabling the reversion of the right side MFD/PFD displays.

MFD REV

R-MFD displays compressed format. R-PFD is shut down.

NORM

R-MFD format is normal. R-PFD is normal.

PFD REV

R-MFD is shut down. R-PFD displays compressed format.

ATT/HDG REVERSION SWITCH

The ATT/HDG reversion switch is a three-position switch.

1

All displays use AHRS 1 data.

NORM

The displays use their own side AHRS (Pilot-1,copilot-2).

2

All displays use AHRS 2 data.

AIR DATA REVERSION SWITCH

The AIR DATA reversion switch is a three-position switch.

1

All displays use ADC 1 data.

NORM

The displays show on-side data.

2

All displays use ADC 2 data.

TUNE SWITCH

The TUNE switch is a four-position switch.

COM1 121.50

COM 1 is tuned to 121.50 MHz emergency frequency

MFD ONLY

Tuning enabled only by MFD. Tuning of the radios by the CDU(s) is disabled;.

NORM

Tuning is normal and can be done through the MFDs or the CDUs as desired.

CDU ONLY

Tuning of the radios enabled only by CDUs. Tuning by the MFD is disabled.

INTEGRATED AVIONICS PROCESSOR SYSTEM (IAPS)

DESCRIPTION

The integrated avionics processor system (IAPS) is a physical collection of functional modules combined into an efficient mechanical package to minimize size, weight, and aircraft wiring, and to improve system reliability and maintainability.

The IAPS independently transmits signals more than once, and each part has independent power. The IAPS also reads some avionics busses and sends data words to the LRUs that use that data. The IAPS performs ARINC data processing and distribution for avionics LRUs.

The IAPS consists of various functional units. The input/output concentrator units (IOCs) get data words and transmit them to the correct LRU. The IAPS power supplies energize the IOCs. The IAPS environmental controller (IEC) monitors the housing temperature and controls the fans. The control strapping units (CSUs) and the options control modules (OCMs) set the IAPS strap settings.

The maintenance diagnostic computer (MDC), the flight management computers (FMCs), and the flight guidance computers (FGCs) are in the IAPS card cage (ICC), but they are not part of the IAPS itself.

Their are no pilot-controlled operations required for the IAPS. Their are no pilot-controlled reversionary operations for the IAPS.

COMPONENTS AND OPERATION

INTEGRATED AVIONICS PROCESSOR SYSTEM CARD CAGE

The IAPS card cage is the housing that contains all the components of the IAPS. The ICC is in the right equipment rack.

INPUT/OUTPUT CONCENTRATOR UNIT

The IAPS data receives from and transmits to many external systems. External system data is transmitted through the ICC circuit card.

The two input/output concentrator units transmit data to other LRUs related to their operation. The IOCs transmit all the display data from other LRUs to the displays.

INTEGRATED AVIONICS PROCESSOR SYSTEM POWER SUPPLY

The IAPS has an input from the 28 vdc main busses. The voltage is filtered and applied to the IAPS power supplies. The two power supplies independently supply the applicable voltages to the necessary units in the IAPS. The No. 1 power supply energizes the No. 1 FGC, FMC, and IOC No. 1. The No. 2 power supply energizes the No. 2 FGC, FMC, MDC, and IOC unit No. 2.

INTEGRATED AVIONICS PROCESSOR SYSTEM ENVIRONMENTAL CONTROLLER (IEC)

The IEC controls the temperature for the ICC. The IEC monitors a pair of ICC temperature sensors and operates fans to control the IAPS environment in each half of the IAPS.

The IEC has a power supply, two thermostats, two transducer monitor circuits, a two-speed fan, and a heat exchanger.

MAINTENANCE DIAGNOSTIC COMPUTER

DESCRIPTION

The maintenance diagnostic computer (MDC) is an onboard computer that records aircraft mechanical and avionics system data. Maintenance personnel can retrieve the information for use in engine trend analysis computation, significant event recording, and avionics/aircraft system failure detection. The MDC is part of the IAPS and consists of an electronic circuit board located in the ICC

COMPONENTS AND OPERATION

The MDC continuously records data for fault analysis and engine trend monitoring.

The MDC monitors engine operating time and counts the number of engine starts and thrust reverser deployments.

The MDC records engine parameters at takeoff to track engine efficiency.

If the engines exceed a maximum operating limit, the peak exceedance value is recorded along with the time and duration of the occurrence.

The MDC data is downloadable to a maintenance facility computer. The data base unit (DBU) is located behind the pilot on the forward bulkhead forward of the entry door. There is also a portable maintenance access terminal (PMAT) located on the aft side of the equipment rack near the floor.

MDC data is available (when on the ground) on the top half of the right MFD by simultaneously selecting A/ICE, ECS, and FUEL on the CCP controller. Accessing MDC data is not needed during flight and is intended to be a maintenance function.

COCKPIT VOICE RECORDER

DESCRIPTION

The cockpit voice recorder (CVR) is a crash survivable recording device that accommodates mandatory cockpit voice recordings up to 2 hours. The CVR is mounted in the aft equipment bay.

COMPONENTS AND OPERATION

The system records the following four audio channels:

- Copilot’s audio, boom/mask and hand held microphone
- Pilot’s audio, boom/mask and hand held microphone
- Cockpit area microphone
- Observer 3rd audio, boom/mask (Optional)

These 4 channels are recorded separately for 30 minutes at high quality recording. In addition, another 2 channels that are generated from the first four channels are recorded at standard quality for 120 minutes. The first channel is the area microphone and the second is a summation of the pilot and copilot’s boom/mask, hand held microphone and the observer 3rd audio (if installed). The system starts recording when power to the left main bus is applied.

The CVR control unit is located on the center pedestal and contains an indicator, headset jack, and erase and test switches. The test switch and indicator provide the test the area microphone channel. The headset jack provides continuos monitoring of all four recorded channels. The bulk erase switch is used to erase the entire recorded data after flight, and will only work when the aircraft is in a weight-on-wheels condition and the parking brake is ON and the hydraulic system is pressurized. To prevent accidental erasures, a time delay circuit makes it necessary to depress the switch for two seconds to start the erasure process.

MESSAGES

EICAS WARNING MESSAGES				
Most warning messages are preceeded by a triple chime.				
Message	Inhibits	Chapt. ref.	Aural Alerts	Voice Alerts
APU FIRE	-	5/9	Triple Chime	"APU FIRE"
APU OVERTEMP	TO/LAND	5	Triple Chime	None
L (R) BATT OVERHEAT	TO/LAND		Triple Chime	None
ESSENTIAL POWER ONLY	-	7	Triple Chime	None
L (R) BLEED LEAK	TO/LAND	2/14	Triple Chime	None
CABIN ALTITUDE	TO/LAND	2	None	"CABIN ALTITUDE"
CABIN DELTA P	TO/LAND	2	Triple Chime	None
CARGO SMOKE	-	9	Triple Chime	None
CONFIG AILERON TRIM	-	10	Triple Chime	"CONFIGURATION"
CONFIG AUTOPILOT	-	4	Triple Chime	"CONFIGURATION"
CONFIG FLAPS	-	10	Triple Chime	"CONFIGURATION"
CONFIG RUDDER TRIM	-	10	Triple Chime	"CONFIGURATION"
CONFIG SPOILERS	-	10	Triple Chime	"CONFIGURATION"
CONFIG STAB TRIM	-	10	Triple Chime	"CONFIGURATION"
GEAR	-	15	Triple Chime	"GEAR"
GEAR BAY OVHT	TO/LAND	9/15	Triple Chime	None
L (R) ENG OIL PRESS LOW	TO/LAND	18	Triple Chime	None
L (R) ENGINE EXCEEDANCE	-	18	Triple Chime	None
L (R) ENGINE FIRE	-	9	Triple Chime	"LEFT (RIGHT) ENGINE FIRE"
HYD PRESS LOW	-	13	Triple Chime	None
NORM BRAKES FAIL	TO	15	Triple Chime	"NORMAL BRAKES FAIL"
PACK LEAK	TO/LAND	2	Triple Chime	None
PARK/EMER BRAKE ON	-	15	Triple Chime	"CONFIGURATION"
PITCH DISCONNECT	-	10	Triple Chime	"CONFIGURATION"
L (R) PYLON BLEED LEAK	TO/LAND	2/14	Triple Chime	None
L (R) REVERSER UNSAFE	-	18	Triple Chime	None
ROLL DISCONNECT	-	10	Triple Chime	"CONFIGURATION"
TRIM AIR LEAK	TO/LAND	2	Triple Chime	None
WING ANTI-ICE LEAK	TO/LAND	14	Triple Chime	None
L (R) WING OVERHEAT	-	14	Triple Chime	None

