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FAA Approved AIRPLANE FLIGHT MANUAL SUPPLEMENT

GFC 600 Autopilot
Installed in Cessna 182P / 182Q / 182R / T182 / 182S / 182T / T182T

Dwg. Number: 190-02011-02 Rev. 1

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the GFC 600 Autopilot system is installed in accordance with STC SA01844WI. The information contained herein supplements the information of the basic Airplane Flight Manual. For Limitations, Procedures, and Performance information not contained in this Supplement consult the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

Airplane Serial Number: _____

Airplane Registration Number: _____

FAA Approved By: _____

Robert G. Murray
ODA STC Unit Administrator
Garmin International, Inc
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Log of Revisions

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1	ALL	Original Issue	See Cover	See Cover

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Section 1 – General

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) when the airplane has been modified by installation of the Garmin GFC 600 Autopilot system in accordance with Garmin International, Inc. approved data.

The information in this supplement supersedes or adds to the basic POH/AFM only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

USE OF THE SUPPLEMENT

The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout the supplement:

WARNING

Operating procedures, techniques, etc., which may result in personal injury or loss of life if not carefully followed.

CAUTION

Operating procedures, techniques, etc., which may result in damage to equipment if not carefully followed.

NOTE

Operating procedures, techniques, etc., which is considered essential to emphasize.

ABBREVIATIONS AND TERMINOLOGY

The following glossary is applicable within the airplane flight manual supplement

AFCS	Automatic Flight Control System
AGL	Above Ground Level
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AP	Autopilot
BC	Back Course Approach
CDI	Course Deviation Indicator
CWS	Control Wheel Steering
DA	Decision Altitude
ESP	Electronic Stability and Protection
FAA	Federal Aviation Administration
GA	Go Around
GFC 600	Garmin Autopilot
GI 285	Garmin Remote Autopilot Mode Annunciator Panel
GMC 605	Autopilot Mode Control Panel
GPS	Global Positioning System
HDG	AFCS heading mode
HSI	Horizontal Situation Indicator
ILS	Instrument Landing System
KIAS	Knots Indicated Airspeed
KTS	Knots
LED	Light Emitting Diode
LNAV	Lateral Navigation
LNAV + V	Lateral Navigation with Advisory Vertical Guidance
LNAV/VNAV	Lateral Navigation / Vertical Navigation Approach
LOC	Localizer (no glideslope available)
LP	Localizer Performance
LP+V	Localizer Performance with Advisory Vertical Guidance
LPV	Localizer Performance with Vertical Guidance
MDA	Minimum Descent Altitude
N/A	Not Applicable
POH	Pilot's Operating Handbook
STC	Supplemental Type Certificate
VHF	Very High Frequency
VNAV	Vertical Navigation
VOR	VHF Omni-directional Range

INSTALLED EQUIPMENT INTERFACES

The following is the list of installed equipment and functions associated with the GFC 600 Autopilot installation in this airplane.

DEVICE TYPE	**Manufacturer / Model** If not installed, note N/A	**Additional Information**
GPS Navigator #1		Roll Steering Capable? ☐ YES ☐ NO
GPS Navigator #2		Roll Steering Capable? ☐ YES ☐ NO Is #2 GPS interfaced to GFC 600? ☐ YES ☐ NO
ADS-B Out Transponder with GPS interface to GFC 600		
Primary Flight Display		
HSI		
DG		
Air Data Computer OR; Air Data Module		
VHF Nav Radio #1		
VHF Nav Radio #2		Is #2 NAV interfaced to GFC 600? ☐ YES ☐ NO
Yaw Damper		
Pitch Trim Servo		

INSTALLED FEATURES CHECKLIST

The checked autopilot modes and features are available on this aircraft.

Basic AP Features

- ☐ Flight Director
- ☐ Control Wheel Steering
- ☐ Yaw Damper
- ☐ Manual Electric Pitch Trim
- ☐ Auto Pitch Trim
- ☒ Overspeed Protection
- ☒ Underspeed Protection

Electronic Stability and Protection

- ☒ Pitch/Roll Attitude
- ☒ High Speed Protection
- ☐ Low Speed Protection

Vertical Autopilot Modes

- ☒ Pitch (PIT)
- ☒ Level (Zero vertical speed)
- ☐ Go Around (GA)
- ☒ Altitude Hold
- ☒ Vertical Speed
- ☐ Altitude Capture via Altitude Preselect
- ☒ Indicated Airspeed (IAS)
- ☐ Vertical Navigation (VNV)
- ☐ VNAV Target Alt Capture
- ☐ GPS Approach Glidepath
- ☐ ILS Glideslope

Lateral Autopilot Modes

- ☒ Roll (ROL)
- ☒ Level (Wings Level)
- ☐ Go Around (GA)
- ☐ Heading
- ☐ GPS Navigation
  - ☐ Roll Steering
- ☐ VHF Navigation
  - ☐ VOR
- ☐ Approach Mode
  - ☐ GPS
  - ☐ VOR
  - ☐ LOC
  - ☐ LOC BC

Section 2 – Limitations

The Garmin GFC 600 Pilot's Guide, part number 190-01488-00 Rev A (or later approved revision), must be immediately available to the flight crew.

