



# **FLIGHT MANUAL**

## **PART II – Aircraft and Systems**

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## **ABOUT THIS MANUAL**

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**WARNING: THIS MANUAL IS FOR MS FSX®/LOCKHEED MARTIN P3D EXPANSION ONLY. DO NOT USE FOR FLIGHT.**

The '1011 Captain' FLIGHT MANUAL is organized into three Parts.  
Each Part is provided as a separate Acrobat® PDF document:

- Part I – User's Manual
- **Part II – Aircraft and Systems** - this document.
- Part III – Normal Procedures

The Manuals are available free of charge [online](#).

THIS MANUAL IS SUPPLEMENTAL TO THE ['1011 CAPTAIN' WEB SITE](#) WHICH WE HIGHLY RECOMMEND TO READ BEFORE USING THIS MANUAL.

# L011 Captain FLIGHT MANUAL

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**DO NOT USE FOR FLIGHT**

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## **SYSTEMS DESCRIPTION**

The '1011 Captain' is one of the most advanced, complete and accurate airliner expansions for MSFS.

But the '1011 Captain' (same as MSFS itself and any MSFS expansion) is a flight simulation software game. Therefore this product should not be used as flight training device (FTD) and/or simulator for flight training purposes.

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

## INSTRUMENT PANELS

### LEFT FORWARD PANEL



### RIGHT FORWARD PANEL





L01, R01. WEATHER RADAR INDICATOR  
L02, R02. CLOCK  
L03, R03. INSTRUMENT COMPARATOR PANEL  
L04, R04. AIRSPEED/MACH INDICATOR  
L05, R05. RDDMI  
L06, R06. AFCS WARNING INDICATOR  
L07, R07. ADI  
L08, R08. HSI  
L09, R09. INSTRUMENT SOURCE SELECT PANEL  
L10, R10 AFCS MODE ANNUNCIATORS  
L11, R11. ALTITUDE ALERT LIGHT  
L12, R12. CORRECTED ALTIMETER  
L13, R13. VERTICAL SPEED INDICATOR  
L14, R14. RADIO ALTIMETER  
L15, R15. MARKER BEACON LIGHTS  
L16, R16. PILOT/COPILOT LIGHTS CONTROLS  
L17, R17. MASTER FIRE WARNING LIGHT 231/ PILOT'S REMOTE SWEEP TIME CONTROL PUSHBUTTON  
L18, R18. VHF NAV RADIO PANEL  
L19, R19. ENGINE NO.2 FAIL LIGHT  
L20. SURFACE POSITION INDICATOR  
R20. STATIC AIR TEMPERATURE INDICATOR  
R21. TRUE AIRSPEED INDICATOR

**CENTER FORWARD PANEL**

- C01. STBY HORIZON INDICATOR
- C02. TAT/MODE/RATE EPR INDICATOR
- C03. PILOTS ANNUNCIATOR PANEL
- C04. STBY AIRSPEED INDICATOR
- C05. ALTIMETER
- C06-C08. EPR INDICATORS
- C09-C11, C15-C17. TACHOMETERS
- C12-C14. TURBINE GAS TEMPERATURE INDICATOR
- C18-C20. FUEL FLOW INDICATOR
- C21-C23. REVERSER INDICATOR LIGHTS
- C24. FLAP POSITION INDICATOR
- C25. LANDING GEAR LEVER
- C26. GEAR LIGHTS
- C27. BRAKE PRESS INDICATOR
- C28. BRAKE SYS SELECT SWITCH

**DO NOT USE FOR FLIGHT**

**GLARESHIELD PANEL**

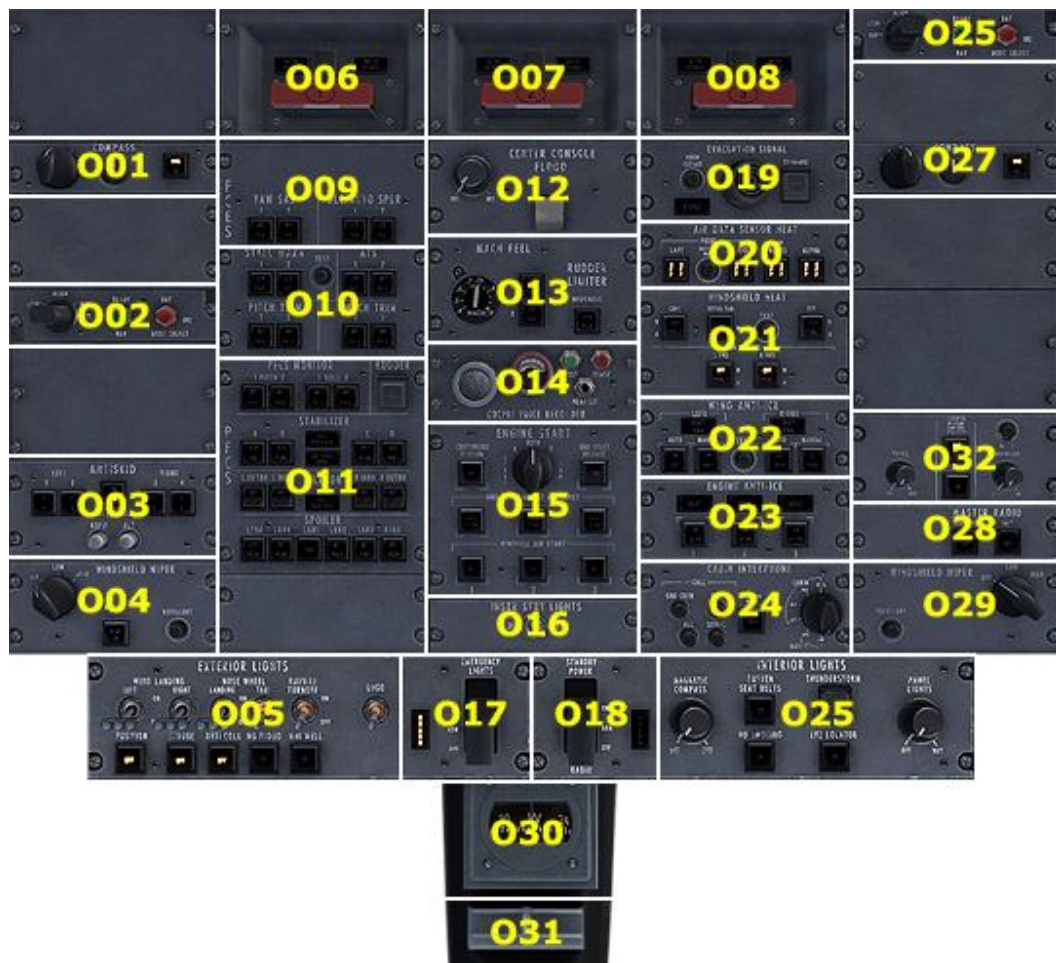


G01. HEADING/PITCH MODE SELECTION PANEL

G02. APFDS ENGAGE PANEL

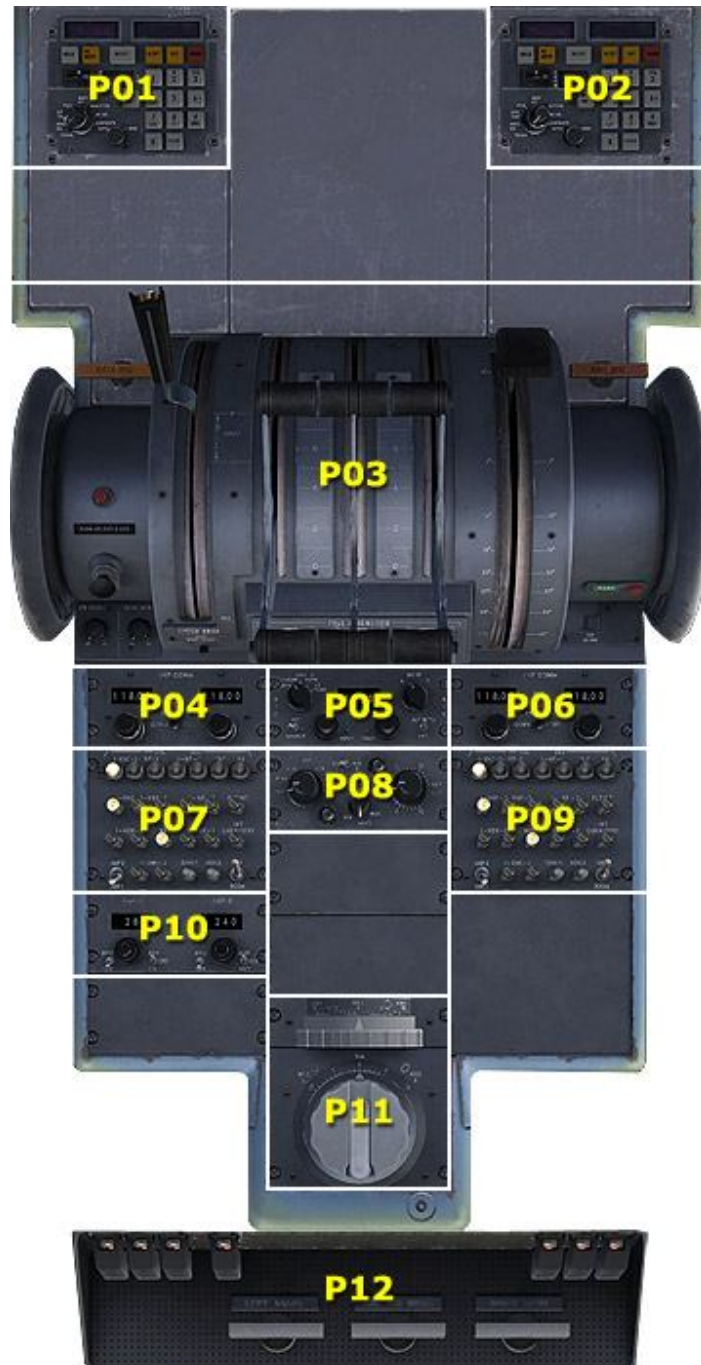
G03. NAVIGATION MODE SELECTION PANEL

G04. ALTITUDE SELECTION PANEL

**OVERHEAD PANEL**

- 001, 027. COMPASS CONTROL PANEL
- 002. MODE SELECTOR UNIT
- 003. ANTI-SKID PANEL
- 004, 029. WINDSHIELD WIPER PANEL
- 005. EXTERIOR LIGHTS CONTROL PANEL
- 006, 007, 008. ENGINE/APU FIRE PULL HANDLE
- 009, 010, 011. PFCS AND FCES PANELS
- 012. CENTER CONSOLE FLOOD LIGHT
- 013. MACH FEEL INDICATOR
- 014. COCKPIT VOICE RECORDER PANEL
- 015. ENGINE START CONTROL PANEL
- 017. EMERGENCY LIGHTS
- 018. STANDBY POWER PANEL
- 019. EVACUATION SIGNAL PANEL
- 020. AIR DATA SENSOR HEAT PANEL
- 021. WINDSHIELD HEAT PANEL
- 022. WING ANTI-ICE CONTROLS
- 023. ENGINE ANTI-ICE PANEL
- 024. CABIN INTERPHONE PANEL
- 025. INTERIOR LIGHTS
- 028. MASTER RADIO PANEL
- 030. MAGNETIC STANDBY COMPASS
- 031. EYE LOCATOR
- 032. ADVISORY LIGHTS CONTROL

**PILOT'S CENTER CONSOLE**



P01,P02. INS CONTROL AND DISPLAY UNIT

P03. CONTROL STAND

P04, P05. VHF COMMUNICATION PANELS

P05. ATC TRANSPONDER PANEL

P07, P09. AUDIO SELECTOR PANELS

P08. WEATHER RADAR CONTROL PANEL

P10. ADF PANEL

P11. AILERON AND RUDDER TRIM CONTROLS

P12. REVERSER TEST SWITCHES, FUEL CONTROL AMPLIFIER TEST SWITCHES; LANDING GEAR UPLOCK MECHANICAL RELEASES



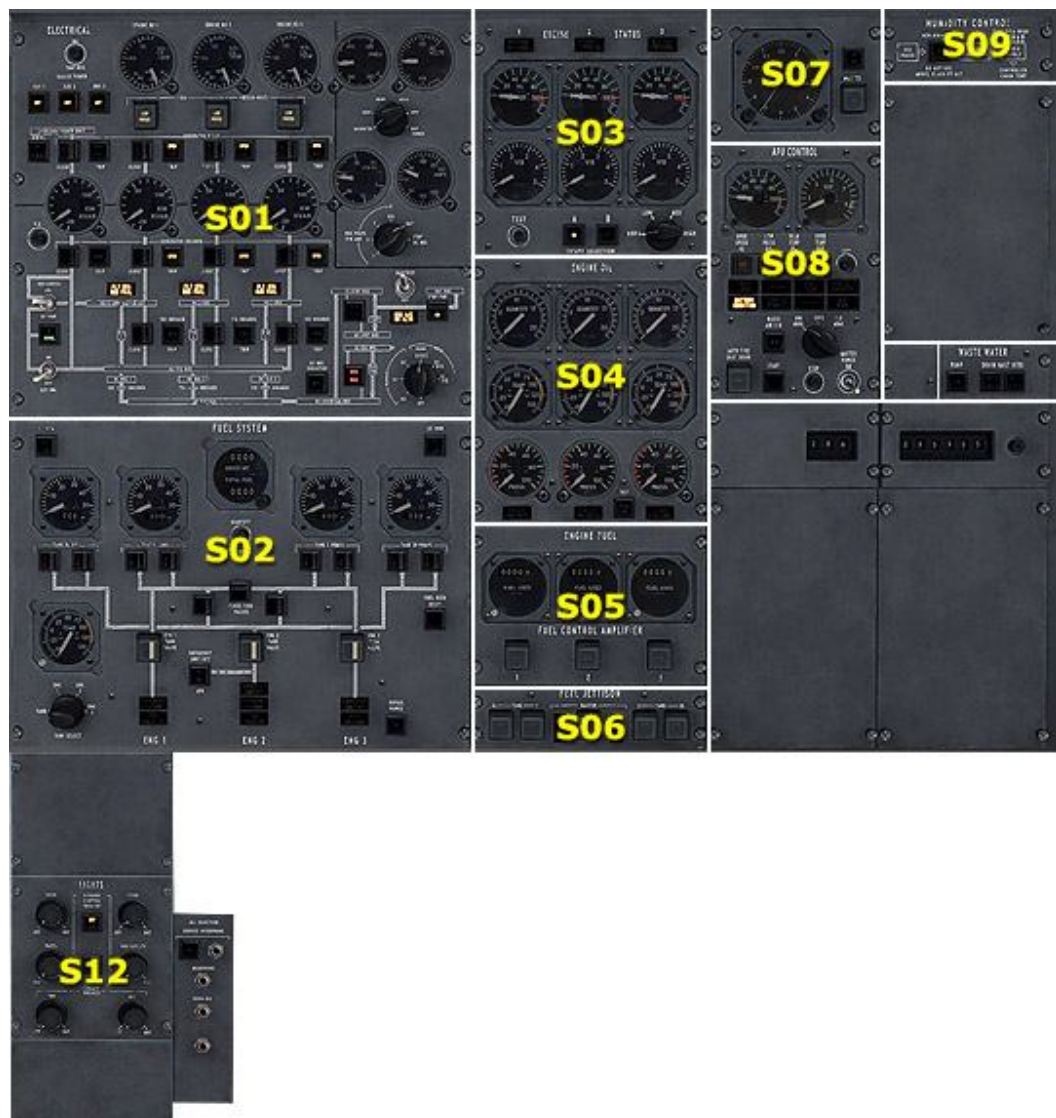
DO NOT USE FOR FLIGHT

**SECOND OFFICER'S UPPER PANEL**



- U01. ENGINE/APU FIRE PULL HANDLE
- U02. FIRE EXTINGUISHER TEST PANEL
- U03. HYDRAULIC SYSTEM CONTROL PANEL
- U04. S/O FIRE DETECTION PANEL
- U05. NACELLE PYLON OVERHEAT DET TEST PANEL
- U06. ENGINE BLEED PANEL
- AIR CONDITIONING PANEL
- U07. ENGINE TURB COOLING AIR PANEL
- U08. WHEEL WELL FIRE TEST PANEL
- U09. PRESSURIZATION PANEL
- U10. ECS MONITOR
- U12. SLAT MONITOR PANEL
- U13. AURAL WARNING TEST PANEL
- U14. S/O ANNUNCIATORS PANEL
- U15. PASSENGER OXYGEN PANEL

**SECOND OFFICER'S LOWER PANEL**



- S01. S/O ELECTRICAL PANEL
- S02. FUEL CONTROL PANEL
- S03. ENGINE STATUS CONTROLS
- S04. ENGINE OIL
- S05. FUEL USED/FUEL CONTROL AMPLIFIER PANEL
- S06. FUEL JETTISON SYSTEM PANEL
- S07. MOVIE SYSTEM PANEL
- S08. APU COCKPIT CONTROL PANEL
- S09. HUMIDITY CONTROL
- S12. WARNING, CAUTION, ADVISORY LIGHTS CONTROL

## AIRCRAFT GENERAL

### COCKPIT

### PILOT'S EYE LOCATOR/VISIBILITY

#### EYE LOCATOR



Eye Locator

### LIGHTS

#### 032. ADVISORY LIGHTS CONTROL



1. Panel Lights Control Knob
2. Overhead Lights Control Knob
3. BRT/DIM Switch
4. TEST ON SWITCH
5. Cockpit Overhead Lights Button

#### 1. Panel Lights Control Knob

Turns ON/OFF Overhead Panel instruments backlighting.

#### 4. TEST ON Switch

Turns on test mode for all lamps.

#### 5. Cockpit Overhead Lights Button

Turns ON/OFF Overhead Panel flood light.



**DO NOT USE FOR FLIGHT****S12. WARNING, CAUTION, ADVISORY LIGHTS CONTROL**

1. Instrument Lights Control
2. Flood Light Control
3. Panel Light Control
4. Desk Utility Light Control
5. FWD Circuit Breaker Light Control
6. AFT Circuit Breaker Light Control
7. BRT/DIM Switch
8. TEST ON Switch

**8. TEST ON Switch**

Provides means of testing switch, indicator, and annunciator lights on the respective (pilot's or S O's) panels. LCH then UNL recalls any active warning lights.

UNL - Normal position. Lights are individually controlled. ON is extinguished.

LCH - ON indicates switch position. All switch, indicator, and annunciator lights illuminate except:

- Pilot's TEST does not illuminate:
  - Engine FIRE PULL handles.
  - MASTER FIRE lights.
  - AFCS WARNINGS panel ALERT lights.
  - MARKER BEACON lights.
- S.O's TEST does not illuminate:
  - APU FIRE PULL handle.
  - FIRE DETECTION LOOP TEST panel lights. -WHEEL WELL FIRE TEST panel lights.
  - APU GEN flowbar and OPEN DIFF indicators and red fault flags if APU Master Switch is OFF.

**PILOT OVERHEAD PANEL LIGHTS CONTROLS****O12. CENTER CONSOLE FLOOD LIGHT**

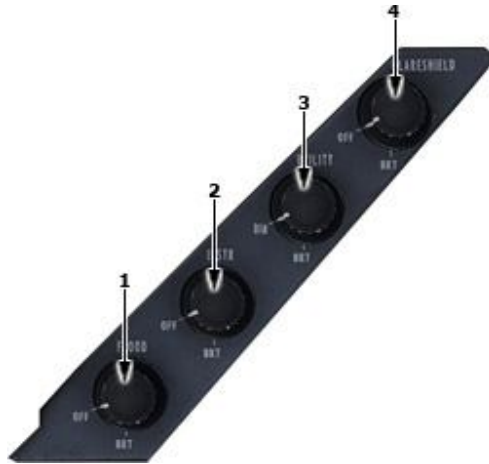
1. Center Console Flood Light Control
2. Center Console Flood Light

**1. Center Console Flood Light Control**

Rotate to turn ON/OFF the center console flood light and cockpit general lights.

## PILOT PANEL LIGHTS CONTROLS

### L16, R16. PILOT/COPILOT LIGHTS CONTROLS



1. Flood Light Control
2. Instrument Panel Lights Control
3. Utility Light Control
4. Glareshield Panel Light Control (Capt's side only)

#### **1. Flood Light Control**

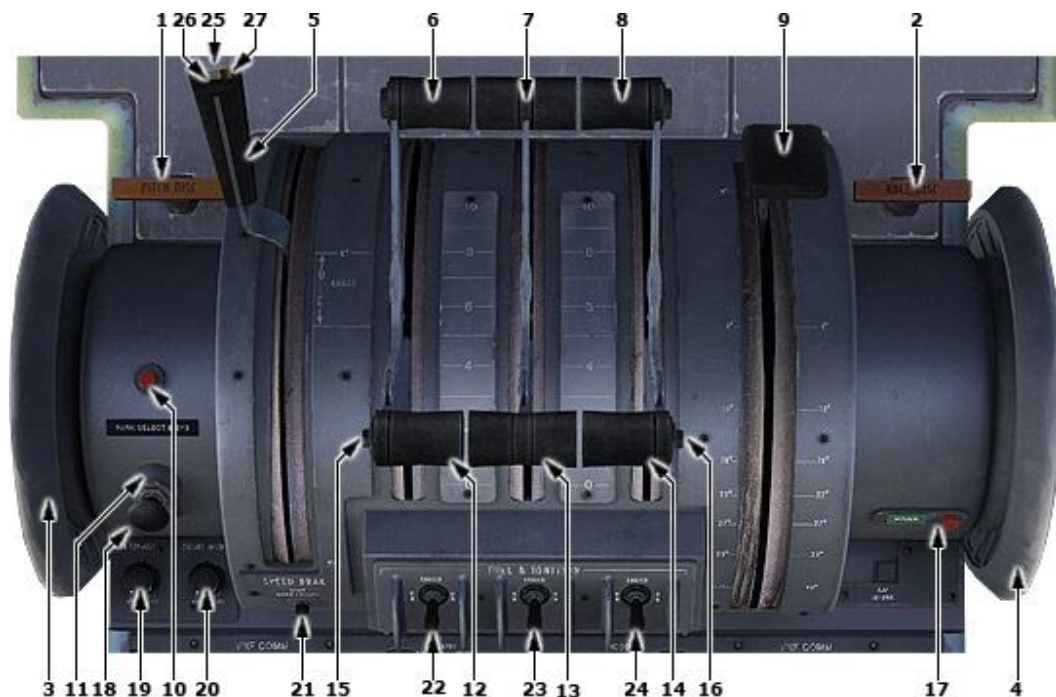
Turns ON/OFF left forward panel flood light.

#### **2. Instrument Panel Lights Control**

Rotate to turn ON/OFF respective pilot's instrument panel background lights.

#### **4. Glareshield Panel Light Control (Capt's side only)**

Rotate to turn ON/OFF glareshield panel (APFDS) background lights.

**DO NOT USE FOR FLIGHT****P03. CONTROL STAND****19. CTR Console Light Control**

Rotate to turn ON/OFF center console background lights.

**20. Engine Instruments Lights Control**

Rotate to turn ON/OFF center panel instruments and background lights.

**005. EXTERIOR LIGHTS CONTROL PANEL**

- 1,2,3. Landing Light Switches
- 4. Nose Wheel Taxi Light Switch
- 5. Runway Turnoff Light Switch
- 6. Logo Light Switch
- 7. Position Lights Switch
- 8. Strobe Lights Switch
- 9. Anti-Collision Lights Switch
- 10. Wing Flood Lights Switch
- 11. Wheel Well Lights Switch

**1,2,3. Landing Light Switches**

Two-position toggle switches that control the landing lights.

**4. Taxi Light Switch**

Two-position toggle switch that controls landing taxi lights.

**5. Runway Turnoff Light Switch**

Two-position toggle switch that controls lights in the fuselage wing fillet leading edge.

**6. Logo Light Switch**

Two-position toggle switch that controls logo light.

**7. Position Lights Switch**

Controls/arms the four position lights mounted on each wing tip.

LCH - Normal position. OFF is extinguished. The two white lights on the aft end of each wing tip, the lower red light on the left wing tip and lower green light on the right wing tip illuminate. The upper green and red position lights are armed to illuminate when the ANTI-COLL light switch is latched.

UNL - OFF is illuminated and position lights extinguish.

**8. Strobe Lights Switch**

Controls forward and aft strobe lights, mounted on each wing tip.

LCH - Normal flight position, OFF extinguishes and strobe lights illuminate.

UNL - OFF illuminates and strobe lights extinguish.

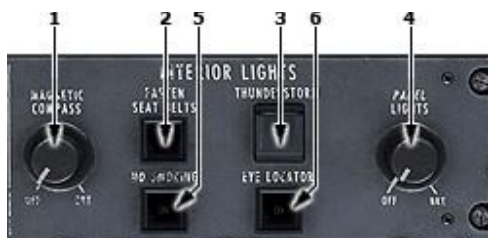
**9. Anti-Collision Lights Switch**

Controls rotating lights on top and bottom of fuselage.

LCH - Normal position when aircraft is in motion or any engine is operating, waj is extinguish and anti-collision lights illuminate

- Upper red and green position lights illuminate if POSITION lights switch is latched.

UNL - Normal position when aircraft is parked and engines shut down. OFF illuminates and anti-collision lights extinguish.

**O25. INTERIOR LIGHT CONTROLS**

1. Magnetic Compass Light Control
2. Fasten Seat Belt Sign Switch
3. Thunderstorm Light Switch (Guarded)
4. Eyebrow Panel Light Control
5. No Smoking Sign Switch
6. Eye Locator Switch

**1. Magnetic Compass Light Control**

Rotate to turn ON/OFF magnetic compass light.

**2. Fasten Seat Belt Sign Switch**

LCH - ON illuminates, single chime sounds.

UNL - ON extinguishes, single chime sounds.

**5. No Smoking Sign Switch**

LCH - ON illuminates, single chime sounds.

UNL - ON extinguishes, single chime sounds.

**017. EMERGENCY LIGHTS**

1. Unarm Light (Amber)
2. Emergency Lighting Switch

**1. Unarm Light (Amber)**

Illuminates when the DC standby bus is powered and EMERGENCY LIGHTING switch is in OFF or ON or when switch is in ARM and any emergency light illuminates.

**MOVIE SYSTEM****S07. MOVIE SYSTEM PANEL**

1. Clock
2. Movie Operating Light (White)
3. Movie Interrupt Switch

## WARNING SYSTEM

### U13. AURAL WARNING TEST PANEL



1. Aural Warning Test Button
2. Aural Warning Test Selector

#### 1. Aural Warning Test Button

- Momentary pushbutton to test aural warnings.
- When pressed and held, activates aural warning for the system selected by the aural warning test selector.

#### 2. Aural Warning Test Selector

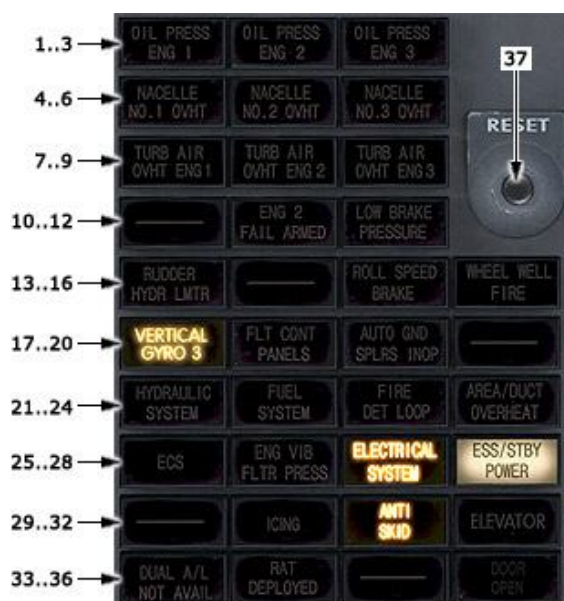
Five position selector that determines which warning is tested when the aural warning TEST button is pressed.

A/C OVSP - Sounds overspeed clacker.

CAB PRESS - Sounds cabin altitude intermittent horn (same sound as unsafe takeoff).

UNSAFE LDG - Sounds steady horn that indicates when landing gear is not down and locked for landing.

UNSAFE TAKEOFF - Sounds intermittent horn that indicates an unsafe takeoff condition. The FWD CARGO, MID CARGO, AFT CARGO and ELEVATOR lights on the S/O's Annunciator Panel, and the DOOR and ELEVATOR lights on the Pilots' Annunciator Panel also illuminate. This test also checks the circuitry to the three cargo doors and lights and the elevators and lights.

**C03. PILOT'S ANNUNCIATOR PANEL**

1. OIL PRESS ENG 1
2. OIL PRESS ENG 2
3. OIL PRESS ENG 3
4. NACELLE NO.1 OVHT
5. NACELLE NO.2 OVHT
6. NACELLE NO.3 OVHT
7. TURB AIR OVHT ENG 1
8. TURB AIR OVHT ENG 2
9. TURB AIR OVHT ENG 3
10. ENGINE 2 FAIL ARMED
11. LOW BRAKE PRESSURE
12. RUDDER HYDR LMTR
13. ROLL SPEED BRAKE
14. WHEEL WELL FIRE
15. VERTICAL GYRO 3
16. FLT CONT PANELS
17. AUTO GND SPLRS INOP
18. HYDRAULIC SYSTEM
19. FUEL SYSTEM
20. FIRE DET LOOP
21. AREA/DUCT OVERHEAT
22. ECS
23. ENG VIB FLTR PRESS
24. ELECTRICAL SYSTEM
25. ESS/STB POWER
26. ICING
27. ANTI SKID
28. ELEVATOR

30. ICING
31. ANTI SKID
32. ELEVATOR
33. DUAL A/L NOT AVAIL
34. RAT DEPLOYED
36. DOOR OPEN
37. Annunciator Light Reset Button
38. MAX IND RESET

**37. Annunciator Light Reset Button**

- Momentary pushbutton.
  - Pressing button extinguishes all illuminated annunciator panel lights except the green ENG TWO FAIL-ARMED
- Any lights for systems which have malfunctioned, and have not been corrected can be recalled by latching and unlatching the Warning, Caution, and Advisory Lights TEST switch on the Pilot's Overhead Panel.