MESSAGES (Cont)

EICAS CAUTION MESSAGES		
All caution messages are preceeded by a single chime.		
Message	Inhibits	Chapt. ref.
AFCS MESSAGES FAIL	TO	
AFT EQPT BAY DOOR	TO/LAND	2
AIR COND TEMP FAIL	TO/LAND	2
AIR COND TEMP HIGH	TO/LAND	2
AIR DATA 1 (2) FAULT	TO/LAND	
L (R) AOA VANE HEAT FAIL	TO/LAND	
AP HOLDING LWD	TO	
AP HOLDING RWD	TO	
AP HOLDING NOSE DOWN	TO	
AP HOLDING NOSE UP	TO	
AP STAB TRIM FAIL	TO	
APU BLEED ALT LIMIT	TO/LAND	5
APU FAULT	TO/LAND	
APU FIRE DET FAIL	TO/LAND	9
APU FUEL SOV FAIL	TO/LAND	12
APU GEN FAIL	TO/LAND	7
APU GEN OVERLOAD	TO/LAND	7
APU OIL PRESS LOW	TO/LAND	5
APU OIL TEMP HIGH	TO/LAND	5
APU OVERSPEED	TO/LAND	
APU SHUTDOWN	TO/LAND	
APU STARTER FAIL ON	TO/LAND	5
AUTO PRESS FAIL	TO/LAND	2
AUX HYD TEMP HIGH	TO/LAND	13
L (R) BATT FAIL	TO/LAND	7
BATTERY BAY DOOR	TO/LAND	
L (R) BLEED FAIL	TO/LAND	2
L (R) BLEED LOOP FAIL	TO/LAND	2
BRAKE FAULT	TO/LAND	15
CABIN ALTITUDE	TO/LAND	2
CABIN PRESS FAULT	TO/LAND	2
CARGO DOOR	TO/LAND	
CARGO SMOKE DET FAIL	TO/LAND	9
CPLT BRAKE FAULT	TO	15
DITCHING NOT AVAIL	-	
EFIS COMPARATOR INOP	TO/LAND	3/11
EFIS MISCOMPARE	-	3/11
ELECTRICAL FAULT	TO/LAND	7
ELEVATOR SPLIT	-	10
ELT ON	TO/LAND	
EMER LIGHTS OFF	TO/LAND	16
EMER LIGHTS ON	TO/LAND	16
EMERGENCY EXIT	TO/LAND	
L (R) ENG ANTI-ICE FAIL	TO/LAND	18

EICAS CAUTION MESSAGES		
All caution messages are preceeded by a single chime.		
Message	Inhibits	Chapt. ref.
L (R) ENG DSPL MISCOMP	TO/LAND	
L (R) ENG FUEL SOV FAIL	TO/LAND	12
L (R) ENG OIL PRESS HIGH	TO/LAND	18
L (R) OIL TEMP HIGH	TO/LAND	
L (R) ENGINE FLAMEOUT	-	18
L (R) ENGINE VIBRATION	TO/LAND	18
ENGINES FUEL BYPASS	TO/LAND	18
EQPT RACK TEMP HIGH	TO/LAND	2
L (R) ESS BUS FAIL	TO/LAND	7
L (R) FADEC FAIL	TO	18
FD MODE CHANGE	TO	
L (R) FIRE DET FAIL	TO/LAND	9/18
FIRE SYS FAULT	TO/LAND	9
FIREX APU SQUIB FAIL	TO/LAND	9
FLAPS FAIL	TO	10
FLAPS FAULT	TO	10
FLAPS NORM PRESS LOW	TO/LAND	10
FLT SPOILERS DEPLOY	TO	10
FLT SPOILERS FAIL	-	
FLT SPOILERS FAULT	-	
L (R) FUEL COLLECTOR LOW	-	
FUEL IMBALANCE	TO/LAND	12
L (R) FUEL PRESSURE LOW	TO/LAND	12
L (R) FUEL PUMP FAIL	TO/LAND	12
FUEL QUANTITY FAIL	TO/LAND	12
FUEL QUANTITY LOW	TO	12
GEAR BAY DET FAIL	TO/LAND	9
GEAR DISAGREE	-	15
GEAR SYS FAIL	TO	
L (R) GEN FAIL	TO/LAND	7
L (R) GEN OVERLOAD	TO/LAND	7
GND SPLRS NOT ARMED	TO	10
GND SPOILERS FAIL	TO	10
L (R) HYD PRESS LOW	TO/LAND	13
HYD PTU FAIL	-	13
L (R) HYD SOV FAIL	TO/LAND	13
L (R) HYD TEMP HIGH	TO/LAND	13
L (R) IAPS FAIL	TO/LAND	4/11
ICE DETECTED	TO/LAND	14
ICE DETECTOR FAIL	TO/LAND	14
L (R) INBD BRAKE FAIL	TO	15
INBD BRAKE PRESS LO	TO	15

MESSAGES (Cont)

EICAS CAUTION MESSAGES		
All caution messages are preceeded by a single chime.		
Message	Inhibits	Chapt. ref.
INBD BRAKES FAIL	TO	15
MACH TRIM FAIL	TO/LAND	10
L (R) MAIN BUS FAIL	TO/LAND	7
NOSE GEAR DOOR	TO/LAND	15
NWS FAIL	TO	15
NWS LIMIT EXCEEDED	TO/LAND	15
L (R) OUTBD BRAKE FAIL	TO	15
OUTBD BRAKE PRESS LO	TO	
OUTBD BRAKES FAIL	TO/LAND	15
OXYGEN QUANTITY LOW	TO/LAND	8
OXYGEN VALVE CLOSED	TO/LAND	8
PACK FAIL	TO/LAND	2
PACK LEAK	TO/LAND	2
PACK LOOP FAIL	TO/LAND	2
PACK TEMP HIGH	TO/LAND	2
PASSENGER DOOR	LAND	
PAX OXYGEN AUTO FAIL	TO/LAND	8
L (R) PITOT HEAT FAIL	TO/LAND	14
PFD X-TALK FAIL	TO/LAND	11
PARK/EMER BRAKE ON	TO	
PK/EMER BRK PRESS LO	TO	15
PLT BRAKE FAULT	TO	15
PRI STAB TRIM FAIL	-	
L (R) PROBE HEAT OFF	TO/LAND	14
L (R) PYLON LOOP FAIL	TO/LAND	2
L (R) REVERSER FAIL	TO	18
ROLL SPOILERS FAIL	-	10

