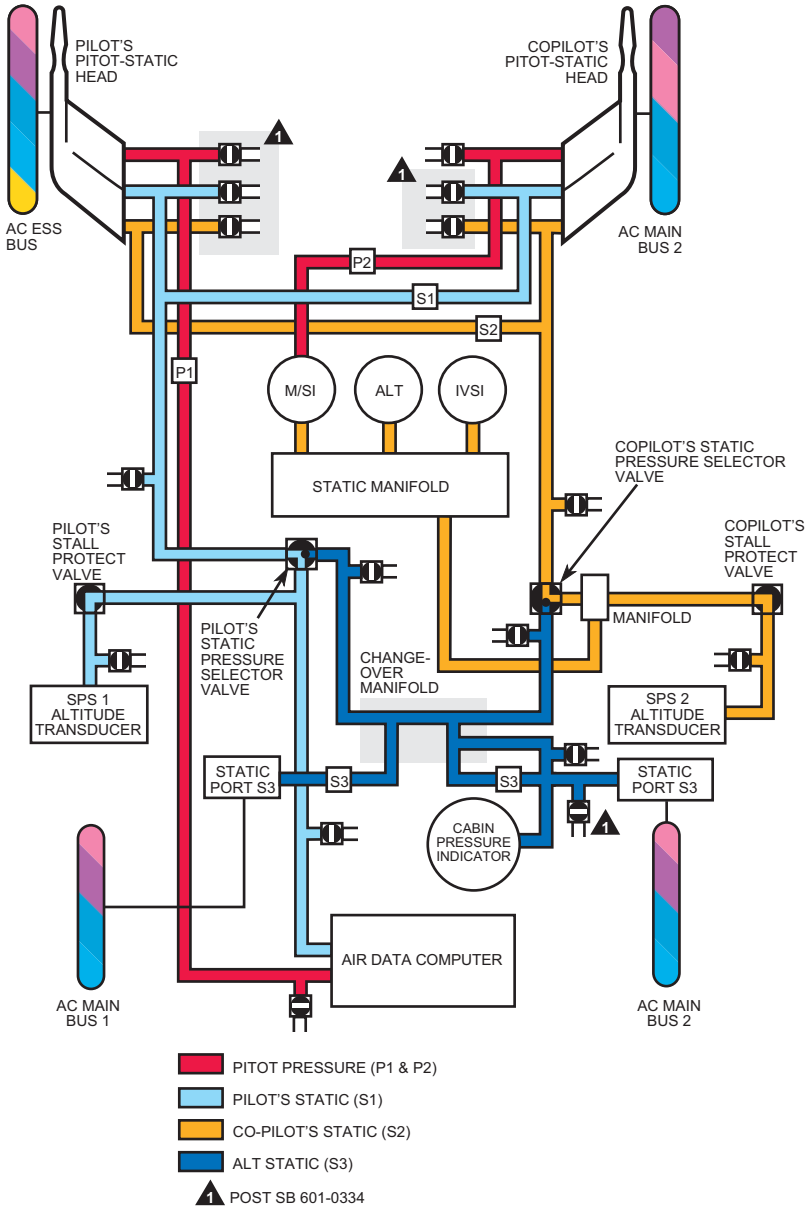
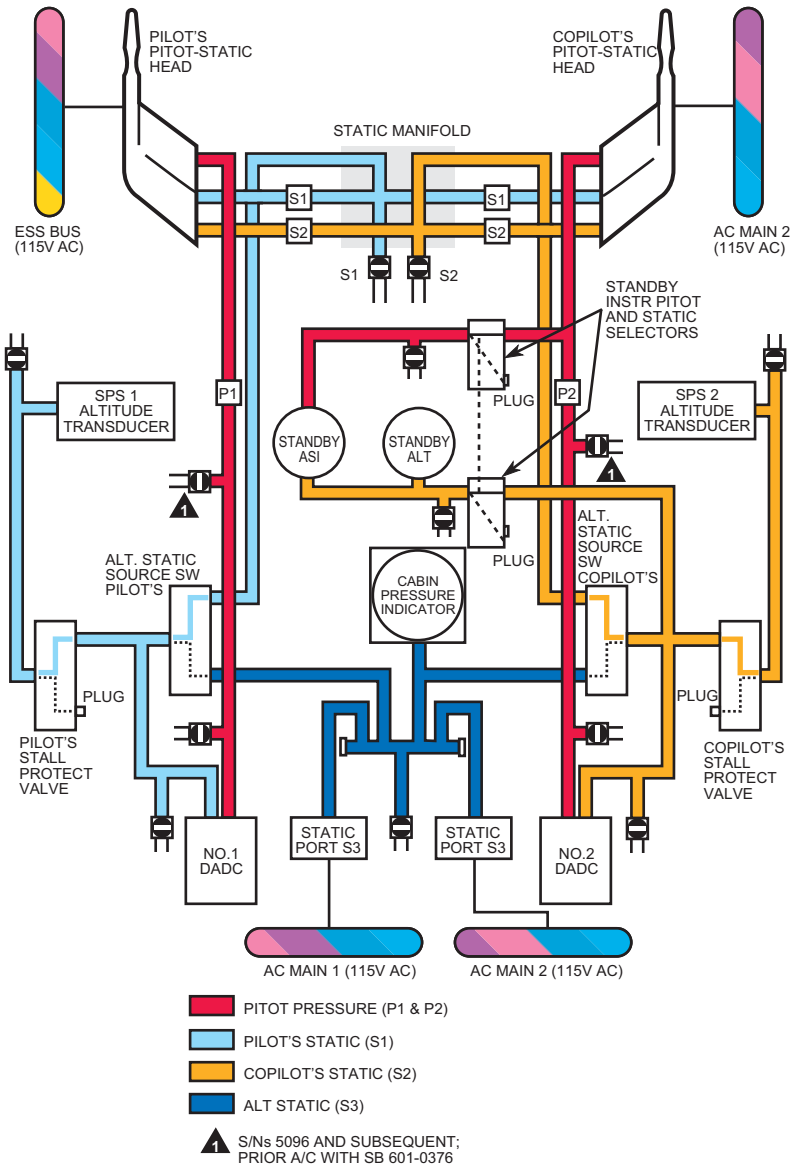
Pitot/Static System

S/Ns 3001-3066



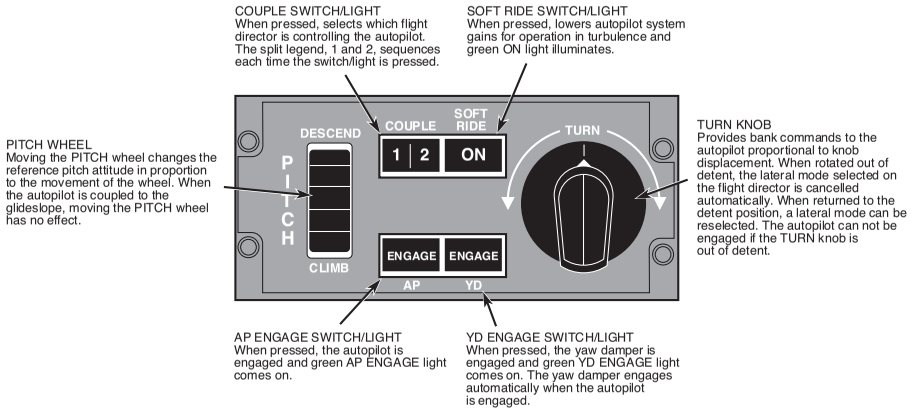
Pitot/Static System

S/N 5001 and Subsequent

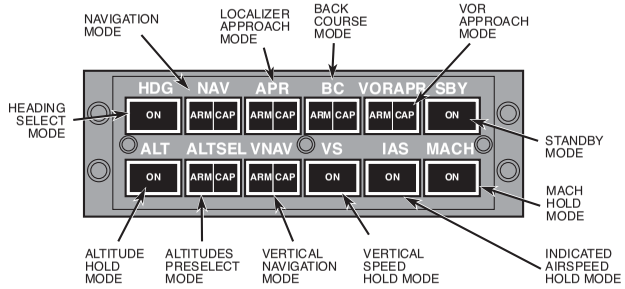


CL-601-1A

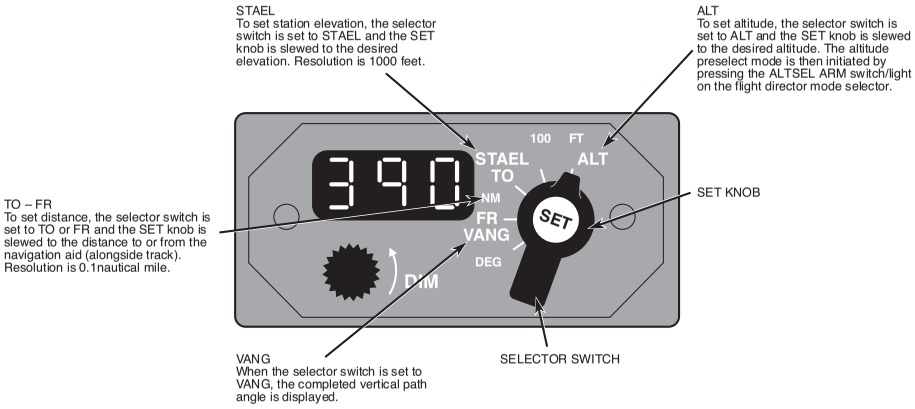
Autopilot Controller Panel



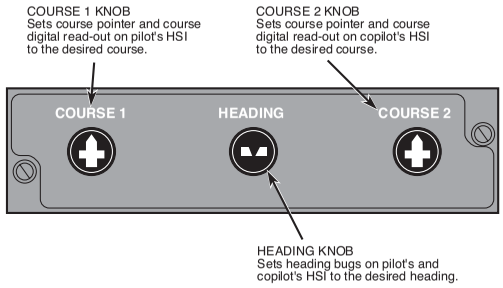
Flight Director Mode Selector



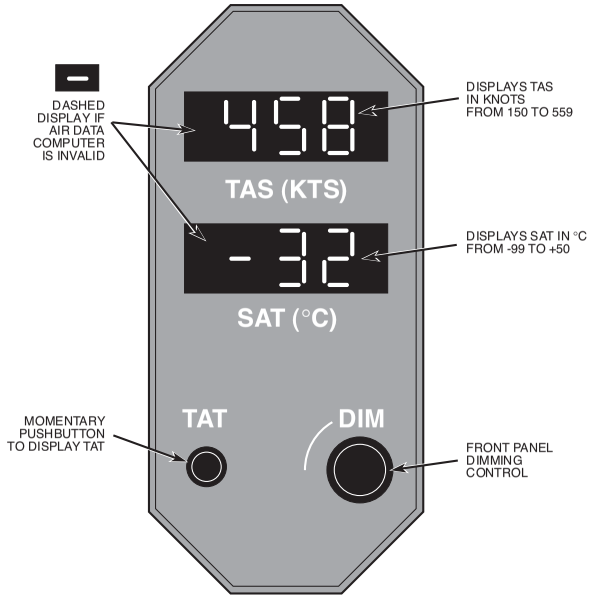
VNAV Computer Controller



Instrument Remote Controller



TAS/SAT/TAT Indicator



Status Panel

ROLL 1 SWITCH/LIGHT
Amber OFF light illuminates to indicate a malfunction and disengagement of ROLL 1 channel.

Pressing ROLL 1 switch/light when the autopilot is disengaged reverts the system to single channel ROLL 2 operation.

ROLL 2 SWITCH/LIGHT
Amber OFF light illuminates to indicate a malfunction and disengagement of ROLL 2 channel.

Pressing ROLL 2 switch/light when the autopilot is disengaged reverts the system to single channel ROLL 1 operation.

PITCH 1 SWITCH/LIGHT
Amber OFF light illuminates to indicate a malfunction and disengagement of PITCH 1 channel.

Pressing PITCH 1 switch/light when the autopilot is disengaged reverts the system to single channel PITCH 2 operation.

PITCH 2 SWITCH/LIGHT
Amber OFF light illuminates to indicate a malfunction and disengagement of PITCH 2 channel.

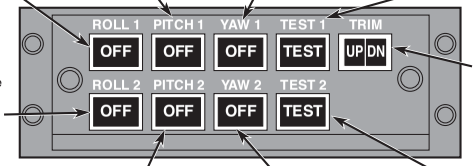
Pressing PITCH 2 switch/light when the autopilot is disengaged reverts the system to single channel PITCH 1 operation.

YAW 1 SWITCH/LIGHT
Amber OFF light illuminates to indicate a malfunction and disengagement of YAW 1 channel.

Pressing YAW 1 switch/light when the autopilot is disengaged reverts the system to single channel YAW 2 operation.

YAW 2 SWITCH/LIGHT
Amber OFF light illuminates to indicate a malfunction and disengagement of YAW 2 channel.

Pressing YAW 2 switch/light when the autopilot is disengaged reverts the system to single channel YAW 1 operation.



TEST 1 SWITCH
ROLL 1 OFF, PITCH 1 OFF and YAW 1 OFF lights illuminate when TEST 1 switch is pressed, indicating that the monitor brakes have been applied and that torque limiting is present in channel 1.

TRIM UP AND DN ANNUNCIATOR LIGHTS
Amber UP light comes on if a nose-up out of trim condition exists.

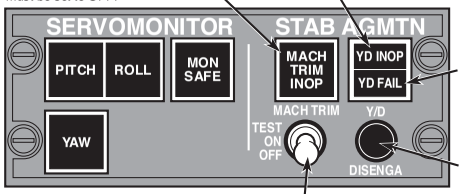
Amber DN light comes on if nose-down out of trim condition exists.

TEST 2 SWITCH
ROLL 2 OFF, PITCH 2 OFF and YAW 2 OFF lights illuminate when TEST 2 switch is pressed, indicating that the monitor brakes have been applied and that torque limiting is present in channel 2.

Stability Augmentation Control Panel

MACH TRIM INOP SWITCH/LIGHT
Amber MACH TRIM INOP light illuminates if MACH trim fails. When pressed, Mach trim is re-engaged. If light remains on, MACH TRIM TEST/ON/OFF switch must be set to OFF.

Y/D INOP SWITCH/LIGHT
Amber YD INOP light illuminates if yaw damper channel fails. When pressed, light is reset.