**PILOT'S ANNUNCIATOR LIGHTS**

ANNUN LIGHT	CONDITION	ASSOCIATED INDICATORS
OIL PRESS ENG 1  OIL PRESS ENG 2  OIL PRESS ENG 3	Engine No. 1, 2 or 3 oil pressure is below 18 psi. Cross-check with associated indicators	<ul style="list-style-type: none"> <li>• Oil quantity indicator</li> <li>• Oil temperature indicator</li> <li>• Oil pressure indicator.</li> </ul>
NACELLE NO.1 OVHT  NACELLE NO.2 OVHT  NACELLE NO.3 OVHT	<ul style="list-style-type: none"> <li>• Selected loop(s) detect an overheat</li> </ul>	<ul style="list-style-type: none"> <li>• Respective engine loop lights on the NACELL PYLON OVERHEAT DET TEST panel</li> <li>• Respective HI-PRESS valve closed on Pneumatic panel.</li> </ul>

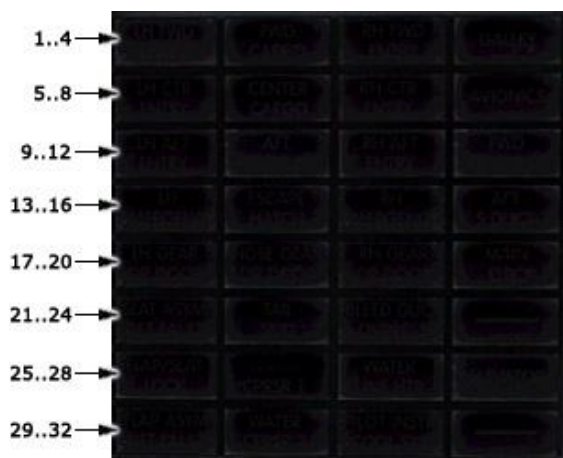
**DO NOT USE FOR FLIGHT**

TURB AIR OVHT ENG 1		
TURB AIR OVHT ENG 2	Both thermal switches detect excessive air temperature at N2 turbine.	Respective <b>OVHT</b> light on ENG TURBINE COOLING AIR panel.
TURB AIR OVHT ENG 3		
ENGINE 2 FAIL ARMED	Illuminates when flaps are in takeoff range and No 2 engine N2 RPM exceeds 83% to indicate the <b>ENG 2 FAIL</b> lights are armed to illuminate if loss of No. 2 engine thrust occurs during takeoff (N2 RPM below 79%). Light extinguishes upon liftoff and <b>ENG 2 FAIL</b> lights are disarmed.	<b>ENG TWO FAIL</b> lights (Captain's & First Officer's).
LOW BRAKE PRESSURE	Brake accumulator pressure is low.	<ul style="list-style-type: none"> <li>Brake Press indicator</li> <li>S/O BRAKE ACCUM NORM/ALT <b>LOW PRESS</b> light.</li> </ul>
RUDDER HYDR LMTR	Rudder hydraulic limiter scheduling is incorrect for existing airspeed.	<ul style="list-style-type: none"> <li><b>FLT CONT PANELS</b> light</li> <li><b>PUSH</b> light on RUDDER LIMITER HYDRAULIC</li> </ul>
ROLL SPEED BRAKE	<ul style="list-style-type: none"> <li>Spoiler L &amp; R1 fault.</li> <li>Mixer fault for spoilers L &amp; R2, 3 &amp; 4</li> </ul> Monitor PFCS panel for specific fault.	Associated SPOILER <b>OFF PUSH</b> light.
VERTICAL GYRO 3	Vertical gyro 3 has failed while not being and is labeled "ATT 3".	<b>ATT MON</b> on the instrument comparator panel.
FLT CONT PANELS	Flight control system has malfunctioned. Monitor overhead panels for specific fault.	<ul style="list-style-type: none"> <li>RUDDER HYDR LIMITER.</li> <li>Any FCES <b>FAIL</b> except STALL WARN</li> <li>Any PITCH or ROLL MONITOR <b>FAIL</b></li> <li>RUDDER <b>OFF</b></li> <li>AILERON <b>OFF</b></li> <li>SPOILER <b>PUSH</b></li> <li>MACH FEEL <b>FAIL</b></li> <li>RUDDER HYD <b>PUSH</b></li> </ul>
AUTO GND SPLRS INOP	Automatic ground spoilers are inoperative. DLC may be operative if light caused by loss of C system hydraulic pressure.	<ul style="list-style-type: none"> <li>Illumination of any two <b>FAIL</b> and/or <b>OFF</b> lights in the DLC AUTO SPOILER switches.</li> <li>HYD SYS C <b>LO PR</b> light.</li> <li>Speedbrake automatic disable lights with flaps extended beyond 30°.</li> </ul>
HYDRAULIC SYSTEM	Hydraulic system has malfunctioned. Monitor hydraulic system panel.	<ul style="list-style-type: none"> <li>Reservoir quantity indicators (4).</li> <li>Reservoir fluid monitor <b>LO QTY/HI TEM</b> lights (4)</li> <li>ATM lube monitor <b>HI TEM/LO PR</b> lights (2)</li> <li>Engine driven pump control switch <b>OFF</b> lights (4).</li> <li>Engine driven pump <b>HI TEM/LO PR</b> lights (4).</li> <li>Brake accumulator <b>LOW PRESS</b> lights</li> </ul>
FUEL SYSTEM	Fuel system has malfunctioned. Monitor fuel system panel	<ul style="list-style-type: none"> <li>Tank 2L, 1, 3, 2R pump switch <b>LOW</b> lights (8)</li> <li>2L &amp; 2R INBD tank <b>LOW</b> lights (2)</li> <li>ENG 1, 2, &amp; 3 <b>FUEL PRESSURE</b> lights (3)</li> </ul>
FIRE DET LOOP	Selected loop(s) detect an overheat (fire) in the respective engine or APU	<ul style="list-style-type: none"> <li>Master <b>FIRE</b> warning lights.</li> <li>Respective FIRE PULL handle.</li> <li>Respective loop lights on the FIRE DETECTION LOOP TEST panel</li> </ul>
AREA/DUCT OVERHEAT		<ul style="list-style-type: none"> <li>Wing anti-ice <b>DUCT FAIL</b> lights (2).</li> <li>Engines 1, 2 &amp; 3 <b>DUCT OVHT</b> lights (3).</li> <li>A, B, C, D, E, J, &amp; H <b>AREA OVHT</b> lights (7).</li> </ul>
ECS	Environmental control system has malfunctioned. Monitor pneumatic panels	<ul style="list-style-type: none"> <li>Pressure relief valve FWD &amp; AFT <b>OPEN</b> Lights (2)</li> <li>Cabin pressure <b>FAULT</b> light.</li> </ul>



**DO NOT USE FOR FLIGHT**

		<ul style="list-style-type: none"> <li>Manual selector switches <b>MNL</b> lights (2).</li> <li>Cool air overboard <b>CLOSE</b> light.</li> <li>Avionic air FWD &amp; MID OVBD <b>LO FLO</b> lights (4)</li> <li>FWD, MID, &amp; AFT cargo heat <b>HOT</b> lights (3)</li> <li>Pack flow control valve <b>OVHT</b> lights (3).</li> <li>Hot air isolation valve <b>OVHT</b> lights (2).</li> <li><b>RAM AUTO</b> light.</li> <li>Floor Heat <b>FAIL</b> light If installed.</li> </ul>
ENG VIB FLTR PRESS	<ul style="list-style-type: none"> <li>Vibration exceeds 2.5 units, or</li> </ul>	<ul style="list-style-type: none"> <li>Engine VIB indicators</li> <li>Engine 1, 2, &amp; <b>FILTER PRESSURE</b> lights (3)</li> </ul>
ELECTRICAL SYSTEM	<ul style="list-style-type: none"> <li>Electrical system has an abnormal condition. Monitor electrical panel</li> <li>Light is illuminated as long as the APU MASTER POWER switch is ON and APU is not operating</li> </ul>	<ul style="list-style-type: none"> <li>IDG DISCONNECT <b>LOW PRESS</b> lights (3).</li> <li>GENERATOR FIELD <b>OPEN</b> lights (4).</li> <li><b>FLT STA BUS FAIL</b> lights (3).</li> <li>Bus TIE BREAKER <b>OPEN</b> lights (3).</li> <li>APU GEN OIL low <b>PRESS</b> light</li> </ul>
ESS/STB POWER	AC or DC essential standby power source has failed. Monitor electrical panel for specific fault	<ul style="list-style-type: none"> <li>Standby power <b>ON</b> light.</li> <li>DC essential and standby bus <b>FAIL</b> lights.</li> <li>AC essential and standby bus <b>FAIL</b> lights.</li> </ul>
ICING	Icing probe is detecting ice build-up.	IF icing conditions exist, ice will begin to form on windshield posts.
ANTI SKID	Selected Anti-skid system is inoperative or parking brake is set.	Anti-skid switch <b>OFF</b> light.
ELEVATOR	Aircraft must be on the ground, and throttles at less than max. continuous thrust for light to be armed to illuminate.	<b>ELEVATOR</b> light on S/O's Annunciator panel. Intermittent horn will sound.
DUAL A/L NOT AVAIL	Dual A L operation (CAT III) not available unless fault can be cleared.	<ul style="list-style-type: none"> <li>Flashing <b>ALERT</b> and [NO DUAL] on AFCS warning panel.</li> <li>Any system failure which would affect APFDS operation such as NAV HDG or ATT flags, nav radios, YAW SAS etc.</li> </ul>
RAT DEPLOYED	RAT is deployed.	Ram air turbine switch <b>UNLKD</b> and <b>PRESS</b> lights.
DOOR OPEN	Any passenger or compartment door not securely closed. Monitor S O's Annun. Panel.	The annunciator lights in the top five rows on the S O's Annun. Panel (except for gear doors).

**U14. S/O ANNUNCIATORS PANEL**

1. LH FWD ENTRY
2. FWD CARGO
3. RH FWD ENTRY
4. GALLEY
5. LH CTR ENTRY
6. CENTER CARGO
7. RH CTR ENTRY
8. AVIONICS
9. TH AFT ENTRY
10. AFT CARGO
11. RH AFT ENTRY
12. FWD S DUCT
13. LH EMERGENCY
14. ESCAPE HATCH
15. RH EMERGENCY
16. AFT S DUCT
17. LH GEAR OR DOOR

18. NOSE GEAR OR DOOR
19. RH GEAR OR DOOR
20. MAIN ELEC
21. SLAT ASYM DET FAULT
22. TAIL SKID
23. BLEED DUCT OVPRESS
25. FLAP/SLAT LOCK
26. WATER CPRSR 1
27. WATER LINE HTR
28. ELEVATOR
29. FLAP ASYM DET FAULT
30. WATER CPRSR 2
31. PILOT INSTR COOL SYS

ANNUN LIGHT	CONDITION	ASSOCIATED INDICATORS
	The following lights are self explanatory. They indicate that a specific door or hatch is not securely closed and latched.	<b>DOOR OPEN</b> illuminates on the Pilots' Annunciator Panel when any of these lights illuminate
LH GEAR OR DOOR  NOSE GEAR OR DOOR  RH GEAR OR DOOR	<ul style="list-style-type: none"> <li>If the pilots' <b>IN TRANS, DOOR</b>, and three green lights are all illuminated a door fault exists. The illuminated light on this panel identifies which door.</li> <li>If the pilots' <b>IN TRANS</b> light is illuminated, but the <b>DOOR</b> and one or more green lights are extinguished a gear fault exists. The illuminated light on this panel</li> </ul>	<ul style="list-style-type: none"> <li>Pilots' red <b>IN TRANS</b> light.</li> <li>Pilots' red <b>DOOR</b> light</li> <li>Pilots' 3 green (LEFT GEAR, NOSE GEAR and RIGHT GEAR) down-and-locked lights.</li> <li>Visual landing gear position indicators</li> </ul>

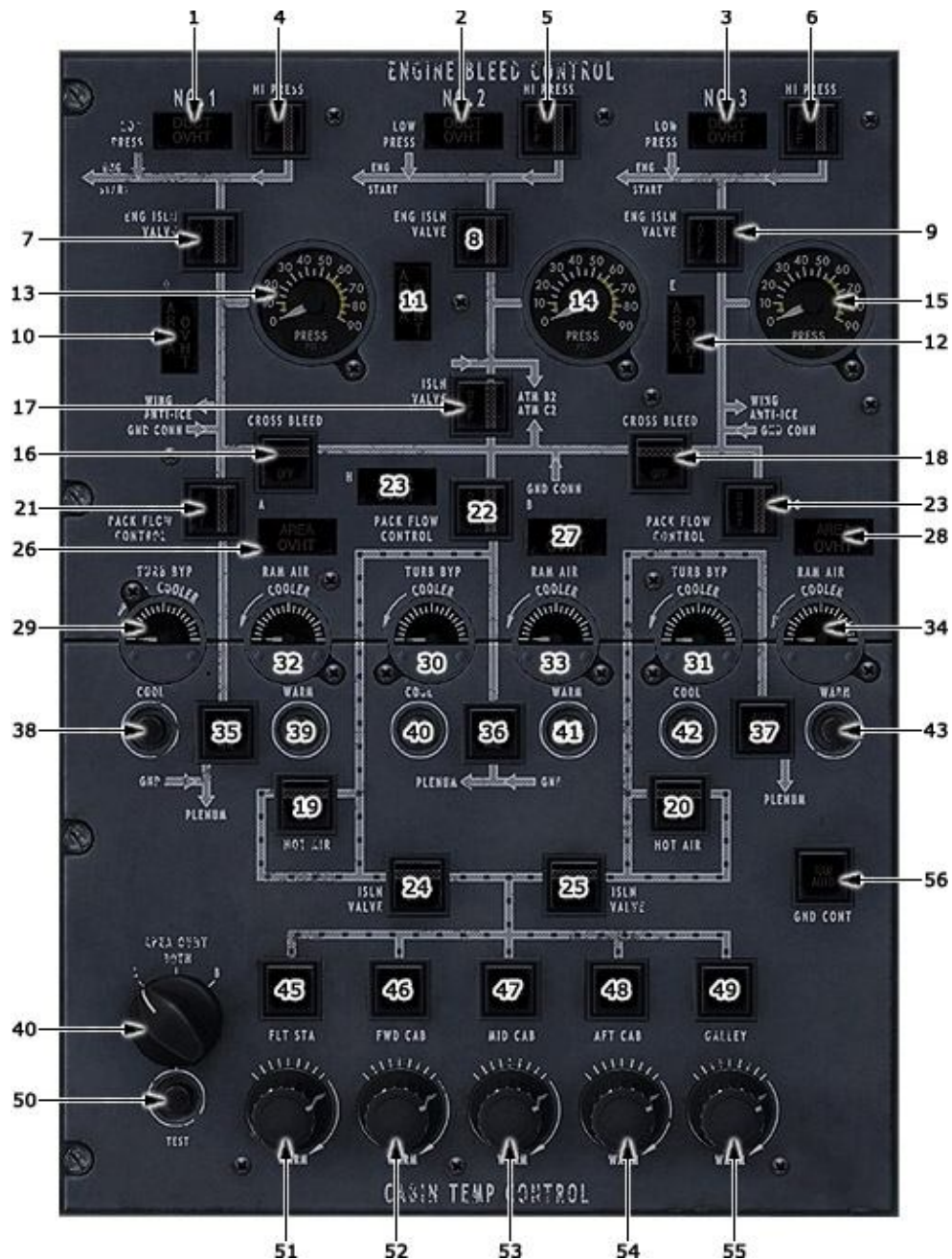
**DO NOT USE FOR FLIGHT**

	identifies which gear.	
SLAT ASYM DET FAULT	A fault is detected in the slat asymmetry detection system.	Slat segment lights and slat position indicator.
TAIL SKID	Tailskid is in transit (tailskid position does not agree with landing gear lever position), or tailskid is contacting the ground.	Landing gear lever position
BLEED DUCT OVPRESS		Engine isolation valve <b>-FB-</b> extinguished.
FLAP/SLAT LOCK	The leading edge slats or trailing edge flaps have locked due to asymmetry.	<ul style="list-style-type: none"> <li>• Flap indicator.</li> <li>• Slat indicator and lights</li> </ul>
WATER CPRSR 1		None.
WATER LINE HTR		None.
ELEVATOR	Aircraft must be on the ground, and throttles at less than max. continuous thrust for light to be armed to illuminate.	<b>ELEVATOR</b> light on Pilots' Annunciator Panel. Intermittent horn will sound.
FLAP ASYM DET FAULT	A fault is detected in the flap asymmetry detection.	Flap position indicator.
WATER CPRSR 2		None.
PILOT INSTR COOL SYS		None.
PILOT INSTR COOL FAN		None.

## AIR CONDITIONING, PRESSURIZATION SYSTEMS

### AIR CONDITIONING COMPONENTS

#### U06. ENGINE BLEED PANEL/AIR CONDITIONING PANEL



- 19,20. Hot Air Switch
- 21,22,23. Pack Flow Control Switch
- 24,25. Hot Air ISLN Valve Switch/ Hot Air Isolation Overheat Lights
- 29-31. Turb Byp Indicator
- 35-37. Auto/MNL Switch
- 32-34. Ram Air Indicator
- 38-43. Cool/Warm Buttons

45-49. Zone Trim Switch  
51-55. Zone Temperature Selector

### **21-23. Pack Flow Control Switch**

Controls flow of air into the pack.

- -FB- indicates valve is open regardless of switch position.
- Valve is spring-loaded closed when the pneumatic duct is unpressurized.
- UNL - Electrical control power is applied to signal pneumatic pressure to close the valve.
- LCH - Electrical control power is removed to signal pneumatic pressure to open the valve.
- Valve modulates to maintain a scheduled air flow depending on aircraft altitude.
- On all aircraft the No. 2 pack flow control valve will close (-FB- extinguish) if the C2 ATM is operating and duct pressure drops to 12 psi or less.

After the pressure has increased, or the ATM(s) no longer has a run signal, the pack flow control valve will reopen. It will be necessary, however, to manually cycle the hot air valve switch and the hot air isolation valve switch in order to restore their operation.

### **29-31. Turb Byp Indicator**

Pointer indicates relative position of the respective ACM turbine bypass valve. Valve is full closed when the pointer is at the 9 o'clock (full cool) position.

- With AUTO-MNL switch in AUTO, the turbine bypass valve is controlled automatically (see Zone Temperature Selectors).
- With the pack operating, the turbine bypass valve is positioned full warm until the ram air louvers have reached the full cool position as indicated on the RAM AIR indicator (9 o'clock position on the ground, 1 o'clock position in flight). The turbine bypass valve will then be positioned as needed to achieve the required ACM discharge temperature.
- With the pack shut off, the turbine bypass valve will be pre-positioned to the 11 o'clock position to prevent overloading the pack during start up.

### **38-43. Cool/Warm Buttons**

Momentary pushbuttons used to posit on the RAM AIR louvers & TURB BYP valve when the respective AUTO/MNL switch is in MNL.

### **35-37. Auto/MNL Switch**

Used to select means of positioning the pack RAM AIR louvers and TURB BYP valve. The position of the RAM AIR louvers and TURB BYP valve then determines pack output temperature.

AUTO - AUTO illuminates; RAM AIR louvers and TURB BYP valve position and pack output temperature are controlled automatically (see Zone Temperature Selectors).

- With the pack operating, the RAM AIR louvers are pre-positioned to the 9 o'clock (full open) position on the ground. In flight, the louvers are positioned as necessary between the 1 o'clock and 3 o'clock positions.
- With the pack shut off, the RAM AIR louvers are prepositioned to 9 o'clock on the ground, 1 o'clock in flight.
- The RAM AIR louvers must travel to their coldest position (9 o'clock on the ground, 1 o'clock in flight), before the TURB BYP valve will begin to move toward cooler.
- With the pack shut off, the TURB BYP is pre-positioned to the 11 o'clock position (in flight or on the ground) to prevent overloading the pack during start up.
- ACM discharge temperature is limited to 2°C (36°F) to prevent icing in the water separator.
- MNL - MNL illuminates. COOL/WARM buttons are used to position RAM AIR louvers and TURB BYP valve to determine pack output temperature.
- The RAM AIR louvers can be positioned through the full travel range in flight or on the ground.
- The RAM AIR louvers must travel to their coldest (9 o'clock) position before TURB BYP will begin to move towards COOLER.
- The TURB BYP must travel to the full warm position before the RAM AIR will begin to move toward warmer.

**32-34. Ram Air Indicator**

Pointer indicates relative position of the respective pack ram air exit louvers. Louvers are full open when the pointer is at the 9 o'clock (full cool) position.

- With the AUTO-MNL switch in AUTO the louvers are pre-positioned and controlled automatically (see Zone Temperature Selectors).
- With the pack shut off, the louvers are pre-positioned to the 9 o'clock position on the ground and 1 o'clock in flight.
- On the ground, with the GND CONT switch unlatched, and RAM AUTO illuminated, the louvers may position to the in-flight range (1 o'clock to 3 o'clock position) to provide a rapid warm-up of the aircraft (less cool air passing through the heat exchangers).

**19,20. Hot Air Switch**

Respective switch controls air supply from just downstream of the pack flow control valves in packs #2 and 3 to the hot air manifold.

- FB illuminates when valve is open regardless of switch position.
- Valve is spring-loaded closed when the pneumatic duct is unpressurized.

UNL - Electrical control power is applied to signal pneumatic pressure to close the valve. OFF illuminates to indicate switch position.

LCH - Electrical control power is removed to signal pneumatic pressure to open the valve.

- Valve modulates as required to maintain a constant temperature in the hot air manifold.
- Respective valve is locked closed when the associated pack flow control valve is closed. Switch must be cycled after pack flow control valve opens to reopen the hot air valve.

**24,25. Hot Air Isolation Switch**

Respective switch controls air supply from the primary heat exchangers in packs #2 and 3 to the hot air manifold.

- FB illuminates when valve is open regardless of switch position.
- Valve is spring-loaded closed when the pneumatic duct is unpressurized.

UNL - Electrical control power is removed to signal pneumatic pressure to close the valve.

LCH - Electrical control power is applied to signal pneumatic pressure to open the valve.

- Pneumatic pressure drives the valve to the full open position.
- Respective valve is locked closed when the associated pack flow control valve is closed. Switch must be cycled after pack flow control valve opens to reopen the isolation valve.

**21-25. Zone Trim Switch**

Controls arming of the zone temperature selector and motor-driven trim air valve from the hot air manifold to the respective zone.

UNL - Zone temperature selector for the zone is deactivated. Respective zone trim air valve is electrically closed. Only air from the cold air plenum is ducted to the affected zone. In addition, that zone temperature selector knob will have no influence on pack output temperature. The CLOSE light is armed and illuminates when the valve closes.

NOTE: If all Zone Trim switches are unlatched while the pack AUTO/MNL switches are in AUTO, THE TURB BYP and RAM AIR indicators will drive to the "shutdown" position (TURB BYP to 11 o'clock, RAM AIR to 9 o'clock on the ground. 1 o'clock in flight) resulting in very cold output temperatures.

LCH - Zone temperature selector is powered to control the respective zone trim air valve. Respective zone trim air valve modulates (electrically) to maintain zone temperature at the desired level. The CLOSE light is extinguished.

**27-31. Zone Temperature Selector**

- With Air Conditioning Packs in AUTO

FWD, MID and AFT CABIN Selectors - The position of each selector provides a desired temperature input to the pack controller and to the respective trim air valve. The pack controller compares the selected temperature with the actual temperature in each zone and then regulates the output temperature of Pack 2



**DO NOT USE FOR FLIGHT**

and Pack 3 to meet the demands of the cabin zone requiring the coldest air. The trim air valves for the remaining zones then modulate to admit more warm air to those zones in order to maintain the temperature selected by the respective Zone Temperature Selector.

**FLT STA Selector** - The position of this selector provides a desired temperature input to pack #1. The pack controller compares the selected temperature to actual cockpit temperature and then regulates Pack 1 output temperature as needed. However, if a Cabin Zone requires colder air than the cockpit, Pack 1 output temperature will decrease to meet that demand. The FLT STA trim air valve will then modulate to maintain the selected temperature in the cockpit.

**GALLEY Selector** - This selector controls only the position of the galley trim air valve.

- With Air Conditioning Packs in MNL, the associated Zone Temperature Selectors still select a desired temperature for that zone. However, only the trim air valve is modulated for temperature control. When trim air valve temperature control is unsatisfactory the respective Pack(s) output temperature must be adjusted manually.

**U10. ECS MONITOR**

1. Pack Flow Indicator
2. Pack Select
3. ECS Temperature Selector
4. ECS Temperature Indicator
5. Cool Air Overboard Switch
- 6, 7. Avionic Air Indicators
8. Cabin Zone/Duct Temperature Selector
- 9-11. Cargo Heat Switches
12. Cabin Temperature Indicator
13. Zone/Duct Temp Select Switch

**1. Pack Flow Indicator**

Displays output air flow of pack in hundreds of cubic feet per minute as determined by the PACK SELECT knob. Normal pack flow is between 2000 and 2500 CFM. Pack #1 flow will normally indicate 300-400 CFM more than pack 2 or 3.

**2. Pack Select**

Selects pack system to be monitored by the PACK FLOW and ECS Temperature Indicators.

**3. ECS Temperature Selector**

Selects temperature to be displayed on the ECS Temperature indicator (degrees centigrade).

**PACK INLET** - Displays temperature at the inlet to the selected pack flow control valve (bleed air temperature). Temperature will vary with engine thrust setting and the opening and closing of the pneumatic HI PRESS valve (Approximately 160° - 200°C in cruise).

**CPRSR DISCH** - Displays temperature at the outlet of the selected pack Air Cycle Machine (ACM) compressor. Temperature will vary with the position of the associated turbine bypass valve (TURB BYP IND) (Approximately 60°-80°C in cruise).

**TURB INLET** - Displays temperature at the inlet of the selected pack ACM. Temperature will vary with ram air exit louver position. (RAM AIR IND) (Approximately 15°-25°C in cruise).

**ACM DISCH** - Displays temperature at the outlet of the selected pack ACM turbine. Temperature will vary with the position of the associated turbine bypass valve (TURB BYP IND) (Approximately 15°-25°C in cruise with TURB BYP IND full warm).

HOT MANF - Displays temperature of the air supplied to the hot air manifold from the selected pack HOT AIR valve (pack #2 or 3). The HOT AIR valve modulates to regulate this temperature to 110°C.

#### **4. ECS Temperature Indicator**

Displays temperature in degrees centigrade at location determined by the position of the ECS Temperature Selector.

#### **5. Cool Air Overboard Switch**

LCH -- Galley vent valve is open. Avionic air overboard valves are open on the ground and closed in flight. (Open in flight if cooling fan fails)

UNL -- CLOSE illuminates to indicate switch position and galley vent and Avionic cooling valves are closed.

#### **6,7. Avionic Air Indicators**

Cooling for the forward and mid avionics compartments is provided by air that is ducted around the equipment in each compartment and exhausted overboard by continuously running fans.

On the ground, the cooling air is exhausted overboard through the forward pressurization outflow valve located under the forward cargo compartment. An Overboard Valve in each avionic compartment is also open on the ground to provide additional airflow.

In flight, the Overboard Valve closes and cooling is provided by a combination of the fans and pressurization air exhausting through the forward outflow valve. In the event of a fan failure, a differential pressure switch across the fan will detect the failure and signal the appropriate Overboard Valve to open. Anytime an Overboard Valve is open the appropriate OVBD light will illuminate. If the amount of cooling air flow is too low, for any reason, an air flow sensor will illuminate the respective LO FLO light.

- In FLT, the battery charger is deactivated if MID OVBD illuminates.

#### **8. Cabin Zone/Duct Temperature Selector**

Selects which zone/supply duct temperature will be displayed on the CABIN Temperature indicator (degrees Fahrenheit).

#### **9-11. Cargo Heat Switches**

LCH -- Fan is armed to operate and maintain normal temperature. HOT will illuminate if compartment temperature reaches 95°F. (Fan will automatically shut off.)

UNL -- Fan and Hot light are disarmed.

- COLD will illuminate at 45°F regardless of switch position.

#### **12. Cabin Temperature Indicator**

Displays temperature in degrees Fahrenheit at location determined by the position of the Cabin zone/duct temperature selector and ZONE/DUCT TEMP SELECT switch.

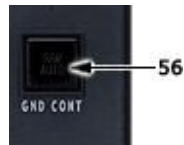
#### **13. Zone/Duct Temp Select Switch**

Selects whether zone temperatures or zone supply duct temperatures will be displayed on the cabin temperature indicator.

LCH - DUCT illuminates. Supply duct temperature for the selected zone will be displayed on the cabin temperature indicator.

UNL - ZONE illuminates. Cabin temperature in the selected zone will be displayed on the cabin temperature indicator.



**56. GND CONT SWITCH****U06. ENGINE BLEED PANEL/AIR CONDITIONING PANEL**

Used to provide for rapid warm-up of a coldsoaked aircraft on the ground. Switch has no effect in flight.

UNL - RAM AUTO illuminates to indicate switch position. Permits the automatic pack controller to close the ram air exit louvers to the 1 O'clock to 3 O'clock position on the ground (same as inflight pre-position). This provides faster warm-up. o Individual pack AUTO/MNL switch must be in AUTO for RAM AUTO to affect respective pack.

LCH - Normal position. RAM AUTO is extinguished. Ram air exit louvers are positioned to the full cold (9 O'clock position) on the ground with the individual pack AUTO/MNL switches in AUTO.

**S09. HUMIDITY CONTROL SWITCH****S09. HUMIDITY CONTROL PANEL**

1. Humidity Control Switch

**24. PILOT INSTR COOL SYS****U14. S/O ANNUNCIATORS PANEL**

24. Pilot Instr Cool Sys

**U06. ENGINE BLEED PANEL/AIR CONDITIONING PANEL****50. Area OVHT Test**

The Area Overheat System utilizes two identical overheat detection loops designated as A and B loops.

- With the AREA OVHT selector in the BOTH position, which is the normal position, an AREA OVHT light may be illuminated by the signals from both A and B loops or from either A or B loop.
- With the AREA OVHT selector in the A or B position only that loop is operative for each AREA OVHT light.
- The AREA OVHT TEST button provides the capability of testing both A and B detection loops or either A or B depending upon the position of the AREA OVHT selector.

**PRESSURIZATION****U09. PRESSURIZATION PANEL**

1. Horn Cutout Button
- 2,3. FWD/AFT Safety Valve Open Lights
4. Cabin Climb Indicator
5. Cabin Alt/Diff Press Indicator
9. Fault Light
- 10,14. FLT/CAB Alt Set Knob and Scales
- 11,15. Baro Set Knob And Scales
- 12,13. FWD/AFT Outflow Valve Position Indicators
- 16,17. Manual Open/Close Switches
18. Mode Sel Knob
19. Norm Rate Knob
20. STBY Rate Selector Knob
- 21,22. Manual FWD/AFT Switches

**1. Horn Cutout Button**

Momentary push button switch that silences intermittent horn which sounds at 10,000 feet cabin altitude.

**2,3. FWD/AFT Safety Valve Open Lights**

Illuminate when respective cabin pressure safety relief valve is open at approximately 8.7 PSI differential pressure.

**4. Cabin Climb Indicator**

- Indicates rate of cabin altitude change.

**5. Cabin Alt/Diff Press Indicator**

- Long pointer indicates cabin altitude on outer scale.
- Short pointer indicates cabin differential pressure on inner scale.
  - Yellow index between 8.4 and 8.6 psi differential pressure which is the maximum range of the Normal mode.
  - Red index is at the 8.7 mark. A cabin pressure safety relief valve should begin to open.

**9. Fault Light**

- - Illuminates when either outflow valve is open beyond the end of the green band when aircraft is above 15,000 feet.
    - Both outflow valves will be locked in position.
    - Manual must be selected on both outflow valves to return the valve to within the green band.
    - The FAULT will extinguish when the valve(s) returns to the green band.
  - Illuminates when the Cabin Altitude exceeds 11,500 feet.
    - Both valves will be driven towards close until the Cabin Altitude decreases to 11,000 feet.
    - The light will remain illuminated until control is regained and both MNL switches are latched at least momentarily.

**10,14. FLT/CAB Alt Set Knob and Scales**

- Used to preset intended cruise altitude on the FLT scale when the Normal mode is in use.
- At 8.4 psi differential pressure, the cabin altitude will be that which is displayed on the CAB scale.
- The cabin altitude displayed on the CAB scale will be maintained at aircraft altitudes up to 1000' above what is displayed on the FLT scale. This would result in an 8.6 PSI differential pressure (maximum when the Normal mode is in use).
- Used to preset altitude of the intended landing airport on the CAB scale.
- Aircraft will be depressurized when selected landing cabin altitude is reached.

**11,15. Baro Set Knob And Scales**

- Used to set barometric correction in inches of Mercury and Millibars when the Normal mode is in use.
- Has no effect in the Standby or Manual modes.

**12,13. FWD/AFT Outflow Valve Position Indicators**

- Indicate position of outflow valves in any mode of operation.
- "Green Band" between 9 and 11 o'clock indicates normal in flight range above 15000 feet aircraft altitude.
- "Dwell Dot" adjacent to the FWD indicator is the point at which the forward outflow valve will stop until the aft outflow valve is fully closed.
  - Ensures adequate cooling air flow from the forward and mid avionics compartments.
  - Only applies in the NORM or STBY modes.

**16,17. Manual Open/Close Switches**

- Manually control individual outflow valves when appropriate MNL switch is latched.

## **18. Mode Sel Knob**

GND CHK

- Overrides air-ground sensing and allows Normal mode to pressurize the aircraft on the ground if a cabin altitude below field elevation is selected on the CAB side of the FLT/CAB scale. (Maintenance use only).

NORM

- Provides automatic pressurization control as determined by the selection made on the FLT/CAB scale and the position of the NORM RATE knob. Outflow valves are powered from No. 3 AC bus.

STBY

## **19. Norm Rate Knob**

Selects cabin altitude rate of change with the MODE SEL in NORM.

- The Dot position provides a 500 feet per minute rate of climb and a 300 feet per minute rate of descent.
- The rate of change may be varied from 200 to 1500 feet per minute rate of climb and 120 to 900 feet per minute rate of descent.

## **20. STBY Rate Selector Knob**

- Controls cabin altitude when the MODE SEL knob is positioned to STBY. Outflow valves are powered from No. 3 AC bus.
- Cabin altitude rate of change may be controlled from 0 to 1000 feet per minute rate of climb or descent.
- The HOLD position will maintain the existing Cabin altitude.
- Outflow valves will not open automatically when the aircraft is on the ground.
- ALT SET and BARO SET controls have no effect when STBY is selected with the MODE SEL knob.

## **21,22. Manual FWD/AFT Switches**

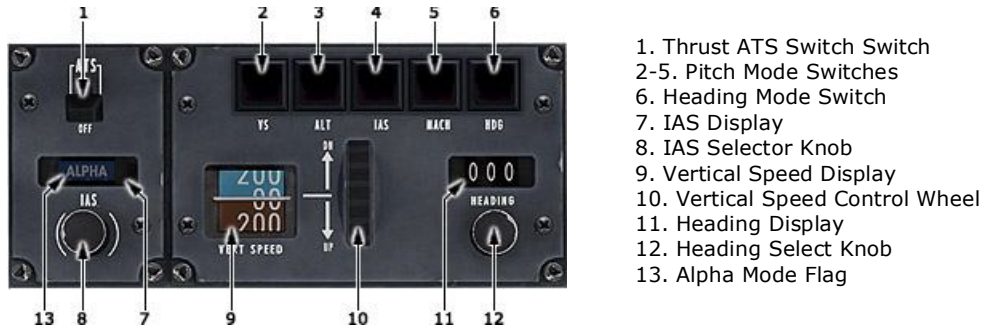
LCH - MNL illuminates, outflow valves are individually controlled with associated OPEN - CLOSE toggle switches utilizing standby DC power.

- Outflow valve movement will be considerably slower in MNL than in NORM or STBY.
- ECS light will illuminate on the Pilot's Annunciator Panel.
- The Manual Mode is unaffected by airground sensing.

UNL - MNL extinguishes. Outflow valve control is determined by the position of the MODE SEL Selector.

# AUTOFLIGHT

## G01. HEADING/PITCH MODE SELECTION PANEL



1. Thrust ATS Switch
- 2-5. Pitch Mode Switches
6. Heading Mode Switch
7. IAS Display
8. IAS Selector Knob
9. Vertical Speed Display
10. Vertical Speed Control Wheel
11. Heading Display
12. Heading Select Knob
13. Alpha Mode Flag

### 1. Thrust ATS Switch

Two position toggle switch.

ATS - Engages autothrottle to hold selected speed.

- Single or dual channel engagement is provided by ATS switches on FCES panel.
- When in TO/GA flaps extend through 30 degrees, or IAS drops below 1.3Vs, ALPHA (angle of attack) flag covers IAS readout and autothrottles are programmed to maintain ALPHA speed.

NOTE: When not in TO/GA and speed drops below 1.3Vs or the flaps are positioned beyond 30°, the ALPHA flag is referenced to 1.3Vs with automatic compensation for a forward acceleration (as would be caused by a tail gust), forward e.g. condition and excessive sink rate.

- ATS automatically disengages when TO/GA switch is pressed, TURB, or IAS is engaged, and upon landing.

NOTE: To prevent excessive throttle movement, do not engage ATS switch until IAS display and actual airspeed are approximately the same.

