



CL-350 TRAINING MANUAL

FLIGHT INSTRUMENTS

18

AIRCRAFT SYSTEMS
TRAINING MANUAL

This page intentionally left blank

FLIGHT INSTRUMENTS

I. INTRODUCTION

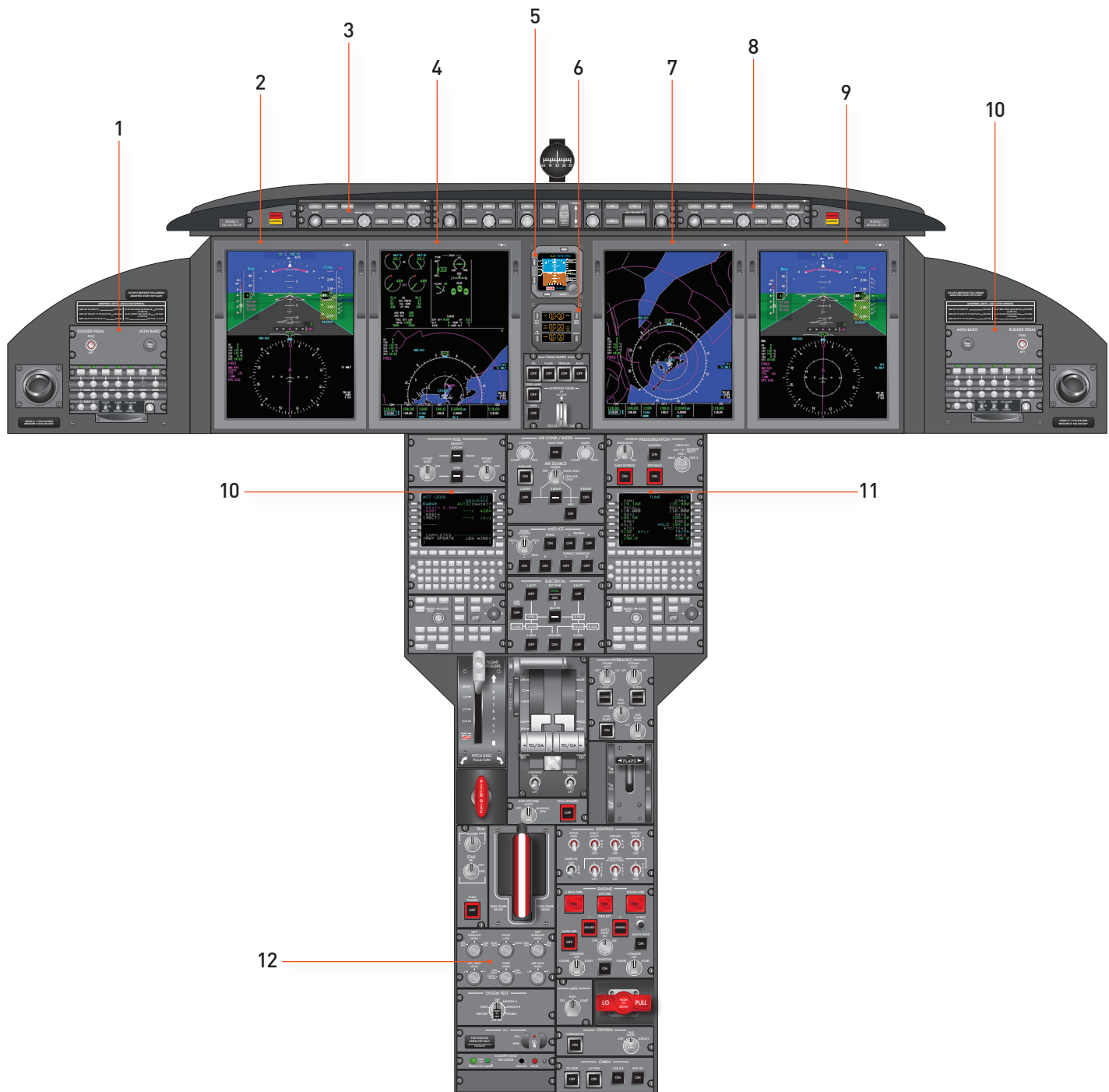
The Challenger 350's Electronic Flight Instrumentation System (EFIS) provides integrated flight information through four adaptive flight displays (AFDs), consisting of two Primary Flight Displays (PFDs) and two Multifunction Displays (MFDs), controlled by Display Control Panels (DCPs), MFD Control Panels (MCPs), and a Reversion Switch Panel (RSP).

The system interfaces with the Integrated Avionics Processor System (IAPS), which serves as the focal point for aircraft information flow, containing flight guidance computers, flight management computers, and maintenance diagnostic computers, while receiving data from air data systems, inertial reference systems, and multiple aircraft subsystems for comprehensive flight deck displays.

System Specifications

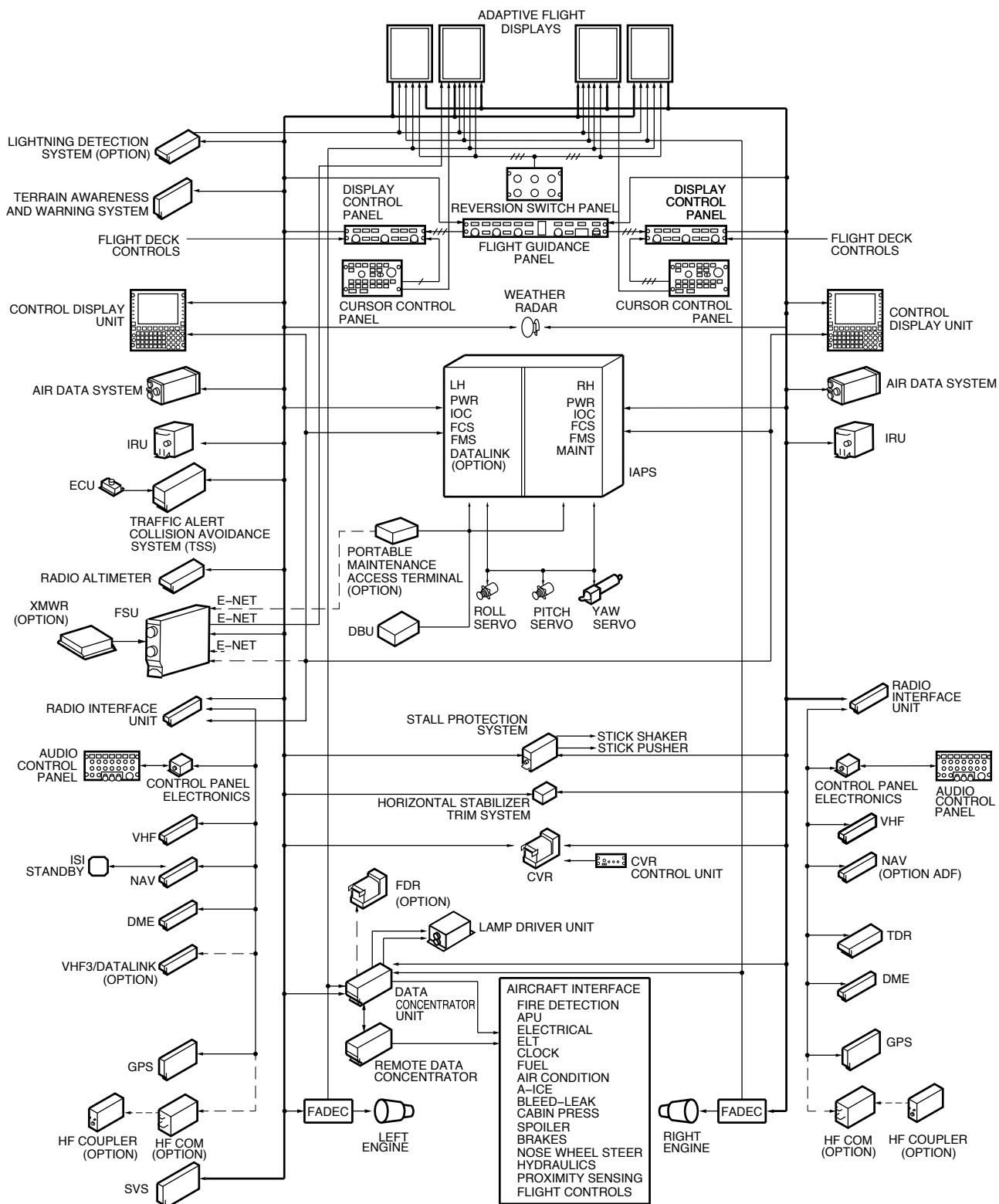
Flight Instruments System Specifications

Parameter	Specification
Adaptive Flight Displays (AFDs)	Color, Liquid Crystal Displays
PFD Configuration	2 Primary Flight Displays (Outboard)
MFD Configuration	2 Multifunction Displays (Inboard)
Inertial Reference Units	2 (Dual IRS)
IRS Alignment Time	5 minutes (Equator) to 17 minutes (Latitudes above 70.24°)
Integrated Standby Instrument (ISI) Alignment Time	70 Seconds
Air Data Computers	2 (ADC 1 and ADC 2)
Synthetic Vision Computers	1 (Optional)
File Server Units	1 Standard (2nd Optional)



- | | |
|---------------------------------------|--|
| 1. Left Compass Control Panel | 7. Right Multifunction Display (MFD) |
| 2. Pilot Primary Flight Display (PFD) | 8. Copilot Display Control Panel (DCP) |
| 3. Left Display Control Panel (DCP) | 9. Right Primary Flight Display (PFD) |
| 4. Left Multifunction Display (MFD) | 10. Left MFD Control Panel |
| 5. Standby Instrument Panel | 11. RuLeft MFD Control Panel |
| 6. Clock | 12. RSP Control Panel |

FLIGHT INSTRUMENTS BLOCK DIAGRAM



II. PRIMARY FLIGHT DISPLAYS (PFDs)

A. PFD DISPLAY AREAS

- Angle of Attack (AOA) display - Left side vertical scale
- Attitude display - Center sphere with pitch and roll indications
- Airspeed/Mach display - Left vertical tape format
- Altitude display - Right vertical tape format
- Vertical speed display - Right side of altitude tape
- Flight Mode Annunciator (FMA) - Top center display area
- Navigation display - Lower portion with HSI format



B. ANGLE OF ATTACK (AOA) SYSTEM

The AOA indicator can assess lift under any flight condition, speed, altitude, wing loading and aircraft configuration. The AOA display is used for crew awareness only and is not a primary flight instrument or a stall warning device. The indicated airspeed remains the primary reference for stall awareness.

AOA Indicator Components:

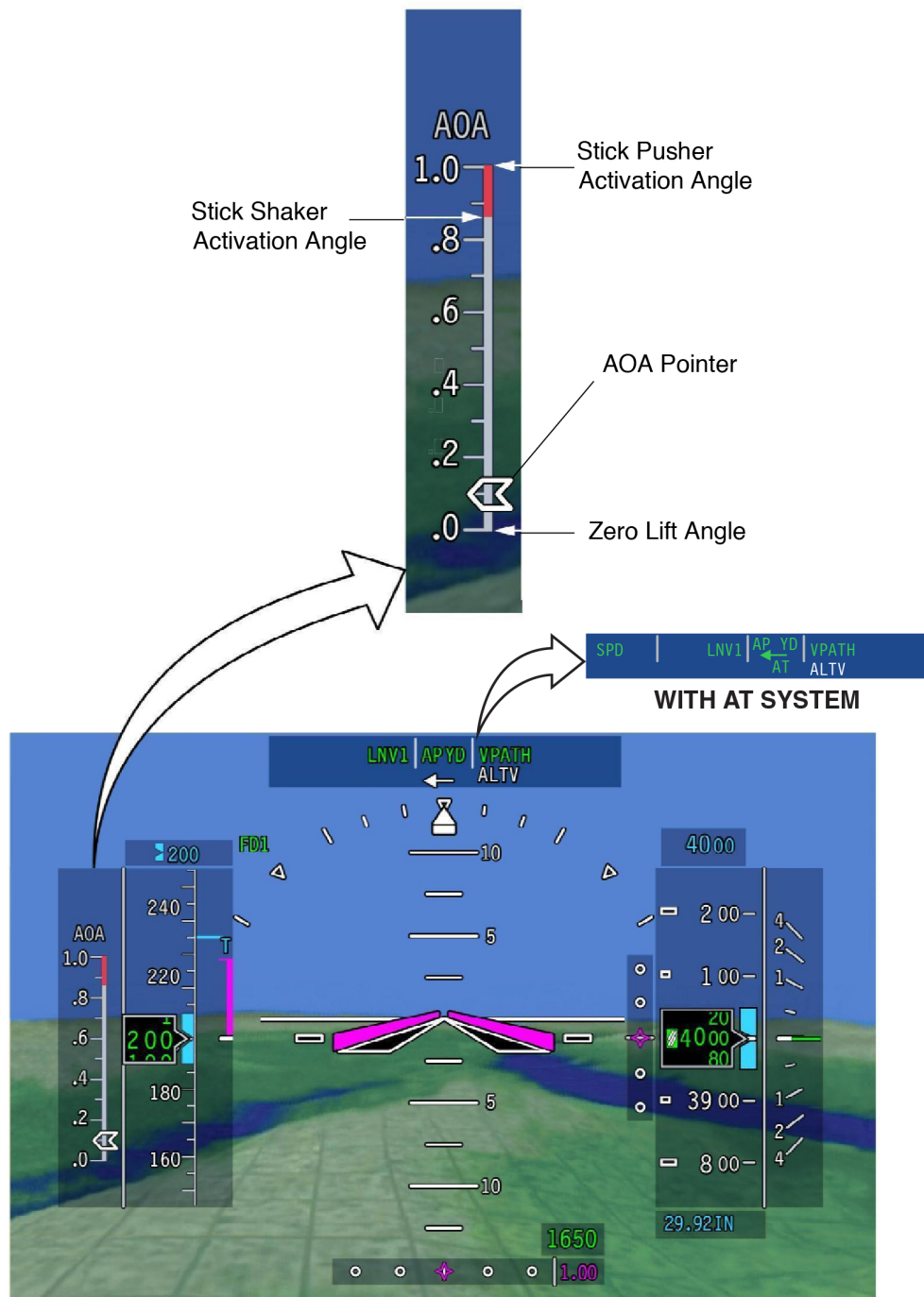
- Analog scale indicator graduated from 0.0 to 1.0
- Zero lift angle represented at 0.0 position
- Stick pusher activation angle at 1.0 position
- AOA pointer showing current normalized angle
- Variable red band with dynamic positioning
- Lower edge of red band indicates stick shaker activation
- Upper edge of red band indicates stick pusher activation
- Green arc showing normal operating range
- Display enabled through CSU strapping configuration

AOA Dynamic Response Features:

- Automatic adjustment for rapid pitch changes
- Trip point lowering if AOA increase exceeds 1°/second
- Prevention of deep stall penetration
- Real-time margin to stick shaker indication
- Real-time margin to stick pusher indication
- Configuration-based limit calculations
- Mach number compensation
- Bank angle compensation during turns

C. AIRSPEED DISPLAY

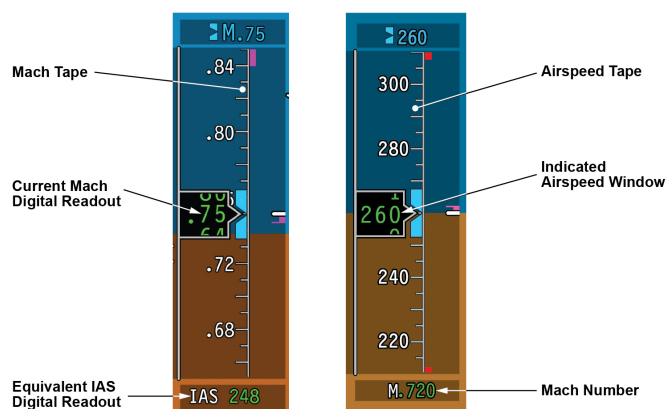
The airspeed display consists of a moving vertical tape located on the left side of each Primary Flight Display with a fixed digital readout window showing current airspeed in the center. The tape displays indicated airspeed from 40 to 400 knots with scale markings every 5 knots and numerical labels every 20 knots, providing continuous visual reference throughout the aircraft's operating envelope.