YD FAIL LIGHT
Red YD FAIL light flashes if there is a channel failure which autopilot and stability augmentation monitors can not identify. Light can not be reset.

Y/D DISENGA PUSHBUTTON
When pressed, disengages yaw damper (both channels if engaged).

MACH TRIM TEST/ON/OFF SWITCH
Three-position, spring-loaded switch.

ON-Mach trim is engaged.

TEST-When held at TEST, NUP STAB pointer on control surface trim indicator moves up. When released, MACH TRIM INOP light illuminates, FLT CONT light on 10-channel system annunciator illuminates, MASTER CAUTION/RESET switch/lights flash.

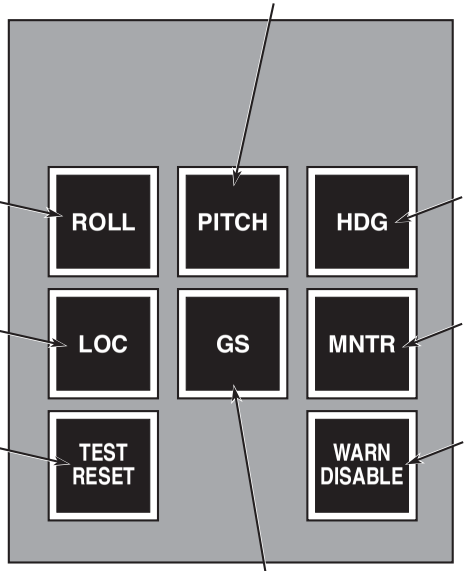
Instrument Comparator

PITCH LIGHT
Illuminates when a difference exists between the dual pitch channels.

ROLL LIGHT
Illuminates when a difference exists between the dual roll channels.

LOC LIGHT
Illuminates when a difference exists between the two localizer signals.

TEST RESET SWITCH/LIGHT
Tests the internal electronics and annunciator light.
Resets any prior disabled channel.



HDG LIGHT
Illuminates when a difference exists between the two heading signals 8 ± 2 degrees.

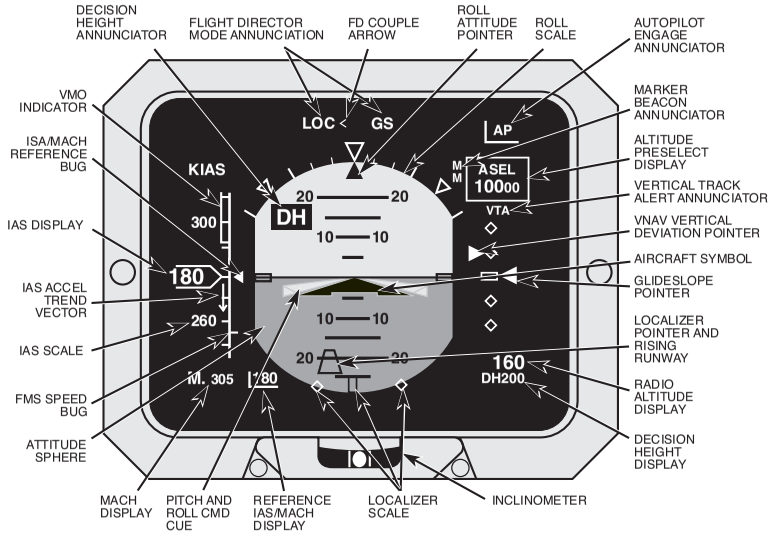
MNTR LIGHT
Illuminates when the internal power supply voltage drops below a predetermined level.

WARN DISABLE SWITCH/LIGHT
Amber light illuminates when one or more drive signals from the above six functions produce a master warning drive signal. Pressing the button disables all monitoring functions except the voltage monitor.

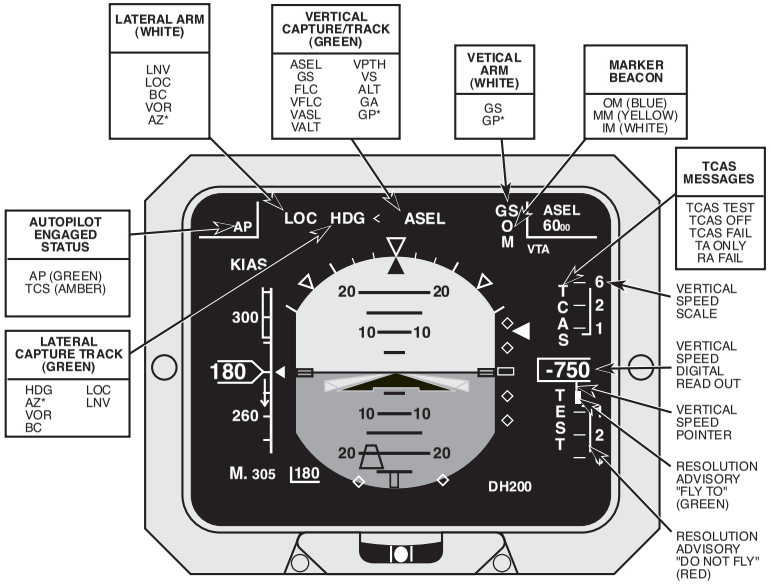
GS LIGHT
Comes on when a difference exists between the two glideslope signals.

CL-601-3A/3R

ED-800 EADI Displays and Annunciators

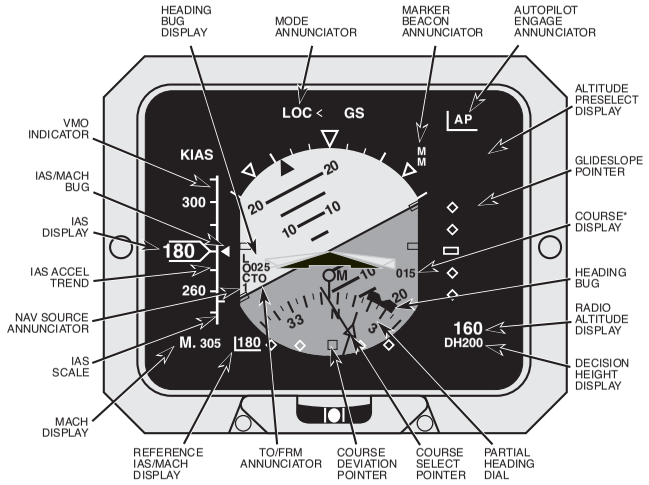


ED-800 EADI With Optional TCAS Symbology



* INDICATES MLS EQUIPPED AIRCRAFT ONLY.

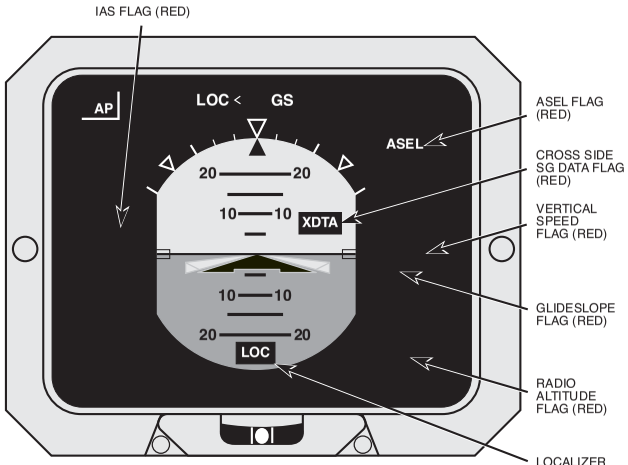
Composite Display Symbology



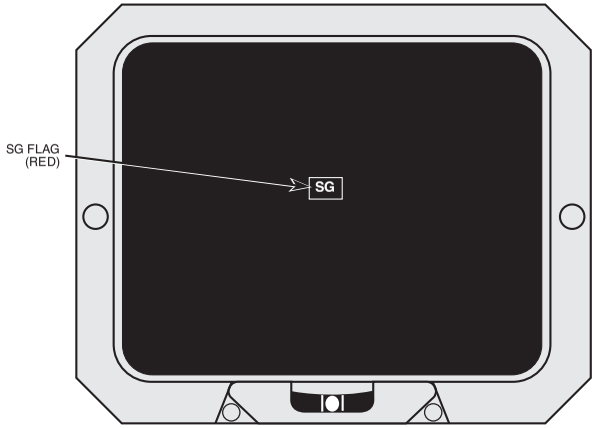
* COURSE AND HEADING SELECTIONS ARE REMOVED 5 SECONDS AFTER SETTING THE DESIRED COURSE OR HEADING.

NOTE: Composite display not available with Honeywell TCAS installed for presentation on EADI. Selecting the failed EADI or EHSI dimming knob to OFF displays the EADI on the remaining operating display. The EHSI display may be selected on the MFD.

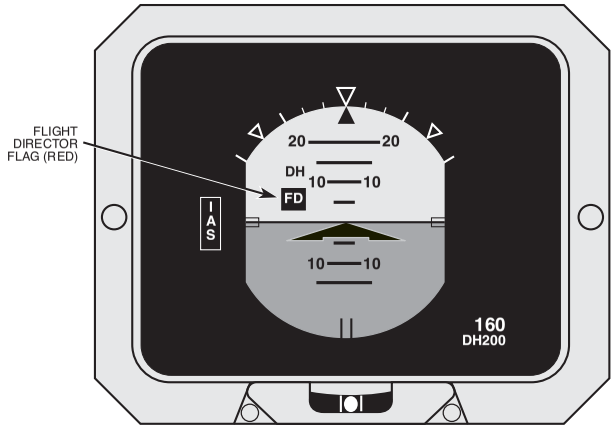
EADI Failure Flags and Annunciators



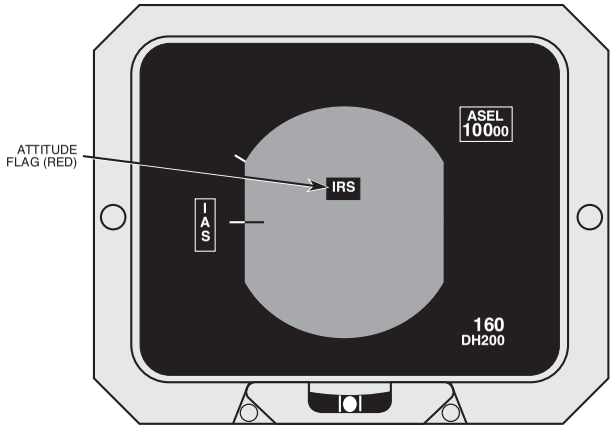
Symbol Generator Internal Failure Flag



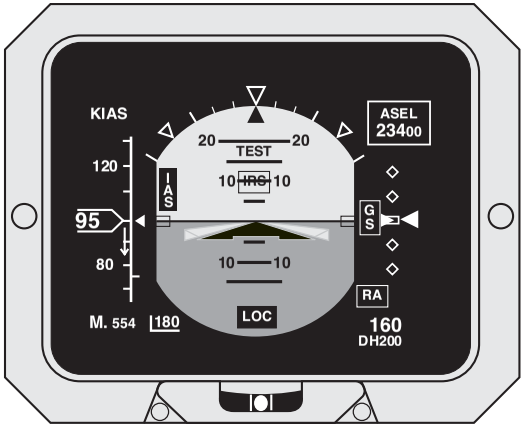
Flight Director Failure Flag



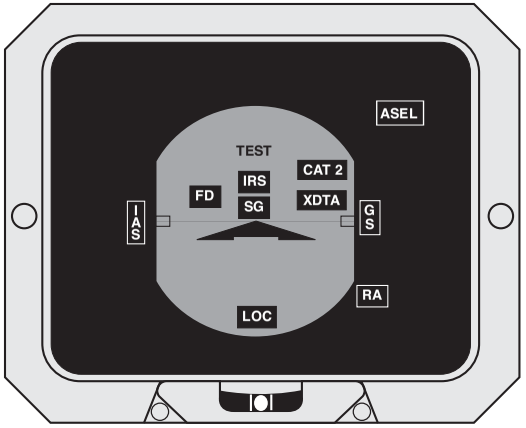
Attitude Failure Flag



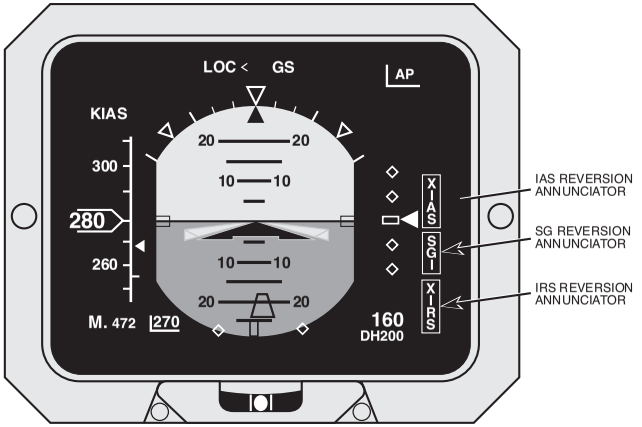
EADI Test Pattern (First 4 Seconds, Comparator Monitor ñ Amber)



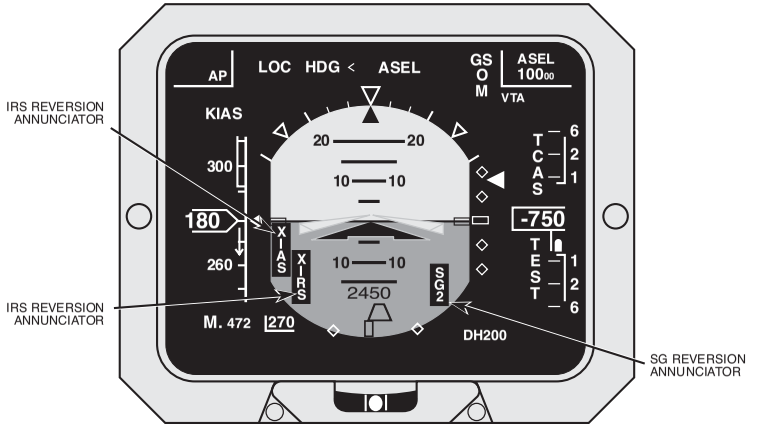
EADI Test Pattern (After 4 Seconds, Failure Flags ñ Red)



