GFC 700 AUTOMATED FLIGHT CONTROL SYSTEM (AFCS)

1. DESCRIPTION

This section covers those systems and components which use inputs to the system to automatically control the flight path of the aircraft through adjustment to the pitch and roll (or optionally, pitch, roll, and yaw) axes or wing lift characteristics and provide visual cues for flight path guidance. This includes the Garmin GFC 700 Autopilot system.

The Garmin GFC 700 digital Automatic Flight Control System (AFCS) Autopilot system is a fully digital, dual channel, fail-passive digital flight control system composed of multiple Line-Replaceable Units (LRUs) and servos. The GFC 700 is fully integrated within the Cirrus Perspective Integrated Avionics System architecture and is used to stabilize the aircraft pitch, roll, and yaw (optional) axes. Pitch autotrim provides trim commands to the pitch trim servo to relieve any long-term effort required by the pitch servo. The system consists of the following components:

- GMC 705 Automatic Flight Control System (AFCS) Mode Controller
- GCU 478 Flight Management System (FMS) Keyboard
- Pitch Servo
- Roll Servo
- Yaw Servo (Optional)
- Dual GIA 63W Integrated Avionics Computers
- GTA 82 Pitch Trim Adapter
- Autopilot Disconnect Switch
- 4-Way Trim Switch
- Take-Off/Go-Around (GA) Switch

The GIA 63W Integrated Avionics computer contains Autopilot/Flight Director algorithms and the MFD/PFD provides autopilot annunciation. The GRS 77 AHRS provides valid attitude, angular rate and acceleration information. The GDC 74A ADC provides air data for flight instrumentation. The GSA 80 and GSA 81 servos are used in the pitch, roll, and yaw (optional) axes. The servos position the aircraft controls in response to commands generated by the internal GIA 63W autopilot calculations. The GTA 82 pitch trim adapter drives the pitch trim cartridge. The operating controls for the autopilot are located on the mode controller/keyboard. The autopilot disconnect and 4-way trim switches provide input to disconnect/override autopilot guidance. (See Figure 22-121)

The GFC 700 AFCS with optional Yaw Damper can be divided into three primary operating functions:

Flight Director - The Flight Director provides pitch and roll commands to the AFCS system and displays them on the PFD. With the Flight Director activated, the pilot can hand-fly the aircraft to follow the path shown by the command bars. Flight Director operation takes place within GIA 63W Integrated Avionics Units and provides:

- Mode annunciation
- Vertical reference control
- Pitch and roll command calculation
- Pitch and roll command display

Autopilot - The Autopilot controls the aircraft pitch, roll, and if installed, yaw attitudes, while following commands received from the Flight Director. Autopilot operation occurs within the trim servos and provides:

- Autopilot engagement and annunciation
- Autopilot command and control
• Auto-trim operation
• Manual electric trim
• Two axis airplane control (pitch and roll), including approaches
• Level (LVL) mode engagement command of zero roll and zero vertical speed

Optional Yaw Damper - The yaw damper reduces dutch roll tendencies and coordinates turns. It can operate independently of the autopilot and may be used during normal hand-flight maneuvers. A GSA 80 servo provides the control surface interface and the mode selection occurs via the GMC 705 controller. Yaw Damper operation is provided by the yaw servo and supplies:
• Yaw Damper engagement and annunciation
• Yaw axis airplane control

For maintenance practices pertinent to the MFD/PFD, see Central Display Systems. (Refer to 31-60)
For maintenance practices pertinent to the AHRS, see Attitude and Direction. (Refer to 34-20)
For maintenance practices pertinent to the ADC, see Flight Environmental Systems. (Refer to 34-10)
For maintenance practices pertinent to the FMS keyboard, see Flight Management Computing. (Refer to 34-60)
For maintenance practices pertinent to the GIA 63W Integrated Avionics Computer, see Central Computers. (Refer to 31-40)
For additional information on the autopilot system integration, see the Cirrus Perspective Integrated Avionics System Pilot’s Guide. (Refer to 05-10)

The GFC 700 AFCS is integral to the Perspective Integrated Avionics system. For an overview of the Perspective Avionics system, refer to Chapter 42, Integrated Modular Avionics. (Refer to 42-20)

A. GMC 705 Automatic Flight Control System (AFCS) Mode Controller - Serials w/ Perspective Avionics

The GFC 705 AFCS Mode Controller, located in the upper section of the center console, provides primary control of autopilot modes and, if installed, yaw damper engagement. A pitch wheel is included for adjustment of pitch mode reference. Through the mode controller, the GIA 63W Integrated Avionics computer serves the function of converting operator commands to logic signals for the roll and pitch computer functions.

28 VDC for mode controller operation is supplied through the 5-amp KEYPADS / AP CTRL circuit breaker on Main Bus 1.

B. GTA 82 Pitch Trim Adapter - Serials w/ Perspective Avionics

The Pitch Trim Adapter, located below the passenger seat, takes input from the trim switches, Integrated Avionics Units, and the pitch servo to allow the GFC 700 to drive the pitch servo. The trim adapter interfaces with the dual GIA 63W Integrated Avionics computers through serial communication on separate RS-485 ports. Trim commands from the yoke switches are routed through the GTA 82 when autopilot is disconnected.

28 VDC for pitch trim adapter operation is supplied through the 2-amp PITCH TRIM circuit breaker on Main Bus 1.

C. Pitch Servo - Serials w/ Perspective Avionics

The pitch servo, located below the baggage compartment at access panel CF5, provides automatic control of the pitch axis. The pitch computer receives signal inputs to compute pitch commands for stabilization, turns, radio intercepts, heading and tracking.

The pitch servo is an electromechanical unit that provides automatic control of the pitch flight axis. The pitch servo receives data from dual GIA 63W Integrated Avionics computers containing Autopilot/Flight
Director algorithms. The GRS 77 AHRS and the GDC 74A Air Data Computer are fed inputs used to drive autopilot. The pitch servo consists of a GSA 81 Servo Actuator and GSM 85A/86 Servo Mount.

The servo actuator contains a motor-control circuit board, monitor circuit board, solenoid, and motor. The motor-control board processes data and drives the motor as required for axis control. The monitor board monitors servo speed, monitors output torque, and controls engagement of the drive-clutch solenoid.

The servo mount contains a capstan and slip-clutch. The capstan transfers the output torque of the servo actuator to the mechanical flight control surface linkage for pitch axis. The slip-clutch allows the pilot to override operation of the servo actuator. Sufficient force applied to the capstan overcomes the slip-clutch setting, allowing the capstan to rotate independently of the servo actuator.

28 VDC for pitch servo operation is supplied through the 5-amp AP SERVOS circuit breaker on Main Bus 1.

D. Roll Servo - Serials w/ Perspective Avionics

The roll servo, located below the passenger seat at access panel CF4C, provides automatic control of the roll axis. The roll computer receives signal inputs to compute roll commands for stabilization, turns, radio intercepts, heading and tracking.

The roll servo is an electromechanical unit that provides automatic control of the roll flight axis. The roll servo receives data from dual GIA 63W Integrated Avionics computers containing Autopilot/Flight Director algorithms. The GRS 77 AHRS and the GDC 74A Air Data Computer are fed inputs used to drive autopilot. The roll servo consists of a GSA 81 Servo Actuator and GSM 85A/86 Servo Mount.

The servo actuator contains a motor-control circuit board, monitor circuit board, solenoid, and motor. The motor-control board processes data and drives the motor as required for axis control. The monitor board monitors servo speed, monitors output torque, and controls engagement of the drive-clutch solenoid.

The servo mount contains a capstan and slip-clutch. The capstan transfers the output torque of the servo actuator to the mechanical flight control surface linkage for roll axis. The slip-clutch allows the pilot to override operation of the servo actuator. Sufficient force applied to the capstan overcomes the slip-clutch setting, allowing the capstan to rotate independently of the servo actuator.

28 VDC for roll servo operation is supplied through the 5-amp AP SERVOS circuit breaker on Main Bus 1.

E. Yaw Servo - Serials w/ Perspective Avionics and Three-Axis Configuration

The yaw servo, located in the empennage avionics bay at access panel RE3, provides automatic control of the yaw axis. The yaw computer receives signal inputs to compute yaw commands for stabilization, turns, radio intercepts, heading and tracking.

The yaw servo is an electromechanical unit that provides automatic control of the yaw flight axis. The yaw servo receives data from dual GIA 63W Integrated Avionics computers containing Autopilot/Flight Director algorithms. The GRS 77 AHRS and the GDC 74A Air Data Computer are fed inputs used to drive autopilot. The yaw servo consists of a GSA 80 Servo Actuator and GSM 85A/86 Servo Mount.

The servo actuator contains a motor-control circuit board, monitor circuit board, solenoid, and motor. The motor-control board processes data and drives the motor as required for axis control. The monitor board monitors servo speed, monitors output torque, and controls engagement of the drive-clutch solenoid.

The servo mount contains a capstan and slip-clutch. The capstan transfers the output torque of the servo actuator to the mechanical flight control surface linkage for yaw axis. The slip-clutch allows the pilot to override operation of the servo actuator. Sufficient force applied to the capstan overcomes the slip-clutch setting, allowing the capstan to rotate independently of the servo actuator.

28 VDC for yaw servo operation is supplied through the 3-amp YAW SERVO circuit breaker on Main Bus 3.
NOTE

Yaw control is only available on three-axis configuration.