This AFMS is applicable to the software versions shown below:

Software Item	Software Version (or later FAA Approved version for this STC)
GFC 600 Software Version	V296900

A pilot must be seated in the left pilot's seat, with seatbelt fastened, during all autopilot operations.

Do not use autopilot during takeoff and landing.

The GFC 600 AFCS preflight test must complete successfully prior to use of the autopilot, flight director or manual electric trim.

If the pitch trim option is not installed, autopilot coupled go-around is prohibited.

Autopilot maximum engagement speed is 165 KIAS.

Autopilot minimum engagement speed is 70 KIAS.

The autopilot must be disengaged below 200 feet AGL during approach operations and below 800 feet AGL during all other operations.

The GFC 600 autopilot is approved for Category 1 precision approaches and non-precision approaches only.

Maximum fuel imbalance with autopilot engaged is 15 gallons.

Automatic CDI mode sequencing (ILS CDI capture) must be disabled when using the GFC 600. This applies if a navigator that includes both GPS and localizer receivers is installed, or if a PFD with automatic CDI source switching is installed.

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Section 3 – Emergency Procedures

Some emergency situations require immediate memorized corrective action. These steps are printed in bold in the emergency procedures and should be accomplished without the aid of the checklist.

AUTOPILOT MALFUNCTION / PITCH TRIM RUNAWAY

If the airplane deviates unexpectedly from the planned flight path:

1. Control Wheel ..... GRIP FIRMLY

2. AP DISC / TRIM INT Button ..... PRESS AND HOLD

3. Aircraft Attitude ..... MAINTAIN / REGAIN AIRCRAFT CONTROL

NOTE

Do not release the AP DISC / TRIM INT Button until after pulling the AUTOPILOT circuit breaker. Pulling the AUTOPILOT circuit breaker will render the autopilot inoperative.

4. Elevator Trim ..... RE-TRIM if necessary using Pitch Trim Wheel

5. AUTOPILOT Circuit Breaker ..... PULL

6. AP DISC / TRIM INT Button ..... RELEASE

WARNING

IN FLIGHT, DO NOT OVERPOWER THE AUTOPILOT. THE TRIM WILL OPERATE IN THE DIRECTION OPPOSING THE OVERPOWER FORCE, WHICH WILL RESULT IN LARGE OUT-OF-TRIM FORCES.

DO NOT ATTEMPT TO RE-ENGAGE THE AUTOPILOT OR USE MANUAL ELECTRIC PITCH TRIM UNTIL THE CAUSE OF THE MALFUNCTION HAS BEEN CORRECTED.

AUTOPILOT FAILURE / ABNORMAL DISCONNECT

(Red LED, AP FAIL in Message Window on GMC 605 display, Continuous aural tone)

1. AP DISC / TRIM INT Button .....PRESS AND RELEASE
   (to cancel disconnect tone)

2. Aircraft Attitude ..... MAINTAIN / REGAIN AIRCRAFT CONTROL

NOTE

The autopilot disconnect may be accompanied by an AP FAIL on the GMC 605 Status message window, indicating the automatic flight control system has failed. The autopilot cannot be re-engaged with this annunciation present.

PITCH TRIM FAILURE

(Red AP LED, P TRIM FAIL in Message Window on GMC 605 display)

This failure will only occur if the optional pitch trim servo is installed.

Indicates a failure of the pitch trim servo of the autopilot. The autopilot may remain engaged, but after disengagement it cannot be re-engaged until the problem is resolved.

1. Control Wheel ..... GRIP FIRMLY

2. AP DISC / TRIM INT Button ..... PRESS and RELEASE
   (Be prepared for possible high elevator control forces)

3. Elevator Trim ..... RE-TRIM if necessary using Pitch Trim Wheel

NOTE

The autopilot disconnect may be accompanied by an AP FAIL on the GMC 605 Status message window, indicating the automatic flight control system has failed. The autopilot cannot be re-engaged with this annunciation present.

ESP ACTIVATION

1. Power..... AS REQUIRED

2. Aircraft Attitude ..... MAINTAIN / REGAIN AIRCRAFT CONTROL

3. LVL key ..... PRESS to engage autopilot

NOTE

If ESP is active for at least 50% of the last 20 seconds, the autopilot will automatically engage in LVL mode, an aural 'ENGAGING AUTOPILOT' will be played, and the autopilot will roll the wings level and fly at zero-vertical speed. Refer to Section 7 – System Description for further information.

4. SELECT desired autopilot modes

OVERSPEED PROTECTION (MAXSPEED)

(MAXSPEED in Message Window on GMC 605 display)

1. Power..... REDUCE

2. Aircraft Attitude and Altitude ..... MONITOR

After overspeed condition is corrected*:*

3. Autopilot .....RESELECT VERTICAL AND LATERAL MODES (if necessary)

4. Power ..... ADJUST AS NECESSARY

NOTE

Overspeed protection mode provides a pitch up command to decelerate the airplane at or below the maximum autopilot operating speed. Overspeed recovery is not active in altitude hold (ALT), glideslope (GS), or glidepath (GP) modes.