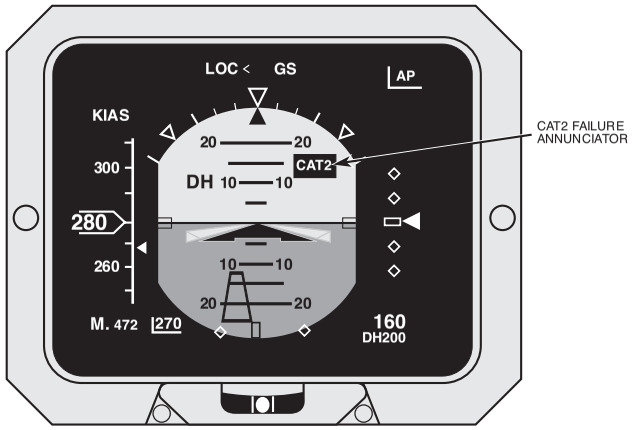
EADI Reversionary Mode Source Annunciators



EADI Reversionary Mode Source Annunciators, TCAS Installations



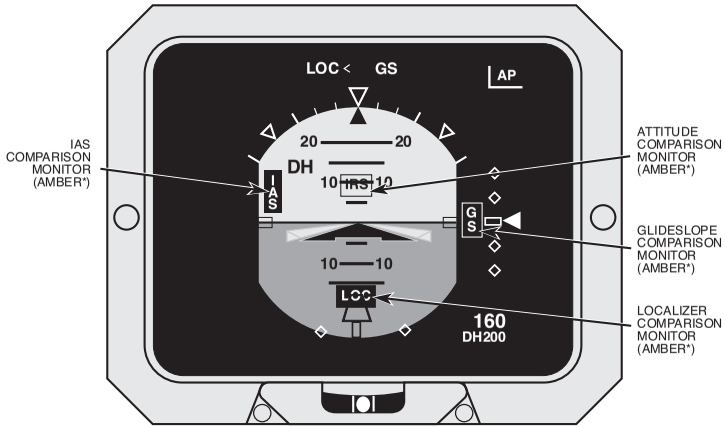
EFIS Control Panel



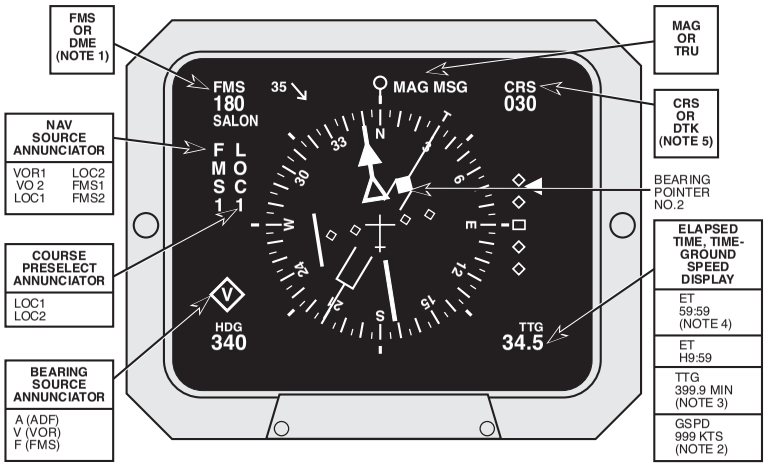
Deviation	Monitor Threshold	Operational Range
LOC	± 35 μA (≈ 1/3 dot)	Approach track to 300 ft
	± 20 μA (≈ 1/5 dot) disabled	300 ft to 100 ft 100 ft to touchdown
GS	± 35 μA (≈ 1/3 dot) ± 35 μA (≈ 1/3 dot) ± 65 μA (≈ 3/4 dot) disabled	Approach track to 300 ft 300 ft to 200 ft 200 ft to 100 ft 100 ft to touchdown

CAT 2 ILS Excessive Deviation Limits

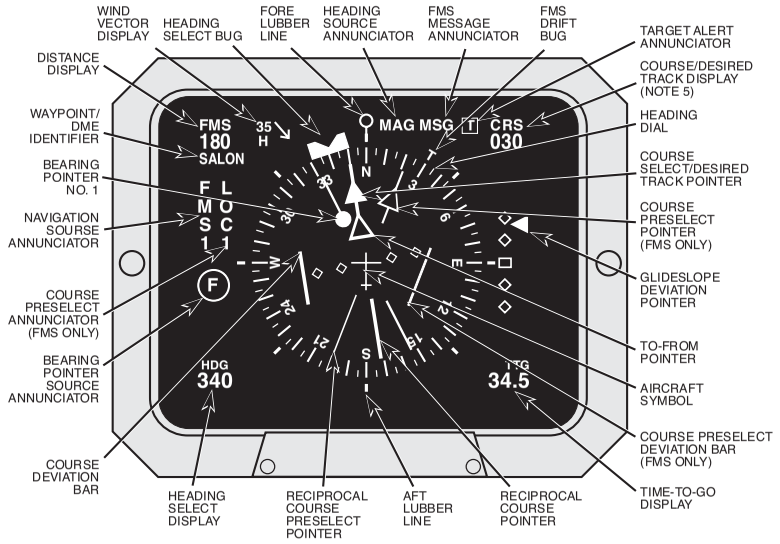
EADI Comparison Monitoring Symbology



ED-800 EHSI Displays and Annunciators



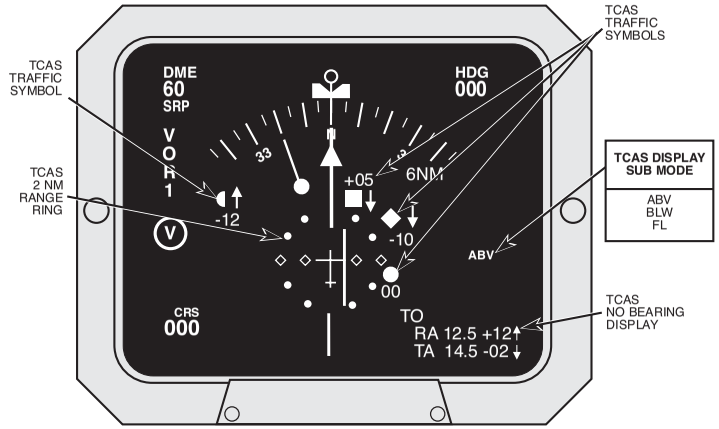
ED-800 EHSI Displays and Annunciators



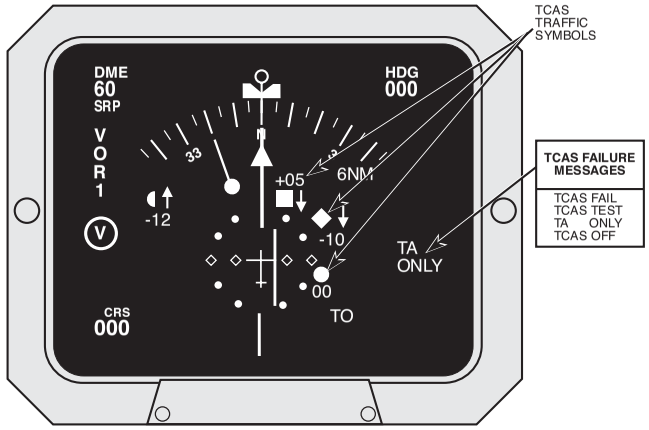
NOTES:

1. Distance is provided by the FMS:
   - To the next waypoint with FMS as the navigation source.
   - To the VOR station in the VOR mode if DME is not collocated with the VOR, or if DME is not valid.
   - If annunciator is FMS.
2. Ground speed is provided by:
   - The FMS in the FMS mode.
   - The IRS in all other modes.
3. Time-to-go is provided by:
   - The FMS in the FMS mode.
   - The FMS in the VOR mode with no collocated DME.
   - The DME and IRS with collocated DME.
4. Elapsed time is computed by the EFIS symbol generator.
5. With FMS selected and during course preselect, the CRS display appears during and for 5 seconds after rotation of the CRS knob and then reverts back to the DTK display.

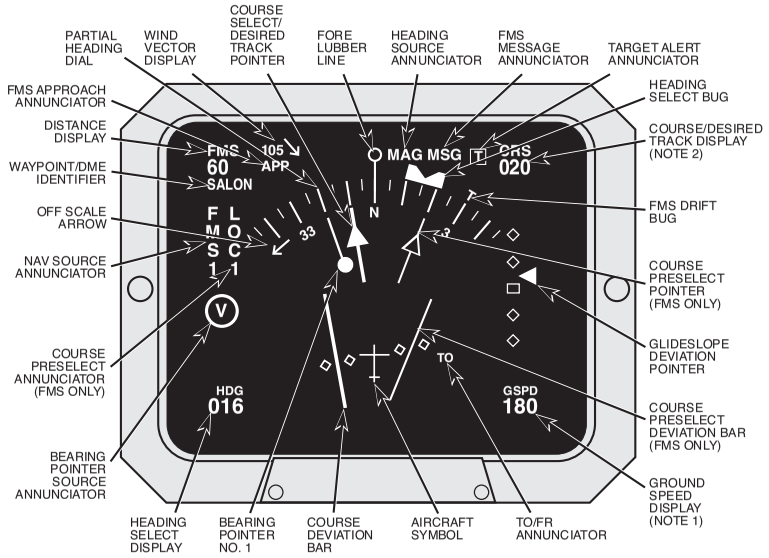
ED-800 EHSI Arc Display with TCAS



ED-800 EHSI Arc Display with TCAS Failure Messages



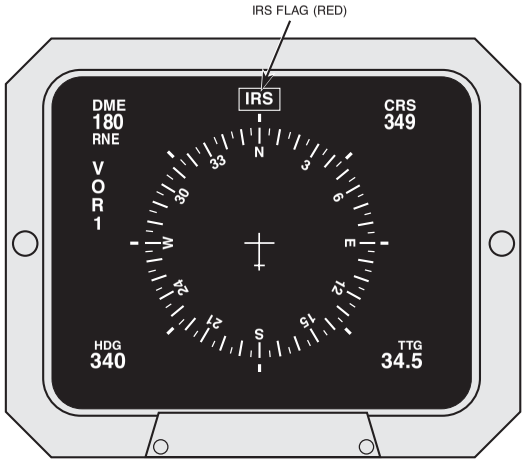
ED-800 EHSI Displays and Annunciators (Arc Mode)



NOTES:

1. Time-to-go and elapsed time is also displayed at this location.
2. With FMS selected and during course preselect, the CRS display appears during and for 5 seconds after rotation of the CRS knob and then reverts back to the DTK display.

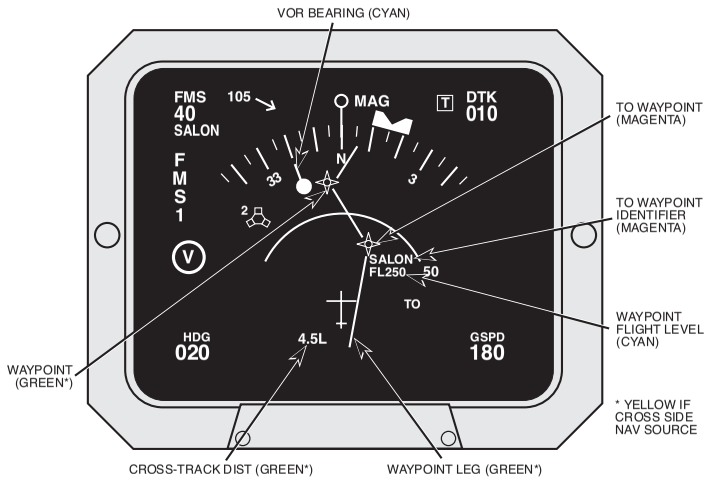
ED-800 EHSI Heading Failure Flag



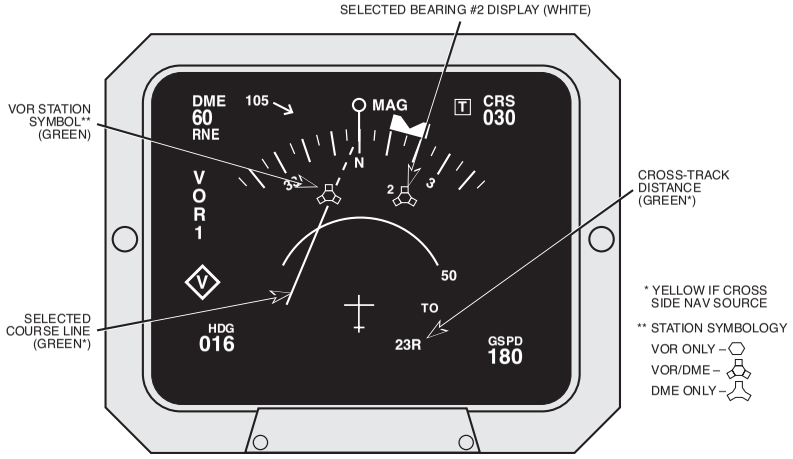
EHSI Heading Comparison Monitor

* FLASHING 10 SECONDS, THEN STEADY

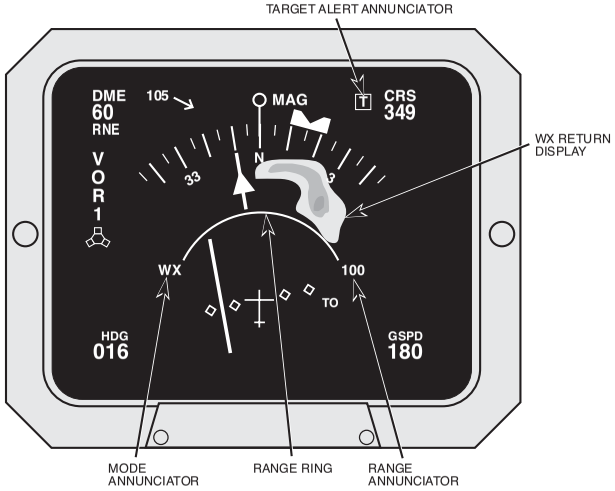
EHSI Map Format ñ FMS Selected for Display



