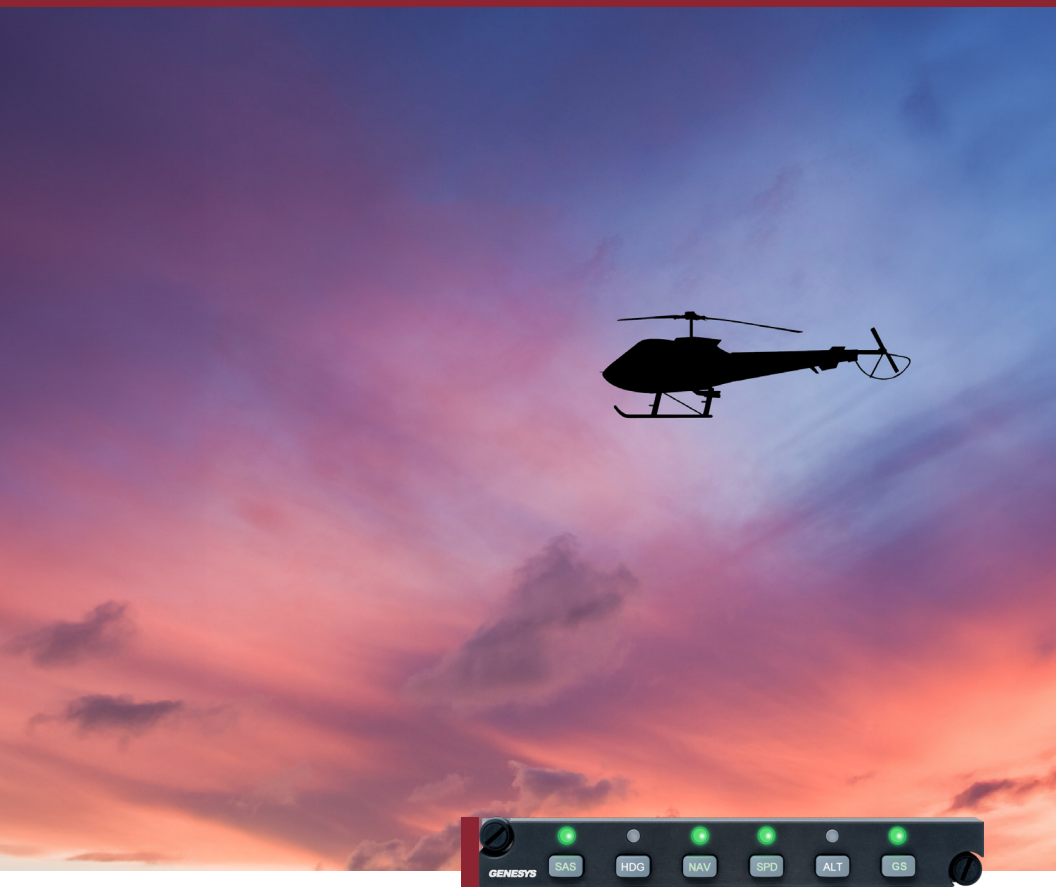

GRC-3000

GENESYS ROTORCRAFT CONTROLS
3-AXIS AUTOPILOT
PILOT GUIDE

Precise Performance.
Proven Experience.
Personalized Attention.

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Pilot Operating Guide and Reference

Genesys Rotorcraft Controls 3-Axis Autopilot (GRC-3000)

Doc No 64-000136

This pilot guide provides additional system information for the GRC-3000. It can only be used in conjunction with the Federal Aviation Administration (FAA) approved Rotorcraft Flight Manual (RFM) or Rotorcraft Flight Manual Supplement (RFMS). Refer to the applicable RFM or RFMS for aircraft specific information, such as unique ground tests, limitations, and emergency procedures.

For service or repairs, contact an authorized Genesys Aerosystems dealer. For product support, contact Genesys Aerosystems.

