## AUTOMATIC FLIGHT

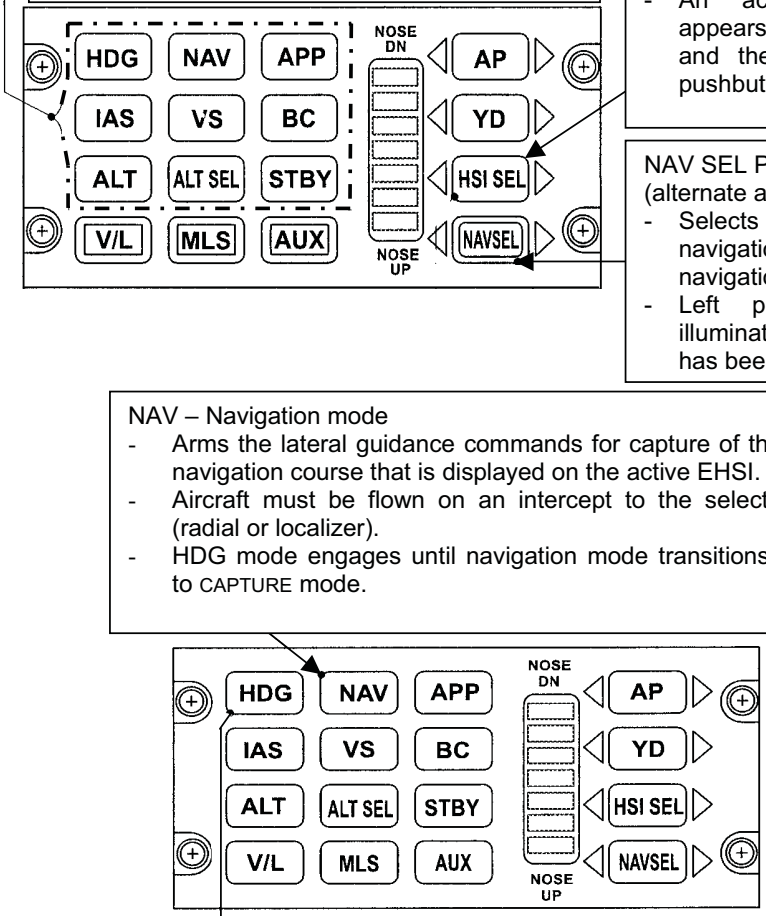
## CONTROLS AND INDICATORS

FLIGHT GUIDANCE MODE SELECTORS
(alternate action)
- Engages flight director modes of operation.
- Flight director command bars display lateral and/or vertical guidance commands depending on engaged mode.
- Pilot can manually fly the displayed command or engage the autopilot to automatically fly the commands.

HSI SEL PUSHBUTTON
(alternate action)
- Selects either pilots or copilot's EHSI and air data computer data the flight guidance system will use as a reference.
- Transferring to cross side EHSI and DADC will cancel all flight director modes.
- An active EHSI annunciation appears on the non-active EADI and the pointer adjacent to the pushbutton illuminates.

NAV SEL PUSHBUTTON
(alternate action)
- Selects which EHSI will display navigation data selected by the navigation selector pushbuttons.
- Left pointer or right pointer illuminates to indicate which EHSI has been selected.

NAV – Navigation mode
- Arms the lateral guidance commands for capture of the selected navigation course that is displayed on the active EHSI.
- Aircraft must be flown on an intercept to the selected course (radial or localizer).
- HDG mode engages until navigation mode transitions from ARM to CAPTURE mode.

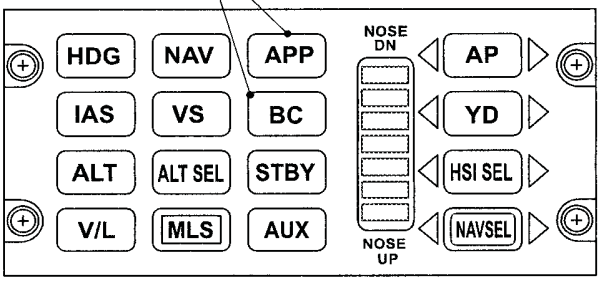


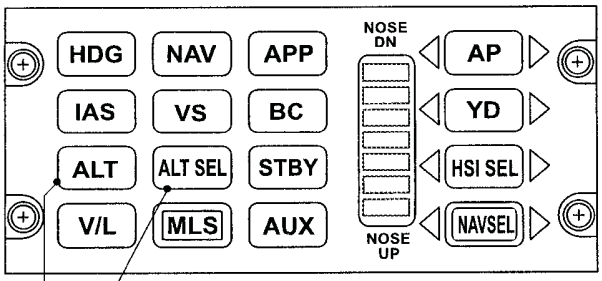

HDG – Heading Mode
- Activates the lateral guidance commands based on selected heading (indicated by heading bug) as displayed on active EHSI

*Flight guidance controller*

BC – back course approach mode
- Activates lateral commands to track a back course localizer displayed on active EHSI.
- Glide slope capture is automatically inhibited.

APP – approach mode
- Arms lateral commands (and vertical commands if an ILS frequency is tuned) to capture and track the approach navigation aid displayed on the active EHSI.
- If LOC and GS are captured with both VHF NAV receivers tuned to the same ILS frequency, both pointers beside the HSI SEL switch will illuminate and DUAL will show on the advisory display when the aircraft descends below 1200 feet RA. This indicates a dual approach mode with valid localizer and glide slope signals.

