



## SERVICE INFORMATION LETTER

SERVICE INFORMATION LETTER NO. 0183

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DATE: August 19, 2015

1. SUBJECT: Collective Stick Socket Replacement
2. MODEL: F28A, 280, F28C, 280C, F28F, 280F, and 280FX Helicopters
3. EFFECTIVITY: All
4. BACKGROUND:

This Service Information Letter (SIL) provides instructions for replacement of the pilot or copilot collective stick sockets.

5. COMPLIANCE:

Remove the old collective stick socket and replace with the new collective stick socket listed below, as applicable, in accordance with paragraph 6. (The part number can be verified by inspecting the socket for the -F suffix part number on the part surface.)

| Collective Stick Socket Position | Old P/N                    | New P/N    | F-28A<br>280 | F-28C<br>280C | F-28F<br>280F/280FX |
|----------------------------------|----------------------------|------------|--------------|---------------|---------------------|
| Pilot Side (LH)                  | 28-16186-1<br>(28-16185-F) | 28-16186-3 | X            | X             | N/A                 |
| Copilot Side (RH)                | 28-16194-1<br>(28-16193F)  | 28-16194-3 | X            | X             | X                   |
| Pilot Side (RH)                  | 28-16377-11<br>(28-16193F) | 28-16377-3 | N/A          | X             | X                   |

### NOTE

**Perform all maintenance in accordance with the applicable F-28/280 A/C/F/FX Series Maintenance Manual.**

### NOTE

**The Illustrated Parts Catalog (IPC) references in this SIL pertain to the 1987 Edition, which includes the F-28F and 280F Series. It is available online through the Technical Support page on the Enstrom Helicopter website.**

## 6. REPLACEMENT:

6.1 A and C Models – Pilot Collective Stick Socket Replacement**CAUTION**

**Verify that the copilot stick is properly installed and secure prior to and during this procedure.**

**NOTE**

**Mark all fittings, washers and spacers so they can be properly indexed on reassembly.**

- 6.1.1 Disconnect the starter wire.
- 6.1.2 Remove the pilot collective stick and socket (IPC Figure 3-10 and Figure 8-15).
  - 6.1.2.1 (IPC Figure 3-10) Remove bolt (170) to disconnect the pilot throttle bellcrank (160) from the collective stick. (It may be necessary to remove the collective stop plate.)
  - 6.1.2.2 (IPC Figure 8-15) Remove the torque tube bolts (2) and remove the socket (1) from the end of the torque tube (12).
- 6.1.3 Install the new airworthy pilot collective stick socket. Refer to paragraph 7 for the applicable part number.
- 6.1.3 Reverse the steps to reassemble.
  - 6.1.3.1 Install the new collective stick socket, reinstall the torque tube bolts (2) (12-15 in-lbs/1.4-1.7 Nm), reinstall the pilot collective stick, and connect the pilot throttle bellcrank to the socket.
  - 6.1.3.3 Connect the starter wire.
- 6.1.4 Verify the collective trim rigging IAW Section 11 “Rigging”, page MM-11-6, of the F-28A/F-28C/280/280C Maintenance Manual. Check that there is no binding or stiffness in the system.
- 6.1.5 Proceed to step 6.5.

## 6.2 A and C Models – Copilot Collective Stick Socket Replacement

### WARNING

**With the capsule in compressed position, there is approximately 180 lbs of force exerted by the springs. Handle with extreme care.**

### CAUTION

**Failure to secure the spring capsule with special tool, T-0022, may cause serious injury or damage. Ensure the spring capsule is secure when disconnecting the collective bellcrank.**

### NOTE

**Mark all fittings, washers and spacers so they can be properly indexed on reassembly.**

- 6.2.1 Remove the seats from the aircraft.
- 6.2.2 Remove the seat deck. If necessary, remove the seatbelts.
- 6.2.3 Disconnect the collective bellcrank from the spring capsule assembly by following steps a through h in Section 11 of the F-28A/F-28C or 280/280C Series Maintenance Manual (pages MM-11-4 and MM-11-5).
- 6.2.4 (Figure 2) Disconnect the brackets (4) from the retainers (8) by removing washers (6) and nuts (7) from the capsule pivots (3).
- 6.2.5 Disconnect the throttle tie rod (220) and the throttle cable (10) (IPC Figure 3-10).
- 6.2.6 Remove the pilot and copilot collective sticks (IPC Figure 3-10).
  - 6.2.6.1 Remove bolt (170) to disconnect the pilot throttle bellcrank (160) from the collective stick. (It may be necessary to remove the collective stop plate.)
  - 6.2.6.2 Remove bolt (210) to disconnect the copilot throttle bellcrank (200) from the collective stick.
- 6.2.7 Remove the through bolts (14) (Figure 1) on the collective sleeves (15) (Figure 1) and the spring capsule bellcrank (18) (Figure 2).
  - 6.2.7.1 Mark all the spacers and bellcranks with a marker to identify sleeves for installation.
- 6.2.8 Disconnect the copilot's collective socket at the two links (1) (IPC Figure 8-16).

- 6.2.9 Remove the copilot's collective socket (13) through bolts (2) (Figure 1).
- 6.2.10 Remove the bearing housing (17) on the copilot side of the torque tube (12) (Figure 1).
- 6.2.11 Remove the pilot's collective socket (1) through bolts (2) and slide the socket off.
- 6.2.12 Slide the torque tube far enough to remove the copilot collective stick socket. If required, drill a 2 inch hole in the left side of the cabin.

### CAUTION

**Do not overtorque the bolts through the sleeves and the collective bellcrank (Figure 1, Item 14 and Figure 2, Item 30), as this will cause binding. Torque to shear nut torque (9-11 in-lbs/1-1.2 Nm).**

### NOTE

**For all bolts connecting the collective stick socket to the torque tube (Figure 1, Item 2), initially torque to shear nut torque (9-11 in-lbs/1-1.2 Nm). Torque to full torque (12-15 in-lbs/1.4-1.7 Nm) after all components are reinstalled and check that there is no binding and that the torque tube moves freely.**

- 6.2.13 Install the new airworthy copilot collective stick socket. Refer to paragraph 7 for the applicable part number.
- 6.2.14 Reverse the steps to reassemble.