OFF - ATS is disengaged.

### 2-5. Pitch Mode Switches

Alternate action switches. The switch illuminates to show selected mode. Engaged mode is annunciated on both AFCS MODES annunciator Panels. One pitch mode may be selected at a time.

A pitch mode may be selected if a F/D is ON or an Autopilot is positioned to CMD. The exception is ALT which is functional with CWS selected on the Autopilot. Any pitch mode may be used with the HDG or NAV mode. However no pitch mode can be used in the TURB mode. The selected mode may be disengaged by pressing the switch again or by disengaging the engaged Autopilot and F/D.

VS - Holds vertical speed existing at engagement. After engagement, VS may be varied by rotating thumbwheel and may be used for G/S capture. VS usage is inhibited in A/L mode after GS capture.

ALT - Holds altitude existing at engagement. May be engaged at any vertical speed with either autopilot in CWS or CMD or at least one F/D on. ALT may be used for G/S capture. ALT is inhibited in A/L mode after G/S capture. When ALT ARM is used on ALTITUDE SELECT panel, ALT engages automatically when aircraft reaches selected altitude. (F/D on or Autopilot in CMD mode.)

IAS - Holds indicated airspeed existing at engagement by varying the pitch of the aircraft and disengages autothrottles if in use. Inhibited in APR or A/L modes.

NOTE: IAS is selected as a pitch mode. It should not be confused with the airspeed selection function of the ATS panel discussed later in this chapter.

## **6. Heading Mode Switch**

Alternate action switch.

Pressing switch holds heading selected and provides heading reference for F/D and/or autopilot in CMD. Mode is inhibited in A/L mode after localizer capture. Cannot be engaged in TURB mode. Disengages when pressed second time. Maximum bank angle is 28° at 200 knots, decreasing to 15° at 450 knots.

## **7. IAS Display**

Indicates selected airspeed. ALPHA flag (not shown) covers IAS numbers when system is operating in ALPHA mode

## **8. IAS Selector Knob**

Knob provides selection of the IAS reference for the speed command system. Depending on configuration, a minimum of 1.25 or 1.3VS is automatically programmed by ALPHA mode regardless of speed selected.

## **9. Vertical Speed Display**

Provides readout for selected vertical speed in VS mode. Synchronized to aircraft vertical speed when VS mode is not engaged.

## **10. Vertical Speed Control Wheel**

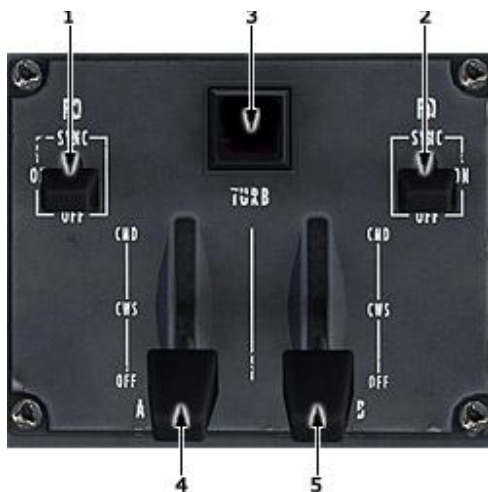
Rotary thumbwheel that provides control of the vertical speed reference for the APFDS when VS mode is selected. Inoperative in all other modes.

## **11. Heading Display**

Indicates selected heading.

## **12. Heading Select Knob**

Knob that provides selection of APFDS heading reference. Positions heading bug on both HSI's.

**G02. APFDS ENGAGE PANEL**

- 1,2. Flight Director Switch  
 3. Turbulence Switch  
 4,5. Autopilot Switch

**1,2. Flight Director Switch**

Three position toggle switch.

OFF - ADI command bars biased out of view.

ON - Engages F/D display on the selected side. A basic attitude hold mode for both pitch and roll is initially displayed until a NAV and/or pitch mode is selected.

SYNC - With no command modes engaged, this synchronizes the F/D to existing aircraft attitude. Presently, there are no Delta procedures to function.

**3. Turbulence Switch**

Alternate action-pushbutton switch. Pressing the switch:

- Engages turbulence mode any time the autopilot is in the CMD or CWS mode unless the A/L or TO/GA modes are engaged.
- Switch illuminates and both pilots' AFCS TURB mode annunciators indicate turbulence mode is engaged.
- Trips autopilot switch (bat handle) to CWS if in CMD and disengage all other modes.
- Disengages autothrottles.
- Biases Flight Director bars out of view.
- Reduces pitch and roll gains by 50 per cent.
- Automatic pitch trim remains operative.

Once the turbulence mode is established, no other mode may be engaged until the turbulence mode is manually disengaged.

The turbulence mode is disengaged by pressing the switch a second time or by disengaging autopilot. The switch extinguishes and the TURB mode annunciators disappear.

**4,5. Autopilot Switch**

Three position lever type switch (bat handle) that is solenoid held out of the OFF position.

Each solenoid-held switch controls one autopilot and cannot be engaged unless all signals are valid. Only one switch may be engaged at a time unless when A/L mode is selected.

OFF - Disengages autopilot. However, the autopilot computers remain synchronized with the aircraft attitude.

CWS - Engages one autopilot at a time in the Control Wheel Steering mode to provide:

- Pitch hold up to 18°.
- Heading hold if bank is 3° or less.
- Bank hold between 3° and 35° max. Will return to 35° if engagement bank angle is greater than 35°. No navigation modes are available. Altitude hold may be engaged. Autopitch trim is operative

**DO NOT USE FOR FLIGHT**

except when force is applied to control wheel. Control wheel electric trim is operative with force applied to control wheel (four pounds or more).

CMD - Same as CWS if no modes engaged. Any compatible NAV and Heading/Pitch modes may be engaged. Autopilot trim operative.

**G03. NAVIGATION MODE SELECTION PANEL**

- 1-4. Navigation Mode Switches
- 5,6. Course Display
- 7. NAV Source Select Switch
- 8,9. Course Selector Knob

**1-4. Navigation Mode Switches**

A/L - (Approach/Land). The APFDS is armed for approach and autoland when either or both autopilots are engaged in CMD and ILS frequency is selected. LOC ARM, G/S ARM, and A/L ARM appear in both AFCS mode annunciators. This provides CAT II or III autoland capability and hand flown F/D approach down to CAT I minimums.

APR - Arms APFDS for capture and tracking of localizer and glide slope of CAT I quality. LOC ARM and G/S ARM appear in both AFCS MODES annunciators. ILS frequency must be selected.

LOC - Arms APFDS for capture and tracking of localizer. Glide slope capture is not available. LOC ARM appears in both AFCS MODES annunciators. However, LOC is not usable for backcourse approaches.

NAV - Selects VOR lateral guidance to APFDS. To select VOR NAV mode, a VOR frequency must be tuned. VOR ARM appears in both AFCS MODES annunciators, followed by VOR after beam capture. If VOR station is not valid, VOR ARM will annunciate but F/D bars will bias out of view.

**5,6. Course Display**

Indicates selected VOR course or ILS runway heading. Repeated on respective HSI course bar.

**7. NAV Source Select Switch**

Navigation sources for autopilot:

- 1) VOR (see the next item on how to use)
- 2) FMS - autopilot in HDG mode tracks CIVA-INS flightplan.
  - HDG Switch should be engaged
  - NAV Switch will be automatically deselected
  - Heading Bug on Captain's HSI will be controlled by navigation system.
- 3) ONS - autopilot in HDG mode tracks 3<sup>rd</sup> party CIVA-INS flightplan, if it is installed
  - INS Nav Mode Selector should be engaged



**DO NOT USE FOR FLIGHT**

- HDG Switch should be engaged.
  - NAV Switch will be automatically deselected.
  - Heading Bug on Captain's HSI will be controlled by 3rd party CIVA-INS flightplan, if it is installed.
- See 'CIVA' Chapter for how to use 3<sup>rd</sup> party CIVA INS.

**8,9. Course Selector Knob**

Left selector knob sets the No. 1 VOR receiver to desired course and positions course pointer on Captain's HSI. The course selector must be set to the proper course for an ILS approach to provide the APFDS computer "A" with the information necessary to determine drift angle and runway alignment.

Right selector knob sets No. 2 VOR receiver to desired course and positions course pointer on First Office's HSI. The course selector must be set to the proper course for an ILS approach to provide the APFDS computer "B" with the information necessary to determine drift angle and runway alignment.

**L11-R11. ALTITUDE ALERT LIGHT**

ALTITUDE is illuminated 750 feet before reaching selected altitude. At 250 feet before reaching the selected altitude, the ALTITUDE lights extinguish and a C-chord sounds. If altitude deviates by 250 feet after reaching 250 feet of selected altitude, the tone sounds and the lights will flash continually until 250 feet is recaptured or a new altitude is selected.

The lights are inhibited below 2500 feet radio altitude, however, the C-chord is operative at all altitudes. Captain's ALTITUDE light is referenced to the Captain's altimeter; First Officer's ALTITUDE light is referenced to the First Officer's altimeter.

The aural warning altitude reference is switched by the NORM/STBY selector.

**G04. ALTITUDE SELECTION PANEL**

1. Altitude Alert System Test Switch
2. Altitude Preselect System Arming Switch
3. Select Altitude Window
4. Air Data Source Selector Knob
5. Altitude Selector Control Knob

**1. Altitude Alert System Test Switch**

Permits check of the altitude alert system

**2. Altitude Preselect System Arming Switch**

Pressing alternate action switch the first time arms APFDS for automatic capture of selected altitude. Switch remains illuminated until selected altitude is reached and ALT ARM appears in both AFCS annunciators. Altitude hold is automatically engaged when selected altitude is captured. At capture ALT SELECT switch extinguishes, and switch illuminates. ALT appears in both AFCS annunciators.

Pressing the switch a second time (before altitude capture) extinguishes switch and disengages altitude select.

**3. Select Altitude Window**

Displays altitude selected by control knob. Flag covers window if system fault occurs.

**4. Air Data Source Selector Knob**

NORM - The aural warning and APFDS Altitude Capture altitude reference is the No. 1 ADC and Captain's altimeter setting.

STBY - The aural warning and APFDS Altitude Capture altitude reference is the No. 2 ADC and First Officer's altimeter setting.

NOTE: The Altitude Lights are not switchable and receive data from their respective ADC's.

**5. Altitude Selector Control Knob**

Selects altitude for automatic capture by APFDS, and reference for altitude alert system. ALT SELECT ARM must be selected after altitude is selected.

## CONTROL WHEEL



### Takeoff/Go-Around Switch (TO/GA)

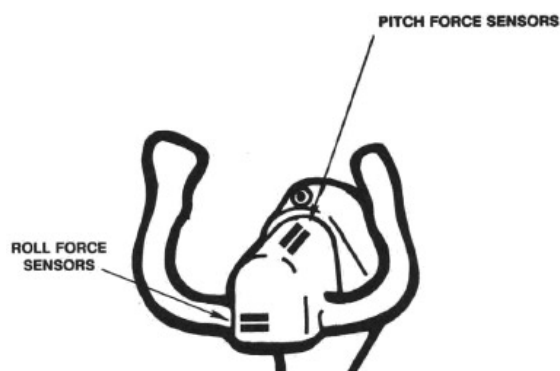
Permits engagement of takeoff (TO) mode with aircraft on the ground, and Go-Around (GA) mode in flight.

### Pitch Trim Thumbwheel

Applies trim at rate proportional to speed of thumbwheel rotation. It is inoperative with an autopilot in CMD, but will operate in CWS only while manual pitch input of greater than 4 pounds is applied.

### Autopilot Disconnect Switch

Pressing momentary pushbutton switch disconnects autopilot(s).



1. Roll Force Sensors
2. Pitch Force Sensors

**L10-R10 AFCS MODE ANNUNCIATORS**

1. AFCS Modes Annunciator Test 1 Switch
2. AFCS Modes Annunciator Test 2 Switch
- 3-14. Display Modes

**1. AFCS Mode Annunciator Test 1 Switch**

Momentary pushbutton switch when pressed causes illuminated display of modes as shown.

LEFT COLUMN

LOC (WHITE)

Localizer captured.

GA (WHITE)

Glide slope captured.

A/L (WHITE)

Autopilots have conducted self checks and dual computations are being used. Armed to appear at 1500 feet radio altitude and 25 seconds after glideslope capture, whichever occurs last, to indicate A/L track. Automatic landing capability has been established.

ALIGN (WHITE)

Appears at 150 feet RA if A/L is in use and autopilot is in CMD. Indicates that runway alignment has been initiated, and that localizer guidance will be available during the landing rollout.

FLARE (WHITE)

Appears at radio altitude of 50 feet if A/L is in use and autopilot is in CMD. Indicates the flare program has been initiated. If engaged, ATS will reduce thrust at a programmed rate.

ROLLOUT (WHITE)

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**DO NOT USE FOR FLIGHT**

Appears at 5 feet radio altitude if A/L is in use and autopilot is in CMD, and indicates wings level command has been initiated.

**RIGHT COLUMN**

HDG SEL (WHITE)

Heading select mode engaged.

VS (WHITE)

Vertical speed mode engaged. VOR (WHITE)

NAV mode selected and VOR captured. IAS (WHITE)

Airspeed hold mode engaged. IAS held by pitch attitude.

TURB (WHITE)

Turbulence mode engaged. Automatically disconnects ATS. Autopilot trips to CWS (control gains reduced).

No CMD modes are available for APFDS until TURB is disengaged.

GO ARND (WHITE)

Appears when the TO/GA switch is pressed in flight, after flaps extended to landing position if autopilot is in CMD, or flight director is on. ATS is disconnected. DLC is stowed. Wings level and minimum speed of 1.25Vs up to a maximum pitch attitude of 18° is commanded. HDG may be engaged.

**2. AFCS Mode Annunciator Test 2 Switch**

Pressing switch causes display of modes as shown.

**LEFT COLUMN**

LOC ARM (BLACK)

Armed for localizer capture.

GS ARM (BLACK)

Armed for glideslope capture.

A/L ARM (BLACK)

Armed for an automatic landing (CMD only).

ALN ARM (BLACK)

Appears when A/L is annunciated (A/L track). Indicates the align function is armed. YAW SAS goes to parallel operation.

FLR ARM (BLACK)

Appears when A/L is annunciated (A/L track). Indicates autopilot self checks have been conducted and computers are armed for flare function.

TAKEOFF (WHITE)

Appears when the takeoff/go around switch is pressed while on the ground with a flight director on. Flight director will display takeoff and climbout commands with wings-level in roll axis unless HDG is also engaged.

**RIGHT COLUMN**

ALT (WHITE)

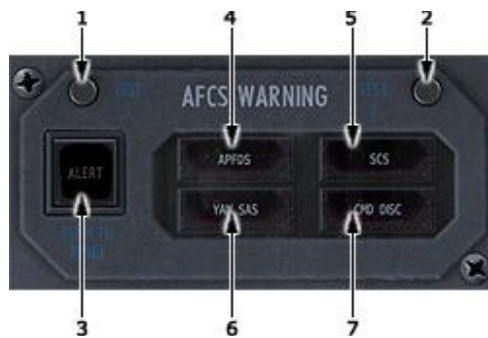
Altitude hold mode engaged. Automatically appears when altitude is captured by altitude select mode. Also appears if ALT mode is manually selected.

VOR ARM (WHITE)

NAV mode selected and armed for VOR capture. VOR frequency must be valid.

ALT ARM (BLACK)

The altitude select mode is armed to capture the selected altitude.

**L06-R06. AFCS WARNING INDICATOR**

1. Test 1
2. Test 2
3. Alert Switch
- 4-7. AFCS Warnings

**3. Alert Switch**

Flashes when annunciator appears. ALERT light reset by pressing once. Annunciator is reset by pressing light twice. If a second annunciator appears, switch may be reset without canceling first annunciator, ALERT light flashes when either test switch is pressed.

## APU

### S08. APU COCKPIT CONTROL PANEL



#### 1. NG Tachometer

Indicates gas turbine speed (N1). 3S12 - CONT PWR

#### 2. NG Tachometer Test Button

When pressed and held, tachometer pointer drives to 3 o'clock position.

#### 3. TGT Indicator

Indicates Turbine Gas Temperature (NG).

#### 4. TGT Indicator Test Button

When pressed and held, TGT pointer drives to 3 o'clock position.

#### 5-8. Fault Flags (Red)

- Appearance of a [FAULT] flag indicates APU has automatically shut down.
- An automatic shutdown occurs if:
  - Oil pressure is too low (NG above 55% and loss of pressure occurs for 10 secs.)
  - Oil temperature is too high.
  - NG (gas turbine) TGT is too high.
- Appropriate [FAULT] flag identifies cause of shutdown.



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**DO NOT USE FOR FLIGHT**

- After shutdown cycle is complete, MASTER POWER switch must be cycled to permit [FAULT] flag reset.
- All [FAULT] flags appear during a S/O's Panel LIGHTS TEST provided the APU MASTER POWER switch is ON. APU will not shutdown during LIGHTS TEST, and APU MASTER POWER switch does not have to be cycled to reset the flags.

#### **9. Reset Button**

- Press to reset [FAULT] flag(s).
- APU MASTER POWER switch must be ON.
- [FAULT] flag(s) remain in view if condition still exists.

#### **10. DONT LOAD Light (Amber)**

Illuminates when the free-turbine (N2) is off speed.

- APU GENERATOR FIELD is tripped OPEN .
- BLEED AIR S/O should be unlatched.

#### **14. BATTERY CONDITION Light (Amber)**

- Illuminates when battery charger is deactivated. May be caused by:
  - Overheated battery.
  - Battery powering either the DC or AC (inverter) standby buses.
  - MASTER RADIO ESSENTIAL switch is latched, and no DC ESS BUS power.
- Illuminates regardless of position of APU MASTER POWER switch.
- Do not attempt APU start with light illuminated.

#### **15. DOORS IN TRANSIT Light (Amber)**

Illuminates unless inlet and injector doors are in the required position.

- Illuminates when start switch is pressed until doors are open
- Illuminates after APU is shutdown (appr. 120 sec. after pressing STOP button) until doors are closed.

#### **17. MAX MODE Light (Amber)**

Illuminates to indicate load compressor IGV's are in the full-open position for maximum bleed air output.

- The IGV's should go to the full-open position when:
  - Compressor Mode Selector is held in the MAX MODE position.
  - Engine GRND START switch is pressed while the APU BLEED AIR S/O switch is latched.
  - Compressor Mode Selector is in NORM and maximum air output is required.
- Illumination of MAX MODE with the Compressor Mode Selector in NORM indicates that the APU has reached maximum bleed air supply capability.
- MAX MODE extinguishing with the engine GRND START switch latched, or with the Compressor Mode Selector held in MAX MODE indicates that APU bleed air supply is being limited by APU generator load.

#### **18. Bleed Air S/O Switch**

Controls bleed air supply from APU to the pneumatic system.

LCH - Normal position when using APU bleed air. Valve is electrically armed to open; valve is opened by APU bleed air pressure.

- At least one PACK FLOW CONTROL switch should be latched before BLEED AIR S/O is latched.
- BLEED AIR S/O closes automatically when:
  - APU FIRE PULL handle (interior or exterior panel) is pulled
  - APU auto-shutdown occurs.
  - Duct pressure drops too low (about 6 psi).

OPEN - Illuminates when valve is opened.

UNL - Normal position for APU shutdown, and when any other pneumatic source is supplying bleed air.

Electrical power is removed to close the shutoff (S/O) valve, and the IGV's are commanded to the MIN position. OPEN extinguishes when the valve is closed.

- Except in an emergency, switch must be unlatched when the pneumatic system is pressurized by any other source.

## **19. Compressor Mode Selector**

Selects operating mode of the load compressor IGV's.

MIN - Normal position of the selector for APU start, shutdown, and when bleed air demands are small (i.e. only operating air conditioning packs). IGV's are positioned to the minimum flow stop.

NORM - Normal position when bleed air demands are high (i.e. operating either ATM). IGV's are scheduled to modulate to maintain constant mass flow within operating limits of the APU.

MAX MODE - Not used in normal operation. Selector is springloaded out of this position. IGV's are commanded to the full open (max. flow) position.

- APU automatically shifts to MIN mode, regardless of selector position, during APU start, shutdown, or when BLEED AIR S-O is unlatched.
- With APU BLEED AIR SHUTOFF latched OPEN and GND START switch pressed, APU automatically shifts to MAX MODE.
- With Mode Selector in NORM or MAX MODE, IGV's will position to reduce bleed air output as needed to maintain constant load compressor RPM to assure stable generator output.

## **20. Auto Fire Shutdown Switch & Armed Light**

Guarded two-position switch that controls arming of the APU AutoFire Shutdown system in-flight.

IN FLIGHT:

LCH - Normal switch position. System is armed, and illuminates as long the APU MASTER POWER switch is ON. UNL - System is disarmed and ARMED is extinguished.

ON GROUND:

System is armed and, light is illuminated regardless of switch position. The system is disarmed when the APU MASTER POWER switch is OFF.

ARMED - When illuminated, an APU fire will cause an auto-fire shutdown, and the following will occur:

- APU GENERATOR FIELD opens.
- BLEED AIR S/O valve closes.
- APU immediately shuts down.
- PRI and SEC EMERGENCY SHUTOFF (fuel) valves close.
- Inlet and ejector doors close.
- When doors close, MAIN APU/No. 2 Engine fire bottle is discharged.

AUTO FIRE SHUTDOWN does not affect visual or aural fire warnings. Performing a FIRE DETECTION LOOP TEST will not cause an auto fire shutdown.

## **21. Start Switch**

- Momentary switch that initiates APU start cycle.
- Pressing the switch opens the SEC EMERGENCY SHUTOFF, if closed.

## **22. Stop Button**

Initiates normal APU shutdown. When pressed and released:

- APU GENERATOR FIELD trips OPEN
- APU shifts to MIN mode.
  - Fuel valve is then closed.
  - 40 seconds later DOORS IN TRANSIT illuminates until inlet door closes.
- If button is pressed during start, shutdown will not actually occur until NG exceeds 55% (starter cutout).

### **23. Master Power Switch**

Controls electrical power to the APU.

OFF - Normal position after APU shutdown. Removes all electrical power from the APU.

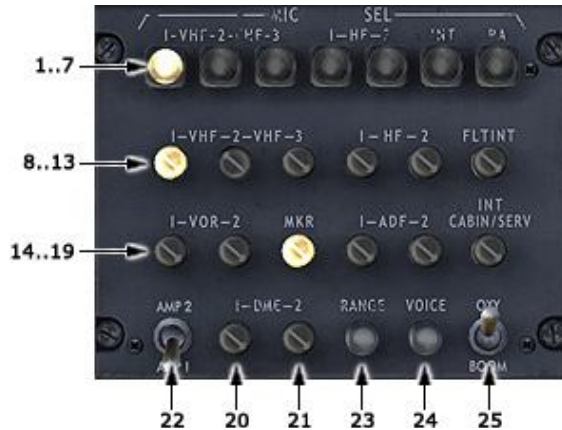
- Closes PRI EMERGENCY SHUTOFF valve.
- Resets APU circuits following any APU fire or auto shutdown.
- Removes all power from APU panel controls and indicators except the BATTERY CONDITION light.

ON - Electrically held position. Must be in this position to operate the APU.

- Opens PRI EMERGENCY SHUTOFF valve provided the APU FIRE PULL handle on both the interior and exterior APU panels are IN, and no AUTO FIRE SHUTDOWN signal is present.
- Powers the APU GENERATOR FIELD and APU GENERATOR BREAKER OPEN lights.
- Powers all APU panel controls and indicators.
- Position of BATTERY switch does not affect APU operation.
- Do not use MASTER POWER switch to shut down the APU.

## COMMUNICATION

### P07,P09. AUDIO SELECTOR PANELS



- 1-7. MIC Selector Switches (7)
- 8-21. Receive Switches
- 22. Amplifier Switch
- 23,24. Filter Switches
- 25. Microphone Selector Switch

#### 1-7. MIC Selector Switches (7)

Two-position interlock pushbutton switches connect microphone inputs to radio transmitters, Interphone, or PA System illuminated when selected.

Note: The PA selector is deactivated on all Audio Panels except the Captain's and First Officer's.

Pressing a switch to the IN position selects its transmitter, illuminates its light and deselects (raises) any other switch previously selected. It is possible for only one switch to be depressed at any given time.

#### 8-21. Receive Switches

Connects the radio receivers, marker beacon or Interphone System to the respective headset/cockpit speaker. Any number of sources may be selected at a given time.

IN - Monitors respective receiver and illuminates light in switchpost  
OUT - Deselects monitoring of respective receiver.

#### 23,24. Filter Switches

RANGE IN - Only range signals are heard. Voice is filtered out.

VOICE IN - Only voice signals are heard. Range is filtered out.

BOTH IN - Both range and voice signals are monitored, with range signal predominant microphone.

**INTERPHONE SYSTEMS****O24. CABIN INTERPHONE PANEL**

- 1-4. Call Switches  
5. Call Reset Switchlight

**1-4. Call Switches**

Pushbutton switches. When pressed, signal as follows:

GND CREW - Sounds horn in nose wheel well

STA - Sounds hi-low chimes and illuminates Flight Attendant call light at station selected with Station Selector Switch.

SIGNAL - Sounds cabin chimes.

ALL - Sounds hi-low chimes at all stations and illuminates all Flight Attendant call lights, regardless of Station Selector Switch position.

**5. Call Reset Switchlight**

When flight station is called, a hi-low chime sounds and CALL is illuminated. Pressing the switchlight resets light and chime for next call to be received.

**6. Station Selector Switch**

Six-position rotary switch for selecting the cabin or galley station to be called. The placarded positions represent stations.

**VHF COMMUNICATIONS****P04,P06. VHF COMMUNICATIONS CONTROL PANEL**

- 1,2. Frequency Light
- 3,4. Frequency Windows
- 5,6. Frequency Selectors
- 7. Transfer Switch
- 8. COMM Test Switch

**1,2. Frequency Light**

Illuminates to indicate which frequency display has been selected by transfer switch.

**7. Transfer Switch**

Selects operating frequency. Other window is provided for pre-selection of another frequency.

**O14. COCKPIT VOICE RECORDER**

- 1. Cockpit Microphone
- 2,3. Test Switch And Indicator
- 4. Erase Switch
- 5. Headset Jack

## WEATHER RADAR

### THEORY OF OPERATION

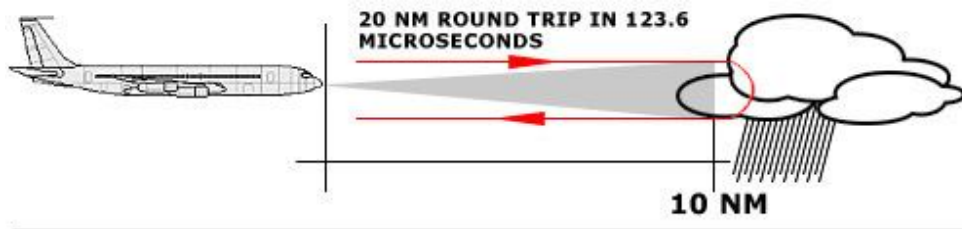
The primary use of this radar is to aid the pilot in avoiding thunderstorms and associated turbulence. Since each operator normally develops specific operational procedures for use of weather avoidance radar, the following information is presented for use at the operator's discretion.

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

### RADAR PRINCIPLES

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

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



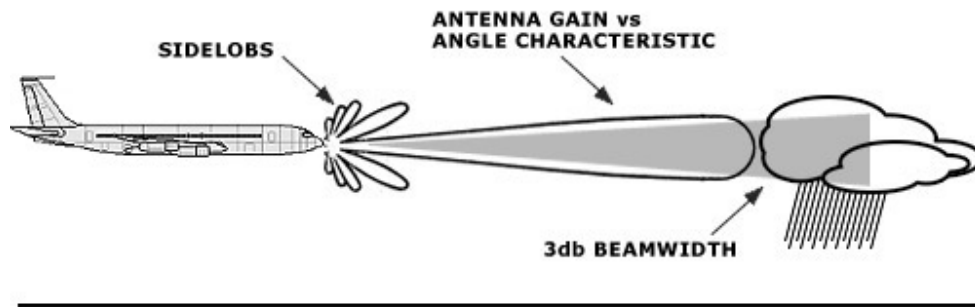
### WEATHER RADAR PRINCIPLES

Airborne weather avoidance radar, as its name implies, is for avoiding severe weather, not for penetrating it. Whether to fly into an area of radar echoes depends on echo-intensity, spacing between the echoes, aircraft capabilities and pilot experience. Remember that weather radar detects only precipitation drops; it does not detect minute cloud droplets, nor does it detect turbulence. Therefore, the radar provides no assurance of avoiding instrument weather in clouds and fog. The indicator may be clear between intense echoes; this clear area does not necessarily mean it is safe to fly between the storms and maintain visual sighting of them.



**RADAR BEAM ILLUMINATION**

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

**RADAR REFLECTIVITY**

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

The radar display has been calibrated to show five levels of target intensity: Black (level 0), and levels 1-4 grades of Amber.

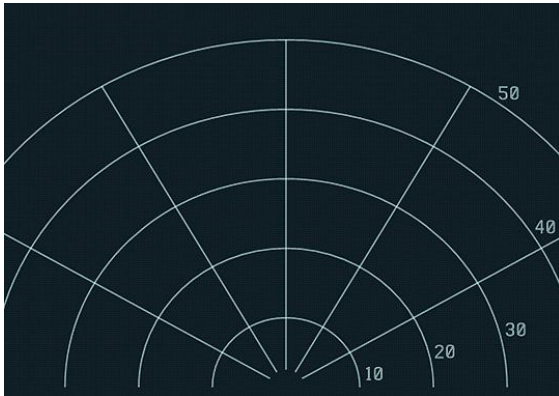
**CONTROLS AND INDICATORS****P08. WEATHER RADAR CONTROL PANEL**

1. System Transfer Switch
2. Function Selector Switch
3. Antenna Tilt Control Knob
4. Gain Control Knob

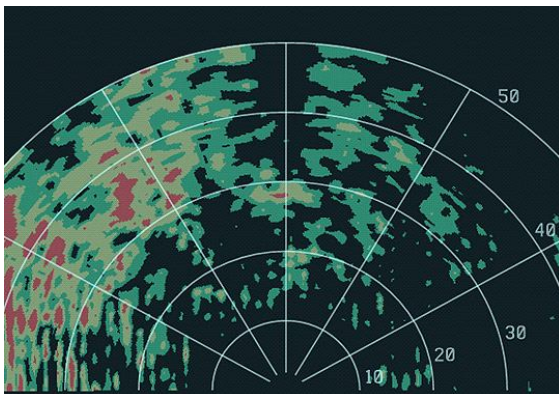
**2. Function Selector Switch**

Six-position rotary switch that provides selection of the system operating modes or functions.

**OFF** - Power is removed.

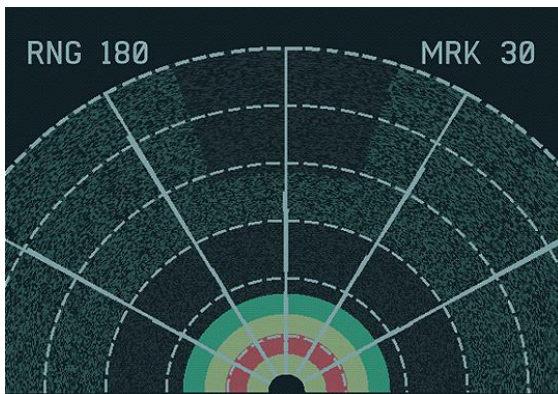


**STBY** - Initiates a 3-4 minute warm-up period. Selection of an operational mode in lieu of STBY will also activate the warm-up period.



**NOR** - Provides a display of all objects within the radar beam scan that have sufficient density to reflect the beam.

**CTR** - The Contour circuit alters the normal radar presentation to display areas of high rainfall rate gradients as black holes in the return. These "holes" also represent areas of greatest turbulence.



**TEST** - Displays a self-test pattern on the CRT indicators which permits evaluation of the radar receiver and indicator. The transmitter and its associated circuits are inoperative while the test pattern is displayed. The TEST position may also be used in lieu of the STBY position for initial 3 minute warmup (both systems are warmed up simultaneously).

### 3. Antenna Tilt Control Knob

Rotary knob permits manual control of antenna tilt  $\pm 14^\circ$  from horizontal. Markings are in one degree increments.

### 4. Gain Control Knob

Rotary knob permits manual adjustment of receiver sensitivity from MIN to MAX. An AUTO position implements the automatic gain control function.

**L01. WEATHER RADAR INDICATOR**

1. Range Selector Switch
2. Brightness Control
3. Radar Display

**1. Range selector switch**

Five-position (OFF, 30, 80, 180, 300) rotary switch selects ranges and displayed range marks.

OFF – power is removed from CRT indicator.

**2. Brightness control**

Rotary knob controls brightness of target returns.

**OPERATION IN-FLIGHT - GENERAL**

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

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

**Note**

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

**TILT MANAGEMENT**

Effective antenna tilt management is the single, most important key to more informative weather radar displays. The prime factors must be kept in mind for proper tilt management:

- The center of the radar beam is referenced to the horizon by the aircraft vertical reference system.
- Adjusting the antenna tilt control will cause the center of the radar beam to scan above or below the plane of the attitude reference system.

**DO NOT USE FOR FLIGHT**

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

**EARLY DETECTION OF ENROUTE WEATHER**

To set the antenna tilt to optimize the radar's ability to quickly identify significant weather, follow these steps:

- 1) Select the NORM mode of operation. Adjust Brightness control as desired.
- 2) Select the 50 or 150 nm range.
- 3) Adjust the antenna tilt to watch the strongest returns seen on the display.