UNDERSPEED PROTECTION (MINSPEED)

(AIRSPEED Aural sounds, MINSPEED in Message Window on GMC 605 display)

1. Power..... INCREASE POWER AS REQUIRED TO CORRECT UNDERSPEED

2. Aircraft Attitude and Altitude ..... MONITOR

After underspeed condition is corrected:

3. Autopilot ..... RESELECT VERTICAL AND LATERAL MODES (if necessary)

4. Power ……..... ADJUST AS NECESSARY

NOTE

Autopilot Underspeed Protection Mode provides a pitch down command to maintain 2 KIAS above stall warning airspeed if the selected vertical mode is ALT, GS, GP, or GA. Otherwise, Underspeed Protection will maintain 70 KIAS.

If the autopilot was in ALT, GS, GP, or GA modes when Underspeed Protection was entered, the autopilot will roll wings level.

Section 3A – Abnormal Procedures

AUTOPILOT PRE-FLIGHT TEST FAIL

(Red LED illuminated next to AP key, AP FAIL in Message Window on GMC 605 display)

Indicates the AFCS system failed the automatic Pre-Flight test. The autopilot, yaw damper (if installed), ESP, and electric elevator trim (if installed) are inoperative. Flight Director may still function.

LOSS OF AIR DATA

(AIRDAT FAIL in Message Window on GMC 605 display)

If pressure altitude, indicated airspeed, or true airspeed is invalid or missing, AIRDAT FAIL is displayed in the message window. This indicates that any mode dependent on air data may not be supported such as ESP high speed, ESP low speed, OSP, USP, IAS, VS, or ALT modes.

MANUAL AUTOPILOT DISCONNECT

If necessary, the autopilot may be manually disconnected using any one of the following methods.

1. AP DISC / TRIM INT Button ..... PRESS and RELEASE
   (Pilot's control wheel)

2. AP Button (GMC 605 mode control panel) ..... PRESS
   (Yaw damper remains engaged)

3. Pitch Trim Switch…….…..... ACTIVATE either half of the split switch
   (Yaw damper remains engaged)

4. AUTOPILOT Circuit Breaker ..... PULL

5. AP DISC Circuit Breaker……..PULL (14 volt aircraft only)

LOSS OF NAVIGATION INFORMATION

(Amber FD LED flashes for 10 seconds, GPS, VOR, LOC, VAPP, or BC flashes for 10 seconds on GMC 605 mode panel display)

NOTE

If a navigation signal is lost while the autopilot is tracking it, the autopilot will roll the aircraft wings level and default to roll mode (ROL).

1. GMC 605 Mode Panel..... SELECT HDG mode and SET desired heading

2. NAV Source……SELECT a valid nav source

3. GMC 605 Mode Panel……..SELECT NAV

If on an instrument approach at the time the navigation signal is lost:

4. Missed Approach Procedure ……..EXECUTE (as applicable)

ELEVATOR MISTRIM

(Amber AP LED flashes for 10 seconds, ELE TRM UP or ELE TRM DN displayed in Message Window on GMC 605 display)

Indicates a mistrim of the elevator while the autopilot is engaged. If a pitch trim servo is not installed, refer to the normal procedures section of this AFMS, MANUAL PITCH TRIM WITH AUTOPILOT ENGAGED. If a pitch trim servo is installed, the autopilot will normally trim the airplane as required. However, during rapid acceleration, deceleration, configuration changes, or near either end of the elevator trim limits, momentary illumination of this message may occur. If the autopilot is disconnected while this message is displayed, high elevator control forces are possible.

WARNING

Do not attempt to overpower the autopilot in the event of a pitch mistrim. The autopilot servo will oppose pilot input and will cause pitch trim to run opposite the direction of pilot input. This will lead to a significant out-of-trim condition, resulting in large control wheel force when disengaging the autopilot.

If a pitch trim servo is not installed:

1. Refer to the normal procedures section of this AFMS, MANUAL PITCH TRIM WITH AUTOPILOT ENGAGED.

If a pitch trim servo is installed:

NOTE

Momentary display of the ELE TRIM UP or ELE TRIM DN message during configuration changes or large airspeed changes is normal.

1. Control Wheel……GRIP FIRMLY

WARNING

Be prepared for significant sustained control forces in the direction of the mistrim annunciation. For example, ELE TRM DN indicates nose down control wheel force will be required upon autopilot disconnect.

2. AP DISC / TRIM INT Switch ……..…PRESS AND RELEASE

3. Manual Elevator Trim ……..RE-TRIM as required

4. The autopilot should be considered inoperative until the cause of the mistrim has been investigated and corrected.

AILERON MISTRIM

(Amber AP LED flashes for 10 seconds, AIL TRM LF or AIL TRM RT displayed in Message Window on GMC 605 display)

Indicates a mistrim of the ailerons while the autopilot is engaged. If the autopilot is disconnected while this message is displayed, high aileron control forces are possible.

NOTE

Observe the 15 gallon maximum fuel imbalance limitation.

