



SERVICE DIRECTIVE BULLETIN

SERVICE DIRECTIVE BULLETIN NO. 0126

Revision 1

DATE: July 6, 2023

1. SUBJECT: Cabin Bellcrank Mounts and Bellcrank Attachment Inspection
2. MODEL: F-28A, 280, F-28C, F-28C-2, F-28C-2R, 280C, F-28F, F-28F-R, 280F, and 280FX
3. EFFECTIVITY: All S/N (Note special exclusion in paragraph 5.3.)

4. BACKGROUND:

Enstrom has received a report of an in-flight separation of a P/N 28-11307-1 upper cabin mount. The upper cabin mount is also the cyclic bellcrank pivot bracket. This failure made lateral control nearly impossible. Analysis of the mount determined the separation was a result of metal fatigue initiated by corrosion and/or surface wear near the bellcrank pivot bolt. Damage on the bellcrank pivot hardware indicated relative movement between the components, which indicates that the joint was loose at one time.

This Service Directive Bulletin (SDB) requires a one-time inspection and repetitive inspection of the upper cabin mounts and cyclic bellcrank attachment.

Revision 1 modifies the hardware assembly between the ears of the cabin mount in cases where the hardware stack-up may be deficient.

5. COMPLIANCE:

- 5.1 At the next 100-hour or annual inspection, whichever occurs first, perform NDT inspection of the cabin bellcrank mounts for cracks in accordance with paragraph 6.1 and check the bellcrank installation for security in accordance with paragraph 6.3.
- 5.2 At each subsequent 100-hour/annual inspection thereafter, perform a visual inspection of the cabin bellcrank mounts for cracks in accordance with paragraph 6.2 and check the bellcrank installation for security in accordance with paragraph 6.3.
- 5.3 At the next scheduled 100-hour or annual inspection, whichever occurs first, the cabin mount bellcrank hardware stack-up may be adjusted per paragraph 6.4. This procedure would be applicable to F-28F, S/N 832 and prior, and 280FX, S/N 2151 and prior. Subsequent S/N have been manufactured from the factory with the modified stack-up and are exempt.

CAUTION

Proper torque is critical to the security of the bellcrank installation and proper performance of the cyclic control. Intentionally under-torquing the bellcrank attachment hardware to avert binding will compromise the integrity of the cyclic control system and may ultimately cause a loss of flight control.

6. INSPECTION:

NOTES

Accomplishment of this SDB may be performed concurrently with the inspection requirements of SDB 0116, if not already complied with.

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

The schematic of the cyclic control system and the relative location of the upper cabin mounts are shown in Figure 1.