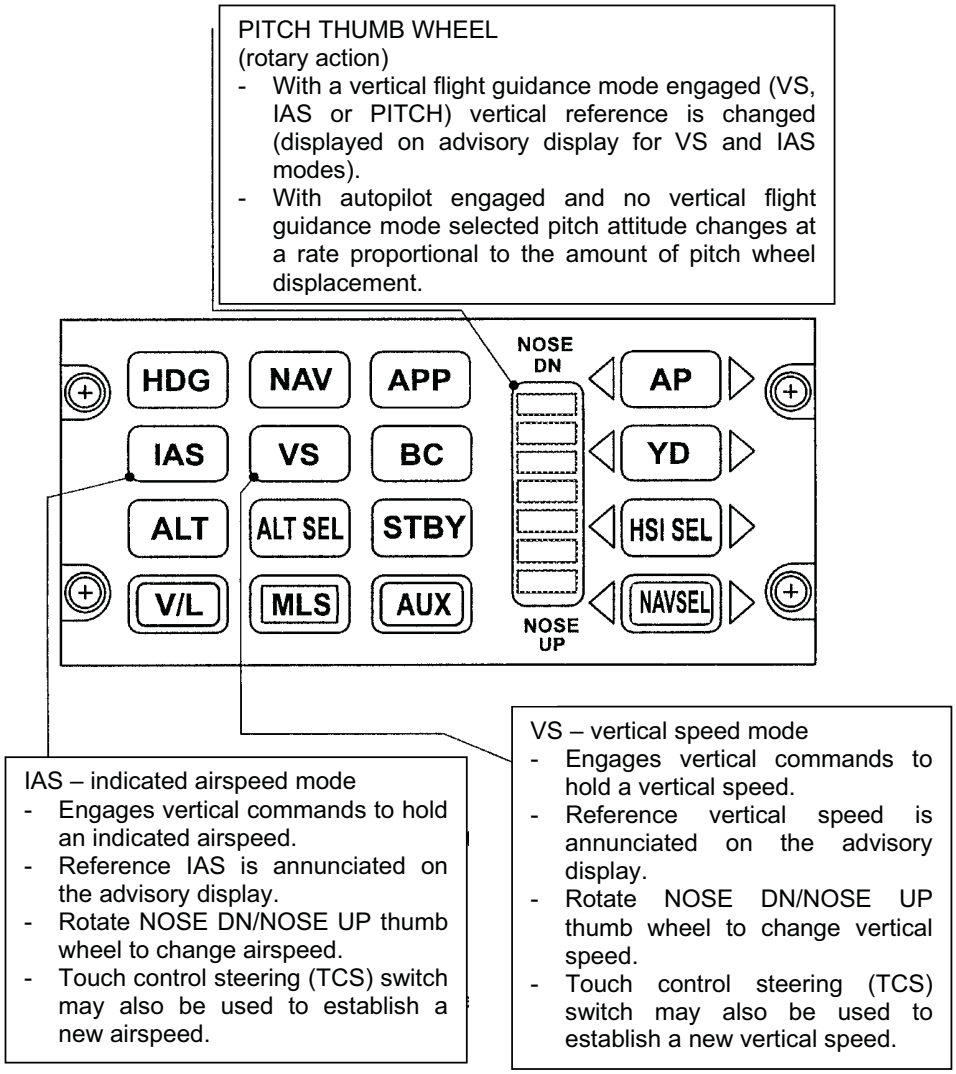



ALT SEL – altitude pre-select mode
- Arms vertical commands to capture the pre-selected altitude displayed on the altitude pre-select controller.
- IAS, VS or PITCH mode can be used to capture the selected altitude (aircraft must be initially manoeuvred to fly toward the pre-selected altitude)

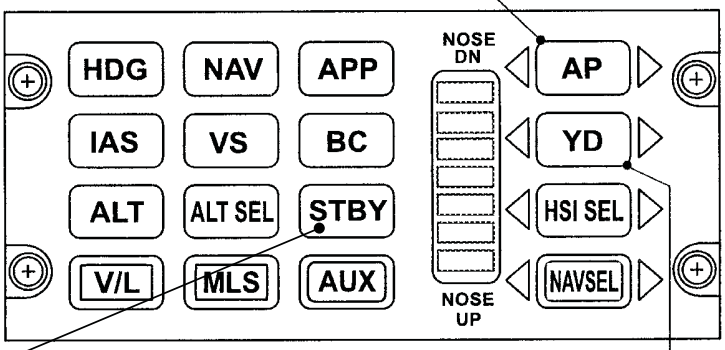
ALT – altitude hold mode
- Engages altitude hold function.
- FD will maintain the altitude, which was present at the time of mode engagement.
- Touch Control Steering (TCS) switch may be used to establish a new altitude.

*Flight guidance controller*




*Flight guidance controller*

AUTOPILOT ENGAGE/DISENGAGE PUSHBUTTON
(alternate action)
- Engages autopilot and yaw damper function simultaneously.
- Active channel is annunciated by lighted pointers located either side of AP pushbutton (active channel selected with R AFCS or L AFCS buttons on advisory display).
- Press again to disengage autopilot (yaw damper will remain engaged).



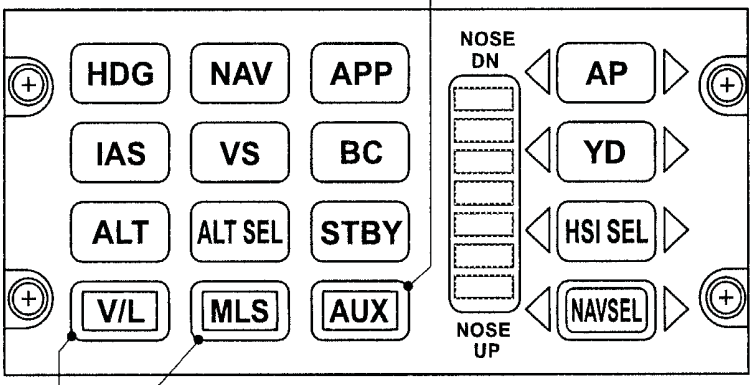

YAW DAMPER ENGAGE/DISENGAGE PUSHBUTTON
(alternate action)
- Engages yaw damper.
- Active channel is annunciated by lighted pointers located either side of YD pushbutton.
- Press again to disengage both yaw damper and autopilot.
- Interlock exists whereby selection of autopilot automatically engages yaw damper. Yaw damper may, however, be selected without autopilot.

STBY – standby mode
- Cancels all selected flight guidance modes.
- If autopilot is engaged and STBY is pressed autopilot will remain engaged in one of two modes:
  - PITCH and WINGS LEVEL, or
  - PITCH and ROLL HOLD.

  (depending on aircraft attitude when STBY was pressed)

*Flight guidance controller*

AUX - auxiliary navigation selector (alternate selection)
- Couples selected EHSI and FGC to its onside FMS. Selection is made with NAV SEL pushbutton; illuminated pointer indicates selected side.
- Selecting AUX with FLIGHT DIRECTOR engaged in VOR, VOR APP or LOC will cause flight director lateral bar to disappear and advisory display to show FD NAV DATA INVLD.




MLS – MLS navigation selector

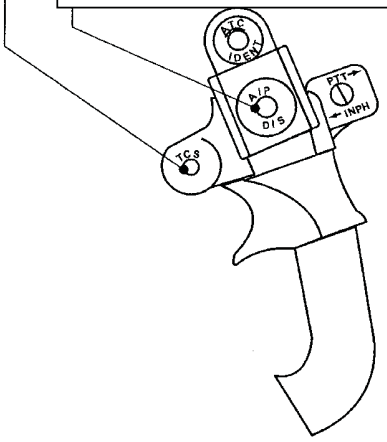
- MLS not installed

V/L – VOR/Localizer selector pushbutton
- Couples selected EHSI and FGC to its onside VHF NAV receiver. Selection is made with NAV SEL pushbutton; illuminated pointer indicates selected side.
- Selecting V/L with flight director engaged in LNAV will cause flight director lateral bar to disappear and advisory display to show FD NAV DATA INVLD.

*Flight guidance controller*

TOUCH CONTROL STEERING PUSHBUTTON (TCS)
(momentary action)
- Uncouples autopilot servos without disengaging the autopilot.
- Pilots can manually change aircraft attitude, heading, altitude, vertical speed or indicated airspeed.
- Releasing the TCS button resumes previously selected flight guidance and autopilot modes, but all pitch related modes and BANK HOLD continue on the newly set value.

AUTOPILOT DISCONNECT PUSHBUTTON (A/P DIS)
(momentary action)
- Disengages the autopilot.
- AP DISENGAGED annunciated on advisory displays.
- Autopilot disengage aural warning will be generated with activation of A/P DIS button.

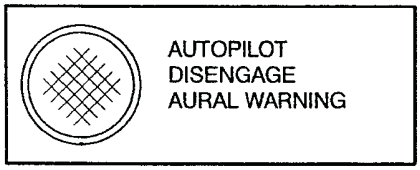



**A/P**
**DISENG**

AUTOPILOT DISENGAGE ANNUNCIATOR
(A/P DISENG) (red)
-Flashing, indicates autopilot disengagement has occurred because system has detected an internal fault or
-Activation of the stick shaker/stick pusher.
-AP DISENGAGED (flashing) annunciates on the advisory display.
-PUSH to reset.