### NOTE

**Enstrom recommends replacing bellcrank P/N 28-16233-1 with P/N 28-16233-3. Refer to Service Directive Bulletin (SDB) No. 0105.**

### NOTE

**Reinstall the spring capsule assembly in reverse order (steps a through h in Section 11 of the F-28A/F-28C or 280/280C Series Maintenance Manual (pages MM-11-4 and MM-11-5)).**

- 6.2.15 Check that there is no binding or stiffness in the system, then torque the collective stick socket bolts (Figure 1, Item 2) to full torque (12-15 in-lbs/1.4-1.7 Nm). Verify again that there is no binding or stiffness in the system.
- 6.2.16 Verify the collective trim rigging IAW Section 11 "Rigging", page MM-11-6, of the F-28A/F-28C/280/280C Maintenance Manual.

6.2.17 Repair the hole in the cabin side wall per AC43.13-1B, Chapter 3.

6.2.18 Proceed to step 6.5.

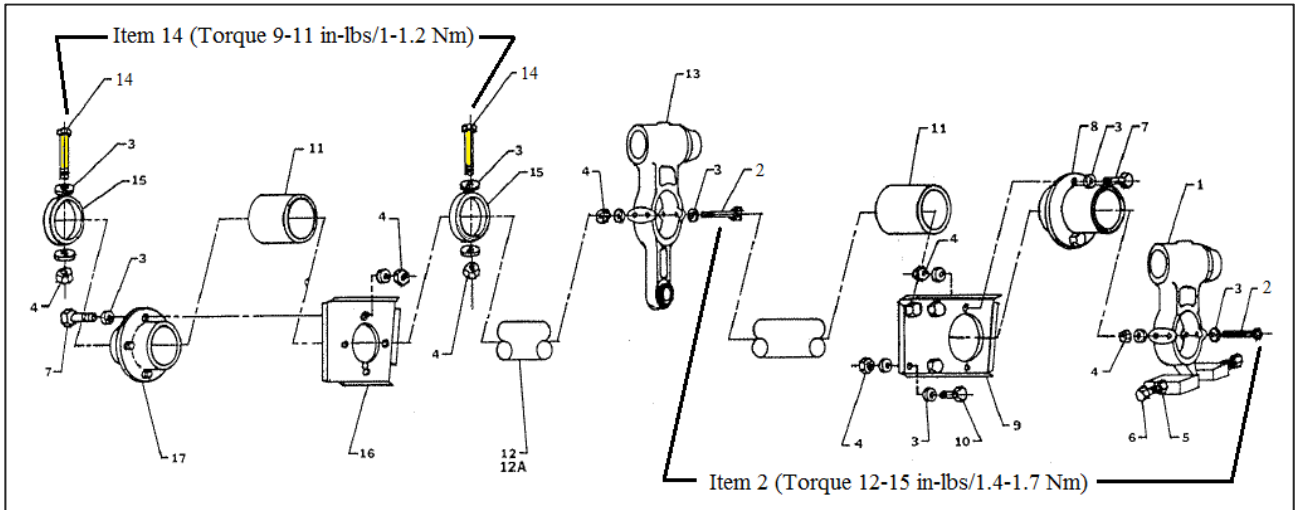


Figure 1. F-28/280 Series Illustrated Parts Catalog, Figure 8-15

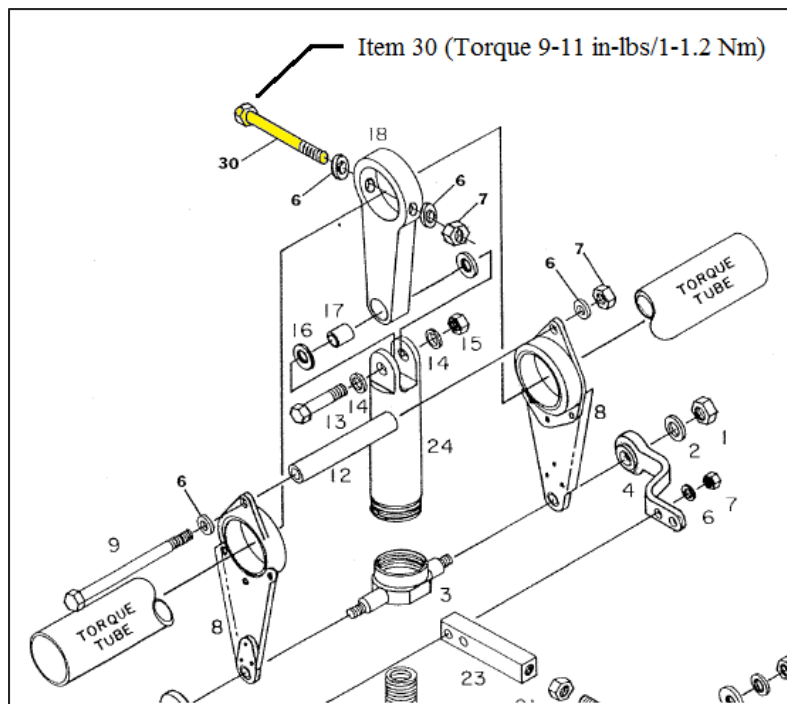


Figure 2. F-28/280 Series Illustrated Parts Catalog, Figure 8-11

### 6.3 F and FX Models – Copilot Collective Stick Socket – Removal

6.3.1 Remove the seats from the aircraft.

#### NOTE

**Mark all fittings, washers and spacers so they can be properly indexed on reassembly.**

6.3.2 Remove the seatbelts (para. 8-7, MM) and remove the seat deck (para. 8-8, MM).

