222 Autopilot System

Autopilot Modes

The autopilot system will become available at speeds above 44kts. A mode may be engaged or disengaged by pressing the associated button on the HCP. If any of the autopilot modes are armed or active, pressing the SBY Autopilot Disconnect button once disengages all autopilot modes but leaves the underlying Auto Trim/SAS mode active.

Altitude Hold Mode (ALT)

- Engagement: Pressing the ALT button commands the autopilot to hold the current indicated altitude. When active, the ALT button itself illuminates green “ON”.

- Function: ALT holds the barometric altitude present at the moment of engagement. If the helicopter is climbing or descending, ALT will command a gentle pitch change to stop the vertical rate, then adjust back toward the reference altitude.

- Limitations: Because of altimeter lag, the helicopter may not return to the exact altitude where ALT was first engaged—especially if the climb or descent rate was high.

- Pilot Input: ALT uses pitch to maintain altitude, so airspeed will vary with collective (power) changes. To change airspeed while ALT is engaged, adjust the collective gradually. Rapid collective inputs will cause temporary altitude deviations, though the autopilot will slowly return to the reference altitude at the new airspeed.

- Mode Switching: Pressing the IAS or VS button will switch to that mode and automatically disengage ALT.

Indicated Airspeed Mode (IAS)

- Engagement: Pressing the IAS button commands the autopilot to hold the current indicated airspeed. When active, the IAS button illuminates green “ON”.

- Function: The autopilot uses pitch attitude to maintain IAS.

- Mode Switching: Pressing the ALT or VS button will switch to that mode and automatically disengage IAS.

Vertical Speed Mode (VS)

- Engagement: Pressing the VS button commands the autopilot to hold the current vertical speed. When active, the VS button illuminates green “ON”.

- Function: The autopilot uses pitch attitude to maintain the selected rate of climb or descent.

- Mode Switching: Pressing the ALT or IAS button will switch to that mode and automatically disengage VS.

Heading Mode (HDG)

- Engagement: Pressing the HDG button commands the autopilot to hold the heading selected by the heading bug on the HSI. When active, the HDG button illuminates green “ON”.

- Function: The autopilot will turn the helicopter to the heading set on the HSI and maintain it.

- Pilot Input: Adjusting the heading bug will command the autopilot to turn to the new heading while HDG is engaged.

- Mode Switching: Pressing the NAV or ILS button will switch to that mode and automatically disengage HDG.

Navigation Mode (NAV)

- Engagement: Pressing the NAV button arms navigation capture. The button first illuminates amber “ARM”. When the autopilot intercepts and captures the selected navigation source (VOR or GPS), the button changes to green “CAP”.

- Function: In ARM, the autopilot waits to intercept the active course. In CAP, the autopilot tracks the selected course until signal loss or mode change.

- Pilot Input: Ensure the correct navigation source and course are set on the HSI before engaging NAV. Large intercept angles may result in overshoot before capture.

- Mode Switching: Pressing the HDG or ILS button will switch to that mode and automatically disengage NAV.

Instrument Landing System Mode (ILS)

- Engagement: Pressing the ILS button arms localizer and glideslope capture. The button first illuminates amber “ARM”. When the autopilot captures the localizer and/or glideslope, the button changes to green “CAP”.

- Function: In ARM, the autopilot waits to intercept the ILS signals. In CAP, the autopilot tracks the localizer for lateral guidance and the glideslope for vertical guidance.

- Pilot Input: Tune the correct ILS frequency and set the approach course on the HSI before engaging ILS. Proper intercept angles and altitudes are required for smooth capture.

- Mode Switching: Pressing the HDG or NAV button will switch to that mode and automatically disengage ILS.

Back Course Mode (BC)

- Engagement: Pressing the BC button arms localizer back course capture. The button first illuminates amber “ARM”. When the autopilot captures the back course signal, the button changes to green “CAP”.

- Function: BC provides lateral guidance on the *reverse* side of a localizer, typically for back course approaches. Glideslope information is not used in BC mode.

- Pilot Input: Set the front course on the HSI, not the back course. Proper intercept angles are required to avoid overshoot. Use caution, as reverse sensing can occur if the HSI is not set correctly.