1. RUDDER TRIM……..VERIFY slip / skid indicator is centered

If annunciation remains:

2. CONTROL WHEEL……..GRIP FIRMLY

WARNING

Be prepared for significant sustained control forces in the direction of the mistrim annunciation. For example, AIL TRM RT indicates right wing down control wheel force will be required upon autopilot disconnect.

3. AP DISC / TRIM INT switch ……PRESS

4. AUTOPILOT……..If lateral trim is re-established, RE-ENGAGE

Section 4 – Normal Procedures

GFC 600 Power Up

During power-up of the GFC 600 system, an initialization splash screen displays on the GMC 605 Mode Selection Panel. The splash screen displays the following information:

- GFC 600 title
- Electronic Stability and Protection (ESP)
- Software version number

When this information has been reviewed, the pilot is prompted to continue (CONT) by pressing the HDG key and the GFC 600 enters preflight test.

During the preflight test the GMC 605 will display PFT in the Message Window. LED fault lights on the GMC 605 autopilot mode panel cycle through a test sequence, three amber lights followed by three red lights, then extinguish if the preflight test successfully passes. The autopilot disconnect tone sounds at the completion of the preflight test. If the GFC 600 passes preflight test, the display on the GMC 605 will be blank and all LED fault lights extinguished.

If the GI 285 remote autopilot mode display is installed, it will cycle through an annunciator light test during the GFC 600 preflight test. All lateral mode annunciations will illuminate amber, followed by AP, YD, TRIM annunciations in amber, all vertical mode annunciations illuminated amber, and finally the AP, YD, and TRIM annunciations in red. If the preflight test passes, all annunciations on the GI 285 will extinguish.

Flight Director / Autopilot Normal Operating Procedures

Autopilot/Flight Director mode annunciations on the GMC 605 displayed in bold fonts indicate active autopilot/flight director modes. Armed modes are indicated in smaller fonts. Normal mode transitions will flash inverse video for 10 seconds before becoming steady. Abnormal mode transitions will flash for 10 seconds before the default mode is annunciated as the active mode. Default autopilot/flight director modes are Roll (ROL) and Pitch (PIT) modes.

If installed, active modes are indicated on the GI 285 Annunciator Panel in green, and armed modes in white. Abnormal mode transitions will flash amber for 10 seconds before the default mode is annunciated as the active mode in green.

The GMC 605 display panel is divided into three sections. From left to right the sections are, lateral autopilot modes, vertical autopilot modes, and the message window.

GMC 605 Autopilot Mode Control Panel

GI 285 Annunciator Panel

Autopilot Engagement — The autopilot may be engaged by pushing the AP Key on the GMC 605 Mode Control Panel. A green LED will illuminate indicating the autopilot is engaged in the active modes as shown on the display.

Autopilot Engagement with Flight Director Off — Upon engagement, the autopilot will be set to hold the current attitude of the airplane, if the flight director was not previously on. In this case, 'ROL' and 'PIT' will be annunciated.

Autopilot Engagement with Flight Director On — If the flight director is on, the autopilot will smoothly pitch and roll the airplane to capture the FD command bars. The prior flight director modes remain unchanged.

Autopilot Disengagement — The most common way to disconnect the autopilot is to press and release the AP DISC / TRIM INT Switch located on the control stick. An autopilot disconnect tone will sound and annunciated on the GMC 605/GI 285. Other ways to disconnect the autopilot include:

– Pressing the AP Key on the GMC 605 Mode Controller
– Operating either side of the Electric Pitch Trim Switch (located on the control wheel)
– Pulling the AUTOPILOT circuit breaker

In the event of unexpected autopilot behavior, press and hold the AP DISC / TRIM INT switch to disconnect the autopilot and remove all power to the servos.

VERTICAL MODES

VERTICAL SPEED (VS) MODE

1. Press VS Button, autopilot synchronizes to the airplane's current vertical speed.

2. Vertical Speed Reference ..... ADJUST using NOSE UP/DN Wheel

INDICATED AIRSPEED (IAS) MODE

1. Press IAS Button, autopilot synchronizes to the airplane's current indicated airspeed.

2. AIRSPEED Reference ..... ADJUST using NOSE UP / DN Wheel

3. POWER.....ADJUST as required

ALTITUDE HOLD (ALT) MODE

1. When at the desired altitude, PRESS the ALT Key. The autopilot will hold the altitude at which the ALT key was pressed.

NOTE

If climbing or descending at a high rate when the ALT button is pressed, the airplane will overshoot the reference altitude and then return to it. The amount of overshoot will depend on the vertical speed when the ALT button is pressed.

2. If altitude preselect is available with a compatible PFD:
   To capture a selected altitude:
   a) Altimeter Setting ..... ADJUST to appropriate value
   b) Altitude Preselect……SET to desired altitude
   c) Vertical Mode and Reference……SELECT on GMC 605

GO AROUND (GA)

1. Control Wheel ..... GRASP FIRMLY

WARNING

If the pitch trim option is not installed, autopilot coupled go-around is prohibited. The autopilot must be disengaged for go around, in accordance with the procedure below.