GLARESHIELD PANEL

*Autopilot disconnect pushbutton/annunciator/TCS*

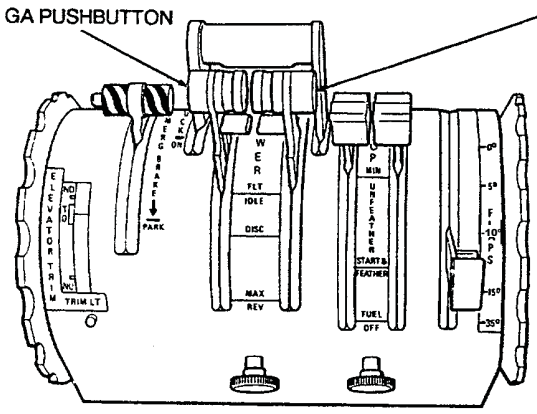



CENTER CONSOLE

AUTOPILOT DISENGAGE AURAL WARNING

– The AUTOPILOT DISENGAGE AURAL WARNING is mounted on the center console and emits an audible aural warning from the unit and in the audio integrating system.

In addition to the basic visual indications of an automatic or manual auto pilot disengagement, an aural warning is emitted from the AUTOPILOT DISENGAGE AURAL WARNING unit. The aural warning is also heard in the audio integrating system. The aural warning is emitted for 0.6 seconds and will be approximately double the frequency of any other flight compartment aural warning.




CONTROL QUADRANT (2)

GO-AROUND (GA) PUSHBUTTONS
- Autopilot will disengage and flight director will command a wings level, nose-up attitude.
- Commanded nose up attitude is approximately 9 degrees nose-up.

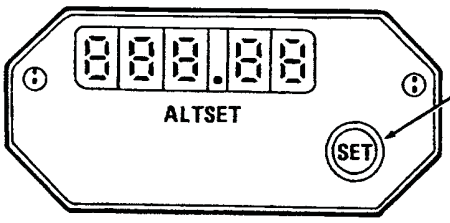


GLARESHIELD PANEL (2)

INSTRUMENT REMOTE CONTROLLER
- Each controller provides heading and course selection on its respective EHSI.

COURSE – rotate to desired course
- Pointer is positioned on EHSI to coincide with required VOR radial or localizer course.

HEADING – rotate to position heading bug to required compass heading.
- In heading select mode the FD will display the proper steering command to turn and maintain this selected heading

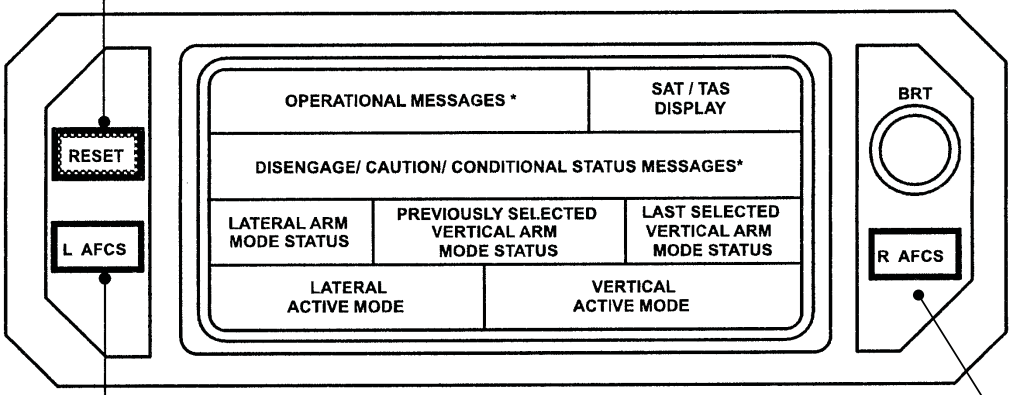



ENGINE INSTRUMENT PANEL

ALTITUDE PRESELECT CONTROLLER

ALTITUDE SELECT KNOB (SET)
(rotary control)
- To select desired altitude.
- Pilot arms ALT SEL on flight guidance controller and initiates a manoeuvre to fly to the preselected altitude.
- FD will automatically flare to and maintain preselected altitude; previous pitch mode is disengaged upon capture.

RESET BUTTON
(momentary action)
- Push to clear caution messages (amber) on line two of the display.

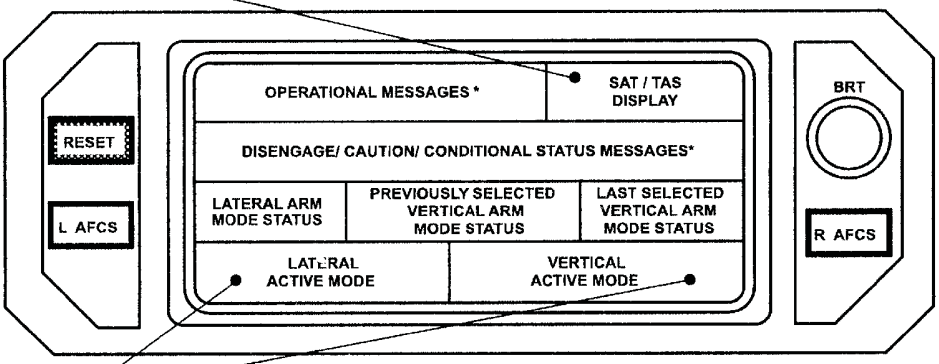



**FLIGHT INSTRUMENT PANEL (2)**

LEFT AFCS SELECTOR
(momentary action)
- Selects the left side flight guidance computer as master.
- With the yaw damper and/or autopilot engaged, left pointer beside AP and YD pushbuttons on flight guidance controller illuminate to indicate the active channel.
- Normal power-up status selects left flight guidance computer as master.

RIGHT AFCS SELECTOR
(momentary action)
- Selects the right side flight guidance computer as master.
- With the yaw damper and/or autopilot engaged, right pointer beside AP and YD pushbuttons on flight guidance controller illuminate to indicate the active channel.
- Normal power-up status selects left flight guidance computer as master.
- When changing the active channel 'L' (or 'R') AFCS MASTER is displayed on the advisory display.

SAT/TAS DISPLAY (white)
- Static air temperature is displayed continuously.
- True airspeed is displayed momentarily by pressing the TAS switch light located above the EADI.
- Dashed lines indicate a loss of valid ADC data.