Figure 22-121
GFC 700 Autopilot System Schematic - Serials w/ Perspective Avionics

EFFECTIVITY:
Serials w/ Perspective Avionics
## 2. TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Trouble - GFC 700 Autopilot System</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>“AFCS” (white text on red background) annunciation is displayed on PFD.</td>
<td>AFCS system failure has occurred.</td>
<td>Ensure Perspective Avionics system is in proper working order. Check for proper operation of GIA Integrated Avionics Unit, GRS AHRS, GDC Air Data Computer, and all GSA servos. Verify no red X’s are displayed on MFD and PFD. Verify no related alert messages are displayed on PFD (press [ALERTS]). Check AUX – SYSTEM STATUS page on MFD to verify all LRUs are online (green check). Isolate fault to an LRU. Replace this LRU and confirm resolution of annunciation.</td>
</tr>
<tr>
<td>“PFT” (black text on white background) annunciation is displayed on PFD.</td>
<td>Pre-flight test is in progress.</td>
<td>Allow system to complete pre-flight tests. The preflight test should finish within 2 minutes. If it does not pass, red ‘PFT’ annunciation is displayed on PFD.</td>
</tr>
<tr>
<td>“PFT” (white text on red background) annunciation is displayed on PFD.</td>
<td>Pre-flight test has failed.</td>
<td>Ensure Perspective Avionics system is in proper working order. Check for proper operation of GIA Integrated Avionics Unit, GRS AHRS, GDC Air Data Computer, and all GSA servos. Verify no red X’s are displayed on MFD and PFDs. Verify no related alert messages are displayed on PFD (press [ALERTS]). Check AUX – SYSTEM STATUS page on MFD to verify all LRUs are online (green check). Isolate fault to an LRU. Replace this LRU and confirm resolution of annunciation.</td>
</tr>
</tbody>
</table>
## Trouble - GFC 700 Autopilot System

<table>
<thead>
<tr>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No aural alert is heard after successful pre-flight test.</td>
<td>Audio operation fault has occurred. Repeat autopilot engagement, followed by disengagement to confirm audio operation fault. Verify connections for GIA 1/GMA 1 and GIA 2/GMA 2 audio interface.</td>
</tr>
<tr>
<td>Autopilot clutches cannot be overpowered.</td>
<td>Servo clutch torque settings are incorrect. Check the servo clutch torque settings. Perform Adjustment/Test - GSM 85A/86 Servo Clutch Test. (Refer to 22-12)</td>
</tr>
<tr>
<td>Trim hesitates during trim switch operation.</td>
<td>Excessive friction on aircraft pitch trim system. Press trim switch on yoke in one direction until it reaches the stop. Using stop watch, time trim speed from one end of travel to opposite stop. Verify elapsed time measures 20 ±3 seconds for each direction.</td>
</tr>
</tbody>
</table>

## Trouble - GMC 705 AFCS Mode Controller

<table>
<thead>
<tr>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;GMC CNFG – GMC Config error. Config service req’d.&quot; annunciation is displayed on PFD.</td>
<td>The Perspective Avionics system has detected a GMC 705 configuration mismatch. Perform Functional Test - GMC 705 AFCS Mode Controller Software and Configuration Loading. (Refer to 22-12) Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12) Replace GMC 705. (Refer to 22-12)</td>
</tr>
<tr>
<td>&quot;GMC FAIL – GMC is inoperative.&quot; annunciation is displayed on PFD.</td>
<td>The Perspective Avionics system has detected a failure in the GMC 705. Check GMC 705 wiring and connector. Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12) Replace GMC 705. (Refer to 22-12)</td>
</tr>
<tr>
<td>&quot;MANIFEST – GMC software mismatch. Communication halted.&quot; annunciation is displayed on PFD.</td>
<td>The Perspective Avionics system has detected an incorrectly loaded software version. Check software version on AUX – SYSTEM STATUS page on MFD. Perform Functional Test - GMC 705 AFCS Mode Controller Software and Configuration Loading. (Refer to 22-12)</td>
</tr>
<tr>
<td>Trouble - GTA 82 Pitch Trim Adapter</td>
<td>Probable Cause</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>“PIRM” (white text on red back-</td>
<td>Pitch trim axis failure has occurred.</td>
</tr>
<tr>
<td>ground) annunciation is displayed</td>
<td></td>
</tr>
<tr>
<td>on PFD.</td>
<td></td>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Trouble - GSA 81 / GSM 85A/86</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch Servo</td>
<td>Pitch axis failure has occurred.</td>
<td>Check <strong>AUX – SYSTEM STATUS</strong> page on MFD to verify pitch servo is online (green check).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify pitch servo is receiving power.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check pitch servo wiring and connector.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perform Operational Test - GFC 700 Autopilot. (<a href="#">Refer to 22-12</a>)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace pitch servo. (<a href="#">Refer to 22-12</a>)</td>
</tr>
<tr>
<td>“PITCH” (white text on red back-</td>
<td>The elevator is mis-trimming down.</td>
<td>Check <strong>AUX – SYSTEM STATUS</strong> page on MFD to verify pitch servo is online (green check).</td>
</tr>
<tr>
<td>ground) annunciation is displayed</td>
<td></td>
<td>Verify pitch servo is receiving power.</td>
</tr>
<tr>
<td>on PFD.</td>
<td></td>
<td>Check pitch servo wiring and connector.</td>
</tr>
<tr>
<td>“↓ELE” (black text on yellow back-</td>
<td></td>
<td>Perform Operational Test - GFC 700 Autopilot. (<a href="#">Refer to 22-12</a>)</td>
</tr>
<tr>
<td>ground) annunciation is displayed</td>
<td></td>
<td>Check elevator pitch control rig-</td>
</tr>
<tr>
<td>on PFD.</td>
<td></td>
<td>ging. (<a href="#">Refer to 22-12</a>)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace pitch servo. (<a href="#">Refer to 22-12</a>)</td>
</tr>
</tbody>
</table>
### Trouble - GSA 81 / GSM 85A/86 Pitch Servo

<table>
<thead>
<tr>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The elevator is mis-trimming up.</td>
<td>Check <strong>AUX – SYSTEM STATUS</strong> page to verify pitch servo is online (green check). Verify pitch servo is receiving power. Check pitch servo wiring and connector. Perform Operational Test - GFC 700 Autopilot. <em>(Refer to 22-12)</em> Check elevator pitch control rigging. <em>(Refer to 22-12)</em> Replace pitch servo. <em>(Refer to 22-12)</em></td>
</tr>
</tbody>
</table>

### Trouble - GSA 81 / GSM 85A/86 Roll Servo

<table>
<thead>
<tr>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll axis failure has occurred.</td>
<td>Check <strong>AUX – SYSTEM STATUS</strong> page on MFD to verify roll servo is online (green check). Verify roll servo is receiving power. Check roll servo wiring and connector. Perform Operational Test - GFC 700 Autopilot. <em>(Refer to 22-12)</em> Replace roll servo. <em>(Refer to 22-12)</em></td>
</tr>
<tr>
<td>The aileron is mis-trimming to right.</td>
<td>Check for possible fuel imbalance. Perform Operational Test - GFC 700 Autopilot. <em>(Refer to 22-12)</em> Check aileron roll control rigging. <em>(Refer to 22-12)</em> Replace roll servo. <em>(Refer to 22-12)</em></td>
</tr>
<tr>
<td>Trouble - GSA 81 / GSM 85A/86 Roll Servo</td>
<td>Probable Cause</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>“AIL” (black text on yellow background) annunciation is displayed on PFD.</td>
<td>The aileron is mis-trimming to left.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Trouble - GSA 80 / GSM 85A/86 Yaw Servo - Serials w/ Three-Axis Configuration</th>
<th>Probable Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>“YAW” (white text on red background) annunciation is displayed on PFD.</td>
<td>Yaw axis failure has occurred.</td>
<td>Check <strong>AUX – SYSTEM STATUS</strong> page on MFD to verify yaw servo is online (green check).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verify yaw servo is receiving power.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check yaw servo wiring and connector.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Replace yaw servo. (Refer to 22-12)</td>
</tr>
</tbody>
</table>
3. MAINTENANCE PRACTICES

A. GMC 705 AFCS Mode Controller - Serials w/ Perspective Avionics (See Figure 22-122)

(1) Removal - GMC 705 AFCS Mode Controller
   (a) Set BAT 1, BAT 2, and AVIONICS master switches to OFF positions.
   (b) Pull KEYPADS / AP CTRL circuit breaker.
   (c) Insert hex wrench into front panel bolt holes and engage locking screws.
   (d) Turn locking screws ¼ turn counter-clockwise to loosen locking cams.
   (e) Disconnect electrical connector from back of mode controller. Remove mode controller.

(2) Installation - GMC 705 AFCS Mode Controller
   (a) Connect electrical connector to back of mode controller. Tighten screws to secure.
   (b) Position mode controller flush to instrument panel.
   (c) Insert hex wrench into front panel bolt holes and engage locking screws.
   (d) Turn locking screws ¼ turn clockwise to tighten locking cams.
   (e) Reset KEYPADS / AP CTRL circuit breaker.
   (f) If GMC 705 has been replaced with a new or different unit, or original unit has been repaired, perform Adjustment/Test - GMC 705 AFCS Mode Controller Software and Configuration Loading. (Refer to 22-12)
   (g) Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12)

(3) Adjustment/Test - GMC 705 AFCS Mode Controller Software and Configuration Loading

   Note: No software loading is required if the original GMC 705 is reinstalled. This does not include units that were returned for repair as the software and configuration files are deleted during the repair testing process.

   If a new, repaired, or exchanged GMC 705 is installed, load software and gains files from the Cirrus Perspective software loader card.

   (a) Connect 28 ±1 VDC external power to external power receptacle.
   (b) Pull STARTER and FUEL PUMP circuit breakers.

   CAUTION: Failure to remove database cards may result in cards becoming corrupted.

   (c) Remove SD cards from top and bottom slots of MFD and PFD.
   (d) Insert Cirrus Perspective software loader card into top slot of PFD.
   (e) Power on PFD and MFD in Configuration mode.
      1. While holding far right softkey on PFD and MFD, set BAT 1 and AVIONICS switches to ON positions.
      2. When "INITIALIZING SYSTEM" appears in upper left corner of displays, release softkeys.
      3. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
      4. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM SPLASH SCREEN?”
   (f) After System Status page appears on PFD, use inner [FMS] knob to select System Upload page.
   (g) Press inner [FMS] knob to activate cursor.
   (h) Rotate inner [FMS] knob to display list of AIRFRAME choices, highlight “Options” in pop-up window, then press [ENT] key.
(i) In FILE window, rotate inner [FMS] knob to display list of FILE choices. In pop-up window, highlight GFC 700 (with or without YD) configuration file that matches aircraft configuration, and press [ENT] key.