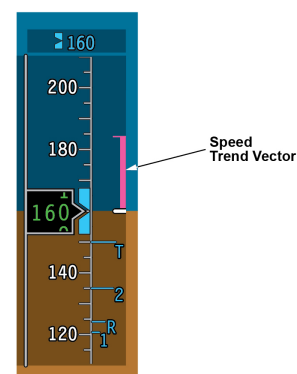
Display Format Selection:

- IAS or Mach tape format selectable via IAS/MACH button on FGP
- Manual selection available when speed greater than Mach 0.4
- Automatic transition from IAS to Mach tape at 35,561 feet
- Automatic transition from Mach to IAS tape descending through 35,561 feet
- Equivalent Mach or IAS readout displayed digitally at bottom of tape
- Current format indicated by tape scaling and digital readout type
- Pilot selection overrides automatic transition when above Mach 0.4



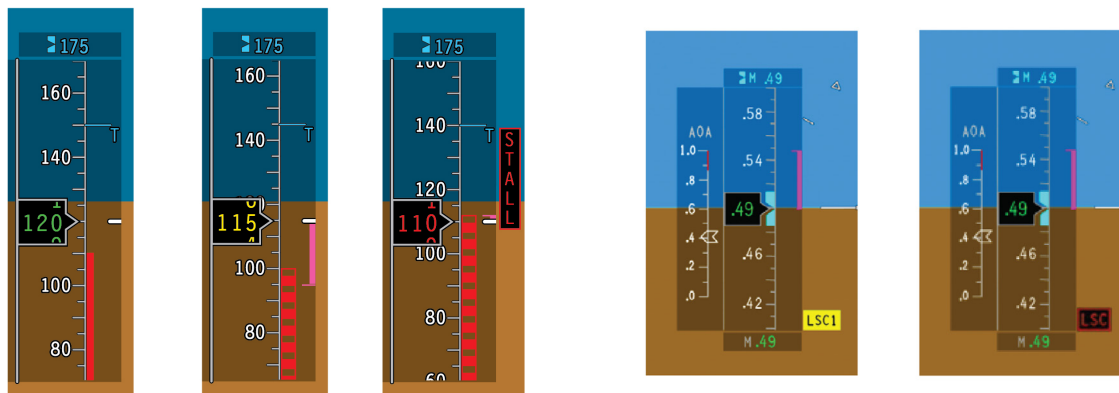
Airspeed Trend Vector:

- Magenta line extending up or down from current airspeed
- Indicates predicted airspeed in 10 seconds based on current acceleration



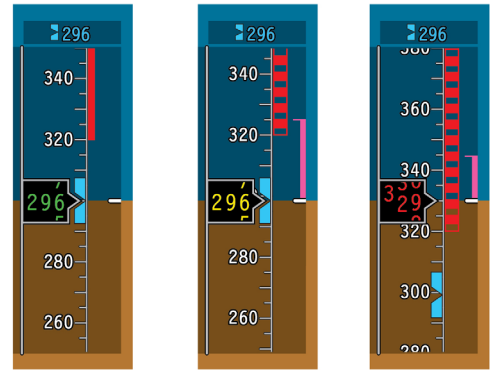
Low Speed Cue (LSC):

- Solid red line rising from bottom of airspeed scale
- Indicates calculated airspeed of 1.06 Vs (stall speed)
- Top of cue represents stick shaker activation speed
- Changes to expanded red checkerboard pattern when within few knots of stick shaker
- LSC caution flag shows when single source is used to determine the stall window
- LSC warning flag shows when no stall speed comparison is available



Overspeed Cue:

- Solid red line descending from top of airspeed scale
- Indicates VMO (maximum operating speed) or MMO (maximum Mach)
- Reduces to flap operating speed limit when flaps extended
- Changes to red checkerboard pattern when approaching overspeed
- Wider checkerboard pattern when trend vector reaches cue
- "OVERSPEED" aural warning when airspeed reaches cue

**V-Speed References:**

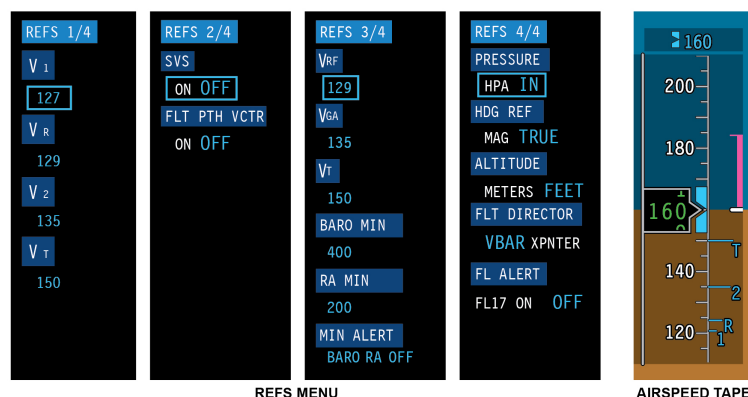
- V-speed reference bugs (V1, VR, V2, VT, VGA, VREF)
- Manually set V speed values are cyan, FMS-calculated are magenta
- Set through REFS button on Display Control Panel

Speed Bug:

- Cyan bug positioned at selected airspeed
- Set via SPEED knob on Flight Guidance Panel
- ± 5 knot deviation scale adjacent to bug
- Remains visible throughout tape range

Airspeed Comparator Function:

- Continuous comparison between pilot and copilot airspeed
- EFIS MISCOMPARE message if difference exceeds limits
- IAS amber flag if mismatch detected
- Automatic display of cross-side data on failure
- Part of integrated monitoring system



REFS MENU

AIRSPEED TAPE

D. ALTITUDE DISPLAY

Altitude Tape

- Vertical moving tape displayed on right side of PFD
- Barometric altitude readout range from -100 to 50,000 feet

Preselected Altitude System

- Cyan bug on altitude tape indicating selected altitude
- Digital readout of selected altitude above tape (cyan)
- ALT knob on Flight Guidance Panel controls selection
- Push function for 1,000-foot increments
- Automatic reset to nearest thousand when pushed from hundred-foot value

Altitude Alerting System

- Altitude bug flash cyan and C-chord is heard when within 1,000' of preselected altitude
- Altitude deviation C-chord alert if departing selected altitude >200 feet
- Amber ALT flashing in Flight Mode Annunciator during deviation

VNAV Altitude References

- Magenta altitude constraints from FMS displayed on tape

Barometric Setting Display

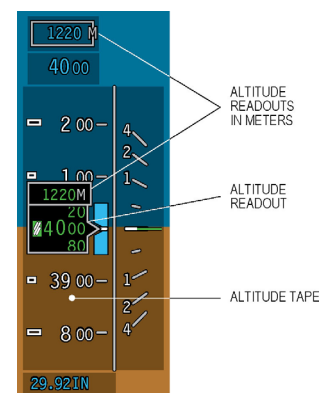
- Barometric correction value displayed below altitude tape
- Manual setting via BARO knob on Display Control Panel
- STD button selection displays "29.92 IN" or "1013 HPA"
- Cross-side barometric comparison monitoring
- BARO miscompare alert for differences >0.04 IN

Radio Altitude Display

- Digital readout appears below 2,500 feet AGL
- Automatic declutter above 2,500 feet AGL
- "RA" flag displayed for invalid radio altitude

Altitude Display Integration

- Data from dual Air Data Computers (ADC 1 and ADC 2)
- Automatic source selection based on onside/offside logic
- Manual source selection via reversionary panel
- Comparison monitoring between ADC sources
- ALT flag displayed for invalid altitude data



E. VERTICAL SPEED DISPLAY

The vertical speed display consists of a vertical analog scale positioned to the right of the altitude tape, featuring a moving pointer with a distinctive green “drag line” that emphasizes rate changes as the pointer moves up or down the scale to indicate current vertical speed.

Scale Range and Markings:

- Scale range of $\pm 4,000$ feet per minute
- Zero reference line at center of scale

VS Pointer and Drag Line:

- White triangular pointer indicates current vertical speed
- Green drag line extends from zero to pointer position

Digital Readout Display:

- Part-time digital readout appears at scale extremes
- Displayed at top of scale during climb operations
- Displayed at bottom of scale during descent operations

Selected VS Bug:

- Cyan bug appears when VS mode active on autopilot
- Positioned at selected vertical speed value
- Set via UP/DOWN wheel on Flight Guidance Panel

FMS Vertical Speed Required (VSR) Pointer:

- Magenta open circle symbol on VS scale
- Indicates minimum average VS to meet altitude constraint
- Calculated from present position to next constraint
- Only displayed when FMS is active navigation source

TCAS Resolution Advisory Display:

- Red and green zones appear during TCAS RA
- Red zone indicates prohibited vertical speeds
- Green zone indicates required vertical speeds
- Corrective RA shows “CLIMB” or “DESCEND” zones
- Preventive RA shows “DO NOT CLIMB/DESCEND” zones
- Zones dynamically adjust based on traffic geometry
- Override normal VS display during RA event

VS Comparator Function:

- Continuous comparison between pilot and copilot VS
- Part of EFIS comparator monitoring system
- Triggers EFIS MISCOMPARE if difference excessive
- Automatic cross-check between ADC sources





- Supports system integrity monitoring

VS Failure Indication:

- Red boxed “VS” flag replaces scale when data invalid
- Flag appears in center of VS display area
- All VS indications removed when flagged
- Digital readouts blanked during failure
- Selected VS bug removed from display
- Requires ADC data for normal operation

F. ATTITUDE DISPLAY

The attitude display provides the primary aircraft attitude reference through the Attitude Director Indicator (ADI), presenting pitch, roll, and yaw information supplied by the Inertial Reference System with enhanced features including Flight Path Vector symbology, unusual attitude recovery guidance, and optional Synthetic Vision System integration.

Attitude Director Indicator Configuration:

- Wall-to-wall ADI format occupying full display width

Pitch Scale Specifications:

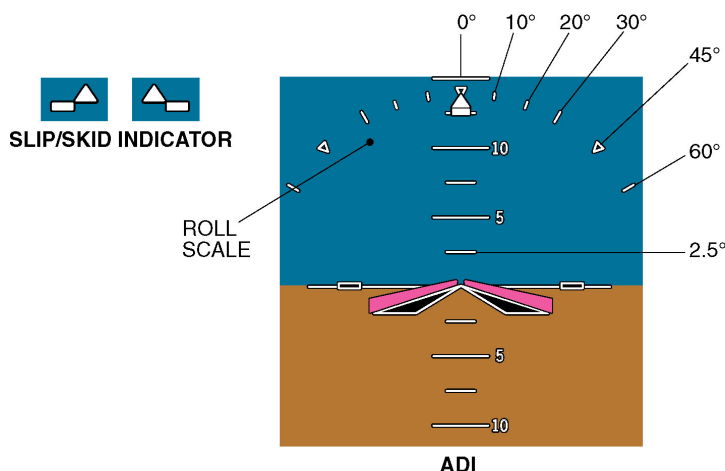
- Normal display range of ± 12 degrees (wall-to-wall format)
- Horizon line at 0 degrees pitch reference
- Flight director takeoff commands greater than 12 degrees parked at +12 degrees

Roll Scale Configuration:

- White tick marks at 10° , 20° , and 30° symmetrically positioned
- Unfilled white triangular ticks at 0° (wings level) and 45°
- White tick outside 45° triangles indicate 60° of roll
- Large tick marks at ± 30 and ± 60 degrees

Slip/Skid Indicator:

- White rectangular indicator below roll pointer
- One rectangle width deflection equals one conventional ball displacement



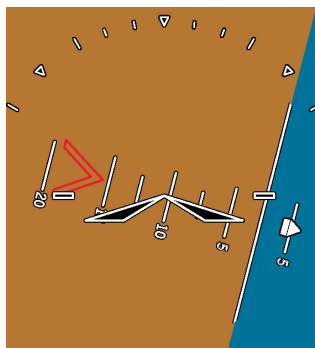


- Uses roll pointer base as reference point
- Rotates with roll pointer during bank maneuvers
- Displays actual flight path vector in space
- Lateral position represents azimuth of ground track to heading
- Vertical position represents climb/descent angle to horizon

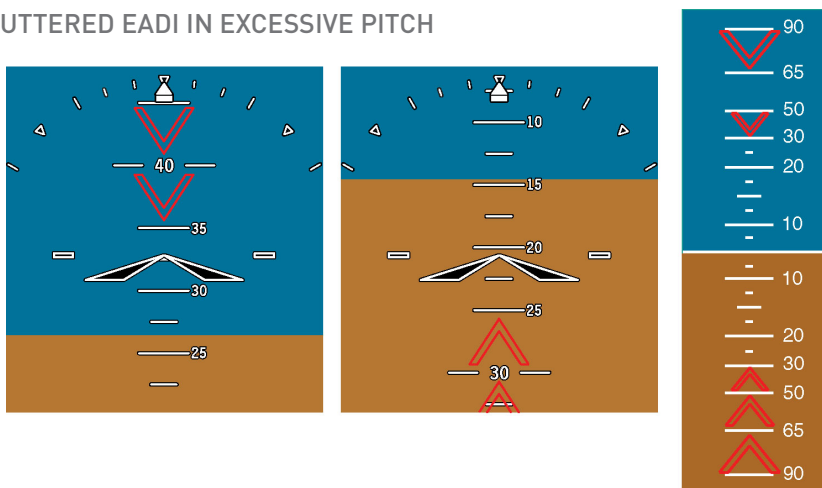
Unusual Attitude Recovery Features:

- Excessive pitch attitude chevrons:
 - Red chevrons appear at +23 degrees nose up
 - Red chevrons appear at -13 degrees nose down
 - Full chevrons visible at +27 degrees and -18 degrees
- Display declutter mode activation:
 - Triggers at pitch $>30^\circ$ up or $>20^\circ$ down
 - Triggers at roll angle >65 degrees
 - Removes non-essential information
 - Returns to normal at pitch $\leq 25^\circ$ up or $\leq -15^\circ$ down
 - Returns to normal at roll angle ≤ 60 degrees
- Only the following information will be displayed while de-cluttered
 - Altitude
 - Airspeed, trend vector
 - Attitude, slip/skid
 - Vertical Speed

EXAMPLE OF DE-CLUTTERED EADI IN EXCESSIVE ROLL

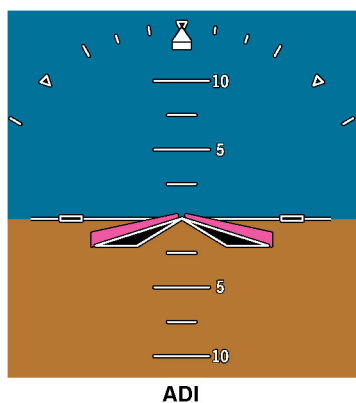


EXAMPLE OF DE-CLUTTERED EADI IN EXCESSIVE PITCH



- Compass
- AOA Indications
- AP/YD engage/disengage

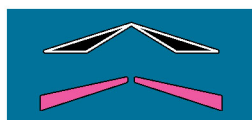
SINGLE CUE COMMAND BARS



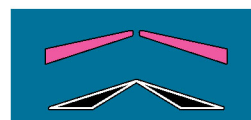
ADI



SINGLE CUE
DESIRED ATTITUDE



PITCH DOWN
COMMAND



PITCH UP
COMMAND

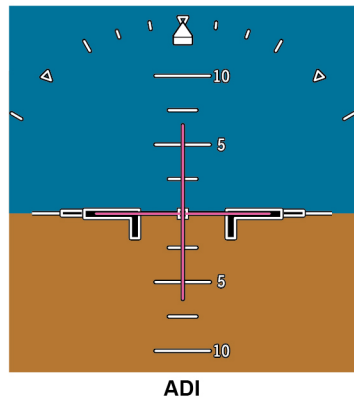


ROLL LEFT AND CLIMB
COMMAND

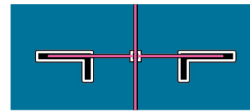
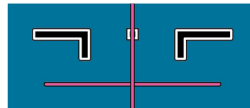
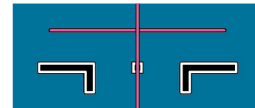
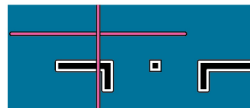
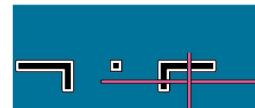


ROLL RIGHT AND DESCEND
COMMAND

CROSS-POINTER COMMAND BARS



ADI

DOUBLE CUE
DESIRED ATTITUDEPITCH DOWN
COMMANDPITCH UP
COMMANDROLL LEFT AND CLIMB
COMMANDROLL RIGHT AND DESCEND
COMMAND**Flight Director Command Bars:**

- Magenta inverted V-bars (standard configuration)
- Optional cross pointers for split cue format

Marker Beacon Annunciations:

- Displayed on right side of ADI
- Synchronized with audio marker tones

Vertical Deviation Display:

- Located right of attitude display
- White fixed scale with moving deviation pointer
- Green pointer for on-side data
- Amber pointer for cross-side data
- Two dots above and below reference line
- Each dot represents 1/4 degree deviation
- Diamond symbol for glideslope data
- Star symbol for VNAV data
- Red boxed GS flag when ILS glideslope invalid

Failure Modes and Flags:

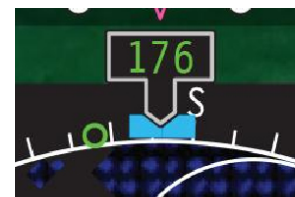
- ATT flag displayed when attitude data invalid
- Command bars removed with invalid steering inputs
- FPV symbol removed when source data unavailable
- SVS image removed per defined failure conditions
- Automatic declutter in unusual attitudes
- Reversion to backup attitude sources via switches

G. HEADING DISPLAY

The heading display presents aircraft directional information on a partial compass card at the bottom of the PFD, providing magnetic or true heading reference with integrated navigation and bearing pointer displays supplied by the IRS system.

Selected Heading System:

- Heading bug displayed as rectangular symbol on compass periphery
 - Positioned according to HDG knob selection on flight guidance panel
 - Bug vector line extends from heading bug position
 - Displays in cyan color when actively set
- Selected heading digital readout
 - Three-digit display preceded by HDG legend
 - Both readout and legend shown in cyan
 - Located to left of heading readout
 - Shares display location with heading comparator flag (flag has priority)



Track Pointer and Drift Angle:

- Track pointer displayed as green open circle shape
- Positioned on compass rose or compass tape at current aircraft track over earth
- Difference between track pointer position and lubber line indicates drift angle
- Continuously updated based on IRS data



Bearing Pointer System:

- Dual bearing pointer capability
 - Number 1 bearing source: cyan single-lined pointer
 - Number 2 bearing source: white double-lined pointer
 - Both pointers can be displayed simultaneously
- Bearing icons displayed as miniature pointer representations
 - Used to identify actively selected bearing pointers
 - Display in same color as associated bearing pointer
- Bearing source selection via BRG SRC button on DCP
 - Opens bearing source menu vertically on left side of PFD
 - Selection box moved with MENU knob between pointer 1 and pointer 2
 - PUSH SELECT or DATA knob used to select source or OFF
- Available bearing sources:
 - VOR 1/VOR 2
 - ADF 1/VOR 2

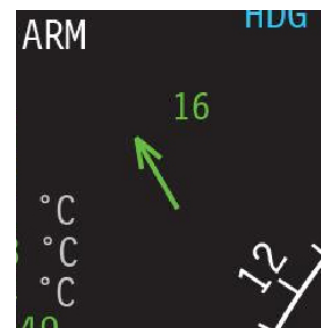
- ADF 1/ADF 2
- FMS 1/FMS 2
- OFF (no display)
- Bearing source behavior:
 - Display blank when BRG source selection is OFF
 - Pointer removed from view when bearing source invalid

Navigation Display Integration:

- Navigation source indicator in digital format
 - Selected using NAV SRC button on DCP
 - Menu window opens vertically on left side of PFD
 - Repeated NAV SRC switch presses cycle through available sources
- Available navigation sources:
 - VOR 1/LOC 1
 - VOR 2/LOC 2
 - FMS 1/FMS 2
 - OFF (no display)
- Course display system:
 - Three-digit display preceded by CRS label
 - Range from 1 to 360 degrees
 - Selected via CRS knob on FGP
- Course pointer presentation:
 - Arrow pointing to course position on compass card
 - Controlled by CRS selector knob on FGP
 - On-side displays in green color
 - Cross-side displays in amber color
- Lateral deviation bar:
 - Indicates aircraft deviation from selected course
 - Moves laterally with position read against deviation scale

Wind Vector Display:

- Wind magnitude and direction shown in green
 - Located between GS/TAS/TAT/SAT/ISA/UTC block and selected map
 - Wind direction arrow represents wind relative to aircraft
 - Arrow pointing to 6 o'clock indicates direct headwind
- Data source selection:
 - Primary: on-side FMS
 - Alternate: cross-side FMS when selected as active NAV source



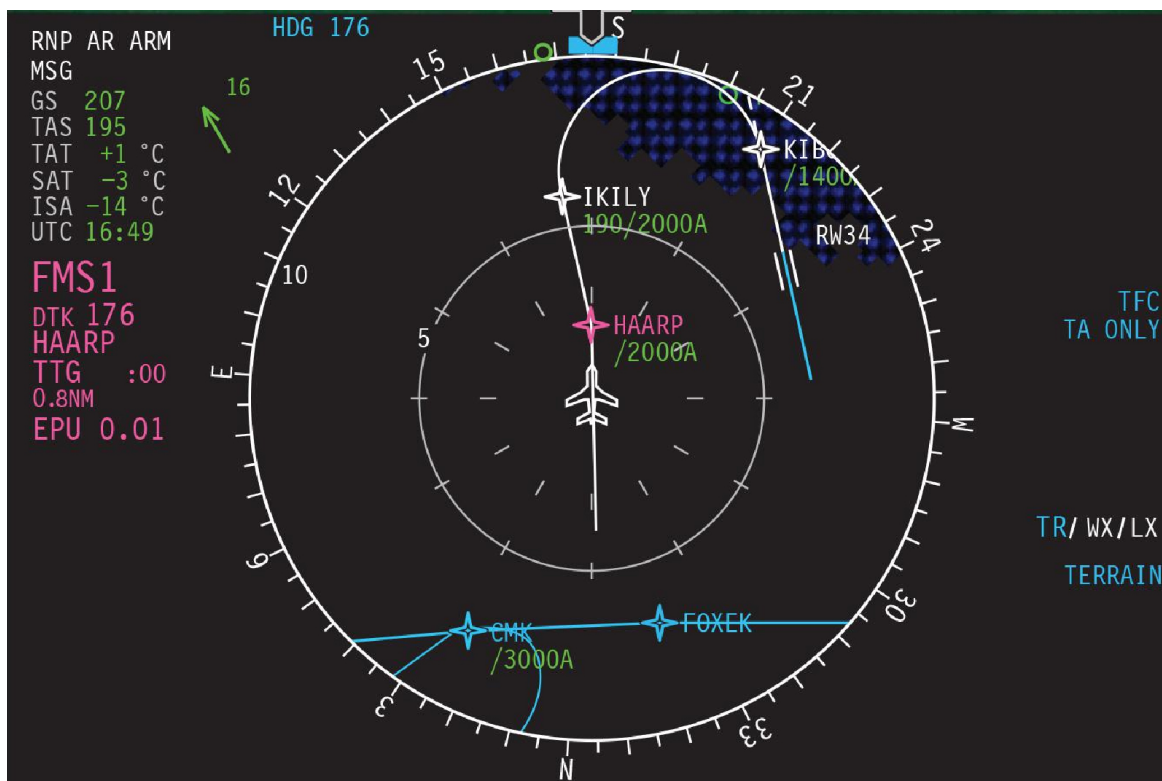


Heading Type Selection (IRS-equipped aircraft):

- Magnetic or true heading selectable
 - Selection via REFS 4/4 page through DCP
 - Alternative selection via CDU through FMS CTL page
- TRUE legend displayed in cyan to right of heading readout when true selected
- DG displayed in cyan to right of heading readout if IRS enters ATTITUDE mode

Failure Indications:

- Attitude flag (ATT):
 - Red boxed flag displayed when attitude information invalid
 - All other PFD information disappears when flag displayed
- Heading flag (HDG):
 - Red boxed flag displayed when heading source invalid
 - Replaces heading readout when displayed
 - Compass rose/arc rotates to North-up orientation
 - Lubber line around digital heading removed



III. MULTIFUNCTION DISPLAYS (MFDs)

A. MFD FORMAT PAGES

Available Display Formats:

- Navigation map displays (PPOS and PLAN modes)
- Engine indication page (EICAS format)
- Systems synoptic pages
- Electronic checklists
- Flight plan display
- Datalink weather displays
- Electronic charts (if equipped)
- TCAS traffic display
- Terrain awareness display
- Status and maintenance pages

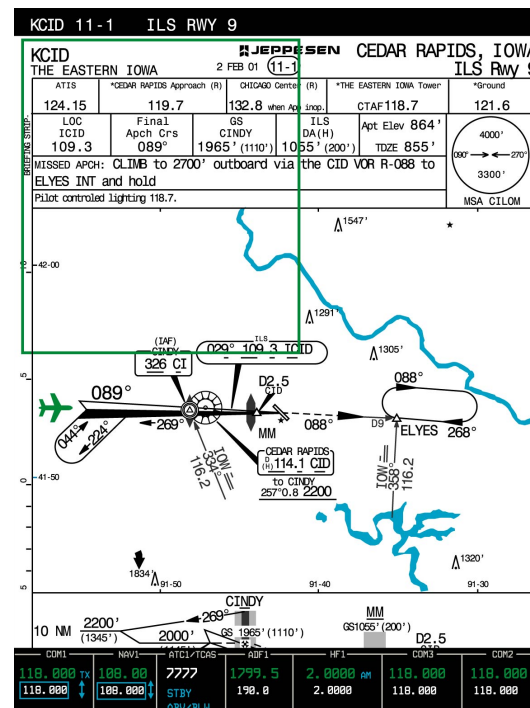
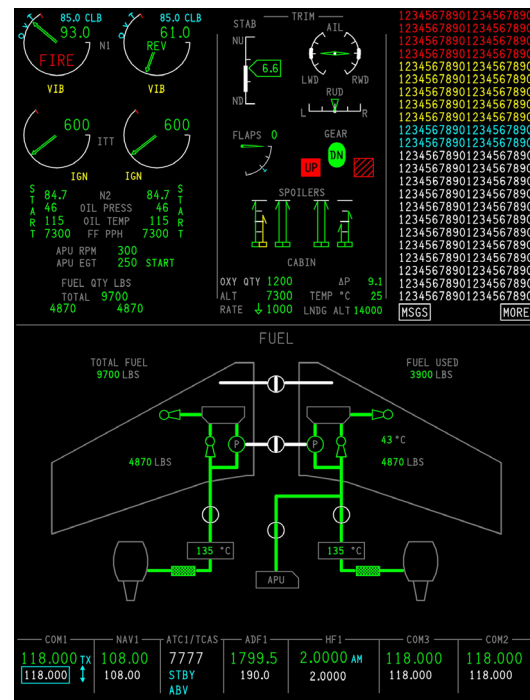
B. MFD NAVIGATION DISPLAYS

Map Display Features:

- Present position (PPOS) moving map
- Flight plan (PLAN) static map
- Range scales from 0.25 to 600 nm
- Waypoint information and identifiers
- Airports, VORs, NDBs symbology
- Airways and airspace boundaries
- Weather radar overlay capability
- Terrain display overlay
- TCAS traffic overlay
- North up or heading up orientation

C. MFD CABIN READOUT

- Oxygen quantity percentage display
- Cabin pressure altitude
- Cabin rate of change
- Cabin temperature
- Landing field elevation setting



IV. DISPLAY CONTROL SYSTEMS

A. DISPLAY CONTROL PANEL (DCP)

DCP Controls and Functions:

- 1/2 button - Selects cross-side radio menu on MFD
- DME H button - Holds DME while tuning VOR independently
- NAV SRC button - Cycles through navigation sources
- FRMT button - Toggles between PPOS and ROSE formats
- TFC button - Overlays TCAS traffic on display
- TR/WX button - Selects terrain, weather, or lightning display
- TUNE knob - Controls MFD radio tuning
- RADIO button - Activates radio tuning submenu
- BRG SRC button - Selects bearing pointer sources
- MENU/DATA knobs - Navigate and select menu items
- PUSH SELECT button - Confirms selections
- REFS button - Displays V-speed reference pages
- RADAR button - Controls weather radar menu
- TILT/RANGE knob - Adjusts display range and radar tilt