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Revision Record

Revision Number	Revision Date	Notes/Pages changed, added, or deleted by current revision
1st Ed	Oct 2024	

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Section 1 System Description

1.1. INTRODUCTION

The Genesys Aerosystems Rotorcraft Controls (GRC-3000) 3-axis (pitch, roll, and yaw) VFR autopilot is a digital flight control system that provides SAS, yaw damper, and autopilot functions. The installation consists of a remote mounted GRC-3000 flight control computer (FCC) (Figure 1-1), Genesys Helicopter autopilot control panel (GHP) (Figure 1-2), and three heavy duty electromechanical servo-actuators (pitch, roll and yaw). In a non-hydraulically boosted flight control system helicopter, the system includes a manual/autotrim switch and trim annunciator panel to support the pilot selected manual trim or autotrim of the cyclic control forces. The system also includes a yaw damper switch/annunciator and cyclic mounted force trim release (FTR) and AP DISC switches.

Autopilot (AP) modes provide altitude hold (ALT), heading hold (HDG), navigation signal tracking (NAV), speed hold (SPD), and glide slope (GS) guidance features. The GRC-3000 is a parallel, fly-through system. It does not break into the flight control system.

Figure 1-1: GRC-3000 Flight Control Computer (FCC)

SAS/AP modes are selected and deselected with buttons on the GHP. White LEDs and EFIS annunciations indicate the system is in standby or the mode is armed. Green LEDs and EFIS annunciations indicate the system or mode is engaged.

Figure 1-2: Genesys Helicopter Autopilot Control Panel (GHP)

The GRC-3000 performs a self-test and enters standby mode during aircraft start and warm-up. Standby mode is indicated on the GHP by annunciation of a white LED above **SAS** on the GHP. The SAS functionality is intended to always be active or in standby mode to ensure the quick engagement of the SAS if needed. To engage SAS, press **SAS**. The white LED turns green. SAS mode may be engaged during all flight phases and airspeeds.

GRC-3000 AP modes may be engaged by using the GHP mode buttons when indicated airspeed is greater than the configured forward flight transition speed (typically 40 KIAS). Automatic AP disengagement occurs at the configured low speed transition setting (typically 40 KIAS) and at the configured high speed limit (typically 5 knots less than V_{NE}).

In a non-hydraulically boosted flight control system helicopter, during all phases of flight, the pilot needs to either manually trim the cyclic pitch and roll forces or, when enabled in auto-trim, monitor the automatic trimming of the control forces by the GRC-3000. Monitoring is supported by trim annunciations provided on the trim annunciator panel, which is placed in the pilot's primary field of view. These annunciations, green (auto-trim being commanded) or amber (manual trim required), are removed when trim forces are reduced below the system threshold.

The GRC-3000 installation provides an interface to the Garmin EFIS , the Genesys EFIS, or to the Aspen EFIS. The EFIS interface provides guidance signals via the digital data bus. Equipped interfaces (Garmin, Genesys, etc.) also include external bugs for IAS and ALT, plus the ability to arm the ALT mode (preselect and capture). Attitude and air data information is provided to the GRC-3000 from the AHRS and ADC via the ARINC 429 digital data bus.

When the system is engaged, the FCC senses aircraft attitude, heading, angular rates and linear accelerations using the ADAHRS plus sensors in the computer. The FCC sends signals to the pitch/roll servo-actuators to apply small corrections to the cyclic as required to maintain the commanded or reference attitude in SAS mode, to the pitch/roll servo-actuators for the AP modes, and to the yaw servo-actuator to provide yaw damper and turn coordination. AP modes provide altitude hold/acquire, heading hold, air speed or vertical speed hold, navigation signal tracking, and vertical (approach) navigation features.

Additionally, safety monitors automatically disengage the system if a malfunction is detected. System disconnect alerts are provided via an aural warning, voice alerts, and by the LEDs on the GHP.

The FTR switch is used to either reset the trim pitch and roll attitude when in SAS mode, or to engage the system. It can also be used to resynchronize altitude or airspeed hold. A push of the FTR switch button for at least 1.25 seconds engages the system in SAS mode (a hands-on-controls alternate to pressing **SAS**) for a standby state. When in SAS mode, a momentary push of the FTR button resets trim to the attitude at which the button is released. The system does not trim to attitudes greater than the configured limits (typically 15° in pitch or 20° in roll).

A single push of the AP DISC switch for less than 1.25 seconds causes all AP modes to disengage, and the SAS to remain engaged. A second push of the AP DISC switch (or a single push of more than 1.25 seconds) causes both the AP and SAS to disengage, and the system to become mechanically disconnected from the flight control system. SAS disengagement is accompanied by four 600 Hz beeps, consisting of 0.25 seconds of tone followed by 0.25 seconds of silence for a total of two seconds. SAS disengagement is also accompanied by the "SAS Disconnect" voice alert. Un-commanded AP mode disengagement is accompanied by a single 600 Hz beep for one second and the "Check Autopilot Modes" voice alert.