**TARGET RESOLUTION**

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

**RANGE RESOLUTION**

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

**AZIMUTH RESOLUTION**

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

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

**PATH PLANNING**

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

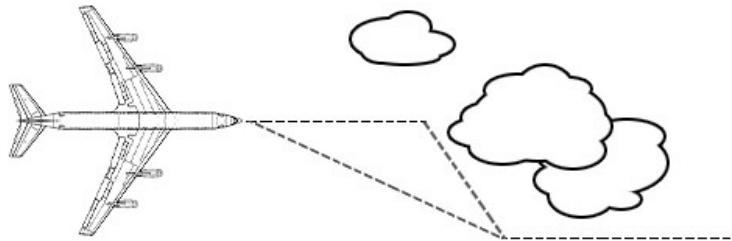
The most intense echoes are severe thunderstorms. Remember that hail may fall several miles from the cloud, and hazardous turbulence may extend as much as 20 nautical miles; therefore, echoes should be separated by at least 40 nautical miles before you fly between them. As echoes diminish in intensity,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

**PATH PLANNING CONSIDERATIONS**

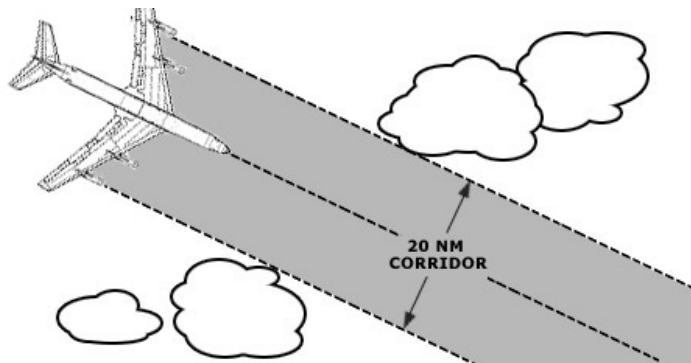
- Avoid cells containing magenta and red areas by at least 20 nautical miles.
- Do not deviate downwind unless absolute necessary. Your chances of encountering severe turbulence and damaging hail are greatly reduced by selecting the upwind side of the storm.
- If looking for a corridor, remember corridors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

**Note**

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



Cells beyond 75 nautical miles are areas of substantial rainfall, do not wait for red or magenta to appear. Plan and execute evasive action quickly to minimize "doglegging."



When a complete detour is impractical, penetration of weather patterns may be required. Avoid adjacent cells by at least 20 nautical miles.

A "Blind Alley" or "Box Canyon" situation can be very dangerous when viewing the short ranges. Periodically switch to longer-range displays to observe distant conditions. As shown below, the short-range returns show an obvious corridor between two areas of heavy rainfall but the long-range setting shows a larger area of heavy rainfall.



## ELECTRICAL SYSTEM

### INTEGRATED DRIVE GENERATOR

#### S01. S/O ELECTRICAL PANEL



1. Electrical Meter Switch
- 2-4. IDG OIL Temp/Rise Indicator
- 10,11,12. IDG Disconnect Switch
14. PMG Switch
15. APU GEN OIL OVHT/PRESS Lights
- 16-19. Generator Field Switch
- 20-23. Generator Breaker Switch
- 24,25,26,27 - Generator Field Light
30. Electric Meter Switch
- 31-34. KW/KVAR Meter
- 35,36,37,38 - Generator Breaker Light
- 46-51. AC Tie Breaker Switch

#### 2-4. IDG OIL Temp/Rise Indicator

Displays either IDG oil outlet temperature, or IDG oil temperature rise between the IDG oil inlet and outlet. Temperature indication is determined by the position of the IDG TEMP RISE button.

**DO NOT USE FOR FLIGHT**

RELEASED - Normal position. Indicators display IDG oil outlet temperature. Should remain below upper yellow band (145°C).

PRESSED - Indicators display the temperature difference (RISE) between the IDG oil inlet and outlet. RISE indicates how hard the IDG is working and should remain below the lower yellow band (25°C). 3G16 - 16-

**10,11,12. IDG Disconnect Switch**

- Guarded momentary switch.
- When pressed, IDG drive is disconnected from the engine. Except in an emergency, switch should not be pressed unless N3 is above 20%.

LOW PRESS - (Amber) Illuminates when IDG oil pressure is too low or oil temperature is too high. Normally illuminates when engine is shutdown or IDG is disconnected.

- Once disconnected. IDG must be reset by Maintenance
- ELECTRICAL SYSTEM illuminates on the Pilot's Annunciator Panel when any LOW PRESS illuminates.

**19. Generator Field Switch**

Momentary switches which manually control generator field operation.

CLOSE - Pressing the CLOSE switch removes any TRIP open lock-out and arms the generator field to CLOSE automatically as commanded by the GCU. FLOWBAR illuminates when generator field is closed. Generator field must be closed for generator to produce power.

BRG - (Amber) De-activated. However, lights illuminate during a S O light test.

TRIP - Pressing the TRIP switch locks the generator field open until the CLOSE switch is pressed.

OPEN - (Amber) Illuminates when generator field is open.

- Generator field opens automatically when:
  - FUEL AND IGNITION switch is OFF
  - Generator is underspeed.
  - Generator voltage is out of limits (locks open).
  - FIRE PULL HANDLE is pulled (locks open).
- ELECTRICAL SYSTEM illuminates on the Pilot's Annunciator Panel when any niajj illuminates.

**20-23. Generator Breaker Switch**

Momentary switch which manually controls generator breaker operation.

CLOSE - Pressing the CLOSE switch removes any TRIP open lock-out (except differential fault) and arms the generator breaker to close automatically as commanded by the GCU. FLOWBAR illuminates when generator breaker is closed.

- GENERATOR FIELD must be closed (FLOWBAR) before generator breaker can close.
- Generator breaker must be closed for generator to power the respective AC Load Bus.
- Closing the APU generator breaker connects the APU generator to the AC TIE BUS.

TRIP - Pressing the TRIP switch locks the tie breaker open until the CLOSE switch is pressed, OPEN (amber) illuminates when tie breaker is open.

- Generator breaker opens automatically when the respective GENERATOR FIELD is open.
- The APU generator breaker also opens when a fault is detected on the AC TIE BUS
- GEN 1 or GEN 2 can be selected to power the AC ESS BUS when the respective generator breaker is open provided the GENERATOR FIELD is closed (FLOWBAR).

**31-34. KW/KVAR Meter**

Displays either generator total load (KW) or reactive load (KVAR). Indication is determined by the position of KVAR button.

RELEASED - Normal position. Indicators display each generator's KW load.

- Should be kept below 81 KW.
- Above 14.000', APU load should be kept below 54 KW.

PRESSED - Indicators display each generator's KVAR load. In parallel operation, KVAR indications should be approximately equal between generators.



**46-51. AC Tie Breaker Switch**

Momentary switch which manually controls bus tie breaker operation.

**CLOSE** - Pressing the CLOSE switch removes any TRIP open lock-out (except differential fault) and arms the tie breaker to close automatically as commanded by the GCU. ■«ti":fIJ:W illuminates when tie breaker is closed.

- The tie breakers must be closed for the engine driven generator(s) to power the AC TIE BUS or operate in parallel. The tie breaker must also be closed for the APU generator or EXT POWER to power the respective AC Load Bus.
  - The respective tie breaker closes automatically if a 'dead' (unpowered) AC Load Bus is sensed.
- Momentary switch which manually controls generator breaker operation.

**TRIP** - Pressing the TRIP switch locks the generator breaker open until the CLOSE switch is pressed OPEN (amber) illuminates when generator breaker is open.

Tie breaker opens automatically when:

- EXT POWER is powering the AC TIE BUS while the respective AC generator is powering the AC Load Bus.
- An AC generator output voltage frequency exceeds limits while the generators are operating in parallel.
- A fault is sensed on the AC TIE BUS
- Differential fault is sensed between the GENERATOR BREAKER and the tie breaker.

**EXTERNAL POWER****S01. S/O ELECTRICAL PANEL**

- 15. APU Gen Oil OVHT/Press Light (amber)
- 45. External Power ON/Avail Lights
- 55. External Power Switch

**15. APU Gen Oil OVHT/Press Light (amber)**

- Monitors condition of the oil in the APU Generator adapter unit.
- Lights are armed to illuminate only when APU MASTER POWER switch is ON.

**OVHT** - Illuminates if adapter oil is too hot.

**PRESS** - Illuminates if adapter oil pressure is too low.

#### **45. External Power ON/Avail Lights**

ON – (White) Illuminates when external power is powering the AC TIE BUS.

AVAIL – (Green) Illuminates when external power is connected and is of proper voltage, frequency and phase rotation.

#### **55. External Power Switch**

Two-position toggle switch which controls the selection of AC external power.

ON - Electrically held position which connects external power to the AC TIE BUS.

- Green AVAIL light must be illuminated for switch to remain in the on position
- Trips GND SERVICE switch to off position
- Opens APU GENERATOR BREAKER.
- Opens Bus TIE BREAKER(S) if engine generator(s) are powering the Load Buses.

OFF - Disconnects external power from the AC TIE BUS.

### **ELECTRICAL SYSTEM LIGHT**

C03. PILOTS ANNUNCIATOR PANEL



#### **27. Electrical System Light**

Illuminates on the Pilot's Annunciator Panel when PRESS or OVHT illuminates.

**GALLEY POWER****S01. S/O ELECTRICAL PANEL**

7,8,9. Galley Power Switch  
41-43. Flight Sta Bus Fail Light (Amber)

**7,8,9. Galley Power Switch**

- Provides cockpit control of power to the galley buses.
- BUS 2 switch also controls power to the forward and aft coffee bars.

LCH - Normal flight position. Respective galley bus is powered.

UNL - Power is removed from respective galley bus.

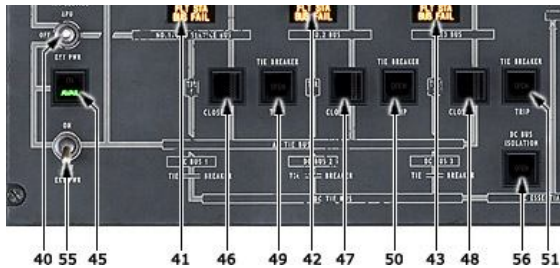
OFF - Illuminates to indicate when galley bus is unpowered for any reason

Galley power is removed and all three ES3 lights illuminate when:

- GALLEY POWER EMER OFF switch in the lower galley is latched.
- The Auto-Load Monitor system senses an excessive generator load (load shedding). All three GALLEY POWER switches must be unlatched to reset the system.

**41-43. Flight Sta Bus Fail Light (Amber)**

- Illuminates when power is lost to the Flight Station Bus segment of the respective AC Load Bus.
- Illuminates on the Pilot's Annunciator Panel when any FLIGHT STA BUS FAIL illuminates.

**GROUND SERVICE POWER****S01. S/O ELECTRICAL PANEL**

40. GND Service Switch  
56. DC Bus Isolation Switch

**40. GND Service Switch**

Three position toggle switch.

- Permits APU or EXT POWER to power only the GND SERVICE BUS to permit servicing operations without having to power all aircraft buses.

APU - Electrically held position. APU GENERATOR power is supplied only to the ground service bus.

- APU power must be available.
- Cannot be selected in flight.

OFF - Normal position. Ground service bus is connected to the No. 1 Load Bus.

EXT POWER - Electrically held position. External power is supplied only to the ground service bus.

- EXT POWER must be available.
- The switch will release to OFF if the EXT POWER switch is positioned to ON to supply external power to all Load Buses.

When either APU or EXT POWER position of the GND SERVICE switch is selected

- BATTERY switch must be OFF to prevent discharging the battery.
- Battery charger will operate while the ground service bus is powered provided:
  - BATTERY switch is OFF.
  - STANDBY POWER switch is not ON
  - MASTER RADIO ESSENTIAL switch is unlatched

**56. DC Bus Isolation Switch**

Controls the 3 DC TIE BREAKERS.

UNL - Normal position. DC Bus 1, 2 and 3 connected to the DC TIE BUS.

LCH - Isolates DC Bus 1,2 and 3 from the DC TIE BUS. DC ESSENTIAL BUS remains connected to the DC TIE BUS.

OPEN (Amber) illuminates when all three DC TIE BREAKERS have opened.

- DC Essential power is required to illuminate the OPEN light.

**ESSENTIAL POWER****S01. S/O ELECTRICAL PANEL**

- 52. DC STBY Bus Fail Light (red)/ AC STBY Bus Fail Light (red)
- 53. ESS AC ON ALT Light (amber)
- 57. AC ESS BUS Fail Light/DC ESS BUS Fail Light
- 58. AC ESS BUS Power Selector

**52. DC STBY Bus Fail Light (red)/ AC STBY Bus Fail Light (red)**

AC STBY Bus Fail Light (red)

- Illuminates when power is lost to the AC STBY BUS.
- ESS STBY PWR illuminates on the Pilot's Annunciator Panel if FAIL illuminates.

**57. AC ESS BUS Fail Light/DC ESS BUS Fail Light**

AC ESS BUS Fail Light

- Illuminates when power is lost to the AC ESSENTIAL BUS.
- ESS/STBY PWR illuminates on the Pilot's Annunciator Panel when FAIL illuminates.

DC ESS BUS Fail Light

- Illuminates when power is lost to the DC ESSENTIAL BUS.
- ESS/STBY PWR illuminates on the Pilot's Annunciator Panel when FAIL illuminates.

**53. ESS AC ON ALT Light (amber)**

Illuminates if the AC ESS BUS Power Selector is in one of the AUTO positions and AC ESSENTIAL BUS power automatically switches to the alternate power source. Indicates primary power source has failed.

**58. AC ESS BUS Power Selector**

Seven position selector which provides means select power source for the AC ESSENTIAL BUS.

AUTO - Selecting any of the three AUTO positions provides automatic switching to alternate power source if primary power to the AC ESSENTIAL BUS fails.

NORM B3(G1) - Normal position. No. 3 AC Load Bus provides primary power to the AC ESSENTIAL BUS No. 1 generator provides automatic alternate

B3(G2) - No. 3 AC Load Bus is primary. No. 2 generator provides automatic alternate.

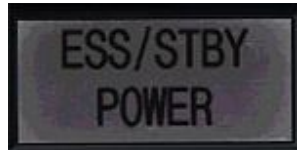
G1(G2) - No. 1 generator is primary. No. 2 generator provides automatic alternate.

MANUAL - Selecting any of the three MANUAL positions selects single power source for the AC ESSENTIAL BUS.

OFF - Power to the AC ESSENTIAL BUS is shutoff

**ESS/STBY POWER LIGHT**

C03. PILOTS ANNUNCIATOR PANEL



**28. ESS/STBY Power Light**

**O30. MASTER RADIO PANEL**



- 2. Master Radio Essential Switch
- 3. NO. 2 Master Radio Switch

Controls power to the essential communications busses.

LCH - Normal position for all flight operations.

- Provides battery power to:
  - VHF COMM 1
  - P. A.
  - FLT INT
- Power source transfers to the essential buses, when powered, and also supplies:
  - HF COMM 1
  - ADF 1
  - MKR BCN
  - INSTR COMPARATOR
  - SELCAL
  - VOICE RCDR
  - DME 1
  - WX RADAR 1

UNL - Normal position when removing power from the aircraft.

- Removes essential communications power. OFF illuminates to indicate switch position.
- Positioning the BATTERY switch to ON overrides this position and supplies power to the P. A. and FLT INT.

**O18. STANDBY POWER PANEL**

1. Standby Power Switch
2. Unarm Light (Amber)

**1. Standby Power Switch**

OFF - Normal position when removing power from the aircraft.

- Isolates AC STBY BUS from battery power.

ARM - Normal flight position.

- Provides for automatic transfer of the AC STBY BUS to the battery powered inverter if AC ESS BUS fails.
- BATTERY switch must be ON for AC STBY BUS automatic transfer to occur.

ON - Manually transfers AC STBY BUS and DC STBY BUS to battery power regardless of BATTERY switch position.

**2. Unarm Light (Amber)**

Illuminates if the DC STBY BUS is powered and:

- STANDBY POWER switch is OFF and the BATTERY switch is ON. or
- STANDBY POWER switch is not ON and the BATTERY switch is OFF.

**BATTERY POWER****O18. STANDBY POWER PANEL**

1. Battery Switch
2. Unarm Light (Amber)

**1. Battery Switch**

Two position switch.

OFF - Normal position when removing all power from the aircraft, or when only the GND SERVICE BUS is powered.

- Battery is isolated from the AC and DC STBY buses.
- Power remains available to the BATT BUS.



**DO NOT USE FOR FLIGHT**

- OFF position is overridden by:
  - Positioning the STANDBY POWER switch to ON (powers AC and DC STBY buses).
  - Latching the MASTER RADIO ESSENTIAL switch (powers ESSENTIAL COMM BUS).
  - Positioning the APU MASTER POWER switch to ON (power provided for APU control and start).
- ON - Position for all normal flight operations.
  - DC STBY BUS is normally powered by the DC ESSENTIAL BUS. If essential bus power is lost, the DC STBY BUS will transfer to the battery.
  - PA and FLT INT are powered. 1B12, 13 - STANDBY DC CONT AND PWR

**2. STBY Power Light**

Indicates when AC or DC STBY BUS transfers to battery power.

FLOWBAR - Illuminates when the STANDBY POWER switch is ON to confirm the following:

- The battery-powered standby inverter is energized and powering the AC STBY BUS.
- DC STBY BUS is powered by the battery.
- ENG START BUS is powered by the battery.

ON - - Illuminates if BATTERY switch is ON, STANDBY POWER switch is ARMED and either the AC or DC STBY BUS has automatically transferred to battery power.

- ELECTRICAL SYSTEM illuminates on the Pilot's Annunciator Panel when STBY PWR ON illuminates.
- BATTERY CONDITION illuminates on the APU Panel if either STBY PWR FLOWBAR or ON illuminates.

**ELECTRICAL SYSTEM LIGHT**

C03. PILOTS ANNUNCIATOR PANEL

**27. Electrical System Light**

Illuminates on the Pilot's Annunciator Panel when STBY PWR ON illuminates.

**AC & DC CONTROLS AND INDICATORS**

S01. S/O ELECTRICAL PANEL



5,6. AC Meters  
13. AC Selector

**5,6. AC Meters, 13. AC Selector**

Displays the selected frequency and volts. Normal frequency is 400 + -4 Hz. Normal volts 117 + - 3.

- The INVERTER position will only indicate frequency and volts when the battery is powering the AC STBY BUS. Normal volts 115+ -3.

### **28,29. DC Meters, 39. DC Selector**

Displays the selected DC volts and amps.

- Normal position of the selector is BAT. Normal battery voltage indication should be between 28-34. Minimum voltage is 22.
- Battery DC AMPS indications are to the positive (+) side for a battery discharge, and to the negative (-) side for a battery charge. When the battery charge is low, the battery charger will supply a steady charge to the battery of -40 amps. When the battery is fully charged, the AMPS indication will cycle between 0 and -40 amps.
- In the STBY DC BUS position, DC VOLTS will indicate DC STBY BUS voltage, but the DC AMPS will indicate '0' since there is no ammeter connection in this position.

BUS VOLTS - Should be equal as long as the DC tiebreakers are closed. To read individual DC bus volts, the DC BUS ISOLATION switch must be latched OPEN.

T/R AMPS - Will indicate properly with the DC tie breakers open or closed. A '0' amp indication identifies an inoperative IH.

## EMERGENCY EQUIPMENT

### O19. EVACUATION SIGNAL PANEL



1. Horn Cutout Switch
2. Horn
3. Evacuation Command Switch
4. Evacuation Light

#### 1. Horn Cutout Switch

A momentary pushbutton switch provided to silence the evacuation signal at the panel.

#### 2. Horn

Sounds intermittently when the command switch is IN. Horn is silenced with horn cutout switch.

#### 3. Evacuation Command Switch

A guarded switchlight provided to activate the evacuation signal system.

IN - Energizes the evacuation signal intermittent horn and flashing EVAC light in flight station, galley, and each passenger door. EVAC is illuminated.

OUT - Disables horn and flashing lights. EVAC is extinguished.

#### 4. Evacuation Light

Flashes when evacuation command switch is pushed to IN position.

## FIRE PROTECTION

### ENGINE/APU FIRE DETECTION

#### L17, R17. MASTER FIRE WARNING LIGHT/ PILOT'S REMOTE SWEEP TIME CONTROL PUSHBUTTON



1. Master Fire Warning Light
2. Pilots' Remote Sweep Time Control Pushbutton

#### 1. Master Fire Warning Light

Illuminates when:

- Any engine, APU, or wheel well loop selector is selected to BOTH and both the A and B fire loops detect an overheat.
- Any engine, APU, or wheel well loop selector is selected to A or B and the selected loop detects an overheat.
- Pressing either FIRE light extinguishes both lights and silences the fire warning bell.

#### 2. Pilots' Remote Sweep Time Control Pushbutton

Operates the same as the sweep time pushbutton control on the pilots' clocks. Captain's pushbutton will not operate First Officer's clock and vice versa.

### FIRE DET LOOP LIGHT

#### C03. PILOTS ANNUNCIATOR PANEL



#### 23. Fire DET Loop Light

**U04. FIRE DETECTION LOOP TEST PANEL**

- 1-4. A and B Loop Lights (amber)
- 5-8. Loop Selectors
- 9,10. Fire Detection Loop Test Buttons
- 11. Fire Warning Bell Cutout Button

**1-4. A and B Loop Lights (amber)**

- Illuminates when:
  - Respective TEST button is pressed.
  - Overheat is detected by respective detection loop.
  - FIRE DET LOOP illuminates on Pilot's Annunciator Panel when any O or O light illuminates.

**5-8. Loop Selectors**

Determines which fire detection loop(s) will activate the engine/APU fire warnings.

BOTH - Both A & B fire detection loop lights must illuminate on the respective engine to activate fire warnings.

A - Deactivates the B loop. Illumination of the A light activates fire warnings.

B - Deactivates the A loop. Illumination of the B light activates fire warnings.

**9,10. Fire Detection Loop Test Buttons**

Tests fire warning circuits by introducing a false fire signal into the detector loop circuits.

- With loop selectors in A or B, pressing respective TEST button activates fire warnings.
- With loop selectors in BOTH, both TEST buttons must be pressed to activate fire warnings.

**11. Fire Warning Bell Cutout Button**

Pressing button silences fire warning bell.

## ENGINE/APU FIRE EXTINGUISHING

### U02. FIRE EXTINGUISHER TEST PANEL



- 1-4. MAIN and ALTN Lights (amber)
- 5. Short Button
- 6. Test Button

#### 1-4. MAIN and ALTN Lights (amber)

- When TEST is pressed, lights illuminate to indicate continuity in the respective circuits.
- When TEST and SHORT is pressed, an illuminated light indicates a short in the respective circuit.

#### 5. Short Button

TEST button must be pressed and held to arm the SHORT button.

- With the TEST and SHORT buttons pressed all MAIN and ALTN lights should extinguish.
  - Any light which illuminates indicates the respective circuit is shorted.

#### 6. Test Button

With the button pressed, all lights should illuminate to indicate continuity in the respective circuits.

- Any light which remains extinguished with the TEST button pressed indicates a failure of the circuitry, or a discharged bottle.
- Pressing the SHORT button while TEST is pressed extinguishes all lights to indicate no circuits are shorted.

**U01, O06, O07, O08. ENGINE/APU FIRE PULL HANDLE**

1. Main Disch Light
2. Fire Discharge Switch
3. ALTN Disch Light
4. Engine/APU Fire Pull Handle

**1. Main Disch Light / 3. ALTN Disch Light**

- Respective light illuminates when fire bottle has discharged.
- When a bottle is discharged for No. 2 engine or APU the corresponding light also illuminates on the other panel, and on the APU External Control Panel.

**2. Fire Discharge Switch**

Spring-loaded toggle switch controls discharge of the two fire bottles for each engine and APU. No. 2 engine and APU share the same fire bottles.

CENTER - Normal spring-loaded position. Switch is guarded in this position as long as the respective FIRE PULL handle is in.

LEFT - ALTN fire bottle is discharged.

RIGHT - MAIN fire bottle is discharged. The No. 2 engine/APU MAIN bottle can also be discharged automatically by the APU AUTO FIRE SHUTDOWN system.

**4. Engine/APU Fire Pull Handle**

IN - Normal position to permit engine/APU operation

FIRE PULL - Illuminates (red) when:

- System is tested.
- Respective engine loop(s) detect an overheat [Remains illuminated until fire is extinguished (loop(s) return to normal temperature range)].
- Associated loop light(s) will also be illuminated on the FIRE DETECTION LOOP TEST panel.

PULLED - Provides emergency engine shutdown by causing the following to occur.

- Silences the fire warning bell. The APU handle also silences the external warning horn. (Bell will sound with subsequent fire warning.)
- Extinguishes master FIRE lights. (Lights will illuminate with subsequent fire warning.)
- Exposes fire extinguisher discharge switch.
- Closes the ENG ISLN VALVE (BLEED AIR S/O on APU).
- Opens the GENERATOR FIELD.
- Closes the fuel EMERGENCY SHUTOFF valve(s), and on engines 1 and 3 closes the ENG TANK valve.
- Closes the engine hydraulic pump FIREWALL S/O valve(s).
- APU handle signals inlet & ejector doors to close.



**NACELLE/PYLON OVERHEAT DETECTION****U05. NACELLE PYLON OVERHEAT DET TEST PANEL**

- 1-3. A and B Loop Lights (amber)  
 4-6. Loop Selector  
 7. Nacelle/Pylon OVHT DET Test Button

**1-3. A and B Loop Lights (amber)**

- Illuminates when:  
 TEST button is pressed and BOTH or respective loop is selected.  
 Overheat is detected by respective nacelle/ pylon overheat detection loop.
- Respective NACELLE OVHT illuminates on Pilot's Annun. Panel when both loop lights illuminate or if selected loop light illuminates.

**4-6. Loop Selector**

Determines which nacelle/pylon overheat detection loop(s) will illuminate the respective light and close the engine HI-PRESS valve.

BOTH - Both A and B lights must illuminate on the respective engine to illuminate the associated NACELLE OVHT light. The engine HI-PRESS valve will close when either loop light illuminates.

A - Deactivates B loop. Illumination of A light illuminates NACELLE OVHT & closes HI-PRESS valve.

B - Deactivates A loop. Illumination of B light illuminates NACELLE OVHT & closes HI-PRESS valve.

**7. Nacelle/Pylon OVHT DET Test Button**

Tests overheat detection circuits by introducing a false overheat signal into the detector loop circuits • Pressing TEST illuminates the 3 NACELLE OVHT lights on the Pilot's Annun. Panel, and illuminates the selected loop lights.

-With loop selector switches in BOTH all (6) loop lights illuminate.

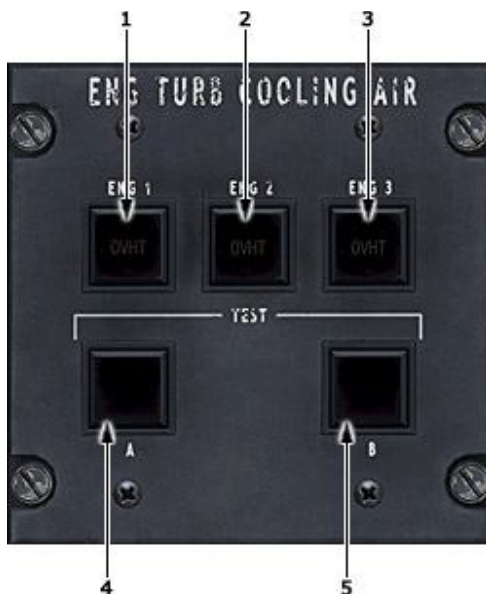
**NACELLE OVERHEAT LIGHTS****C03. PILOTS ANNUNCIATOR PANEL**

4-6. Nacelle Overheat Lights

**4-6. Nacelle Overheat Lights**

Illuminate when:

- Respective nacelle/pylon overheat detector selector is in BOTH and both loops detect an overheat on the respective engine.
- Respective nacelle/pylon overheat detector selector is in A or B and selected loop detects an overheat.
- Nacelle/pylon TEST button is pressed.

**TURBINE OVERHEAT DETECTION****U07. ENGINE TURB COOLING AIR PANEL**

1-3. OVHT Lights (red)

4,5. ENG TURB Cooling Air Test Switches

**1-3. OVHT Lights (red)**

- Illuminates when:
  - Both TEST switches are pressed at the same time.
  - Both A & B thermal switches detect an overheat.
- Respective VIB/TURB OVHT illuminates on Pilot's Annun. Panel when OVHT illuminates.

**4,5. ENG TURB Cooling Air Test Switches**

Tests thermal switch status in each engine.

- Switch illuminates while switch is pressed.
  - Pressing both switches at the same time illuminates the three OVHT lights, and the three VIB/TURB OVHT lights on the Pilot's Annun. Panel.
- Illumination of OVHT and VIB/TURB OVHT light when only one TEST switch is pressed indicates the remaining thermal switch has sensed an overheat or a system failure.

**VIB/TURB OVERHEAT LIGHT****C03. PILOTS ANNUNCIATOR PANEL****7-9. VIB/TURB Overheat Lights**

Illuminate when:

- Turbine overheat is sensed.
- Excessive engine vibration is sensed (see Power Plant section).
- During engine turbine overheat or vibration system tests.

**WHEEL WELL FIRE DETECTION****U08. WHEEL WELL FIRE TEST PANEL**

1. A and B Loop Light (amber)
2. Loop Selector
- 3,4. Loop Test Buttons

**1. A and B Loop Light (amber)**

- Illuminates when:
  - TEST button(s) pressed and BOTH or respective loop is selected.
  - Overheat is detected by the respective wheel well fire detection loop.

WHEEL WELL FIRE illuminates on Pilot's Annun. Panel when either loop light illuminates with BOTH selected, or if selected loop light illuminates.

**2. Loop Selector**

Determines which fire detection loop(s) activate the wheel well fire warnings.

BOTH - Both A & B fire detection loop lights must illuminate to activate fire warning.

A - Deactivates the B loop, illumination of the A light activates fire warnings.

B - Deactivates the A loop, illumination of the B light activates fire warnings.

**3,4. Loop Test Buttons**

Tests fire warning circuits by introducing a false fire signal into the detector loop circuits.

- With loop selector in A or B, pressing respective TEST button activates fire warnings.
- With loop selector in BOTH, both TEST buttons must be pressed to activate fire warnings.

**WHEEL WELL FIRE LIGHT**

C03. PILOTS ANNUNCIATOR PANEL



**16. Wheel Well Fire Light**

Illuminates when:

- Wheel well fire loop selector is in BOTH and either loop detects an overheat.
- Wheel well fire loop selector is in A or B and respective loop detects an overheat.
- Wheel well fire system is tested.

## FLIGHT CONTROLS

### AILERONS

#### O10, O11. PFCS AND FCES PANELS



- 3,4. Roll Monitor Switch  
12-15. Aileron Switch  
16. Pull Roll DISC Light (amber)

#### 3,4. Roll Monitor Switch

Monitors for jams in Capt's or F/O's aileron cable control paths.

LCH - Normal position. OFF is extinguished and FAIL light is armed.

FAIL - Illuminates to indicate respective ROLL monitor channel has failed.

UNL - Channel is unpowered and OFF illuminates to indicate switch position. FAIL light is disarmed.

- With one channel inoperative, remaining channel provides normal roll monitor operation.
- If both channels inoperative, no roll monitoring is available.

-AILERON [/////], PULL ROLL DISC and associated SPOILER PUSH lights are disarmed with both switches unlatched.

#### 12-15. Aileron Switch

Electrically controls aileron servo shutoff valves.

LCH - Normal position. OFF is extinguished and [/////] (crosshatch) light is armed. Respective aileron servo is powered.

UNL - Respective aileron servo is electrically energized to shut off. OFF illuminates to indicate switch position. [/////] light is disarmed.

- Unlatching an inboard aileron switch will affect other ailerons and spoilers.

#### CAUTION:

DO NOT UNLATCH IN FLIGHT UNLESS SPECIFICALLY REQUIRED BY EMERGENCY PROCEDURES.

**ROLL DISC HANDLE**

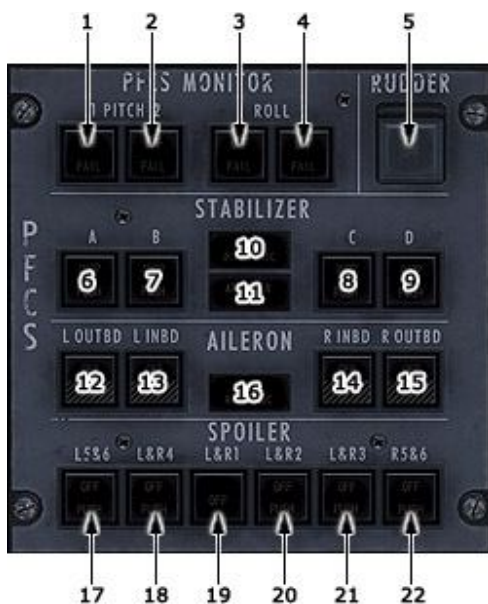
P03. CONTROL STAND



Controls roll disconnect and lost motion device.

DOWN - Normal position. Roll disconnect is coupled and handle lights extinguished.

PULLED - Roll disconnect is opened, and dead band is removed from lost motion device.

**SPOILERS/SPEEDBRAKES****O10, O11. PFCS AND FCES PANELS**

17,22. Spoiler L5&6 and R5&6 Switches  
 18,20,21. Spoiler L&R2, L&R3, and L&R4 Switches  
 19. Spoiler L&R1 Switch

**17,22. Spoiler L5&6 and R5&6 Switches**

LCH - Normal position. Spoiler panels L 5 & 6, and R 5 & 6 operate in response to SPEED BRAKE lever or roll inputs as programmed by flap position through the left and right selector assemblies.

Illumination of both L5&6 PUSH and R5&6 PUSH indicates that selector programming is incorrect for flap position.