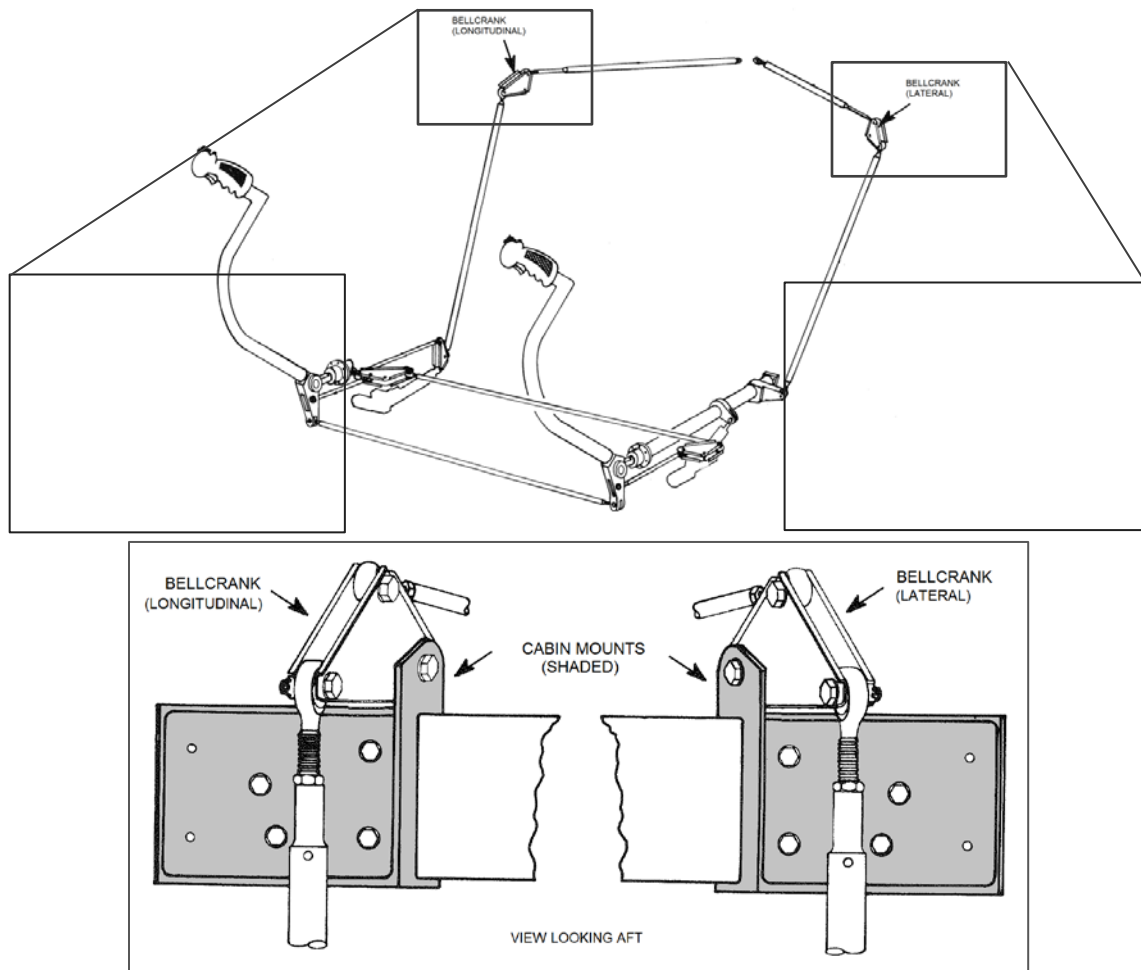


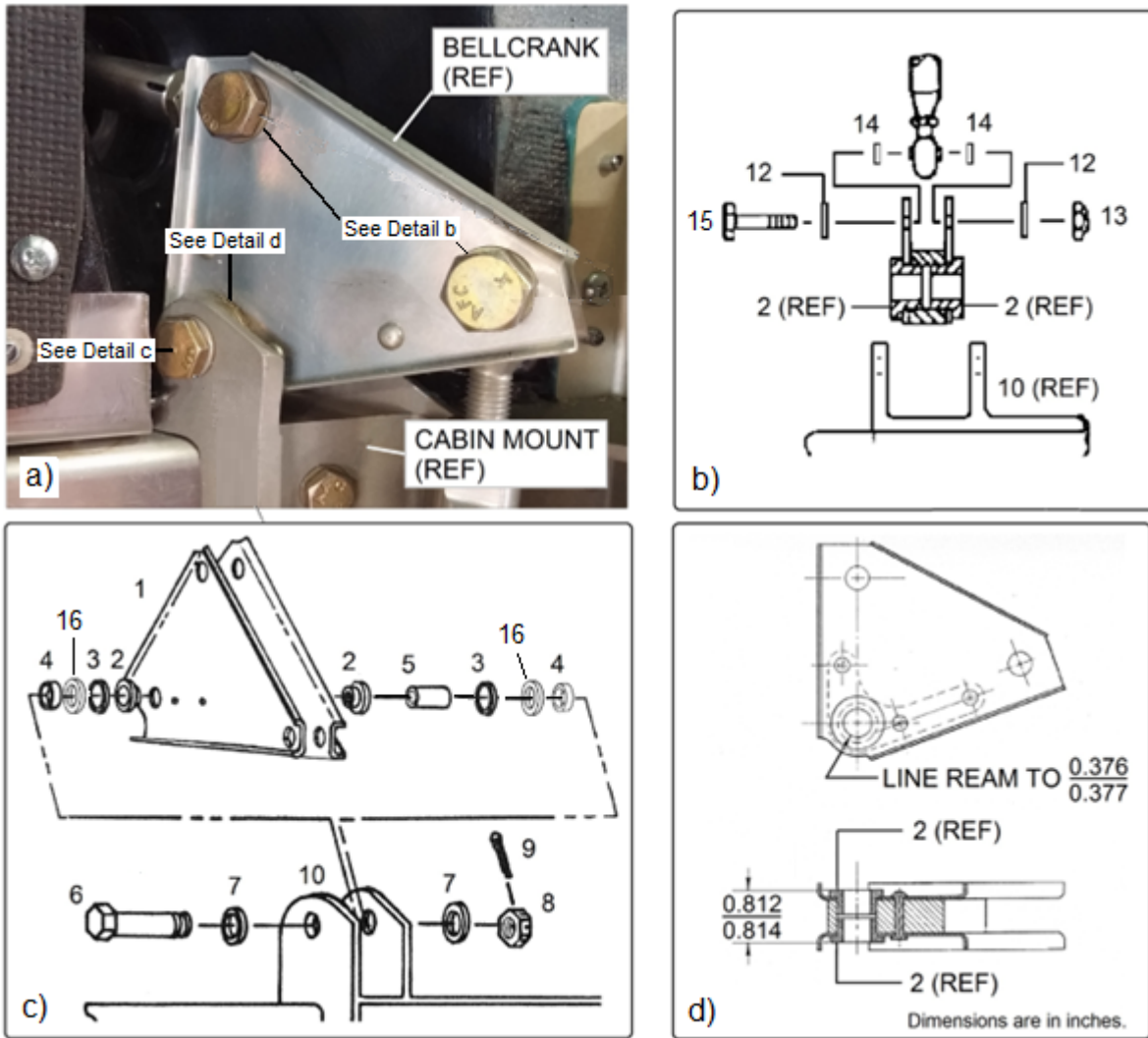
Figure 1. Cyclic Control System Schematic (Top); Bellcrank Cabin Mounts (Bottom)