Turn coordination and rate damping functions are provided by the system Yaw Damper and the associated servo attached to the pedal controls. The yaw damper is engaged along with the SAS when the yaw damper switch/annunciator is set to Auto (in). The switch can be used to disengage the YD or allow the YD to engage/disengage automatically with the SAS. The annunciator indicates whether the YD is ON or OFF. Yaw Damper disengagement is accompanied by four 600 Hz beeps.

NOTE:

The Enstrom 480/480B cyclic control system does not include hydraulic boost. Therefore, a trim system with a pitch trim actuator and a roll trim actuator allows the pilot to control the rotor induced forces to the cyclic as the helicopter maneuvers throughout its flight envelope.

NOTE:

In a non-hydraulically boosted flight control system helicopter, the cyclic trim switch only controls the aircraft pitch & roll actuator positions to reduce the cyclic control loads, no additional AP functions are controlled by the cyclic trim switch. In a hydraulically boosted flight control system helicopter, the cyclic trim switch can be used to modify the roll/pitch targets in SAS mode. Additionally, in a Genesys EFIS equipped installation, the cyclic trim switch can be used to modify the SPD, ALT, and HDG targets in upper modes.

1.2. GRC-3000 INSTALLATION

The GRC-3000 installation is a full autopilot interface to the Genesys Aerosystems (IDU-450 or IDU-680) EFIS displays including mode annunciations; trim annunciations; ALT and IAS pre-select; beep trim for HDG, ALT, IAS, and VS bugs; autopilot upper mode source selection (navigation source, heading source, approach source, etc.); and guidance signals driven via the digital data bus. Attitude and air data information is provided to the GRC-4000 from the Genesys Aerosystems Air Data Attitude Heading Reference System (ADAHRS).

Figure 1-3: EFIS Annunciations (Examples)

1.3. MANUAL/AUTOTRIM ANNUNCIATIONS (ONLY APPLICABLE TO NON-HYDRAULICALLY BOOSTED HELICOPTERS)

The trim annunciator panel and the manual/autotrim switch are shown in Figure 1-4. The manual/autotrim switch is normally in the on (in) position which allows the system to enable autotrim. Autotrim in disabled when the manual/autotrim switch is placed in the off (out) position. The manual/autotrim switch displays a green “ENABLE” annunciation when autotrim is enabled.

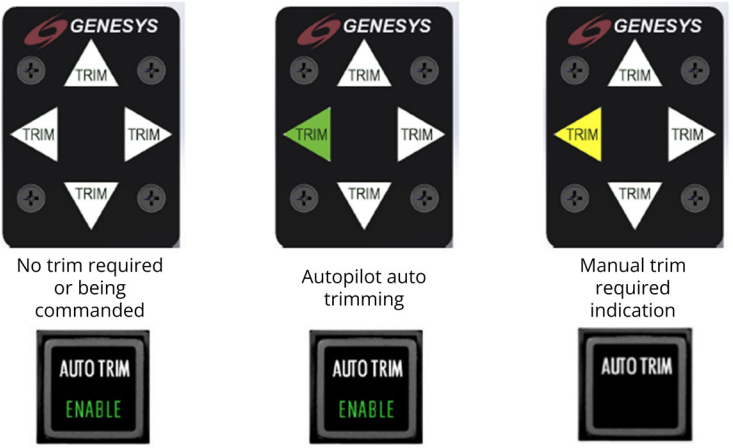

Figure 1-4: SAS/AP Trim System Annunciations

Manual or autotrim annunciations are only provided when the aircraft is in both a lateral and a vertical upper AP mode (HDG and ALT, NAV and SPD, NAV:HVR, etc.) is engaged. When the system senses a load on the pitch or roll servo that exceeds the system threshold, an annunciation in that direction is provided:

1) When auto-trim is disabled (manual/autotrim switch is set to off (out), or only one upper mode (HDG without ALT or ALT without HDG) is engaged), the annunciation in that direction is yellow indicating to the pilot that the trim should be manually actuated in that direction to reduce the servo load. If the load continues to be sensed (trimming is needed) continues for more than two seconds, a voice alert of “check roll trim” or “check pitch trim” is provided.