**Note:** Pressing [ENT] key will check and uncheck highlighted software and configuration boxes.

(k) Using [FMS] knob and [ENT] key, select the following files:
   - GMC 705 software
   - GMC 705 Configuration

(l) Once files are selected, press [LOAD] softkey.

(m) When upload is complete, press [ENT] key to select OK in UPLOAD COMPLETE window.

(n) Set BAT 1 and AVIONICS switches to OFF positions.

**CAUTION:** Wait for “flash” of display screens or 5 seconds to ensure backup capacitors have discharged before removing software loader card.

(o) Remove Cirrus Perspective software loader card from PFD.

(p) Insert SD cards into top and bottom slots of MFD and PFD.

(q) Reset STARTER and FUEL PUMP circuit breakers.

(r) Disconnect 28 ±1 VDC external power from external power receptacle.
B. GCU 478 Flight Management System (FMS) Keyboard - *Serials w/ Perspective Avionics*

The GCU 478 FMS keyboard is an alphanumeric, softkey keyboard that provides the primary interface for data entry for the MFD and is used to control NAV/COM radios, transponder, and FMS entry. Heading, course and altitude select are also provided. For maintenance practices pertinent to the GCU 478 FMS keyboard, see Flight Management Computing. *(Refer to 34-60)*

C. 4-Way Trim Switch - *Serials w/ Perspective Avionics*

The 4-way trim switch is integral to the control yoke and is used to command manual electric pitch/roll trim. For maintenance practices pertinent to the 4-way trim switch, see Aileron And Roll Trim System. *(Refer to 27-10)*

D. Take-Off/Go-Around (TO/GA) Switch - *Serials w/ Perspective Avionics*

The Take-Off/Go-Around (TO/GA) switch is integral to the throttle and is used to disengage the autopilot and select Take-Off/Go-Around mode on the Flight Director. For maintenance practices pertinent to the TO/GA switch, see Speed-attitude Correction. *(Refer to 22-20)*

E. Autopilot Disconnect Switch - *Serials w/ Perspective Avionics*

The autopilot disconnect switch is integral to the control yoke and is used to disengage the autopilot and mute the aural alert associated with an autopilot disconnect. For maintenance practices pertinent to the autopilot disconnect switch, see Aileron And Roll Trim System. *(Refer to 27-10)*
Figure 22-122
GMC 705 AFCS Mode Controller Installation - Serials w/ Perspective Avionics

LEGEND
1. GMC 705 Mode Controller

EFFECTIVITY:
Serials w/ Perspective Avionics
F. GTA 82 Pitch Trim Adapter - Serials w/ Perspective Avionics (See Figure 22-123)

1. Removal - GTA 82 Pitch Trim Adapter
   a. Set BAT 1, BAT 2, and AVIONICS master switches to OFF positions.
   b. Pull PITCH TRIM circuit breaker.
   c. Remove access panels CF4C and CF4R. (Refer to 06-00)
   d. Disconnect electrical connector from pitch trim adapter.
   e. Remove bolts, washers, spacers, and nuts securing pitch trim adapter assembly to RH aft longeron. Remove trim adapter assembly from airplane.

2. Disassembly - GTA 82 Pitch Trim Adapter
   a. Remove screws and washers securing pitch trim adapter to mounting plate.

3. Assembly - GTA 82 Pitch Trim Adapter
   a. Position mounting plate to pitch trim adapter and secure with screws and washers.

4. Installation - GTA 82 Pitch Trim Adapter
   a. Position pitch trim adapter assembly to RH aft longeron and secure with bolts, washers, spacers, and nuts.
   b. Connect electrical connector to pitch trim adapter.
   c. Reset PITCH TRIM circuit breaker.
   d. If GTA 82 has been replaced with a new or different unit, or original unit has been repaired, perform Functional Test - GTA 82 Pitch Trim Adapter Software and Configuration Loading. (Refer to 22-12)
   e. Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12)
   f. Install access panel CF4C and CF4R. (Refer to 06-00)

5. Adjustment/Test - GTA 82 Pitch Trim Adapter Software and Configuration Loading
   Note: No software loading is required if the removed pitch trim adapter is reinstalled in the same position. This does not include units that were returned for repair as the software and configuration files are deleted during the repair testing process.
   
   If a new, repaired, or exchanged GTA 82 pitch trim adapter is installed, load software and gains files from the Cirrus Perspective software loader card.
   a. Connect 28 ±1 VDC external power to external power receptacle.
   b. Pull STARTER and FUEL PUMP circuit breakers.
   
   CAUTION: Failure to remove database cards may result in cards becoming corrupted.
   c. Remove SD cards from top and bottom slots of MFD and PFD.
   d. Insert Cirrus Perspective software loader card into top slot of PFD.
   e. Power on PFD and MFD in Configuration mode.
      1. While holding far right softkey on PFD and MFD, set BAT 1 and AVIONICS switches to ON positions.
      2. When “INITIALIZING SYSTEM” appears in upper left corner of displays, release softkeys.
      3. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
      4. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM SPLASH SCREEN?”
   f. After System Status page appears on PFD, use inner [FMS] knob to select System Upload page.
   g. Press inner [FMS] knob to activate cursor.
(h) Rotate inner [FMS] knob to display list of AIRFRAME choices, highlight “Options” in pop-up window, then press [ENT] key.

(i) In FILE window, rotate inner [FMS] knob to display list of FILE choices. In pop-up window, highlight GFC 700 (with or without YD) configuration file that matches aircraft configuration, and press [ENT] key.


**Note:** Pressing [ENT] key will check and uncheck highlighted software and configuration boxes.

(k) Using [FMS] knob and [ENT] key, select following files:
   - Pitch Trim software
   - Pitch Trim gains

(l) Once files are selected, press [LOAD] softkey.

(m) When upload is complete, press [ENT] key to select OK in UPLOAD COMPLETE window.

(n) Set BAT 1 and AVIONICS switches to OFF positions.

**CAUTION:** Wait for “flash” of display screens or 5 seconds to ensure backup capacitors have discharged before removing software loader card.

(o) Remove Cirrus Perspective software loader card from PFD.

(p) Insert SD cards into top and bottom slots of MFD and PFD.

(q) Reset STARTER and FUEL PUMP circuit breakers.

(r) Disconnect 28 ±1 VDC external power from external power receptacle.
Figure 22-123
GTA 82 Pitch Trim Adapter Installation - Serials w/ Perspective Avionics (Sheet 1 of 2)

Serials 22-3026 thru 22-3309, 22-3311 thru 22-3325 w/ Perspective Avionics.

LEGEND
1. Mounting Plate
2. Pitch Trim Adapter
3. Screw
4. Washer
5. Bolt
6. Spacer
7. Nut

DETAIL A

Serials w/ Perspective Avionics.

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effectivity:
Serials w/ Perspective Avionics
Serials 22-3003, 22-3310, and 22-3326 w/ FIKI.

**NOTE**

Serial 22-3003: Install large area washers at inboard locations on RH aft longeron.

**DETAIL**

Figure 22-123

GTA 82 Pitch Trim Adapter Installation - Serials w/ Perspective and FIKI (Sheet 2 of 2)

**EFFECTIVITY:**

Serials w/ Perspective and FIKI

SR22_MM22_0996

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G. GSA 80 Servo Actuator - Serials w/ Perspective Avionics (See Figure 22-124) (See Figure 22-125)

(1) Removal - GSA 80 Servo Actuator
   (a) Set BAT 1, BAT 2, and AVIONICS master switches to OFF positions.
   (b) Pull YAW SERVO circuit breaker.
   (c) Remove access panel RE3. (Refer to 06-00)
   (d) Disconnect servo actuator connector from aircraft harness.
   (e) Remove bolts and washers securing servo actuator to servo mount.

(2) Installation - GSA 80 Servo Actuator
   (a) Perform Inspection/Check - GSA 80 Servo Actuator. (Refer to 22-12)
   (b) Carefully align servo actuator with servo mount.

   **CAUTION:** The servo actuator and servo mount must fit flush together with no gaps before tightening mounting bolts. Do not under any circumstances try to close gap by tightening mounting bolts or the servo mount will be damaged.

   **Note:** To facilitate gear alignment, use the correct orientation.

   (c) Install bolts and washers securing servo actuator to servo mount.
   (d) Serials w/ GSM 85A: Torque bolts to 45.0 ±5.0 in-lb (5.1 ±0.6 Nm). (Refer to 20-60)
   (e) Serials w/ GSM 86: Torque bolts to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm). (Refer to 20-60)
   (f) Connect servo actuator connector to aircraft harness.

   **Note:** Ensure that harness is properly secured to the airframe.

   (g) Reset YAW SERVO circuit breaker.
   (h) If GSA 80 has been replaced with a new or different unit, or original unit has been repaired, perform Functional Test - GSA 80 Servo Software and Configuration Loading. (Refer to 22-12)
   (i) Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12)
   (j) Install access panel RE3. (Refer to 06-00)

(3) Inspection/Check - GSA 80 Servo Actuator
   (a) Acquire necessary tools, equipment, and supplies.

   **Description** | **P/N or Spec.** | **Supplier** | **Purpose**
   --- | --- | --- | ---
   Cotton Cloth (clean, lint free) | - | Any Source | Remove excess grease.
   Paint Brush | - | Any Source | Apply grease.
   Grease | AeroShell 17 (or equivalent that meets MIL-G-21164D) | Shell Aviation London, United Kingdom +44-20-7934-8264 | Lubrication.

   (b) Remove GSA 80 servo actuator. (Refer to 22-12)
   (c) Using lint-free cloth, remove excess grease build-up from servo output gear.