6.3.3 Remove the pilot collective control stick (para. 12-4, MM).

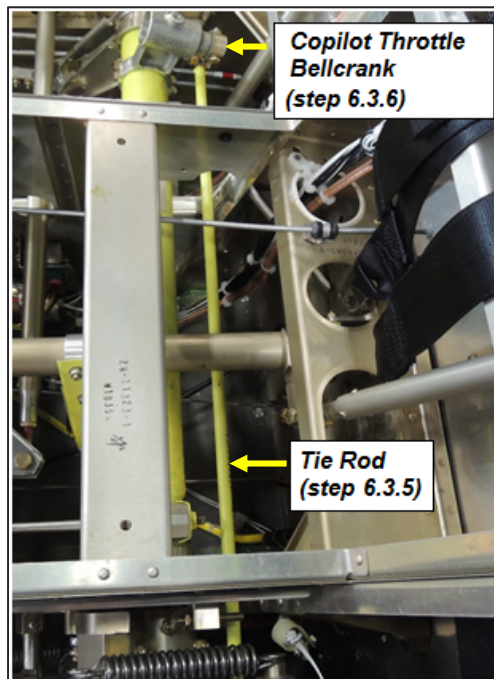
#### CAUTION

**Set friction on the collective controls to avoid injury if the spring capsule inadvertently releases.**

6.3.4 Set friction on the collective controls.

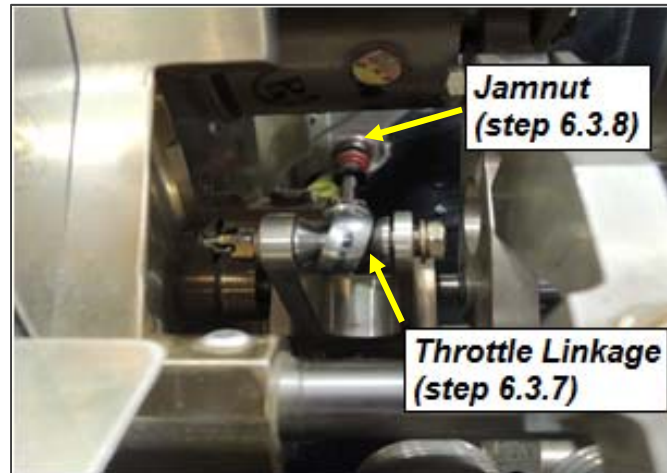
6.3.5 Remove the throttle tie rod assembly (Figure 3).

6.3.6 Remove the copilot throttle bellcrank (Figure 3).

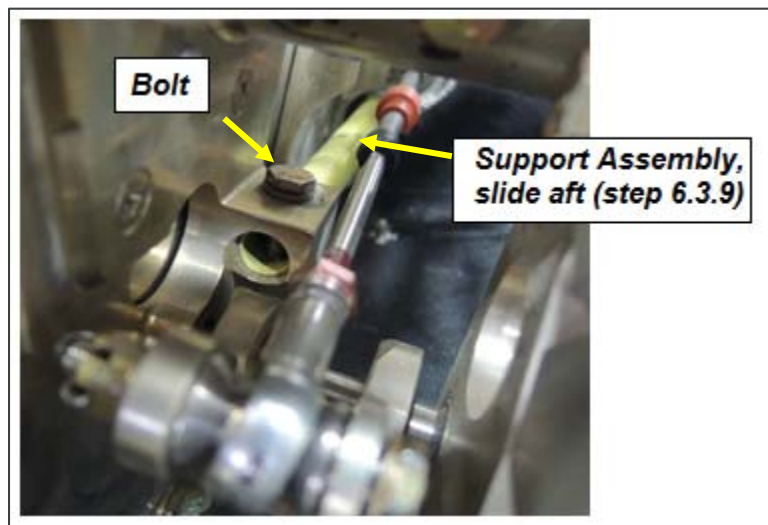


**Figure 3. Copilot Throttle Bellcrank and Tie Rod**

- 6.3.7 Disconnect the throttle cable from the control linkage (Figure 4, and para. 13-12, MM).
- 6.3.8 Remove the throttle cable jam nut and slide the cable aft (Figure 4).
- 6.3.9 Remove the bolt securing the cable support assembly and slide aft (Figure 5).



**Figure 4. Throttle Linkage**



**Figure 5. Support Assembly Removal**

**NOTE**

**For some early production helicopters that have a horizontally installed bolt, check for clearance between the bolt head and the throttle cable. If interference is evident, contact Enstrom Product Support for assistance.**

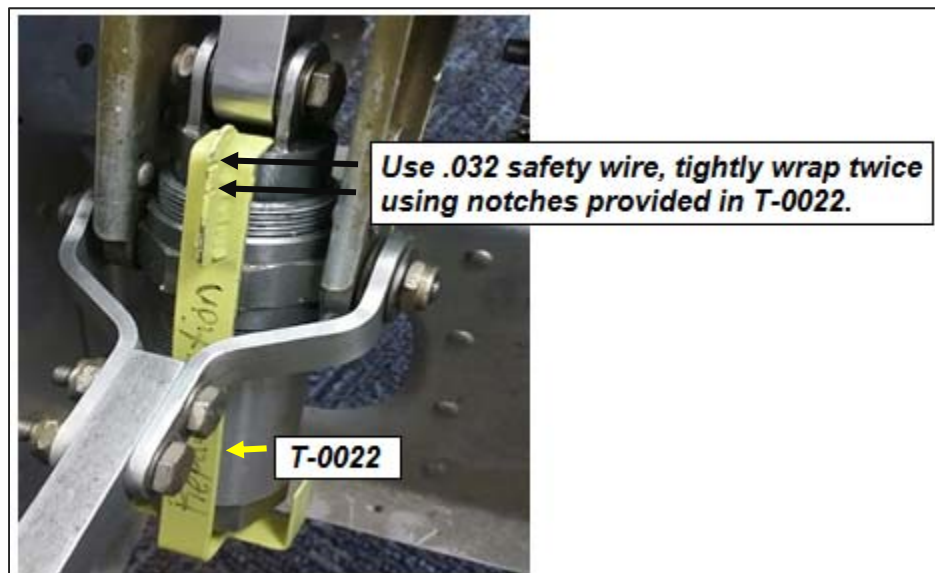
**CAUTION**

Failure to secure the spring capsule with special tool, T-0022, may cause serious injury or damage. Ensure the spring capsule is secure when disconnecting the collective bellcrank.