**FLIGHT INSTRUMENT PANEL (2)**

FLIGHT DIRECTOR LATERAL AND VERTICAL ENGAGED MODES (green)

-The following messages appear in green on line four upon selection of a mode:

| LATERAL MODES | VERTICAL MODES |
|---|---|
| HDG SEL<br>WINGS LEVEL | PITCH<br>ALT<br>GA<br>IAS xxx KTS<br>VS xx00 FPM |

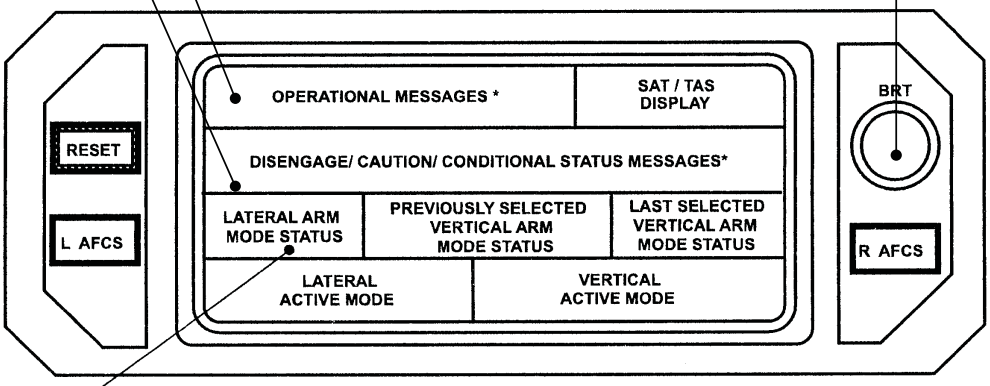
Where xxx is airspeed at time of selection, and xx is vertical speed in hundreds of feet per minute at time of selection.

-While pressing the TCS button to change the airspeed or vertical speed reference, IAS---KTS or VS---FPM is displayed.
-In the VOR mode, VOR OS is displayed when receiving unreliable radio signals during station passage.

*ID-802 advisory display unit*

BRIGHTNESS CONTROL (BRT)
-Rotate to adjust display brightness.

DISPLAYED MESSAGES
-See system description for the operational messages appearing on line 1 and disengage/caution/conditional status messages appearing on line 2




FLIGHT DIRECTOR LATERAL AND VERTICAL ARM MODES (white)
Modes, which are annunciated on line three in white, are:

GS LNAV LOC VOR BC
ALT SEL VOR APP

-Flight director modes must be armed with the necessary sensor data being valid.

When the transition from arm to capture is made the following messages will appear in the vertical or lateral mode fields of line 4:

GS* LNAV* LOC* VOR* BC*
ALT* VOR APP*

-At capture the mode is shown in reverse video for approximately 1 second to emphasize the transition, e.g. ALT*

-When the transition to the track mode is completed the annunciation will remain in the same location with no asterisk.