EICAS CAUTION MESSAGES		
All caution messages are preceeded by a single chime.		
Message	Inhibits	Chapt. ref.
ROLL SPOILERS FAULT	-	
ROLL SPOILERS OFF	-	10
RUDDER LIMITER FAIL	-	10
L (R) START ABORTED	TO/LAND	
SEC STAB TRIM FAIL	-	
SPOILERS FAIL	-	10
SPOILERS FAULT	-	10
STALL PROTECT FAIL	-	10
STALL PUSHER OFF	TO/LAND	10
L (R) START ABORTED	TO/LAND	
L (R) STARTER FAIL	TO/LAND	
L (R) STARTER FAIL ON	TO/LAND	
STBY PITOT HEAT FAIL	TO/LAND	
L (R) STBY STAT HT FAIL	TO/LAND	
TRIM AIR FAIL	TO/LAND	2
TRIM AIR LOOP FAIL	TO/LAND	2
L (R) WINDOW HEAT FAIL	TO/LAND	14
L (R) WING A/ICE FAIL	TO/LAND	14
WING A/ICE LOOP FAIL	TO/LAND	
L (R) WING A/I PRESS HI	TO/LAND	14
WING ANTI-ICE FAULT	TO/LAND	14
WING FUEL TEMP LOW	TO/LAND	12
L (R) WSHLD HEAT FAIL	TO/LAND	
WOW FAIL	TO	15
XBLEED FAIL	TO/LAND	2
YAW DAMPER FAIL	TO/LAND	4

MESSAGES (Cont)

EICAS ADVISORY MESSAGES		
Message	Inhibits	Chapt. ref.
APS FAN FAULT	TO/LAND	
ACARS MESSAGE	TO/LAND	
AFIS MESSAGE	TO/LAND	
AIR COND FAULT	TO/LAND	
L (R) AOA CASE HEAT FAIL	TO/LAND	
APU FAULT	-	
APU SHUTDOWN	-	
L (R) AUX BUS FAIL	TO/LAND	
L (R) AUX BUS OFF	TO/LAND	
AUX HYD PUMP FAIL ON	TO/LAND	
AUX HYD SYS FAIL	TO/LAND	
CABIN ALT WARN HIGH	-	
CABIN CALL	TO/LAND	
L (R) BLEED FAULT	TO/LAND	
CVR FAIL	TO/LAND	
DCU FAULT	TO/LAND	
DOWNLOAD FADEC	TO/LAND	
ELECTRICAL FAULT	TO/LAND	
L (R) ENG AICE FAIL ON	TO/LAND	
L (R) ENG IGN FAULT	TO/LAND	
L (R) ENGINE FAULT	TO/LAND	
L (R) ENG FUEL TEMP LOW	TO/LAND	
L (R) ENGINE FUEL BYPASS	TO/LAND	
L (R) ENGINE MINOR FAULT	TO/LAND	
L (R) ENGINE OIL BYPASS	TO/LAND	
L (R) ENGINE OIL CHIP	TO/LAND	
L (R) ENG THRUST FAULT	TO/LAND	
L (R) ENG VIBRATION FAIL	TO/LAND	
ENG SYNCM-HOLD FAIL	TO/LAND	
EQPT RACK COOL FAULT	TO/LAND	
L (R) ESS BUS OFF	TO/LAND	
FAX RECEIVED	TO/LAND	
FD 1 (2) FAIL	TO/LAND	
FDR FAIL	TO/LAND	
FDR FAULT	TO/LAND	
FIRE SYS FAULT	TO/LAND	
FIREX BTL 1 (2) FAULT	TO/LAND	
FIREX BTL 1 (2) LOW	TO/LAND	
FLAPS RATE LOW	TO/LAND	

EICAS ADVISORY MESSAGES		
Message	Inhibits	Chapt. ref.
L (R) FUEL EJECTOR FAIL	TO/LAND	
FUEL GRAV XFLOW FAIL	TO/LAND	
L (R) FUEL PUMP ON	TO/LAND	
FUEL QUANTITY FAULT	TO/LAND	
FUEL XFER FAIL	TO/LAND	
L (R) HYD DC PUMP FAIL	TO/LAND	
L (R) HYD ENG PUMP FAIL	TO/LAND	
L (R) HYD SOV CLOSED	TO/LAND	
ICE DETECTED	TO/LAND	
ICE DETECTOR FAULT	TO/LAND	
L (R) ENG FUEL TEMP LOW	TO/LAND	
L (R) ENGINE OIL BYPASS	TO/LAND	
L (R) HYD DC PUMP FAIL	TO/LAND	
LAV CALL	TO/LAND	
L (R) MAIN BUS OFF	TO/LAND	
MANUAL PRESS FAIL	TO/LAND	
MPD X-TALK FAIL	TO/LAND	
NWS FAULT	TO/LAND	
PACK COOL AIR FAIL	TO/LAND	
L (R) PROBE HT CTLR FAIL	TO/LAND	
PROX SYS FAULT	TO/LAND	
RAM AIR FAIL	TO/LAND	
RDC FAULT	TO/LAND	
RUDDER LIMITER FAULT	TO/LAND	
SELCAL DATALINK	TO/LAND	
SELCAL HF 1 (2)	TO/LAND	
SELCAL VHF 1 (2) (3)	TO/LAND	
SPOILERS FAULT	TO/LAND	
STAB TRIM FAULT	TO/LAND	
STALL PROTECT FAULT	TO/LAND	
L (R) STALL SHAKER FAIL	TO/LAND	
STALL WARN BASIC	TO/LAND	
STBY INST BATT FAULT	TO/LAND	
TAT HEAT FAIL	TO/LAND	
TAWS BASIC FAIL	TO/LAND	
TAWS SYSTEM FAIL	TO/LAND	
TAWS TERR FAIL	TO/LAND	
TAWS TERR NOT AVAIL	TO/LAND	
TAWS WINDSHEAR FAIL	TO/LAND	
WING ANTI-ICE FAULT	TO/LAND	
WING SOURCE XBLEED	TO/LAND	

MESSAGES (Cont)

EICAS STATUS MESSAGES		
Message	Inhibits	Chapt. ref.
AIR COND MAN TEMP ON	-	
AIR SOURCE OFF	-	
APU GEN OFF	-	7
AURAL WARN A (B) MUTED	-	3
AUTO APR OFF	-	
AUTOPILOT DISCONNECT	-	
L (R) BATT OFF	-	7
BLEED OFF	-	2
BUS TIE MAN OPEN	-	7
CARGO DOOR	TO/LAND	
DITCHING ON	-	2
EMER DEPRESS ON	-	2
L (R) ENG ANTI-ICE ON	-	
ENG ANTI-ICE ON	-	
L (R) ENG FUEL SOV CLSD	-	12
L (R) ENGINE SHUTDOWN	-	
FIRE SYS IN TEST	-	9
FIRE SYS TEST OK	-	9
FUEL BALANCED	-	12
FUEL GRAV XFLOW OPEN	-	12
L (R) FUEL PUMP OFF	-	12
L (R) FUEL PUMP ON	-	12
FUEL XFER OPEN	-	12
L (R) GEN OFF	-	7
GND SPOILERS OFF	-	10
HYD PUMP NOT AUTO	-	13