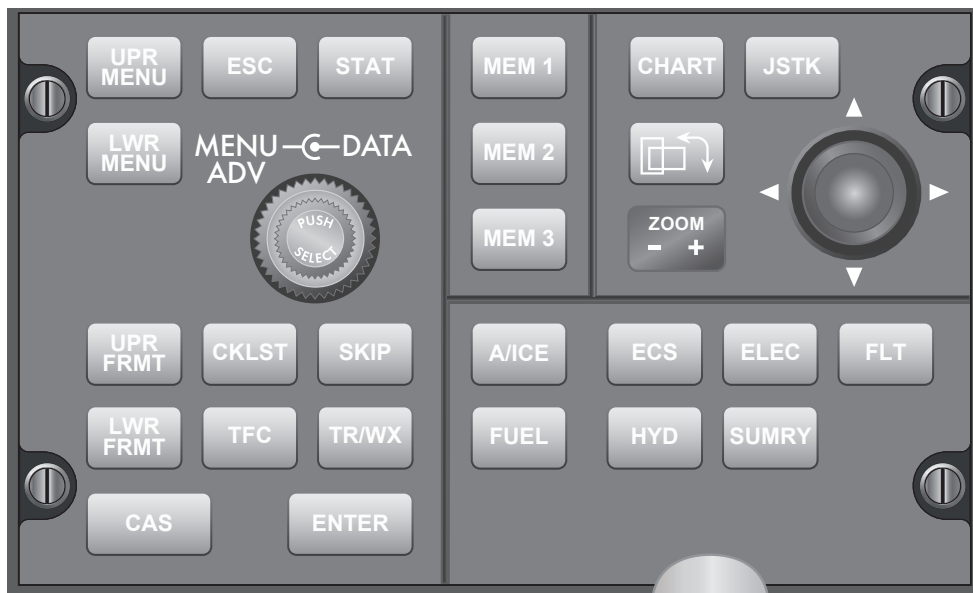


B. MFD CONTROL PANEL (MCP/CCP)

MCP Controls and Functions:

- UPR MENU button - Displays upper menu options
- LWR MENU button - Displays lower menu options
- MENU ADV knob - Moves cursor through menu items
- ESC button - Moves up menu hierarchy
- STAT button - Shows status format pages
- MEM buttons (1, 2, 3) - Quick access to memory items
- CHART button - E-Charts
- JSTK button - Activates joystick cursor control
- ZOOM button - Changes map zoom level

- CAS button - Controls CAS message paging
- ENTER button - Confirms data entry
- CKLST button - Displays electronic checklists
- SKIP button - Bypasses checklist items
- A/ICE button - Anti-Ice synoptic page
- ECS button - Environmental control system synoptic page
- ELEC button - Electrical system synoptic
- FLT button - Flight controls synoptic
- FUEL button - Fuel system synoptic
- HYD button - Hydraulic system synoptic
- SUMRY button - Summary page display



C. REVERSION SWITCH PANEL (RSP)

RSP Switch Functions:

Left Displays Switch:

- MFD REV - Left MFD in compressed format, left PFD shutdown
- NORM - Normal left MFD and PFD operation
- PFD REV - Left PFD in compressed format, left MFD shutdown

EICAS Switch:

- BOTH PFDS - Display configured as PFD displays EICAS information in compressed format
- L MFD - Selects the left MFD into a presentation that includes EICAS
- R MFD - Selects the right MFD into a presentation that includes EICAS

Right Displays Switch:

- MFD REV - Right MFD in compressed format, right PFD shutdown
- NORM - Normal right MFD and PFD operation
- PFD REV - Right PFD in compressed format, right MFD shutdown

ATT/HDG Switch:

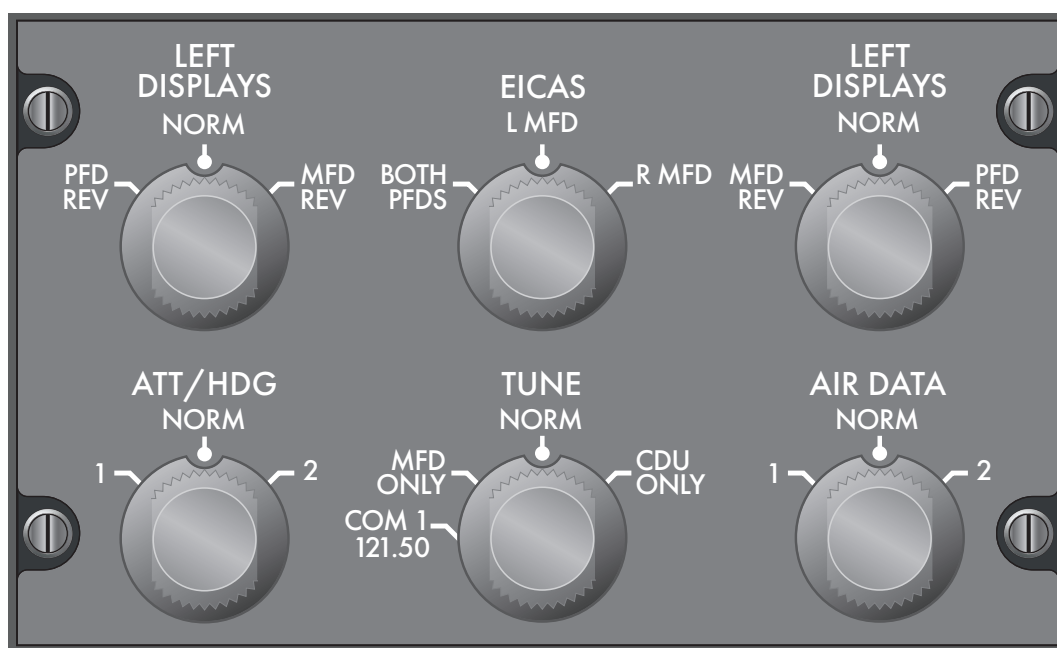
- Position 1 - All displays use IRS 1 data
- NORM - Onside IRS data (pilot IRS1, copilot IRS2)
- Position 2 - All displays use IRS 2 data

TUNE Switch:

- COM 1 121.50 - L-VHF COM tuned to emergency frequency
- MFD ONLY - CDU tuning disabled, MFD tuning enabled
- NORM - Normal tuning operation
- CDU ONLY - MFD tuning disabled, CDU tuning enabled

AIR DATA Switch:

- Position 1 - All displays use ADC 1 data
- NORM - Onside ADC data (pilot ADC1, copilot ADC2)
- Position 2 - All displays use ADC 2 data



V. AIR DATA SYSTEM

A. AIR DATA COMPUTERS (ADCs)

ADC Calculated Parameters:

- Pressure altitude
- Static pressure
- Total pressure
- Vertical speed
- Airspeed
- Mach number
- VMO/MMO values
- Baro correction
- Barometric corrected altitude
- Static air temperature (SAT)
- Total air temperature (TAT)
- True airspeed (TAS)
- ISA temperature deviation

B. PITOT STATIC SYSTEM

Primary System Components:

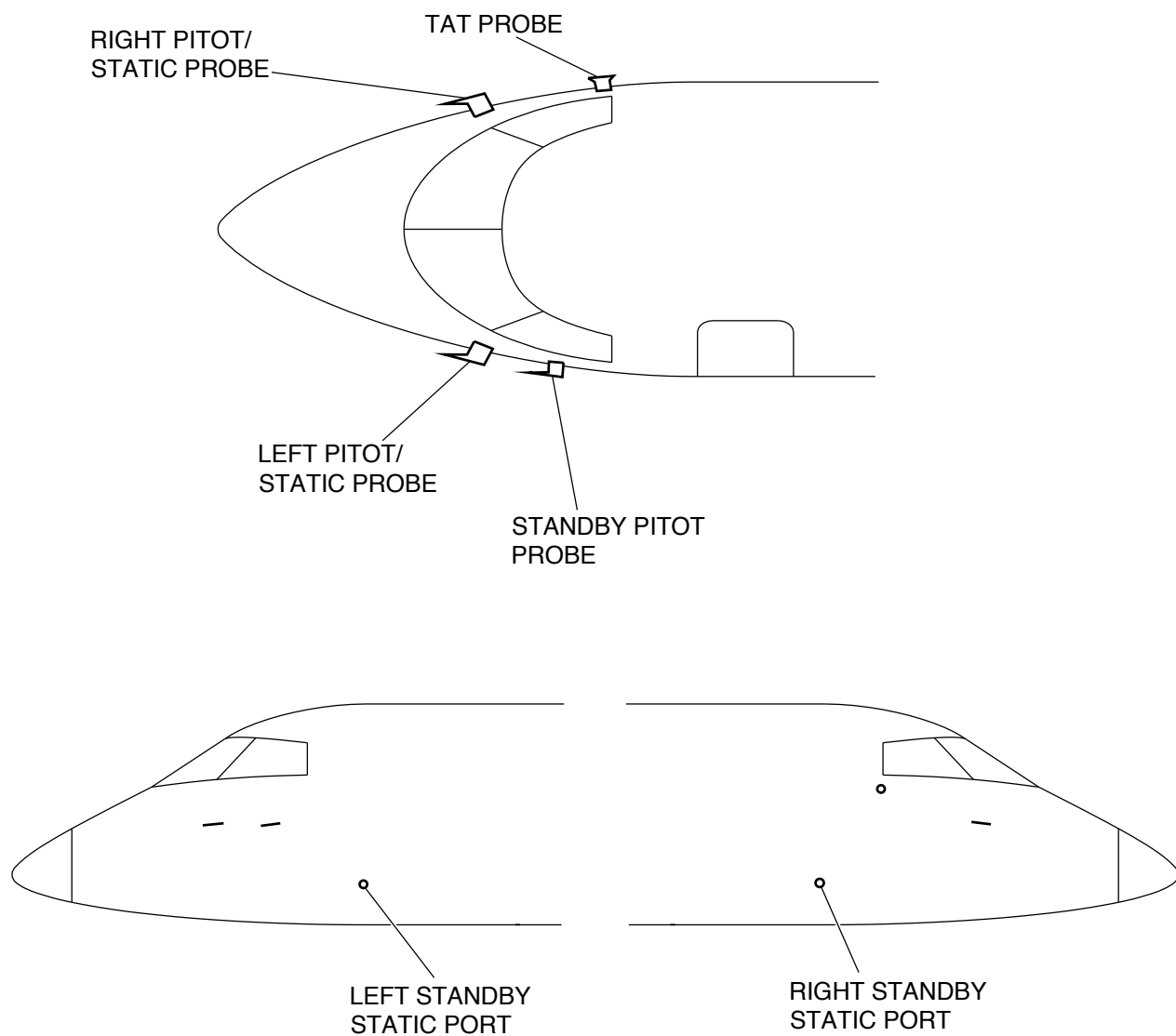
- Left pitot/static probe - One total pressure port, two static ports
- Right pitot/static probe - One total pressure port, two static ports
- Total air temperature probe - Right forward fuselage mounted
- Electrically heated probes for ice protection

Standby System Components:

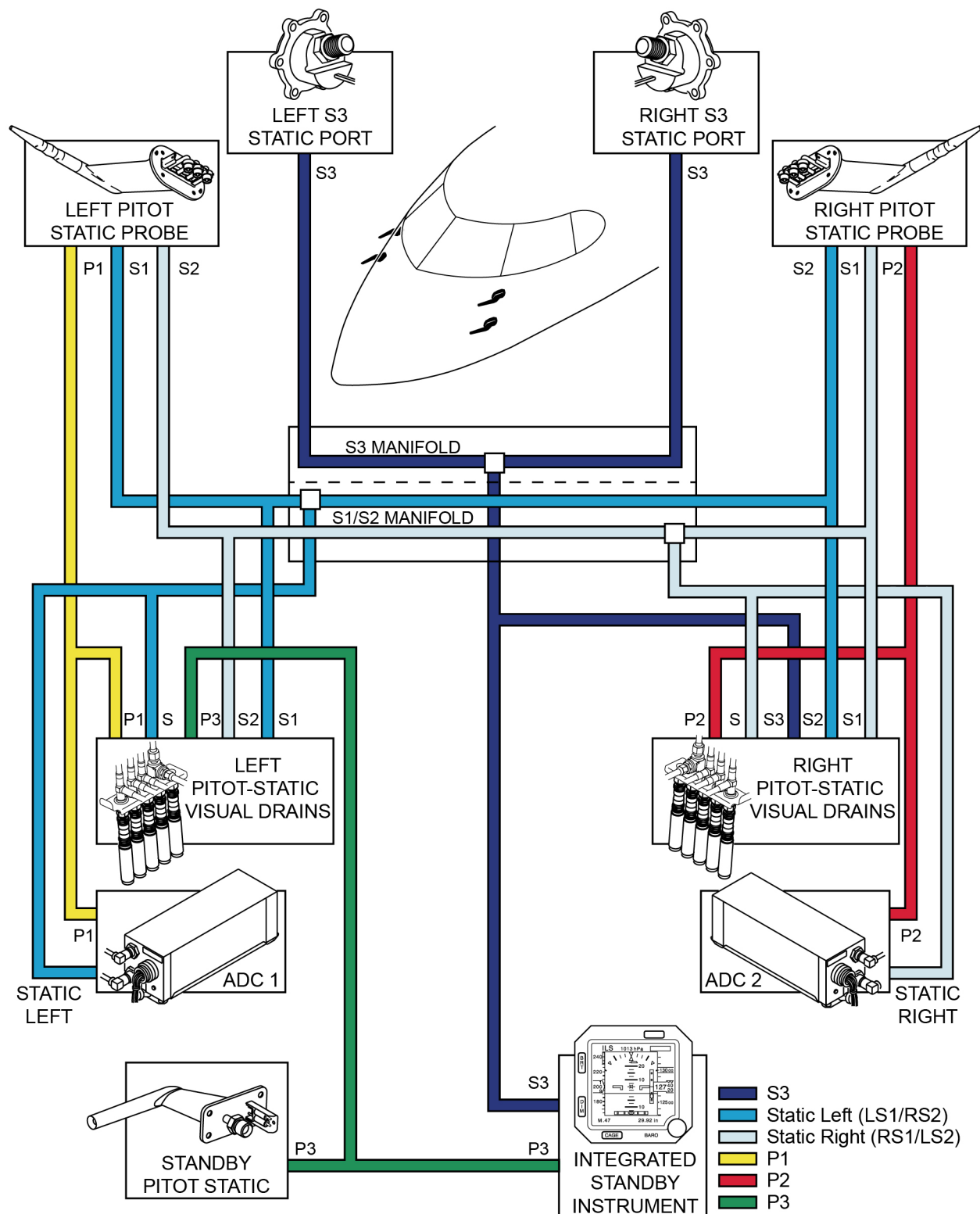
- Standby pitot probe - Single pressure port
- Two flush-mounted standby static ports
- Provides data to integrated standby instrument

Pitot Static Distribution:

- P1 normal pitot input to ADC 1
- S1 normal static input to ADC 1
- P2 normal pitot input to ADC 2
- S2 normal static input to ADC 2