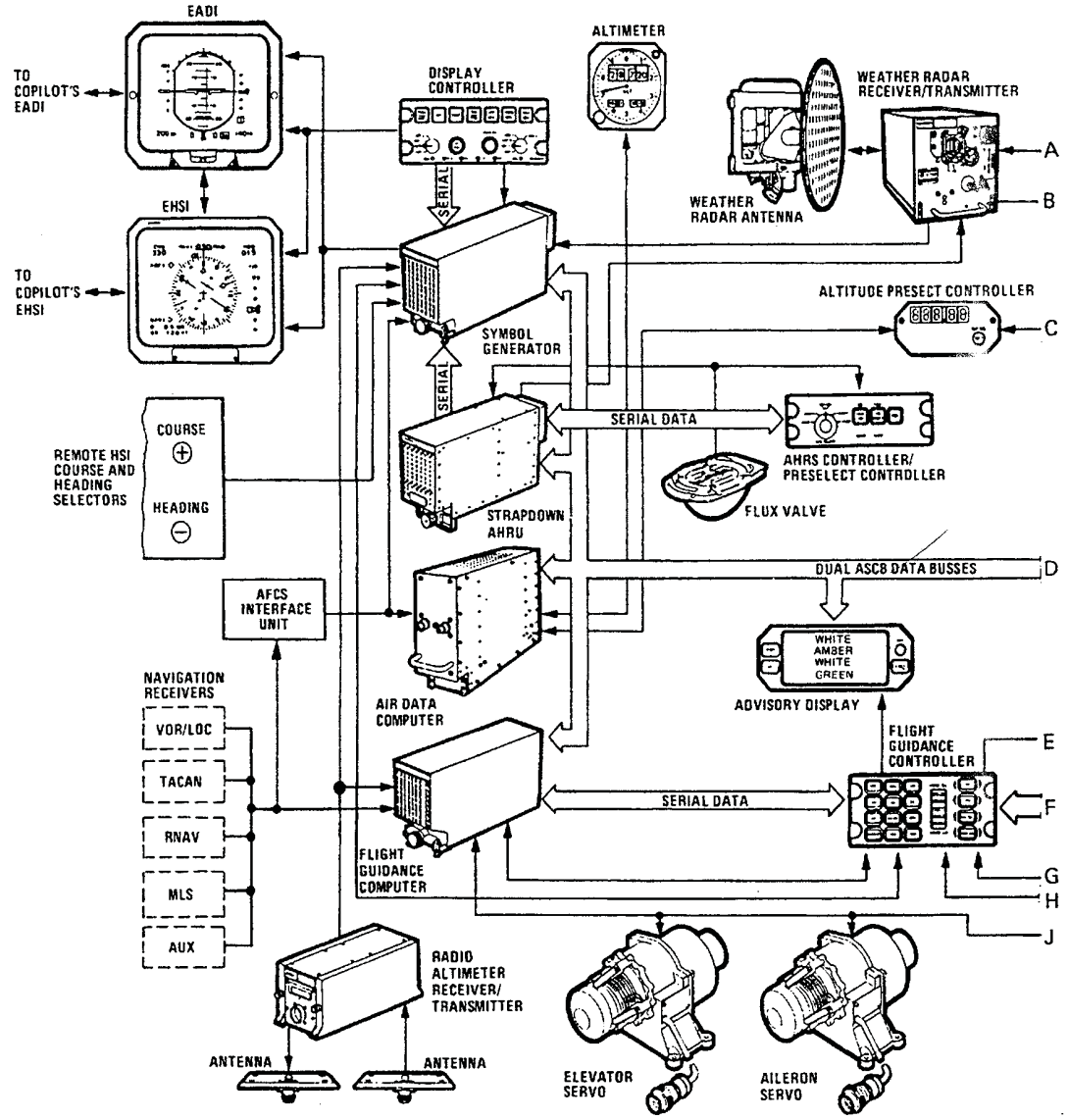
## SYSTEM DESCRIPTION

### Automatic flight control system

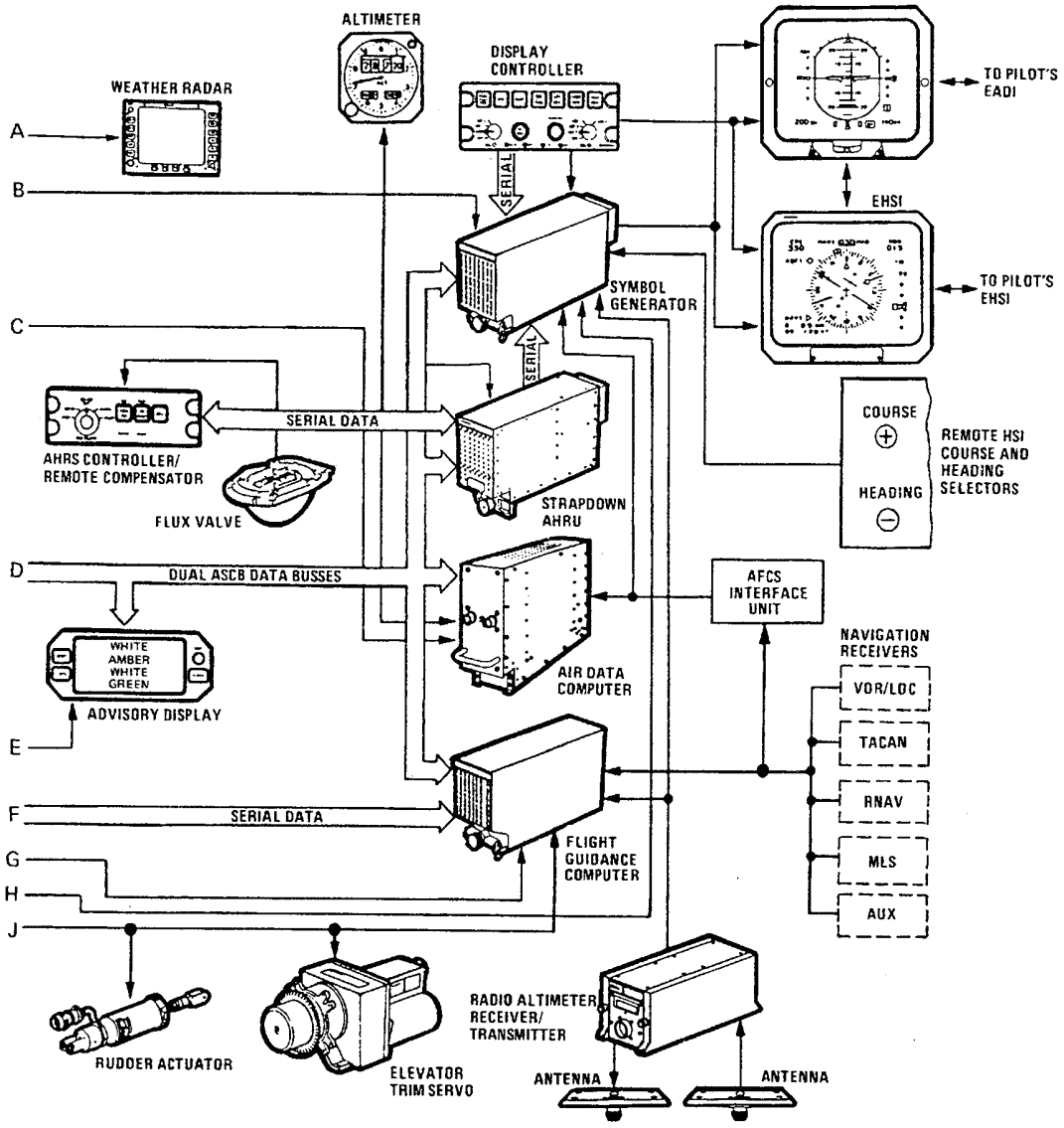
The SPZ-8000 automatic flight control system (AFCS) refers to the combined operation of the dual flight guidance system, air data system, attitude and heading reference system (AHRS) and the related flight instruments to provide aircraft stabilization and control.

The AFCS shares information among its subsystems via serial data buses (ASCB) and discrete information lines. The ASCB is an information bus that allows subsystems to receive and share information among the systems. The data bus system allows invalid information to be automatically replaced by a redundant information source, allowing the AFCS to remain operational if a failure of a component occurs.

A block diagram shows how the system components are interconnected.



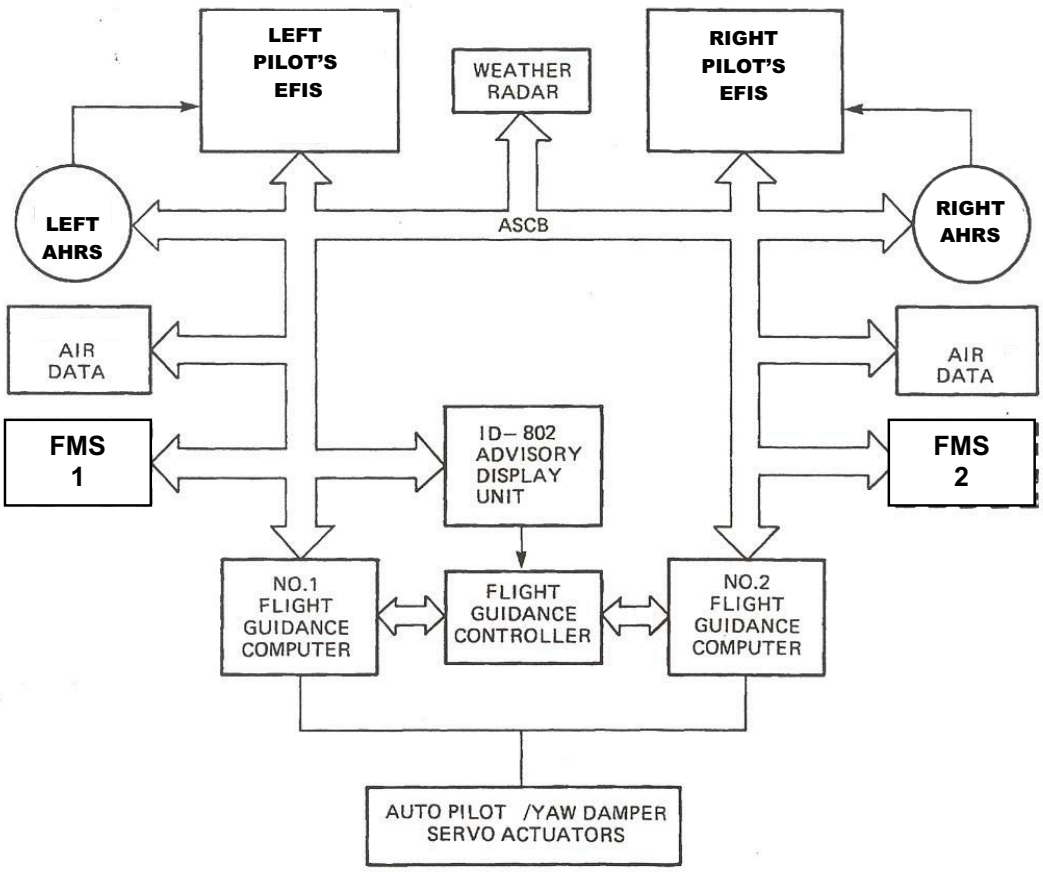

*Automatic flight control system schematic EFIS*




*Automatic flight control system schematic EFIS*

### Flight guidance system general

The flight guidance system provides flight director guidance, yaw damper and trim functions. The system consists of a number 1 and number 2 flight guidance computer, flight guidance controller and a pilot and co-pilot's advisory display unit.




*Flight guidance system diagram*

### Flight Guidance Computers (FGC)

The flight guidance computers generate flight guidance commands, provide autopilot pitch/roll and yaw damper control, monitor the operation of the AFCS, and manage all data transfer activity of the serial data buses. The flight guidance commands are generated according to the flight guidance mode and navigation data selected on the flight guidance controller. The flight guidance commands are displayed by command bars on both pilots' Electronic Attitude Director Indicators (EADI). The pilot can manually manoeuvre the aircraft toward the bars to capture and track the commands or engage the autopilot function of the flight guidance computer to automatically fly the flight guidance commands.