2) When auto-trim is enabled (manual/autotrim switch to on (in)), upper AP modes are engaged), a command is sent to the aircraft trim system (pitch or roll trim actuator) to reduce the servo loads automatically. While trimming, an annunciation in that direction is green, indicating to the pilot that trimming is automatically occurring. If automatic trimming continues for more than two seconds, a voice alert of “check roll trim” or “check pitch trim” is provided.

When the load on the pitch or roll servo has been reduced below the set threshold, the trim annunciation/command ceases.

Section 2 GRC-3000 Modes

2.1. SAS MODE

The attitude-command-attitude-hold SAS mode of the GRC-3000 maintains helicopter attitude in all flight conditions by applying corrective inputs to the cyclic to maintain the commanded or reference attitude.

When SAS is initially engaged, it maintains the current rotorcraft attitude. The system does not hold attitudes greater than those defined in the configuration settings. The standard trim limits are 15° pitch and 20° bank.

If the FTR switch is activated (pressed and released) outside these limits while SAS is engaged, the system returns to the closest limit. For example, if the FTR is pressed and released at a 30° bank angle and the cyclic is released, the helicopter achieves a bank inside the limit in the same direction.

An attitude reaching more than 10 degrees beyond the configured pitch limit or more than 20 degrees beyond the configured roll limit (so typically 25° pitch or 40° bank) initiates the “Attitude, Attitude” voice alert.

Table 2-1: Control Panel SAS Button Functions

Button Label/ Mode	Control Mode	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
SAS	Stability Augmentation System	Press **SAS** to engage SAS mode to provide cyclic inputs for pitch and roll attitude-hold and pedal inputs for yaw rate/acceleration control. White – SAS is ready to engage. Green – SAS mode is engaged and active.	

2.1.1. Recommended Pilot Technique with SAS

The proper technique for flying with the SAS is to “fly-through” the SAS to achieve the desired attitude and activate the FTR. Activation of the FTR refers to a press and release of the switch on the cyclic. Activation of the FTR removes the need to apply force on the cyclic grip and the helicopter holds the attitude that existed when the FTR switch is released. While the FTR is depressed, the pilot should feel any forces in the cyclic and after the FTR is released, use the cyclic trim switch to trim out those forces.

Workload is significantly reduced if the FTR is activated any time there is residual force on the cyclic. It is best to avoid holding the FTR switch down while trying to establish a trimmed attitude as this negates the stabilization provided by the SAS. It is better to fly-through the SAS and activate the FTR when the desired attitude is achieved.

The system uses very small movements of the cyclic to perform its stabilizing function. If the pilot holds the cyclic grip very tightly, the stabilizing action could be inhibited. Proper technique requires that the cyclic grip be held

loosely so that cyclic can move slightly within the pilot's hand to allow the system to compensate for helicopter instability, especially in hover.

The SAS provides a force gradient that acts like a centering spring, often referred to as a force feel system. When maneuvering with the SAS engaged, the pilot will feel some resistance on the controls. This is referred to as "flying through" the system. It is possible to accomplish all normal maneuvering both in low speed and hover and up-and-away by flying through the system. Note: The normal forces felt in the cyclic from the basic aircraft may be hidden by the force feel of the SAS. When maneuvering in SAS mode, the pilot should occasionally depress the FTR and feel any forces in the cyclic and after the FTR is released, trim out those forces with the cyclic trim switch.

2.1.2. Closely Monitor the Controls

The SAS is intended to enhance safety by reducing pilot workload. With the system engaged, it is possible to fly for periods without touching the cyclic. However, since the helicopter is inherently unstable, a disengagement of the SAS due to a failure may result in a rapid roll or pitch excursion that requires immediate pilot takeover to avoid dangerous attitudes. The divergence following a SAS disengagement is more rapid if the trim forces in the cyclic are allowed to build, especially at higher airspeeds. Other events that require immediate takeover are engine or drive train failures.

It is required that the pilot have hands on the controls below 200 ft. AGL. It is recommended that the pilot have hands on the controls at airspeeds near VNE because a system failure is much more critical near redline.