**WARNING**

With the capsule in compressed position, there is approximately 180 lbs of force exerted by the springs. Handle with extreme care.

6.3.10 Cage and remove the collective spring capsule (Figure 6 and para. 12-5, MM).



**Figure 6. Spring Capsule Caged with T-0022**

6.3.11 Disconnect one bolt from the collective bellcrank attachment bracket. Take note of the shim and spacer stack when removing the hardware (Figure 7).

6.3.12 Remove the friction hardware and rod assembly (Figure 8).

6.3.13 Remove the four springs from the collective/correlator assembly (Figure 9).

6.3.14 Disconnect the starter wire plug (Figure 9).



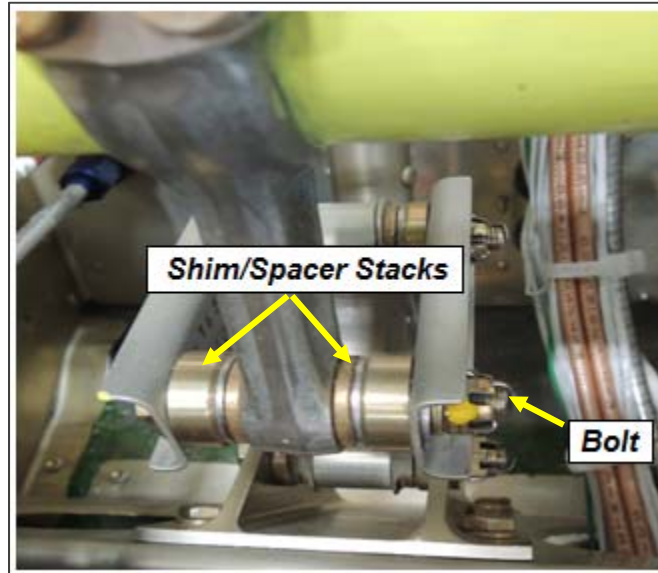


Figure 7. Copilot Collective Socket/Collective Bellcrank Linkage

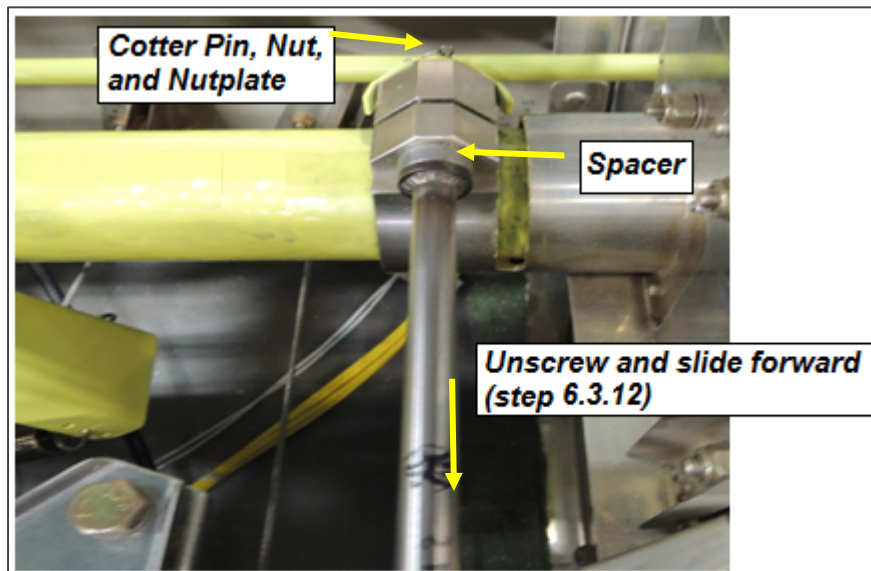
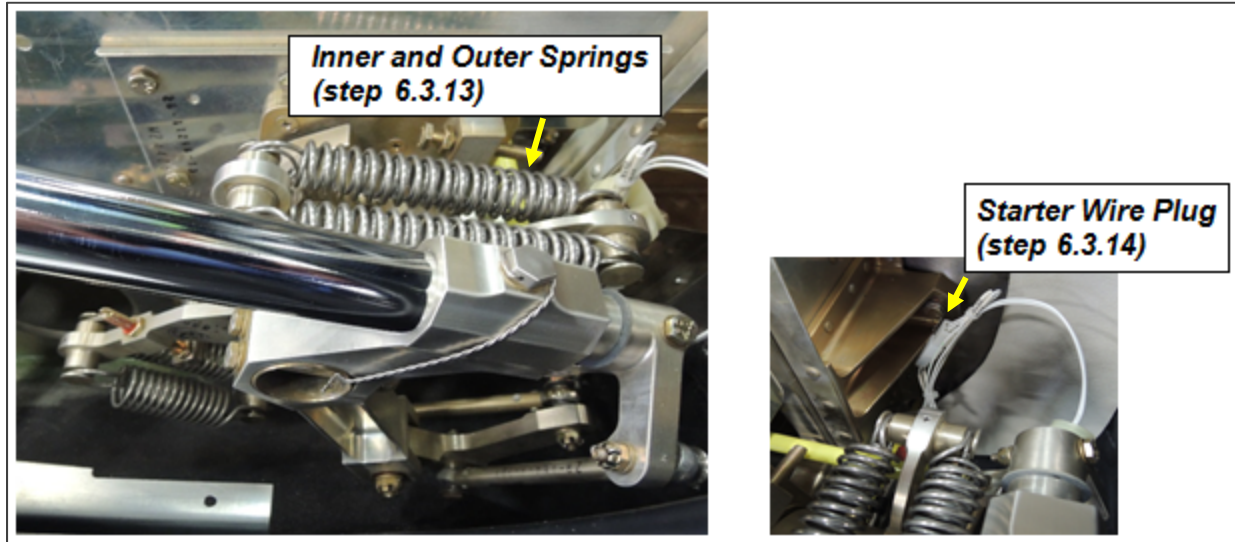
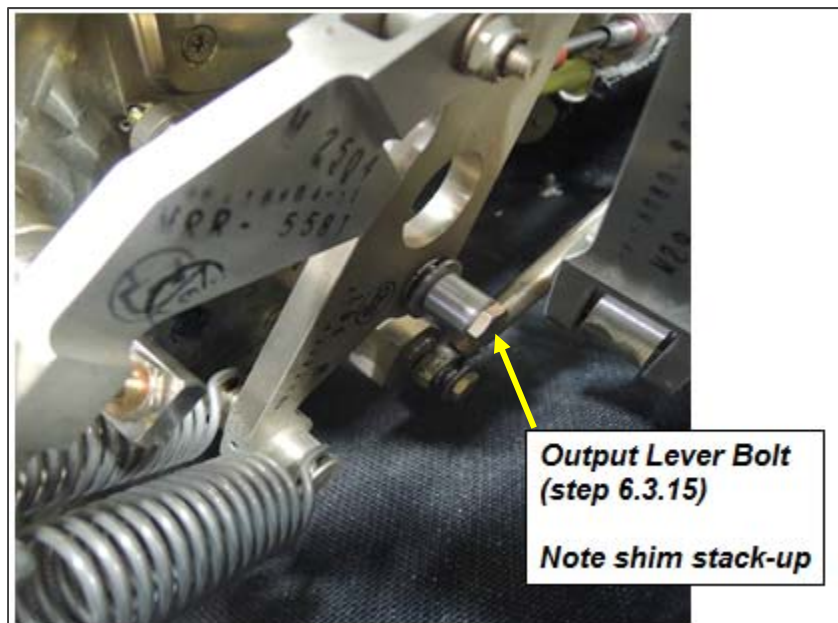