Both flight guidance computers operate in the same flight guidance mode using the same navigation data. The computers provide fail operational capabilities by having one computer active while the other acts as a back up. Should the active computer fail the second computer will automatically take control. A message will appear on the advisory display to annunciate why the switchover was required.

Only one Flight Guidance Computer at a time has authority to control the flight control servos if autopilot or yaw damping functions are selected. Either Flight Guidance Computer may be selected by pressing the L AFCS or R AFCS pushbutton on either advisory display.

### Flight guidance controller

The flight guidance controller is used mainly to select the source of navigation data for the EHSI and flight guidance computer and to engage the operating modes. Also, autopilot and yaw damper are controlled from this device.

The flight guidance mode selectors, when pressed, command both flight guidance computers to generate flight guidance commands for the selected mode. With the autopilot function engaged the priority Flight Guidance Computer will control the servos so the aircraft will automatically fly the computed commands that are displayed by the flight director. When the autopilot function is not engaged either pilot flies the aircraft to the commands displayed on the EADI's. A selected mode and its condition of being armed, capturing, or tracking are displayed on the advisory display units.

### Advisory displays

The ID-802 advisory displays, located on each flight instrument panel, provide capability for the automatic flight control system to request data from the pilots, in addition to providing system status annunciations. Advisory messages provide maximum pilot awareness of system transitions and failures, while minimizing pilot effort in assessing system status. Low priority messages are inhibited during heavy pilot workload periods such as take-off and approach in order to minimize distractions.

Each advisory display consists of a display screen, a RESET pushbutton, L AFCS and R AFCS pushbuttons, and a dim knob. Both advisory displays show the same information and their pushbuttons have duplicate functions.

Messages are displayed on four different lines of the advisory displays' screens. Line one is at the top; line four is at the bottom.

Messages displayed on the left side of line one are displayed in white for a short period of time and are extinguished. Messages displayed on line two are either flashing or steady amber and require the crew members to acknowledges the message by clearing the message using the RESET button or in some cases using the AP disconnect button on the control wheel. Armed flight director modes are annunciated on line three in white. Active flight director modes are annunciated on line four in green. When a mode transitions from the armed status to the captured state, the green message appears in reverse video (black letters on a green background) for a short period of time in order to emphasize the transition.

Advisory display lines 3 and 4 are copied to the EFIS symbol generators and displayed in the top line of the EADI's. Messages annunciated in line 2 (amber) trigger a short message in each EADI, thus drawing attention to the advisory displays.

**Status messages**

**Disengage/caution/conditional status messages (line 2 in amber)**

(a) The following messages are flashing or steady messages. Depressing the RESET button on the advisory display units will cause the message to stop flashing. A second push of the RESET pushbutton will cancel the message.

| MESSAGE | COMMENTS |
|---|---|
| AP DISENGAGED | The crew has disengaged the autopilot by use of the control wheel A/P DIS pushbuttons or the AP pushbutton on the flight guidance controller.<br><br>**NOTE:** The message cannot be reset following a manual disengagement. The message will clear automatically after five seconds. |
| AP DISENGAGED (FLASHING) | A monitor within the AFCS has disengaged the autopilot. Clearing this message will cause another message to be displayed, which identifies the cause of the disengagement. |
| AP/YD DISENGAGED (STEADY) | The crew has disengaged the autopilot and yaw damper by use of the YD push button on flight guidance controller.<br><br>**NOTE:** Pressing the RESET button causes the message to cease flashing and remain steadily annunciated for five seconds, and then clears. |
| AP/YD DISENGAGED (FLASHING) | A monitor within the AFCS has disengaged the autopilot and yaw damper. When this message is cleared, another message is displayed which identifies the cause of the disengagement. |
| YD DISENGAGED (STEADY) | The crew has disengaged the yaw damper by use of the YD pushbutton on the flight guidance controller. |
| YD DISENGAGED (FLASHING) | A monitor within the AFCS has disengaged the yaw damper. Clearing this message will cause another message to be displayed, which identifies the cause of the disengagement. |

(b) The following messages are displayed when one of the Flight Guidance Computers has failed. The messages are steady (non-flashing) and are cancelled by the use of the RESET pushbutton on the advisory display.

| MESSAGE | COMMENTS |
|---|---|
| L AP/YD FAIL | A system monitor has turned off the left Flight Guidance Computer. |
| R AP/YD FAIL | A system monitor has turned off the right Flight Guidance Computer. |

(c) The following steady messages are displayed after a disengage message has been cleared when a system monitor has caused the disengagement. The messages are cancelled by use of the RESET pushbutton on the advisory display.

| MESSAGE | COMMENTS |
|---|---|
| AHRS DATA INVLD | Both AHRS' are invalid or the AFCS is receiving bad ASCB data from both AHRS. |
| DADC DATA INVLD | Both DADC's are invalid or the AFCS is receiving bad ASCB data from both AHRS. |

(d) AFCS mis-trim messages that appear in line two in amber are listed below. These messages are cleared by re-trimming the airplane

| MESSAGE | COMMENTS |
|---|---|
| MISTRIM<br>(TRIM L WING DN) | The AFCS senses a steady-state load on the roll servo.<br><br>**ACTION:** Trim the ailerons in the direction indicated. |
| MISTRIM<br>(TRIM R WING DN) | The AFCS senses a steady-state load on the roll servo.<br><br>**ACTION:** Trim the ailerons in the direction indicated. |
| MISTRIM<br>(TRIM NOSE UP) | The AFCS senses a steady-state load on the pitch servo.<br><br>**ACTION:** No action required. System will automatically re-trim the airplane. If this message is displayed when the autopilot is to be disengaged, the crew should expect the airplane to be out of trim and should anticipate a force on the control column when the autopilot is disengaged.<br><br>**NOTE:** If this message doesn't clear automatically within a few seconds, the autopilot should be disengaged. |
| MISTRIM<br>(TRIM NOSE DN) | Same as for nose up case. |
| PITCH TRIM FAIL | The AFCS monitors have sensed a failure in the automatic pitch trim function.<br><br>**ACTION:** Disengage the autopilot. The crew should anticipate a force on the control wheel when the AP is disengaged. |

**Operational messages**

(a) These messages will appear momentarily when engagement is attempted and the system has detected a failure, which prohibits engagement.

| MESSAGE | COMMENTS |
|---|---|
| AP FAIL/YD AVAIL | Failures in the pitch, roll, or pitch trim servos, or a failure in the servo drive functions within the computers prior to engagement. |
| AHRS DATA INVLD | Both AHRS' are invalid or the AFCS is receiving bad data from both AHRS'. |
| DADC DATA INVLD | Both DADC's are invalid or the AFCS is receiving bad data from both DADC's. |
| L (R) AP/YD FAIL | Left (right) AFCS invalid. |
| ACFT ON GND | AP engagement is inhibited on the ground. |
| ENGAGE INHIBIT | Message appears for one of the following reasons:<br><br>- AP DIS button pushed<br>- TCS button pushed<br>- Stall warning active<br>- GA button pushed |