- With flaps not up panels only provide roll augmentation in response to aileron position.
- With flaps up panels respond only to SPEED BRAKE lever movement.

UNL - Respective 5 & 6 spoiler servos are electrically energized to shut off and panels stow, OFF illuminates to indicate switch position. PUSH light is disarmed.

- With flaps up, pulling the SPEED BRAKE lever will cause asymmetric spoiler panel extension unless both switch positions agree.

**18,20,21. Spoiler L&R2, L&R3, and L&R4 Switches**

LCH - Normal position. L & R spoiler panels #2, 3, and 4 operate in response to SPEED BRAKE lever and/or roll inputs as programmed by flap position through the left and right mixer assemblies.

**DO NOT USE FOR FLIGHT**

- With flaps not up panels provide roll augmentation in response to aileron position and speed brakes in response to SPEED BRAKE lever movement.
- With flaps up panels respond only to SPEED BRAKE lever movement.

ROLL SPEED BRAKE illuminates on the Pilot's Annun. Panel to indicate mixer programming is incorrect for flap position.

UNL - Respective L & R spoiler servos are electrically energized to shut off and panels stow, OFF illuminates to indicate switch position. PUSH light is disarmed.

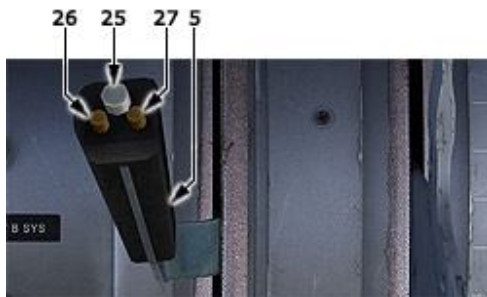
**19. Spoiler L&R1 Switch**

LCH - Normal position. Servos operate L & R spoiler panels #1 as scheduled by SPEED BRAKE and flap position.

- With flaps not up panels respond to SPEED BRAKE lever movement.
- With flaps retracted servos are deactivated and panels stow.

UNL - L & R #1 spoiler servos are electrically energized to shut off and panels are stowed, OFF illuminates to indicate switch position.

ROLL SPEED BRAKES illuminates on the Pilot's Annun. Panel when OFF illuminated with flaps not up.

**P03. CONTROL STAND**

- 5. Speed Brake Lever
- 25. Automatic Disable Button
- 26,27. Automatic Disable Lights

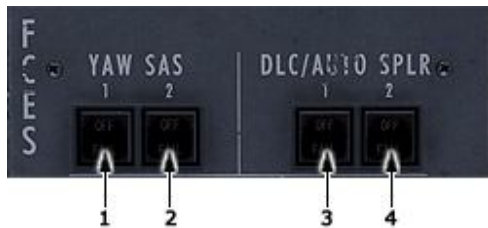
**5. Speed Brake Lever**

- Provides manual positioning of spoilers for speed brakes.
  - With lever in forward (0°) position spoilers are stowed.
  - With lever in the aft (MAX) position all panels available for speed brakes (depending on flap position) deploy to max extension.
- Indicates operation of spoilers by DLC, AGS or RTO systems.
  - Range of DLC spoiler operation is marked on pedestal.
- Lever is normally power assisted and will remain in any selected position.
  - The DLC, AGS and RTO systems also operate through the power assist servo.
  - The power assist servo is powered by hydraulic systems A and/or B.

**25,26,27. Automatic Disable Button and Lights**

Pressing the Automatic Disable button electrically shuts off hydraulic pressure to the power assist servo and causes the two amber lights on the lever to illuminate.

- Considerable force will be required to move the SPEED BRAKE lever out of the stowed position, and the handle must be held in the desired position.
- DLC, AGS and RTO spoilers are inoperative.
  - If the aircraft is in a configuration that calls for automatic spoilers, both DLC/AGS FAIL lights illuminate. Pressing the Automatic Disable button a second time restores hydraulic pressure to the power assist servo and extinguishes the two amber lights on the lever.
  - If both DLC/AGS FAIL lights are illuminated, both switches must be cycled to restore the DLC, AGS and RTO systems.

**009. DLC/AGS SWITCH**

3,4. DLC/AGS Switch

**3,4. DLC/AGS Switch**

Provides control of Direct Lift Control, Auto Ground Spoilers, and Rejected Takeoff spoilers.

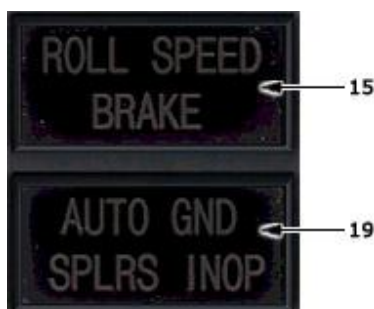
LCH - Normal position. DLC/AGS systems are armed. OFF light is extinguished and FAIL light is armed.

- Power assist servo must be operative (lever lights extinguished).
- If speed brake lever lights are illuminated both DLC/AGS FAIL lights will illuminate when DLC/AGS operation required. Speed brake lever lights must be extinguished and both DLC/AGS switch must be cycled to reset the system.
- DLC system will control spoiler panels 1 - 4 on each wing within the DLC range when the flap lever is positioned beyond 30°. Panels retract if:
  - Flap lever positioned to less than 30°.
  - Two throttles advanced to max continuous. -Stall warning.
  - Go-Around mode selected.
- AGS system will fully deploy spoiler panels 1 - 4 on each wing upon landing if the flap lever is positioned beyond 30°. Panels retract if:
  - Flap lever positioned to less than 30°.
  - Two throttles advanced to max continuous.
  - On Ground signal is lost.
  - C hydraulic pressure lost & gear lever DOWN.
- RTO system will fully deploy spoiler panels 1 - 4 on each wing when any two throttles are positioned to reverse (Panels 2 - 6 if flaps up). Panels retract when throttles are out of reverse.

UNL - Channel is unpowered and OFF illuminates to indicate switch position. FAIL light is disarmed.

- With one channel inoperative, remaining channel provides normal DLC/AGS and RTO operation. At least one channel must be operative for CAT III approach.
- With both channels inoperative, no DLC/AGS or RTO

AUTO GND SPLRS INOP illuminates on the Pilot's Annun. Panel if both DLC/AGS switches unlatched or both FAIL lights illuminate.

**ROLL SPEED BRAKE LIGHT (AMBER)/AUTO GTB SPLRS INOP LIGHT (AMBER)****C03. PILOTS ANNUNCIATOR PANEL**

15. Roll Speed Brake Light (amber)

19. Auto GTB SPLRS INOP Light (amber)

**15. Roll Speed Brake Light (amber)**

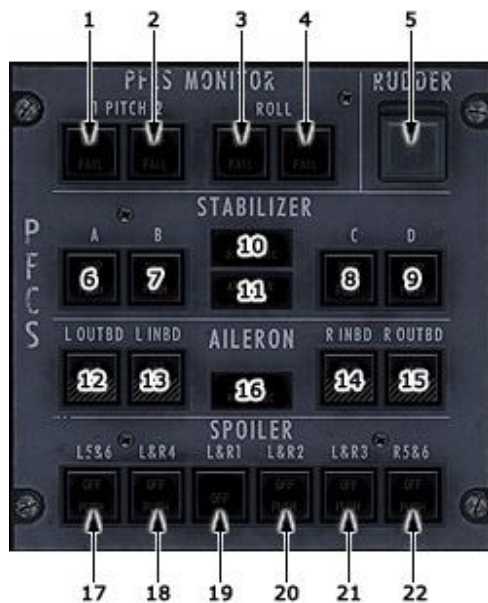
Illuminates to indicate spoiler panels L&R 1 through 4 are not all in the correct mode for the flap position.



**DO NOT USE FOR FLIGHT****19. Auto GTB SPLRS INOP Light (amber)**

Indicates that automatic extension of spoilers will not occur at touchdown.

- Both DLC/AGS switches unlatched, or
- Both DLC/AGS INOP illuminated, or
- Gear handle down & no C sys. hyd. pressure.

**STABILIZER****O10, O11. PFCS AND FCES PANELS**

- 1,2. Pitch Monitor Switch
- 6-9. Stabilizer Switches
- 10. Pull Pitch DISC Light (amber)
- 11. Aft Coupler Open (amber)

**1,2. Pitch Monitor Switch**

Monitors for jams or breaks in the Capt's or F/O cable control paths.

LCH - Normal position. OFF is extinguished and FAIL light is armed.

FAIL - Illuminates to indicate respective PITCH monitor channel has failed.

UNL - channel is unpowered and OFF illuminates to indicate switch position. FAIL light is disarmed.

- With one channel inoperative, remaining channel provides normal pitch monitor operation.
- With both channels inoperative, no pitch monitoring is available.

-PUSH and PULL PITCH DISC lights are disarmed with both switches unlatched.

**6-9. Stabilizer Switches**

Electrically controls stabilizer servo shutoff valves and aft coupler.

LCH - Normal position. Respective stabilizer servo is powered.

INOP - illuminates if hydraulic pressure is lost to the respective servo.

UNL - Respective stabilizer servo is electrically energized to shut off. PUSH light is disarmed.

INOP illuminates when pressure is shut off to the respective servo.

- An elevator warning will occur if A or C is unlatched on the ground with the throttles retarded.
- The aft coupler will open, and AFT COUPLER OPEN illuminates, if A & B or C & D switches are unlatched.
  - PULL PITCH DISC will illuminate when the AFT COUPLER OPEN illuminates provided PUSH lights had been illuminated.
- Maximum airspeed is 250K with A & B or C & D unlatched, or loss of any two hydraulic systems.

**10. Pull Pitch DISC Light (amber)**

- Advisory light to pull the PITCH DISC handle.
- Illuminated by the PITCH monitor system after the STABILIZER A & B or C & D switches have been unlatched following or broken cable indication (PUSH lights).

**11. Aft Coupler Open (amber)**

- Indicates that pitch system aft coupler has opened.
- Illuminates any time STABILIZER switches A & B or C & D are unlatched at the same time.

**P03. CONTROL STAND****1. Pitch Disc Handle**

Provides control of pitch disconnect mechanism.

DOWN - Normal position. Pitch disconnect is coupled and handles lights extinguished.

PULLED - Pitch disconnect is opened.

- Handle will illuminate when disconnect is open.
- Rotate handle 90° clockwise to lock handle in pulled position.
- Do not allow handle to snap back into the down position.
- With handle pulled and STABILIZER switches C & D unlatched both autopilots are inoperative.

**ELEVATOR LIGHT (AMBER)**

C03. PILOTS ANNUNCIATOR PANEL/ U14. S/O ANNUNCIATORS PANEL

**32. Elevator Light (amber)****32. Elevator Light (amber)**

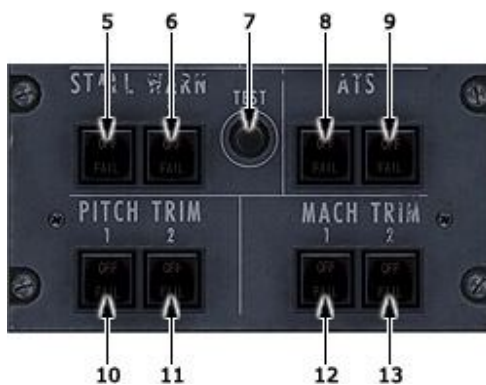
Illuminate and takeoff warning sounds if an.

- Warning is inhibited unless the aircraft is on the ground and the throttles are retarded.
- Lights illuminate and warning sounds on the ground if either STABILIZER switch A or C is unlatched.

**P03. CONTROL STAND****3,4. Mechanical Trim Wheel**

Provides manual control of stabilizer trim system and overrides electrical trim inputs.

- Wheels rotate any time electric trim occurs (Pitch trim, autopilot trim, Mach trim).
- Indicator shows the trim position in degrees of stabilizer angle.
- Takeoff warning will sound on the ground when throttles are advanced unless stabilizer trim is in the green band.

**O10. PFCS AND FCES PANELS**

10,11. Pitch Trim Switch  
12,13. Mach Trim Switch

**10,11. Pitch Trim Switch**

Controls power and provides electric pitch trim system.

LCH - Normal position. Pitch trim system is operative for autopilot or thumbwheel use. FAIL light is armed.

FAIL - (Amber) Illuminates to indicate respective pitch trim channel has failed.

UNL - Respective pitch trim channel is inoperative. OFF (white) illuminates to indicate switch position. FAIL light is disarmed.

- With one channel inoperative, remaining channel provides trim at one half the normal rate.
- With both channels inoperative autopilots are inoperative. Mechanical trim remains available.

**12,13. Mach Trim Switch**

Provides control and monitoring of Mach trim system.

LCH - Normal position. FAIL light is armed.

**DO NOT USE FOR FLIGHT**

FAIL - (Amber) Illuminates to indicate respective Mach trim channel has failed.

UNL - Respective Mach trim channel is inoperative. OFF (white) illuminates to indicate switch position. FAIL light is disarmed.

- With one channel inoperative, remaining channel provides normal mach trim operation.
- With both channels inoperative, engage an autopilot above .55M (.75M on -500).

**O13. MACH FEEL INDICATOR**

1. Mach Feel Indicator  
2,3. Mach Feel Switch

**1. Mach Feel Indicator**

- With loss of electrical power, the indicator will point to the 12 o'clock position.

**2,3. Mach Feel Switch**

Provides control and monitoring of Mach feel system.

LCH - Normal position. FAIL light is armed.

FAIL (Amber) - Illuminates to indicate respective Mach feel channel has failed.

UNL - Respective Mach feel channel is inoperative. OFF (white) illuminates to indicate switch position. FAIL light is disarmed.

- With one channel inoperative, remaining channel provides normal Mach feel operation.
- If channel 2 fails Mach feel indicator may also be inoperative although normal Mach feel scheduling will still be provided by channel 1.
- If both channels are inoperative altitude and/or airspeed are limited (see Flight Controls Abnormal Procedures).

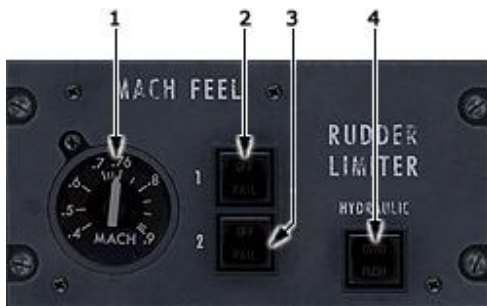
**RUDDER****O10, O11. PFCS AND FCES PANELS****5. Rudder Switch**

Guarded switch. Provides electrical control of rudder servo shutoff valves.

LCH - Normal position. Rudder servos are powered.

UNL - All three rudder servos hydraulic limiter shutoff valves are electrically energized to shut off. Red OFF light illuminates to indicate switch position.

- Rudder is unpowered and will streamline with the vertical stabilizer.
- YAW SAS is inoperative.

**013. MACH FEEL INDICATOR**

4. Rudder Hydraulic Limiter Switch

**4. Rudder Hydraulic Limiter Switch**

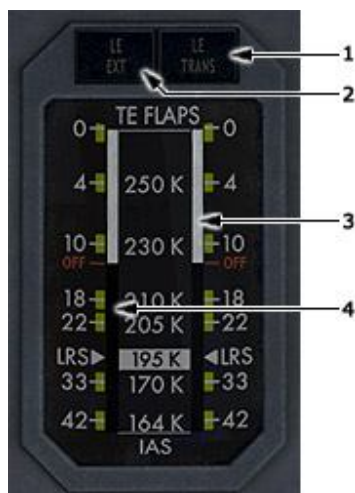
Provides control and monitoring of rudder hydraulic limiter operation.

LCH - Normal position. PUSH light is armed, and OVRD light is extinguished.

- Rate of rudder travel is decreased as speed is increased.
- Refer to table on facing page for actual hydraulic limiter schedule.

PUSH - (Amber) illuminates when the number of systems and/or pressure is insufficient for flight regime. RUDDER HYDR LMTR also illuminates on the Pilot's Annun. Panel RUDDER HYDR LMTR will also illuminate if rudder is being operated by too many systems or too much pressure.

UNL - Rudder is powered by systems A, B, and C at 3,000 psi regardless of airspeed. OVRD illuminates to indicate switch position and PUSH is disarmed.

**FLAPS/SLATS****C24. FLAP POSITION INDICATOR**

1,2. Moving Tape  
3. Le Trans Light (amber)  
4. Le Ext Light (green)

**1,2. Moving Tape**

A moving tape that indicates the position of the left and right wing trailing edge flaps.

- Airspeed limit is placarded for each flap position.

**DO NOT USE FOR FLIGHT**

- Two types of power loss indicators are used. On some indicators the tapes will position to an OFF mark between 10° and 18°. On the remaining indicators, power loss is indicated by OFF appearing at the bottom of both tapes.

**3. Le Trans Light (amber)**

Not all leading edge slats are in the required position.

**4. Le Ext Light (green)**

All (14) leading edge slats are fully extended.

**P03. CONTROL STAND****9. Flap Lever**

Controls flap and slat extension or retraction. Lever is spring-loaded in detents at:

- 0° - UP.
- 4° - Slat positioning gate takeoff/approach.
- 10° - Takeoff/approach.
- 18° - Takeoff.
- 22° - Approach/go-around gate.
- 27° - Not used.
- 33° - Landing.
- 42° - Alternate (short field) landing.

The gate at 4° will stop lever movement as a reminder to pause to permit slat re-positioning. A similar gate at 22° identifies the go-around position during retraction only.

**DO NOT USE FOR FLIGHT****U12. SLAT MONITOR PANEL**

- 1-7. Slat Monitor Panel
- 8. Slat Degrees Indicator
- 9. Slat Lock Switch

**1-7. Slat Monitor Panel**

Respective green lights illuminate when the associated slat panel is extended. The green light illuminates on the flap indicator when all slats are extended.

**8. Slat Degrees Indicator**

- Indicates the position of the slat torque shafts.

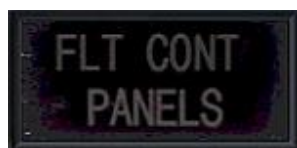
**9. Slat Lock Switch**

SWITCH - Normal position is unlatched and guarded to permit slat power drive unit to operate.

- Latching the switch shuts off hydraulic pressure to the slat power drive unit. Slats are locked in existing position, 1 LOCK|2 LOCK to indicate switch position.

**FLT CONT PANELS PANELS LIGHT (AMBER)**

C03. PILOTS ANNUNCIATOR PANEL



18. FLT CONT PANELS Panels Light (amber)

**18. FLT CONT PANELS Panels Light (amber)**

Illuminates if any of the following lights illuminate:

- Any FCES FAIL or STALL WARN;
- MACH FEEL FAIL;
- Any PFCS MONITOR FAIL;
- RUDDER MECH LIMITER;
- RUDDER HYDR LIMITER;
- RUDDER HYD PUSH;
- RUDDER OFF;
- Any AILERON OFF;
- Any SPOILER OFF;
- L5&6 or R5&6 SPOILER PUSH.



**SLAT ASYM DET FAULT LIGHT (AMBER)/FLAP/SLAT LOCK LIGHT (AMBER)/FLAP ASYM DET FAULT LIGHT (AMBER)**

U14. S/O ANNUNCIATORS PANEL



- 21. SLAT ASYM DET FAULT Light (amber)
- 25. FLAP/SLAT LOCK Light (amber)
- 29. FLAP ASYM DET FAULT Light (amber)

**21. SLAT ASYM DET FAULT Light (amber)**

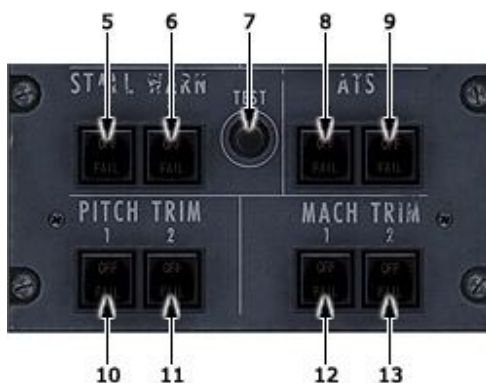
Indicates a slat asymmetry detection system fault.

**25. FLAP/SLAT LOCK Light (amber)**

Indicates that an asymmetry has been detected in either the flaps or slats.

**29. FLAP ASYM DET FAULT Light (amber)**

Indicates a flap asymmetry detection system fault.

**O10, O11. PFCS AND FCES PANELS**

- 5,6. Stall Warn Switch
- 7. Stall Warn Test Button

**5,6. Stall Warn Switch**

Controls power and provides monitoring of the stall warning system.

LCH - Normal position. Stall warning system operative. FAIL light is armed.

FAIL (Amber) illuminates to indicate respective stall warning channel has failed.

UNL - Associated stall warning channel are shut off. OFF illuminates to indicate switch position. FAIL light is disarmed.

**7. Stall Warn Test Button**

Pressing switch provides stall angle of attack input to the stall warning system.

- TEST button inhibited in flight.

## **P11. AILERON AND RUDDER TRIM CONTROLS**



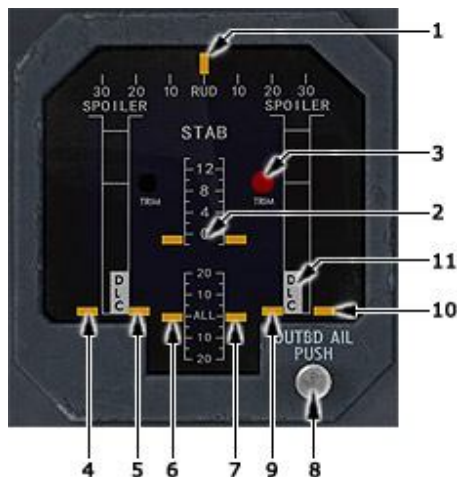
1. Aileron Trim Control
2. Rudder Trim Control

- Provide control of aileron and rudder trim settings.
- Pointers indicate units of aileron trim and degrees of rudder trim.



### **Rudder Pedal Adjustment**

- Rotate to adjust position of rudder pedals.
- Total adjustment range is 9 inches. Indicator shows adjustment in inches from center of range.

**L20. SURFACE POSITION INDICATOR**

1. Rudder Indicator
2. Stabilizer Indicator
3. Stabilizer Auto-Trim Warning Flag
4. Spoiler Panel L5 Indicator
5. Spoiler Panel L4 Indicator
- 6,7. Aileron Indicators
8. Outbd Aileron Button
9. Spoiler Panel R2 Indicator
10. Spoiler Panel R6 Indicator
11. DLC Range Indicator

**2. Stabilizer Indicator**

- Total range 1° nose to 14° nose up.
- Trim range 0 to 10° nose up.

**3. Stabilizer Auto-Trim Warning Flag**

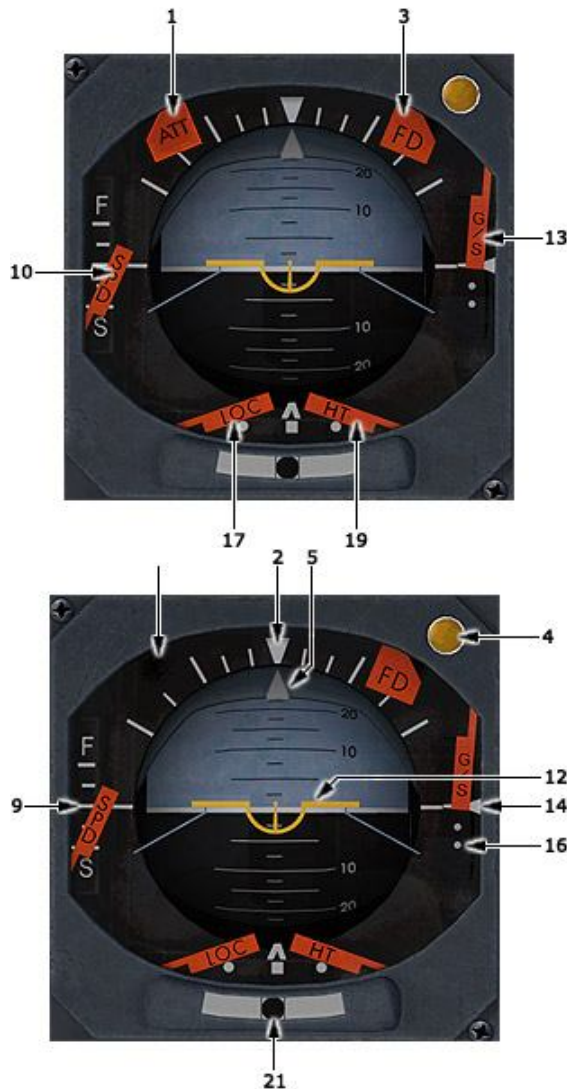
Appears if aircraft is not in trim while an autopilot is engaged.

**6,7. Aileron Indicators**

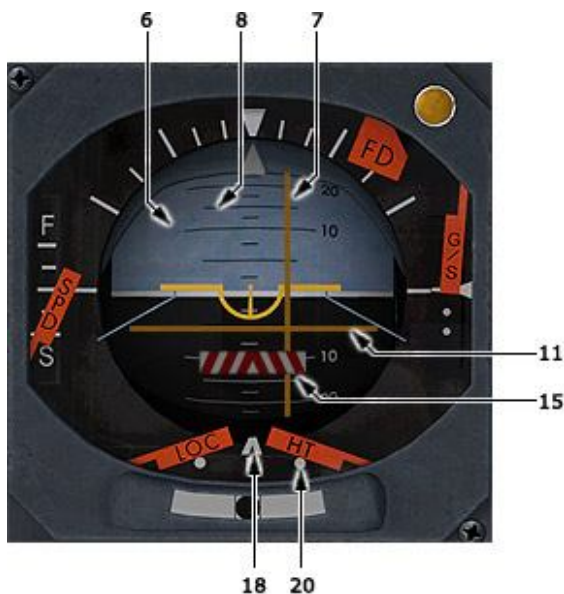
Normally indicates position of inboard ailerons.

**8. Outbd Aileron Button**

When pressed, aileron indicators display outboard aileron position.

**DO NOT USE FOR FLIGHT****FLIGHT INSTRUMENTS****L07-R07. ADI**

1. Attitude Flag (orange)
2. Fixed Roll Angle Scale
3. Flight Director Flag (orange)
4. Decision Height (DH) Indicator Light
5. Roll Angle Pointer
6. Attitude Sphere
7. Roll Command Bar
8. Attitude Sphere Pitch Scale
9. Speed Deviation Pointer
10. Speed Command Flag (orange)
11. Pitch Command Bar
12. Fixed Aircraft Reference Symbol (yellow)
13. Glide Slope Flag (orange)
14. Glide Slope Deviation Pointer
15. Rising Runway
16. Glide Slope Deviation Scale
17. Localizer Flag (orange)
18. Localizer Deviation Pointer
19. HT Flag (orange)
20. Localizer Deviation Scale
21. Inclinator

**DO NOT USE FOR FLIGHT****1. Attitude Flag (orange)**

Attitude input signals are not valid or power sources have failed. All attitude displays should be disregarded.

**2. Fixed Roll Angle Scale**

Roll angle is displayed by the roll angle pointer against the roll angle scale. Scale is marked from zero at 10

**3. Flight Director Flag (orange)**

Pitch and roll commands from the flight director system are not valid or power sources have failed. Command bars bias out of view.

**4. Decision Height (DH) Indicator Light**

Illuminates when aircraft is at or below DH selected on radio altimeter. The lights are a repeater of DH light on radio altimeter. Pressing DH light on radio altimeter extinguishes this light.

**5. Roll Angle Pointer**

Displays roll angle against fixed roll angle scale.

**6. Attitude Sphere**

Displays both pitch and roll attitude by its physical relationship against fixed aircraft reference symbol. The horizon is represented by a white line separating the blue (sky) from the black (earth) portions.

**7. Roll Command Bar**

Bar position in relation to center of fixed aircraft reference symbol indicates roll commands. Bar to the right of center commands right roll. Bar to left of center commands left roll.

**8. Attitude Sphere Pitch Scale**

Pitch angle is displayed by the fixed aircraft reference symbol against the attitude sphere pitch scale. Scale is marked in one degree increments from 0 to 20 degrees and at 10, 15, 20, 30, 40, 60, 80, and 90 degrees up and down. The scale is marked with the small word PUSH between 60 and 80 degrees and the large word

PUSH between 80 and 90 degrees pitch up. The small word PULL is between 40 and 60 degrees and the large word PULL between 80 and 90 degrees pitch down.

#### **9. Speed Deviation Pointer**

Indicates actual speed is faster, equal to, or slower than desired speed command alpha mode or autothrottle selection. It will bias out of view if signals are invalid.

#### **10. Speed Command Flag (orange)**

Speed command information is not valid.

#### **11. Pitch Command Bar**

Bar position in relation to fixed aircraft reference symbol indicates pitch commands. Bar below aircraft symbol commands nose down pitch Bar above aircraft symbol commands nose up pitch.

#### **12. Fixed Aircraft Reference Symbol (yellow)**

Attitude sphere moves in pitch and roll to indicate aircraft attitude against fixed aircraft reference symbol.

#### **13. Glide Slope Flag (orange)**

Loss of valid glide slope frequency input or power sources have failed.

#### **14. Glide Slope Deviation Pointer**

Indicates aircraft position (fixed-center index) in relation to glide slope beam (movable pointer). When pointer is below, the aircraft is above glide slope. When pointer is above the center, aircraft is below glide slope.

#### **15. Rising Runway**

Display radio altimeter information. The symbol moves vertically with radio altimeter inputs. The symbol indicates radio altitude from 200 feet to 0.

#### **16. Glide Slope Deviation Scale**

Indicates glide slope deviation against glide slope deviation pointer. When aircraft is on glide slope, pointer is opposite center index.

#### **17. Localizer Flag (orange)**

Loss of valid localizer frequency input or power source have failed.

#### **18. Localizer Deviation Pointer**

Indicates aircraft position (fixed center Index) in relation to localizer beam (movable pointer). Scale is expanded and pointer will displace approximately three times as far for the same deviation as the HSI pointer.

#### **19. HT Flag (orange)**

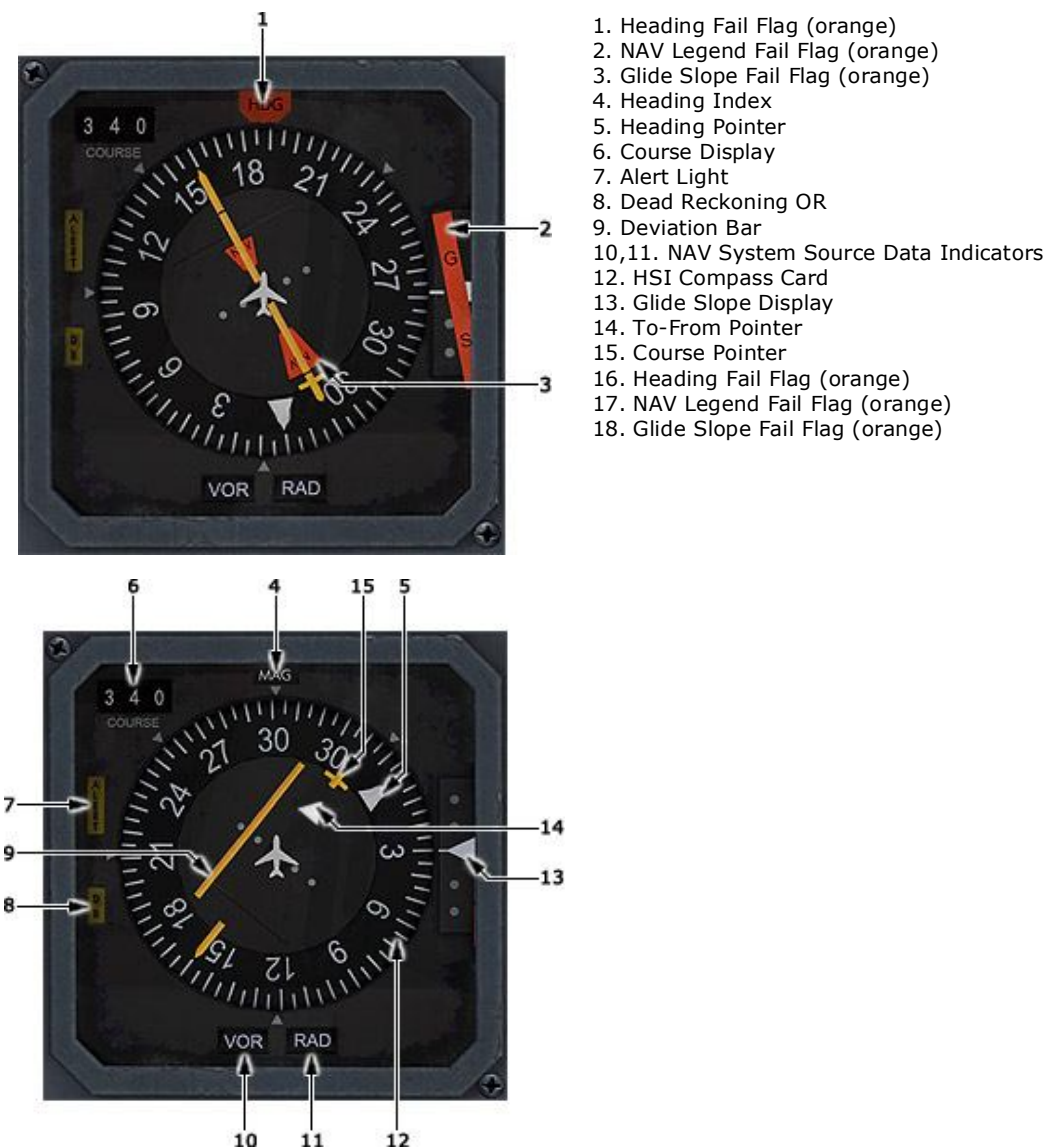
Radio altimeter information not valid.