2.1.3. Liftoff and Hover

Once all preflight checks are done, engage the SAS and verify that the SAS LED is green. With the FTR button held down, make cyclic adjustments as the helicopter becomes light on the skids and feel any forces in the cyclic. Once the proper cyclic position has been achieved, release the FTR button, use the cyclic trim switch to trim out those forces, and lift into a hover. Make needed cyclic adjustments to hold the hover position, and then activate the FTR to eliminate any residual force on the cyclic.

Maximum benefit is obtained from the SAS if the cyclic grip is held loosely. This allows the SAS to provide stabilization for hover with the pilot applying small and infrequent inputs to correct for slight changes in wind velocity and direction. In light winds, it is possible to hover with no inputs to the cyclic.

2.1.4. Acceleration from Hover

Accelerate from hover normally, activating the FTR as necessary to compensate for changing forces on the cyclic due to increasing airspeed. While the FTR is depressed, the pilot should feel any forces in the cyclic and after the FTR is released the use the Cyclic Trim to trim out those forces. The SAS holds the commanded attitude through the acceleration, so activating the FTR only needs to be used to feel for cyclic forces or to command a new desired attitude. Forward and right cyclic trim is normally required to maintain the cyclic forces near zero and to allow the SAS to perform optimally as the helicopter accelerates.

2.1.5. Deceleration to Hover

If one or more AP modes are engaged, they automatically disengage as the airspeed decreases below the configured low speed limit (typically 40 kts). This is accompanied by a single 600 Hz beep in the headset. Decelerate normally by flying through the system, activating the FTR as necessary to compensate for changing forces on the cyclic due to decreasing airspeed. While the FTR is depressed, the pilot should feel any forces in the cyclic and after the FTR is released, use the cyclic trim switch to trim out those forces. The SAS holds the commanded attitude through the deceleration, so activating the FTR only needs to be used to feel for cyclic forces or to command a new desired attitude. Aft and left cyclic trim is normally required to maintain the cyclic forces near zero and to allow the SAS to perform optimally as the helicopter decelerates.

2.1.6. Landing

Establish a stable hover by flying through the SAS. Activate the FTR to establish the trimmed cyclic position and helicopter hover attitude and feel any forces in the cyclic. Once the proper cyclic position has been achieved, release the FTR button, and use the cyclic trim switch to trim out those forces. Use the collective control normally to accomplish a vertical descent and touchdown. Workload is minimized if only small occasional cyclic inputs are made to eliminate drift during the vertical descent.

2.1.7. SAS Mode Inflight Engagement

As a safety feature, the system incorporates unusual attitude detection limits. If SAS mode engages inside of 6° roll or 10° pitch, the system targets the attitudes at the time of engagement. However, if SAS mode engages outside of 6° roll or 10° pitch, the system targets 0° (level) at the time of engagement.

2.2. AP (UPPER) MODES

The AP modes, except NAV:HVR, are only available at airspeeds above the configured low speed limit (typically 40 KIAS). The fly-through control forces are significantly increased when in the AP modes, and in the case of systems with auto-trim, this may result in an opposing trim command, so the pilot should utilize the FTR to make any needed control inputs.

2.2.1. Heading (HDG) Mode

Heading mode intercepts and tracks the EFIS heading bug. Set the Heading Bug to the desired heading and then press **HDG** to engage the heading mode (see Table 2-7). There is no armed heading mode. It is either disengaged or engaged.

The HDG LED illuminates green when HDG mode is engaged. The helicopter turns to selected headings with a command to achieve a standard rate turn based upon the current airspeed up to a configured maximum bank angle (typically 20°). When making heading changes, it is acceptable to fly-through the system to achieve larger or smaller bank angles.

Table 2-2: Control Panel HDG Button Functions			
Button Label/ Mode	Control Mode	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
HDG	Heading Hold	Press **HDG** to engage HDG mode. System flies to and maintains heading reference bug. White: N/A Green: HDG mode engaged. Press **HDG** to switch to HDG from NAV.	N/A

2.2.2. Altitude (ALT) Mode

Press **ALT** to engage ALT mode. The autopilot uses pitch attitude to control altitude so airspeed varies with power setting. To accomplish an airspeed change while ALT mode is engaged, slowly move the collective to the new power setting. A rapid change in collective causes the helicopter to deviate from the target altitude because collective is a powerful control of vertical rate, and it is not possible for the autopilot to counter rapid power changes with pitch attitude. Nonetheless, the autopilot gradually returns to the reference altitude, albeit at a different airspeed. The target altitude may be reset by manually flying through the autopilot to the desired altitude and activating the FTR switch, or holding the FTR while maneuvering to the new desired altitude, which is the recommended method for systems equipped with auto-trim to avoid any opposing trim command during the repositioning.