(b) The following message appear momentarily during initial power-up of the system:

| MESSAGE | COMMENTS |
|---|---|
| L AFCS MASTER | • This is the normal power-up state. The left computer is master.<br>• The left side computer has been selected as master by using the L AFCS pushbutton on the advisory display. |
| R AFCS MASTER | • The left computer has failed and the right computer is master.<br>• The right side computer has been selected as master by using the R AFCS pushbutton on the advisory display. |
| SYSTEM TEST | Annunciated during first 30 to 40 seconds of power-up on ground. |

(c) Other messages appearing momentarily in line one in white are shown below. These messages occur when a FLIGHT DIRECTOR mode has been selected and mode engagement is inhibited due to a failure within the system.

| **MESSAGE** | **COMMENTS** |
|---|---|
| HDG DATA INVLD | Loss of heading data from selected AHRS.<br>**ACTION**: Use HSI SEL pushbutton to select opposite AHRS and DADC. |
| DADC DATA INVLD | Loss of DADC on selected side.<br>**ACTION**: Use HSI SEL pushbutton to select opposite DADC and AHRS. |
| CHECK NAV SOURCE | APP or BC mode has been selected while NAV source is either RNAV or AUX NAV selection. |
| CHECK NAV FREQ | BC mode has been selected while VOR frequency is tuned (tuned to LOC not present). |
| INVALID OP | ALT SEL mode has been selected while tracking in GS mode. |
| SELECT INHIBIT | L AFCS or R AFCS pushbutton is used to select master computer while in DUAL HSI approach. Without AP or YD engaged, this selection is not allowed. |
| LDG ATT 6 DEG | Landing attitude has reached certification limit. |
| TCS ENGAGE | TCS button is selected. |

(d) Other messages which the reset button can clear.

| MESSAGE | COMMENTS |
|---|---|
| FD NAV MISMATCH (R VALID) | • Active in DUAL HSI LOC and GS modes. When the two navigation receivers do not agree the AFCS monitors have selected the right side navigation receiver as correct.<br>**ACTION:** If, when the two navigation receivers do not agree, the right side receiver is determined to be correct by the crew, depress the RESET button. If the left side receiver is determined by the crew to be the valid receiver, depress the L AFCS and then the RESET pushbutton. |
| | • A FD NAV MISMATCH (L VALID) message has been displayed and the crew has selected the right side receiver by use of the R AFCS pushbutton on the advisory display. |
| FD NAV DATA INVLD | This amber message appears for loss of valid NAV data on selected side. |
| FD DADC DATA INVLD | This amber message appears for loss of valid air data on selected side. |
| RAD ALT INVLD | Active only in APP modes. There is no valid RAD ALT information. |
| FD HDG DATA INVLD | This amber message appears for loss of valid heading data on selected side. |

(e) Other steady messages which can not be cleared by the RESET button are:

| MESSAGE | COMMENTS |
|---|---|
| ADI ROLL MISMATCH | Roll data displayed on both EADI's does not agree. Displayed if data mismatch exceeds 6 degrees. |
| ADI PITCH MISMATCH | Pitch data displayed on both EADI's does not agree. Displayed if data mismatch exceeds 6 degrees. |
| ADI PITCH/ROLL MISMATCH | This message is a combination of the two previous messages. |
| HSI HDG MISMATCH | Heading data displayed on both EHSI's does not agree. Displayed if data mismatch exceeds 6 degrees in level flight or 12 degrees during a turn. |
| EXCESSIVE DEV | Active only in DUAL HSI mode. The LOC or GS deviation signals exceed the CAT II window.<br>**NOTE:** The RESET button on the advisory display cannot cancel this message. The message is displayed until the deviation signals are inside the CAT II window. |
| AFCS CONTROLLER INOP | This message is active whenever the AFCS detects a continuous button push on the flight guidance controller or advisory display unit. |

(f) The following message is displayed as a momentary message on line two:

| MESSAGE | COMMENTS |
|---|---|
| ALT OFF | The pitch wheel is used while in altitude hold mode. |
| FD NAV DATA INVLD | The selected navigation source has been changed by use of the V/L, MLS, or AUX pushbuttons while in a NAV mode. |
| CHECK NAV FREQ | A VHF NAV frequency has been changed with VOR, VOR APP or LOC mode armed or captured. |

**Altitude alert**

Altitude alerting occurs when approaching or departing the altitude selected on the altitude pre-select controller. To initiate altitude pre-select, the ALT SEL button is selected on the flight guidance controller.

**Approaching a selected altitude**

At 1000 feet to go, the altitude alert annunciator on each altimeter illuminates and sounds a warning tone for one second.

At 250 feet to go, the lights extinguish.

**Deviating from a selected altitude**

At 250 feet from the altitude:

- Altitude alert annunciator illuminates
- Warning tone sounds
- Light extinguishes if airplane returns to within 250 feet
- If the airplane does not return to selected altitude, pre-selected altitude must be reset to extinguish light

**Auto flight operation**

**Take-off operation (FD only):**

The flight director on both sides may be used for takeoff. By engaging the GA pushbutton, the flight director will command a wings level, 9° nose-up attitude giving a suitable reference for climb out.

**CAUTION:** A nose-up attitude greater than 9° prior to lift-off may cause the tail to contact the runway.

If an attempt is made to engage the autopilot while weight is on the gear, an advisory display message 'ACFT ON GND' is displayed as a reminder that the system cannot be engaged on the ground.

**.En route**

The A/P and/or flight director can be used after take-off to fly the required lateral and vertical track.

**NOTE**: In the event of an engine failure, disengage the autopilot. The autopilot may be engaged following re-trimming except during approach.

### Heading hold and wings level

Heading hold is defined as:

- Autopilot engaged
- No lateral flight director mode engaged
- Bank angle less than 6°

If above conditions are satisfied, the autopilot will roll the aircraft to a wings level attitude. When the bank angle is less than 3º for 10 seconds, the heading hold mode is automatically engaged. There is no annunciation on the advisory display unit.

### Roll hold

Roll hold is operational when:

- No lateral flight director mode is selected
- Bank angle is greater than 6°, but less than 45°
- Touch control steering (TCS) was used to initiate the roll manoeuvre, with autopilot engaged

When conditions are satisfied, the autopilot will maintain the desired bank angle. If TCS is released at bank angles greater than 45°, the autopilot will roll the aircraft to 45° bank and maintain.

### Pitch attitude hold

Mode is activated when a flight director roll mode is engaged without an accompanying pitch mode or an engaged pitch mode is cancelled by pressing this particular pitch mode button once again. PITCH is annunciated on the advisory display unit. Pitch reference may be changed with the TCS button.

With the autopilot engaged the pitch wheel on the flight guidance controller may be used to change the pitch reference attitude.

Pitch attitude hold is cancelled by engaging any vertical mode or automatic capture of a vertical mode.

### Heading select mode

The heading select mode is used to intercept and maintain a magnetic heading. To activate this mode:

- Position the heading bug on HSI to the desired heading, using the instrument remote controller on the glareshield
- Engage HDG button on the flight guidance controller
- HDG SEL will be annunciated on the advisory display unit

The flight director will, if HDG SEL is already engaged, follow the direction of turn of the heading bug, even when the turn exceeds 180º.

**Vertical speed hold mode**

The vertical speed hold mode is used to automatically maintain the aircraft at a selected vertical speed reference. To initiate the mode, engage VS and select the vertical speed reference to the desired climb or descent rate. The reference vertical speed may be changed with the TCS button by manoeuvring the aircraft to a new vertical speed and releasing the TCS button.