PITOT STATIC SCHEMATIC

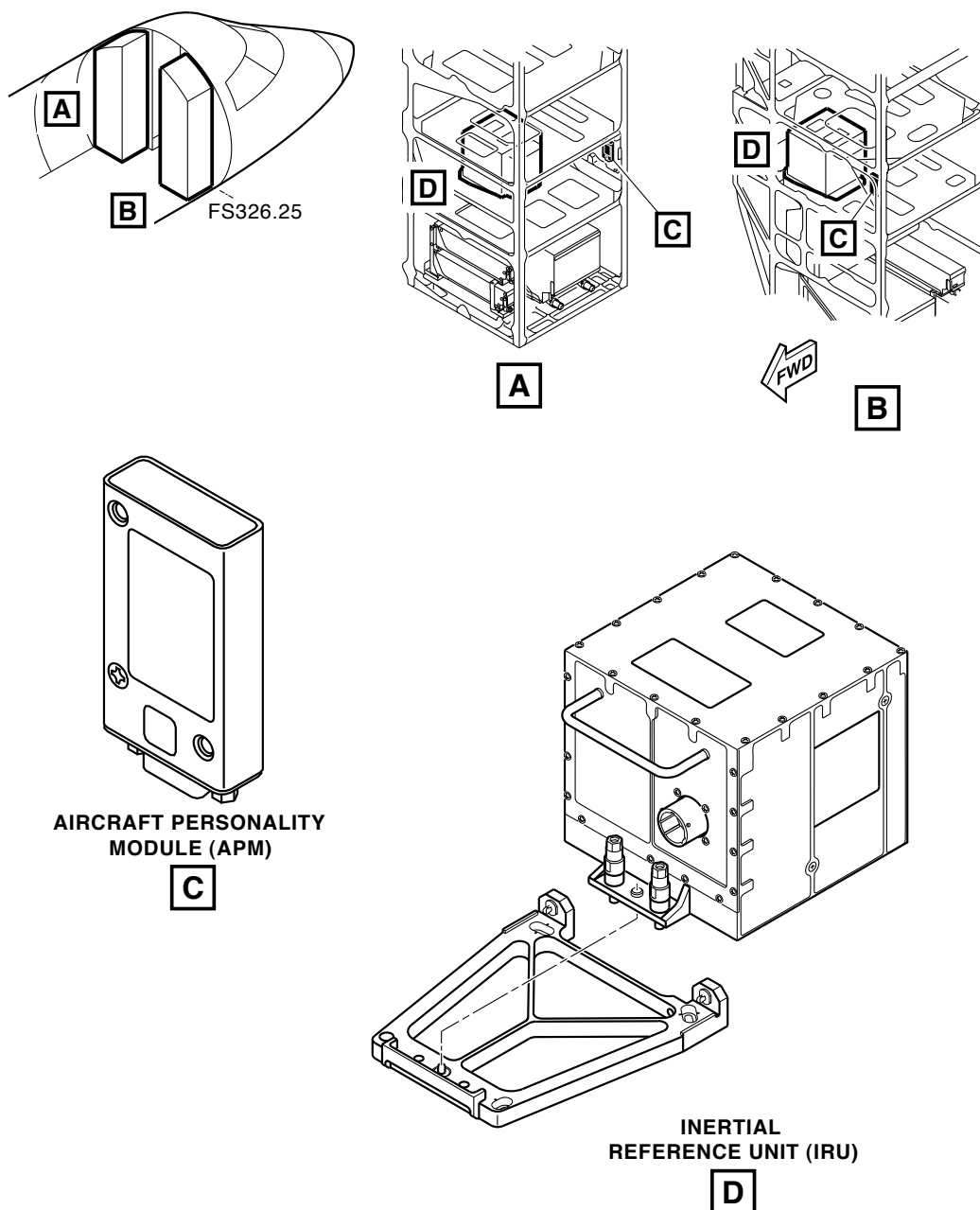


VI. INERTIAL REFERENCE SYSTEM (IRS)

A. IRS COMPONENTS

System Architecture:

- Two Inertial Reference Units (IRUs)
- Two mounting trays with shock isolation
- Two Aircraft Personality Modules (APMs)
- Dual independent attitude/heading references



B. IRS PARAMETERS PROVIDED

Navigation Data Outputs:

- Attitude (pitch and roll)
- Magnetic and true heading
- Angular rates and accelerations
- Inertial altitude and vertical speed
- Linear rates and accelerations
- Track angle and ground speed
- Wind speed and direction
- Flight path angle
- Aircraft position

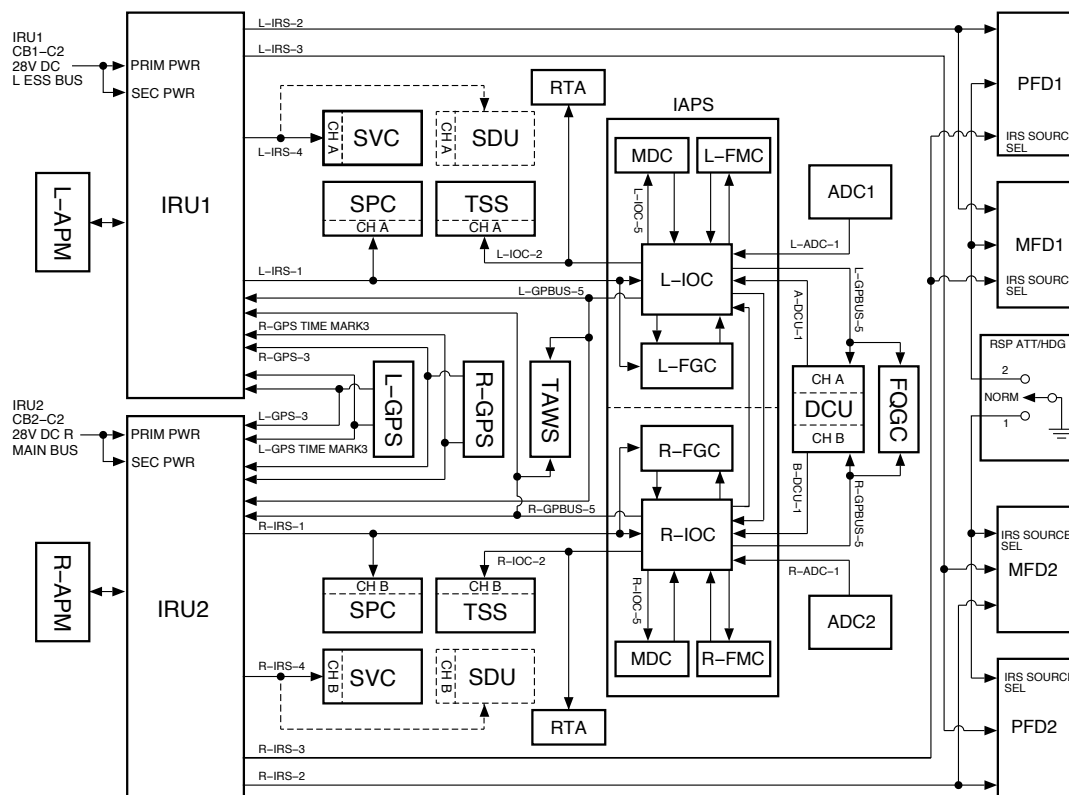
C. IRS INTERFACES

- Aircraft Personality Module (APM)
- Global Positioning System (GPS)
- Synthetic Vision System (SVS)
- EFIS/EICAS Adaptive Flight Displays
- Weather radar system through IOCs (Input/Output Concentrator)
- Autoflight control system (FGCs in IAPS)
- IOCs in the Integrated Avionics Processing System (IAPS)
- Terrain Awareness Warning System (TAWS)
- Traffic Surveillance System (TSS) (TCAS/XPDR 1) through IOCs
- Stall Protection System (SPC)
- Flight Management Computer (FMC)
- Maintenance Diagnostic Computer (MDC)

D. IRS OPERATING MODES

- OFF - System not powered
- ALIGN - Initial alignment mode (full or fast)
- NAV - Normal navigation mode
- ATT - Attitude-only mode (reversionary)
- AIM - Alignment in motion (air restart)

IRS INTERFACES



VII. INTEGRATED STANDBY INSTRUMENT (ISI)

A. ISI DISPLAY FEATURES

- Attitude indication
- Airspeed tape display
- Altitude tape display
- Slip/skid indicator
- Localizer and glideslope deviation (when ILS tuned)
- Barometric setting adjustment and display

NOTE: No heading information is provided

B. ISI OPERATION

Alignment Process:

- Self-test initiated on power-up (10-20 seconds)
- ALIGNING flag displayed during attitude alignment
- Countdown timer shows alignment progress
- Operational after approximately 70 seconds



ISI Controls:

- CAGE button - Gyro caging function
- STD button - Standard barometric setting
- BRT/DIM buttons - Display brightness adjustment
- BARO knob - Barometric pressure correction

C. ISI DATA SOURCES

- Standby pitot probe for airspeed
- Standby static ports for altitude
- Internal attitude reference system
- VHF NAV 1 for ILS data
- Red LOC or GS flag if data is invalid, scales removed

D. ISI POWER SUPPLY

- 28V DC power
- Internal battery backup

VIII. CLOCK/CHRONOMETER**A. CLOCK FUNCTIONS**

- UTC time display
- Local time display
- Elapsed time counter
- Count-up/count-down timer
- Date display

B. CLOCK OPERATIONS**Flight Time (FLT / RST):**

- Tracks flight time automatically
- Status determined by in air/on ground discrete input
- Press and hold FLT/RST for 2 seconds to reset timer

Chronograph:

- Pressing CHR starts a count-up timer
- Press again to stop, third press resets timer to 00:00

GPS / MAN Mode:

- In GPS mode clock displays external GPS time (GPS displayed on face)
- In MAN mode clock utilizes a highly accurate internal time base

MODE:

- Pressing toggles between UTC, LOC (local) time and Date displays
- Pressing and holding with enter the UTC, LOC and date mode



IX. STANDBY COMPASS

A. COMPONENTS AND LOCATION

Primary Components:

- Self-contained transparent molded bowl filled with silicon fluid
- Compass dial sphere with heading markings suspended in fluid
- Two adjustment compensators for magnetic interference correction
- Non-magnetic light bulb powered by 5 VDC from integral light controller
- Metal bellows allowing fluid volume expansion and contraction with temperature and altitude changes

B. DISPLAY CHARACTERISTICS

Heading Markings:

- Cardinal headings displayed: N, E, S, W
- Numerals shown every 30 degrees
- Bars indicated every 10 degrees
- Last numeral omitted (e.g., "24" represents "240")

Reading Method:

- Aircraft heading read against vertical lubber line
- Center index mark on adjustment scale serves as reference point

C. ADJUSTMENT FEATURES

Mechanical Adjustments:

- Vertical axis adjustment via two screws through extended holes in mounting bracket
- Index error adjustment scale at top of compass with center major index mark

Magnetic Compensation:

- Two compensators (B and C) installed at top area of compass
- Used to adjust readings for magnetic interferences
- Inertial Reference System (IRS) provides heading reference during adjustment procedures

D. COMPASS CORRECTION CARD

Description:

- Installed on bracket above standby compass
- Contains STEER row for recording corrected headings

Calibration Points:

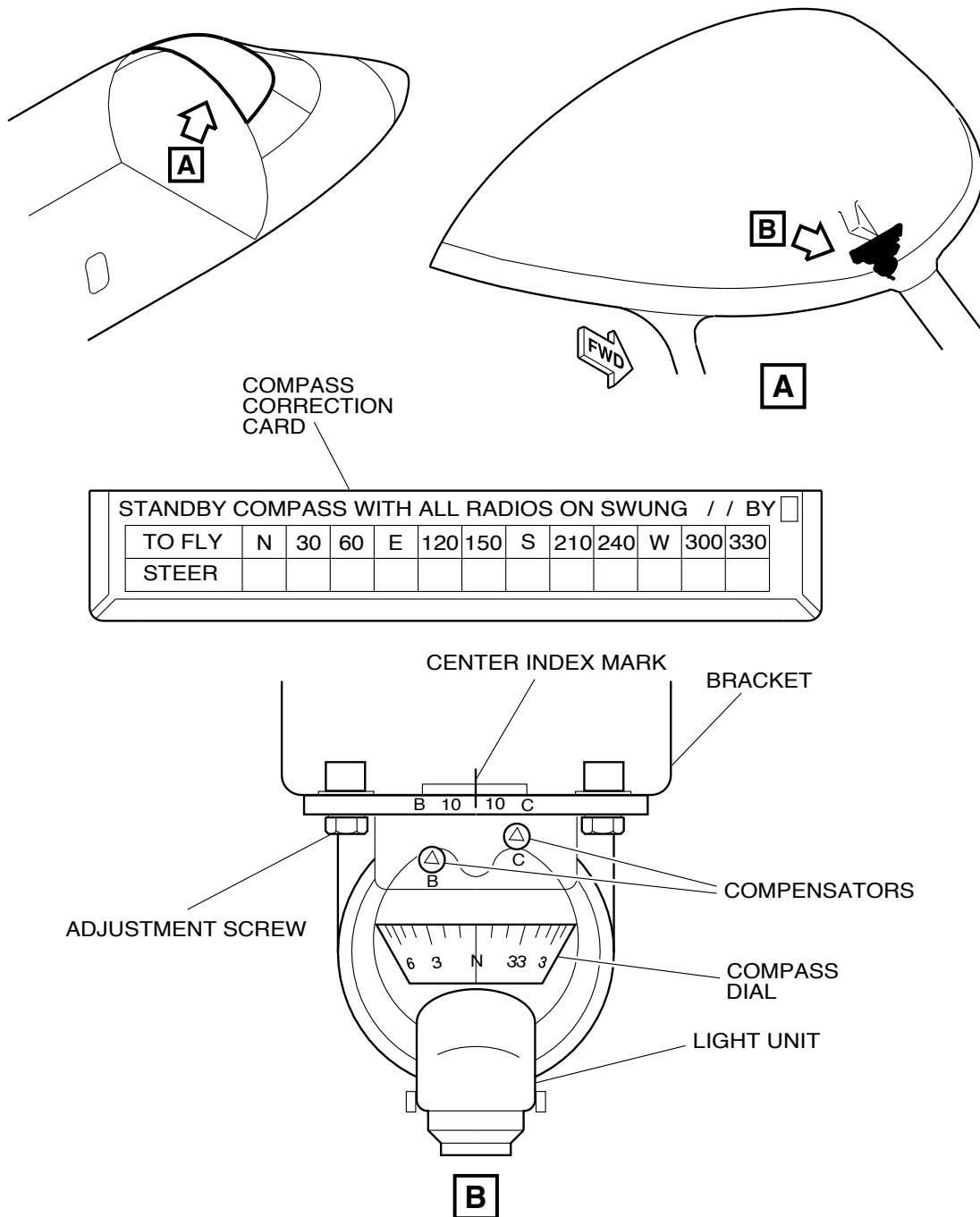
- Corrected headings recorded for cardinal directions (N, E, S, W)
- Additional corrections noted at 30-degree increments

E. POWER REQUIREMENTS

- Lighting: 5 VDC from integral light controller
- Basic operation: No electrical power required for magnetic heading indication

F. FLUID SYSTEM

- Fluid type: Silicon fluid for smooth movement and accurate indication
- Temperature compensation: Metal bellows accommodate fluid volume changes
- Function: Ensures free movement of compass dial for accurate heading display



Note: L and R WSHLD/WINDOW switches must be temporarily selected OFF while the standby compass is being read.