If the pitch trim option is installed:

2. GO AROUND button ..... PRESS – Verify GA / GA on GMC 605
   autopilot will not disengage

3. Autopilot ..... VERIFY airplane pitches up following flight director command bars

If the pitch trim option is not installed:

2. AP DISC / TRIM INT …….....PRESS to disengage autopilot

3. GO AROUND button…….PRESS – Verify GA / GA on GMC 605

NOTE

The autopilot may be re-engaged after the aircraft is configured for climb (flaps retracted), established in the climb, and at a minimum of 800 ft AGL.

4. Power ……APPLY Go Around power

5. GMC 605 Mode Panel ..... PRESS **NAV** to couple to selected navigation source
   OR;
   PRESS **HDG** to Fly ATC Assigned Missed Approach Heading

6. Altitude Preselect (if installed) ..... VERIFY Set to appropriate altitude

NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. When the GA button is pressed the Flight Director command bars will command go-around pitch attitude and wings level. The pilot must select the CDI to the appropriate navigation source and select the desired lateral and vertical flight director modes.

MANUAL PITCH TRIM WITH AUTOPILOT ENGAGED

(Amber AP LED, ELE TRM UP or ELE TRM DN in Message Window on GMC 605 display)

If the aircraft is not equipped with a pitch trim servo, the pilot must manually adjust the pitch trim when airspeed and aircraft configuration changes are made. A message will be displayed on the GMC 605 mode panel display to indicate the pitch servo is holding sustained force, and the pilot must manually trim the aircraft.

1. If ELE TRM UP message is displayed..... MANUALLY TRIM nose up

2. If ELE TRM DN message is displayed..... MANUALLY TRIM nose down

LATERAL MODES

HEADING MODE (HDG)

1. HDG Key ..... PRESS

2. HDG Knob ..... ROTATE to set heading bug to desired heading

NOTE

If heading bug is rotated quickly, the airplane could turn in the opposite direction as the heading bug's movement.

3. When the airplane reaches the heading bug, the autopilot will roll the wings level to track the heading reference.

NAVIGATION (VOR)

1. Navigation Source. .....SELECT CDI to VHF NAV
   Tune and identify the station frequency

2. CDI ..... SET / VERIFY course

If HSI is installed:

3. Intercept Heading .....ESTABLISH in HDG or ROL mode (if required)

If DG is installed (no HSI):

3. Desired VOR radial.....ALIGN aircraft on desired VOR radial using HDG mode

3a. HDG Bug (on DG) .....SET course

4. GMC 605 NAV key .....PRESS

5. Bold or subdued font VOR annunciation .....VERIFY on GMC 605

NOTE

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the VOR mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the NAV key is pressed.

In aircraft with a DG installed and no HSI, VOR mode cannot be armed. HDG mode must be used to align the aircraft on the selected course with less than half scale deflection prior to pressing the NAV key.

NAVIGATION (GPS)

1. Navigation Source ..... SELECT CDI to GPS

2. Flight Plan ..... LOAD in GPS navigator

3. CDI ..... SET / VERIFY desired track

If HSI is installed:

4. Intercept Heading ..... ESTABLISH in HDG or ROL mode (if required)

If DG is installed:

4. Active Navigation Leg ……..….ALIGN aircraft on active navigation leg using HDG mode

4a. HDG Bug (on DG) ……SET desired track

5. GMC 605 NAV key ..... PRESS

6. Bold or subdued font GPS annunciation .....VERIFY on GMC 605

NOTE

If the Course Deviation Indicator (CDI) is greater half scale deflection, the autopilot will arm the GPS mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the NAV key is pressed.

In aircraft with a DG installed and no HSI, GPS mode cannot be armed. HDG mode must be used to align the aircraft on the active course with less than half scale deflection prior to pressing the NAV key.

APPROACHES

ILS

1. Navigation Source. .....SELECT CDI to VHF Nav
   Tune and Identify an ILS station frequency

2. CDI …….....SET / VERIFY course

If HSI is installed:

3. Intercept Heading .....ESTABLISH in HDG or ROL mode (if required)

If DG is installed (no HSI installed):

3. Final Approach Course ……..…… ALIGN aircraft on final approach course using HDG mode

3a. HDG Bug (on DG) ……..…… SET course

4. GMC 605 APR Key .....PRESS

5. Bold or subdued font LOC and GS annunciations .....VERIFY on GMC 605

6. Airspeed .....MAINTAIN 80 KIAS or greater (recommended)

NOTE

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the LOC mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the APR key is pressed.

When the selected navigation source is an ILS, glideslope coupling is automatically armed when the APR key is pressed. The glideslope cannot be captured until the localizer is captured. The autopilot can capture the glideslope from above or below the glideslope.

In aircraft with a DG installed and no HSI, LOC mode cannot be armed. HDG mode must be used to align the aircraft on the approach course with less than half scale deflection prior to pressing the APR key.