EICAS STATUS MESSAGES		
Message	Inhibits	Chapt. ref.
L (R) HYD SOV CLOSED	-	13
MANUAL PRESS ON	-	2
NWS OFF	-	
PACK ONLY	-	
PARK/EMER BRAKE ON	-	15
PASSENGER DOOR	TO/LAND	
PAX OXYGEN OFF	-	
PAX OXYGEN ON	-	2
PITCH DISCONNECT	-	2
PROBE HEAT TEST OK	-	
RAM AIR ON	-	
L (R) REVERSER INOP	-	
ROLL DISCONNECT	-	10
ROLL SPOILERS OFF	-	10
RUD LIMITER IN TEST	-	
SEC STAB TRIM ON	-	10
STAB TRIM OFF	-	10
STBY INST OFF	-	
TAWS FLAPS OFF	-	17
TAWS GS WARN OFF	-	17
TAWS TERR OFF	-	17
TRIM AIR ONLY	-	
WING ANTI-ICE ON	-	
WING/ENG ANTI-ICE ON	-	
WING SOURCE-XBLEED	-	
YAW DAMPTER OFF	-	
XBLEED OPEN	-	

MESSAGES (Cont)

MESSAGE	MESSAGE SOUND
AFT EQPT BAY DOOR	TONE
ALTITUDE ALERT	TONE
“APU FIRE”	VOICE MESSAGE
APU FIRE DET FAIL	TONE
APU FUEL SOV FAIL	TONE
APU GEN FAIL	TONE
APU GEN OVERLOAD	TONE
AUTOPILOT DISCONNECT	TONE
AUX HYD TEMP HIGH	TONE
LEFT (R) BATT FAIL	TONE
BATTERY BAY DOOR	TONE
LEFT (R) BATTERY OVERHEAT	TONE
“CABIN ALTITUDE”	VOICE MESSAGE
CARGO DOOR	TONE
CARGO SMOKE	TONE
CARGO SMOKE DET FAIL	TONE
CONFIG AILERON TRIM	VOICE MESSAGE
CONFIG AUTOPILOT	VOICE MESSAGE
CONFIG FLAPS	VOICE MESSAGE
CONFIG RUDDER TRIM	VOICE MESSAGE
CONFIG SPOILERS	VOICE MESSAGE
CONFIG STAB TRIM	VOICE MESSAGE
CPLT BRAKE FAULT	TONE
ELEC HYD GEN FAIL	TONE
ELECTRICAL FAULT	TONE
LEFT (R) ENG ANTI-ICE FAIL	TONE
LEFT (R) ENG DSPL MISCOMP	TONE
LEFT (R) ENG FUEL SOV FAIL	TONE
LEFT (R) ENG OIL PRESS HIGH	TONE
LEFT (R) ENG OIL PRESS LOW	TONE
LEFT (R) ENG OIL TEMP HIGH	TONE
LEFT (R) ENGINE EXCEEDANCE	TONE
“LEFT (RIGHT) ENGINE FIRE”	VOICE MESSAGE
LEFT (R) ENGINE FLAMEOUT	TONE
LEFT (R) ENGINE VIBRATION	TONE
ENGINES FUEL BYPASS	TONE
ELEVATOR SPLIT	TONE
EMERGENCY EXIT	TONE
EMER LIGHTS OFF	TONE
EMER LIGHTS ON	TONE
LEFT (R) ESS BUS FAIL	TONE
ESSENTIAL POWER ONLY	TONE
LEFT (R) INBD BRAKE FAIL	TONE
INBD BRAKE FAIL	TONE
INBD BRAKE PRESS LO	TONE
LEFT (R) FADEC FAIL	TONE
FIRE SYS FAULT	TONE
FIREX APU SQUIB FAIL	TONE

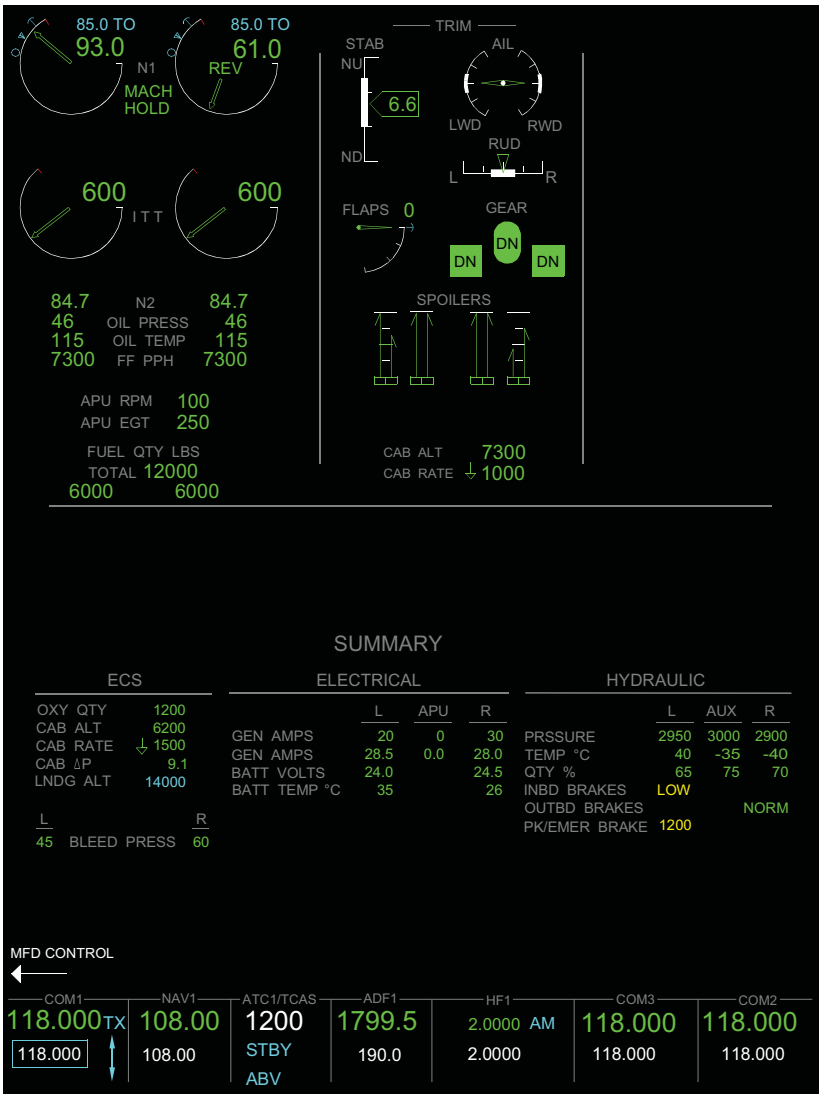
MESSAGE	MESSAGE SOUND
FLAPS FAIL	TONE
FLAPS FAULT	TONE
FLAPS NORM PRESS LOW	TONE
FLT SPOILERS DEPLOY	TONE
FLT SPOILERS FAIL	TONE
FLT SPOILERS FAULT	TONE
FUEL IMBALANCE	TONE
LEFT (R) FUEL COLLECTOR LOW	TONE
LEFT (R) FUEL PRESSURE LOW	TONE
LEFT (R) FUEL PUMP FAIL	TONE
FUEL QUANTITY FAIL	TONE
FUEL QUANTITY LOW	TONE
“GEAR”	VOICE MESSAGE
GEAR BAY OVHT	TONE
GEAR BAY DET FAIL	TONE
GEAR DISAGREE	TONE
GEAR SYS FAIL	TONE
LEFT (R) GEN FAIL	TONE
LEFT (R) GEN OVERLOAD	TONE
GND SPOILERS FAIL	TONE
GND SPLRS NOT ARMED	TONE
HYD PRESS LOW	TONE
LEFT (R) HYD PRESS LOW	TONE
HYD PTU FAIL	TONE
LEFT (R) HYD SOV FAIL	TONE
LEFT (R) HYD TEMP HIGH	TONE
“LEFT (RIGHT) ENGINE FIRE”	VOICE MESSAGE
LEFT (R) FIRE DET FAIL	TONE
LEFT (R) MAIN BUS FAIL	TONE
“NORMAL BRAKES FAIL”	VOICE MESSAGE
NOSE GEAR DOOR	TONE
NWS FAIL	TONE
NWS LIMIT EXCEDED	TONE
LEFT (R) OUTBD BRAKE FAIL	TONE
OUTBD BRAKE PRESS LO	TONE
OUTBD BRAKES FAIL	TONE
“OVERSPEED”	VOICE MESSAGE
PARK/EMER BRAKE ON	VOICE MESSAGE
PARK/EMER BRAKE ON	TONE
PASSENGER DOOR	TONE
PITCH DISCONNECT	VOICE MESSAGE
PK/EMER BRK PRESS LO	TONE
PLT BRAKE FAULT	TONE
PRI STAB TRIM FAIL	TONE
LEFT (R) REVERSER FAIL	TONE
LEFT (R) REVERSER UNSAFE	TONE
MACH TRIM FAIL	TONE
ROLL DISCONNECT	VOICE MESSAGE
ROLL SPOILERS FAIL	TONE