Figure 8. Friction Control Disassembly



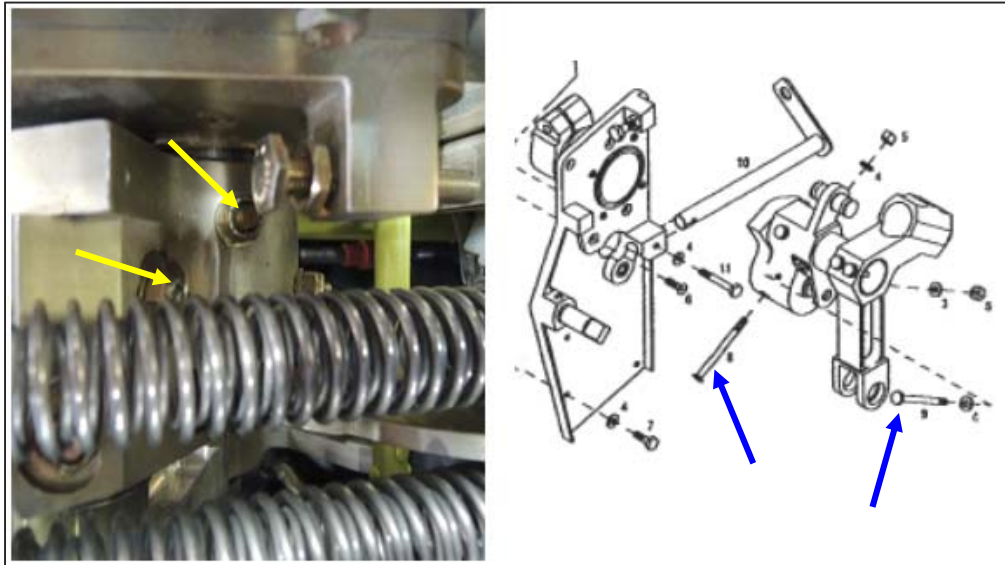
**Figure 9. Correlator Springs and Starter Wire Plug**

6.3.15 Remove the output lever bolt and associated hardware (Figure 10). Note the shim stack up during removal.



**Figure 10. Correlator Output Lever**

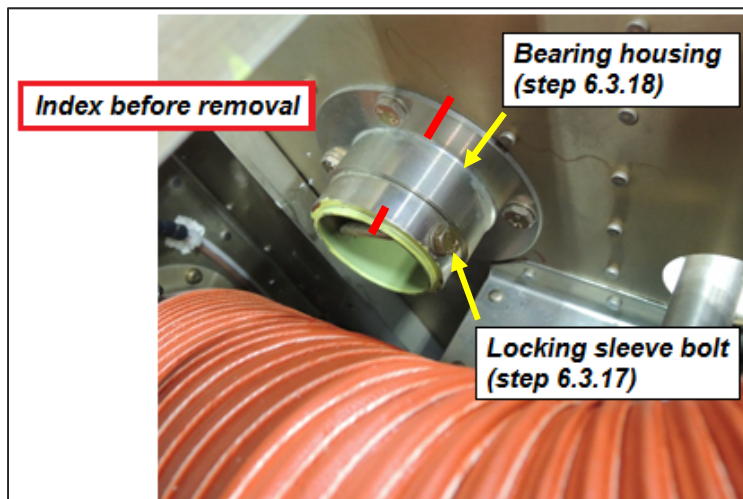
6.3.16 Remove the two bolts securing the offset collective tube housing to the torque tube (Figure 11).