- 6.1 Perform NDT inspection of the upper cabin mounts (lateral and longitudinal) (Figure 1 and Figure 4-a, 4-b).
 - 6.1.1 Remove the seat structure cover.
 - 6.1.2 Remove the left and right fuel tanks.
 - 6.1.3 Detach the control tube backwall cover, if equipped (Figure 2).
 - 6.1.3.1 Remove the four screw fasteners.
 - 6.1.3.2 Cut the cable ties on both ends of the rubber boot.
 - 6.1.3.3 Break the seal between the cover and the backwall and the fire curtain.
 - 6.1.3.4 Move the boot and cover aft to gain direct access to the cabin mount.



Figure 2. Control Tube Cover (Fuel Tank Installed)

- 6.1.4 Disconnect the control tube assemblies. Keep the bolt, spacer, and washer stack up together (Figure 3-b). Inspect the bolts for wear.
- 6.1.5 Disconnect the bellcrank and set aside. Keep the bolt, spacer, and washer stack up together (Figure 3-c). Inspect the bolt for wear.
- 6.1.6 Use a solvent (denatured alcohol, mineral spirits, or equivalent) to remove grease or oil residue from the cabin mount.



ITEM NUMBER	PART NUMBER	DESCRIPTION	QTY PER A/C
1	28-16218-1	. Bellcrank	2
2	28-16156-1	. Bearing	4
3	ECD050-11	. Washer (.048" thick)	4
4	28-16209-1	. Spacer (.105" thick)	A/R
4	28-16209-11	. Spacer (.095" thick)	A/R
5	28-16157-4	. Spacer	2
6	AN4-17	. Bolt	4
7	AN960-416	. Washer	6
8	F12-NE-4753-048	. Nut	2
9	AN381-2-8	. Cotter Pin	2
10	28-11307-1	. Upper Cabin Mount (LH)	1
-11	28-11307-2	. Upper Cabin Mount (RH)	1
12	AN960-516	. Washer	A/R
12	AN960-516L	. Washer	A/R
13	F12-NE-4753-054	. Nut	2
14	28-14259-3	. Spacer	4
15	AN5-10	. Bolt	2
16	28-16217-x	. Shim	A/R

- Item not illustrated

Figure 3. Cabin Mount, Control Tube, and Bellcrank Installation Detail

- 6.1.7 Inspect the cabin mount for cracks using dye penetrant method. Follow the manufacturer's instructions. Refer to Figure 4 for the area to inspect.
- 6.1.7.1 Positive indication – Reject the cabin mount and replace with an airworthy cabin mount. Contact Enstrom Product Support for the replacement procedure.
- 6.1.8 If no indication, remove the dye products from the area per the manufacturer's instructions and inspect all visible rivets (countersunk and universal head) for condition and looseness. Replace loose rivets, as necessary.
- 6.1.9 Repeat 6.1.3 through 6.1.8 for the opposite side cabin mount or proceed to step 6.3.