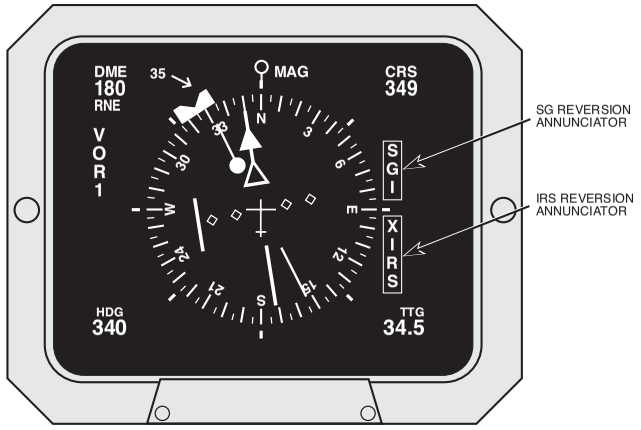
EH-800 EHSI Map Format ñ VOR Selected for Display



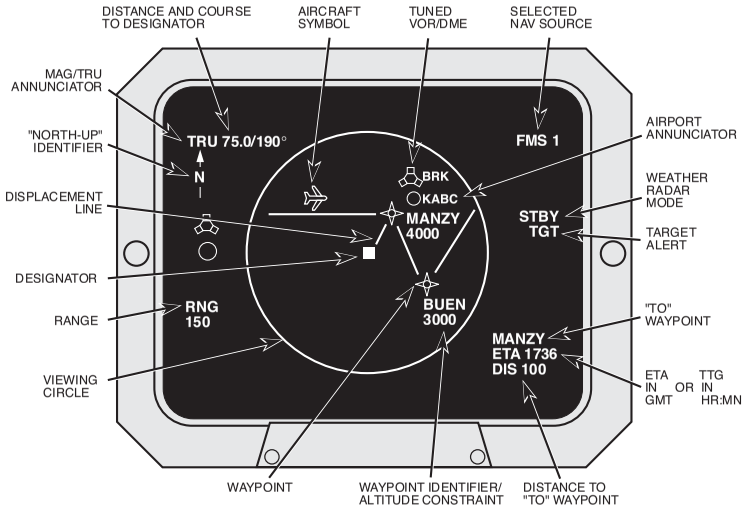
EHSI Weather Radar Mode and Target Alert Annunciations



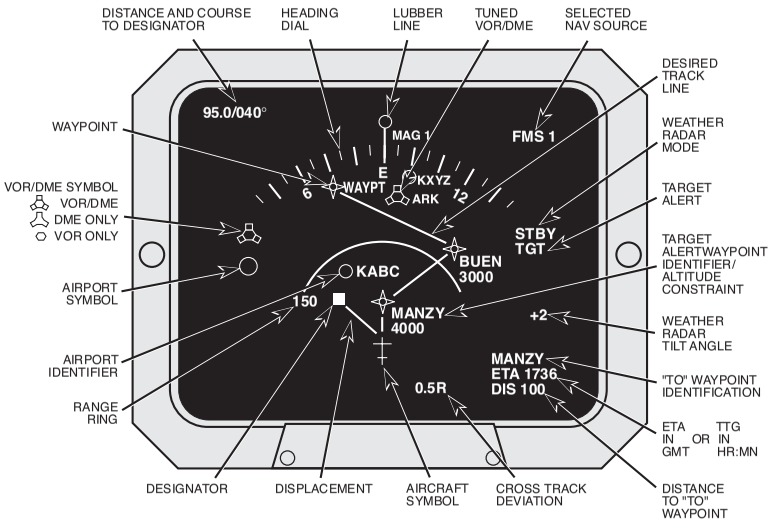
EHSI Reversionary Mode Source Annunciators



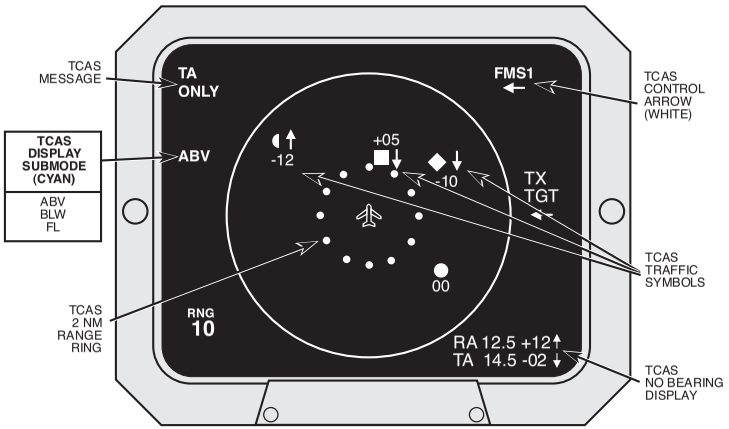
MFD Plan Mode Displays and Annunciators



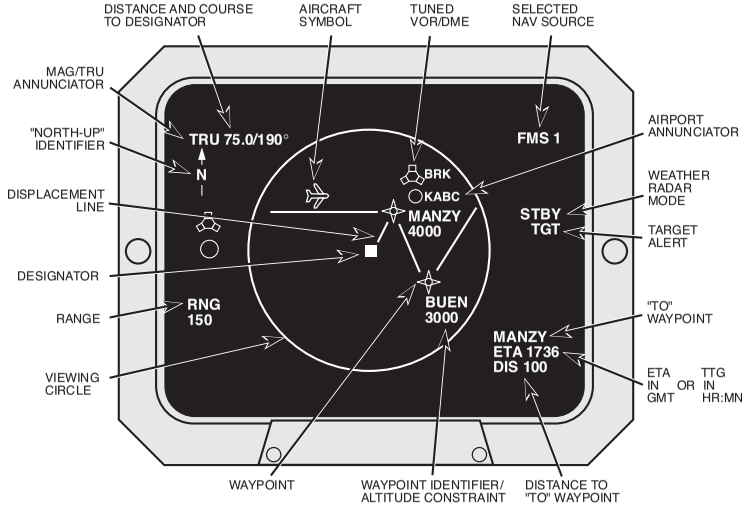
MFD Map Mode Displays and Annunciators



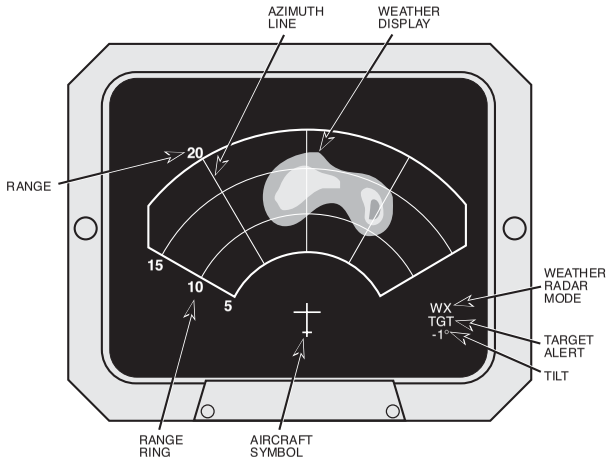
TCAS Traffic Display on MFD



MFD Plan Mode Displays and Annunciators

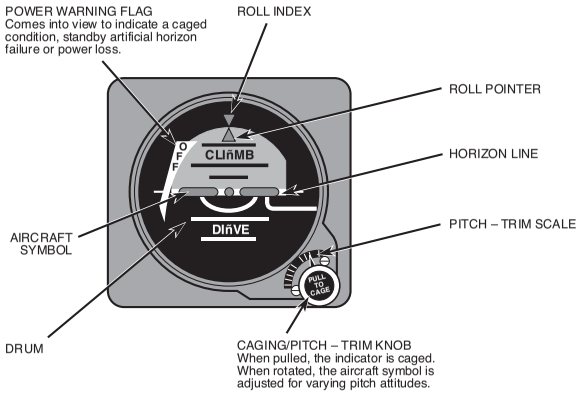


MFD WX Mode


AZIMUTH LINE
WEATHER DISPLAY
RANGE
20
15
10
5
WEATHER RADAR MODE
WX
TGT
-1°
TARGET ALERT
TILT
RANGE RING
AIRCRAFT SYMBOL

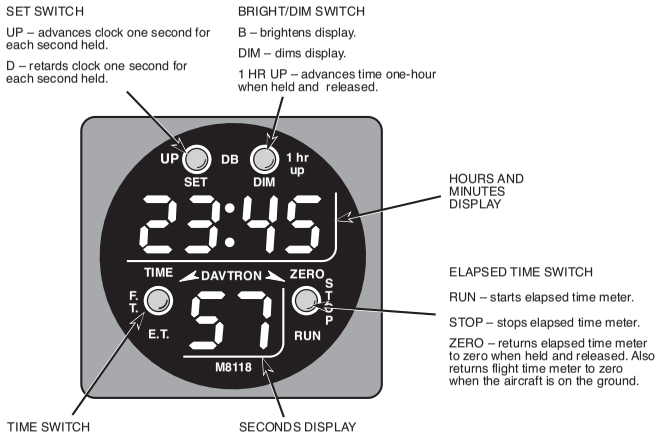
Standby Magnetic Compass

Standby Attitude Indicator

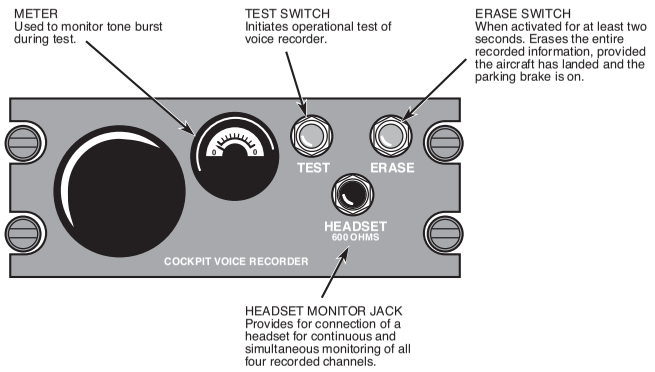


Digital Clock and Reset Button

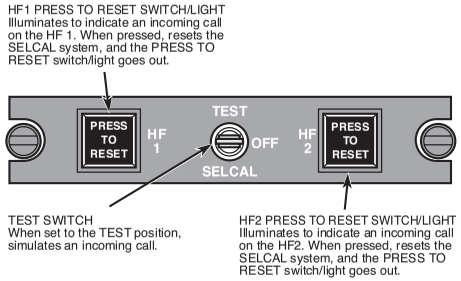
PRESS TO RESET PUSHBUTTON
Allows flight time recorder to be reset to zero without turning off aircraft electrical power.



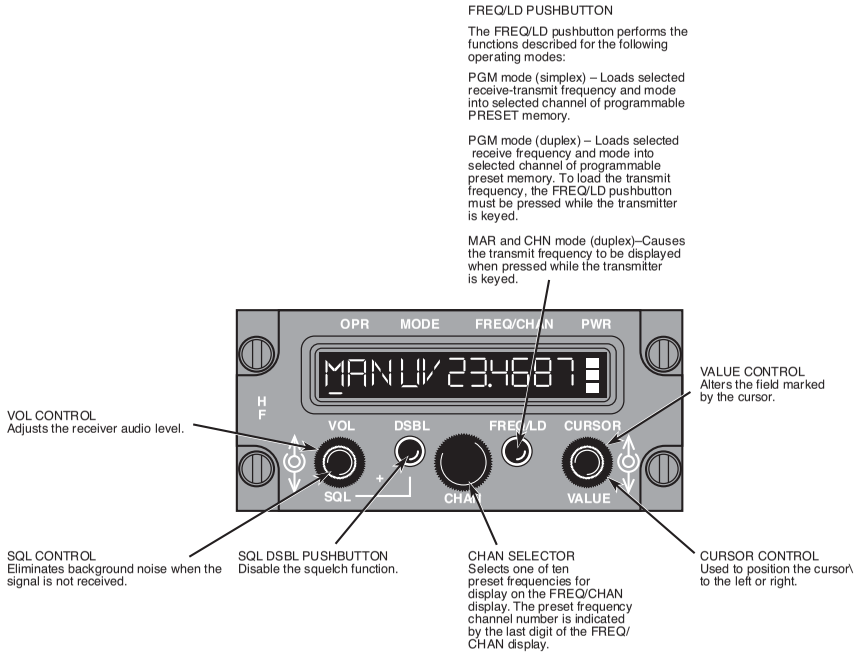
Cockpit Voice Recorder



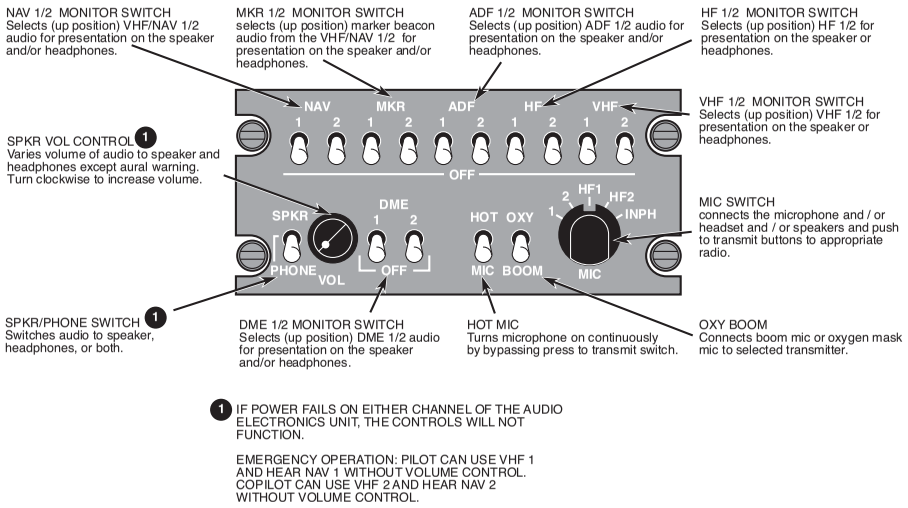
SELCAL Control Head



HF COMM Control Head



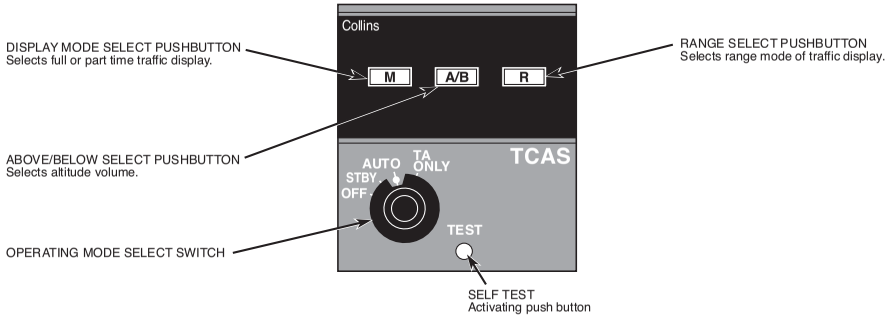
Pilotís and Copilotís Side Console



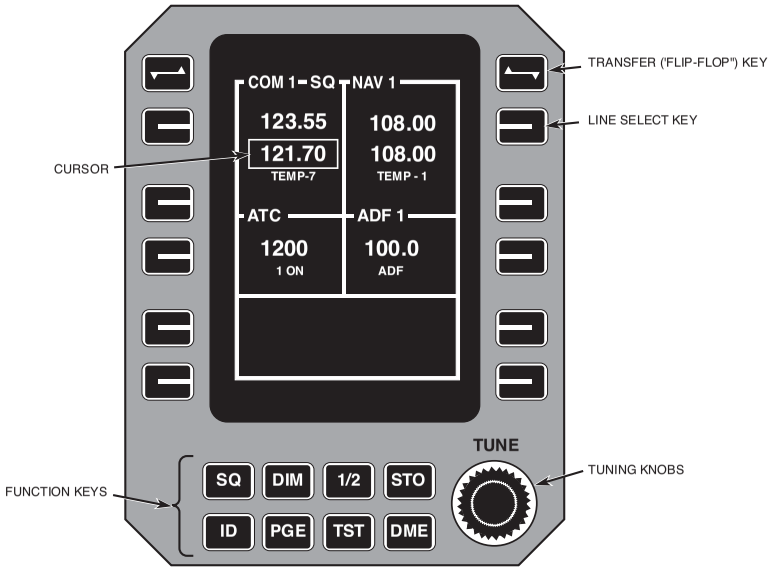
1 IF POWER FAILS ON EITHER CHANNEL OF THE AUDIO ELECTRONICS UNIT, THE CONTROLS WILL NOT FUNCTION.