**Figure 11. Offset Collective Tube Housing**

6.3.17 Index the locking sleeve and the end of the torque tube, then remove one locking sleeve bolt and remove the locking sleeve from the end of the torque tube (Figure 12).

6.3.18 Index the bearing housing, then remove the four bearing housing bolts and remove the bearing housing (Figure 12).

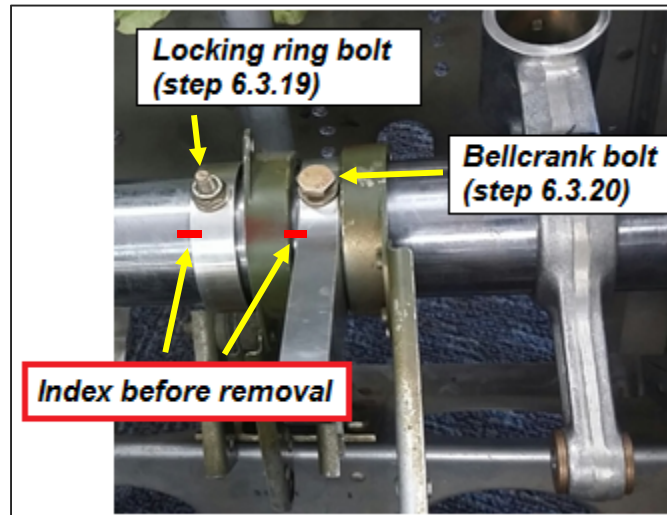


**Figure 12. Locking Sleeve and Bearing Housing**

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6.3.19 Index the locking sleeve, then remove one locking ring bolt (Figure 13).

6.3.20 Index the collective bellcrank, then remove one collective bellcrank bolt (Figure 13).

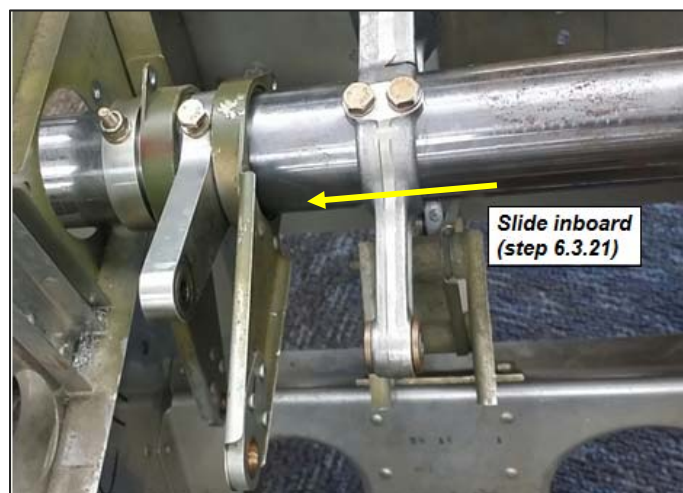


**Figure 13. Locking Sleeve and Collective Bellcrank**

**NOTE**

**Use care when sliding the torque tube to avoid damage to the limit switches or other sensitive components.**

6.3.21 Slide the collective torque tube inboard toward the copilot side (Figure 14).



**Figure 14. Torque Tube Slid Toward the Copilot Seat**

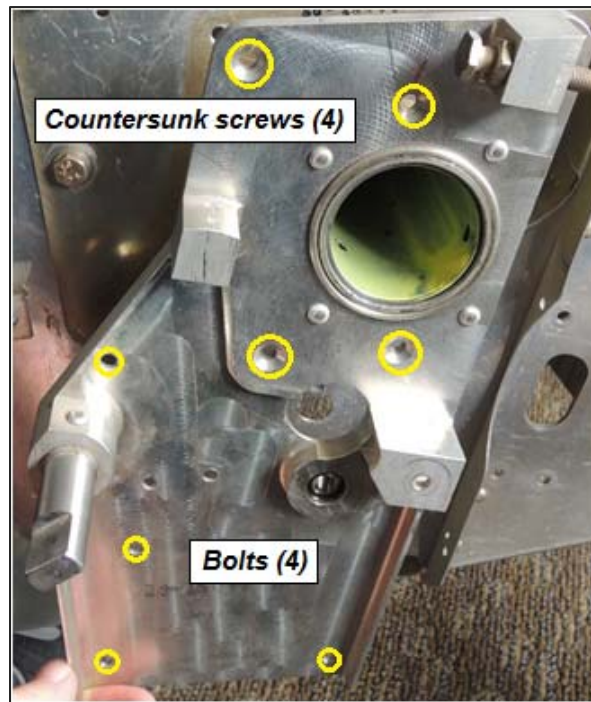
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6.3.22 Remove the collective/correlator assembly from the torque tube (Figure 15).



**Figure 15. Collective/Correlator Assembly**

6.3.23 Remove the four mounting bolts and the four countersunk mounting screws from the mounting plate (Figure 16).



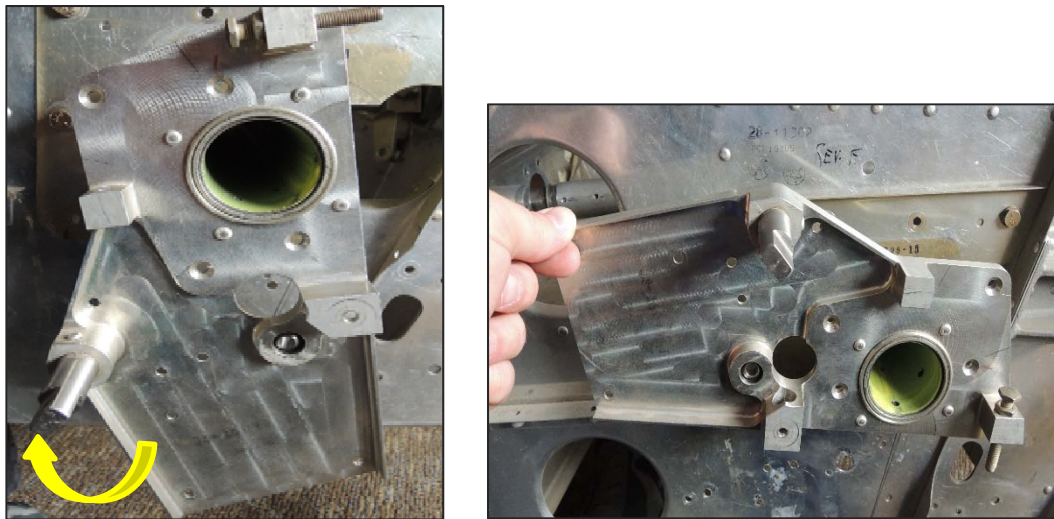
**Figure 16. Mounting Plate Attachment Disassembly**