**20. Localizer Deviation Scale**

Indicates localizer deviation against localizer deviation pointer. When pointer is opposite center index, aircraft is on localizer.

**21. Inclinator**

Displays slip and skid information for aid in coordinating turns.

**L08-R08. HSI****1. Heading Fail Flag (orange)**

Heading annunciator flag HDG covers window when selected source is unreliable.

## **2. NAV Legend Fail Flag (orange)**

Indicates failure of course signal as selected.

## **3. Glide Slope Fail Flag (orange)**

GS fail flag covers GS scale if signal is weak or the receiver fails.

## **4. Heading Index**

Indicates magnetic heading on compass card.

## **5. Heading Pointer**

Indicates APFDS heading selected.

## **6. Course Display**

Indicates VOR course selected.

## **9. Deviation Bar**

Displays VOR, LOC, course deviation. C deviation indicates:

VOR - 5°

LOC - 1 3/4 °

NAV - 3.5 miles

## **10,11. NAV System Source Data Indicators**

Indicates which navigation system is providing the display. The sources of navigation data are:

LEFT

- ILS - Instrument Landing System
- VOR - VHF omni range
- NAV - Navigation mode

RIGHT

- RAD - Radio

## **12. HSI Compass Card**

Captain's card receives information from mag. heading system No. 1. F/O's card receives information from mag. heading system No. 2.

## **13. Glide Slope Display**

Glide slope scale and bar appear when LOC frequency is selected.

## **14. To-From Pointer**

Appears at nose or tail of course pointer to indicate selected course is TO or FROM the station or waypoint.

## **15. Course Pointer**

Indicates VOR course as selected by the navigation mode selector panel.



**16. Heading Fail Flag (orange)**

Heading annunciator flag HDG covers window when selected source is unreliable.

**17. NAV Legend Fail Flag (orange)**

Indicates failure of HSI power or invalid navigation input.

**18. Glide Slope Fail Flag (orange)**

GS fail flag covers GS scale if signal is weak or the receiver fails

**C05. STANDBY ALTIMETER**



- 1. Instrument Vibrator Flag
- 5. Baro Knob

**1. Instrument Vibrator Flag**

With no power to the vibrator circuit, a red flag is visible. With power the area is black.

**5. Baro Knob**

Set barometric pressure in millibars and inches of mercury.

**L13-R13. VERTICAL SPEED INDICATOR**

2. OFF Flag (orange)

Operates by inputs from the air data computer, captain's by ADC 1, first officer's by ADC 2. The alternate selector switch may be used to switch vertical speed inputs to the opposite ADC.

**2. OFF Flag (orange)**

Indicates loss of power or unreliable indication.

**L04-R04. AIRSPEED/MACH INDICATOR**

1. Mach Indicator
2. Mach Flag (orange)
3. Maximum Speed Pointer
4. Reference Speed Bug
5. VMO Flag (orange)
6. IAS Pointer
7. AS Flag (orange)
8. Selectable VMO Switch (covered)
9. Setting Knob

**DO NOT USE FOR FLIGHT****1. Mach Indicator**

Corrected mach from air data computer. Captain's by ADC 1, first officer's by ADC 2.

**2. Mach Flag (orange)**

Mach reading unreliable.

**3. Maximum Speed Pointer**

Maximum speed pointer receives signal from the air data computer and indicates the maximum operating speed. Overspeed clacker sounds if speed is exceeded.

**5. VMO Flag (orange)**

The maximum speed pointer indication unreliable or loss of power.

**6. IAS Pointer**

IAS pointer receives signal from air data computer.

**7. AS Flag (orange)**

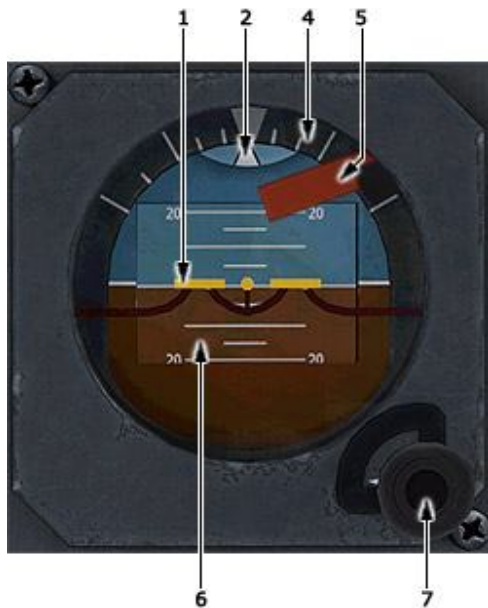
Airspeed indication unreliable or loss of power.

**8. Selectable VMO Switch (covered)**

Permits disconnecting the maximum speed pointer from the air data computer and manually setting it to 270K for gear down flight.

If all flags appear simultaneously, the instrument has lost electrical power.

### C01. STBY HORIZON INDICATOR



1. Fixed Airplane Reference
2. Bank Angle Indicator
3. Standby Horizon Indicator
4. Bank Angle Scale
5. Fail Flag
6. Pitch Scale
7. Caging/Pitch Trim Control

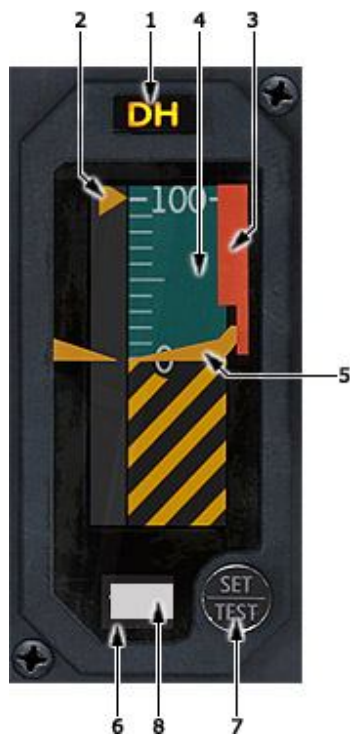
#### 5. Fail Flag

Attitude indications are not valid or power source has failed

### C04. STBY AIRSPEED INDICATOR



1. Pointer

**L14-R14. RADIO ALTIMETER**

1. Decision Height (DH) Warning Switchlight
2. Decision Height (DH) Bug
3. Fail Flag (fire orange)
4. Altitude Tape (green 0-500 ft blue 500-2500 ft)
5. Aircraft Pointer
6. Decision Height Counter
7. Decisions Height Set Knob (yellow triangle)
8. Decision Height Flag

**1. Decision Height (DH) Warning Switchlight**

Illuminates when reaching decision height altitude. Also illuminates DH light on ADI. Press light extinguish DH light on ADI will also extinguish. Rotating set knob so that counter reads below decision height will also extinguish light. Also illuminates at 2500 and 1000 feet as proximity warning. Press DH light to reset.

**2. Decision Height (DH) Bug**

The DH bug moves up or down as tape moves up or down to remain opposite selected decision height. Intermittent tone starts when 50 feet from bug. Tone stops at the bug. DH light on as altitude is passed.

**3. Fail Flag (fire orange)**

Indicates loss of reliable radio altitude indication. The ADI rising runway vertical motion indications will be unreliable.

**4. Altitude Tape (green 0-500 ft blue 500-2500 ft)**

Tape movement displays altitude from zero to 2500 feet.  
Ground Symbol (black and yellow stripes)  
 Appears below zero on tape.

**5. Aircraft Pointer**

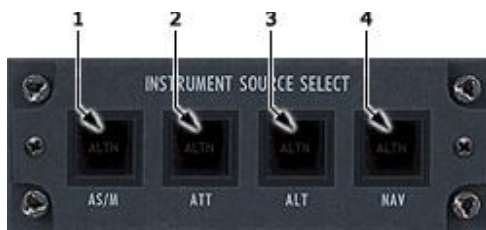
Stationary pointer indicates height above terrain.

## 6. Decision Height Counter

Indicates decision height setting. Displays altitude from zero to 499 feet. Covered by black mask above 500 feet and white mask below zero.

Sets DH in window and places bug on tape at selected decision height.

## L09-R09. INSTRUMENT SOURCE SELECT PANEL



1. AS/M
2. ATT
3. ALT
4. Alternate Navigation Instrument Source Select Switch

OUT - Normal position. No lights on.

AS/M, ATT and ALT signals are from normal source.

IN - ALTN indicates that alternate source data is selected. Except for ATT, the selector pressed first takes priority and it is not possible for the Captain and First Officer to simultaneously use AS/M or ALT.

### 1. AS/M

Selects other ADC to airspeed/mach indicator.

### 2. ATT

Selects No. 3 gyro to ADI. Both ATT switches may be in ALTN at the same time.

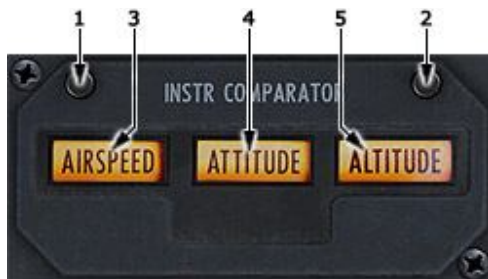
### 3. ALT

Selects other ADC to altimeter and vertical speed indicator.

### 4. NAV

IN - Selects No. 3 INS navigation data to the HSI

**L03-R03. INSTRUMENT COMPARATOR PANEL**



- 1. TEST 1
- 2. TEST 2
- 3-5. Comparison Flags/Monitor Flags

**1. TEST 1**

Displays all comparison flags on both pilots' indicators. The ATT flag in the ADI appears on the side that is activated. If both pilots' tests 1 are pressed at the same time, all comparison flags except ATTITUDE will appear and the VERT GYRO 3 light on pilots' annunciator panel will illuminate.

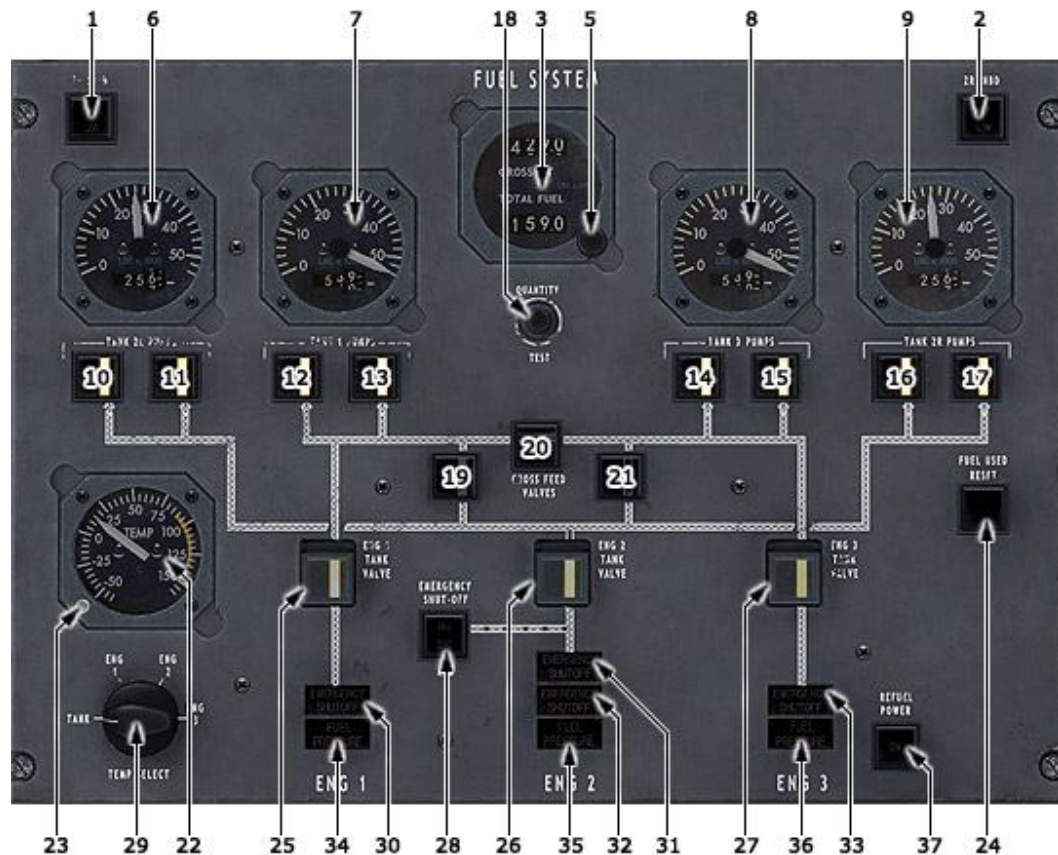
**2. TEST 2**

Displays all monitor flags.

## FUEL SYSTEM

### FUEL QUANTITY INDICATION SYSTEM

#### S02. FUEL CONTROL PANEL



- 1,2. Tanks 2L and 2R INBD QTY Switch/LOW Light
- 3. Gross Wt/Total Fuel Indicator
- 5. Set Knob
- 6-9. Fuel Quantity Indicator
- 10-17. Tank Pumps Switch
- 18. Quantity Test Button
- 19-21. Crossfeed Valves Switch
- 22. Temp Indicator
- 23. Test Button
- 24. Fuel Used Reset
- 25-27. ENG Tank Valve Switch
- 28. APU Emergency Shutoff Lights
- 29. Temp Selector
- 30-33. Emergency Shutoff Light (amber)
- 34-36. Fuel Press Light
- 37. Refuel Power Switch

#### 1,2. Tanks 2L and 2R INBD QTY Switch/LOW Light

Provides capability to monitor fuel quantity contained in the inboard compartment of tank 2L and 2R. and provides warning of low inboard compartment quantity.

UNL - Normal position. QTY is extinguished. Fuel quantity indicators display total fuel (inboard and outboard compartment) contained in the respective tank (2L or 2R).



**DO NOT USE FOR FLIGHT**

LCH - QTY illuminates to indicate switch position. Fuel quantity indicator displays fuel contained in the inboard compartment for the respective tank (2L or 2R).

LOW (Amber) - Illuminates when fuel contained in the inboard compartment is less than 700 pounds regardless of QTY switch position.

The FUEL SYSTEM light on the Pilots' Annunciator Panel illuminates when LOW illuminates.

- Inboard quantity should not exceed 1,000 pounds unless the outboard compartment is full.

- TOTAL FUEL Indicator quantity is reduced when 2L or 2R INBD switches are latched.

### **3. Gross Wt/Total Fuel Indicator**

- Provides indication of present gross weight and total fuel quantity.
- TOTAL FUEL display is independent of individual tank Fuel Quantity indicators.
- Indicates quantity is reduced when 2L or 2R QTY LOW switch is latched.

### **5. Set Knob**

- Push and turn SET Knob to select aircraft gross weight displayed in GROSS WT window.
- As total fuel decreases. GROSS WT indicator decreases automatically.

### **6-9. Fuel Quantity Indicator**

- Indicates fuel quantity, in thousands of pounds, in respective tank.
- Max capacity is 54,100 pounds each for tanks 1 and 3, and 25,700 pounds each for tanks 2L and 2R.
- The position of the 2L and 2R INBD quantity switches determine whether the respective indicators display the total fuel in the tanks, or only the fuel contained in the inboard compartment.
- With loss of power, pointer and digital indicator remain in last indicated position.

### **10-17. Tank Pumps Switch**

Controls operation of fuel tank boost pump

LCH - Normal flight position. Pump is energized and provides pressure. FLOWBAR illuminates to indicate switch position and LOW light is armed.

UNL - Pump is de-energized;

LOW (Amber) - Illuminates when pump output pressure is too low.

The FUEL SYSTEM light on the Pilots' Annunciator Panel illuminates when LOW illuminates.

### **18. Quantity Test Button**

Provides means of testing quantity indication system.

- When button is pressed and held, a full tank input is sent to the signal conditioners.
- Fuel Quantity indicators and TOTAL FUEL indicator drive to full indications.
- GROSS WT indication increases.
- LOW illuminates in both INBD QTY switches.

### **19-21. Crossfeed Valves Switch**

Controls operation of the crossfeed valves to provide the means of feeding any engine from any tank.

LCH - Crossfeed valve opens, FLOWBAR illuminates to indicate switch position

UNL - Crossfeed valve closes, FLOWBAR is extinguished.

DISAGREEMENT LIGHT (BLUE) - Illuminates when valve position and switch position disagree.

### **22. Temp Indicator**

Monitors fuel temperature in tank 2L. or downstream of the fuel oil heat exchanger at the inlet to each engine fuel control as selected by the TEMP SELECTOR.

### **23. Test Button**

Pointer drives to the 12 o'clock position when button is pressed.

### **24. Fuel Used Reset**

Press to reset all fuel counters to zero .

### **25-27. ENG Tank Valve Switch**

Controls position of Engine Tank Valve.

UNL - Valve is closed. FLOWBAR is extinguished.

LCH - Normal switch position. Valve is open. FLOWBAR illuminates to indicate switch position.

NOTE: Pulling FIRE PULL Handle 1 or 3 closes the respective Tank Valve and extinguishes the flowbar regardless of switch position. No. 2 Tank Valve is independent of the No. 2 FIRE PULL Handle.

DISAGREEMENT LIGHT (BLUE) - Illuminates when valve is not in the required position.

### **28. APU Emergency Shutoff Lights**

- Monitors position of APU Primary (PR1) and Secondary (SEC) EMERGENCY (firewall) SHUT- OFF valves.

- Lights are armed to illuminate only when the APU MASTER POWER switch is ON.

- PR1 or SEC illuminates when respective valve position disagrees with required position.

With FIRE PULL Handle in

- Lights extinguish when valves are open.

- Lights illuminate when valves are closed.

With FIRE PULL Handle pulled or AUTO FIRE SHUTDOWN:

- Lights extinguish when valves are closed.

- Lights illuminate when valves are open.

### **29. Temp Selector**

Four position selector which determines temperature probe monitored by the TEMP Indicator.

### **30-33. Emergency Shutoff Light (amber)**

- Monitors position of Emergency (firewall) Shutoff Valve.

- Engine No. 1 and 3 are each provided with one valve.

- Engine No. 2 is provided with two valves.

- Illuminates when valve position disagrees with position selected by FIRE PULL Handle.

With FIRE PULL Handle IN:

- Light extinguishes when valve is open.

- Light illuminates when valve is closed.

With FIRE PULL Handle PULLED

- Light extinguishes when valve is closed.

- Light illuminates when valve is open.

**S06. FUEL JETTISON PANEL**

- 1-4. Tank Dump Switches/Disagreement Lights (blue)  
 5,6. Jettison Valve Disagreement Lights (blue)  
 7. Fuel Jettison Master Switch/Disagreement Light (blue)

**1-4. Tank Dump Switches/Disagreement Lights (blue)**

- Controls operation of tank dump valves.
  - Switches are armed to operate only when FUEL JETTISON MASTER Switch is latched.
- UNL - Normally guarded in this position. Dump valves close and DUMP is extinguished.  
 LCH - Dump valves open provided FUEL JETTISON MASTER Switch is latched. DUMP illuminates to indicate switch position. Fuel jettisoning is automatically terminated when fuel level in the tanks is reduced to:
- 8,000 pounds each in tanks 1 and 3.
  - 4,000 pounds (or less than 900 pounds inboard) each in tanks 2L & 2R.

Disagreement Lights (Blue) – Illuminates when valve is not in the required position.

LCH

- Above shut-off level, light illuminates until valve is open.
- Below shut-off level, light illuminates until valve is closed.
- The 2L and 2R lights may cycle as inboard tank quantity fluctuates around the 900 pound level.

UNL - Light illuminates until valve is closed.

**5,6. Jettison Valve Disagreement Lights (blue)**

Illuminates when Jettison Valve position disagrees with position selected by FUEL JETTISON MASTER Switch.

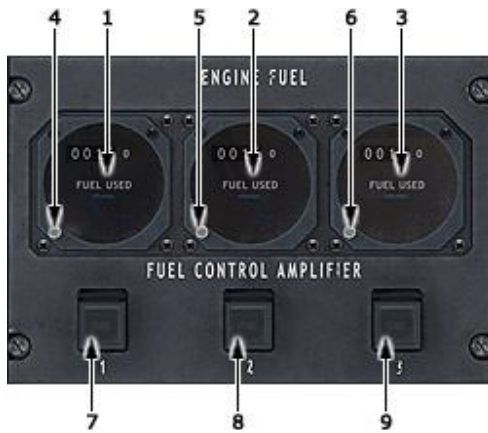
**7. Fuel Jettison Master Switch/Disagreement Light (blue)**

Controls position of the two wing jettison valves and cross-ship isolation valve, and controls arming of the four TANK DUMP switches.

UNL - Normally guarded and safetied in this position. The two wing jettison valves and cross-ship isolation valve close, and the four TANK DUMP switches are disarmed. OPEN is extinguished.

LCH - The two wing jettison valves and cross-ship isolation valve are opened, and the four TANK DUMP switches are armed illuminates to indicate switch position.

Disagreement Light (Blue) - Illuminates when position of the cross-ship isolation valve disagrees with selected position.

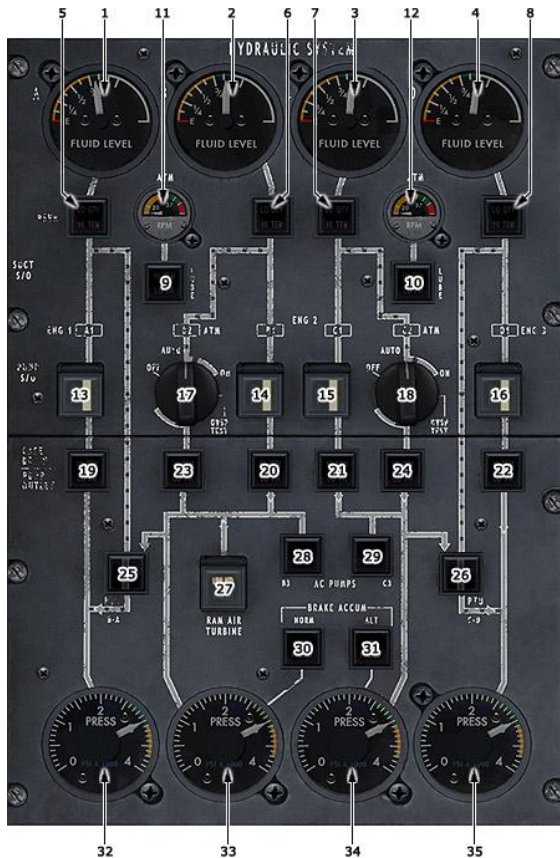
**DO NOT USE FOR FLIGHT****S05. FUEL USED/FUEL CONTROL AMPLIFIER PANEL****1-3. Fuel Used Counters**

Three fuel used counters, located on the Second Officer's lower panel, display the fuel used by each engine since the last resetting of the indicator. The counter reset switch is located adjacent to the counters on the fuel panel. If the reset switch is pressed, all indicator counter drums are driven to zero. A test knob is provided on each indicator. When turned clockwise, its respective Fuel Used Indicator functions at a rate of 10.000 pph. In addition, the associated FUEL FLOW Indicator on the Pilot's Instrument panel will indicate 10.000 pph.

# HYDRAULICS

## BASIC COMPONENTS

### U03. HYDRAULIC SYSTEM PANEL



- 1-4. Fluid Level Indicators
- 5-8. RSVR LO QTY/HI TEMP Lights (amber)
- 13-16. Pump S/O Switch
- 19-22. Case Drain HI TEM/PUMP Output LO PR Lights (amber)
- 32-35. Press Indicator

#### 1-4. Fluid Level Indicators

- Indicates quantity in respective system reservoir.
- Quantity should normally remain within the green band.
- Hydraulic system must be pressurized for an accurate indication.
- C system indicator will show a slight quantity increase when landing gear is extended.
- With loss of power, pointer indicates E.

#### 5-8. RSVR LO QTY/HI TEMP Lights (amber)

LO QTY - Illuminates when fluid quantity is below approximately 1/4. Light is independent of reservoir quantity indicator.

The HYDRAULIC SYSTEM light on the Pilots' Annunciator Panel will illuminate if either the LO QTY or HI TEMP lights illuminate.

#### 13-16. Pump S/O Switch

Guarded switch which controls output of the engine driven hydraulic pump.

LATCHED - Normal position. Pump is pressurized, and output is automatically regulated to maintain normal system pressure. Flowbar illuminates to indicate switch position. UNLATCHED - Pump is electrically energized to stop pump output (depressurize). A system check valve isolates the pump from the rest of the hydraulic

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**DO NOT USE FOR FLIGHT**

system. OFF illuminates to indicate switch position. The pump S/O is also activated when the respective FIRE PULL Handle is pulled. However, flowbar remains illuminated and OFF extinguished as long as PUMP S/O switch remains latched.

**19-22. Case Drain HI TEM/PUMP Output LO PR Lights (amber)**

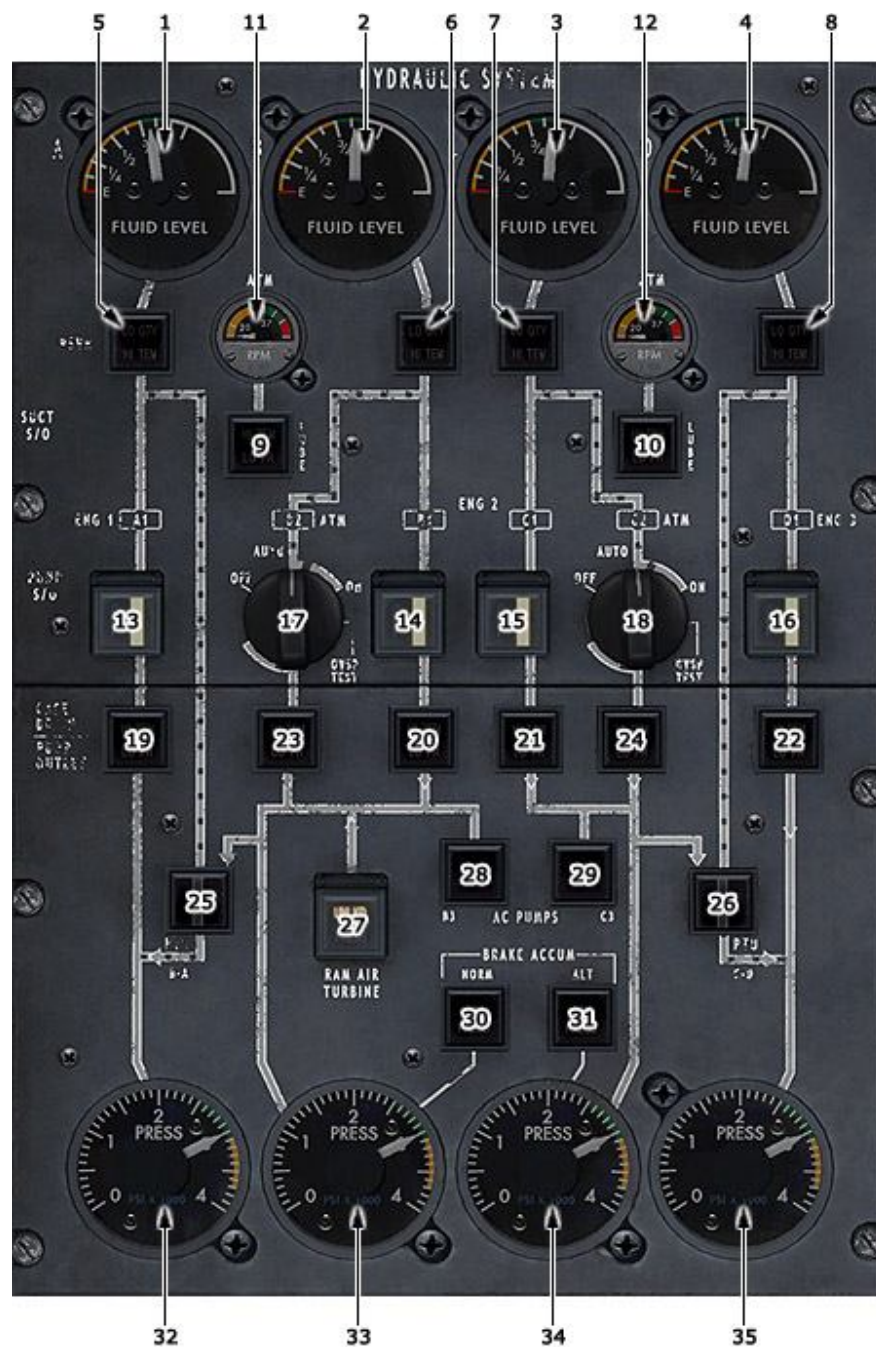
Lights are armed to illuminate only if respective PUMP S/O is latched.

LO PR - Illuminates when pump output pressure is too low for normal operation.

The HYDRAULIC SYSTEM light on the Pilots' Annunciator Panel will illuminate if either the HI TEMP or LO PR lights illuminate.

**32-35. Press Indicator**

- Indicates hydraulic system pressure.
- Pressure should normally remain within the green band.
- With loss of power, pointer remains in last indicated position

**DO NOT USE FOR FLIGHT****HYDRAULIC SYSTEMS B & C**

- 9,10. ATM LUBE HI TEM/LO PR Lights (amber)
- 11,12. ATM (Air Turbine Motor) Tachometer
- 17,18. ATM Selector
- 23,24. ATM Case Drain HI TEM/PUMP Output LO PR Lights (Amber)
- 27. Ram Air Turbine (RAT) Switch/Indicator
- 28,29. AC Pumps Switches
- 30,31. Brake Accum Lights (Amber)



### **9,10. ATM LUBE HI TEM/LO PR Lights (amber)**

Monitors condition of the ATM gearbox lubricating oil. Lights are armed to illuminate only if respective ATM has a run signal. LO PR - Illuminates when gearbox oil pressure is too low for normal operation. May illuminate momentarily for "C" system during gear actuation.

The HYDRAULIC SYSTEM light on the Pilots' Annunciator Panel will illuminate if either the HI TEMP or LO PR lights illuminate.

### **11,12. ATM (Air Turbine Motor) Tachometer**

Indicates operating speed of the air turbine.

### **17,18. ATM Selector**

Four position selector that controls ATM operation.

OFF - Deactivates ATM. Also resets any overspeed trip signal.

- Normal flight position. Arms ATM to operate automatically when system pressure drops toward lower end of green band. ATM automatically shuts down after preset time. C2 ATM normally cycles when landing gear is operated.

- ATM operates continuously.

OVSP TEST - Checks overspeed shutdown circuit and locks out ATM until ATM Selector is cycled to OFF. Intended for maintenance use only.

Lights are armed to illuminate only if respective ATM selector is in the ON or OVSPD TEST position.

HI TEMP - Illuminates when fluid temperature from the pump case drain is too high for normal operation. LO PR - Illuminates when pump output pressure is too low for normal operation.

The HYDRAULIC SYSTEM light on the Pilots' Annunciator Panel will illuminate if either the HI TEMP or LO PR lights illuminate.

While the ATM is operating, RPM should normally remain in the green band.

### **23,24. ATM Case Drain HI TEM/PUMP Output LO PR Lights (Amber)**

Lights are armed to illuminate only if respective ATM selector is in the ON or OVSPD TEST position.

LO PR - Illuminates when pump output pressure is too low for normal operation.

The HYDRAULIC SYSTEM light on the Pilots' Annunciator Panel will illuminate if either the HI TEMP or LO PR lights illuminate.

While the ATM is operating, RPM should normally remain in the green band.

### **27. Ram Air Turbine (RAT) Switch/Indicator**

Guarded and safetied momentary switch which provides manual RAT deployment Annunciator lights verify RAT deployment and operation.

In flight the RAT will deploy automatically if:

- The RPM on all 3 engines falls below flight idle, or
- All four engine driven hydraulic pumps are shutdown and both ATM switches are OFF.

Pressing the RAT switch in-flight manually deploys the RAT.

UNLKD (amber) - Illuminates when RAT is deployed. The RAT DEPLOYED light illuminates on the Pilots' Annunciator Panel when UNLKD illuminates.

PRESS (green)

- Illuminates when the RAT is providing useable pressure.
- Airspeed should be maintained above 100K assure adequate pump output.
- RAT deployment (both manual and automatic) is inhibited on the ground.
- Once deployed, the RAT must be re-stowed by Maintenance



**28,29. AC Pumps Switches**

Controls operation of AC pumps.

UNLATCHED - Normal flight position. Pump is de-energized.

LATCHED - Pump is selected to operate. ON illuminates to indicate power is available to the pump. System pressure indication verifies pump operation provided no other pumps are operating in that system. ON extinguishes if the pump shuts down for any reason, including overheating or load shedding.

- Wait 90 seconds before re-start after shutting pump off.
- Limit continuous ground operation of an AC pump to 15 minutes.
- Do not operate any flight control using only the AC pumps.

**30,31. Brake Accum Lights (Amber)**

LOW PRESS illuminates to indicate that respective accumulator pressure is too low for adequate braking. The LOW BRAKE PRESS light illuminates on the Pilots' Annunciator Panel when either LOW PRESS lights illuminate.

**HYDRAULIC SYSTEMS A & D**

Alternate action switch selects operation of respective PTU.

When switch is pressed, PTU shutoff valve is electrically energized to open, and flowbar illuminates to indicate PTU has been selected to operate. System pressure indication verifies PTU operation, provided the engine driven pump is shutdown.

When switch is pressed again, PTU is electrically energized to shutdown, and flowbar extinguishes.

Normal selection is flowbar extinguished and PTU shutdown.

## ICE/RAIN PROTECTION

### 022. WING ANTI-ICE CONTROLS



- 1,2. Duct Fail Light
- 3,4. Automatic Switch
- 5,6. Manual Switch
- 7. Test Switch

#### 1,2. Duct Fail Light

Tested with ECS area overheat test switch.

#### 3,4. Automatic Switch

IN — Energizes wing anti-ice valve to operate automatically to maintain correct anti-icing temperature. ON is illuminated to show switch position. OVHT is illuminated to indicate excessive slat temperature.