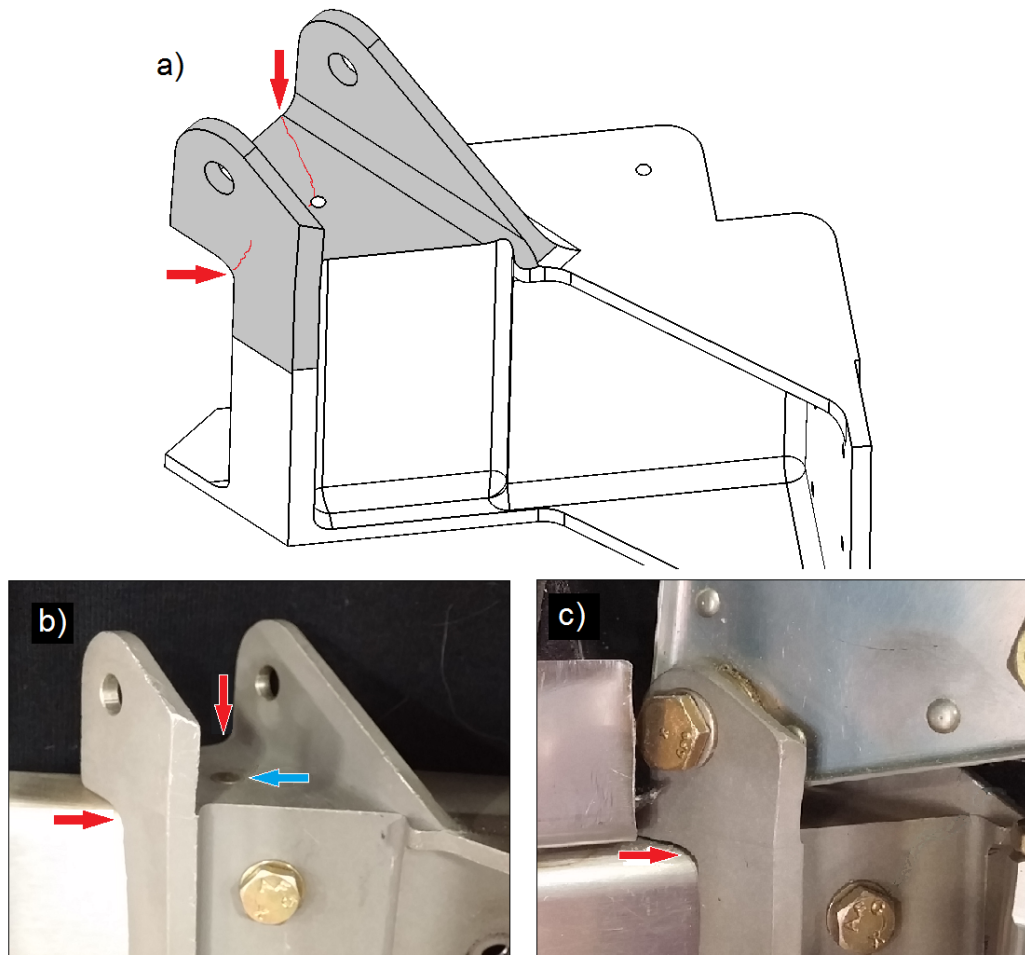


Figure 4. Upper Cabin Mount Inspection (LH Shown)

All Views – Red Arrow Points to the Area for a Possible Crack

a) NDT Inspection Area (Shaded)

b) Actual Part (Incomplete Installation Shown); Blue Arrow – Rivet Inspection (Countersunk Rivet Shown)

c) Actual Part for Visual Inspection (Complete Installation Shown)