Table 2-3: Control Panel ALT Button Functions			
Button Label/ Mode	Control Mode	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
ALT	IAS, Altitude, and AGL Hold	Press **ALT** to engage IAS and altitude hold to hold altitude based on pressure altitude. White: ALT if an ALT bug is set in the correct direction (ALT pre-select). Green: ALT mode engaged.	N/A

2.2.3. Speed (SPD) Mode

Press **SPD** to engage the SPD mode (see Table 2-4). EFIS interfaces transmitting external bugs for IAS and ALT, allow for the ability to select an IAS command and arm the ALT mode (preselect and capture) when entering the SPD mode, thus automatically transitioning from SPD to ALT mode at the preselected altitude. For EFIS interfaces that do not have this capability, entering SPD mode simply holds the current IAS without arming ALT.

Table 2-4: Control Panel SPD Button Functions			
Button Label/ Mode	Control Mode	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
SPD	Speed Hold and ALT Pre-Select	From SAS without a preselected ALT bug: Press **SPD** to engage SPD mode. If no IAS bug is set. The airspeed at the time SPD is pressed is held. The target speed is reset each time the FTR switch is pressed and released. From SAS with an IAS bug set: Press **SPD** to engage SPD mode and the system acquires and holds the bug/ target airspeed. From SAS with a preselected ALT bug: Press **SPD** to engage SPD mode with ALT armed. White LED – ALT if an ALT bug is set. Green LED – SPD mode engaged. See Table 2-7 for beep trim switch functionality.	N/A

2.2.4. Navigation (NAV) Mode

NAV mode tracks an EFIS GPS course, a localizer front course, or a VHF Omni-directional Radio (VOR) course. Press **NAV** to arm or engage NAV mode (see Table 2-5). Select the navigation source with the EFIS (GPS or VOR/LOC). If VOR/LOC is selected, select the VOR or instrument landing system (ILS) frequency on the NAV receiver, check for valid signal, and set the desired course on the EFIS. If GPS is selected, program an active course (flight planned route), direct-to, or instrument approach procedure. If HDG mode is engaged, set the heading bug to the desired intercept angle. If HDG mode is not engaged, the aircraft should be manually flown on a heading to intercept the selected course. Press **NAV** to arm or engage NAV mode, depending on whether the conditions for course intercept are met.

To disengage NAV mode, press NAV or press the AP DISC switch for less than 1.25 seconds. NAV mode is automatically disengaged when the course navigation signal is lost or when the system detects a failure.

NAV automatically transitions from armed to active at course intercept. NAV LED changes from white to green at intercept. If HDG is not active, fly to a heading to intercept the selected course. NAV is armed (white) until course intercept (see Table 2-5).

NOTE:

When executing a localizer-based approach (ILS, LOC, SDF, LDA) using an EFIS source of VOR/LOC, it is recommended that the approach procedure is loaded and active in the EFIS flight plan. The system uses GPS course lateral deviation from the GPS flight plan to improve capture and tracking of the localizer signal during strong crosswinds. This also allows for automatic switching to the GPS source upon executing the missed approach.

Table 2-5: Control Panel NAV Button Functions

Button Label/ Mode	Control Mode	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
NAV	Lateral Navigation	Press **NAV** to engage NAV mode to intercept and track lateral deviation signal (VOR, localizer, or GPS) or LNAV roll steering signal. White: NAV mode armed. Green: NAV mode engaged. Press **NAV** to switch from HDG to NAV. HDG/NAV to intercept: Press **HDG** and turn heading bug to the desired intercept angle. Press **NAV**. NAV LED is white, indicating that NAV is armed, and HDG LED is green, indicating that HDG is active. NAV automatically transitions from armed to active at course intercept. NAV LED changes from white to green and HDG extinguishes at intercept. NAV (direct/stand-alone) to intercept: Press **NAV** to intercept the selected course at 45°. NAV LED is green, indicating that NAV mode is active.	If optional Genesys GPS is installed, press **NAV** to engage the NAV:HVR mode, which provides geo-position hold with the cyclic. NAV:HVR is available for ground speed less than 26 kts. To set a new position target, press the FTR switch. (See Table 2-7). White LED: N/A Green LED: NAV when NAV:HVR mode is engaged.

