AIRSPEED LIMITATIONS

V_{NE} (Power-ON)..... See Figure 1-5

V_{NE} (Power-OFF / OEI)..... V_{NE} (Power-ON) - 40 KIAS

Vmini (minimum IFR airspeed).....55 KIAS

Maximum landing gear operating airspeed (V_{LO}) .....140 KIAS

Maximum landing gear extended airspeed (V_{LE}).....140 KIAS

Minimum airspeed in autorotation
(without close external reference).....60 KIAS

GROUND SPEED LIMITATIONS

ON CONCRETE OR EVEN SURFACES

Maximum speed for running take-off and landing ..... 40 knots

Maximum taxiing speed (nose wheel unlocked)

- Straight..... 20 knots

- Turning ..... 10 knots

ON UNPREPARED OR UNEVEN SURFACES

Maximum speed for running take-off and landing ..... 20 knots

Maximum taxiing speed (nose wheel unlocked)

- Straight..... 20 knots

- Turning ..... 10 knots

WIND SPEED LIMITATIONS FOR ROTOR STARTING AND STOPPING

The maximum wind speed for rotor starting and stopping is 40 knots.

Helipilot Operating Modes

The helipilot systems can be operated in three distinct modes that are described below.

D **Stability Augmentation System (SAS) Mode -** In the SAS mode each axis control operates to maintain short**-** term stability or motion damping. The stability augmentation is most evident when the pilot is maneuvering at low altitudes and at low airspeeds. The pilot controls the aircraft while the helipilots correct attitude changes due to turbulence.

D **Attitude Hold Mode -** Either or both helipilots operate to maintain the aircraft pitch and roll attitude at the moment of system engagement. This attitude is maintained indefinitely and the pilot can fly completely **hands off**. The attitude can be changed incrementally by pushing the attitude beep switch which causes a 2□/sec. change. For larger changes, the pilot can push the FTR switch on the cyclic and move the cyclic control to put the aircraft into a new attitude. After the switch is released, the helipilots again maintain the new attitude indefinitely.

While this mode is engaged, the yaw axis is controlled from system No. 1 only (there is no yaw control in system No. 2). The yaw control is damping only. It does not maintain a fixed numerical heading. Pilot pedal inputs are necessary for desired headings.

D **Coupled Mode -** In this mode the helipilots are coupled to the FD for automatic path following. The helipilots steer the aircraft in the roll and pitch axes to follow the FD commands displayed on the ADI. The command bars are kept centered during normal operation.

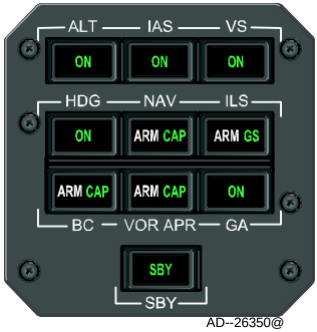
The system can be coupled by selecting any lateral or vertical mode on the flight director mode selector after the helipilots are engaged in the ATTD HOLD mode and the COUPLE/DECOUPLE switch is set in the COUPLE position. The roll or pitch axis can be coupled separately. If the FD mode goes invalid and the command bars are retracted, the affected helipilot axis reverts to the ATTD HOLD mode. The roll axis maintains a wings level attitude and the pitch axis continues the last stable pitch angle. If the invalid condition is cleared, the helipilots automatically recouple and resume the commanded flight path.

Any condition that causes the systems to DECOUPLE also lights the DCL annunciator on the ADI.

Flight Director Controls

The flight director mode selector, shown in Figure 3- 3, is used to select and annunciate the various flight modes of the helicopter FD system. The bezel and panel display consists of illuminated buttons that select flight director standby, roll axis, or pitch axis modes of operation. When a mode is selected, it is annunciated by a light on the button. The light level is controlled by an external cockpit dimming knob.

The navigation (NAV), back course (BC), and VOR approach (VORAPR) modes have split legends on their buttons that annunciate ARM and capture (CAP) to advise the pilot as to the mode the FD is tracking. The split legends of the ILS button are ARM and GS.



Flight Director Mode Selector

This section describes the modes and combinations of modes that can be selected on the mode selector.

All FD modes are available for automatic (coupled) flight path operation by engaging the helipilot system in ATTD and selecting the desired mode by pushing the correct button on the mode selector. When coupled, the system automatically satisfies all pitch and roll commands that are required to capture and track the desired flight path.

D **Altitude Hold (ALT) Button -** The altitude hold mode is selected by pushing the ALT button on the mode selector. When ALT is selected, it overrides the ILS, GS, GA or VS modes. In the ALT mode, the pitch command is proportional to altitude error relative to the engage reference. Once engaged in the ALT HOLD mode, the pitch steering pointer biases out of view if the VG goes invalid.

- **Indicated Air Speed (IAS) Button -** The IAS hold mode can be engaged at any speed above 50 knots. It is selected by pushing the IAS button on the mode selector. The IAS mode overrides any other vertical modes that are engaged. The system maintains the airspeed that exists when the IAS button is pushed. The reference airspeed can be changed incrementally by pushing the airspeed beep switch on the collective control. The beep rate is 2 kt/sec.

- **Vertical Speed Select (VS) Button -** The vertical speed select mode is engaged by pushing the VS button on the mode selector. When VS is selected, it overrides the ILS, GS, GA or ALT modes. The vertical speed reference is set by the cursor position on the vertical speed indicator. Once engaged, if the vertical gyro (VG) goes invalid, the pitch steering pointer biases out of view.