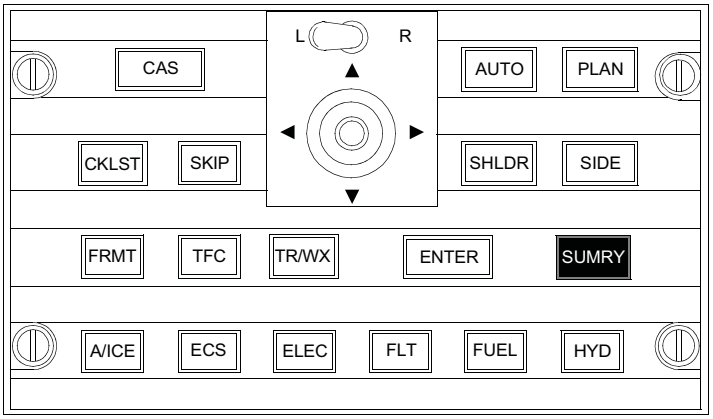
MESSAGE	MESSAGE SOUND
ROLL SPOILERS FAULT	TONE
ROLL SPOILERS OFF	TONE
RUDDER LIMITER FAIL	TONE
SEC STAB TRIM FAIL	TONE
“SELCAL DATALINK”	VOICE MESSAGE
“SELCAL HF 1 (2)”	VOICE MESSAGE
“SELCAL VHF 1 (2) (3)”	VOICE MESSAGE
SPOILERS FAIL	TONE
SPOILERS FAULT	TONE
“STALL”	VOICE MESSAGE
LEFT (R) START ABORTED	TONE
LEFT (R) STARTER FAIL	TONE
LEFT (R) STARTER FAIL ON	TONE
TRIM CLACKER	TONE
VERTICAL TRACK ALERT	TONE
WING FUEL TEMP LOW	TONE
WOW FAIL	TONE

CONTROLS AND INDICATIONS

MULTI-FUNCTION DISPLAYS (MFD)

MFD display systems information, synoptic diagrams, and CAS messages are usually displayed on the left MFD.





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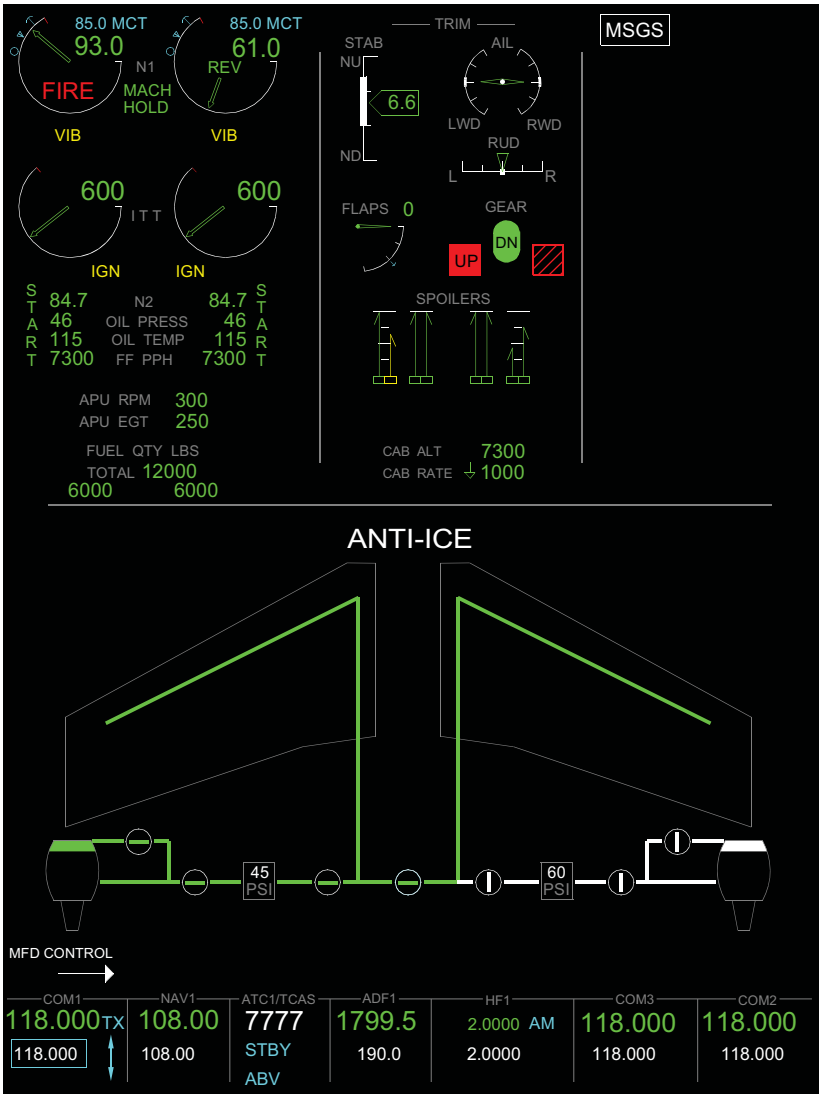
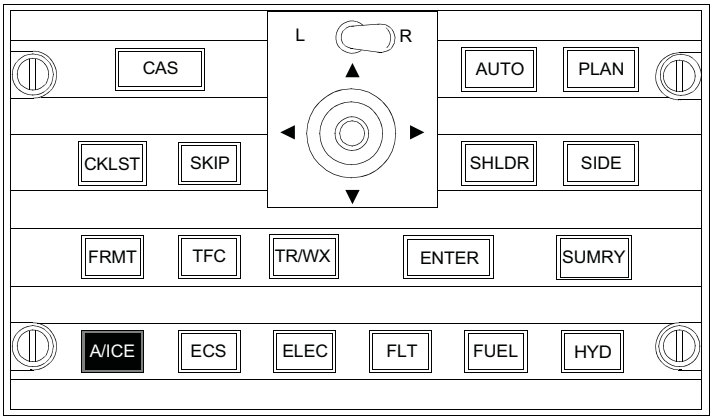
CONTROLS AND INDICATIONS (Cont)