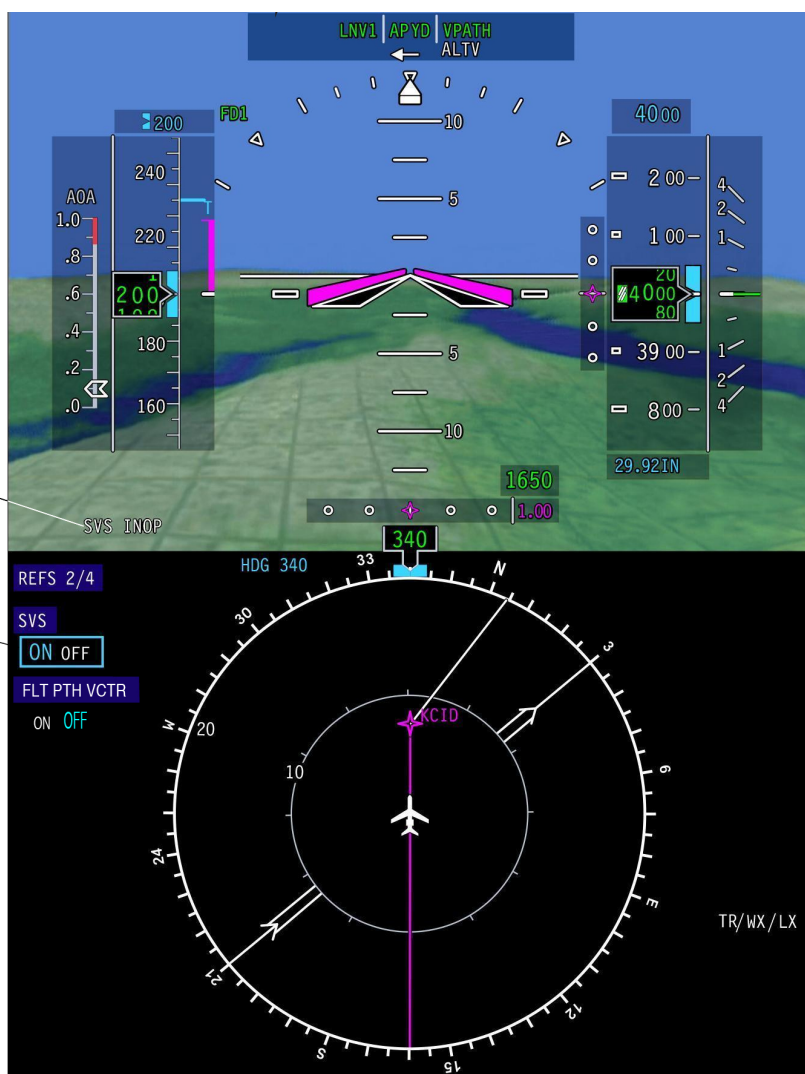
X. SYNTHETIC VISION SYSTEM (SVS)

The Synthetic Vision System (SVS) is designed as a sophisticated situational awareness enhancement feature for the flight crew. It replaces the normal sky/ground view on the Primary Flight Display (PFD) with a virtual view of the external environment, displaying elements such as surrounding terrain (color-coded by elevation) and depictions of the FMS flight plan origin/destination airports and runways.

The SVS utilizes aircraft system data, including current position and attitude from sources like the Inertial Reference System (IRS) and Global Positioning System (GPS), along with dedicated SVS terrain and airport/runway databases. This system is intended to assist the flight crew during situations like poor weather, at night, and with visual maneuvering.

ANNUNCIATORS:
SVS INOP
SVS RWY INOP

SVS ON/OFF
SELECTION



A. SVS COMPONENTS

Hardware Elements:

- Synthetic Vision Computer (SVC)
- SVS Configuration Module (SVCM)
- Video Interface Unit (VIU)
- FSU/SVC Data Load Switch
- Database Unit (DBU) interface

B. SVS DISPLAY FEATURES

Terrain Visualization:

- 3D terrain representation
- Large bodies of water
- FMS flight plan integration
- Origin and destination airports
- Runway depictions (Position, Heading, Width, Length)
- Extended runway centerlines

C. SVS DATA SOURCES

Input Systems:

- Air Data Computer for pressure altitude and temperature
- FMS for flight plan and airport data
- GPS for position information
- IRS for attitude and heading
- Database unit for terrain and airport databases

D. SVS DATABASES

Terrain Database:

- Worldwide coverage
- No expiration date
- Enhanced regional updates available
- Aligns with runway databases

Airport/Runway Database:

- Updated every 28 days
- Synchronized with FMS navigation database
- Position, heading, width, length data
- Status indication when not current

Elevation (ASL)	Color	
<0	Green	
0 to 1000	Green	
1000 to 2000	Green	
2000 to 3000	Green	
3000 to 4000	Tan	
4000 to 5000	Tan	
5000 to 6000	Tan	
6000 to 7000	Tan	
7000 to 8000	Brown	
8000 to 9000	Brown	
9000 to 10000	Brown	
10000 to 11000	Brown	
>11000	Gray	
Water	Blue	
Sky	Blue	
Missing	Black	



E. SVS LIMITATIONS

Operational Restrictions:

- Situational awareness enhancement only
- Not for approach continuation below minimums
- Not a replacement for natural vision
- Not for low visibility operations
- No operational credit applicable
- Cannot be sole reference for flight tasks

F. SVS CONTROLS AND ANNUNCIATIONS

- ON/OFF selection on REFS 2/4 menu
- Automatically enables FPV when selected ON
- SVS INOP annunciation below airspeed tape
- SVS RWY INOP for runway database issues
- No CAS messages for SVS system

G. INTEGRATION

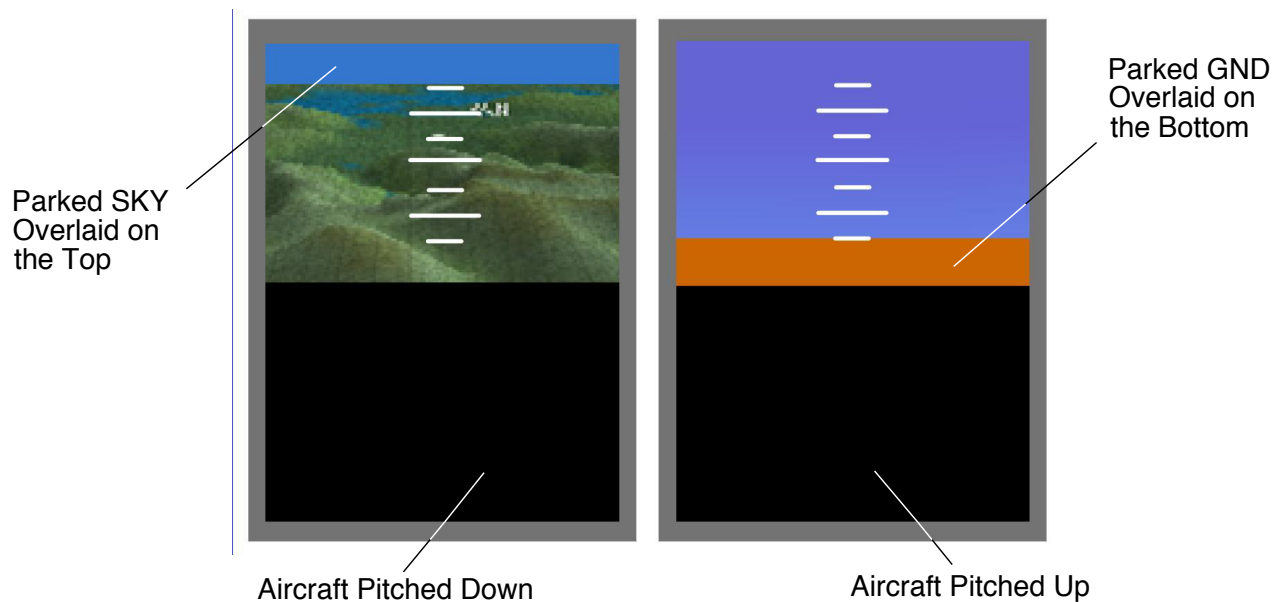
Synthetic Vision System Integration:

- Replaces traditional blue/brown ADI background
- Virtual terrain view with topographical features
- Large water bodies displayed in distinct blue
- Airport and runway symbology from FMS flight plan
- Terrain elevation color-coded altitude bands
- Texture patterns, shading, and grid overlays
- Missing terrain data displayed as black at sea level
- Controlled via SVS ON/OFF on REFS 2/4 menu

SVS Parked Sky/Ground References:

- Pitched down condition (below 20,000 feet):
 - Blue sky reference parks at top when horizon out of view
 - Instantly shown at -13 degrees pitch
 - Removed when pitch greater than -12 degrees
- Pitched down condition (above 20,000 feet):
 - Sky parks at horizon line position
 - Horizon out of view at -13.1 degrees
 - Instantly shown at -11 degrees
 - Removed when pitch greater than -10 degrees

- Pitched up condition (below 20,000 feet):
 - Brown ground reference parks at bottom
 - Instantly shown at +13 degrees pitch
 - Removed when pitch less than +12 degrees
- Pitched up condition (above 20,000 feet):
 - Ground parks at horizon line position
 - Horizon out of view at +13.1 degrees
 - Instantly shown at +11 degrees
 - Removed when pitch less than +10 degrees



SVS System Removal Conditions:

- SVS selected OFF via menu
- SVS failure detected
- Compressed PFD format selected
- Incorrect BARO setting below terrain (ground only)
- Unusual attitude occurrence
- Data miscompare conditions:
 - Heading, pitch, or roll miscompare
 - Airspeed or altitude miscompare
 - Attitude or Mach miscompare
- Display attitude differs from SVS image attitude
- Video image invalid or VIU failure

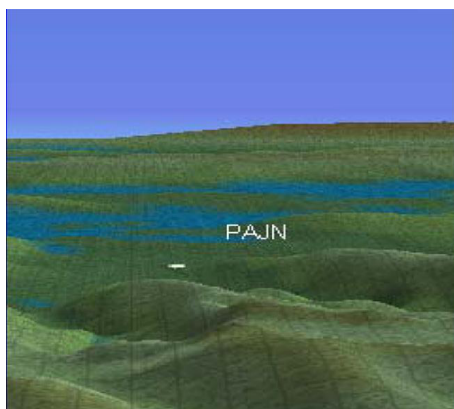


SVS Annunciations:

- SVS INOP message displayed when:
 - PFD-PFD or PFD-SVS pitch/roll/heading miscompare
 - GPS position accuracy inadequate
 - SVS safety monitor failure
 - SVC BIT or AFD video input failure
 - SVC terrain database failure
- SVS RWY INOP message displayed when:
 - SVC airport/runway database failure
 - Airport and runway symbols removed
 - SVS image remains displayed
- Annunciations positioned below airspeed tape
- SVS INOP takes precedence over SVS RWY INOP

SVS Airports/Runways:

- Depiction of airport/runway requires an active flight plan in the FMS
- Airport symbol shows when 10-15 NM out
- Runway symbol is shown within 10 NM if runway selected in FMS
- Extended centerline is shown out to 7.5 NM
- Origin runway is removed 20 seconds after airborne
- Arrival runway is removed 120 seconds after landing
- Runway marking are generic and may not match actual markings
- Markings include identifier, centerline and threshold

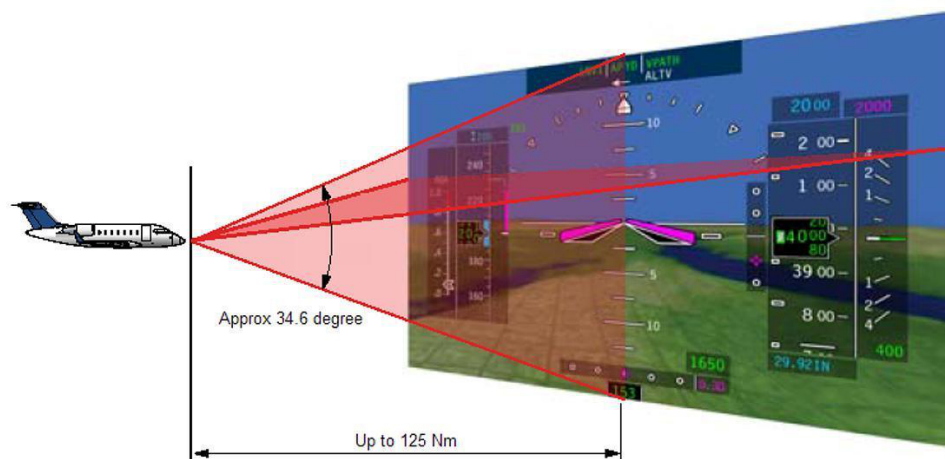


SVS Field of View:

- Conformal to the pitch tape
- 50° horizontal 34.6° vertical and up to 125 NM



Approx 50 degree

**HORIZONTAL VIEW**

Approx 34.6 degree

Up to 125 Nm

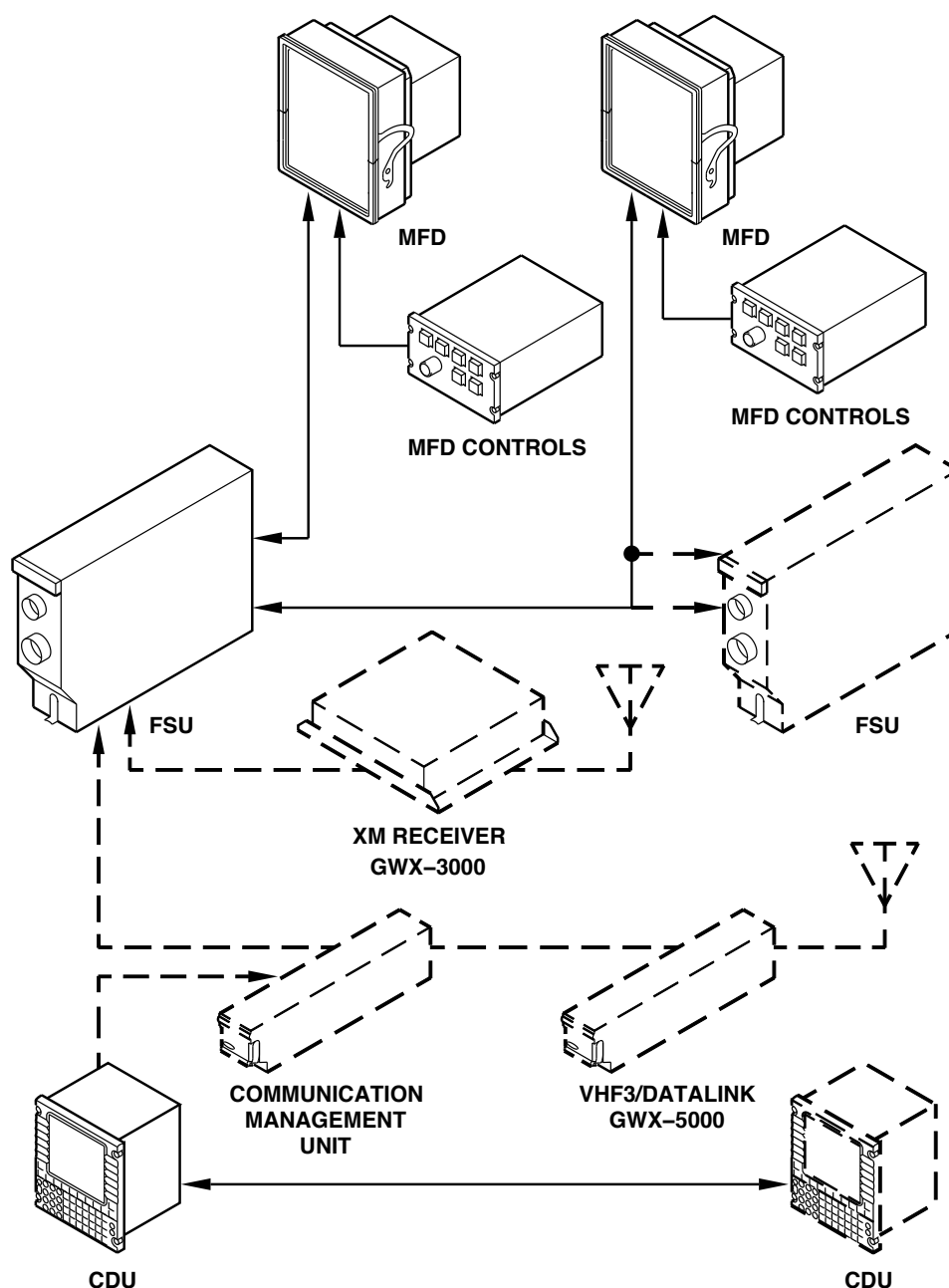
VERTICAL VIEW



XI. INTEGRATED FLIGHT INFORMATION SYSTEM (IFIS)

The Integrated Flight Information System (IFIS) is fundamentally a Multifunction Display (MFD) upgrade intended to provide the flight crew with enhanced situational awareness. The IFIS integrates features such as Electronic Charts (E-Charts), Enhanced Map Overlays, and Graphical Weather (GWX) directly onto the MFD displays. Central to the system is the File Server Unit (FSU), which manages the processing and storage for all IFIS functions.

The system relies on various databases (including charts, airspace, airways, and graphical weather) and displays geopolitical boundaries, airspace, and airways on the MFD (Enhanced Map overlays). The IFIS does not include enroute charts, and all weather products displayed are considered advisory in nature.



A. IFIS COMPONENTS

System Architecture:

- One or two File Server Units (FSUs)
- Two Multifunction Controls
- Two MFD displays
- XM Weather Receiver (optional)
- Database storage and processing

B. ELECTRONIC CHARTS (ECH-5000)

Chart Capabilities:

- Approach plates
- Departure procedures (SIDs)
- Arrival procedures (STARs)
- Airport diagrams
- En route charts
- Terminal area charts
- Own-ship position overlay
- Dynamic zoom and pan functions

C. ENHANCED MAP OVERLAYS (OVL-5000)

Overlay Features:

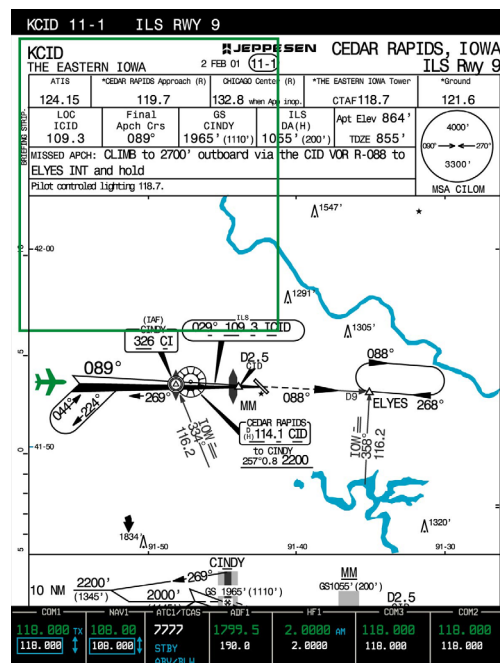
- Victor airways depiction
- Jet routes display
- Special use airspace boundaries
- Class B, C, D airspace
- Restricted and prohibited areas
- MOAs and warning areas
- Temporary flight restrictions (TFRs)
- Graphical TFR display with NOTAM ID

D. GRAPHICAL WEATHER (GWX-3002)

Weather Products Available:

US Weather Products:

- NEXRAD radar imagery
- Echo tops
- Icing conditions
- Turbulence
- Lightning strikes
- Cloud tops



Briefing Split View



- Winds aloft with arrows
- TAF/METAR reports
- SIGMET/AIRMET text
- Surface analysis
- Temporary flight restrictions

Canadian Weather Products:

- TAF and METAR reports
- Textual SIGMETS and AIRMETS
- High resolution NEXRAD radar
- Winds aloft data
- Radar coverage areas

Puerto Rico Weather Products:

- Radar coverage
- High resolution NEXRAD
- TFR information



Profile Split View

E. CHART ACCESS METHODS

Quick Access:

- Push CHART button on MFD control to display last viewed E-Chart
- Chart automatically selected by FMS when flight plan entered
- Loss of on-side FMS data prevents automatic fill-in of airports
- Select off-side FMS as NAV source to restore automatic fill-in

Manual Selection Methods:

- Via Chart Main Index menu
- Via Chart Type menu
- Via Chart List menu
- Using DATA knob to cycle through linked charts

F. CHART MAIN INDEX OPERATIONS

Accessing Chart Main Index:

- With E-Chart displayed, push UPR or LWR
- MENU button
- From Chart Type/List/NOTAM menu, push
- ESC button
- Airport Field Configuration:
- Origin - Supplied by FMS from flight plan
- Destination - Supplied by FMS from flight plan
- Alternate - Supplied by FMS from flight plan
- Other Airport - Manual entry by pilot



Minimums Split View

Shortcut Controls Available:

- ORIGIN shortcuts:
 - Airport
 - Departure
 - Any Chart
 - Chart NOTAMS
- DESTINATION shortcuts:
 - Arrival
 - Approach
 - Airport
 - Any Chart
 - Chart NOTAMS
- ALTERNATE/OTHER AIRPORT shortcuts:
 - Any Chart (two selections)
 - Chart NOTAMS

Shortcut Color Coding:

- Magenta - Chart selected automatically by FMS
- White - FMS found no match or multiple matches
- Cyan - Chart selected manually by pilot

G. CHART SELECTION PROCEDURES**Using ANY CHART Function:**

- Turn MENU ADV knob to position cursor on ANY CHART shortcut
- Push and hold PUSH SELECT button to access Chart Type menu
- Select from available chart types:
 - Approach
 - Airport
 - Departure
 - Arrival
 - Airspace
 - Noise

Direct Chart Selection:

- Turn MENU ADV knob to position cursor on desired chart shortcut
- Push PUSH SELECT button to display associated chart

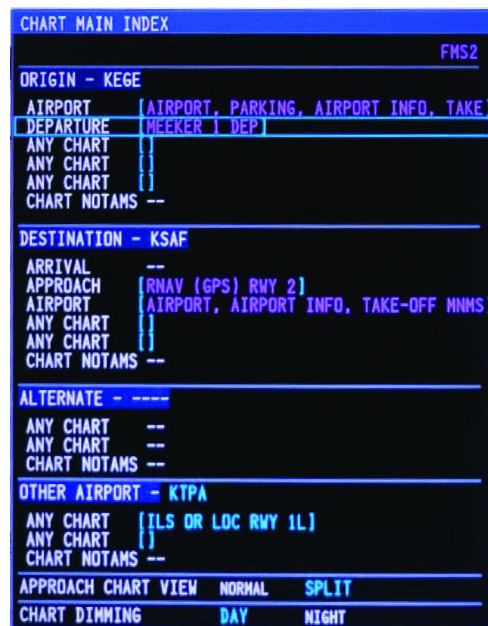


Chart Main Index View



Using Chart List:

- Access via Display Chart, Chart Main Index, or Chart Type menus
- Turn MENU ADV knob to position cursor on desired chart
- Push PUSH SELECT button to select chart for display

H. CHART MANIPULATION CONTROLS

Zoom Operations:

- ZOOM (+) button increases magnification
- ZOOM (-) button decreases magnification
- Operate joystick to move pan/zoom window to desired area
- Chart initially scaled with width filling display
- Landscape rotation rescales height to fill display

Pan Operations:

- Use joystick to move desired area into view when zoomed
- Horizontal joystick movement pans horizontally
- Vertical joystick movement pans vertically
- Last viewed pan position recalled when chart reselected

Orientation Control:

- Push orientation button (below CHART button) to rotate ninety degrees
- First push rotates chart ninety degrees
- Second push returns to original orientation
- Default orientation determined by chart database
- Last viewed orientation recalled when chart reselected

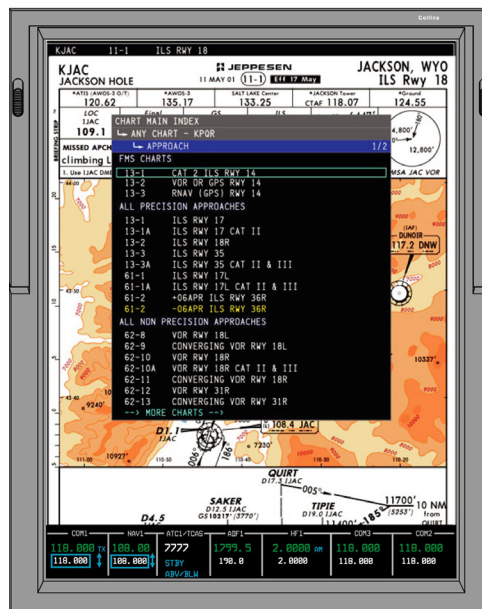
I. SPLIT VIEW OPERATIONS

Accessing Split View:

- Navigate to APPROACH CHART VIEW on Chart Main Index
- Turn DATA knob to select SPLIT option
- Push PUSH SELECT button when SPLIT becomes cyan

Split View Display Options:

- Top half - Chart display
- Bottom half selectable:
- BRIEFING - Briefing data display
- PROFILE - Approach profile view
- MINIMUMS - Minimums data



J. DATA ENTRY OPERATIONS

Airport Identifier Entry:

- Use MENU ADV knob to position cursor on data entry field
- Rotate DATA knob clockwise to move forward through characters
- Rotate DATA knob counterclockwise to move backward through characters
- Push PUSH SELECT to confirm entry

Cycling Through Linked Charts:

- With chart displayed, rotate DATA knob
- Cycles through charts associated with displayed airport

K. MENU NAVIGATION

Menu Tree Navigation:

- UPR MENU button - Display/remove upper menu
- LWR MENU button - Display/remove lower menu
- ESC button - Move up one level in menu tree
- PUSH SELECT button - Select highlighted item

Window Control with JSTK:

- Push JSTK button to change active window in split formats
- JOYSTICK annunciation arrow indicates active window
- Valid for Checklist, PPOS Map, Plan
- Map, 3D Plan Map, XM Weather

L. CHART STATUS INDICATIONS

Effectivity Messages:

- White text - Current chart
- Yellow text - Non-current chart
- OUT OF DATE - Chart cycle expired
- CHECK DATE - Unable to verify effectivity

FMS Integration Status:

- Loss of FMS data evident by unavailable auto fill-in
- Switching to off-side FMS restores functionality



M. CHART DIMMING CONTROL

Day/Night Selection:

- Turn MENU ADV knob to CHART DIMMING line item
- Turn DATA knob to select DAY or NIGHT
- Control located at bottom of Chart Main Index

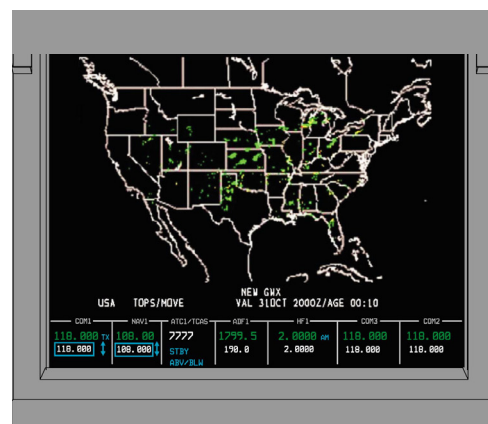
N. NOTAMS ACCESS

Viewing Chart NOTAMS:

- Access from CHART NOTAMS shortcut on Chart Main Index
- Displays NOTAMS for selected airport
- NOTAM summary and details shown
- Data entry field allows selection of specific NOTAM

NOTAM Display Fields:

- NOTAM type
- Effectivity dates
- Begin/end dates
- Summary information
- Detailed NOTAM text



XII. DISPLAY FAILURE FLAGS AND ANNUNCIATIONS

A. PFD/MFD FLAGS

Critical Failures (Red Flags):

WARNING PFD/MFD Flags

Critical failures displayed in red

Message	Meaning	Inhibits	Aural Warning
AOA	A red, boxed, AOA flag shows in a centered location in the AOA indicator field when no valid AOA data is available. The flag flashes for five seconds, then remains steady.	—	—
ALT	Indicates an invalid altitude source. Crosscheck standby instruments altitude to validate instruments	—	—
AP	Indicates a monitored autopilot disconnect	—	—
ATT	Indicates an invalid attitude source and shows in the center of the attitude sphere. Most likely cause is an IRS failure. The attitude ball, pitch tape, and roll pointer are removed when the ATT flag is in view.	—	—
FD	Indicates a fault in the flight guidance computer	—	—
FMS 1 FMS 2	Indicates that data from the active nav source is missing or invalid	—	—
LOC 1 LOC 2	Indicates that data from the active nav source is missing or invalid	—	—
VOR 1 VOR 2	Indicates that data from the active source is missing or invalid	—	—
HDG	Indicates an invalid heading source and shows in place of the heading digital readout in the center of the PFD. Most likely cause is an IRS failure. The compass is positioned so North is directly under the lubber line when the HDG flag is in view.	—	—
IAS	Indicates an invalid air data source and illuminates in the center of the airspeed tape	—	—
LSC	Shows when no stall warning speed comparison is available and the LSC will not show	—	—
MACH	Indicates an invalid air data source and illuminates in the center of the airspeed tape	—	—
RA	Indicates an unreliable radar altitude	—	—
VNV	Indicates when VNAV data from the FMS is missing or invalid	—	—
VS	Indicates in place of the vertical speed scale when vertical speed data from the air data computer is missing or invalid	—	—