   **CAUTION:** Do not use solvents to clean the output gear.

   **Note:** It is not necessary to remove all grease from output gear.
(d) Using brush or other applicator, apply a thin coat of grease to servo output gear.
(e) Install GSA 80 servo actuator. (Refer to 22-12)

(4) Adjustment/Test - GSA 80 Servo Software and Configuration Loading

Note: No software loading is required if the removed servo is reinstalled in the same position. This does not include units that were returned for repair as the software and configuration files are deleted during the repair testing process.

If a new, repaired, or exchanged GSA 80 servo is installed, load software and gains files from the Cirrus Perspective software loader card.

(a) Connect 28 ±1 VDC external power to external power receptacle.
(b) Pull STARTER and FUEL PUMP circuit breakers.

CAUTION: Failure to remove database cards may result in cards becoming corrupted.

(c) Remove SD cards from top and bottom slots of MFD and PFD.
(d) Insert Cirrus Perspective software loader card into top slot of PFD.
(e) Power on PFD and MFD in Configuration mode.

1. While holding far right softkey on PFD and MFD, set BAT 1 and AVIONICS switches to ON positions.
2. When “INITIALIZING SYSTEM” appears in upper left corner of displays, release softkeys.
3. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
4. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM SPLASH SCREEN?”
(f) After System Status page appears on PFD, use inner [FMS] knob to select System Upload page.
(g) Press inner [FMS] knob to activate cursor.
(h) Rotate inner [FMS] knob to display list of AIRFRAME choices, highlight “Options” in pop-up window, then press [ENT] key.
(i) In FILE window, rotate inner [FMS] knob to display list of FILE choices. In pop-up window, highlight GFC 700 (with or without YD) configuration file that matches aircraft configuration, and press [ENT] key.

Note: Pressing [ENT] key will check and uncheck highlighted software and configuration boxes.

(k) Using [FMS] knob and [ENT] key, select following files:
   • Yaw software
   • Yaw gains
(l) Once are selected, press [LOAD] softkey.
(m) When upload is complete, press [ENT] key to select OK in UPLOAD COMPLETE window.
(n) Set BAT 1 and AVIONICS switches to OFF positions.

CAUTION: Wait for “flash” of display screens or 5 seconds to ensure backup capacitors have discharged before removing software loader card.

(o) Remove Cirrus Perspective software loader card from PFD.
(p) Insert SD cards into top and bottom slots of MFD and PFD.
(q) Reset STARTER and FUEL PUMP circuit breakers.
(r) Disconnect 28 ±1 VDC external power from external power receptacle.
H. GSA 81 Servo Actuator - Serials w/ Perspective Avionics (See Figure 22-126)

(1) Removal - GSA 81 Servo Actuator
   (a) Set BAT 1, BAT 2, and AVIONICS master switches to OFF positions.
   (b) Pull AP SERVOS circuit breaker.
   (c) For pitch servo: Remove access panel CF5. (Refer to 06-00)
   (d) For roll servo: Remove access panel CF4C. (Refer to 06-00)
   (e) Disconnect servo actuator connector from aircraft harness.
   (f) Remove bolts and washers securing servo actuator to servo mount.

(2) Installation - GSA 81 Servo Actuator
   (a) Perform Inspection/Check - GSA 81 Servo Actuator. (Refer to 22-12)
   (b) Carefully align servo actuator with servo mount.

   CAUTION: The servo actuator and servo mount must fit flush together with no gaps before tightening mounting bolts. Do not under any circumstances try to close gap by tightening mounting bolts or the servo mount will be damaged.

   Note: To facilitate gear alignment, use the correct orientation.

   (c) Install bolts and washers securing servo actuator to servo mount.
   (d) Serials w/ GSM 85A: Torque bolts to 45.0 ±5.0 in-lb (5.1 ±0.6 Nm). (Refer to 20-60)
   (e) Serials w/ GSM 86: Torque bolts to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm). (Refer to 20-60)
   (f) Connect servo actuator connector to aircraft harness.

   Note: Ensure that harness is properly secured to the airframe.

   (g) Reset AP SERVOS circuit breaker.
   (h) If GSA 81 has been replaced with a new or different unit, or original unit has been repaired, perform Functional Test - GSA 81 Servo Software and Configuration Loading. (Refer to 22-12)
   (i) Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12)
   (j) For pitch servo: Install access panel CF5. (Refer to 06-00)
   (k) For roll servo: Install access panel CF4C. (Refer to 06-00)

(3) Inspection/Check - GSA 81 Servo Actuator
   (a) Acquire necessary tools, equipment, and supplies.

<table>
<thead>
<tr>
<th>Description</th>
<th>P/N or Spec.</th>
<th>Supplier</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cotton Cloth (clean, lint free)</td>
<td>-</td>
<td>Any Source</td>
<td>Remove excess grease</td>
</tr>
<tr>
<td>Paint Brush</td>
<td>-</td>
<td>Any Source</td>
<td>Apply grease</td>
</tr>
<tr>
<td>Grease</td>
<td>AeroShell 17 (or equivalent that meets MIL-G-21164D)</td>
<td>Shell Aviation London, United Kingdom +44-20-7934-8264</td>
<td>Lubrication</td>
</tr>
</tbody>
</table>

   (b) Remove GSA 81 servo actuator. (Refer to 22-12)
   (c) Using lint-free cloth, remove excess grease build-up from servo output gear.

   CAUTION: Do not use solvents to clean the output gear.
Note: It is not necessary to remove all grease from output gear.

(d) Using brush or other applicator, apply a thin coat of grease to servo output gear.
(e) Install GSA 81 servo actuator. (Refer to 22-12)

(4) Adjustment/Test - GSA 81 Servo Software and Configuration Loading

Note: No software loading is required if the removed servo is re-installed in the same position. This does not include units that were returned for repair as the software and configuration files are deleted during the repair testing process.

If a new, repaired, or exchanged GSA 81 servo is installed, load software and gains files from the Cirrus Perspective software loader card.

(a) Connect 28 ±1 VDC external power to external power receptacle.
(b) Pull STARTER and FUEL PUMP circuit breakers.

CAUTION: Failure to remove database cards may result in cards becoming corrupted.

(c) Remove SD cards from top and bottom slots of MFD and PFD.
(d) Insert Cirrus Perspective software loader card into top slot of PFD.
(e) Power on PFD and MFD in Configuration mode.

1. While holding far right softkey on PFD and MFD, set BAT 1 and AVIONICS switches to ON positions.
2. When “INITIALIZING SYSTEM” appears in upper left corner of displays, release softkeys.
3. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
4. On PFD, press [NO] softkey at “DO YOU WANT TO UPDATE SYSTEM SPLASH SCREEN?”

(f) After System Status page appears on PFD, use inner [FMS] knob to select System Upload page.
(g) Press inner [FMS] knob to activate cursor.
(h) Rotate inner [FMS] knob to display list of AIRFRAME choices, highlight “Options” in pop-up window, then press [ENT] key.
(i) In FILE window, rotate inner [FMS] knob to display list of FILE choices. In pop-up window, highlight GFC 700 (with or without YD) configuration file that matches aircraft configuration, and press [ENT] key.

Note: Pressing [ENT] key will check and uncheck highlighted software and configuration boxes.

(k) For pitch servo: Using [FMS] knob and [ENT] key, select following files:
   • Pitch software
   • Pitch gains
(l) For roll servo: Using [FMS] knob and [ENT] key, select following files:
   • Roll software
   • Roll gains

(m) Once files are selected, press [LOAD] softkey.
(n) When upload is complete, press [ENT] key to select OK in UPLOAD COMPLETE window.
(o) Set BAT 1 and AVIONICS switches to OFF positions.

CAUTION: Wait for “flash” of display screens or 5 seconds to ensure backup capacitors have discharged before removing software loader card.

(p) Remove Cirrus Perspective software loader card from PFD.
(q) Insert SD cards into top and bottom slots of MFD and PFD.
(r) Reset STARTER and FUEL PUMP circuit breakers.
(s) Disconnect 28 ±1 VDC external power from external power receptacle.
I. GSM 85A/86 Pitch Servo Mount - Serials w/ Perspective Avionics (See Figure 22-124)

(1) Removal - GSM 85A/86 Pitch Servo Mount
   (a) Set BAT 1, BAT 2, and AVIONICS switches to OFF positions.
   (b) Pull AP SERVOS circuit breaker.
   (c) Remove access panel CF5. (Refer to 06-00)
   (d) Serials w/ Air Conditioning: Remove condenser. (Refer to 21-50)
   (e) Disconnect pitch servo plug from socket.
   
   **Note:** Note location of bridle cable clamps on elevator cable to facilitate reinstallation.

   (f) Remove bolts, nuts, and clamps securing bridle cable to elevator cable.
   (g) Remove bolts and washers securing pitch servo to mounting bracket and remove pitch servo from airplane.

(2) Disassembly - GSM 85A/86 Pitch Servo Mount
   (a) Remove screws and washers securing stiffener ring to capstan cable guards.
   (b) Remove cable guards.
   (c) Serials w/ GSM 85A: Disassemble capstan cover.
       1. Remove screws and washers securing outer capstan cover and gasket to capstan.
       2. Remove cotter pin, nuts, o-ring, and washer securing inner capstan cover to capstan. Remove capstan cover and gasket.
   (d) Serials w/ GSM 86: Disassemble capstan.
       1. Remove bolt and washer securing capstan assembly to servo mount.
       2. Remove retaining ring securing slip clutch cartridge to capstan.
   (e) Remove cotter pin, nut, washers, spacer, and bolt securing pulley and cable keeper to mounting bracket.
   (f) Remove stop-ball from capstan recess and unwrap bridle cable from capstan.