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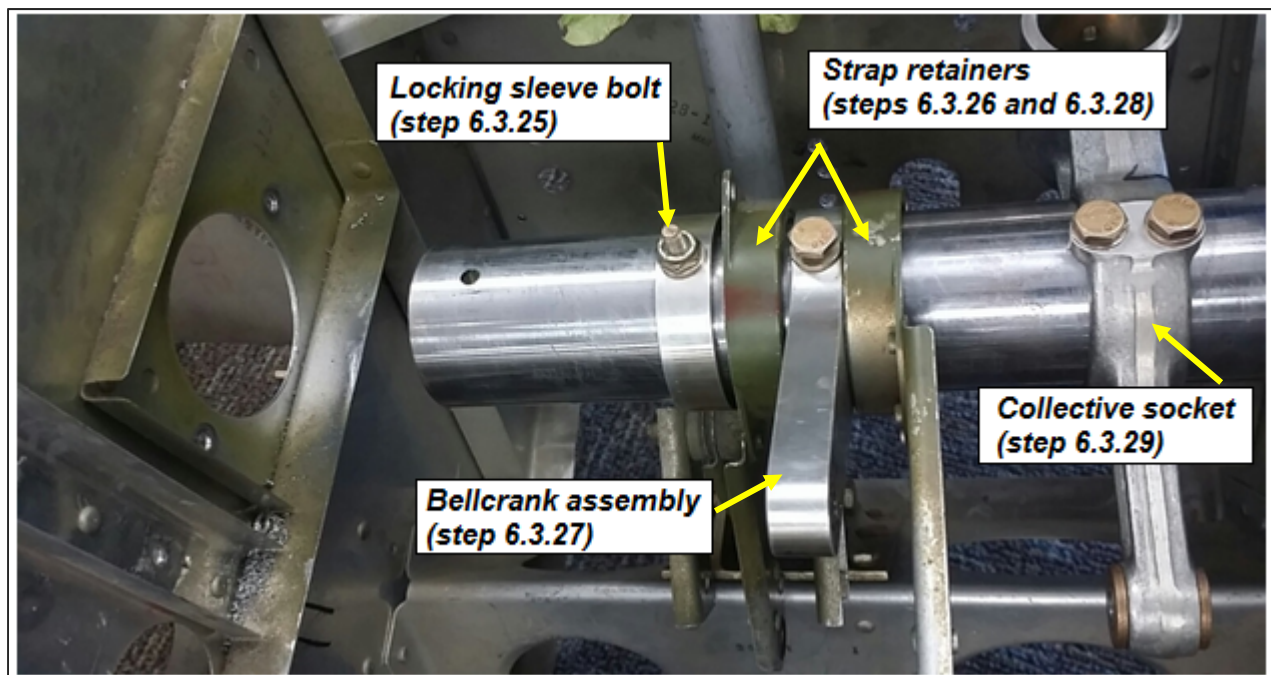
6.3.24 Pivot the bottom of the mounting plate 90 degrees forward and remove (Figure 17).

6.3.25 Remove the locking sleeve from the end of the torque tube (Figure 18).

6.3.26 Remove the copilot-side strap retainer from the torque tube (Figure 18).



**Figure 17. Mounting Plate Pivot and Removal**



**Figure 18. Locking Sleeve, Strap Retainers, Collective Bellcrank and Collective Stick Socket (bolts removed in a previous step)**

6.3.27 Remove the bellcrank from the torque tube (Figure 18).

6.3.28 Remove the pilot-side strap retainer from the torque tube (Figure 18).

**NOTE**

**It may be necessary to remove the chromate primer or rust on the torque tube to facilitate removal of the collective socket.**

6.3.29 Remove the two copilot's collective stick socket bolts and remove the socket (Figure 18).

6.4 F and FX Models – Copilot Collective Stick Socket – Installation

**NOTE**

**For all bolts connecting the collective stick socket to the torque tube (Figure 1, Item 2), initially torque to shear nut torque (9-11 in-lbs/1-1.2 Nm). Torque to full torque (12-15 in-lbs/1.4-1.7 Nm) after all components are reinstalled and check that there is no binding and that the torque tube moves freely.**

**NOTE**

**Use standard torque unless stated otherwise. Refer to Table 2-5 of the F-28F/280F Series Maintenance Manual.**

**NOTE**

**Enstrom recommends replacing bellcrank P/N 28-16233-1 with P/N 28-16233-3. Refer to Service Directive Bulletin (SDB) No. 0105.**

6.4.1 Install the new airworthy copilot collective stick socket. **Do not overtorque the bolts.** Torque the bolts initially to shear nut torque (9-11 in-lbs/1-1.2 Nm).

6.4.2 Reinstall the pilot side strap retainer (Figure 18).

6.4.3 Reinstall the collective bellcrank assembly on the torque tube (Figure 18).

6.4.4 Reinstall the copilot side strap retainer (Figure 18). **Do not overtorque the bolts through the strap retainers.** Torque to shear nut torque (9-11 in-lbs/1-1.2 Nm).