ANTI-ICE SYNOPTIC PAGE





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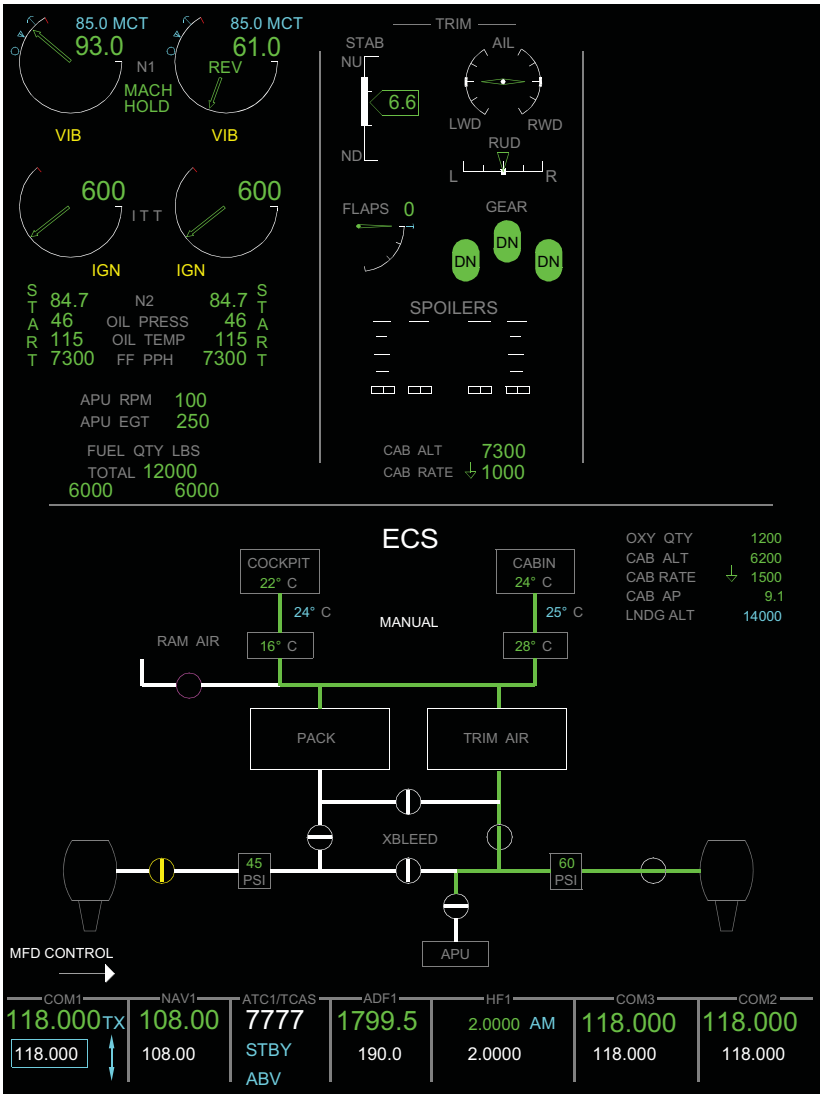
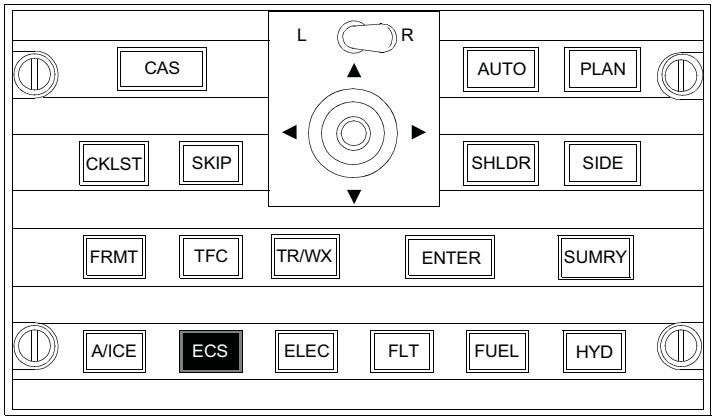
CONTROLS AND INDICATIONS (Cont)

ECS SYNOPTIC PAGE





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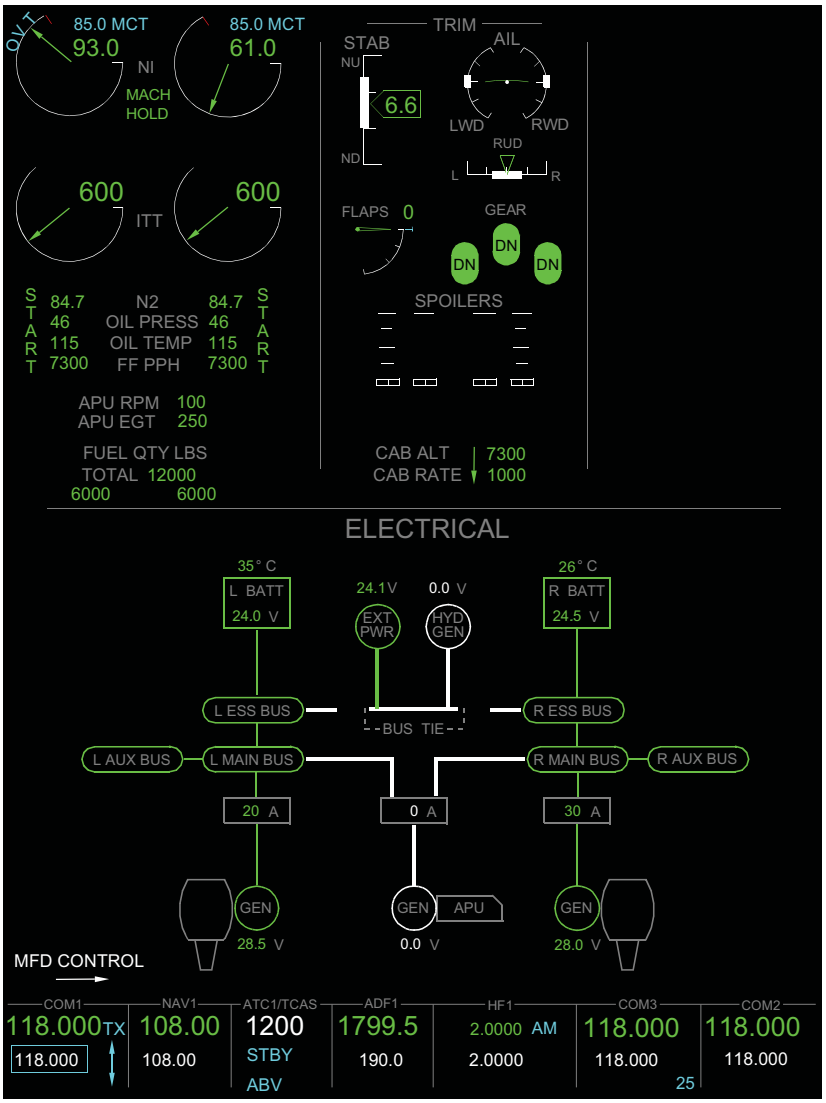
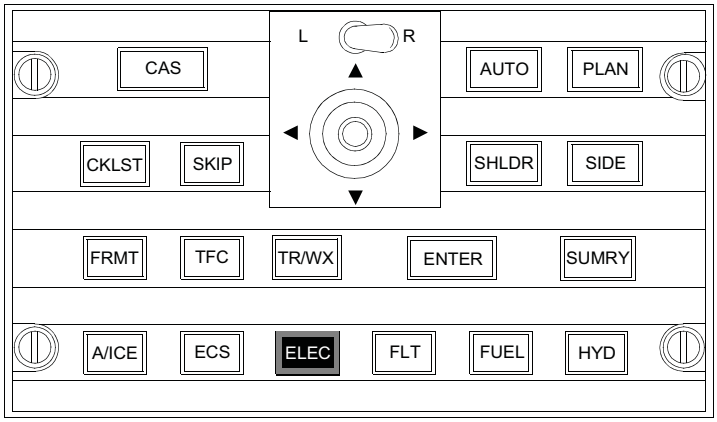
CONTROLS AND INDICATIONS (Cont)