When the vertical speed mode is engaged:

- VS in green is annunciated on the advisory display
- The advisory display shows the selected vertical rate in FPM

The vertical speed reference may be changed with the pitch wheel, with the advisory display indicating the new selected vertical speed. Actual aircraft vertical speed is displayed on the vertical speed indicator (VSI). When VS is engaged, it will reset all previously engaged vertical modes.

The vertical speed mode is cancelled by:

- Pressing the VS pushbutton (PITCH is now engaged)
- Engaging another vertical mode
- Engaging go-around
- Coupling to the opposite side DADC and AHRS (HSI SEL button on flight guidance controller)

**Indicated air speed hold mode**

The indicated air speed hold mode is used to automatically maintain the aircraft at a pilot selected airspeed reference.

Operation of IAS mode is similar to previously discussed vertical speed hold mode with the following exceptions:

Mode is engaged with IAS pushbutton on flight guidance controller
IAS replaces VS annunciation on the advisory display
IAS reference is in KIAS

**Altitude pre-select**

The altitude pre-select mode is used in conjunction with another vertical mode to enable the pilot to automatically capture, level off, and hold the altitude that is selected on the altitude preselect controller.

To fly the altitude preselect mode, the pilot would perform the following:

Select the desired altitude on the altitude preselect controller
Press the ALT SEL button on the flight guidance controller
Engage another vertical mode (VS, IAS or PITCH) on the flight guidance controller to initiate the required ascent or descent to the new altitude

The advisory display will annunciate:

- ALT SEL in white
- The other vertical mode in green

As the aircraft captures its selected altitude the ALT SEL is dropped and the altitude hold (ALT) automatically comes on.

During the capturing phase (ALT* and ALT*) the process is cancelled by:

- Moving the pitch wheel on the flight guidance controller
- Selecting a new altitude target on the altitude preselect controller
- Engaging any other vertical mode
- Engaging go-around or STBY
- Coupling to cross side DADC and AHRS (HSI SEL button on flight guidance controller)

**Altitude hold mode**

The altitude hold mode is a vertical flight director mode used to maintain a barometric altitude reference.

To engage the altitude hold mode, the pilot would:

- Be in any lateral flight director mode
- Press the ALT button on the flight guidance controller

A green ALT is annunciated on the advisory display. The altitude may be changed using the TCS button. Engaging the ALT mode will cancel any other previously engaged vertical mode.

The ALT hold mode is cancelled by:

- Moving the pitch wheel on the flight guidance controller
- Pressing the ALT pushbutton
- Capturing a glideslope
- Engaging go-around or any other vertical mode
- Coupling to cross side DADC and AHRS (HSI SEL button on flight guidance controller)
- Engaging standby (STBY)

### VOR (NAV) mode

The VOR mode provides for automatic intercept, capture and tracking of a selected VOR radial. To activate mode:

- Tune the NAV receiver to the desired VOR frequency
- Select V/L as the navigation source on the flight guidance controller
- Select the desired course (radial)
- Select the intercept heading
- Press the NAV button on the flight guidance controller
- Advisory display annunciates HDG SEL in green and VOR in white

Upon reaching capture point (within two dots on EHSI) the following is observed on the advisory display:

White VOR message will extinguish
Green HDG SEL message will extinguish
Green VOR* message will appear (momentarily annunciated in reverse video to emphasize transition from armed to captured)
The asterisk (*) indicates the system is in the capture phase and will extinguish when the aircraft is tracking the selected radial

The VOR mode is cancelled by:

- Pressing the NAV button on the flight guidance controller
- Engaging the heading select mode
- Changing NAV sources to AUX or selecting a different VHF NAV frequency
- Engaging go-around
- Engaging standby (STBY)
- Coupling to cross side DADC and AHRS (HSI SEL button on flight guidance controller)

### Approach

**NOTE**: For approaches to runways without a glideslope facility, NAV mode should be selected in lieu of APP mode.

### Approach mode

The approach mode provides for automatic intercept, capture, and tracking of the front course localizer and glideslope signals. This allows the pilot to fly a fully coupled ILS approach. Glideslope capture is inhibited until localizer capture has occurred.

The approach mode is set up and flown as follows:

- Tune the navigation receiver to the published ILS frequency for the runway in use
- Select the inbound final course
- Select the intercept heading
- Select V/L as the navigation source on the flight guidance controller
- Engage the APP button on the flight guidance controller
- Advisory display annunciates HDG SEL in green and LOC and GS in white

Upon reaching the capture point (within one to two dots on EHSI) the following is observed on the advisory display:

- White LOC message will extinguish
- Green HDG SEL message will extinguish
- Green LOC* message will appear (momentarily annunciated in reverse video to emphasize transition from armed to captured)
- The asterisk (*) indicates the system is in the capture phase and will extinguish when the aircraft is tracking the selected course.

Upon glideslope capture the advisory display will annunciate:

- GS* in green

The asterisk denotes the capture phase mode of operation. The GS* will momentarily be displayed in reverse video to highlight glideslope capture. After glideslope capture, with the aircraft tracking the glideslope beam the advisory display will display GS.

The approach mode is cancelled by:

- Pressing the NAV or APP pushbuttons on the flight guidance controller
- Engaging any other lateral or vertical mode
- Changing NAV sources to AUX or selecting a different VHF NAV frequency
- Engaging go-around
- Engaging standby (STBY)
- Coupling to cross side DADC and AHRS (HSI SEL button on flight guidance controller)

**Dual couple approach mode**

The system will utilize landing flight path data from both pilots' VHF NAV receivers. This allows the approach to be continued in the event of a failure of one navigation receiver.

The dual coupled approach mode is set up as follows:

- Tune both NAV receivers to the ILS frequency for the approach runway
- Select the same course on both EHSI's

The system will transition to the dual HSI mode of operation when:

- Tracking localizer and glideslope signal
- Radio altitude is below 1200 feet
- Both navigation receivers produce valid data

Both pointers beside the HSI SEL pushbutton on the flight guidance controller illuminate to indicate the dual mode is active, and the advisory display annunciates DUAL in green.

**Back course mode**

The back course mode provides for automatic intercept, capture, and tracking of the back course localizer. Glideslope capture is automatically inhibited. The back course mode is set up and flown exactly like a front course approach with the following differences:

- Select localizer frequency and front course
- BC pushbutton is engaged on the flight guidance controller
- BC replaces LOC annunciation on the advisory display

**VOR approach (VOR APP) mode**

The VOR approach mode is set up and flown exactly like the VOR (NAV) mode with the following differences:

- Press the APP pushbutton on the flight guidance controller
- Capture and track messages on ID-802 advisory display will identify VOR APP

**Go-around (wings level)**

The go-around mode is normally used to transition from an approach to a climb-out condition when a missed approach has occurred. The pilot engages go-around by pressing the GA button located on the outboard side of either power lever. With go-around engaged, all flight director modes are cancelled, and the autopilot is disengaged. The EADI will show a wings level command laterally and a 9° nose-up command vertically.

The advisory display will annunciate WINGS LEVEL and GA until a subsequent mode engagement has occurred, or the autopilot is engaged. Operating the TCS button with WINGS LEVEL and GA displayed cancels all flight director modes.