EMERGENCY OPERATION: PILOT CAN USE VHF 1 AND HEAR NAV 1 WITHOUT VOLUME CONTROL. COPILOT CAN USE VHF 2 AND HEAR NAV 2 WITHOUT VOLUME CONTROL.

Collins TCAS Control Head



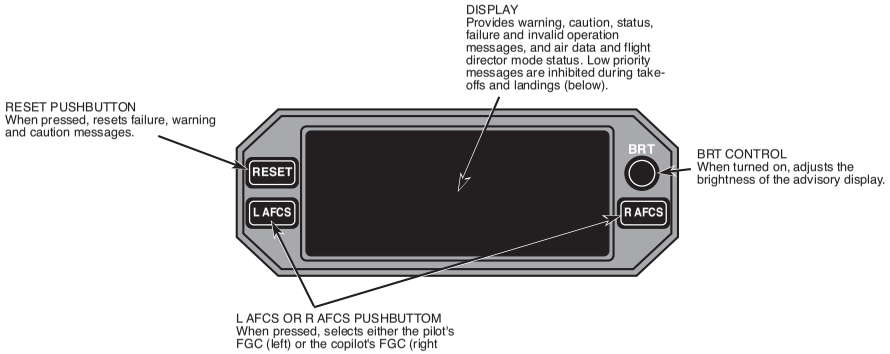
Honeywell RMU (Release III)

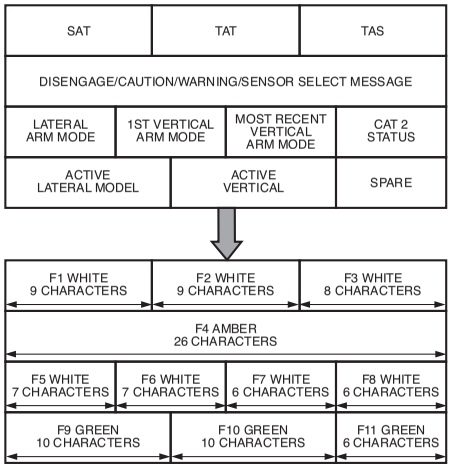


NOTES:

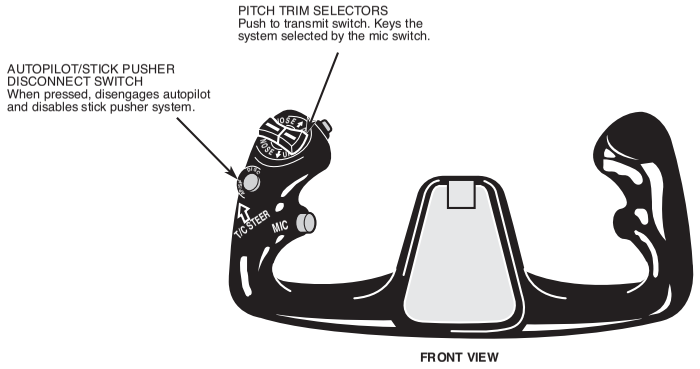
1. If power fails on either channel of the audio electronics unit, the controls will not function.
2. Emergency Operation: Pilot can use VHF 1 and hear NAV 1 without volume control. Copilot can use VHF 2 and hear NAV 2 without volume control.

Flight Guidance Advisory Display

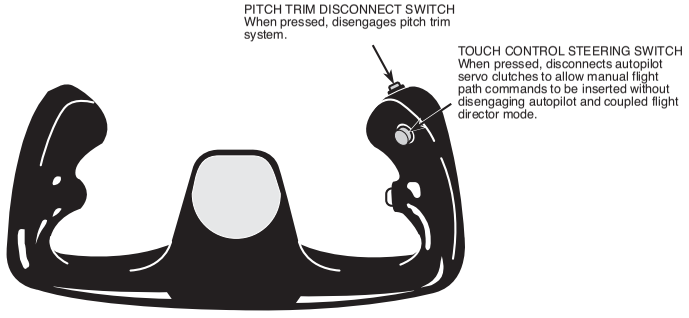




Pilotís and Copilotís Control Wheels



FRONT VIEW



REAR VIEW

RMU COM Messages

MIC STK Wnen the microphone is stuck for approximately two minutes, a beep will sound on the audio and the MIC STK message will appear until the MIC button is released. Ten seconds after the MIC STK annunciation appears, the selected transmitter will automatically turn off.

AUX ON Inticates the auxiliary COM control head is turned on or clearance delivery control is in emergency mode. The respective COM is being channeled by the AUX control head or the clearance delivery control. The RMU is locked out from control of that COM.

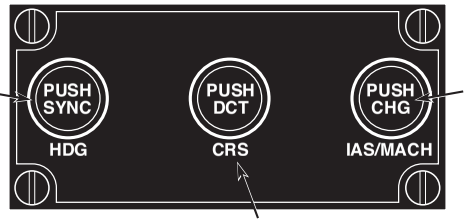
TX Indicates the transmitter is ON.

SQ Indicates the squelch has been opened with SQ button.

NB On later software, indicates that narrow band width has been selected.

WB On later software, indicates that wide band width has been selected.

Pilotís EFIS Remote Controller



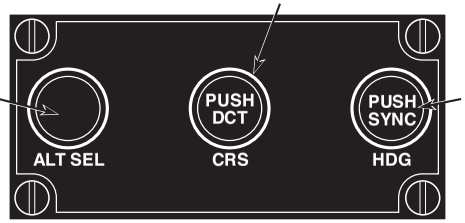
HDG PUSH SYNC PUSHBUTTOM

When rotated, moves the heading bug on the pilot's EHSI. When pressed, causes the heading bug to synchronize to the aircraft heading.

IAS/MACH PUSH CHG CONTROL/SWITCH
When rotated, adjusts the IAS/Mach reference on the pilot's and copilot's EADIs. When pressed, change the IAS reference to Mach reference or vice versa. The push-to-change function is inhibited with the aircraft on the ground.

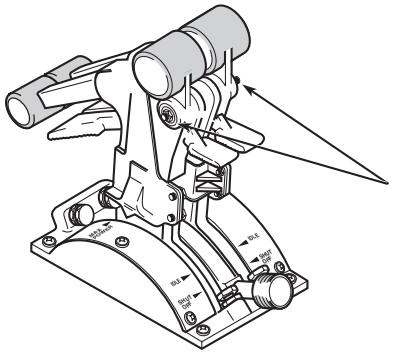
CRS PUSH DCT CONTROL/ SWITCH
When rotated, moves the course select pointer on the associated EHSI. When pressed, causes the course pointer to indicate the zero deviation course to the turned VOR station. When an FMS source is selected, rotating the control causes the preselect course pointer to move.

Copilotís EFIS Remote Controller



ALT SEL CONTROL
When rotated, adjusts the ASEL display on the pilot's and copilot's EADIs

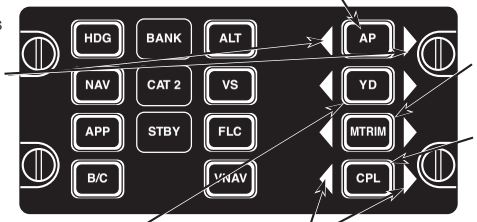
HDG PUSH SYNC PUSHBUTTON
When rotated, moves the heading bug on the copilot's EHSI. When pressed, causes the heading bug to synchronize to the aircraft heading.



GO-AROUND SWITCHES
When pressed, the autopilot function is disengaged, all selected flight director modes are reset and wing-level and 10-degree fly-up command is displayed on the EADIs. The GA mode is cancelled by pressing the touch control steering switches or by selecting another pitch mode.

Flight Guidance Controller

AP PUSHBUTTON
When pressed, engages the autopilot and yaw damper function simultaneously. When pressed, a second time, the autopilot is disconnected but the yaw damper function remains on.



M TRIM PUSHBUTTON
When pressed, selects the mach trim function which stays active even when the autopilot is engaged. Permitting the Mach trim function to engage automatically when the autopilot is disengaged. Pressing the M TRIM pushbutton a second time disengages the Mach trim function.

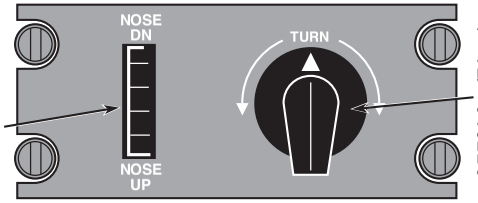
AP, YD, M TRIM AND CPL POINTERS
Left and right pointers indicate the coupled AFCS. When the selected function is operating in a normal no failure condition, the pilot's AFCS is automatically coupled and the left pointer comes on. The copilot's AFCS can be selected by pressing the R AFCS pushbutton on the advisory display. When the copilot's side is engaged, the right pointer come on.

CPL PUSHBUTTON
When pressed, selects either the pilot's or copilot's EHSI and DADC data for lateral and vertical flight guidance to the FGC1 and FGC 2. During transfer, all flight director modes are cancelled. At power up, the pilot's data is selected. Pressing the CPL pushbutton selects the copilot's data. Pressing it a second time reselect the pilot's data.

YD PUSHBUTTON
When pressed, engages the yaw damper function. Pressing the YD pushbutton a second time disengages the YD function.

CPL POINTERS
indicate whether the pilot's EHSI and DADC is coupled to the master FGC (left pointer) or the copilot's EHSI and DADC is coupled to the master FGC (right pointer). During an ILS approach, the AFCS automatically selects the data from both sides (both pointers come on). if on side fails, the remaining good side is selected.