(3) Reassembly - GSM 85A/86 Pitch Servo Mount
   (a) Serials w/ GSM 85A: If pitch servo mount is a different unit from the originally installed pitch servo mount:
       1. Perform Adjustment/Test - GSM 85A Servo Mount Torque. (Refer to 22-12)
   (b) Insert and depress bridle cable stop-ball into capstan recess.
   (c) Wrap bridle cable around servo capstan.
       1. On servo capstan, position bridle cable stop-ball at 9 o’clock position (stop-ball at forward side of capstan), and wrap long end of bridle cable approximately 480° counter-clockwise such that cable exits bottom of capstan.
       2. On servo capstan, position bridle cable stop-ball at 9 o’clock position (stop-ball at forward side of capstan), and wrap short end of bridle cable approximately 480° clockwise such that cable exits bottom of capstan.
       
       **Note:** Align cable keeper so arm extends through mounting bracket hole but does not contact pulley or mounting bracket.
   (d) Position pulley and cable keeper to mounting bracket and secure with bolt, washers, nut, and new cotter pin.
   (e) Serials w/ GSM 85A: Reassemble capstan cover.
       1. Position capstan cover and gasket onto capstan. Install new cotter pin, nuts, o-ring, and washer securing inner capstan cover to capstan.
       2. Install screws and washers securing outer capstan cover and gasket to capstan. Torque screws to 10.0 ±2.0 in-lb (1.13 ±0.23 Nm).
(f) **Serials w/ GSM 86:** Reassemble capstan.
1. Position slip clutch cartridge into capstan.
2. Install retaining ring securing slip clutch cartridge to capstan.
3. Position capstan assembly to servo mount.
4. Install bolt and washer securing capstan assembly to servo mount. Torque bolt to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm).

(g) Install cable guards.

(h) Position stiffener ring to capstan cable guards and secure with screws and washers. Torque screws to 10.0 ±2.0 in-lb (1.13 ±0.23 Nm).

(4) **Installation - GSM 85A/86 Pitch Servo Mount**

(a) Position pitch servo to mounting bracket and secure with bolts and washers.

(b) **Serials w/ GSM 85A:** Torque bolts to 45.0 ±5.0 in-lb (5.1 ±0.6 Nm). (Refer to 20-60)

(c) **Serials w/ GSM 86:** Torque bolts to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm). (Refer to 20-60)

(d) Perform Adjustment/Test - GSM 85A/86 Pitch Servo Mount Bridle Cable Tension. (Refer to 22-12)

(e) Connect pitch servo plug to socket.

(f) Reset AP SERVOS circuit breaker.

(g) Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12)

(h) **Serials w/ Air Conditioning:** Install condenser. (Refer to 21-50)

(i) Install access panel CF5. (Refer to 06-00)

(5) **Adjustment/Test - GSM 85A/86 Pitch Servo Mount Bridle Cable Tension**

(a) Acquire necessary tools, equipment, and supplies.

<table>
<thead>
<tr>
<th>Description</th>
<th>P/N or Spec.</th>
<th>Supplier</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensiometer</td>
<td>BT-33-75D</td>
<td>Kent Moore</td>
<td>Cable tension determination.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Warren, MI 48092</td>
<td></td>
</tr>
<tr>
<td>Rigging Lockout Tool</td>
<td>14905-001</td>
<td>Cirrus Design</td>
<td>Lockout elevator bellcrank.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Duluth, MN 55811</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>218-727-2737</td>
<td></td>
</tr>
<tr>
<td>3/16&quot; Lockout Pin</td>
<td>-</td>
<td>Any Source</td>
<td>Lockout elevator bellcrank.</td>
</tr>
</tbody>
</table>

(b) Remove access panel RE1. (Refer to 06-00)

(c) Using rigging lockout tool and pin, lockout elevator empennage bellcrank.

(d) Using tensiometer, verify elevator control cable tension. If elevator control cable tension falls outside specified tolerance, perform Adjustment/Test - Elevator System Rigging. (Refer to 27-30) (Refer to 27-30)

(e) On servo capstan, position bridle cable stop-ball at 9 o’clock position (stop-ball at forward side of capstan in capstan recess).

(f) Ensure approximately two and one-half wraps of bridle cable exist around capstan and that stop-ball is in center of cable wrap when cable is at center of travel.

(g) Ensure that stop-ball can not become disengaged from capstan recess or that bridle cable exit length can not exceed full groove length of capstan.

**Note:** Use a ratcheting open-end wrench and socket for tightening bridle cable clamp assembly to elevator cable.
(h) Position long end of bridle cable and clamp assembly to outboard elevator cable and secure with bolts and nuts. Torque nuts to 50 ±5 in-lb (5.6 ±0.6 Nm).

(i) Route short end of bridle cable through mounting bracket hole and between pulley and cable keeper.

(j) Position short end of bridle cable and clamp assembly to inboard elevator cable and loosely secure with bolts and nuts.

(k) While pushing long end of bridle cable and clamp assembly aft, tighten clamp to elevator cable. Torque nuts to 50 ±5 in-lb (5.6 ±0.6 Nm).

(l) Using tensiometer, verify bridle cable tension forward of bridle cable clamps is set to 25.0 +2.0/-0.0 lb (11.3 +0.9/-0.0 kg). If bridle cable tension falls outside specified tolerance, loosen aft clamp assembly and adjust bridle cable as required to obtain 25.0 +2.0/-0.0 lb (11.3 +0.9/-0.0 kg).

(m) Using tensiometer, verify elevator control cable tension forward of the bridle cable clamp assemblies. (See Figure 06-001)

(n) Remove rigging lockout pin and tool from elevator empennage bellcrank.

(o) Ensure flight control systems operate through full range of travel without binding, obstruction, or excessive friction.

(p) Ensure bridle cable remains in capstan grooves during full elevator and pitch servo travel and bridle cable moves freely through cable guards without chafing.

(q) Ensure there is 0.005 inch (0.127 mm) minimum clearance between bridle cable clamps along main control cable side.

(r) Ensure bridle cable moves freely through mounting bracket without chafing.

(s) Install access panel RE1. (Refer to 06-00)
NOTE
Ensure bridle cable does not rub on cable guards.

Figure 22-124
Pitch Servo Installation - Serials w/ Perspective Avionics (Sheet 1 of 2)
NOTE

Before disassembly, mark location of bridle cable.

DETAIL B

Serials w/ Perspective Avionics.

LEGEND

3. Screw
4. Washer
6. Nut
8. Bridle Cable
9. Bolt
21. Clamp
22. Bridle Cable End Fitting
23. Spacer

Figure 22-124
Pitch Servo Installation - Serials w/ Perspective Avionics (Sheet 2 of 2)

EFFECTIVITY:
Serials w/ Perspective Avionics

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J. GSM 85A/86 Roll Servo Mount - Serials w/ Perspective Avionics (See Figure 22-125)

(1) Removal - GSM 85A/86 Roll Servo Mount
   (a) Set BAT 1, BAT 2, and AVIONICS switches to OFF positions.
   (b) Pull AP SERVOS circuit breaker.
   (c) Remove access panels CF3C and CF4C. (Refer to 06-00)
   (d) Disconnect roll servo plug from socket.

   Note: Note location of bridle cable clamps on aileron cable to facilitate reinstallation.

   (e) Remove bolts, nuts, and clamps securing bridle cable to aileron cable.
   (f) Remove bolts and washers securing roll servo to mounting bracket and remove roll servo from airplane.

(2) Disassembly - GSM 85A/86 Roll Servo Mount
   (a) Remove screws and washers securing stiffener ring to capstan cable guards.
   (b) Remove cable guards.
   (c) Serials w/ GSM 85A: Disassemble capstan cover.
      1 Remove screws and washers securing outer capstan cover and gasket to capstan.
      2 Remove cotter pin, nuts, o-ring, and washer securing inner capstan cover to capstan. Remove capstan cover and gasket.
   (d) Serials w/ GSM 86: Disassemble capstan.
      1 Remove bolt and washer securing capstan assembly to servo mount.
      2 Remove retaining ring securing slip clutch cartridge to capstan.
   (e) Remove stop-ball from capstan recess and unwrap bridle cable from capstan.

(3) Reassembly - GSM 85A/86 Roll Servo Mount
   (a) Serials w/ GSM 85A: If roll servo mount is a different unit from the originally installed roll servo mount:
      1 Perform Adjustment/Test - GSM 85A Servo Mount Torque. (Refer to 22-12)
   (b) Insert and depress bridle cable stop-ball into capstan recess.
   (c) Wrap bridle cable around servo capstan.
      1 On servo capstan, position bridle cable stop-ball at 6 o’clock position (stop-ball at bottom of capstan), and wrap RH wing end of bridle cable approximately 540° counter-clockwise to exit at top of capstan.
      2 On servo capstan, position bridle cable stop-ball at 6 o’clock position (stop-ball at bottom of capstan), and wrap LH wing end of bridle cable approximately 540° clockwise to exit at top of capstan.
   (d) Serials w/ GSM 85A: Reassemble capstan cover.
      1 Position capstan cover and gasket onto capstan. Install new cotter pin, nuts, o-ring, and washer securing inner capstan cover to capstan.
      2 Install screws and washers securing outer capstan cover and gasket to capstan.
      Torque screws to 10.0 ±2.0 in-lb (1.13 ±0.23 Nm).
   (e) Serials w/ GSM 86: Reassemble capstan.
      1 Position slip clutch cartridge into capstan.
      2 Install retaining ring securing slip clutch cartridge to capstan.
      3 Position capstan assembly to servo mount.
      4 Install bolt and washer securing capstan assembly to servo mount. Torque bolt to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm).
   (f) Install cable guards.
(4) Installation - GSM 85A/86 Roll Servo Mount

(a) Position roll servo to mounting bracket and secure with bolts and washers.

(b) *Serials w/ GSM 85A:* Torque bolts to 45.0 ±5.0 in-lb (5.1 ±0.6 Nm). *(Refer to 20-60)*

(c) *Serials w/ GSM 86:* Torque bolts to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm). *(Refer to 20-60)*

(d) Perform Adjustment/Test - GSM 85A/86 Roll Servo Mount Bridle Cable Tension. *(Refer to 22-12)*

(e) Connect roll servo plug to socket.