ELECTRICAL SYNOPTIC PAGE





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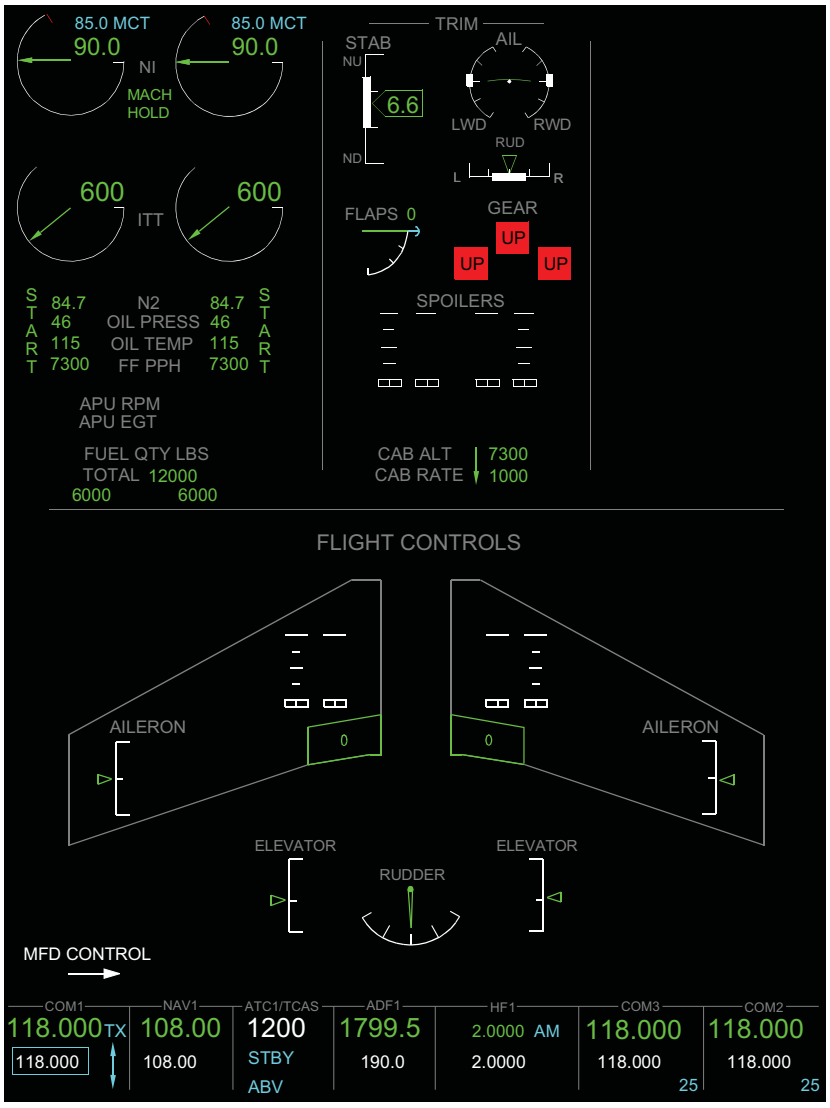
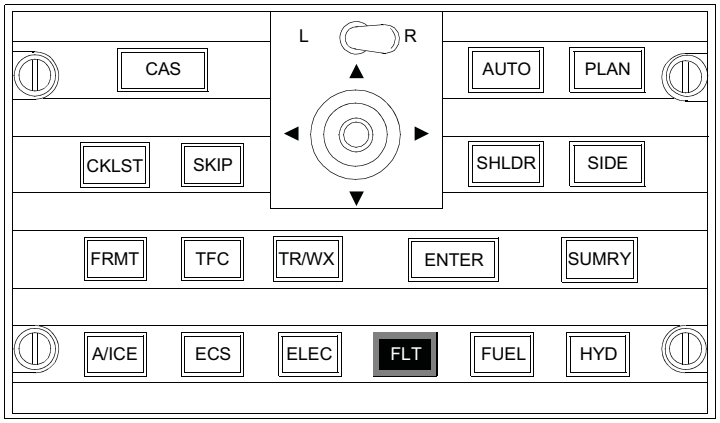
CONTROLS AND INDICATIONS (Cont)

FLIGHT CONTROLS SYNOPTIC PAGE





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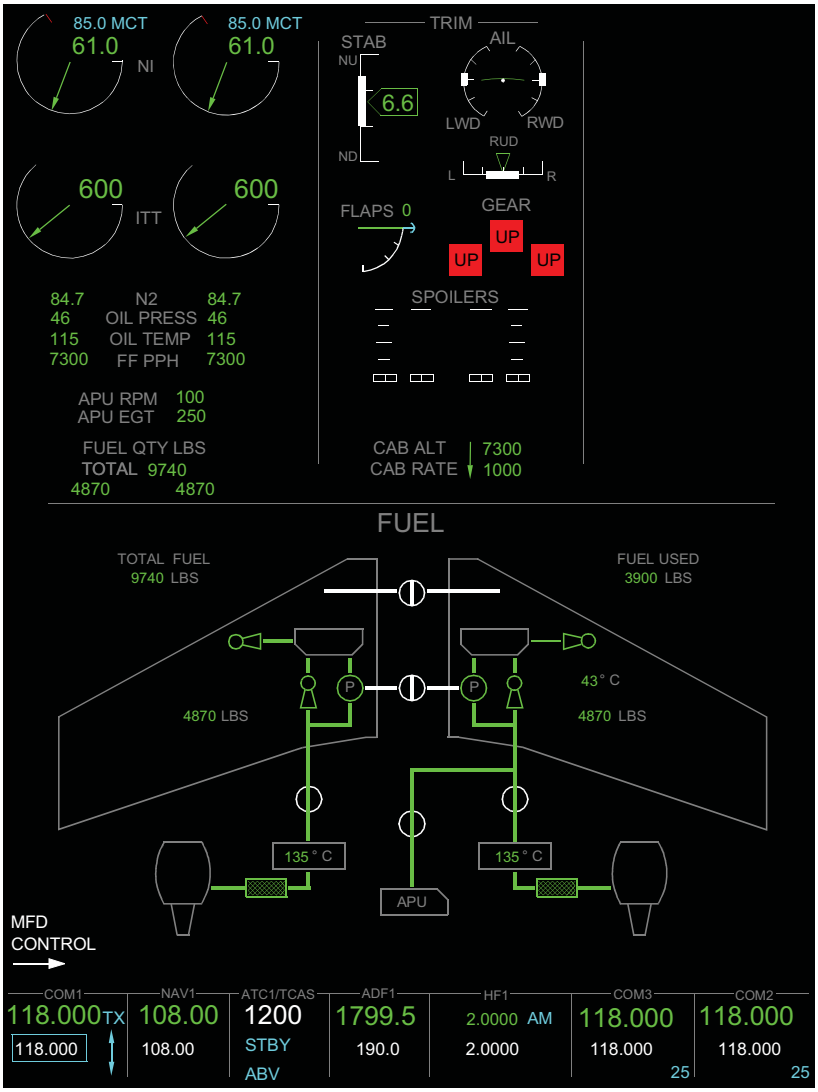
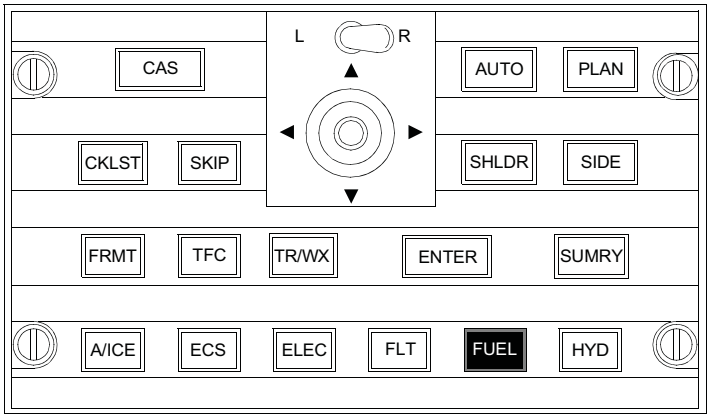
CONTROLS AND INDICATIONS (Cont)