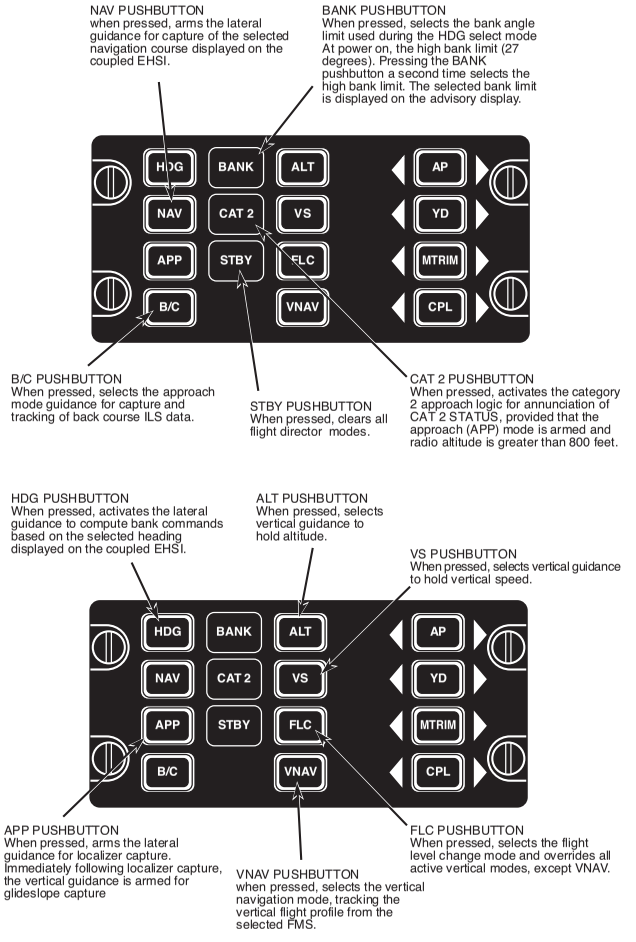
Manual Turn and Pitch Controller



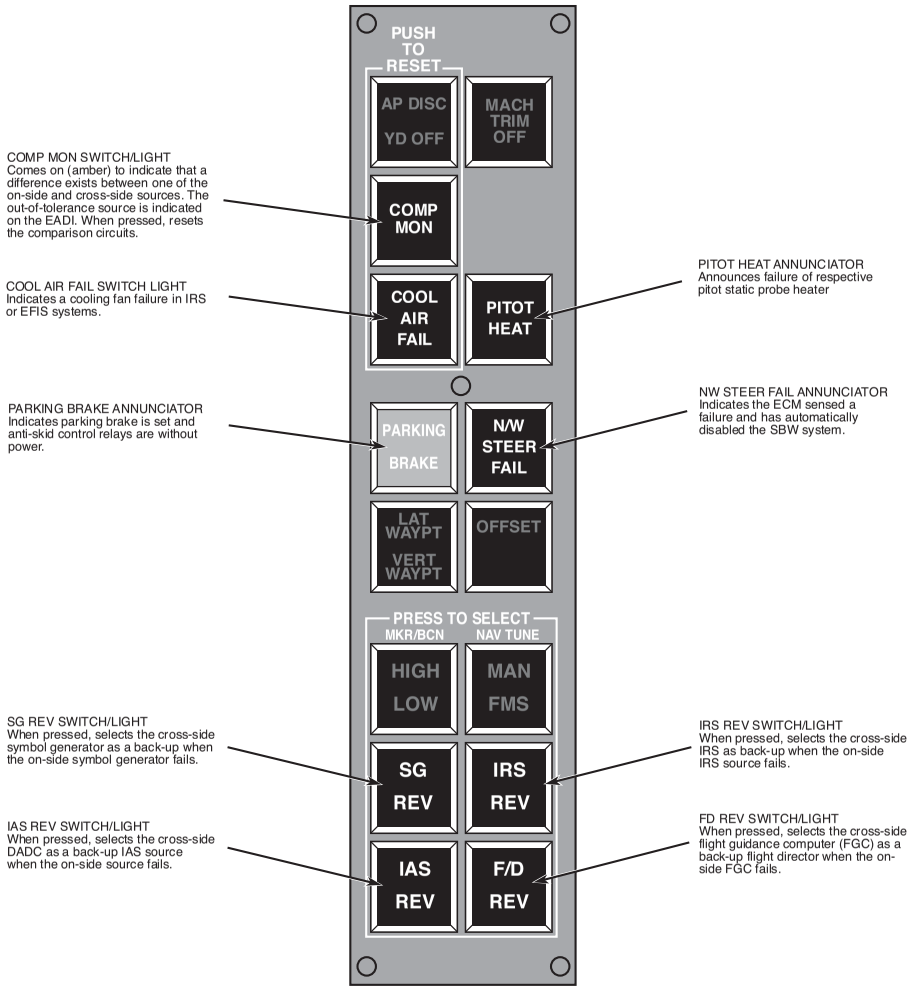
NOSE DN – NOSE UP WHEEL
Moving the NOSE DN – NOSE UP wheel (pitchwheel) changes the pitch attitude proportional to the rotation of the pitch wheel and in the direction of the rotation. When flight director VNAV and APP (glideslope captured) modes are used, the NOSE DN – NOSE UP wheel operation is cancelled.

TURN KNOB
Provided bank Commands to the autopilot (FGC1 and FGC 2) proportional to knob displacement. When rotated out of detent (centre position), the lateral mode selected on the flight director is cancelled automatically. When returned to the detent position, a lateral mode can be reselected. The autopilot can not be engaged if the TURN knob is out of detent.

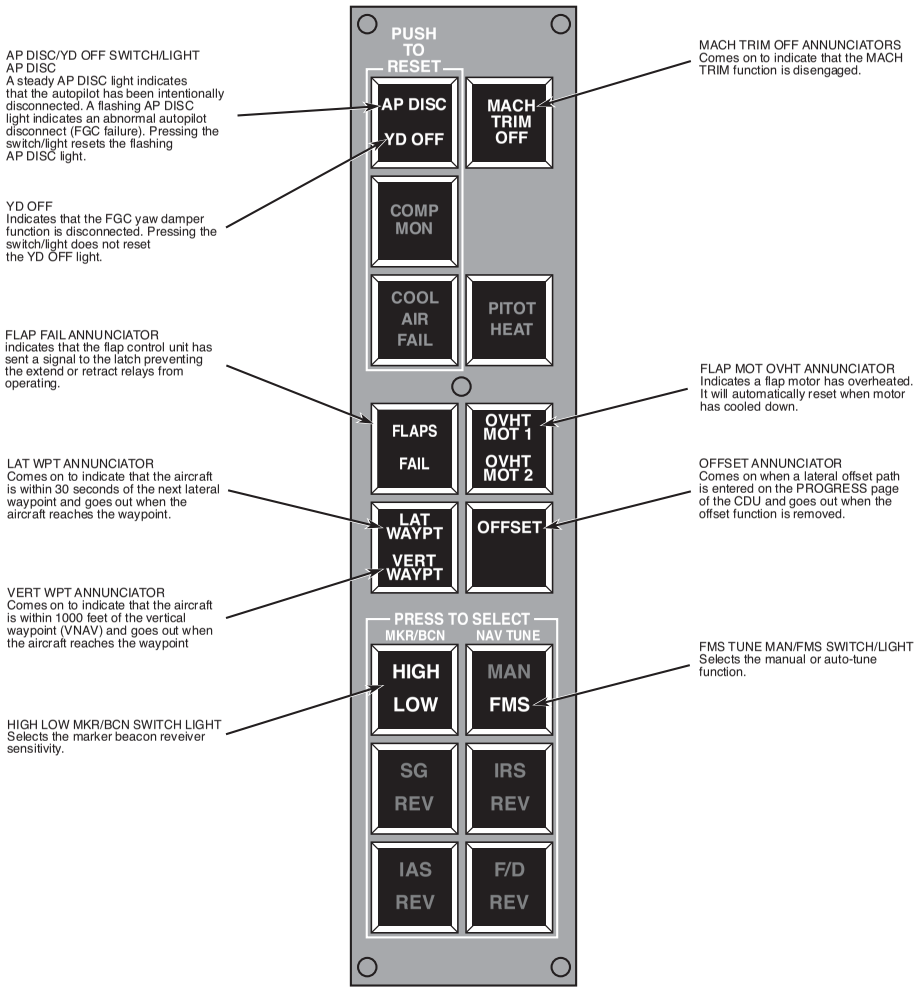
Flight Guidance Controller



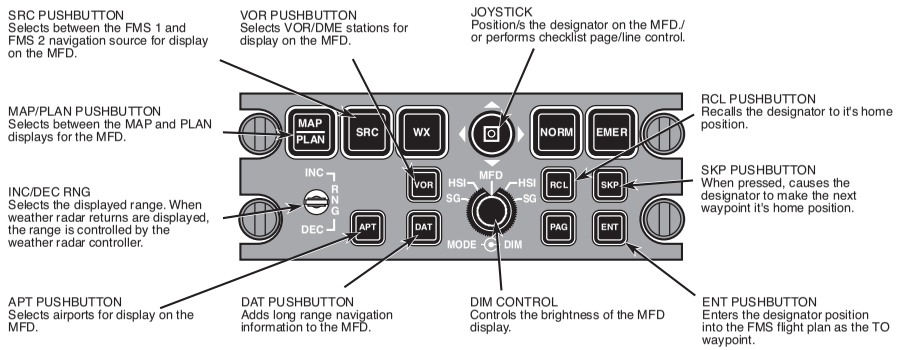
Pilotís Annunciator Switch Panel

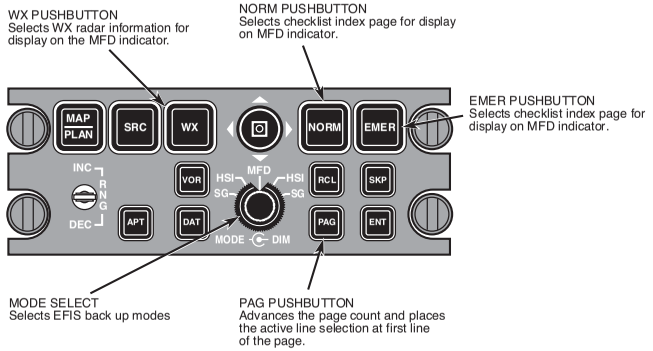


Copilotís Annunciator Switch Panel

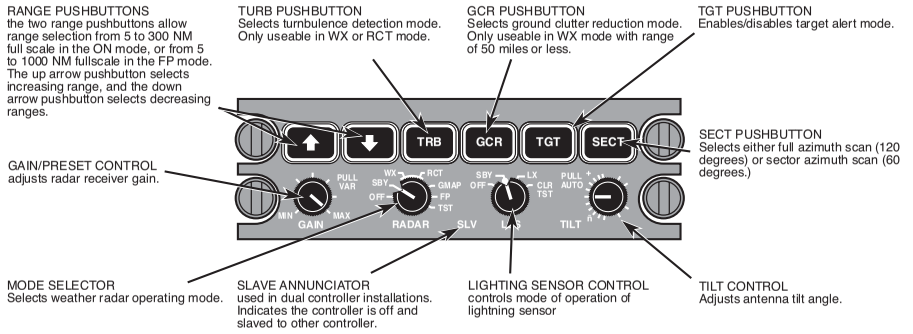


Multi-Function Display Controller

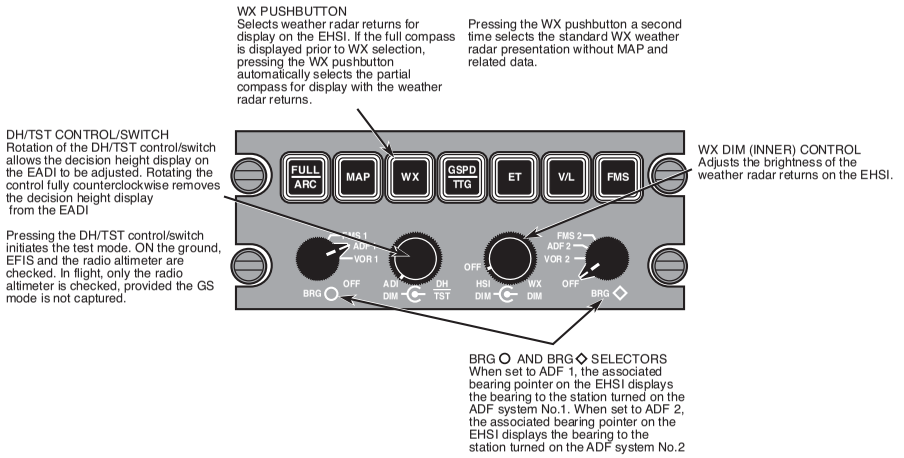




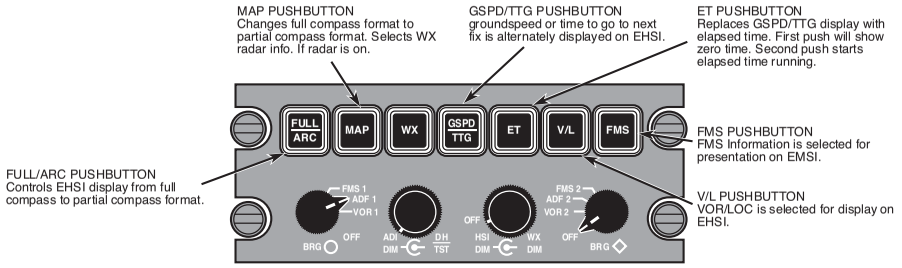
Weather Radar Controller



EFIS Display Controller

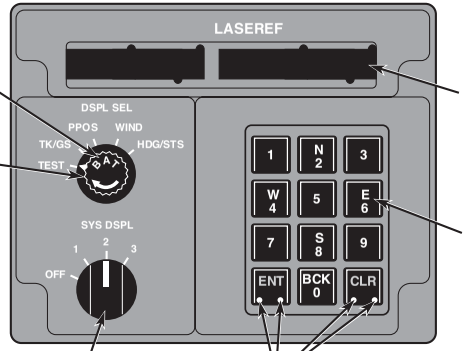


EFIS Display Controller



NOTE: If an ILS/LOC frequency has been selected on the associated NAV while in FMS mode, pressing the V/L pushbutton once leaves the FMS in FMS mode and arms a phantom (magenta) settable course arrow that automatically intercepts then changes to green after intercept. Pressing the V/L pushbutton a second time bypasses the phantom course and goes straight to VOR/LOC navigation.

Honeywell Laseref (ISDU) Control Head



DIMMER KNOB
Controls the brightness of the display.

DSPL SEL SWITCH
Selects the data to be shown on the digit display.

TEST – Lights all the display elements and the keyboard ENT and CLR cue lights. The switch is spring-loaded and must be held in this position.

TK/GS – Selects the track angle in degrees on the left display and the ground speed in knots on the right.

PPOS – Selects the latitude on the left display and the longitude on the right.

WIND – Selects the wind direction in degrees on the left display and the wind speed in knots on the right.

HDG/STS – Selects true or magnetic heading on the left display and time to complete alignment on the right.

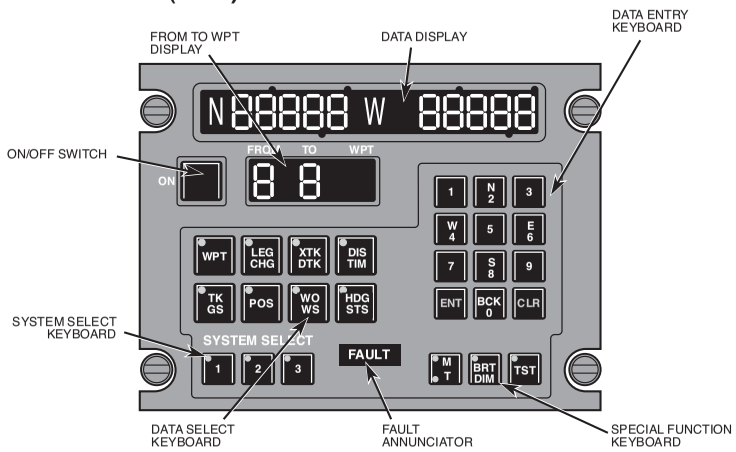
DIGIT DISPLAY
Shows data from the selected system.

KEYBOARD
Enters initial data.

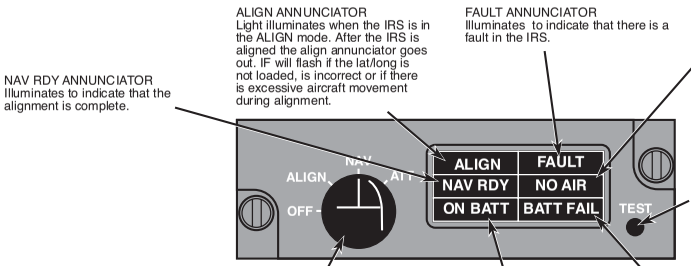
SYS DSPL SWITCH Selects the IRU from which the displayed data originates. If the switch is set of OFF, the ISDU cannot send or receive data to or from any IRU.