GPS

1. Navigation Source. .....SELECT CDI to GPS

2. Approach Procedure ..... SELECT in GPS Navigator

3. CDI .....SET / VERIFY desired track

If HSI is installed:

4. Intercept Heading .....ESTABLISH in HDG or ROL mode (if required)

If DG is installed (no HSI):

4. Approach Course .....ALIGN aircraft on approach course using HDG mode

4a. HDG Bug (on DG) …… SET desired track

5. GMC 605 APR Key .....PRESS

6. Bold or subdued font GPS and GP annunciations .....VERIFY on GMC 605

7. Vertical Mode and Reference…… SELECT on GMC 605
If required for GPS approach without vertical guidance

8. Airspeed .....MAINTAIN 80 KIAS or greater (recommended)

NOTE

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the GPS mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the APR key is pressed.

When the selected GPS approach includes vertical guidance (LPV, LNAV/VNAV, LNAV+V, LP+V), glidepath coupling is automatically armed when the APR key is pressed. The glidepath cannot be captured until the lateral approach path is captured. The autopilot can capture the glidepath from above or below the glidepath.

In aircraft with a DG installed and no HSI, GPS mode cannot be armed. HDG mode must be used to align the aircraft on the approach course with less than half scale deflection prior to pressing the APR key.

In aircraft without GPS roll steering capability, it is recommended that HDG mode is used to make large course changes on the approach procedure. An example of a large course change is the 90° turn on a Terminal Arrival Area “T” approach transition. Reselect APR mode when the aircraft is established inbound on the final approach course.

VOR

1. Navigation Source. .....SELECT CDI to VHF Nav
   Tune and Identify a VOR station frequency

2. CDI …….....SET / VERIFY course

If HSI is installed:

3. Intercept Heading .....ESTABLISH in HDG or ROL mode (if required)

If DG is installed (no HSI installed):

3. Final Approach Course ……..ALIGN aircraft on final approach course using HDG mode

3a. HDG Bug (on DG) ……..……..SET course

4. GMC 605 APR Key .....PRESS

5. Bold or subdued font VAPP annunciation .....VERIFY on GMC 605

6. Airspeed .....MAINTAIN 80 KIAS or greater (recommended)

7. Vertical Mode and Reference…… SELECT on GMC 605

NOTE

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the VAPP mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the APR key is pressed.

In aircraft with a DG installed and no HSI, VAPP mode cannot be armed. HDG mode must be used to align the aircraft on the approach course with less than half scale deflection prior to pressing the APR key.

BC

1. Navigation Source. .....SELECT CDI to VHF Nav
   Tune and Identify a LOC BC station frequency

2. CDI …….....SET / VERIFY localizer front course

If HSI is installed:

3. Intercept Heading .....ESTABLISH in HDG or ROL mode (if required)

If DG is installed (no HSI installed):

3. Final Approach Course .....ALIGN aircraft on final approach course using HDG mode

3a. HDG Bug (on DG) …….…… SET localizer front course

4. GMC 605 BC Key .....PRESS

5. Bold or subdued font BC annunciation .....VERIFY on GMC 605

6. Vertical Mode and Reference……..…… SELECT on GMC 605

7. Airspeed .....MAINTAIN 80 KIAS or greater (recommended)

NOTE

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the BC mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the BC key is pressed.

In aircraft with a DG installed and no HSI, BC mode cannot be armed. HDG mode must be used to align the aircraft on the approach course with less than half scale deflection prior to pressing the BC key.

DISABLING ESP

(ESP OFF message displayed in Message Window on GMC 605 display)

ESP can be disabled with the following procedure. ESP will be re-enabled when either the AP or FD keys are pressed. The GMC 605 Mode Control Panel will display the message “ESP OFF” when ESP is disabled.

1. AP DISC / TRIM INT switch.....PRESS and HOLD 5 seconds

Section 5 – Performance

No Change.

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Section 6 – Weight and Balance

No Change

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Section 7 – System Description

AFCS OVERVIEW

The GFC 600 is a digital Automatic Flight Control System (AFCS). It is a two-axis autopilot and flight director system which provides the pilot with the following features:

Flight Director (FD) — The flight director processing occurs in the GMC 605 mode panel. Selected modes for the flight director are displayed on the GMC 605 display and the GI 285 annunciator panel (if installed).

The flight director provides:
- Command Bars showing pitch/roll guidance
- Vertical / lateral mode selection and processing

Autopilot (AP) — Autopilot operation occurs within the pitch, roll, and optional pitch trim servos. It also provides servo monitoring, and automatic flight control in response to flight director steering commands, attitude and rate information, and airspeed.

Optional Electric Pitch Trim — The pitch trim servo provides manual electric pitch trim capability when the autopilot is not engaged.

Internal Attitude Source – The GMC 605 contains internal sensors which calculate the aircraft attitude, allowing the GFC 600 to operate without relying on any external source of attitude. Internal monitoring detects attitude errors and will automatically disconnect the autopilot in the unlikely event of internal attitude failure.

Airspeed and Altitude Information – The GFC 600 requires airspeed and altitude information. It may be interfaced to an external air data computer. If an external air data computer is not available, a small Air Data Module will be attached to the back of the GMC 605 rack to provide basic air data information to the GFC 600.

Pilot commands to the AFCS are entered through the GMC 605 autopilot mode panel.

Other components of the AFCS include the GSA 87 pitch, roll, optional yaw, and optional pitch trim servos that also contain autopilot processors, control wheel mounted elevator trim switch, control wheel mounted autopilot / yaw damper disconnect and trim interrupt switch (AP DISC / TRIM INT), Control Wheel Steering switch (CWS), and a Go-Around (GA) switch.

