GFC600 AUTOPILOT

The Garmin GFC 600 is a high-performance, attitude-based, Automatic Flight Control System (AFCS) that supports an extensive set of operating modes and safety features. The system design offers the flexibility to interface with a wide variety of avionics equipment commonly found in general aviation aircraft.

The GFC600 basic functions consist of a Flight Director (FD), Autopilot(AP), Yaw Dumper(YD) and Electronic Stability & Protection (ESP).

Flight Director (FD): The Flight Director function provides pitch and roll commands needed to guide the aircraft toward the active reference selected by the pilot. If a compatible Primary Flight Display (PFD) is installed these pitch and rolls commands are displayed on the PFD as Command Bars. When the Flight Director is active the pitch and roll commands can be hand-flown by the pilot. When the Autopilot is engaged the autopilot servos drive the flight controls to follow the commands issued by the Flight Director.

Autopilot(AP): The Autopilot function is provided by servo actuators which move the flight control surfaces in response to Flight Director steering commands, aircraft attitude, and airspeed.

Yaw Dumper(YD): The optional Yaw Damper function provides Dutch Roll damping, assists in turn coordination, and provides a steady force to help maintain directional trim. If installed the YD comes on when the autopilot is engaged. It can be turned on/off independent of the autopilot and may be used during normal hand-flying maneuvers.

Electronic Stability & Protection (ESP): The ESP function provides a soft barrier to keep the aircraft within the desired operating envelope when the autopilot is not engaged. When the GFC 600 senses that the aircraft is near the defined operating limit in pitch attitude, roll attitude, high airspeed, or low airspeed, the ESP function will automatically engage one or more servos to nudge it back to the nominal operating envelope. While ESP utilizes the same sensors, processors, and actuators as the GFC 600 autopilot it is a separate mutually exclusive function. ESP can be easily overpowered by the pilot and can be disabled using the AP DISC button.
AP: Autopilot Engage button. Engages/disengages the autopilot. The led will become Green when engaged. The autopilot will engage ROL and PIT mode as default.

FD: Flight Director button. Activates/deactivates the Flight Director only. Pressing once turns on the director in the default vertical and lateral modes. Pressing again deactivates the Flight Director and removes the Command Bars. If the autopilot is engaged, the key is disabled. The led will become Green when enabled.

YD: Yaw Damper button. Engages/disengages the yaw damper. The led will become Green when engaged.

HDG: Selects/deselect Heading Select Mode, making the autopilot follow the heading bug on the Garmin G5 HSI or PFD display.

NAV: Selects/deselect Navigation Mode. It will flow the VOR or GPS course of the selected Nav Source (selected via the Garmin G5 HSI menu). It also cancels GS Mode if LOC Mode is either active or armed. Cancels GP Mode if GPS Mode is either active or armed.

APR: Selects/deselect Approach Mode. Which will make the aircraft to follow the ILS localizer when in range and will start to follow the gliding slope when the vertical deviation indicator reaches the middle of the glide-path marks.

BC: Selects/deselect Back-course Mode. This mode is used to fly a back course localizer approach.

VNV: Selects/deselect Vertical Path Tracking Mode for Vertical Navigation flight control. (NOT AVAILABLE YET)

IAS: Selects/deselect Indicated Airspeed Mode. This mode acquires and maintains the Airspeed Reference (IAS) until reaching the autopilot reference altitude. The Airspeed Reference is set to the current airspeed upon mode activation. The IAS reference can be changed using the NOSE UP/DN wheel. Moving the knob in the NOSE UP direction decreases the reference by 1 knot per click, and the NOSE DN direction increases the reference by 1 knot per click.

The airspeed reference can also be adjusted by pressing the CWS button, hand-flying the aircraft to establish a new airspeed, and then releasing the CWS button.

Engine power must be adjusted to allow the autopilot to fly the aircraft at a pitch attitude corresponding to the desired flight profile (climb or descent) while maintaining the Airspeed Reference.
VS: Engages/disengages the Vertical Speed Mode. This mode acquires and maintains the autopilot's Vertical Speed Reference until reaching the autopilot reference altitude.

The Vertical Speed Reference is set to the current airspeed upon mode activation and may be changed using the NOSE UP/DN wheel or by pressing the CWS button, hand-flying the aircraft to establish a vertical speed, and then releasing the CWS button.

ALT: Enables the altitude Hold Mode. Which sets the current altitude as reference and maintain it.

ALTS: It will appear as the vertical mode when the selected altitude is captured by the autopilot.