(f) Reset AP SERVOS circuit breaker.

(g) Perform Operational Test - GFC 700 Autopilot. *(Refer to 22-12)*

(h) Install access panels CF3C and CF4C. *(Refer to 06-00)*

(5) Adjustment/Test - GSM 85A/86 Roll Servo Mount Bridle Cable Tension

(a) Acquire necessary tools, equipment, and supplies.

<table>
<thead>
<tr>
<th>Description</th>
<th>P/N or Spec.</th>
<th>Supplier</th>
<th>Purpose</th>
</tr>
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<tbody>
<tr>
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<td>Kent Moore</td>
<td>Cable tension determination.</td>
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<td></td>
<td></td>
<td>Warren, MI 48092</td>
<td></td>
</tr>
<tr>
<td>3/16” Lockout Pin</td>
<td>-</td>
<td>Any Source</td>
<td>Lockout aileron pulleys.</td>
</tr>
</tbody>
</table>

(b) Remove carpet and access panels CF3C and CF4C. *(Refer to 06-00)*

(c) Insert rigging lockout pins at aileron actuation pulleys in LH and RH wing.

(d) Insert rigging lockout pin at aileron actuation pulley in center console.

(e) Using tensiometer, verify aileron control cable tension. *(See Figure 06-001)* If aileron control cable tension falls outside specified tolerance, perform Adjustment/Test - Aileron System Rigging. *(Refer to 27-10)*

(f) On servo capstan, position bridle cable stop-ball at 6 o’clock position (stop-ball at bottom of capstan in the capstan recess).

(g) Ensure three wraps of bridle cable exist around capstan, stop-ball is in center of cable wrap when cable is at center of travel, and LH wing and RH wing bridle cable ends exit from top of capstan.

(h) Ensure that stop-ball can not become disengaged from capstan recess or that bridle cable exit length can not exceed full groove length of capstan.

**Note:** Use a ratcheting open-end wrench and socket for tightening bridle cable clamp assembly to aileron cable.

Cable clamps may be rotated to ensure proper cable alignment on servo capstan. Locate clamps such that they do not travel through longeron hole.

(i) Position RH end of bridle cable and clamp assembly to RH aileron cable and secure with bolts and nuts. Torque nuts to 50 ±5 in-lb (5.6 ±0.6 Nm).

(j) Position LH end of bridle cable and clamp assembly to LH aileron cable and loosely secure with bolts and nuts.

(k) While pushing LH end of bridle cable and clamp assembly outboard, tighten clamp to aileron cable. Torque nuts to 50 ±5 in-lb (5.6 ±0.6 Nm).

(l) Using tensiometer, verify bridle cable tension inboard of bridle cable clamps is set to 25.0 +2.0/-0.0 lb (11.3 +0.9/-0.0 kg). If bridle cable tension falls outside specified tolerance,
loosen LH clamp assembly and adjust bridle cable as required to obtain 25.0 +2.0/-0.0 lb
(11.3 +0.9/-0.0 kg).

(m) Using tensiometer, verify aileron control cable tension outboard of the bridle cable clamp
assemblies. (See Figure 06-001)

(n) Remove rigging lockout pins from LH and RH aileron actuation pulleys.

(o) Remove rigging lockout pin in center console aileron actuation pulley.

(p) Ensure flight control systems operate through full range of travel without binding, obstruc-
tion, or excessive friction.

(q) Ensure bridle cable remains in capstan grooves during full elevator and pitch servo travel
and bridle cable moves freely through cable guards without chafing.

(r) Ensure there is 0.005 inch (0.127 mm) minimum clearance between bridle cable clamps
along main control cable side.

(s) Install access panels CF3C and CF4C, and carpet. (Refer to 06-00)
Figure 22-125
Roll Servo Installation - Serials w/ Perspective Avionics

NOTE
⚠️ Before disassembly, mark location of bridle cable.
⚠️ Ensure bridle cable does not rub on cable guards.

DETAIL A

Serials w/ GSM 85A.

LEGEND
1. Plug
2. Screw
3. Washer
4. Capstan
5. Nut
6. Clamp
7. Bridle Cable
8. Bolt
9. Star Washer
10. Capstan Cover
11. Cotter Pin
12. Cable Guard
13. O-Ring
14. GSA 81 Servo Actuator
15. Bridle Cable End Fitting
16. GSM 85A/86 Roll Servo Mount
17. Gasket
18. Stiffener Ring
19. Retaining Ring
20. Slip Clutch Cartridge

Serials w/ Perspective Avionics.

CIRRUSS AIRPLANE MAINTENANCE manual MODELS SR22 AND SR22T

31 May 2011
K. GSM 85A/86 Yaw Servo Mount - *Serials w/ Perspective Avionics and w/ Three-Axis Configuration* (See Figure 22-126)

(1) Removal - GSM 85A/86 Yaw Servo Mount
   (a) Set BAT 1, BAT 2, and AVIONICS switches to OFF positions.
   (b) Pull YAW SERVO circuit breaker.
   (c) Remove access panel RE3. *(Refer to 06-00)*
   (d) Disconnect yaw servo plug from socket.

   **Note:** Note location of bridle cable clamps on rudder cable to facilitate reinstallation.

   (e) Remove bolts, nuts, and clamps securing bridle cable to rudder cable.
   (f) Remove bolts and washers securing yaw servo to mounting bracket and remove yaw servo from airplane.

(2) Disassembly - GSM 85A/86 Yaw Servo Mount
   (a) Remove screws and washers securing stiffener ring to capstan cable guards.
   (b) Remove cable guards.
   (c) *Serials w/ GSM 85A:* Disassemble capstan cover.
      1 Remove screws and washers securing outer capstan cover and gasket to capstan.
      2 Remove cotter pin, nuts, o-ring, and washer securing inner capstan cover to capstan. Remove capstan cover and gasket.
   (d) *Serials w/ GSM 86:* Disassemble capstan.
      1 Remove bolt and washer securing capstan assembly to servo mount.
      2 Remove retaining ring securing slip clutch cartridge to capstan.
   (e) Remove stop-ball from capstan recess and unwrap bridle cable from capstan.

(3) Reassembly - GSM 85A/86 Yaw Servo Mount
   (a) *Serials w/ GSM 85A:* If yaw servo mount is a different unit from the originally installed yaw servo mount:
      1 Perform Adjustment/Test - GSM 85A Servo Mount Torque. *(Refer to 22-12)*
   (b) Insert and depress bridle cable stop-ball into capstan recess.
   (c) Wrap bridle cable around servo capstan.
      1 On servo capstan, position bridle cable stop-ball at 12 o’clock position (stop-ball at top of capstan), and wrap long end of bridle cable approximately 540° counterclockwise such that it exits forward at bottom of capstan.
      2 On servo capstan, position bridle cable stop-ball at 12 o’clock position (stop-ball at top of capstan), and wrap short end of bridle cable approximately 540° clockwise such that it exits aft at bottom of capstan.
   (d) *Serials w/ GSM 85A:* Reassemble capstan cover.
      1 Position capstan cover and gasket onto capstan. Install new cotter pin, nuts, o-ring, and washer securing inner capstan cover to capstan.
      2 Install screws and washers securing outer capstan cover and gasket to capstan. Torque screws to 10.0 ±2.0 in-lb (1.13 ±0.23 Nm).
   (e) *Serials w/ GSM 86:* Reassemble capstan.
      1 Position slip clutch cartridge into capstan.
      2 Install retaining ring securing slip clutch cartridge to capstan.
      3 Position capstan assembly to servo mount.
      4 Install bolt and washer securing capstan assembly to servo mount. Torque bolt to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm).
   (f) Install cable guards.
(g) Position stiffener ring to capstan cable guards and secure with screws and washers. Torque screws to 10.0 ±2.0 in-lb (1.13 ±0.23 Nm).

(4) Installation - GSM 85A/86 Yaw Servo Mount

(a) Position yaw servo to mounting bracket and secure with bolts and washers.

(b) **Serials w/ GSM 85A:** Torque bolts to 45.0 ±5.0 in-lb (5.1 ±0.6 Nm). (Refer to 20-60)

(c) **Serials w/ GSM 86:** Torque bolts to 35.0 ±5.0 in-lb (3.95 ±0.56 Nm). (Refer to 20-60)

(d) Perform Adjustment/Test - GSM 85A/86 Yaw Servo Mount Bridle Cable Tension. (Refer to 22-12)

(e) Connect yaw servo plug to socket.

(f) Reset YAW SERVO circuit breaker.

(g) Perform Operational Test - GFC 700 Autopilot. (Refer to 22-12)

(h) Install access panel RE3. (Refer to 06-00)

(5) Adjustment/Test - GSM 85A/86 Yaw Servo Mount Bridle Cable Tension

(a) Acquire necessary tools, equipment, and supplies.

<table>
<thead>
<tr>
<th>Description</th>
<th>P/N or Spec.</th>
<th>Supplier</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale 6.0 inches (15.24 cm)</td>
<td>-</td>
<td>Any Source</td>
<td>Rudder deflection determination.</td>
</tr>
<tr>
<td>Spacer Block 7 3/8” x 2” (18.73 x 5.08 cm)</td>
<td>-</td>
<td>Any Source</td>
<td>Spacer for holding neutral rudder position.</td>
</tr>
<tr>
<td>3/16” Lockout Pin</td>
<td>-</td>
<td>Any Source</td>
<td>Lockout rudder pulley.</td>
</tr>
</tbody>
</table>

(b) Remove access panel LE1, LE2 and RE2. (Refer to 06-00)

(c) Insert rigging lockout pin at rudder actuation pulley in empennage.

(d) Perform Inspection/Check - Rudder Gap and Overlap. (Refer to 55-40)

(e) Verify rudder neutral position remains at 0 ±1° with rudder pedals in neutral position.