OUT — Deactivates automatic mode.

#### 5,6. Manual Switch

IN - Bypasses automatic control unit and opens anti-ice valve. ON indicates switch position. OPEN indicates anti-ice valve has been opened either automatically or manually.

OUT - Deactivates manual mode. Anti-ice valve closes if auto mode is not on.

#### 7. Test Switch

Momentary pushbutton switch bypasses air/ground sensing switch to check system when airplane is on the ground. Pneumatic power must be available for test. Test is made with either auto or manual switches in. Pressing test switch causes OPEN legends to illuminate indicating anti-ice valve operation is normal.

**DO NOT USE FOR FLIGHT****O23. ENGINE ANTI-ICE PANEL**

- 1-3. Heat Indicator  
4-6. ENG Anti-Ice Control Switch

**1-3. Heat Indicator**

Illuminates when pressure in cowl leading edge is normal.

**4-6. ENG Anti-Ice Control Switch**

IN - System energized to operate with pressure.

ON - Indicates switch position.

HI PR - Overpressure in duct system will continue to function using overpressure relief valve.

OUT - System deenergized and regulator/shutoff valve is closed.

**ICE DETECTOR****C03. PILOTS ANNUNCIATOR PANEL****30. Ice Detector**

Icing probe is accumulating ice. Light is on as long as icing conditions exists and for 60 seconds after icing ceases.

**O20. AIR DATA SENSOR HEAT PANEL**

1. Captain's Pitot Heat Switch
2. Mast Light Inhibit Switch
3. First Officer's Pitot Heat Switch
4. Temperature Probe Power Switch
5. Alpha (Angle Of Attack) Sensor Power Switch

**1. Captain's Pitot Heat Switch**

Supplies power to captain's left and right pitot mast/probes.

IN - OFF is extinguished and electrical power is supplied to respective mast/probe. OFF is illuminated with mast or probe heater failure.

OUT - OFF is illuminated, and probes are unheated.

**3. First Officer's Pitot Heat Switch**

Supplies power to first officer's left and right pitot mast/probes.

IN - OFF is extinguished and electrical power is supplied to respective mast/probe. OFF is illuminated with mast or probe heater failure.

OUT - OFF is illuminated and probes are unheated.

**4. Temperature Probe Power Switch**

Supplies power to left and right temperature probes.

IN - OFF is extinguished and electrical power is supplied to respective mast/probe. OFF is illuminated with heater failure.

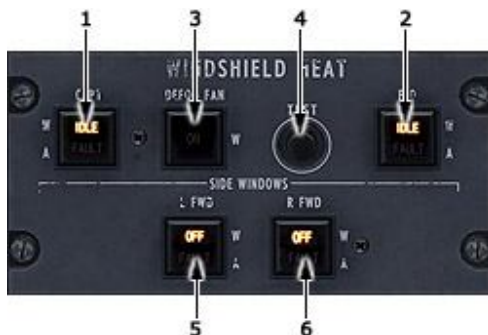
OUT - OFF is illuminated and probes are unheated.

**5. Alpha (Angle Of Attack) Sensor Power Switch**

Supplies power to left and right angle-of-attack sensor probes.

IN - Energizes sensor heaters. OFF is illuminated if temperature is too low.

OUT - OFF illuminated and probes are unheated.

**021. WINDSHIELD HEAT PANEL**

- 1,2. Windshield Heat Control Switch
- 3. Defog Fan Control Switch
- 4. Windshield Heat Test Switch
- 5,6. Window Heat Control Switches

**1,2. Windshield Heat Control Switch**

OUT - IDLE is illuminated whenever power is applied to the airplane and shows switch position. Low temperature warmup cycle is operating.

IN - Normal temperature control system is operating. IDLE is extinguished. FAULT is illuminated when there is a fault in the control unit or if the windshield heater element is burned out. Operation of first officer's windshield heat control is the same as the captain's.

**3. Defog Fan Control Switch**

IN - ON is illuminated to show switch position only.

OUT - ON is extinguished.

#### 4. Windshield Heat Test Switch

With windshield heat switches IN or OUT and side window heat switches IN, pressing momentary pushbutton test switch tests windshield and side windows.

Normal test results in all four FAULT lights cycling on and off RAPIDLY.

#### 5,6. Window Heat Control Switches

OUT - Window heat system deenergized. OFF is illuminated to show switch position only.

IN - System operating on normal cycle. OFF is extinguished. FAULT is illuminated under same conditions as windshield fault indicator.

### 004. WINDSHIELD WIPER PANEL



1. Windshield Wiper Control Switch
2. Windshield Washer Pump Switch
3. Rain Repellent Switch

#### 1. Windshield Wiper Control Switch

Three position rotary switch that turn on and controls speed of captain's windshield wiper.

#### 2. Windshield Washer Pump Switch

Alternate action switch. When pressed, PUMP ON illuminates.

### 029. RAIN REPELLENT CONTROL PANEL

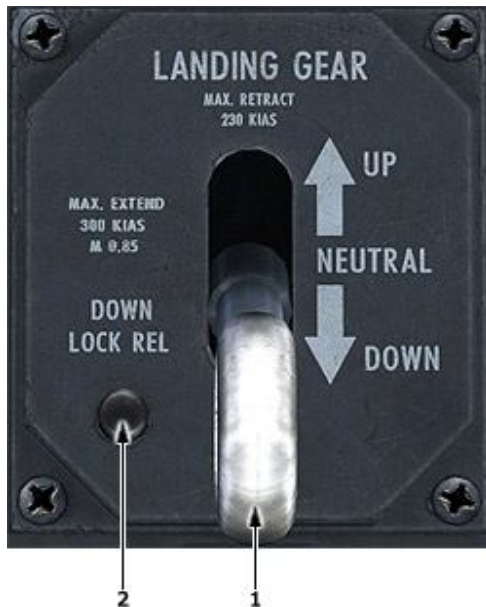


1. Windshield Wiper Control Switch
2. Rain Repellent Switch

## LANDING GEAR SYSTEM

### LANDING GEAR EXTENSION/RETRACTION

#### C25. LANDING GEAR LEVER



1. Landing Gear Lever
2. Down Lock REL Button

#### 1. Landing Gear Lever

Three position lever that electrically controls the hydraulic extension and retraction of the landing gear and tailskid.

UP - Landing gear and tailskid are retracted.

NEUTRAL - Normal flight position after landing gear is fully retracted.

- Landing gear and tailskid are isolated from their respective hydraulic systems.

DOWN - Landing gear and tailskid are extended.

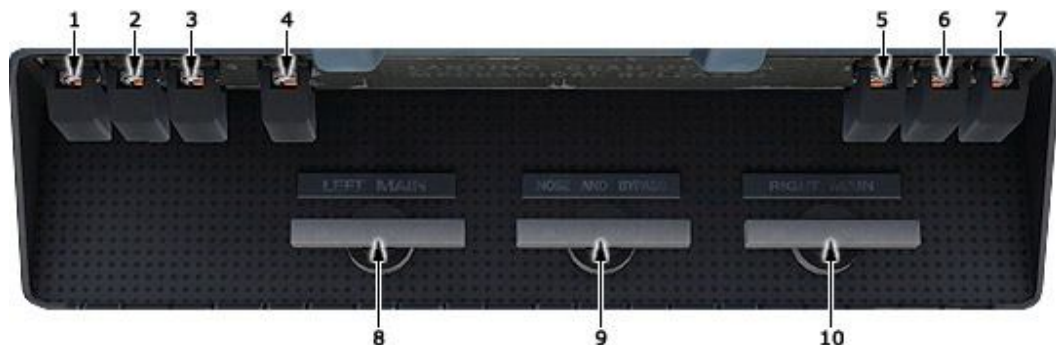
- Anti-skid system is armed and can be tested.

- Lever must be pulled out before it can be placed to UP or NEUTRAL.

- Lever is locked in DOWN position when air/ ground sensing signals an on ground condition, or if a main gear

#### 2. Down Lock REL Button

Pushbutton which manually releases gear lever down lock to permit gear retraction if normal release fails after liftoff. Unless a greater emergency exists, refer to the Abnormal Procedures before pressing the button to override the down lock release.

**DO NOT USE FOR FLIGHT****P12. ALTERNATE HYDRAULIC EXTENSION SWITCH/LANDING GEAR UPLOCK MECHANICAL RELEASES**

4. Alternate Hydraulic Extension Switch  
 8,9,10. Landing Gear Uplock Mechanical Release

**8,9,10. Landing Gear Uplock Mechanical Release**

Mechanically releases the uplocks to permit gear to free-fall to the down and locked position.

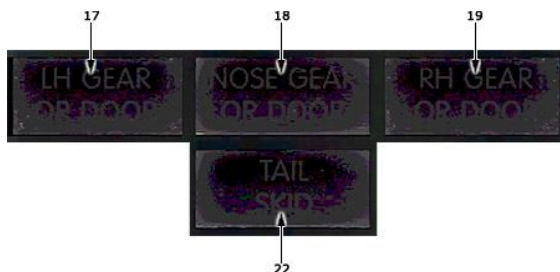
- The NOSE AND BYPASS handle must be pulled approx. seven inches. Each MAIN handles must be pulled approx. nine inches.
- The nose gear doors are mechanically closed by the action of the gear going into the down and locked position. Air loads on the doors may prevent the nose gear from locking into the down position until airspeed is reduced to as low as 190 KIAS.
- When all three handles are pulled the three green down and locked lights, DOOR and IN TRANS lights on the center instrument panel, and LH GEAR OR DOOR and RH GEAR OR DOOR lights on the S/O's Annun. Panel will be illuminated.
- If the normal landing gear lever is locked in the UP position the NOSE & BYPASS handle must be pulled first to port all hydraulic fluid to return to prevent fluid from being trapped in any cylinder.

When the NOSE AND BYPASS handle is pulled:

- MAIN handles will now operate regardless of the position of the normal landing gear lever.
- Nosewheel steering is inoperative.
- Do not re-stow NOSE AND BYPASS handles or gear may retract upon landing.

**LANDING GEAR POSITION AND WARNING****TAILSKID LIGHT/GEAR OR DOOR LIGHTS (AMBER)**

U14. S/O ANNUNCIATORS PANEL



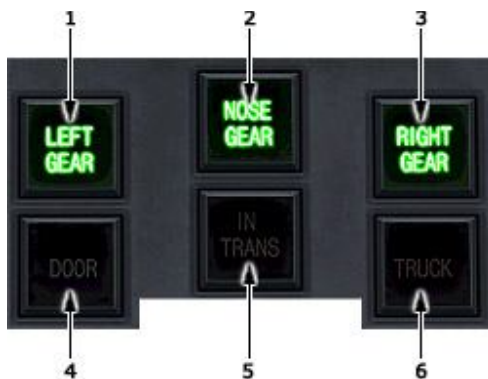
22. Tailskid Light  
 17-19. Gear or Door Lights (amber)

**22. Tailskid Light**

Illuminates when tailskid is not in the position selected by the landing gear lever, or following any ground contact of the tailskid

**17-19. Gear or Door Lights (amber)**

Respective light illuminates when doors or gear are not in the position selected by the gear lever. will be illuminated on the center instrument panel and will be illuminated and/or one or more green down and locked lights extinguished.

**C26. GEAR LIGHTS**

1-3. LEFT GEAR, NOSE GEAR, RIGHT GEAR Lights (green)

4. Door Light (red)

5. IN TRANS Light (red)

6. TRUCK Light (amber)

**1-3. LEFT GEAR, NOSE GEAR, RIGHT GEAR Lights (green)**

Illuminates when respective gear is down and locked regardless of lever position.

**4. Door Light (red)**

Illuminates when any gear door is open. Respective light illuminated on S/O's Annun. Panel identifies which gear is affected.

**5. IN TRANS Light (red)**

Illuminates when any door is open or any gear position disagrees with position selected by landing gear lever.

- Remains extinguished with landing gear lever in NEUTRAL provided all landing gear are up and all doors are closed.

**6. TRUCK Light (amber)**

Illuminates when either main gear truck is not level.

- Landing gear lever is locked in DOWN position while light is illuminated.
- Normally illuminates momentarily at touchdown and liftoff.
- May illuminate during taxi if a tire is low.



**21. GEAR HORN CUTOUT BUTTON**

P03. CONTROL STAND



21. Gear Horn Cutout Button

**1. Gear Horn Cutout Button**

Press to cancel silenceable gear warning horn.

**GEAR WARNING HORN**

Sounds to indicate gear is not down and locked when:

- Any throttle is retarded at airspeeds below 180 KIAS. This warning can be silenced.
- Flaps are positioned to 33° or more. This warning cannot be silenced.

**BRAKES**

P03. CONTROL STAND

**11. Park Brake Lights (red)**

Illuminate when parking brakes are set provided:

- Landing Gear Lever is DOWN.
- Parking brake shutoff valves have closed.
- Adequate pressure is trapped in NORM SYS B brake lines to assure brakes.
- BRAKE SYS SELECT switch is in NORM SYS B.

**18. Park Brake Knob**

- Pull PARK knob.
- Overrides position of BRAKE SYS SELECT switch and provides NORM SYS B pressure to the brakes.
- Anti-skid is disarmed and OFF illuminates on the ANTI-SKID panel. ANTI-SKID also illuminates on the Pilot's Annun. Panel.
- Release by pressing both pedals and knob will return to stowed position.

**U03. HYDRAULIC SYSTEM PANEL****30,31. Brake Accum Lights (Amber)**

- LOW PRESS illuminates to indicate that respective accumulator pressure is too low to assure adequate braking.
- LOW BRAKE PRESS illuminates on the Pilot's Annun. Panel when either LOW PRESS light illuminates.

**C27. BRAKE PRESS INDICATOR**

1. Norm Sys B Accumulator Pressure Needle
2. Alt Sys C Accumulator Pressure Needle

- Displays hydraulic pressure in the brake accumulators.
- Left needle (B) indicates pressure in the NORM SYS B accumulator. Right needle (C) indicates pressure in the ALT SYS C accumulator.
- Normal pressure is 3,000 PSI. When pressure is too low to assure adequate brakes the respective BRAKE ACCUM LOW PRESS light on the S/O's panel and the LOW BRAKE PRESS light on the Pilot's Annun. Panel illuminate.

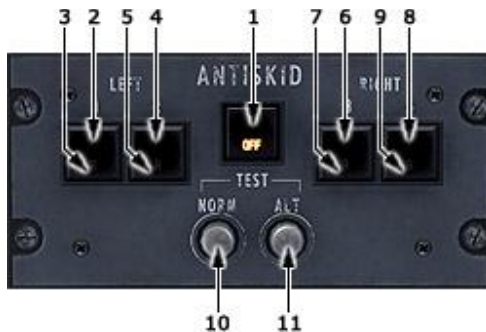
**C28. BRAKE SYS SELECT SWITCH****1. Brake Sys Select Switch**

Provides means of selecting hydraulic supply and anti-skid system to be used.

NORM SYS B - Selects B hydraulic system to brakes.  
 - Selects NORM anti-skid system. -With only B accumulator available approx. four brake applications may be made.

ALT SYS C - Selects C hydraulic system to brakes.

- Selects ALT anti-skid system.
- With only the C accumulator available approx. ten brake applications may be made.
- Switch must be in NORM SYS B to test either NORM or ALT anti-skid system.
- When PARK BRAKE knob is pulled, or if electrical power is lost, brakes will automatically switch to system B regardless of switch position.

**ANTI-SKID****003. ANTI-SKID PANEL**

1. Anti-Skid Switch  
 2-9. Anti-Skid Lights (amber)  
 10,11. Test Norm & ALT Buttons

**1. Anti-Skid Switch**

Provides control of anti-skid system.

LCH - Normal position from before takeoff until after landing. System is armed.

UNL - Normal position for ground operations. System is off.

ON (GREEN) - active.

OFF (AMBER) - Illuminates when system is disarmed or shutdown by:

- Unlatching ANTI-SKID switch.
- Setting PARK BRAKE.
- System failure.

- Both lights extinguish when gear lever is in UP or NEUTRAL
- ANTISKID illuminates on the Pilot's Annun. Panel when OFF illuminates.

**2-9. Anti-Skid Lights (amber)**

- Individual lights illuminate to indicate the antiskid system has released brakes on the affected wheel to prevent a skid. May also illuminate to indicate system failure.
- All lights should illuminate during NORM or ALT TEST to verify anti-skid protection is available to each wheel.

**10,11. Test Norm & ALT Buttons**

- Provides means of testing the anti-skid system for both normal and alternate brakes.
- All (8) amber anti-skid lights and the green ON light should illuminate when either NORM or ALT button is pressed, provided:
  - Landing Gear Lever is DOWN.
  - BRAKE SYS SELECT is in NORM SYS B.
  - ANTI-SKID switch is latched.
  - PARK BRAKE is released

## **NOSEWHEEL STEERING**



### **1. Nosewheel Steering Wheel**

- Provides steering control of nosewheel while on the ground.
- Overrides rudder pedal steering.
- System is deactivated when:
  - Nose gear is centered by a centering cam at liftoff.
  - NOSE AND BYPASS mechanical release handle is pulled.
  - Landing gear lever is in UP or NEUTRAL.
  - 'C' system hydraulic pressure is lost.

## DELCO CAROUSEL IV-A INS

### GENERAL DESCRIPTION

The Delco Carousel INS computes horizontal navigation data all the time during flight. Signals from the INS can be used to steer the airplane automatically between selected waypoints.

The INS calculated position can be updated by crew:

- Manually flying over along track radio equipment which position is available on the navigation charts.
- Automatic alignment and calibration of the INS is required before the flight, it can be made only when the aircraft is parked.

INS consists of two components as listed below:

- Control Display Unit (CDU) located on pedestal.
- Mode Selector Unit (MSU) located on overhead.

Only Single Unit with 2 CDUs is installed.

Crew can fulfill the tasks like:

- Any moment of flight save and update coordinates of up to 9 waypoints.
- Display horizontal navigation data:
  - True Heading (HDG) and drift angle (DA);
  - Track angle (TK) and ground speed (GS);
  - Track angle error (TKE) and cross track distance (XTK);
  - Waypoint (WAYPT);
  - Present position (POS);
  - Distance (DIS), flying time (TIME) to next waypoint, between any two waypoints or from present position to any waypoint;
  - Desired track (DSRTK) and system status (STS);
  - Wind velocity and wind direction (WIND);
  - Display program identification;
  - Nose and stern wind components and velocity;
- Make a manual position updates to minimize drift errors.

### 002. MODE SELECTOR UNIT



1. MODE SELECTOR Knob
2. READY NAV Light (GREEN)
3. BAT Light (RED)

#### 1. MODE SELECTOR Knob

The Mode Selector is a five position rotary switch that controls INS operating modes. The Knob must be pulled for rotation to overtake mechanical stops between STBY and ALIGN and NAV to ATT positions.

OFF - turns the power of INS off.

STBY - turns the power of INS on and starts STBY mode operations. Initiates fast INS warm up and turns on the NU and CDU hence allows data insertion into the INS.

ALIGN - starts automatic INS alignment after the fast warm up is done. During alignment a battery test will be performed when API 8 is reached and it is indicated by the CDU BAT light illumination.

Note: You can use "Fast Alignment" key combination to minimize alignment time after all "setup" phases have been completed. Press HOLD, REMOTE (lights should illuminate) and set Waypoint selector to 9 - HOLD and REMOTE lights will extinguish, it means fast alignment has started.

NAV - Selects navigation mode and MI (Mode Index) 4 if Accuracy Performance Index (API) equals to at least 5 and Ready Nav Light on MSU is on. From API=5 the alignment will continue to API=0 and better



**6. ALERT Light**

Illuminates (amber) for two minutes before airplane reaches TO waypoint. Flashes when AUTO-MAN switch is positioned in MAN, the TO waypoint has been reached and passed.

This is the alert for pilots that switching leg must be manually carried out. If AUTO/MAN selector is in AUTO the light will extinguish when leg switching occurs.

**7. BAT Light**

Illuminates (amber) during alignment at API=8 for about 15 seconds indicating the battery test is in progress. Also illuminates when INS is operating on battery power.

**8. WARN Light**

Illuminates (red) when INS detects an abnormal condition or flashing occasionally when route operation is in progress.

**9. Waypoint Switch**

Selects waypoint number to be loaded or displayed.

**10. FROM-TO Display**

Two digit display where the pilot can insert and read waypoints and DME ID numbers:

1. Two non-flashing numbers are the waypoints defining the current navigation leg.
2. Non-flashing number in the FROM side of the display with Data Selector in WAYPT position shows waypoint ID displayed on data displays.
3. Flashing number in the FROM side of the display with Data Selector in WAYPT position shows that selected waypoint is in the leg currently shown.

**11. DATA Selector**

Selects what data is to be displayed on the Left and Right data displays.

Mode	Left Display	Right Display
TK/GS	Present track angle from 0° to 359,9° to the nearest tenth of degree with respect to the true north. When HOLD switch is pushed and illuminated the along track acceleration (ATA) sign (N for negative, blank for positive) will be shown in the left display and the ATA value in the right display.	Ground speed
HDG/DA	Airplane heading angle from 0° to 359.9° to the nearest tenth of degree with respect to the true north.	Drift angle from 0° to 180° left or right of the plane. Heading to the nearest degree. Drift angle is 0° if GS is <80kts.
XTK/TKE	Cross track distance from 0 to 999.9 NMs right (R) or left (L) of the track to the nearest tenth of NM.	Track angle error from 0° to 180° left (L) or right (R) of the desired track angle to the nearest degree.
POS	North (N) or South (S) latitude.	East (E) or West (W) longitude.
	In degrees and minutes of displayed present position to the nearest tenth of minute.  If the HOLD switch is pushed and illuminated the displays are frozen. POS is used to insert ramp and position updating coordinates.	

**DO NOT USE FOR FLIGHT**

WYPT	North (N) or South (S) latitude.	East (E) or West (W) longitude.
	In degrees and minutes of waypoint selected by the waypoint/DME selector to the nearest tenth of minute. Waypoint 0 (before a manual track leg change has been made) indicates the ramp position. When the INS is on the left and right displays digits show all zeros for waypoint position. In DME updating mode for DME position will show the last position loaded. Inertial position is indicated if HOLD switch is pushed and illuminated.	
DIS/TIME	Distance from present position to the displayed TO waypoint, to any DME or between any two waypoints, from zero to 999.9 NM.	Time from present position to the displayed TO waypoint, or between any two waypoints, from zero to 999.9 minutes to the nearest tenth of min. Displayed time is based on present ground speed.
WIND	Wind direction from 0° to 359°	
DSRTK/STS	Desired track angle from 0° to 359° to the nearest degree with respect to true north. If HOLD switch is pushed and lit the program ID Number is displayed.	System status: operation mode (0 for Non-NAV, 1 for NAV mode), system Mode Index(MI), accuracy required performance index, actual performance index (API).

**13. WY PT CHG**

When pushed and illuminated allows to select numbers on FROM-TO display using the CDU keyboard. Key light extinguishes if CLEAR or INSERT is pushed. INSERT key illuminates when WYPT CHG is pushed and illuminated, and goes out when CLEAR or INSERT key is pushed.

**14. AUTO/MAN Switch**

Selects automatic leg switching by INS (AUTO) or manual leg switching by the pilot (MAN).

**15-24. Keyboard**

10 keys to load data into data displays and FROM-TO display.

**25. CLEAR Key**

Used to cancel or clear data loading operation prior INSERT switch pushing.

**26. Hidden (Virtual) Key – Keyboard Hook Mode ON/OFF**

Used to switch on keyboard shortcuts:

Ctrl+Shift+K: Keyboard Mode On/Off (or press left upper screw)

Data Selector: [ ]

Waypoint Selector: - + on Numpad

Digits: Numpad numbers

Clear: BackSpace **or** Del on Numpad

Insert: Ctrl+**I** or Numpad Enter

**HOLD:** Ctrl+**H**

**REMOTE:** Ctrl+**R**

**WYPT CHG:** Ctrl+**W**



**27. Hidden (Virtual) Key – Pages List ON/OFF**

When ON you will see page (pages if there are more than 9 waypoints) in your flightplan.



- CURRENT – this page is loaded to CIVA
- Yellow highlights – current FROM and TO points
- First digit column – number in the CIVA memory
- Second digit column (in parenthesis) – number of points in flightplan
- Name of the points (or WpXXX if custom loaded)
- Course to waypoint
- Distance between waypoints
- Total distance

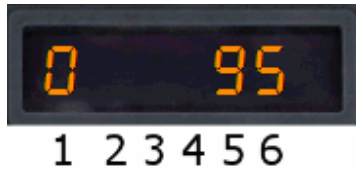
**28. Hidden (virtual) key – Auto-Switch Route Pages on/off**

- There is no click zone if route is less or equal 9 waypoints.
- Lower right screw is amber if route is more than 1 page (more than 9 waypoints) and the lower right screw has not been pressed yet. It indicates that you should decide which mode you will use for navigation. By default "auto-switch route pages" will be on.

If "auto-switch route pages" is on (lower right screw green or amber), next 9 waypoints will be loaded automatically when you reach leg 9-1 at the current page. Please see NAVIGATION chapter for details.

**DISPLAYED STATUS**

When CDU Data Selector Knob is in the DSRTK/STS position INS unit status is displayed on the CDU Right Data Display. The display has six digits.



1. NAV Mode Indicator (always visible)
- 2,3. Action/Malfunction Codes (not always visible)
4. Always Blank
5. PI/AI (always visible)
6. "Desired PI" or "Requested PI" (always visible)

**1. NAV Mode Indicator (always visible)**

Two values of this digit are possible:

**0** – the unit is NOT in NAV Mode at the moment.

**1** – the unit is in NAV mode

If NAV Mode indicator shows 0 – the unit is in ALIGN or STDB status.

**5. PI/AI (always visible)**

During the alignment this digit is called Performance Index (PI), it represents the current INS computer alignment submode. It is a single digit number starting from 9 decreasing toward 0 as alignment phase progresses. At PI=5 or lower NAV Mode is allowed.

The fifth digit in NAV Mode becomes the Accuracy Index (AI). It provides indication of the position error the unit should have accumulated for present moment. It is not a precise value where, for instance, the value 7 corresponds to 0.9 NM of error.

**6. "Desired PI" or "Requested PI" (always visible)**

5 during alignment, 4 in NAV Mode.

**NORMAL PROCEDURES****INS ALIGNMENT**

- MSU Mode Selector - STBY
- CDU DIM Selector - SET as required
- CDU Data Selector - DSRTK/STS

Check if the status mode (the first digit on RH display) shows 0 (is not in NAV mode) and Accuracy Performance Index (API on the fifth digit on RH display) is 9 and the desired Mode Index (MI on the sixth digit on RH display) is 5.

- HOLD Switch – Push (Light On)

Push HOLD key and check on the LH display, the program ID "11 25".

- HOLD Switch – Push (Light Off)

- CDU Data Selector - POS

Insert the Latitude and Longitude ramp coordinates into all INS: first the sign (N or S for the LATITUDE and W or E for LONGITUDE), then the angle values, push INSERT switch after each entry (LAT/LON) is complete.

- MSU Mode Selector - ALIGN

- CDU Data Selector - DSRTK/STS

The alignment takes place. Should be recognized by the API value decreasing. At API=8 check if the amber BAT light comes on for about 15 seconds indicating the battery test is in progress. When API=5 is reached check if READY NAV light is illuminated on the MSU. If not ready to taxi the alignment may be continued to reach better refinement and accuracy. The best one is gained when API=0.

**WAYPOINTS LOADING AND DISTANCE CHECK ON GROUND**

The easiest way to setup waypoints is to use the existing Flight Simulator flightplan. Select it from Flight SimulatorMenu: Flights -> Flight Planner -> Load. First 9 waypoints of selected flightplan will appear under appropriate Waypoint selector number.

Or

set it manually:

- CDU Data Selector - WAY PT

Insert up to 9 waypoints using the INS CDU keyboard selecting waypoint numbers from 1 to 9 by the Waypoint/DME selector. It is recommended during the first insertion on ground to reinsert the ramp position as waypoint 1 to verify that the distance from present position (waypoint 0) and waypoint 1 is 0.

- CDU Data Selector - DIS/TIME
- WYPT CHG Switch – Push (Light On)

Check if the INSERT key illuminates and FROM-TO indicator displays the figures 0-1. If the ramp position has been reinserted as waypoint 1, check the distance from ramp position and the waypoint 1 which must be 0. Otherwise the distance shown must be consistent with the flight plan's waypoint 0-1 distance. Push the '2' key, check if FROM-TO display shows "21" and check if the related distance corresponds to the flight plan.

Repeat this procedure for all loaded waypoints. Check all INS leg distances match those reported by the flight plan. It is a good method to make sure waypoints definition phase has been performed without errors.

- CLEAR Key - Push

Check the WPT CHG and INSERT lights go out.

**Map:** you will see all waypoints on the map in realtime.

**Save route:** all waypoints with all your changes will be saved together with saved \*.flt file.

**BEFORE TAKEOFF**

When ready to start the engines and taxi:

MSU Mode Selector - NAV

---

**DO NOT USE FOR FLIGHT**

Check the READY NAV light turns off and the status mode changes from 0 to 1 (NAV mode) and the mode index from 5 to 4. Set the CDU data selectors in the desired positions.

#### **AFTER TAKEOFF**

- Autopilot -- ON
- Autopilot -- HDG mode
- NAV Source Selector -- FMS

From this moment the INS will send navigation commands to the Autopilot.

#### **NAVIGATION**

Basically, during navigation, you need to program it (in case of need) to navigate to the destination waypoint. This unit is able to memorize up to 9 waypoints only. If the flight requires more than 9 waypoints (remember the INS wraps back to waypoint 1 after the 9th is reached, so from leg 89 it jumps to 91) then you will need to load new ones during flight.

- If you load flightplan using Flight Simulator Flight Planner and it has more than 9 waypoints, you can see all flightplan page by page using hidden right upper screw button on the CDU.

- You can use "auto-switch route pages" feature if you want. In this case you do not need to load new waypoints during flight, they will be loaded in the following sequence: when you reach leg 9-1, leg #9 will from previous page, #1 - from current page and THEN leg will be switched to 1-2, #9 becomes 9 from current page. To use this feature activate right lower screw (should be green during flight).

### **LEG CHANGE**

It is possible to command a track leg change from present position (waypoint 0) to any waypoint or from any waypoint to any other waypoint:

- WAYPT CHG Switch – Push (Light On)
- Data keyboards - Push desired keys
- INSERT Switch – Push (Light Out)
- AUTO/MAN Selector - AUTO

Monitor the flight instruments to make sure that the track change has been executed correctly.

### **CURRENT POSITION CHECK**

You can check the INS inertial (without updating) and displayed (with updating) positions while over flying a FIX which position is known.

- NAV Source Selector - NAV
- CDU Data Selector - POS

Using the autopilot HDG selector and referring to the related RMI drive the plane to precisely overfly the FIX.

When over the FIX:

- All HOLD Switches/Lights - Push (Light On)

The displays will be frozen allowing the comparison between the Displayed position and the Fix position.

- CDU Data Selector - WAY PT

On WPT position you can compare the Inertial positions to evaluate the difference.

After the position check:

- HOLD Switch – Push (Light Out)
- WPT CHG Switch – Push (Light On)

On all INS keyboards Push 0 (present position) X (next waypoint)

- INSERT Switch – Push (Light Out)
- NAV Source Selector - FMS

### **MANUAL POSITION UPDATING**

Any time during NAV mode overflying a Fix which position is published in the navigation charts the pilot is able to manually update the INS position.

- NAV Source Selector – NAV
- CDU Data Selector - POS

When over flying the FIX

- HOLD Switch – Push (Light On)

The CDU displays will be frozen showing the Displayed positions.

- Fix Coordinates - Insert

Insert the Latitude and Longitude coordinates as described in the present position insertion for ground alignment.

- HOLD Switches/Lights - Push (Light Out)

Verify that position data are unfrozen and monitor flight instruments.

- WPT CHG Switch - Push (Light On)

CDU keyboard - Push 0-X (0 stands for present position, X for the next waypoint)

- INSERT Switch - Push (Light Out)
- NAV Source Selector - FMS

Maximum drift error is ~0.8-0.9 nm, it will be accumulated in 60-120 min and will depend on bank; the more turns – the faster drift errors will be accumulated.

Zero Drift Error Feature:

- data Selector - DSRTK/STS
  - press REMOTE
  - when REMOTE illuminates you will see increasing digits on the left display
  - press key 3
  - REMOTE will extinguish
  - if you press REMOTE again - you will see 0
- Drift error is erased and will not increase in the current flight.

### **SIMPLIFICATIONS**

- One unit (no dual/triple modes).
- No ACTION/MALFUNCTION codes.
- No DME alignment.
- No brightness adjustment.

### **FREWARE DELCO CAROUSEL IV-A INS**

You can use freeware [Delco Carousel IV-A INS](#) software to work with 1011 Captain (2D only).

1. Install CIV-A INS - [the file](#).
2. To add CIV-A 2D panel to the L-1011:
  - Backup (rename) original panel.cfg file in ...\\SimObjects\\Airplanes\\CS\_L-1011\\panel\\ folder.
  - Rename CIVA\_panel.cfg file to panel.cfg file.

If you decide to uninstall CIVA INS you should restore original panel.cfg file.

You can use more than one INS Unit.

Please read <http://www.simufly.com/ins> and CIVA INS manual on how to integrate the second unit.

For details on CIVA INS ops see its manual and [video tutorial](#).

We do not support any issues with the third-party software.

## NAVIGATION

### HEADING REFERENCE SYSTEM

#### L18, R18. VHF NAV RADIO PANEL



1. Tune Light
2. Frequency Display Window
3. Auto-Manual Switch
- 4,5. Freq. Selector Knobs
6. DME Selector Switch

#### 4,5. Freq. Selector Knobs

Concentric knobs. The outer knob selects digits to the left of the decimal point. The inner knob selects digits to the right of the decimal point.