The following conditions will cause the autopilot to automatically disconnect:

- Electrical power failure, including pulling the AUTOPILOT circuit breaker, or the AP DISC circuit breaker (AP DISC circuit breaker installed on 14 volt aircraft only)
- Internal autopilot system failure (including internal AHRS failure)

The following pilot actions will cause the autopilot to disconnect:

- Pressing the red AP DISC / TRIM INT switch on the pilot's control wheel
- Actuating either half of the manual electric trim split switch (if installed)
- Pushing the AP key on the GMC 605 mode controller when the autopilot is engaged
- Pulling the AUTOPILOT circuit breaker
- Pulling the AP DISC circuit breaker (14 volt aircraft only)

The red AP DISC / TRIM INT switch on the pilot's control wheel will interrupt power to the manual electric trim for as long as the switch is depressed.

AFCS CONTROL UNIT

The following tables list the available AFCS vertical and lateral modes with their corresponding controls and annunciations. The NOSE UP/DN Wheel can be used to change the vertical mode reference while operating in Pitch Hold, Vertical Speed, Altitude Hold, or Flight Level Change mode. Increments of change and maximum ranges of values for each of these references using the NOSE UP/DN Wheel are also listed in the table.

AFCS VERTICAL MODES

Vertical Mode	Control	Annunciation	Reference Range	Reference Change Increment
Pitch Hold	(default)	PIT	20˚ Nose up 15˚ Nose Down	0.5˚
Selected Altitude Capture	*	ALTS		
Altitude Hold	**ALT** Key	ALT nnnnn FT		10 ft
Vertical Speed	**VS** Key	VS nnnn FPM	-3000 to +1500 fpm	100 fpm
IAS Hold	**IAS** Key	IAS nnn KTS	70 to 165 kt	1 kt
Vertical Path Tracking (VNAV)	**VNV** Key	Disabled Key		
Glidepath	**APR** Key	GP		
Glideslope		GS		
Go Around	**GA** Switch	GA	7°	
Level (LVL)	**LVL** Key	LVL	Zero Vertical Speed	
ESP High Pitch Engagement			ESP High Pitch Attitude engages at 18° nose up	
ESP Low Pitch Engagement			ESP Low Pitch Attitude engages at 17° nose down	
ESP High Airspeed Engagement			ESP High Airspeed engages at 176 KIAS	
ESP Low Airspeed Engagement			When above 200 ft AGL, ESP Low Airspeed engages when stall warning activates. (This mode only available if height above terrain is available from a compatible Garmin GPS).	

* ALTS arms automatically when PIT, VS, IAS, or GA is active, if the aircraft is equipped with altitude preselect.

AFCS LATERAL MODES

Lateral Mode	Control	Annunciation	Maximum Roll Command Limit
Roll Mode	(default)	ROL	22°
Heading Select	**HDG** Key	HDG	22°
Navigation, GPS Arm/Capture/Track	**NAV** Key	GPS	30°
Navigation, VOR Enroute Arm/Capture/Track		VOR	22°
Navigation, LOC Arm/Capture/Track (No Glideslope)		LOC	22°
Backcourse Arm/Capture/Track	**BC** Key	BC	22°
Approach, GPS Arm/Capture/Track (Glidepath Mode Automatically Armed, if available)	**APR** Key	GPS	30°
Approach, VOR Arm/Capture/Track		VAPP	22°
Approach, ILS Arm/Capture/Track (Glideslope Mode Automatically Armed)		LOC	22°
Go Around	**GA** Switch	GA	Wings Level
LVL (Level)	**LVL** Key	LVL	Wings Level
ESP Roll Attitude Engagement	ESP Roll Attitude engages at 45°		

The CWS Button does not change lateral references for Heading Select, Navigation, Backcourse, or Approach modes. The autopilot guides the aircraft back to the Selected Heading/Course upon release of the CWS Button.

The autopilot may be engaged within the following ranges:

Pitch 50° nose up to 50° nose down

Roll ±75°

If the above pitch or roll limits are exceeded while the autopilot is engaged, the autopilot will disconnect. Engaging the autopilot outside of its command limits, but within its engagement limits, will cause the autopilot to return the aircraft within command limits. The autopilot is capable of commanding the aircraft in the following ranges:

Pitch 20° nose up to 15° nose down

Roll ±30°

PREFLIGHT TEST

During the preflight test the GMC 605 will display PFT in the Message Window. LED fault lights on the GMC 605 autopilot mode panel cycle through a test sequence, three amber lights for one second, followed by three red lights for one second, then extinguish if the preflight test successfully passes. The autopilot disconnect tone sounds at the completion of the preflight test. If the GFC 600 passes preflight test, the display on the GMC 605 will be blank and all LED fault lights extinguished. If GFC 600 fails the PFT, PFT FAIL is displayed in the message window the AP LED in red illuminates.