ENT AND CLR KEYS
Contain green cue lights which, when lit, indicate that operator action is required. CLR is used to remove data erroneously entered. ENT is used to send data to the IRU.

Honeywell Lasertrak (NDU) Control Head



Mode Selector Unit (MSU)



ALIGN ANNUNCIATOR
Light illuminates when the IRS is in the ALIGN mode. After the IRS is aligned the align annunciator goes out. IF will flash if the lat/long is not loaded, is incorrect or if there is excessive aircraft movement during alignment.

FAULT ANNUNCIATOR
Illuminates to indicate that there is a fault in the IRS.

NO AIR ANNUNCIATOR
Illuminates to indicate a cooling failure.

NAV RDY ANNUNCIATOR
Illuminates to indicate that the alignment is complete.

TEST PUSHBUTTON
Initiates a test sequence in which the IRS outputs three sets of specified test value sequentially. Used for maintenance purposes.

MODE SELECT SWITCH
Selects the four IRU basic modes and the four submodes. Nav position is detented.

OFF – Turns off the IRS.

ALIGN – Turns the IRS on and selects the align mode. To complete the align mode, the initial position latitude and longitude must entered into the IRS, either from the FMS or the Lasertrak (LASERREF).

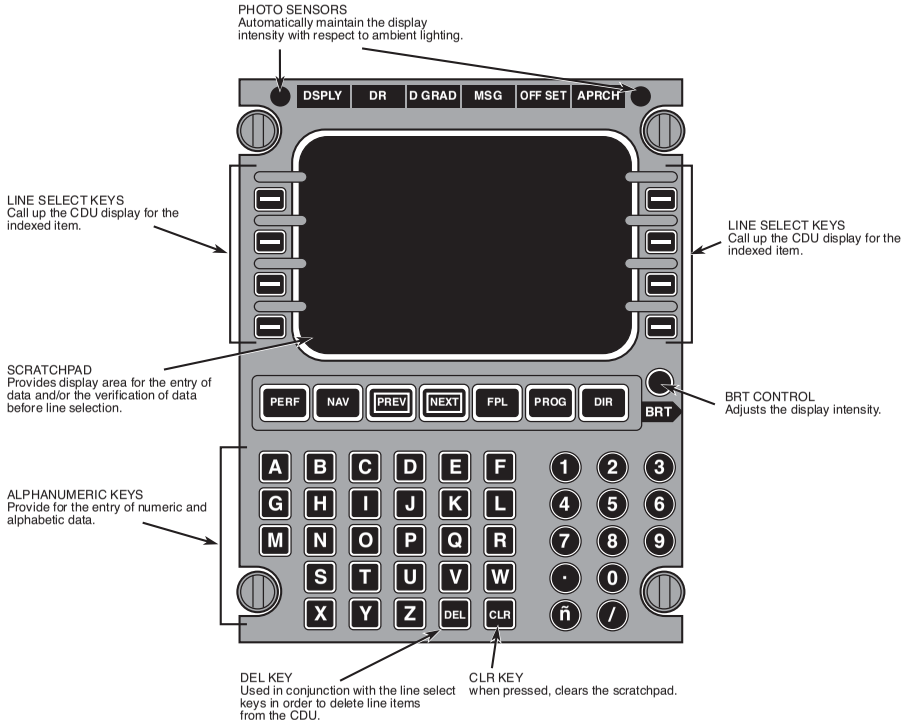
NAV – Selects the navigation mode if the align mode is successfully completed.

ATT – Selects the revisionary ATT (attitude) mode for the IRS, normally used when the NAV mode fails.

ON BATT ANNUNCIATOR
Illuminates to indicate that the IRS is receiving power from the IRS back-up battery.

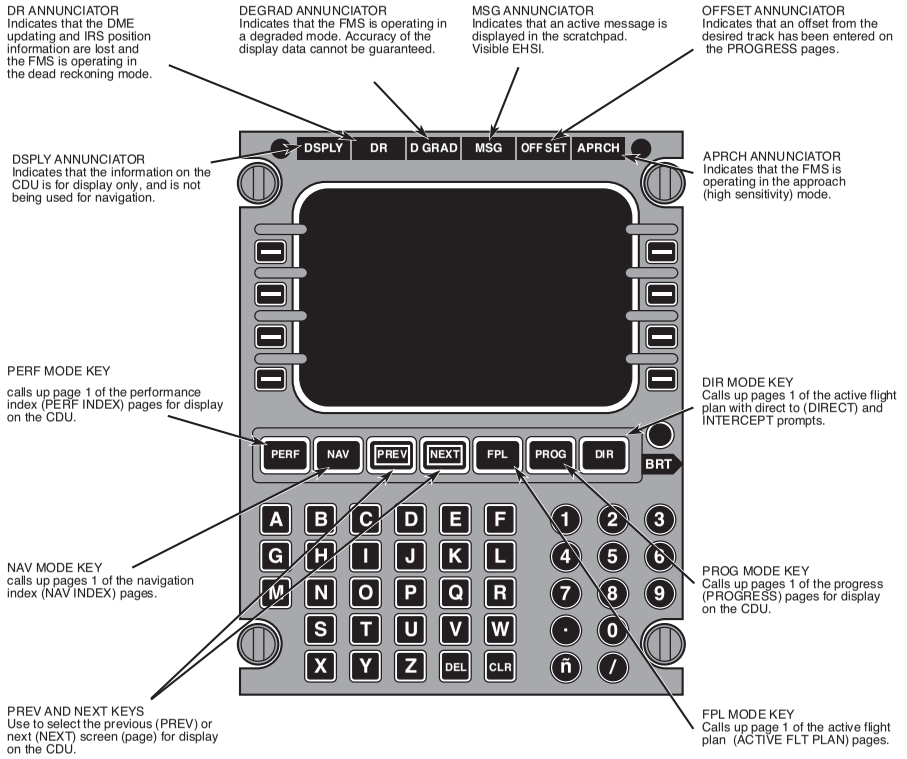
BATT FAIL ANNUNCIATOR
Illuminates to indicate that the IRS back-up battery is supplying less than the minimum voltage required for IRS operation.

Honeywell CD-800/810 Control Display Unit (CDU)

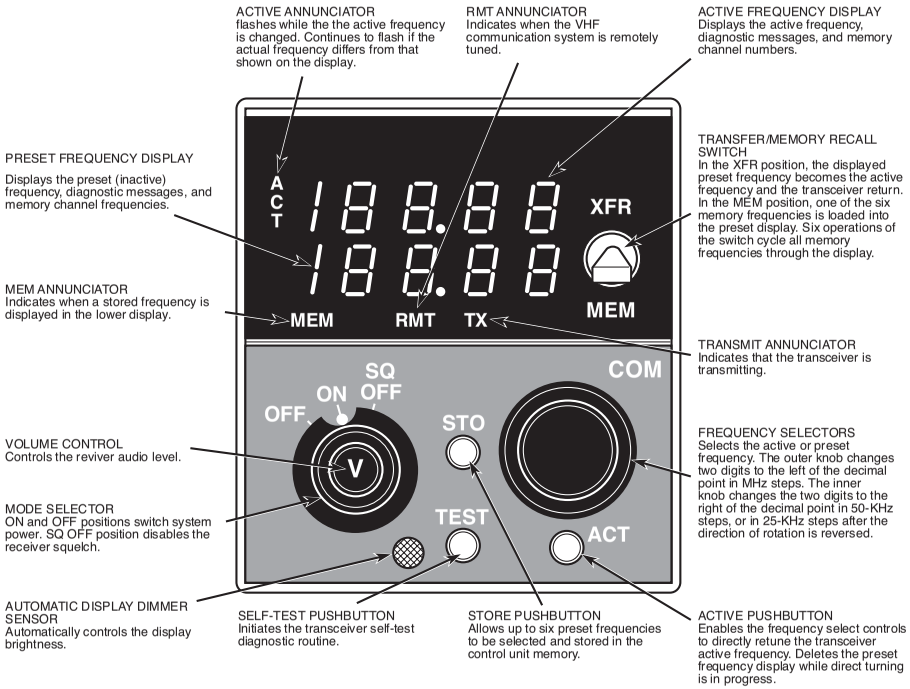


NOTE: The CD-800 and CD-810 CDUs are identical in function, but differ slightly in size and the CRT display. The CD-800 is monochrome. The CD-810 is a color CRT display and is slightly larger in height and depth as compared with the CD-800.

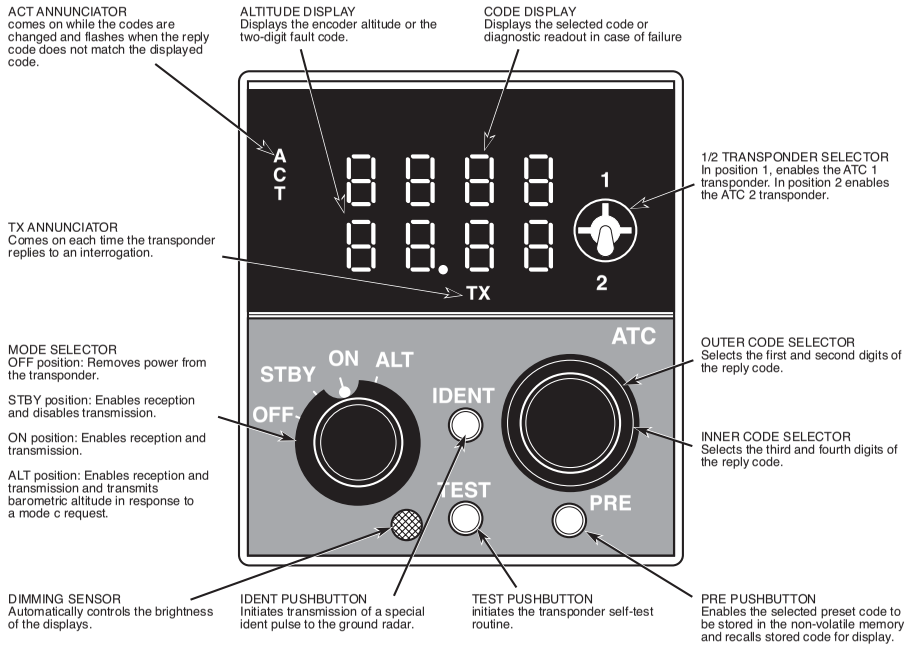
Honeywell CD-800/810 Control Display Unit (CDU)



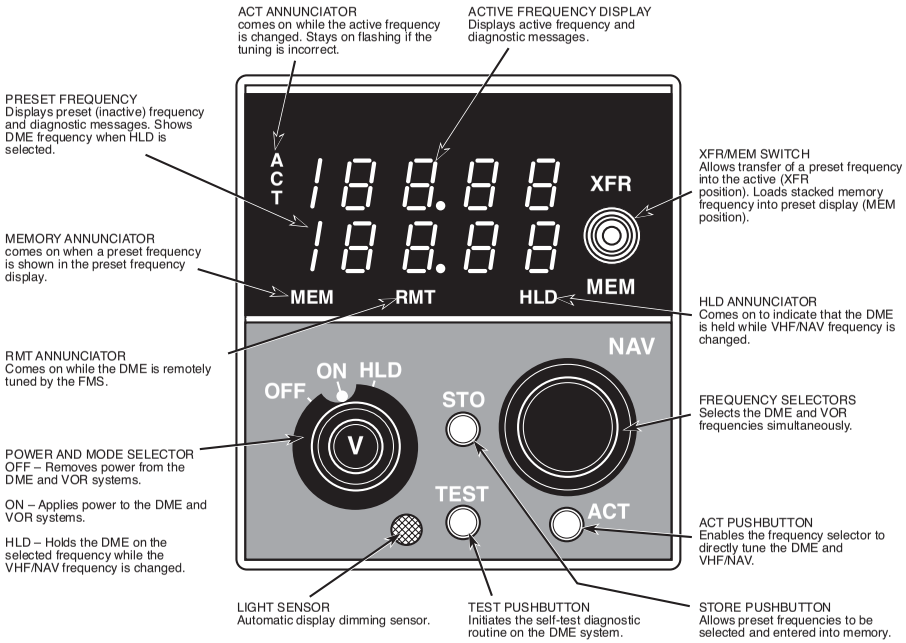
Collins VHF COMM Control Head



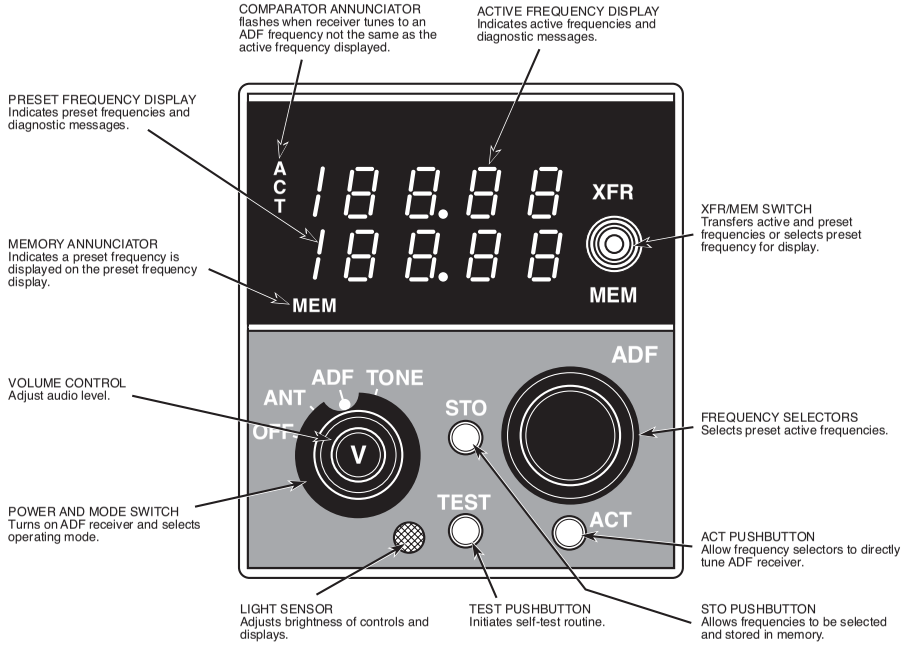
Collins ATC Transponder Control Head



Collins VHF NAV Control Head



Collins ADF Control Head



Pitot/Static System

An electrically heated pitot/static head on the left and right forward fuselage supplies pitot and static pressure to the pilot's and copilot's air data system. Each pitot/static head has two static ports. One supplies the pilot's (S1); the other supplies the copilot's (S2) pitot/static systems.