**Note:** Typically, the correct rudder deflection (20° ±1°) is obtained by measuring 5.8 - 6.2 inches (14.7 - 15.8 cm) between chord line at upper leading edge of vertical stabilizer and chord line at lower leading edge of deflected rudder horn. (See Figure 27-204)

(f) Using scale, verify 20° ±1° rudder deflection angle. If rudder deflection angle falls outside specified tolerance, perform Adjustment/Test - Rudder System Rigging. (Refer to 27-20)

(g) On servo capstan, position bridie cable stop-ball at 12 o’clock position (stop-ball at top of capstan in the capstan recess).

(h) Ensure three wraps of bridie cable exist around capstan and that stop-ball is in center of cable wrap when cable is at center of travel.

(i) Ensure that stop-ball can not become disengaged from capstan recess or that bridie cable exit length can not exceed full groove length of capstan.

**Note:** Use a ratcheting open-end wrench and socket for tightening bridie cable clamp assembly to rudder cable.

Cable clamps may be rotated to ensure proper cable alignment on servo capstan.
(j) Position short end of bridle cable and clamp assembly to aft rudder cable and secure with bolts and nuts. Torque nuts to 50 ±5 in-lb (5.6 ± 0.6 Nm).
(k) Route long end of cable forward through pulley assembly.
(l) Position long end of bridle cable and clamp assembly to forward rudder cable and loosely secure with bolts and nuts.
(m) While pushing long end of bridle cable and clamp assembly forward, tighten clamp to rudder cable. Torque nuts to 50 ±5 in-lb (5.6 ± 0.6 Nm).
(n) Using tensiometer, verify bridle cable tension forward of bridle cable clamps is set to 25.0 ±2.0/-0.0 lb (11.3 ±0.9/-0.0 kg). If bridle cable tension falls outside specified tolerance, loosen forward clamp assembly and adjust bridle cable as required to obtain 25.0 ±2.0/-0.0 lb (11.3 ±0.9/-0.0 kg).
(o) Using scale, verify 20° ±1° rudder deflection angle.
(p) Remove rigging lockout pin from rudder actuation pulley in empennage.
(q) Ensure flight control systems operate through full range of travel without binding, obstruction, or excessive friction.
(r) Ensure bridle cable remains in capstan grooves during full rudder and yaw servo travel and bridle cable moves freely through cable guards without chafing.
(s) Ensure there is 0.005 inch (0.127 mm) minimum clearance between bridle cable clamps along main control cable side.
(t) Install access panel LE1, LE2 and RE2. (Refer to 06-00)
Figure 22-126

YW Servo Installation - Serials w/ Perspective Avionics & w/ Three-Axis Configuration (Sheet 1 of 2)

NOTE

Ensure bridle cable does not rub on cable guards.

DETAIL A

Serials w/ Perspective Avionics.

Serials w/ GSM 85A.

Serials w/ GSM 86.

LEGEND

1. Plug
2. Screw
3. Washer
4. Capstan
5. Nut
6. Clamp
7. Bridle Cable
8. Bolt
9. Star Washer
10. Capstan Cover
11. Cotter Pin
12. Cable Guard
13. Cable Diverter
14. GSA 80 Servo Actuator
15. GSM 85A/86 Yaw Servo Mount
16. Gasket
17. Stiffener Ring
18. O-Ring
19. Retaining Ring
20. Slip Clutch Cartridge

EFFECTIVITY:

Serials w/ Perspective Avionics & w/ Three-Axis Configuration
NOTE

Before disassembly, mark location of bridle cable.

Figure 22-126

Yaw Servo Installation - Serials w/ Perspective Avionics & w/ Three-Axis Configuration (Sheet 2 of 2)
L. Tests - Serials w/ Perspective Avionics

(1) Operational Test - GFC 700 Autopilot
   (a) Pull STARTER and FUEL PUMP circuit breakers.
   (b) Set ALT master switch to OFF position.
   (c) Connect 28 ±1 VDC external power to external power receptacle.
   (d) Complete preflight test.
       1. Set BAT 1 and AVIONICS switches to ON positions.

   Note: AFCS (red) is displayed on PFD until AHRS and air data computer parameters become valid.

   2. After AHRS and air data computer parameters become valid, verify PFT (white) annunciation is displayed on PFD.
   3. Approximately 10 to 15 seconds after successful test completion, the PFT annunciation will clear.

   (e) To verify trim switches are operating correctly, perform the following trim switch checks.
       1. On pilot’s yoke, momentarily actuate trim (roll) switch to the left. Verify yoke moves left.
       2. Momentarily actuate trim (roll) switch to the right. Verify yoke moves right.
       3. Actuate trim (roll) switch to the left until stop is reached.
       4. Actuate trim (roll) switch to the right until stop is reached.
       5. Actuate trim switch to the center.
       8. Actuate trim (pitch) switch forward until stop is reached.
       9. Actuate trim (pitch) switch aft until stop is reached.
      10. Actuate trim switch to the center.
      11. Repeat trim switch check on co-pilot’s yoke.

   (f) To verify AFCS systems buttons and switches are operating correctly, perform the following AFCS switch checks:
       1. Press and hold [AP DISC] on yoke while actuating pitch trim switch. Verify trim does not run.
       4. Pull AP SERVOS, GPS NAV GIA 1, and GPS NAV GIA 2 circuit breakers to cause abnormal autopilot disengagement.
       5. Verify a continuous disconnect tone is heard, and AP (flashing red/white) annunciation is displayed on PFD.
       6. Verify no AFCS annunciations (e.g. AFCS, PFT, Mis-Trim) remain displayed on PFD.
       8. Reset AP SERVOS, GPS NAV GIA 1, and GPS NAV GIA 2 circuit breakers.
       9. Wait for pre-flight test sequence to successfully complete again.
      10. Press [TO/GA] button on power lever. Verify “TO” is annunciated on PFD for both pitch and roll modes and command bars indicate a wings-level, pitch-up attitude.
      13. Press [VS] on GMC 705 to engage VS mode.
14 Verify VS (green) annunciation and a pitch reference of ‘0 FPM’ is displayed on PFD.

15 Press [IAS] on GMC 705 to engage IAS mode.

Note: The minimum speed reference for the GFC 700 is 80 KTS.

16 Verify IAS (green) annunciation and a speed reference of ‘80 KTS’ is displayed on PFD.

17 Press [ALT] on GMC 705 to engage ALT mode.

18 Verify “ALT” annunciation and an altitude reference equal to the aircraft altitude (within the nearest 20 feet) is displayed on PFD.

19 Press [FD] on GMC 705 to engage FD mode.

20 Verify mode annihilations and command bars are removed from PFD.

(g) Verify autopilot clutch override operation.

1 Press [AP] on GMC 705 to engage autopilot.

2 Apply force to yoke to verify autopilot clutches can be overpowered in pitch and roll.

3 Serials w/ three-axis configuration: Press [YD] on GMC 705 to engage yaw damper.

4 Serials w/ three-axis configuration: Apply manual rudder inputs in both directions to verify autopilot clutch can be overpowered in yaw.

(h) Perform autopilot operation checks.

1 Press [AP] on GMC 705 to engage autopilot.

2 Press [HDG] on GMC 705 to synchronize heading bug to present aircraft heading on HSI.

Note: Due to aircraft not being perfectly level, very slow movement of yoke is acceptable.

3 Press [HDG] again to select Heading mode. Verify command bars are level and yoke is stationary.

4 Turn [HDG] knob on GMC 705 to left. Verify command bars move to left and yoke moves left.

5 Turn [HDG] knob on GMC 705 to right. Verify command bars move to right and yoke moves right.

6 Holding yoke lightly, rotate pitch command wheel on GMC 705 UP to increase pitch reference.

7 Verify command bars move up and yoke moves aft.

8 Rotate pitch command wheel on GMC 705 DN to decrease pitch reference.

9 Verify command bars move down and yoke moves forward.

10 Press [AP DISC] on yoke to disconnect autopilot.

11 Actuate trim switch to the center.

12 Press [AP] on GMC 705 to engage autopilot.

13 Rotate pitch command wheel on GMC 705 down to command full NOSE DN.

14 Hold yoke firmly and verify mis-trim annunciation is displayed on PFD.

15 While continuing to hold yoke, press [AP DISC]. Verify Flight Director command bars on PFD remain in view and autopilot disengages.

16 With Flight Director command bars in view, alternately command NOSE UP and NOSE DN by rotating pitch command wheel on GMC 705. Verify Flight director command bars on PFD show corresponding NOSE UP or NOSE DN indication.

17 Serials w/ three-axis configuration: Press [AP] and [YD] on GMC 705 to engage autopilot and yaw damper.
18  **Serials w/ three-axis configuration:** Externally push tail of aircraft to left and right. Verify rudder deflection is in the corresponding direction.
(2) Adjustment/Test - GSM 85A/86 Servo Clutch Test

**CAUTION:** Once test is initiated, the tested servo begins to drive and corresponding flight surface begins to move. Ensure all flight surfaces are free from obstructions through their full range of motion prior to initiating test. If test must be stopped, press [AP DISC] on yoke to disconnect autopilot. (See Figure 27-103)

**Note:** Adjustment/Test - GSM 85A/86 Servo Clutch Test requires Garmin system software version 0764.08 or later.

*Serials w/ GSM 85A and Garmin system software prior to version 0764.08:* Do not perform Adjustment/Test - GSM 85A/86 Servo Clutch Test, and proceed directly to Adjustment/Test - GSM 85A Servo Mount Torque. (Refer to 22-12)

Flight control surfaces may need to be lockout pinned for automated test to complete successfully. (See Figure 27-102), (See Figure 27-204), (See Figure 27-306)

During testing, temperature conditions of 10° - 48°C (50° - 120°F) are required.