MESSAGES

GMC 605 Messages	
AIL TRM LF	Aileron Trim Left - Autopilot is holding left wing down roll force. Amber AP LED flashes amber for 5 seconds then remains steady amber.
AIL TRM RT	Aileron Trim Right - Autopilot is holding right wing down roll force. Amber AP LED flashes amber for 5 seconds then remains steady amber.
AIRDAT FAIL	Air data input to the GFC 600 has failed. Vertical modes that require air data input are failed.
ALT KEY STK	ALT key stuck – System has sensed ALT key input for 30 seconds or longer.
AP FAIL	Autopilot Failed – The autopilot is inoperative. Red AP LED will flash until the pilot presses the AP key. Once AP FAIL acknowledged, the Red AP LED will be steady.
AP KEY STK	Autopilot key stuck – System has sensed AP key input for 30 seconds or longer.
APR KEY STK	Approach key stuck – System has sensed APR key input for 30 seconds or longer.
BC KEY STK	Back Course key stuck – System has sensed BC key input for 30 seconds or longer.
CWS	System is in Control Wheel Steering mode.
DISABLD KEY	Disabled Key – The pressed key is inactive; it has no associated mode. This message will extinguish after 3 seconds.
ELE TRM DN	Elevator Trim Down – Autopilot is holding elevator nose down force. The pitch trim needs to be adjusted nose down. Amber AP LED flashes amber for 5 seconds then remains steady amber.
ELE TRM UP	Elevator Trim Up – Autopilot is holding elevator nose up force. The pitch trim needs to be adjusted nose up. Amber AP LED flashes amber for 5 seconds then remains steady amber.
ESP FAIL	Electronic Stability and Protection Has Failed – ESP function is not available.

GMC 605 Messages	
ESP OFF	Electronic Stability and Protection is OFF – The pilot has turned ESP OFF.
FD KEY STK	Flight Director key stuck – System has sensed FD key input for 30 seconds or longer.
HDG KEY STK	Heading key stuck – System has sensed HDG key input for 30 seconds or longer.
IAS KEY STK	Indicated Airspeed key stuck – System has sensed IAS key input for 30 seconds or longer.
LVL KEY STK	Level Mode key stuck – System has sensed LVL key input for 30 seconds or longer.
MAXSPEED	Autopilot Overspeed Protection mode is active.
MINSPEED	Autopilot Underspeed Protection mode is active.
NAV KEY STK	Nav Mode key stuck – System has sensed NAV key input for 30 seconds or longer.
P TRIM FAIL	Pitch Trim Fail – Autopilot and Manual Electric Pitch Trim is inoperative. Amber AP LED flashes for 10 seconds and becomes steady.
PFT FAIL	Preflight Test Failed – Autopilot failed the preflight test. The autopilot is inoperative. FD modes may still be available. Red AP LED illuminates steady.
PFT	Preflight Test is in Progress.
RUD TRM LF	Rudder Trim Left – Yaw Damper is holding left rudder force. Amber AP LED flashes amber for 5 seconds then remains steady amber.
RUD TRM RT	Rudder Trim Right – Yaw Damper is holding right rudder force. Amber AP LED flashes amber for 5 seconds then remains steady amber.
SET HDG=CRS	When the GFC 600 is configured to use a DG (not an HSI), the heading bug must be set to the desired track or navigation course when in NAV or APPROACH modes. This message will be displayed continuously when NAV or APPROACH modes are active.
VNV KEY STK	Vertical Navigation Mode key stuck – System has sensed VNV key input for 30 seconds or longer.
VS KEY STK	Vertical Speed Mode key stuck – System has sensed VS key input for 30 seconds or longer.
YD KEY STK	Yaw Damper key stuck – System has sensed YD key input for 30 seconds or longer. Yaw damper is inoperative.

LED ANNUNCIATOR LIGHTS

GMC 605 GREEN LED LIGHTS	
AP	Steady Green AP LED - Autopilot is engaged and functioning.
FD	Steady Green FD LED - Flight Director is displayed and functioning.
YD	N/A: YD not installed
GMC 605 AMBER LED LIGHTS	
AP	Flashing Amber AP LED for 5 seconds, then extinguish – Normal AP disconnect
FD	Flashing Amber FD LED for 10 seconds, then extinguish – The coupled lateral or vertical mode has been lost, and the GMC has reverted to ROL mode (if lateral mode was lost) or PIT mode (if vertical mode was lost).
YD	N/A: YD not installed
GMC 605 RED LED LIGHTS	
AP	Continuous Flashing Red AP LED – Abnormal AP disconnect Steady Red AP LED – Autopilot Fail. Cause of the failure will be annunciated in the message window.
FD	Not used
YD	N/A: YD not installed
NO ILLUMINATED LED LIGHT	
AP	Autopilot is OFF
FD	Flight Director is OFF
YD	YD not installed, this LED will not illuminate other than pre-flight test

LIGHTING

When the aircraft's dimming bus is selected off, or full dim, GMC 605 mode panel and GI 285 annunciator panel lighting (if installed) is controlled by integrated photocells which sense the ambient cockpit lighting. When the aircraft's dimming bus is activated, GMC 605 and GI 285 (if installed) lighting is controlled using the aircraft's instrument panel lighting dimmer control.