2.2.4.1. VOR (HDG is Not Active) Fixed Intercept Angle

NAV LED illuminates green and the autopilot establishes the helicopter on a 45° intercept angle relative to the selected course.

2.2.4.2. VOR Selected Intercept Angle

To select an intercept angle other than 45°, set the heading bug to achieve the desired intercept angle. Set the selected course arrow to the desired course. Press **HDG** and then **NAV**. The HDG LED is green, and the NAV LED is white (armed). As the helicopter approaches the selected course, the NAV LED changes from white to green, and the HDG LED changes from green to dark (off). Bank angle at course capture depends on the distance from the VOR, or final approach fix for a localizer, and the selected intercept angle.

2.2.4.3. Navigation (NAV) Mode – GPS

The autopilot follows the GPS roll steering through holding patterns and published course reversals on instrument approach procedures. This feature is only available if the GPS receiver is GPS/SBAS capable, and if roll steering is valid.

2.2.4.3.1. GPS Preprogrammed Intercept Angle

Ensure that HDG mode is not engaged and press **NAV** to engage the navigation mode. NAV mode engages (green) and the autopilot follows the GPS roll steering commands to capture and track the active course.

2.2.4.3.2. GPS Selected Intercept Angle

To select an intercept angle to an active GPS course, set the heading bug to achieve the desired intercept angle. Press **HDG** and then press **NAV**. HDG LED is green, and NAV LED is white (armed). This is useful if being vectored to final for an instrument approach procedure. As the helicopter approaches the selected course, NAV transitions from armed (white) to active (green), and HDG disengages (dark). The autopilot smoothly captures and tracks the active course. Capture does not occur if the selected heading does not cause the helicopter to intercept the active course.

2.2.4.4. NAV:HVR Mode

In a hover, NAV:HVR mode position hold utilizes GPS data to apply corrective cyclic inputs to hold the aircraft at the reference position. To set a new reference point, use the cyclic to fly-through the autopilot and then momentarily press the FTR switch, or press and hold the FTR switch, maneuver to the new position, and then release the FTR switch at the desired target. To exit the NAV:HVR mode position hold, press **NAV** or press the AP DISC switch for less than 1.25 seconds. The NAV:HVR mode utilizes the YD to maintain zero yaw rate with pedal inputs.

2.2.5. Glide Slope (GS) Mode

GS mode tracks an EFIS VNAV glide path or an ILS glide slope. If EFIS VNAV is planned, the RNAV (Area Navigation) procedure must be active on the EFIS prior to arming or engaging GS mode. GS mode must be armed prior to intercepting the glide path or glide slope. GS mode must be armed or engaged before vertical navigation mode can be armed or engaged. Press **GS** to arm or engage GS mode (see Table 2-6). The GS mode does not arm or engage until a valid VNAV glide path or ILS glide slope signal is displayed on the EFIS. Select the navigation source (GPS or VOR/LOC).

To disengage GS mode, press **GS** or press the AP DISC switch for less than 1.25 seconds. GS mode is automatically disengaged when the glide slope/ glide path signal is lost or when the system detects a failure.

Table 2-6: Control Panel GS Button Functions

Button Label/ Mode	Control Mode	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
GS	Glide Slope Hold	In NAV mode, press **GS** to engage GS mode to intercept and track vertical deviation signal (VNAV GS or ILS). Press **GS** to switch to GS from ALT. White: GS mode armed. Green: GS mode engaged.	N/A
Armed Modes			
GS	Glide Slope	GS mode is armed (white) until the glide slope capture criteria are met and capture occurs (green). System changes from ALT to GS mode.	

For ILS approaches, the autopilot control laws use GPS ground speed to enhance ILS glide slope tracking. If a GPS receiver is not available, GS still functions, but glide slope tracking is less accurate. It is recommended that the GPS overlay be loaded for ILS and localizer approaches. While this is not essential, it serves two useful purposes. First situational awareness is enhanced by having the final approach course displayed on the moving map. Second, when the GPS overlay is active, the autopilot control laws use GPS-derived track angle to enhance localizer intercept and tracking, especially in crosswinds.