LVL: Engages/disengages the Level Mode. Level mode is a coupled pitch and roll mode and is annunciated as both the vertical and lateral modes when active. Pressing the LVL key engages the autopilot (if the autopilot is disengaged) in level vertical and lateral modes.

Level mode does not track altitude or heading but instead uses a vertical reference of zero feet per minute and a lateral reference of zero bank angle. When the LVL key is pressed all armed and active modes are canceled and the aircraft reverts to LVL mode for pitch and roll.

While in level mode, all other modes are available by pressing the corresponding button.

AUTOPILOT ENGAGE LOGIC:
The autopilot is engaged by pressing the AP key on the GFC600. If the Flight Director is already on the autopilot will begin following the active Flight Director commands. If the Flight Director is not on when the AP key is pressed, the Flight Director will come on with autopilot engagement in the default PIT and ROL modes. Another way to engage the autopilot is by selecting the LVL key. This will engage the autopilot in Level mode.

LCD INDICATIONS:

ACTIVE VERTICAL MODE
REFERENCE
ACTIVE LATERAL MODE
ARPED VERTICAL AND LATERAL MODES
STATUS MESSAGES AND ALERTS
HDG VS 300 FPM ESP OFF
ALTS

ARMED VERTICAL AND LATERAL MODES
CONTROL WHEEL STEERING:
During autopilot operation, the aircraft may be hand-flown without disengaging the autopilot. Pressing and holding the CWS button (if installed) disengages the pitch and roll servos from the flight control surfaces and allows the aircraft to be hand flown. While the button is press the AP engaged will blink until the button is released.
Releasing the CWS button reengages the servos. Depending on the active mode the Flight Director may be synchronized to a new reference upon CWS release. Refer to the descriptions of vertical and lateral modes for specific CWS behavior in each mode.

Auto Pilot Disconnect, Go Around and Control Wheel Sterring button are located on the aircraft command. They all have their X-Plane custom commands and can be bind to a Joystick button or keyboard key via X-Plane settings.

GO AROUND MODE (GA BUTTON):
Go Around mode is a coupled pitch and roll mode and is annunciated as both the vertical and lateral modes when active. It is activated by the GA button installed in the command. Go Around mode can also be activated while the aircraft is on the ground to be used to establish an attitude reference to follow immediately after takeoff.
Pressing the GA button while in the air allows the execution of a missed approach or a go around without disconnecting the autopilot. It will command a wings level and pitch up attitude. By pressing the CWS button it will result in reversion to Pitch and Roll Hold modes. By moving the noes UP/DN wheel it will change the pitch up attitude.
AUTOPilot DISCONNEC (A/P DISC BUTTON):
This button is will disconnect the autopilot.

**GARMIN G5**

The G5 is an electronic instrument display capable of operating as a standalone flight display and a horizontal situation indicator (HSI) It features a bright, sunlight readable, 3.5-inch color display which is sized to fit in a standard 3-1/8-inch instrument cutout.

**Power Button:**

*When the system is ON:*
1. If hold it turns off the system.
2. If clicked it opens the back light adjustment page.
3. If the system detect that it is out of power it will begin a regressive count and turn off itself. If the button is press before the regressive count reaches 0, the shutdown will cancel and the system will continue on battery.

*When the system is OFF:*
If hold for 4 seconds it will enter to the G5 settings menu, where units and other options may be configured.

**Knob Wheel and Button:**
It is used to access the menus to do things like select the desired altitude, OBS course, turn on or off the ESP, etc.
SETTINGS:
They can be accessed by holding down the power button while the unit is OFF.
Then scroll using the knob wheel.

Attitude page:
Here you can select between Single-Cue or Cross-hairs flight director.

Airspeed Configuration:
You can modify the Vspeed References of the speed indicator.

Units Configuration:
In this page you can select between Knots, Miles and Kilometers for the Indicated Airspeed and the Ground Speed. And between feets and meters for the altitude and vertical speed indicator.
PFD AND HSI MENU:
The menus can be accessed by clicking the knob wheel button

PDF MENU

Back: Closes the menu
Heading: Heading selection for the autopilot Heading Bug.
Altitude: Altitude selection for the autopilot.
Pitch: Artificial Horizon pitch adjuster.
ESP: Engage or disengage the Electronic Stability Protection (ESP). It will prevent the aircraft of exceeding a roll angle of more than 45 degrees, and will return the aircraft to a roll angle of 35 degrees. It also will limit the pitch level to +15 and -12 degrees of pitch angle.

HSI MENU

OBS: OBS heading selection for the HSI.
Setup: Selection of the sources for the bearing pointers.
Source: Select the navigation source for the autopilot and HSI.
PFD: It displays the PFD on the HSI screen in case of a primary malfunction.