B. COMPARATOR FLAGS (AMBER)

CAUTION MESSAGES

Timely crew awareness/action needed - Each accompanied by a single chime

Message	Meaning	Inhibits	Aural Warning
AIR DATA 1 (2) FAULT	The angle of attack input to the ADC has failed. The affected altitude may indicate up to 150 ft low	TO/LAND	—
EFIS COMPARATOR INOP	The EFIS comparator is unable to compare one or more of the following parameters: altitude, airspeed, roll attitude, pitch attitude, heading, radio altitude, flight director, localizer or glideslope, FMS lateral and vertical deviation pointers.	TO/LAND	—
EFIS MISCOMPARE	There is a mismatch between the onside and cross-side data. Accompanied by an amber PFD annunciation (flag): ALT, IAS, ROL, PIT, ATT, HDG, LOC, GS, RA, or FD	—	—
L IAPS FAIL	The left integrated processing system has failed	TO/LAND	—
R IAPS FAIL	The right integrated processing system has failed	TO/LAND	—
PFD X-TALK FAIL	Communication between the PFDs has failed. REFs menu pages 1, 2 and 3 are not synchronized. The EFIS comparator will be inoperative and is unable to compare one or more of the following parameters: altitude, airspeed, roll, attitude, pitch attitude, heading, radio altitude, flight director, localizer or glideslope	TO/LAND	—

ADVISORY MESSAGES

Crew awareness - no immediate action required

Message	Meaning	Inhibits	Aural Warning
DCU FAN FAIL	The avionics data concentrator unit fan has failed	TO/LAND	—
DCU FAULT	Channel A or B in the data concentrator unit has failed, the yaw damper may fail. The rudder travel limiter monitoring may be inoperative.	TO/LAND	—
IAPS FAN FAULT	The IAPS is indicating an over temperature condition or fan failure. Opening avionics rack doors and/or lowering cabin and cockpit temperatures may aid in cooling	TO/LAND	—
MFD X-TALK FAIL	Communication between the MFDs has failed, and cross side tuning will not be available	TO/LAND	—
RDC FAN FAIL	The remote data concentrator fan is inoperative.	TO/LAND	—
RDC FAULT	Channel A or B of the remote data concentrator has failed with no loss of functionality	TO/LAND	—

Status Messages:

STATUS MESSAGES

Information only - No crew action required

Message	Meaning	Inhibits	Aural Warning
IRS 1 IN ATT	IRU 1 is in Attitude mode.	—	—
IRS 2 IN ATT	IRU 2 is in Attitude mode.	—	—
STBY INST OFF	The standby instrument has been selected OFF.	—	—

B. COMPARATOR FLAGS

- **IAS** - Displays when the difference between the two airspeed values is not within 10 knots.
- **ALT** - Displays when the difference between the two pressure altitude values is not within the limit.
- **PIT** - Displays when the pitch data between the two Attitude Heading Computers (AHCs) is out of limits.
- **ROL** - Displays when the roll data between the two AHCs is out of limits.
- **ATT** - Displays when both the pitch and roll data between the two AHCs are out of limits.
- **FD** - Displays during a monitored approach when the difference between the two flight director steering commands is not within limits.
- **FMS** - Displays during an LPV approach when the difference between the two LPV (or ANP) lateral deviations is not within the limit.
- **GS** - Displays during a monitored approach when the difference between the two glideslope deviations is not within the limit.
- **HDG** - Displays when the difference between the two heading values is not within 6 degrees (active whenever the roll angle is less than or equal to 20 degrees).
- **LOC** - Displays during a monitored approach when the difference between the two localizer deviations is not within the limit.
- **MACH** - Displays when the difference between the two Mach values is greater than .03 Mach.
- **RA** - Displays when the difference between the radio altitudes supplied to the on-side and cross-side is not within the limit (active whenever the radio altitude is less than 2,450 feet AGL).
- **VNV** - Displays during an LPV approach when the difference between the FMS-computed vertical deviation from each AFD exceeds the comparator limit.
- **VSPD** - Displays if any on-side FMS VSPEED is 2 or more knots different from its cross-side counterpart, or if a PFD cannot compare VSPEEDS from both FMSs.
- **STAB** - Replaces the horizontal stabilizer trim legend on the Primary Flight Controls display when a miscompare condition exists.
- **Tilt** - The tilt value changes to amber if the tilt value commanded and the tilt value returned from the weather radar disagree for more than 5 seconds.

C. SYSTEM WARNING FLAGS (RED)

- **ALT** - Displays when the barometric altitude data from the Air Data Computer (ADC) is missing or invalid.
- **AOA** - Displays when no valid AOA data is available, or when the stall protection system fails.



- **AP** - Flashes red to indicate that the autopilot has disengaged manually or automatically.
- **ATT** - Displays when the attitude data from the selected AHRS or IRS is missing or invalid.
- **FD** - Displays when there is a detected fault in the Flight Guidance Computer (FGC) or the signals required for basic flight director operation.
- **GS** - Displays when the localizer (LOC) is the active NAV source and the vertical deviation data is missing or invalid.
- **HDG** - Displays when heading data from the AHC/IRS is missing or invalid.
- **IAS** - Displays when the indicated airspeed data from the ADC is missing or invalid.
- **LOC or FMS** - Displays when the lateral deviation data from the active NAV source (LOC or FMS) is missing or invalid.
- **LSC** - Displays when the data required to compute the low speed cue marker is unavailable, indicating no stall warning speed comparison is available.
- **MACH** - Displays when Mach data from the ADC is missing or invalid when the airspeed reaches or exceeds .99 Mach.
- **NAV Source (VOR1, VOR2, LOC1, LOC2, FMS1, FMS2)** - The active NAV source message turns red and is boxed when data from that active NAV source is missing or invalid.
- **RA** - Displays when radio altitude data is missing or invalid.
- **STALL** - Displays when a stall condition is detected by the Stall Protection Computer (SPC).
- **VNAV / VNV -J**: Displays when VNAV data from the FMS is missing or invalid.
- **VS** - Displays when vertical speed data from the ADC is missing or invalid

D. SYSTEM FAULT/CAUTION FLAGS (AMBER/CYAN)

- **CCP** - Displays in amber when the Cursor Control Panel (CCP) is reported as failed.
- **DCP** - Displays in amber when the Display Control Panel (DCP) is reported as failed.
- **LOCx (Preselect NAV Source)** - Displays struck through with a cyan line if the preselect localizer is invalid or erroneous.
- **LX FAIL** - Displays in amber when a Lightning Detection System (LDS) fault is reported while the lightning overlay is selected.
- **MAP** - Displays in amber if a fault is detected in any data that is required to show the map.
- **TCAS FAIL** - Displays in amber when a TCAS system fault is detected.
- **TERRAIN FAIL** - Displays in amber when the Terrain Awareness Warning System (TAWS) is reported as failed.
- **TERRAIN NOT AVAILABLE** - Displays in amber when TAWS is reporting that terrain data is not available for the current location.
- **WX FAIL** - Displays in amber when weather data is not available to the display while the weather radar overlay is selected.
- **WX FAULT** - Displays in amber when the weather radar reports itself as failed.
- **XTLK** - Displays in amber when a PFD or MFD loses communication with any other PFD or MFD.
- **YD** - Displays in amber to indicate the yaw damper has disengaged (e.g., manually, automatically due to limits, or because data from the FGC is missing).

XIII. EICAS MESSAGES

WARNING MESSAGES

None specific to flight instruments system

CAUTION MESSAGES

CAUTION MESSAGES

Timely crew awareness/action needed - Each accompanied by a single chime

Message	Inhibits	Meaning	Aural
AIR SATA 1 (2) FAULT	TO/LAND	The angle of attack input to the ADC has failed. The affected altitude may indicate up to 150 ft low	-
EFIS COMPARATOR INOP	TO/LAND	The EFIS comparator is unable to compare one or more of the following parameters: altitude, airspeed, roll attitude, pitch attitude, heading, radio altitude, flight director, localizer or glideslope, FMS lateral and vertical deviation pointers.	-
EFIS MISCOMPARE	-	There is a mismatch between the onside and cross-side data. Accompanied by an amber PFD annunciation (flag): ATL, IAS, ROL, PIT, ATT, HDG, LOC, GS, RA, or FD	-
L IAPS FAIL	TO/LAND	The left integrated processing system has failed	-
R IAPS FAIL	TO/LAND	The right integrated processing system has failed	-
PFD X-TALK FAIL	TO/LAND	Communication between the PFDs has failed. REFs menu pages 1, 2 and 3 are not synchronized. The EFIS comparator will be inoperative and is unable to compare one or more of the following parameters: altitude, airspeed, roll, attitude, pitch attitude, heading, radio altitude, flight director, localizer or glidescope.	-

ADVISORY MESSAGES

ADVISORY MESSAGES

Crew awareness - no immediate action required

Message	Inhibits	Meaning
DCU FAN FAIL	TO/LAND	The avionics data concentrator unit fan has failed.
DCU FAULT	TO/LAND	Channel A or B in the data contractor unit has failed, the yaw damper may fail. The rudder travel limiter monitoring may be inoperative.
IAPS FAN FAULT	TO/LAND	The IAPS indicating an over temperature condition or fan failure. Opening avionics rack doors and/or lowering cabin and cockpit temperatures may aid in cooling.
MFD X-TALK FAIL	TO/LAND	Communication between the MFDs has failed, and cross side tuning will not be available.
RDC FAN FAIL	TO/LAND	The remote data concentrator fan is inoperative.
RDC FAULT	TO/LAND	Channel A or B of the remote data concentrator has failed with no loss of functionality.



STATUS MESSAGES

STATUS MESSAGES

Information only - No crew action required

Message	Inhibits	Meaning	Aural
IRS 1 IN ATT	-	IRU 1 is in Attitude mode.	-
RS 2 IN ATT	-	IRU 2 is in Attitude mode.	-
STBY INST OFF	-	The standby instrument has been selected OFF.	-

XIV. LIMITATIONS

DISPLAY LIMITATIONS

- Synthetic Vision System not approved for operational credit
- SVS not to be used as sole reference for any flight task

XV. CIRCUIT BREAKER

Flight Instruments System Circuit Breakers

CB Name	Bus	Location
PFD 1	LEFT ESS	CB1-C3
PFD 2	RIGHT MAIN	CB2-C3
MFD 1	LEFT ESS	CB1-C5
MFD 2	RIGHT MAIN	CB2-C5
DCP 1	LEFT ESS	CB1-C4
DCP 2	RIGHT MAIN	CB2-C4
IRU 1	LEFT ESS	CB1-C2
IRU 2	RIGHT MAIN	CB2-C2
ADC 1	LEFT ESS	CB1-B2
ADC 2	RIGHT ESS	CB2-B2
ISI	LEFT ESS	CB1-B3
CLOCK	LEFT ESS	CB3-F9
CLOCK STBY	LEFT BATT	CB3-F8
SVC/VIU	RIGHT MAIN	CB2-A7
FSU 1	LEFT MAIN	CB1-C6
FSU 2	RIGHT MAIN	CB2-D6
XM WX	LEFT MAIN	CB1-C7
PFD 1 HTR	LEFT MAIN	CB3-F6
PFD 2 HTR	RIGHT MAIN	CB4-F6
MFD 1 HTR	LEFT MAIN	CB3-F7
MFD 2 HTR	RIGHT MAIN	CB4-F7

This page intentionally left blank



XVI. CHAPTER 18 QUIZ

- 1) How many adaptive flight displays (AFDs) are installed in the Challenger 350 EFIS?
 - A) 2
 - B) 3
 - C) 4
 - D) 5
- 2) What is the normal alignment time for the Integrated Standby Instrument (ISI)?
 - A) 30 seconds
 - B) 70 seconds
 - C) 90 seconds
 - D) 120 seconds
- 3) What is the tilt range for the weather radar in manual mode?
 - A) -10° to +10°
 - B) -15° to +15°
 - C) -20° to +20°
 - D) -30° to +30°
- 4) Which button on the Display Control Panel toggles between PPOS and ROSE formats?
 - A) NAV SRC
 - B) TFC
 - C) FRMT
 - D) BRG SRC
- 5) At what altitude does the radio altitude display on the PFD?
 - A) Below 1,500 feet AGL
 - B) Below 2,000 feet AGL
 - C) Below 2,500 feet AGL
 - D) Below 3,000 feet AGL
- 6) What power source supplies the left PFD?
 - A) 28V DC L ESS BUS
 - B) 28V DC L MAIN BUS
 - C) 28V DC R MAIN BUS
 - D) 28V DC BATT BUS
- 7) Which system provides attitude, heading, and position data to the flight displays?
 - A) Air Data Computer
 - B) Flight Management System
 - C) Inertial Reference System
 - D) GPS only

- 8) How often is the SVS airport/runway database updated?
- A) Every 14 days
 - B) Every 28 days
 - C) Every 56 days
 - D) Never expires
- 9) What happens when the ATT/HDG reversion switch is placed in position 1?
- A) All displays use IRS 2 data
 - B) All displays use outside IRS data
 - C) All displays use IRS 1 data
 - D) IRS system is disabled
- 10) Which CAS message indicates the EFIS cannot compare parameters between sides?
- A) EFIS MISCOMPARE
 - B) PFD X-TALK FAIL
 - C) EFIS COMPARATOR INOP
 - D) DCU FAULT
- 11) What is the default TCAS range when selected via long press of the TFC button?
- A) 5 nm
 - B) 10 nm
 - C) 20 nm
 - D) 40 nm
- 12) The ROAAS in-air warning occurs between which altitudes?
- A) 500 to 200 feet
 - B) 450 to 200 feet
 - C) 200 feet to touchdown
 - D) 100 feet to touchdown
- 13) Which button on the MCP is used to display electronic checklists?
- A) STAT
 - B) CKLS
 - C) ESC
 - D) SUMRY
- 14) What color indicates terrain 500 feet or more below the aircraft on TAWS?
- A) Red
 - B) Yellow
 - C) Green
 - D) Cyan
- 15) When DME HOLD is selected, what happens?
- A) DME frequency changes with VOR
 - B) DME holds current frequency while VOR can be tuned
 - C) DME is turned off
 - D) DME displays distance to next waypoint



16) Which switch position on the RSP TUNE selector enables emergency frequency?

- A) MFD ONLY
- B) CDU
- C) COM 1 121.50
- D) NORM

17) What indicates a Traffic Advisory on the TCAS display?

- A) White diamond
- B) Yellow circle
- C) Red square
- D) Cyan diamond

18) The Air Data Computer calculates all of the following EXCEPT:

- A) Pressure altitude
- B) True airspeed
- C) Angle of attack
- D) Wind speed and direction

19) How many File Server Units can be installed for IFIS?

- A) 1 only
- B) 1 or 2
- C) 2 only
- D) Up to 4

20) Which database for the SVS never expires?

- A) Airport database
- B) Runway database
- C) Terrain database
- D) Navigation database

This page intentionally left blank