When an ILS frequency is selected the corresponding GS frequency is also selected.

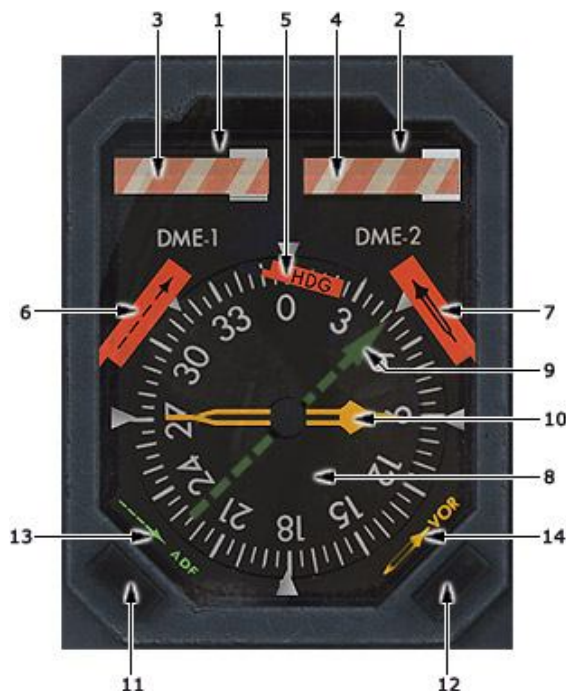
#### 5. DME Selector Switch

STBY – receiver operating but bu not transmitting. Four dashes at RDDMI indicates no computed data.

NORM – usable to 200 nm.

OVRD – usable to 400 nm.

TEST – DME fail flag, followed by four dashes, followed by four zeroes in RDDMI window indicates satisfactory test.

**L05-R05. RDDMI**

1. DME-1 Distance Indicator Window
2. DME-2 Distance Indicator Window
3. DME-1 DME Fail Flag
4. DME-2 DME Fail Flag
5. Heading Fail Flag (orange)
6. VOR-1/ADF-1 Fail Flag
7. VOR-2/ADF-2 Fail Flag
8. Compass Card
9. VOR-1/ADF-1 Pointer
10. VOR-2/ADF-2 Pointer
11. VOR-1/ADF-1 RDDMI Selector Switch
12. VOR-2/ADF-2 RDDMI Selector Switch
13. ADF1 Selector Flag
14. ADF2 Selector Flag

**1,2. Distance Indicator Windows**

Indicates slant range distance to selected VORTAC stations.

**3,4. DME Fail Flag**

Four white dashes over distance display indicate no computed data. Orange and white barber pole indicates DME receiver failure.

**5. Heading Fail Flag (orange)**

Indicates compass card or complete signal failure.

**6,7. VOR/ADF Fail Flags**

Respective VOR or ADF signal input has failed.

**8. Compass Card**

Rotates to indicate aircraft heading against heading index and relative bearing to selected VOR or ADF stations against VOR and ADF pointers. Capt's compass card is operated by compass No. 2. F/O's compass card is operated by compass No. 1.

**11,12. RDDMI Selector Switch**

Alternate action pushbutton switches. Push to select either ADF or VOR. The selection is shown above the switch in the shape of the respective VOR or ADF pointer.



### **O30. MAGNETIC STANDBY COMPASS**



#### **1. Compass Card**

### **O01,O27. COMPASS CONTROL PANEL**



- 1. Heading Set Control
- 2. Alignment Sync Indicator
- 3. MAG/DG Switch

#### **1. Heading Set Control**

Five position rotary switch used to slew the compass cards.

First index left or right is for slow alignment. Full over left or right is for faster alignment of sync indicator.

#### **2. Alignment Sync Indicator**

Indicates sync condition of gyro and flux valve when operating in the MAG mode.

#### **3. MAG/DG Switch**

IN - MAG is illuminated to indicate that all heading system information is magnetic heading data.

OUT - DG is illuminated to indicate that all heading system information is true heading data and is operating as a gyro compass with no magnetic corrections.

**P10. ADF PANEL**

1. Beat Frequency Oscillator (BFO) and Test Switch
2. Frequency Window
3. Frequency Selector Inner Knob
4. Frequency Selector Middle Knob
5. Frequency Selector Outer Knob
6. Antenna Selector Switch

**1. Beat Frequency Oscillator (BFO) and OFF Switch**

BFO – when BFO is selected a tone is heard while signal is being received.

**2. Frequency Window**

Displays the selected frequency.

**3-5. Frequency Selector**

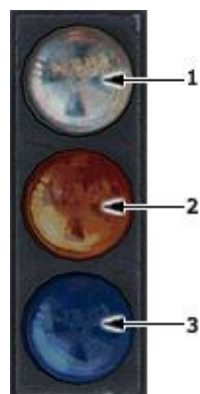
Three concentric knobs. Large knob controls 100's, middle knob controls 10's and small knob controls units and 1/10 ths.

**6. Antenna Selector Switch**

Two position toggle switch

ADF – Selects both loop and sense antennas. RDDMI pointers will indicate the bearing to a selected station.

ANT – Selects only the sense antenna for range reception. RDDMI pointer will rest in the 3 o'clock position while ANT is selected.

**L15-R15. MARKER BEACON LIGHTS**

1. Airways Light
2. Middle Light
3. Outer Light

AIRWAYS, MIDDLE, OR OUTER lights flash when aircraft is over respective marker beacon transmitter and essential master radio switch is on. Flashing light is accompanied by an identification tone. Lights are pushed to self-test the bulbs. Marker beacon HI or LO sensitivity switch is located on the SELCAL panel. A marker beacon switch is located on each audio select panel.

## R20. STATIC AIR TEMPERATURE INDICATOR



1. Fail Indication
2. Static Air Temperature Indicator

Static air temp – computed by ADC#2. Range -99C to 50C.

### 1. Fail Indication

Orange warning off flag covers indicator with power or signal loss.

## R21. TRUE AIRSPEED INDICATOR



1. Fail Indication
2. True Airspeed Indicator

True airspeed – computed by ADC#2. Range 150 to 650 knots.

### 1. Fail Indication

Orange warning off flag covers indicator with power or signal loss.

**L02- R02. CLOCK**

1. Minute Hand
2. Sweep Second Hand
3. Hours Hand
4. Set Knob
5. 12 Minute Sweep Bug
6. Sweep Time Control Pushbutton

**1. Minute Hand**

One revolution equals one hour.

**2. Sweep Second Hand**

One revolution equals one minute.

**4. Set Knob**

To set hour and minute hands, use left mouse button and drag.

**5. 12 Minute Sweep Bug**

Functions the same as the sweep second hand except that readout is in minutes. One revolution equals 12 minutes.

**6. Sweep Time Control Pushbutton**

Pressing the momentary alternate action pushbutton starts the sweep second hand and 12 minute sweep bug. Pressing the button a second time resets the hand and but to zero (12 o'clock) position

**L17, R17. MASTER FIRE WARNING LIGHT/ PILOT'S REMOTE SWEEP TIME CONTROL PUSHBUTTON****2. Pilots' Remote Sweep Time Control Pushbutton**

Operates the same as the sweep time pushbutton control on the pilots' clocks. Captain's pushbutton will not operate First Officer's clock and vice versa

**P05. ATC TRANSPONDER PANEL**

1. Transponder Selector Switch
2. Code Indicator Window
3. Mode Selector Switch
4. Altitude Source Switch
9. Reply Light (Blue)
10. Fault Light (Amber)
11. Altitude Reporting Switch

**1. Transponder Selector Switch**

Five position rotary switch that selects the No. 1 or No. 2 transponders and their functions.

NO. 1 LO SENSE/NORM - Select No. 1 transponder with NORM function for reception of interrogation and transmission of reply.

STBY - Both transponders are turned on in the warmup mode, but are not operating.

The NO. 2 LO SENSE and NORM positions operate the same as for the NO. 1 system except that the NO. 2 transponder is selected and operating.

**2. Code Indicator Window**

Displays code set by code selector.

**5,6. Code Selector**

Rotary knobs used to set transponder codes which appear in code indicator window.

**8. TEST Pushbutton**

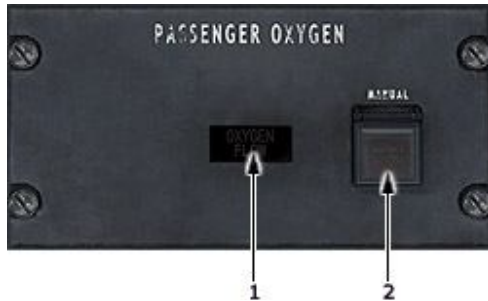
Momentary pushbutton switch concentric within right code selector. Pressing switch causes REPLY light to illuminate.

**9. Reply Light (Blue)**

Flashes when test button is pressed.

## OXYGEN SYSTEM

### U15. PASSENGER OXYGEN PANEL



1. Oxygen Flow Light
2. Manual Switch

#### 1. Oxygen Flow Light

Illuminates when the oxygen sequence timer has been actuated either automatically or manually to signal the masks to deploy and activate the oxygen generators.

#### 2. Manual Switch

Provides manual control to deploy passenger oxygen masks.

UNL- Normal position. MASKS DPLYD is extinguished.

- Masks and oxygen generators are armed to operate automatically if cabin altitude exceeds 13,000 feet.
- LCH - Sequence timer is actuated to deploy masks and activate oxygen generators. MASKS DPLYD illuminates to indicate switch position.

NOTE: The FASTEN SEAT BELT and NO SMOKING signs in the cabin illuminate when oxygen masks are signaled to deploy manually or automatically.

## PNEUMATICS SYSTEM

### U06. ENGINE BLEED PANEL/AIR CONDITIONING PANEL



- 4-6. High Pressure Valve Switch  
 7-9. Engine Isolation Valve Switch  
 13-15. Duct Pressure Indicator  
 16-18. Fuselage Isolation Valve and Crossbleed Valve Switches

#### 4-6. High Pressure Valve Switch

UNLATCHED - Valve is electrically energized to close and OFF illuminates.

LATCHED - Normal position except for engine start. The high pressure valve is armed to open when low pressure air is inadequate. The valve is signaled either full open or full closed and will remain closed whenever the engine isolation valve is closed.

FLOWBAR - Indicates that the valve is open. The high pressure valve closes automatically when:

- The engine isolation valve is closed
- Low pressure air is adequate

#### 7-9. Engine Isolation Valve Switch

UNLATCHED - Valve is electrically energized to close and OFF illuminates.

LATCHED - Normal position. Each valve serves as a shutoff to prevent reverse flow of air to the engine and modulates to maintain desired duct pressure in its respective channel of the pneumatic (engine 1 or 3) If the fire handle is pulled for the respective engine. During engine start or with the Air/Ground Reverser Switch activated, the valve is energized to allow reverse flow of air from the pneumatic system to the engine.

FLOWBAR - Indicates valve is open. The engine isolation valve closes automatically to prevent reverse flow of air (except as indicated above) under the following conditions:

- BLEED DUCT OVPRESS
- If the fire handle is pulled for the respective engine.

#### 13-15. Duct Pressure Indicator

Displays the pneumatic pressure in the respective channel downstream of the duct overpressure shutoff valve.

---

**DO NOT USE FOR FLIGHT**

**16-18. Fuselage Isolation Valve and Crossbleed Valve Switches**

UNLATCHED - Electrical power is removed to close the respective valve and OFF illuminates.

- With the fuselage isolation valve closed, the number two engine, APU, and B2 ATM are isolated from the crossbleed manifold.
- With a crossbleed valve closed, the associated wing engine, wing anti-ice system, and pack are isolated from the crossbleed manifold.
- These valves are not normally closed except to isolate portions of the pneumatic system for abnormal conditions or for troubleshooting.

LATCHED - Normal position. Valves are electrically energized to open if pneumatic pressure is available.

FLOWBAR - Indicates valve is open.

NOTE: In the event of a loss of all generators, both crossbleed valves will remain operable.



## PROTECTIVE SYSTEMS

### BLEED DUCT OVERPRESSURE LIGHT

U14. S/O ANNUNCIATORS PANEL



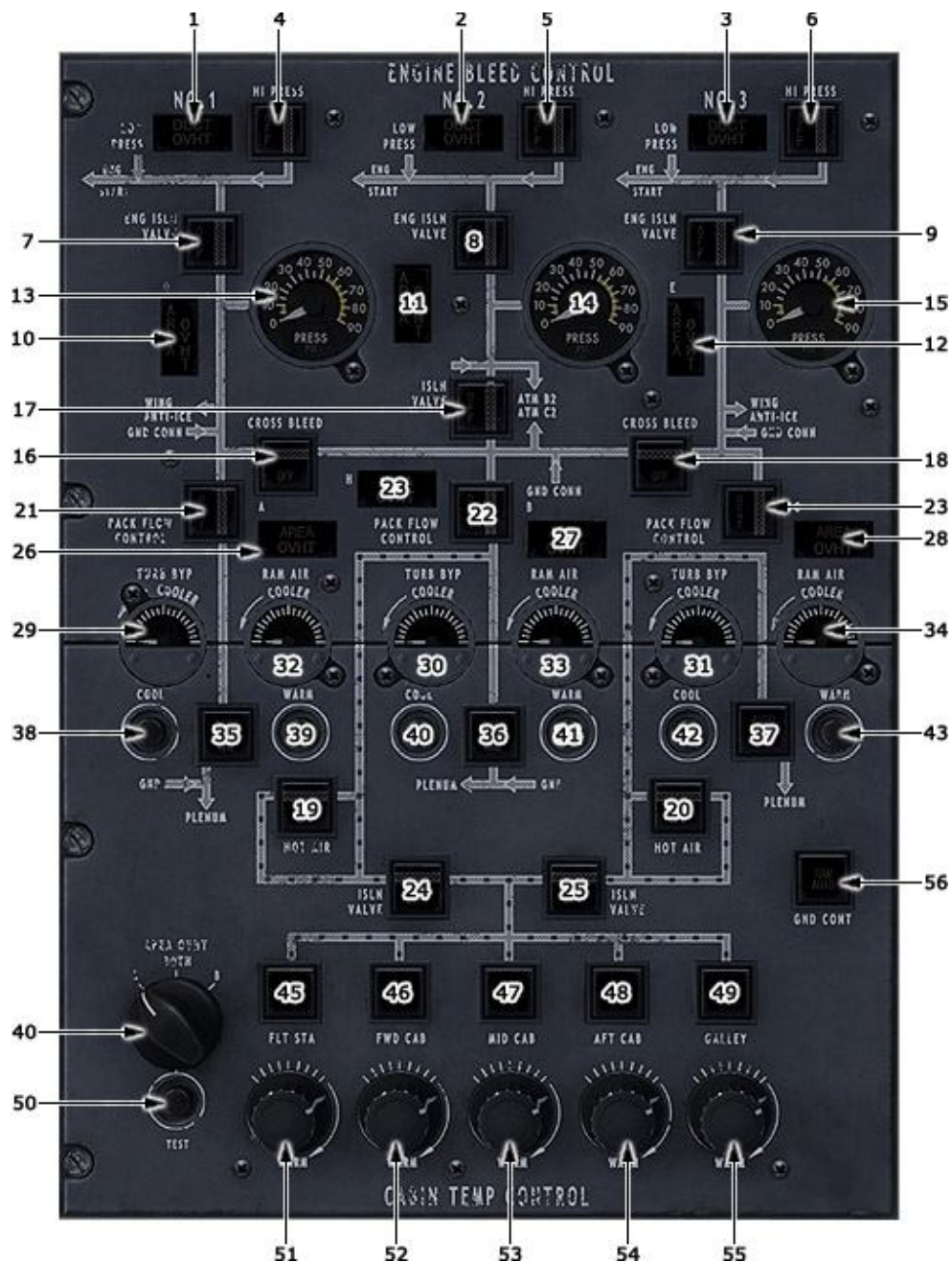
23. Bleed Duct Overpressure Light

#### 23. Bleed Duct Overpressure Light

Downstream of each engine isolation valve is an overpressure shutoff valve. This valve closes when an overpressure condition exists. Closure of any overpressure valve signals the respective engine isolation valve to lock closed, and illuminates the BLEED DUCT OVERPRESSURE light on the Second Officers annunciator panel. The overpressure valve re-opens when duct pressure is reduced. To reset the system and the BLEED DUCT OVERPRESSURE light, the engine ISOLATION VALVE switch must be unlatched.

Downstream of each overpressure valve is an overboard pressure relief valve. Should both the engine isolation valve and overpressure valve fail to limit duct pressure, the overboard pressure relief valve will dump the excessive pressure overboard to protect the system. White blowout discs are installed on the overboard line to indicate that an overboard pressure relief valve has actuated.

DO NOT USE FOR FLIGHT

**U06. AREA OVERHEAT**

- 10. Area D AREA OVERHEAT Light
- 11. Area J AREA OVERHEAT Light
- 12. Area E AREA OVERHEAT Light
- 23. Area H AREA OVERHEAT Light
- 26-28. Areas A,B and C AREA OVERHEAT Lights
- 50. Test Button
- 58. Area Overheat Loop Selector

#### 10. Area D AREA OVERHEAT Light

This loop monitors the temperature surrounding the duct leading from the number one engine isolation valve to the left crossbleed valve and the number one pack flow control valve.

#### 11. Area J AREA OVERHEAT Light

This loop monitors the temperature surrounding the duct leading from the number two engine isolation valve to the fuselage isolation valve.

#### 12. Area E AREA OVERHEAT Light

This loop monitors the temperature surrounding the duct leading from the number three engine isolation valve to the right crossbleed valve and the number three pack flow control valve.

#### 23. Area H AREA OVERHEAT Light

This loop monitors the temperature surrounding the crossbleed duct between the crossbleed valves and from the fuselage isolation valve to the number two pack flow control valve.

#### 26-28. Areas A,B and C AREA OVERHEAT Lights

These loops monitor temperature surrounding the ducts downstream of the pack flow control valves (see Air Conditioning/Pressurization).

#### 50. Test Button

TEST - Tests the circuitry of the selected loop. When pressed, the following lights illuminate:

- Seven AREA OVHT lights
- Two DUCT FAIL lights
- AREA DUCT OVERHEAT light.

NOTE: If pressed while selector is in BOTH, both loops are tested, and either loop is capable of giving an indication of a good test. Therefore the test is invalid if performed with the selector in the BOTH position.

#### 58. Area Overheat Loop Selector

BOTH - Normal position. Either A or B loop detecting an overheat condition will illuminate respective AREA OVHT light.

A - Only loop A provides overheat detection and indication.

B - Only loop B provides overheat detection and indication.

#### AREA DUCT OVERHEAT LIGHT

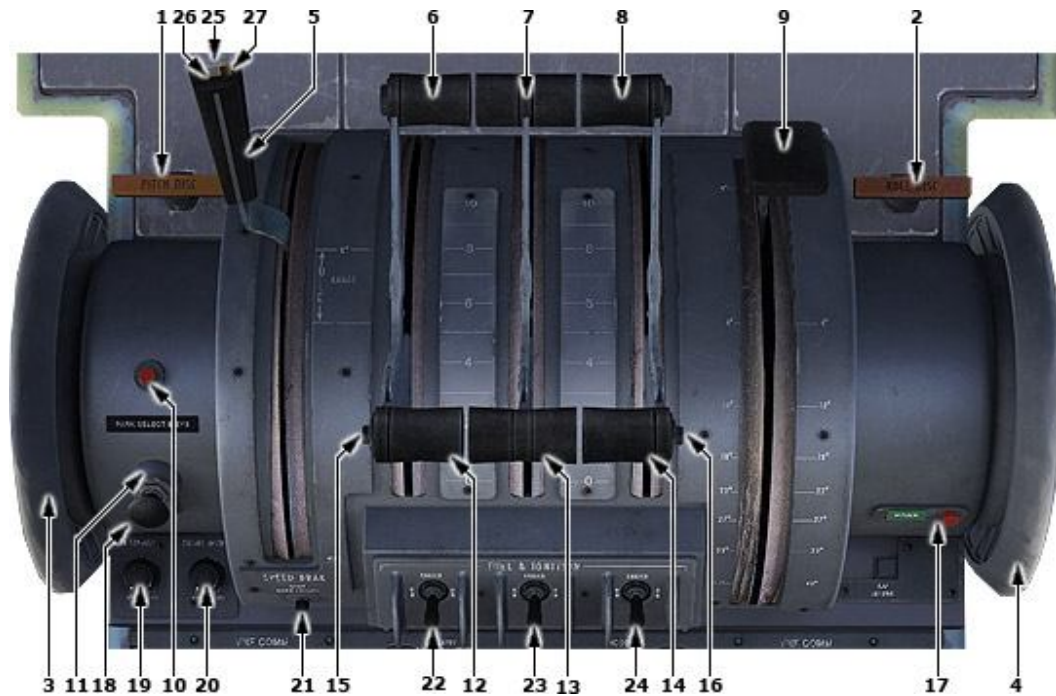
C03. PILOTS ANNUNCIATOR PANEL



24. Area DUCT OVERHEAT Light

## POWERPLANT

### P03. CONTROL STAND



6-8. Thrust Reverser Levers

12-14. Throttle Levers

15,16. Automatic Throttle Disconnect Switches

#### 6-8. Thrust Reverser Levers

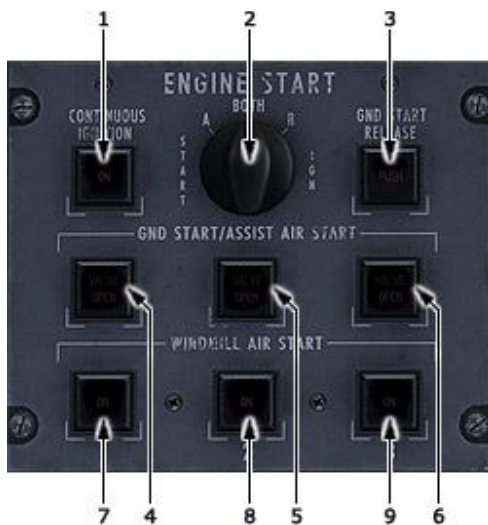
Selects and regulates reverse thrust. Interlock prevents engine acceleration until reversers are extended.

#### 12-14. Throttle Levers

Regulate engine forward thrust.

#### 15-16. Automatic Throttle Disconnect Switches

Momentary pushbutton switches on throttle levers one and three. Pushing either switch disconnects the autothrottle system.

**015. ENGINE START CONTROL PANEL**

1. Continuous Ignition Switch
2. Ignition System Selection Switch
3. Ground Start Release Switch
- 4-6. Ground Start/Assist Air Start Switch
- 7-9. Windmill Air Start Switch

**1. Continuous Ignition Switch**

IN - ON is illuminated and both low energy ignition systems are energized when the Fuel and Ignition switches are turned ON.

OUT - Deenergizes both low energy ignition systems. ON is extinguished.

**2. Ignition System Selection Switch**

Three-position rotary switch that selects ignition system A, B, or BOTH systems for GND START/ASSIST AIR START SWS.

**3. Ground Start Release Switch**

Pressing momentary pushbutton switch deenergizes the start system. Also is illuminated while the GND START/ASSIST AIR START switch is in. PUSH is extinguished and the GND START-ASSIST AIR START switch is released when switch is pushed and held in for approximately two seconds, or when N3 compressor reaches approximately 55% RPM.

**4-6. Ground Start/Assist Air Start Switch**

Pressing switch arms high energy ignition system and arms engine start valve to open with pressure, and switch is electrically held in. VALVE OPEN and PUSH (on GRD START RELEASE switch) are illuminated. At approximately 46% N3, the VALVE OPEN light is extinguished. At approximately 55% N3, the GND START/ASSIST AIR START switch is automatically released, with an audible click, and the GRD START RELEASE PUSH light is extinguished.

**7-9. Windmill Air Start Switch**

IN - ON is illuminated and both high energy ignition systems are energized when the Fuel and Ignition switches are turned on. OUT - Deenergizes both high energy ignition systems and ON is extinguished.

**L19, R19. ENGINE NO.2 FAIL LIGHT**

Engine No.2 Fail Light

Illuminates to indicate No. 2 engine failure while aircraft is on the ground during takeoff. With takeoff flaps set, it is triggered by drop in N2 below approximately 79%.

**ENGINE 2 FAIL ARMED ANNUNCIATOR**

C03. PILOTS ANNUNCIATOR PANEL



11. Engine 2 Fail Armed Annunciator

**11. Engine 2 Fail Armed Annunciator**

When the No. 2 throttle is advanced for takeoff, the green legend is illuminated on the pilots' annunciator panel. The pilots' annunciator panel indicates that the ENG 2 FAIL lights are armed. The aircraft must be on the ground, flaps in the takeoff range, and N2 above 83% RPM.

**FUEL AND IGNITION SWITCH**

P03. CONTROL STAND



22-24. Fuel and Ignition Switch

**22-24. Fuel and Ignition Switch**

Three-position toggle switch.

ON - Completes all ignition circuits to engine and opens high pressure fuel shutoff valves on fuel control.

OFF - Deactivates all ignition circuits to engine, closes high pressure fuel shutoff valves, and opens the respective generator field.

ENRICH - Spring-loaded position that adds fuel for starting.

**C09-C11, C15-C17. TACHOMETERS**



N1 TACHOMETER

1. N1 Pointer
2. N1 Overspeed Pointer
3. N1 Counter
4. Test Button

Indicates % of RPM of the fan (LP) compressor. Secondary thrust setting instrument.

**1. N1 Pointer**

Pointer indicates gross N1 RPM.

**2. N1 Overspeed Pointer**

Indicates and remains at overspeed RPM reached. Reset using the max indicator reset switch.

**3. N1 Counter**

Counter indicates fine N1 RPM.

**4. Test Button**

Pressing momentary pushbutton tests indicator.

Pointer drives to 12 o'clock position to indicate normal operation.



**DO NOT USE FOR FLIGHT****N3 TACHOMETER**

1. N3 Pointer
2. N3 Overspeed Pointer
3. N3 Counter
4. Test Button

Indicates % RPM of HP compressor. The N3 pointer/counter and overspeed pointer operates the same as for N1 tachometer

**C06-C08. EPR INDICATORS**

1. Set Counter
2. EPR Bug
3. EPR Pointer
4. EPR Counter
5. EPR Set Knob

Indicate ratio of integrated exhaust pressure to engine inlet pressure. Indicated value is proportional to thrust output. Primary thrust setting instrument.

**1. Set Counter**

Indicates EPR bug position set with knob.

**2. EPR Bug**

Positioned by EPR set knob.



### 3,4. EPR Pointer/Counter

Pointer indicates gross engine EPR. Counter indicates fine engine EPR.

### 5. EPR Set Knob

Positions EPR bug and numerical value in set counter.

## C12-C14. TURBINE GAS TEMPERATURE INDICATOR



- 1. TGT Pointer
- 2. Over Temperature Pointer
- 3. TGT Counter
- 4. TGT Caution Light (Red)

Indicates temperature of exhaust gas entering turbine inlet.

### 1,3. TGT Pointer/Counter

Pointer indicates gross TGT. Counter indicates fine TGT.

### 2. Over Temperature Pointer

Indicates and remains at overtemp reached, using max indicator reset switch.

### 4. TGT Caution Light (Red)

Indicates TGT is above 750°C.

### C18-C20. FUEL FLOW INDICATOR



1. Fuel Flow Pointer
2. Fuel Flow Counter

Indicates pounds per hour rate of metered fuel delivered to the engine.

### C21-C23. REVERSER INDICATOR LIGHTS



1. Transit Light
2. Reverse Light

TRANSIT and REVERSE are extinguished in forward thrust.

TRANSIT is illuminated any time reversers are not stowed and locked.  
REVERSE is illuminated any time reversers are fully deployed.

**S03. ENGINE STATUS CONTROLS**

- 1-3. Reverser Pressure Indicator Light
- 4-6. N2 Tachometer Pointer
- 7-9. Overspeed Pointer
- 10-12. N2 Tachometer Test Button
- 13-15. Engine Vibration Indicator Pointer
- 16-18. Vibration Monitor Test Button
- 19-21. Engine Vibration Caution Light (Amber)
- 22. Test Button
- 23,24. Vibration Pickup Selector Switches
- 25. Broad Band Vibration Filter Selector

**N2 TACHOMETER (3)**

Indicates % RPM of intermediate pressure compressor.

**1-3. Reverser Pressure Indicator Light**

Indicate HP bleed supply air is available to operate reversers.

**7-9. Overspeed Pointer**

Indicates maximum attained RPM above 106% and remains at this point until reset with MAX IND RESET switch.

**10-12. N2 Tachometer Test Button**

Holding pushbutton switch in tests indicator by driving wide pointer to the 91% position.

**ENGINE VIBRATION INDICATOR**

Indicates a continuous reading of the vibration level as selected by pickup selector and filter selector.

**16-18. Vibration Monitor Test Button**

When pressed, tests indicator by driving pointer to approximately 4 units and illuminating engine vibration caution light.

**19-21. Engine Vibration Caution Light (Amber)**

Light indicates abnormal vibration level. Also the ENG VIB FLTR PRESS illuminates on the Pilot's Annunciator Panel after a two second delay.

**22. Test Button**

Momentary pushbutton. When pressed, tests vibration system and indicators. Pointers move to approximately 4 units and the engine vibration caution light is illuminated.

**23,24. Vibration Pickup Selector Switches**

NOTE: Latching A and B switches simultaneously will cause invalid indications.

LCH - ON illuminates. Normal position is A latched ON, B unlatched.

A - Selects A pickup signal from all engines simultaneously.

B - Selects B pickup signal from all engines simultaneously.

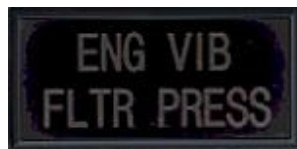
UNL - ON extinguishes. With both ON lights extinguished, both A and B pickups are operating.

**25. Broad Band Vibration Filter Selector**

Four position rotary switch that selects frequency be read

**ENG VIB FLTR PRESS LIGHT**

C03. PILOTS ANNUNCIATOR PANEL



26. ENG VIB FLTR PRESS Light

**S04. ENGINE OIL PANEL**

- 1-3. Oil Quantity Indicator Pointer
- 4-6. Oil Quantity Test Switch
- 7-9. Oil Temperature Indicator Pointer
- 10-12. Oil Temperature Test Switch
- 13-15. Oil Pressure Indicator (3)
- 16-18. Filter Pressure Light
- 19. Indicator Test

OIL QUANTITY INDICATOR

Indicates usable oil remaining in engine oil tank.

**4-6. Oil Quantity Test Switch**

Momentary pushbutton switch that tests oil quantity indicator by driving pointer to 12 o'clock position.

OIL TEMPERATURE INDICATOR

Measures oil temperature after it passes through the pressure pump.

**10-12. Oil Temperature Test Switch**

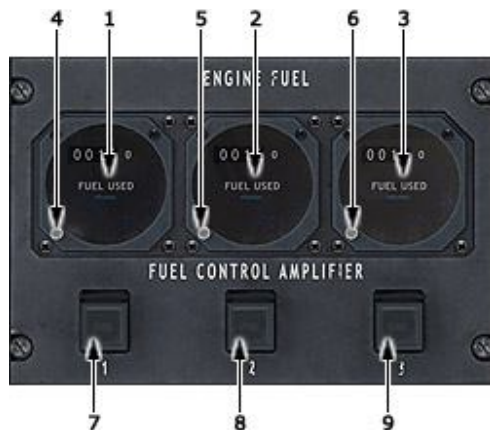
Momentary pushbutton switch that tests (oil temperature) indicator by driving pointer to 12 o'clock position.

OIL PRESSURE INDICATOR

Indicates differential oil pressure between lubricating pump output and scavenge pump input.

**19. Indicator Test**

Pressing momentary pushbutton switch drives oil pressure indicator pointers to 9 o'clock position

**S05. FUEL USED/FUEL CONTROL AMPLIFIER PANEL**

- 1-3. Fuel Used Counters
- 4-6. Test Knob
- 7-9. Fuel Control Override Switches

**1-3. Fuel Used Counters**

Indicate fuel used since last reset.

**4-6. Test Knob**

Spring-loaded rotary knob for use on ground only.

- Turning knob CLOCKWISE checks fuel flow rate and fuel used system circuits, and drives FF indicators to 10,000 Ibs/hr and fuel used indicators at a rate of 10,000 Ibs/hr.
- Turning knob COUNTERCLOCKWISE checks only indicator's operation.

### 7-9. Fuel Control Override Switches

Guarded two position toggle switches.

IN - OVRD is illuminated.

OUT - OVRD is extinguished.

### C02. TAT/MODE/RATE EPR INDICATOR.



- 1. TAT Indicator
- 2. Mode Indicator
- 3. Rated EPR Indicator

#### 1. TAT Indicator

Indicates total air temperature directly from the right temperature probe. TAT indications may be inaccurate on the ground if the temp, probe is heat soaked.

A failure flag appears over the indicator with power loss or system failure. Any TAT failure also causes a failure flag to appear over the RATED EPR indicator.

## **CUSTOMER CARE**

### **FORUM**

You are invited to join Captain Sim [community forum](#)

### **DAILY NEWS**

For Captain Sim *daily* news please follow us at [Twitter](#), [Facebook](#) and [Google](#)

### **VIDEO CHANNEL**

Please watch our YouTube [channel](#)

### **TECH SUPPORT**

The '1011 Captain' is the most advanced, complete and accurate digital replica of the 1011 ever made for any game platform.

Our product is not perfect (unfortunately nothing is). But we are working on improvements. If you have some important issue to report, please check-in to [Your Profile](#) then click Product Name > Customer Support > and use the Trouble Ticket System. We process all tickets and consider the most significant issues for the next service packs.

### **SPECIAL THANKS TO**

Mark Fletcher  
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Lou Thieblemont