FUEL SYNOPTIC PAGE





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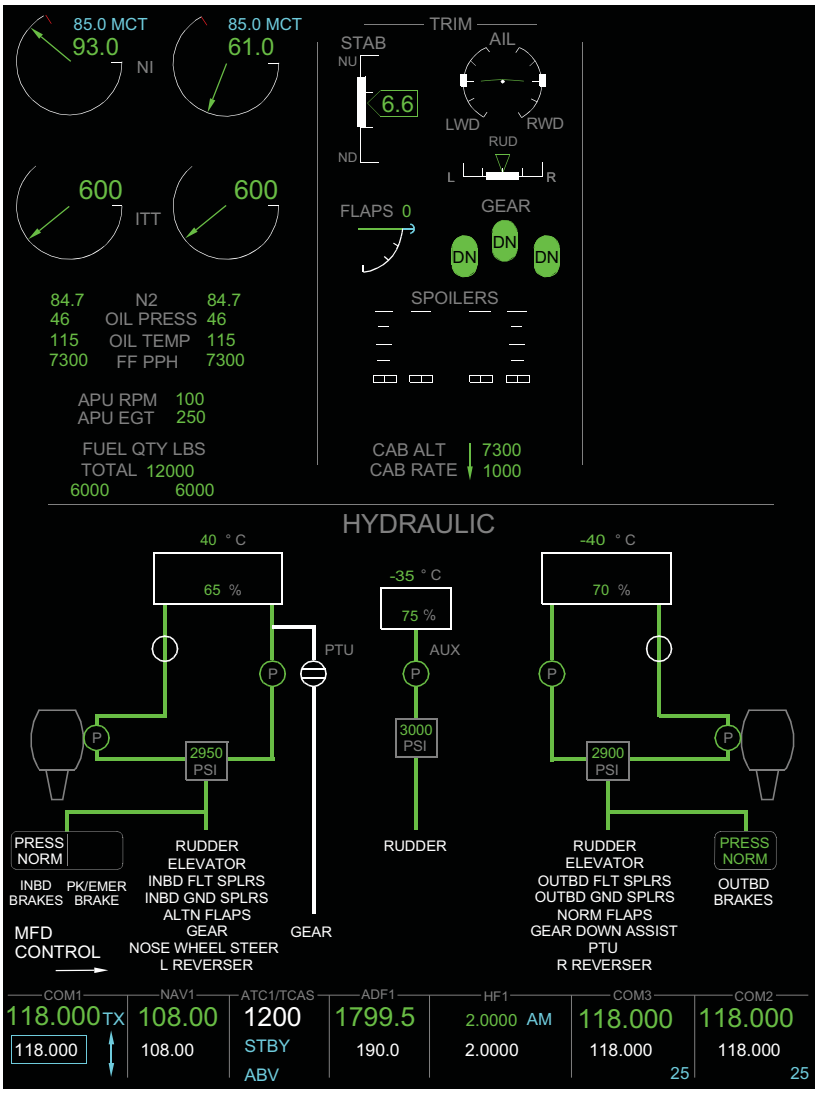
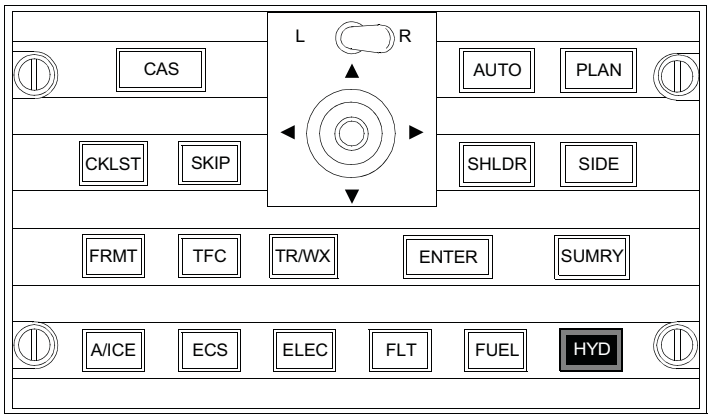
CONTROLS AND INDICATIONS (Cont)

HYDRAULIC SYNOPTIC PAGE





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EICAS MESSAGES

The engine indicating and crew alerting system messages are shown on the EICAS. In the table below, a brief explanation for each message is provided.

MESSAGE	INHIBITS	MEANING	AURAL WARNING
EFIS COMPARATOR INOP	TO/LAND	EFIS comparator unable to compare one or more of the following parameters: altitude, airspeed, roll attitude, pitch attitude, heading, radio altitude, flight director, localizer or glideslope	
EFIS MISCOMPARE		There is a mismatch between the onside and cross-side data and accompanied by a PFD annunciation ALT, IAS, ROL, PIT, HDG, LOC, GS, RA, or FD	
L (R) IAPS FAIL	TO/LAND	The respective Integrated Avionics Processing System has failed	
PFD X-TALK FAIL	TO/LAND	Communication between the PFDs has failed. REFs menu pages 1, 2 and 3 are not synchronized. The EFIS comparator will be inoperative and is unable to compare one or more of the following parameters: altitude, airspeed, roll attitude, pitch attitude, heading, radio altitude, flight director, localizer or glideslope	
DCU FAULT	TO/LAND	Channel A or B in the DCU failed.The yaw damper may fail. The rudder travel limiter monitoring may be inoperative	
MFD X-TALK FAIL	TO/LAND	Communication between the MFDs has failed, and cross side tuning will not be available	
RDC FAN FAIL	TO/LAND	Channel A or B of the remote data concentrator has failed	
RDC FAULT	TO/LAND	RDC channel A or B failed with no loss of functionality.	
AURAL WARN A (B) MUTED		The respective AURAL WARNING DCU A or DCU B switch has been selected, muting all warnings through that channel	