2.2.6. Go-Around

Upon pressing the GA switch, any selected autopilot modes disengage, the “Go Around” voice alert is provided. SAS mode maintains a 0 deg roll, the pitch attitude remains at the current attitude if it is between 5 – 10°, or if the current pitch attitude is below 5°, the aircraft pitches up to hold 5°. Pressing the FTR switch, or any subsequent mode change, cancels GA.

It is recommended to preset the HDG bug to the runway heading and preset the ALT bug to the missed approach altitude as the aircraft is descending glide slope in GS mode. Once the Go-Around is executed, and the climb-out has been established by adding power, press HDG and then SPD to place the system in HDG mode to hold the preselected heading bug that was preselected, and press SPD, to engage the system in SPD with ALT armed to capture the attitude that was preselected on the descent down the glide path.

2.3. NON-CONTROL PANEL SWITCH FUNCTIONS

Table 2-7: Non-Control Panel Switch Functions

Switch	Switch Positions	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
AP DISC Switch	Pressed/ Released	If upper modes are engaged, a single press of AP DISC disengages all those modes but leaves the SAS operating. Press the switch a second time (or hold it down for at least 1.25 seconds) to disengage the system.	If hover mode is engaged, a single press of AP DISC disengages hover mode but leaves the SAS operating. Press the switch a second time (or hold it down for at least 1.25 seconds) to disengage the system.
FTR Switch	Pressed/ Released	Press the FTR switch for at least 1.25 seconds to engage the system (a hands-on-controls ***alternate*** to pressing **SAS**). In SAS mode, a momentary press of the FTR switch resets trim to the pitch and roll attitude at which the switch is released. When pressed, the FTR releases the cyclic and yaw trim (system commands are paused) for easier control movements. In SPD or ALT mode, the FTR can be used to resynchronize the airspeed or altitude hold target/bug.	Press the FTR switch for at least 1.25 seconds to engage the system (a hands-on-controls alternate to pressing **SAS**). When in SAS mode, a momentary press of the FTR switch resets trim to the attitude at which the switch is released. When pressed, the FTR releases the cyclic and yaw trim (system commands are paused) for easier control movements. When in NAV:HVR mode, the pilot may also set a new reference point by using the cyclic to fly-through the autopilot and then momentarily pressing the FTR switch, or by pressing and holding the FTR switch, maneuver to the new position, and then release the FTR switch at the desired hover position target.

Table 2-7: Non-Control Panel Switch Functions			
Switch	Switch Positions	Forward Flight (Above 40 KIAS)	Low Speed/Hover (Below 40 KIAS)
GA Switch	Pressed/ Released	Upon pressing the GA switch, any selected autopilot modes disengage, the SAS mode maintains a 0 deg roll, the pitch attitude remains at the current attitude if it is between 5 – 10°, or if the current pitch attitude is below 5°, the aircraft pitches up to hold 5°. Press the FTR switch, or any subsequent mode change, cancels GA.	If the GA switch is pressed below 50 KIAS, the upper modes disengage, and the system reverts to SAS mode.
Yaw Damper Switch/ Annunciator	Pressed/ Released	Use the switch to select the yaw damper to auto (in) or off (out). Annunciator indicates yaw damper status. Yaw damper engages automatically when the SAS mode is engaged.	

Section 3 Glossary

ADAHRS	Air Data Attitude Heading Reference System
AGL	Above Ground Level
ALT	Altitude Hold
AP	Autopilot
DISC	Disconnect
EFIS	Electronic Flight Instrument System
FAA	Federal Aviation Administration
FCC	Flight Control Computer
FTR	Force Trim Release
GA, G/A	Go-Around
GPS	Global Positioning System
GRC	Genesys Rotorcraft Controls
GS	Glide Slope
HDG	Heading Hold
HVR	Hover
HZ	Hertz
IAS	Indicated Airspeed
ILS	Instrument Landing System
KIAS	Knots Indicated Airspeed
Kts	Knots
LDA	Localizer Directional Aid Approach
LED	Light Emitting Diode
LOC	Localizer
NAV	Navigation Signal Tracking
RFMS	Rotorcraft Flight Manual Supplement
RNAV	Area Navigation
SAS	Stability Augmentation System
SPD	Speed Hold
V_{NE}	Never exceed speed
VOR	VHF Omni-directional Radio

GENESYS AEROSYSTEMS
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