An electrically heated static port (S3), one on the left and one on the right fuselage, normally supply the cabin pressure indicator. If the pilot's or copilot's normal static source fails, placing the appropriate STATIC PRESSURE SELECTOR VALVE in the ALTERNATE SOURCE position isolates the normal static source and connects the alternate static source to the affected system.

If a fault occurs in the static system (i.e., erratic flight instruments), placing the associated STALL PROTECT SELECTOR VALVE in the CLOSED position isolates the stall protection system (SPS) altitude transducer from its static source.

A total air temperature (TAT) probe on the right forward fuselage supplies temperature data to the air data system.

On S/Ns 3001 to 3066, the pilot's pitot/static system supplies the air data computer (ADC) and the pilot's SPS altitude transducer while the copilot's pitot/static system supplies the copilot's Mach/airspeed indicator, altimeter, vertical speed indicator (VSI), and SPS altitude transducer.

On S/N 5001 and subsequent, the pilot's pitot/static system supplies the No. 1 digital air data computer (DADC) and the pilot's SPS altitude transducer while the copilot's pitot/static system supplies the No. 2 DADC, copilot's SPS altitude transducer, standby airspeed indicator, and altimeter.

Placing the STANDBY INSTR SELECTOR VALVES in the CLOSED position isolates the standby airspeed indicator and altimeter from their pitot/static pressure sources.

Air Data Computers

Normally, **S/Ns 3001 to 3066** have a single air data computer (ADC) that receives pitot/static inputs from the pilot's pitot/static system, temperature data from the TAT probe, and barometric setting from the pilot's altimeter. With these inputs, the ADC supplies the:

- pilot's altimeter, vertical speed indicator (VSI), and Mach/airspeed indicator
- TAS/SAT indicator
- No. 1 ATC transponder
- aural warning system
- stability augmentation, autopilot, and flight director computers.

Various supplemental Type Certificates (STCs) add a second air data computer to the copilot's pitot/static system. This STC also replaces the copilot's Mach/airspeed indicator, VSI, and driven with ADC-driven instruments.

S/N 5001 and subsequent have two digital air data computers (DADCs). The DADCs, supplied by the pitot/static system and TAT probe, compute air data functions and supply analog and digital outputs to the associated:

- pilot and copilot altimeter, vertical speed indicator, and Mach/airspeed indicator
- advisory display
- ATC transponders
- inertial reference units (IRUs)
- electronic flight instrument system (EFIS)
- flight guidance system computers
- flight management system.

Communications

Communications equipment includes:

- audio integrating system
- VHF communications
- HF communications
- SELCAL
- cockpit voice recorder (CVR).

Audio Integrating System

The audio integrating system ties the communication and navigation receiver audio inputs and outputs to the headsets, cockpit speakers, and microphones. The system consists of two audio amplifiers and a headphone, microphone, and oxygen mask microphone jack on the pilot's and copilot's consoles. Additional microphone and headphone jacks on the radio rack, nosewheel bay, and near the rear equipment bay connect with the pilot's and copilot's systems.

Switches on the audio panels select the audio input source and microphone output, adjust headset and speaker volume, and select other operating modes. Audio input sources include the:

- VHF and HF communications transceivers
- VHF navigation receivers
- ADF receivers
- ILS, DME, and marker beacon receivers.

VHF Communications

On S/Ns 3001 to 3066, the standard VHF communications package consists of two Collins VHF-20A transceivers each controlled by a Gables control head.

On S/N 5001 and subsequent, the VHF communications system consists of two Collins VHF-22B transceivers each controlled by a Collins CTL-22 control head.

An available supplemental type certificate (STC) replaces the standard Collins transceivers and control heads with the Honeywell Primus II SRZ-850 integrated radio system. This installation consists of two RCZ-85X integrated communications units with each having a transceiver module controlled by a RM-850 radio management unit (RMU). The RM-850 RMU also controls the VHF navigation, ADF, and transponder systems. An optional clearance delivery unit (CDU) allows use of a VHF transceiver without powering up the entire system.

HF Communications

A typical HF communications equipment installation consists of two Collins HF transceivers connected to separate control heads. These transceivers provide long range communications capabilities in the 2.000 to 29.999 MHz frequency range. Operating modes include upper and lower sideband (USB and LSB), amplitude modulation (AM), frequency modulation (FM), and continuous wave (CW) with simplex or full duplex operation.

Cockpit Voice Recorder

A cockpit voice recorder (CVR) records all cockpit conversations through a remote microphone and the pilot's, copilot's, and third crewmember's microphones. The CVR recorder unit in the aft equipment bay is in a crash resistant case that protects it from extreme forces. With the aircraft on the ground and the parking brake set, two relays close to enable the CVR's ERASE switch. Pressing the ERASE button for at least two seconds erases the entire CVR tape.

The system's noise suppressing microphone and an interface with the audio control amplifiers ensure that the recorder captures all conversations for post-accident analysis.

Navigation

Navigation equipment includes:

- VHF navigation
- long range navigation
- automatic direction finding (ADF)
- distance measuring equipment (DME)
- attitude and optional heading reference systems (AHRS)
- traffic alert and collision avoidance system (TCAS)
- flight data recorder (FDR).

VHF Navigation

On S/Ns 3001 to 3066, VHF navigation equipment includes two Collins VHF navigation receivers controlled by separate Gables control heads. The units interface with the attitude director indicators (ADIs), horizontal situation indicator (HSI), flight director computer, VNAV computer/controller, radio magnetic indicators (RMIs), and the audio control units.

On S/N 5001 and subsequent, VHF navigation equipment includes two Collins VIR-32 navigation receivers controlled by separate Collins navigation control units. The units interface with the electronic flight control system (EFIS) symbol generators, FMS computers, and the audio control units.

Both types of receivers cover the 108.00 through 117.95 MHz range and the 40 localizer/glideslope channels. Tuning a VOR station automatically selects the appropriate DME channel.

Long Range Navigation

On S/Ns 3001 to 3066, long range navigation is optional. Various combinations of equipment may be found on the aircraft. Among the possibilities are very low frequency (VLF) Omega, Loran and Inertial Navigation. Refer to the individual Aircraft Flight Manual for installed equipment and operating procedures.

On S/Ns 5001 and subsequent, aircraft are equipped with two or a third optional Laseref inertial reference system integral with a Honeywell SPZ-8000 digital automatic flight control system with dual FMS configuration. This system blends a number of navigational signals to form a blended FMS position with a high degree of accuracy for long range navigation. Optional additional equipment, such as GPS may be installed, further augmenting the accuracy and versatility of the system.

Automatic Direction Finding

Automatic direction finding equipment, operating in the 190 to 1749.5 kHz frequency range, provide aircraft relative bearing to a transmitting station through the HSIs, radio RMIs, or, if installed, electronic flight instrument system. The receivers also provide audio outputs to the audio control panels for navaid identification purposes and reception of AM broadcast stations.

On S/Ns 3001 to 3066, the installation consists of a single Collins ADF-60A receiver, Gable control head, two RMIs, and an ADF antenna.

On S/N 5001 and subsequent, the installation consists of two Collins ADF-462 receivers, two CTL-62 control units, and a single antenna. The units interface with the EFIS symbol generators, FMS navigation control units, and audio control units.

Distance Measuring Equipment

Distance measuring equipment (DME) computes and provides slant range distance between the aircraft and a DME ground station. It also computes and provides aircraft ground speed and time to station information. Selecting a VOR frequency through the appropriate VHF NAV receiver control head automatically selects the associated DME channel.

On S/Ns 3001 to 3066, the installation consists of two Collins DME-40 receiver/transmitters and two DME antennas on the lower fuselage. The units interface with the flight director computers, HSIs, and the vertical navigation computer/controller.

On S/N 5001 and subsequent, the installation consists of two Collins DME-42 receiver/transmitters and two DME antennas on the lower fuselage. The units interface with the VHF NAV control units, EFIS symbol generators, FMS navigation control units, and audio control panels.

ATC Transponders

On S/Ns 3001 to 3066, the transponder system consists of two Collins TDR-90 transponders, a transponder control unit, and two antennas. The No. 1 transponder receives altitude data from the air data computer (ADC) and the No. 2 transponder receives altitude data from the copilot's altimeter. On installations with two ADCs, No. 2 altitude data is from the No. 2 ADC.

On aircraft with TCAS installed, the original transponders are replaced with Mode S compatible units.

On S/N 5001 to 5117, the installation consists of two Collins TDR-90 transponders, a control unit, and two antennas. The units receive altitude data from the DADCs. The transponders also interface with the FMS navigation control unit.

On S/N 5118 and subsequent, the aircraft has Mode S compatible Collins TDR-94 transponders interfaced with TCAS instead of the TDR-90 units.

TCAS

Optional traffic alert and collision avoidance systems (TCAS) manufactured by Honeywell, Collins, or Bendix provide increased flight safety by alerting the crew to potential conflicts with other traffic. Typically, the Bendix and Collins installations replace the conventional analog vertical speed indicator (VSI) with a liquid crystal display unit. The Honeywell system usually removes the VSIs and moves the VSI and TCAS display to the EFIS displays.

Interfaced with Mode S compatible transponders, TCAS II periodically interrogates and tracks other aircraft transponder-equipped in the aircraft's immediate vicinity. Provided with transponder signals from other aircraft, the TCAS computer predicts expected flight paths in relation to its aircraft.

Through a compatible vertical speed indicator or the EFIS displays, the system provides four different symbols to represent traffic that:

- does not pose a threat to the aircraft
- is in the immediate area and has a threat potential
- poses a threat to aircraft (aircraft's warning area)
- poses an immediate threat (aircraft's caution area).

If the traffic has an operating Mode C or Mode S transponder, TCAS II also displays next to the traffic's symbol the relative altitude in relation to the aircraft and whether it is climbing or descending.

If traffic poses a threat to the aircraft, TCAS II provides aural and visual resolution advisories (evasive maneuvers) to create adequate separation between the aircraft and traffic. These advisories include the recommended climb or descent rate that will provide the adequate separation. They also include climb and descent rates that the crew should avoid.

Flight Data Recorder

An optional digital flight data recorder (FDR), interfaced to various aircraft and engine systems through a data acquisition unit, records approximately 25 hours of aircraft operating data with a time signal for latter analysis. An accelerometer separate from the normal navigation systems provides aircraft acceleration data in the pitch, roll, and yaw axes.

The recorder unit, housed in a crash resistant container in the aft equipment bay, records data digitally with parking brake release or main entrance door closing. The recorder stops after application of the parking brake, the opening of a door, or because of a high G impact.

Attitude and Heading Systems

On S/N 3001 to 3066, a system of vertical gyros, rate gyros, directional gyros, and accelerometers provide aircraft pitch, roll, yaw, heading, and acceleration data to the flight director, autopilot system, and the horizontal situation indicator (HSI).

Supplemental type certificates (STCs) exist to replace most of the components of the flight director system with an electronic flight instrument system (EFIS).

On S/N 5001 and subsequent, an inertial reference system (IRS) based on ring laser gyros (IRS) provides very accurate aircraft attitude, heading, velocity, and position data to the flight guidance, flight management, and electronic display systems.

The installation consists of two or three (optional) inertial reference units (IRUs), mode select unit (MSU), Laseref inertial system display unit (ISDU) or Lasertrak navigation display unit (NDU), and dedicated battery packs. The IRS interfaces with its various components and other navigation systems through ARINC 429 buses and an avionics standard communications bus (ASCB).

The selector unit (MSU) selects the operating modes for the IRUs and AHRS, initiates the IRU test mode, and provides annunciations of individual system status.

Through the FMS CDU, Lasertrak (NDU), or Laseref (ISDU), the flight crew selects the desired IRU and system operating modes. The flight crew also enters the aircraft's current longitude and latitude for IRU initialization and selects the desired IRU for display. The crew can also display the aircraft's track, ground speed, position and current wind direction, and speed. The unit has a keyboard, mode select switches, and display screen.

Electronic Flight Instrument System

On S/N 5001 and subsequent, an electronic flight control system (EFIS) consisting of an electronic attitude director indicator (EADI), electronic horizontal situation indicator (EHSI), multifunction display (MFD) driven by three symbol generators, and an advisory display replaces the conventional flight director instruments.

A reversionary feature in this system reduces the possibility of a fault hindering normal system operation by moving an operating display to a failed unit's display.

Automatic Flight Control System

Automatic flight control systems combine the functions of an autopilot, flight director, yaw damper, and trim systems in an integrated system.

On S/Ns 3001 to 3066, the factory installation consists of a Honeywell SPZ-600 automatic flight control system that consists of:

- dual channel SP-600 three-axis autopilot
- two FZ-500 flight director computers
- pilot and copilot attitude director indicators (ADIs) and horizontal situation indicators (HSIs)
- SZ-600 stability augmentation system (yaw damper and Mach trim)
- AZ-242 air data system (ADC)
- directional gyros, vertical gyros, and accelerometers.

STCs are available to replace the conventional ADIs and HSIs with Bendix, Collins, or Honeywell electronic flight instrument systems. Some STCs also replace the standard weather radar indicator with a multi-function display (MFD).

On S/N 5001 and subsequent, the aircraft has a Honeywell SPZ-8000 digital automatic flight control system (DAFCS). The SPZ-8000 installation includes:

- FMZ-800/900 flight management system (FMS)
- dual DFZ-800 flight guidance system (flight director)
- dual EDZ-815 electronic flight instrument system (EFIS)
- dual ADZ-810 air data system (ADS)
- MDZ-815 multifunction display (MFD)
- AA-300 radio altimeter
- Primus 650 or Primus 870 weather radar
- two or three unit Laseref inertial reference system (IRS).

The various SPZ-8000 components exchange data through an avionics standard communications bus (ASCB). An ARINC 429 standard communications bus connects the SPZ-8000 components with other avionics equipment.