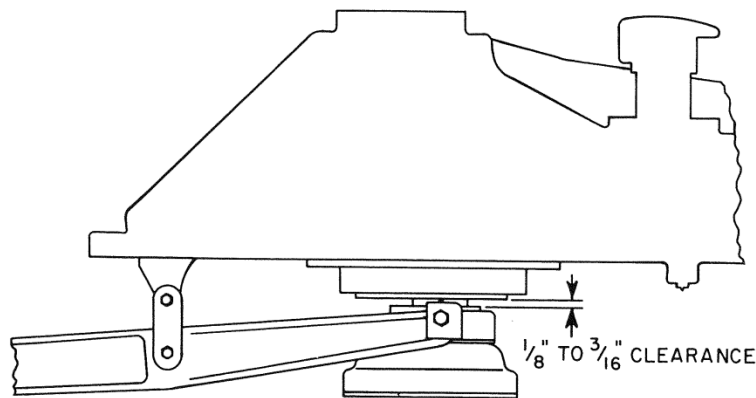
- 6.4.5 Reinstall the locking sleeve on the torque tube (match the index markings on the torque tube) (Figure 18). **Do not overtorque the bolts through the locking ring.** Torque to shear nut torque (9-11 in-lbs/1-1.2 Nm).
- 6.4.6 Slide the torque tube toward the copilot seat.
- 6.4.7 Reinstall the mounting plate on the torque tube (Figure 17 and Figure 16).
- 6.4.8 Slide the torque tube into the offset housing. Install the collective/correlator assembly onto the torque tube (Figure 15).
- 6.4.9 Reinstall the bearing housing on the torque tube (match the index markings on the torque tube) (Figure 12). **Do not overtorque the bolts through the torque tube.** Torque to shear nut torque (9-11 in-lbs/1-1.2 Nm).
- 6.4.10 Reinstall the outer locking sleeve on the torque tube (match the index markings on the torque tube) (Figure 12). **Do not overtorque the bolts through the torque tube.** Torque to shear nut torque (9-11 in-lbs/1-1.2 Nm).
- 6.4.11 Reinstall the offset collective tube housing to the torque tube (Figure 11).
- 6.4.12 Reinstall the output lever bolt and associated hardware (Figure 10).
- 6.4.13 Verify that the torque tube rotates freely before proceeding.
- 6.4.14 Reinstall the springs and starter wire plug (Figure 9).
- 6.4.15 Reattach the collective bellcrank to the collective socket arm (Figure 7).
- 6.4.16 Reinstall the friction assembly (Figure 8).
- 6.4.17 Reinstall the spring capsule assembly (para. 12-5, D, MM and Figure 6).
- 6.4.18 Reinstall the support assembly (Figure 5).
- 6.4.19 Reinstall the copilot collective throttle bellcrank (Figure 3).



- 6.2.20 Check that there is no binding or stiffness in the system, then torque the collective stick socket bolts (Figure 1, Item 2) to full torque (12-15 in-lbs/1.4-1.7 Nm). Verify again that there is no binding or stiffness in the system.
  
- 6.4.21 Reinstall the throttle tie rod (Figure 3).
  
- 6.4.22 Reinstall the throttle cable (para. 13-12, (2), MM).
  
- 6.4.23 Reinstall the pilot collective stick (para. 12-4, 3.B, MM).
  
- 6.4.24 Rig the collective trim system (para. 12-5, E, MM).
  
- 6.4.25 Rig the correlator (para. 13-12, MM).
  
- 6.4.26 Reinstall the seat deck (para. 8-8, B, MM) and the seatbelt (para. 8-7, B, MM).
  
- 6.4.27 Reinstall the seats.
  
- 6.4.28 Proceed to step 6.5.
  
- 6.5 Maintenance Preflight Check, Ground Run, and Test Flight
  - 6.5.1 Preflight Collective Rigging Check
    - 6.5.1.1 Place the collective control stick in full down position and tighten the friction.
    - 6.5.1.2 Check that there is 1/8 to 3/16 inch clearance between the collective bearing housing spacer and the swashplate mount flange (Figure 19).
    - 6.5.1.3 Verify that the correlator rigging has been complied with.
  
  - 6.5.2 Limited Maintenance Ground Run
    - 6.5.2.1 Verify that the manifold pressure is 16 to 18 inches.
    - 6.5.2.2 Verify that the fuel flow is 50 to 65 lb/hr.

## 6.5.3 Limited Maintenance Flight Check

- 6.5.3.1 Perform an autorotation and verify that the rotor speed RPM is within limits.



**Figure 19. Collective Bearing Housing Spacer and Swashplate Mount Flange Clearance**

7. PARTS: Refer to the following table to select the new collective stick socket part number.

| Collective Stick Socket Position | Collective Stick Socket P/N |            |                  | Quantity |
|----------------------------------|-----------------------------|------------|------------------|----------|
|                                  | F-28A/280                   | F-28C/280C | F-28F/280F/280FX |          |
| Pilot Side (LH)                  | 28-16186-3                  | 28-16186-3 | N/A              | 1        |
| Copilot Side (RH)                | 28-16194-3                  | 28-16194-3 | 28-16194-3       | 1        |
| Pilot Side (RH)                  | N/A                         | 28-16377-3 | 28-16377-3       | 1        |

8. SPECIAL TOOLS: Enstrom Tool T-0022 (Collective Spring Capsule Holding Tool)

9. MAN-HOURS:

| Collective Stick Socket Position | Man-Hours |            |                  |
|----------------------------------|-----------|------------|------------------|
|                                  | F-28A/280 | F-28C/280C | F-28F/280F/280FX |
| Pilot Side (LH)                  | 2         | 2          | N/A              |
| Copilot Side (RH)                | 8         | 8          | 14               |
| Pilot Side (RH)                  | N/A       | 8          | 14               |

10. WARRANTY: N/A

11. WEIGHT CHANGE: N/A

12. LOG BOOK ENTRY: As required for maintenance actions

13. REPETITIVE ACTION: N/A