(a) Pull STARTER, FUEL PUMP, and PFD circuit breakers.
(b) Set ALT master switch to OFF position.
(c) Connect 28 ±1 VDC external power to external power receptacle.
(d) While holding far right softkey on PFD, reset PFD circuit breakers and hold softkey until "INITIALIZING SYSTEM" appears to restart PFD in Configuration mode.
(e) On instrument panel, press reversionary button to force MFD into reversionary mode.
(f) Acknowledge any flashing CAS messages on MFD.
(g) On PFD, rotate outer [FMS] knob to select GFC group.
(h) Rotate inner [FMS] knob to select **GFC Status** page.
(i) Select and test servo.

1. Press inner [FMS] knob to activate cursor.
2. Rotate inner [FMS] knob to highlight applicable servo in SELECT SERVO AXIS field, then press [ENT] key.
3. Verify that PFT status fields on **GFC Status** page display "PASSED".
4. Press [TEST SVO] softkey on PFD.
   Test begins a 50 second data collection period, where servo is driven at approximately 2.5 RPM while servo load cell measures clutch torque. During test, a pop-up window on PFD indicates test status for active axis and servo direction.
6. Monitor CURRENT, SPEED and TORQUE fields on PFD during test. Verify that values displayed within those fields are not equal to zero.
   After data is collected and processed, minimum and maximum torque readings from initial direction of test are displayed on PFD. The servo immediately reverses direction and performs test in opposite direction.
7. If "COMPLETE" is displayed, the test for that servo has completed successfully.
Verify all displayed SLIP CLUTCH TEST RESULTS values are within specifications:

<table>
<thead>
<tr>
<th>Servo / Axis</th>
<th>GSM 85A Slip Clutch Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
</tr>
<tr>
<td>Pitch</td>
<td>39.0 in-lb (4.4 Nm)</td>
</tr>
<tr>
<td>Roll</td>
<td>21.0 in-lb (2.4 Nm)</td>
</tr>
<tr>
<td>Yaw - Serials w/ Three-Axis Configuration</td>
<td>60.0 in-lb (6.8 Nm)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servo / Axis</th>
<th>GSM 86 Slip Clutch Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
</tr>
<tr>
<td>Pitch</td>
<td>39.0 in-lb (4.4 Nm)</td>
</tr>
<tr>
<td>Roll</td>
<td>20.0 in-lb (2.3 Nm)</td>
</tr>
<tr>
<td>Yaw - Serials w/ Three-Axis Configuration</td>
<td>61 in-lb (6.9 Nm)</td>
</tr>
</tbody>
</table>

If "INCOMPLETE" is displayed or any result exceeds allowable limit, the test for that servo has failed.

Serials w/ GSM 85A: Perform Adjustment/Test - GSM 85A Servo Mount Torque. (Refer to 22-12)

Serials w/ GSM 86: Return slip clutch cartridge to Garmin for recalibration.

Press [ENT] key to acknowledge test complete prompt on PFD.

Repeat selection and test for additional servo(s) as required.

Adjustment/Test - GSM 85A Servo Mount Torque (See Figure 22-127)

The slip-clutch fixture consists of a motor-driven capstan connected by cable to an idler pulley. At the idler pulley, a torque wrench measures torque applied to the capstan. The observed torque value is used to adjust the slip-clutch by setting the clutch adjustment nut.

Note: For optimal results, temperature conditions of 15° - 25°C (59° - 77°F) with a corresponding relative humidity less than 50% is recommended.

(a) Acquire necessary tools, equipment, and supplies.

<table>
<thead>
<tr>
<th>Description</th>
<th>P/N or Spec.</th>
<th>Supplier</th>
<th>Purpose</th>
</tr>
</thead>
</table>
(b) Set up slip-clutch adjustment fixture.

1. Set MOTOR and SOLENOID switches to OFF position.
2. Loosen fixture clamps and position GSM 85A servo mount onto fixture.

**CAUTION:** Do not force servo mount into position on fixture. Servo mount should easily be positioned flat on the top of fixture.

3. Engage clamps to secure GSM 85A servo mount to fixture.

**Note:** Adjust clamp height and position as required to ensure servo mount is secure.

4. At bottom of fixture capstan, insert swaged ball end of cable into bottom end slot. Starting at bottom, wrap cable around fixture capstan two full turns.
5. At center of servo capstan, wrap cable around GSM 85A servo mount capstan two and one half turns, with cable ball positioned to capstan recess.
6. At top of fixture capstan, wrap cable around fixture capstan two more full turns. Insert swaged ball end of cable into top end slot.

**Note:** Cable tension will be somewhat loose.

7. Tighten fixture adjustment knob to increase cable tension.

**Note:** Do not over-tighten knob. Some cable slack should remain to allow for approximately 0.25-inch deflection midway between fixture and servo mount capstans. Deflection can be obtained using finger pressure.

8. To secure fixture capstan and bearings to fixture, hand tighten wing-nuts on bottom of fixture while holding top thumb screw ends.
9. Using 13/16” socket, install torque wrench on top of fixture capstan.

**Note:** Ensure torque wrench is initially set to zero torque before placing it in the fixture.

10. Adjust torque wrench support as required to level torque wrench.
Note: Ensure torque wrench support is secured tightly to prevent movement of the support when torque is applied.

11 Connect 24V ±0.5 VDC from electrical power supply to slip-clutch adjustment fixture. Turn power supply on.
12 Set SOLENOID switch to ON position.
13 Set MOTOR switch to CW (clockwise) position.
14 Using 9/16" wrench, adjust castle nut until torque value indicates required setting.

(c) For pitch servo: Adjust slip-clutch.
   1 Set MOTOR switch to CCW (counter clockwise) position. Adjust castle nut until torque value is within 39.0 ±3.0 in-lb (4.4 ±0.6 Nm).
   2 Alternate motor direction back and forth and adjust castle nut as required until torque value of 39.0 ±3.0 in-lb (4.4 ±0.6 Nm) is obtained in both directions.

Note: Ensure holes in shaft are centered within notches of castle nut.

3 Run capstan two full turns in each direction while observing the torque reading. If torque reading does not remain within required range without any adjustment of castle nut, repeat slip-clutch adjustment.

(d) For roll servo: Adjust slip-clutch.
   1 Set MOTOR switch to CCW (counter clockwise) position. Adjust castle nut until torque value is within 21.0 ±3.0 in-lb (2.4 ±0.3 Nm).
   2 Alternate motor direction back and forth and adjust castle nut as required until torque value of 21.0 ±3.0 in-lb (2.4 ±0.3 Nm) is obtained in both directions.

Note: Ensure holes in shaft are centered within notches of castle nut.

3 Run capstan two full turns in each direction while observing the torque reading. If torque reading does not remain within required range without any adjustment of castle nut, repeat slip-clutch adjustment.

(e) For yaw servo: Adjust slip-clutch.
   1 Set MOTOR switch to CCW (counter clockwise) position. Adjust castle nut until torque value is within 60.0 ±3.0 in-lb (6.8 ±0.3 Nm).
   2 Alternate motor direction back and forth and adjust castle nut as required until torque value of 60.0 ±3.0 in-lb (6.8 ±0.3 Nm) is obtained in both directions.

Note: Ensure holes in shaft are centered within notches of castle nut.

3 Run capstan two full turns in each direction while observing the torque reading. If torque reading does not remain within required range without any adjustment of castle nut, repeat slip-clutch adjustment.

(f) Determine how much of cotter pin hole diameter is above the castle nut.

(g) If more than half of cotter pin diameter is above the nut castellation, install additional washer under the nut.
   1 Position servo mount with the shaft pointing up.
   2 Remove castle nut. Do not disassemble clutch or adjust position of capstan/hub.
   3 Install additional washer on top of existing washer.
   4 Hand tighten castle nut onto shaft. Install new cotter pin. If castle nut must be rotated to install cotter pin, verify clutch torque is within recommended torque settings.
CAUTION: To avoid torque wrench damage, relieve cable tension before turning off solenoid. Failure to do so may subject torque wrench to large shock loads.

(h) Relieve cable tension.
   1 Set MOTOR switch to OFF position.
   2 Briefly set MOTOR switch to opposite direction of previous operation for approximately ½ second or until tension is relieved in cable.
   3 Set MOTOR switch to OFF position.

   Note: The tension is relieved when torque wrench is loosened in the torque wrench support. Also, torque wrench reading should be zero or close to zero.

   4 Set SOLENOID switch to OFF position.

(i) Disconnect electrical power supply from the slip-clutch adjustment fixture.

(j) Remove bolts securing torque wrench support to fixture.

(k) Loosen thumbscrews and wing-nuts securing fixture capstan and bearings to fixture.

(l) Rotate fixture adjustment knob to loosen cable tension.

(m) Remove swaged ball end from top end slot of fixture capstan and unwrap cable from servo mount capstan.

(n) Remove swaged ball end from bottom end slot of fixture capstan and remove cable.

(o) Disengage clamps to remove GSM 85A servo mount from fixture.
**NOTE**

⚠️ Do not force GSM 85A servo mount onto fixture.

⚠️ Engage clamps as required to secure GSM 85A servo.

⚠️ Insert swaged ball end of cable into bottom and top end slot of fixture capstan.

⚠️ Verify torque wrench is initially set to zero torque before securing it to the fixture.

⚠️ Adjust torque wrench support as required to ensure torque wrench is level and secured tightly to prevent movement.

⚠️ Adjust fixture adjustment knob to allow for approximately 0.25 inch deflection (using finger pressure) midway between the fixture capstan and the GSM 85A servo mount capstan. Do not over-tighten knob.

⚠️ Hand tighten attaching parts securing fixture capstan to fixture.

**LEGEND**
1. Slip-Clutch Adjustment Fixture
2. GSM 85A Servo Mount
3. Fixture Capstan
4. Cable
5. Torque Wrench
6. Torque Wrench Support
7. Fixture Adjustment Knob
8. Clamp
9. Solenoid/ Motor Switches
10. Thumbscrew

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**Figure 22-127**

Adjustment/Test - GSM 85A Servo Mount Torque - Serials w/ Perspective Avionics

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**EFFECTIVITY:**
Serials w/ Perspective Avionics

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