- Mode Switching: Pressing HDG, NAV, or ILS will switch to that mode and automatically disengage BC.

VOR/Approach Mode (VOR/APR)

- Engagement: Pressing the VOR/APR button arms VOR or approach capture. The button first illuminates amber “ARM”. When the autopilot captures the selected course, the button changes to green “CAP”.

- Function: VOR/APR provides lateral guidance for VOR approaches and can also be used for localizer approaches without glideslope. In CAP, the autopilot tracks the selected radial or course.

- Pilot Input: Tune the correct VOR frequency and set the desired course on the HSI before engaging. Large intercept angles may result in overshoot before capture.

- Mode Switching: Pressing HDG, NAV, or ILS will switch to that mode and automatically disengage VOR/APR.

Go-Around Mode (GA)

- Engagement: Pressing the GA button commands a go-around. When engaged, the GA button illuminates green “ON”.

- Function: GA mode commands a fixed nose-up pitch attitude and wings-level roll attitude to establish a climb. The autopilot disengages all approach tracking modes (NAV, ILS, VOR/APR, BC).

- Pilot Input: Advance collective to takeoff/go-around power when GA is pressed. The pilot must manage power and climb rate; GA only provides attitude guidance.

- Mode Switching: GA remains active until another lateral/vertical mode (HDG, ALT, IAS, VS, NAV, ILS, VOR/APR, or BC) is selected.

Auto Trim (SAS)

The Auto Trim/SAS is an attitude-based stabilization system that greatly reduces pilot workload from takeoff through landing. It may be engaged at any time—from before liftoff to after touchdown—and must be active for autopilot modes to function (available above 44 KIAS). With Auto Trim/SAS engaged, the helicopter can be flown hands-off, but the pilot must be prepared to assume control immediately in the event of a disconnect or system failure.

The trim hat on the cyclic provides proportional pitch and roll adjustments in Auto Trim/SAS mode.

- Aft: increases nose-up pitch attitude

- Forward: decreases nose-down pitch attitude

- Right: rolls right wing down

- Left: rolls left wing down

Limitations: Simulation hardware affects trim behavior. With non-spring (force feedback) controls, Auto Trim/SAS will hold the attitude where the cyclic is positioned. With self-centering controls (springs), releasing the grip causes the helicopter to return toward level attitude. These limitations apply to both Auto Trim/SAS and Force Trim.

Force Trim (FTR)

In a real helicopter, force trim holds the cyclic in a trimmed position using springs or magnetic brakes. Pressing the Force Trim Release (FTR) button temporarily frees the cyclic, allowing the pilot to set a new attitude. Releasing FTR re-engages the hold, reducing workload.

In the simulator, force trim is modeled in software.

Using a spring-centered joystick:

- Fly to the desired attitude

- Press and hold FTR

- Return the joystick to its physical center

- Release FTR to set the trim reference

Using a non-spring joystick:

- Fly to the desired attitude

- Press and hold FTR

- Adjust if needed

- Release FTR; the current stick position becomes the new trim reference

Mapping Hardware

Altitude Hold Mode (ALT)

-Toggle: AP_ALT_HOLD

Indicated Airspeed Mode (IAS)

-Toggle: AP_FLIGHT_LEVEL_CHANGE, AP_AIRSPEED_HOLD, AP_PANEL_SPEED_HOLD

Vertical Speed Mode (VS)

-Toggle: AP_VS_HOLD, AP_PANEL_VS_HOLD

Heading Mode (HDG)

-Toggle: AP_HDG_HOLD

Navigation Mode (NAV)

-Toggle: AP_NAV1_HOLD

Instrument Landing System Mode (ILS)

-AP_LOC_HOLD

Back Course Mode (BC)

-AP_BC_HOLD

VOR/Approach Mode (VOR/APR)

-AP_APR_HOLD

Go-Around Mode (GA)

-AUTO_THROTTLE_TO_GA

Force Trim (FTR)

-ROTOR_TRIM_RESET

Auto Trim (SAS)

-AP_MASTER, AUTOPILOT_DISENGAGE_TOGGLE

All Modes Off (SBY)

-AUTOPILOT_OFF