- **Heading Select (HDG) Button -** The heading select mode is selected by pushing the HDG button on the mode selector. In the HDG mode the FD computer provides inputs to roll the steering pointer to command a turn to the heading indicated by the heading bug on the HSI. When HDG is selected, it overrides the NAV, BC and ILS modes. If valid data is lost from either the vertical or directional gyros, the roll steering pointer biases out of view and the automatic flight control system (AFCS) roll channel is driven to a level attitude configuration.

- **Navigation (NAV) Button -** The NAV mode outputs steering commands for VOR, localizer or other navigational devices, each of which is described below.

  — VOR MODE **-** Pushing the NAV button on the mode selector while the navigational receiver is tuned to a VHF omnidirectional radio range (VOR) frequency, engages the VOR mode. When outside the lateral beam sensor trip point, the roll steering pointer receives the heading select command as described above, and both NAV ARM and HDG mode annunciators light. When the lateral beam sensor trip point is reached, the system automatically switches to the VOR mode, the HDG and NAV ARM annunciators go out, the NAV CAP annunciator lights and a command is generated to capture and track the VOR beam.

  When passing over the station, an overstation sensor detects the aircraft passing the station, and it removes the VOR deviation signal from the command bars until the signal stabilizes. While over the station, course changes are made by selecting a new course on the HSI.

If the NAV receiver is not valid before the capture point is reached, the lateral beam sensor does not trip and the system remains in the HDG mode. After capture, if the NAV receiver or compass data go invalid, the roll steering pointer biases out of view and the AFCS roll commands a zero attitude.

— LOCALIZER (LOC) MODE **-** The localizer mode is selected by tuning a LOC frequency, setting the course pointer to the inbound runway heading and pushing the NAV button on the mode selector. The mode selection and annunciations are the same as for the VOR mode.

D **Instrument Landing System (ILS) Button -** The ILS mode is used to make a full ILS approach. Pushing the ILS button with a LOC frequency tuned arms both the localizer and glideslope modes. The initial localizer capture angle is set using the heading bug as with the VOR mode.

With the ILS mode armed, the pitch axis can be in any one of the other pitch modes except GA. When reaching the vertical beam sensor trip point, the system automatically switches to the glideslope mode. The pitch mode and ILS ARM annunciators go out and the ILS GS annunciator lights. At capture, a command is generated to smoothly approach the glideslope beam. Capture can be made from above or below the beam.

Glideslope capture is interlocked so that the localizer must be captured before glideslope capture. If the glideslope receiver is not valid before capture, the vertical beam sensor does not trip and the system remains in the existing pitch mode. After capture, if the glideslope receiver or vertical gyro go invalid, the pitch steering pointer biases out of view and the AFCS pitch reverts to ATTD HOLD.

If the approach is continued below the normal DH, a flare is initiated as the aircraft nears the runway. The system flies a path 50 feet high as measured by the radar altimeter and along runway center as defined by the localizer beam. This auto level feature is inhibited if the radar altimeter is invalid.

D **Back Course (BC) Button -** The BC mode is selected by setting the course pointer to the FRONT course heading and pushing the BC button on the mode selector. BC operates the same as the LOC mode with the deviation and course signals reversed. Glideslope capture is locked out in the BC mode. When BC is selected outside the lateral beam sensor trip point, BC ARM and HDG are annunciated on the mode selector. At the capture point, BC CAP is annunciated with BC ARM and the HDG light goes out.

- **VOR Approach (VOR APR) Button -** The VOR APR mode is engaged by pushing the VOR APR button on the mode selector when the navigation receiver is tuned to a VOR frequency. The mode operates identically to the VOR mode with gains optimized for close in approaches. This mode is used if the distance to station is less than 10 miles.

- **Go-Around Mode (GA) Button -** The GA mode is engaged using the mode selector GA button or by pushing the GA button on the collective control. All other modes are canceled when GA is engaged. The roll axis commands a level flight attitude. The pitch axis commands a 750 feet/min (FPM) climb is airspeed is above 55 knots. If airspeed is between 45 and 55 knots, the climb rate is between 0 and 750 feet. Below 45 knots the pitch axis flies straight and level.

  When GA is engaged, the collective cue on the ADI is displayed and it commands a collective control setting that is equivalent to a 750 FPM climb. The pilot moves the collective to center the collective cue which normally results in a positive climb that maintains the approach speed.

  Once the GA climb out is established, roll or pitch channel modes can be selected separately to make a new approach or proceed to an alternate destination.

- **Standby Mode (SBY) Button -** Pushing the SBY button on the mode selector or the remote SBY button on the cyclic stick resets all the other FD modes and biases both FD command bars from view. While SBY is pushed, it acts like a lamp test because all of the FD and helipilot mode annunciators light and the FD warning flag on the ADI comes into view. When the SBY button is released, all other mode annunciator lights go out and the FD warning flag retracts.

FLIGHT DIRECTOR COUPLING

The helipilots have two basic modes of operation, SAS and ATTD HOLD. In ATTD HOLD the helipilots hold the aircraft attitude until the pilot engages the FD couple switch (FD/CP- DCPL) and selects an FD mode on the mode selector. If the FD mode goes invalid (i.e., command bars are biased from view), the system automatically reverts to ATTD HOLD and wings level in the roll axis. The FD is not coupled when flying ATTD HOLD off (SAS).

COUPLED MODES

The FD provides the path computation and mode selection for both lateral and vertical path modes of the helipilot. The lateral and vertical modes that can be coupled are listed in Table 3- 1.

Lateral Mode	Vertical Mode
Heading Select	Attitude Hold
VOR Tracking	Airspeed Hold
VOR Approach	Vertical Speed Select
LOC Approach	Go- Around
Back Course LOC	None

Lateral and Vertical Mode Coupling Combinations