- 6.2 Perform a visual inspection of the upper cabin mounts (lateral and longitudinal) (Figure 4).
- 6.2.1 Remove the seat structure cover.
- 6.2.2 If equipped with control tube covers, the covers may be left in place for visual inspection of the forward side of the upper cabin mount. If the helicopter is not equipped with control tube covers, open the upper engine cowl to allow visual inspection of the aft side of the upper cabin mount.
- 6.2.3 Use a solvent (denatured alcohol, mineral spirits, or equivalent) to remove grease or oil residue from the cabin mount.
- 6.2.4 With a bright light source and inspection mirror, visually inspect the cabin mounts for cracks, particularly in the area indicated in Figure 4-c.
- 6.2.4.1 If a crack is detected, reject the cabin mount and replace with an airworthy cabin mount. Contact Enstrom Product Support for the replacement procedure.
- 6.2.5 If no crack is detected, inspect all visible rivets (countersunk and universal head) for condition and looseness. Replace loose rivets, as necessary.
- 6.2.6 Repeat 6.2.2 through 6.2.5 for the opposite side cabin mount or proceed to step 6.3.
- 6.3 Check the security of the bellcrank attachment hardware.
- 6.3.1 If removed, install the bellcrank attachment hardware (50-70 in-lb/5.6-7.9 Nm).
- 6.3.1.1 Refer to paragraph 6.4 for proper hardware stack-up components and adjust, as required.

NOTE

Looseness (side-to-side movement) in the bellcrank installation is attributed to worn bearings, loose hardware, or improper stack-up, whereas binding is attributed to interference caused by constriction in the joint. This occurs when the torque load is carried through the bearings and the cabin mount rather than through the internal spacer.

CAUTION

Maintaining the required torque is critical to the security of the bellcrank installation and proper performance of the cyclic control system. Intentionally under-torquing the bellcrank attachment hardware to achieve freedom of movement may ultimately cause a loss of flight control.

- 6.3.2 Check the bellcrank installation hardware for looseness by moving the bellcrank side to side in the same axis as the installed hardware.
- 6.3.2.1 Refer to paragraph 6.4 for proper hardware stack-up components and adjust, as required.
- 6.3.2.2 If the looseness is detected (deflection, audible clicking, slack between the bearings and washer, etc. is observed), the bearings and spacers (Figure 3-c, Items 2, 4, and 5) must be replaced.
- 6.3.2.2.1 Remove the control tube and bellcrank hardware (Figure 3-b, -c). Remove the bellcrank and press out the bearings (Figure 3-c, Item 2) from the bellcrank.
- 6.3.2.2.2 Install the new bearings.
- 6.3.2.2.3 Ream the bearings in accordance with Figure 3-d.
- 6.3.2.2.4 Install the bellcrank with new spacers (Figure 3-c, Items 4 and 5) and shims (Figure 3-c, Item 16), as required, and complete the installation (torque 50-70 in-lb/5.6-7.9 Nm).
- 6.3.3 Check the bellcrank for binding or freedom of movement.
- 6.3.3.1 If the bellcrank moves freely, no further action is required. Proceed to step 6.5.
- 6.3.3.2 If the binding is detected, remove the nut, spacers, shims (if present), washers, and bolt. Verify the length of the spacer (Figure 3-c, Item 5) (0.817/0.819"). File the hat-end of the bearing to reduce the thickness or protrusion. Deburr and remove any debris from the assembly.
- 6.3.3.3 Complete the installation (torque 50-70 in-lb/5.6-7.9 Nm).
- 6.3.3.4 Repeat step 6.3.3, as necessary.
- 6.3.3.5 Proceed to step 6.6 when the bellcrank moves freely at the required torque (50-70 in-lb/5.6-7.9 Nm).

NOTE

Before proceeding with the following procedure, refer to paragraph 5.3 for specific S/N effectivity. (Current production F-28F and 280FX models are manufactured from the factory accordingly.)

This procedure compares the measurement between the cabin mount ears and the calculated length of the hardware stack-up. Any deficiency in hardware stack-up is corrected by installing spacer P/N 28-16209-x (if required) and shim P/N 28-16217-x as required.

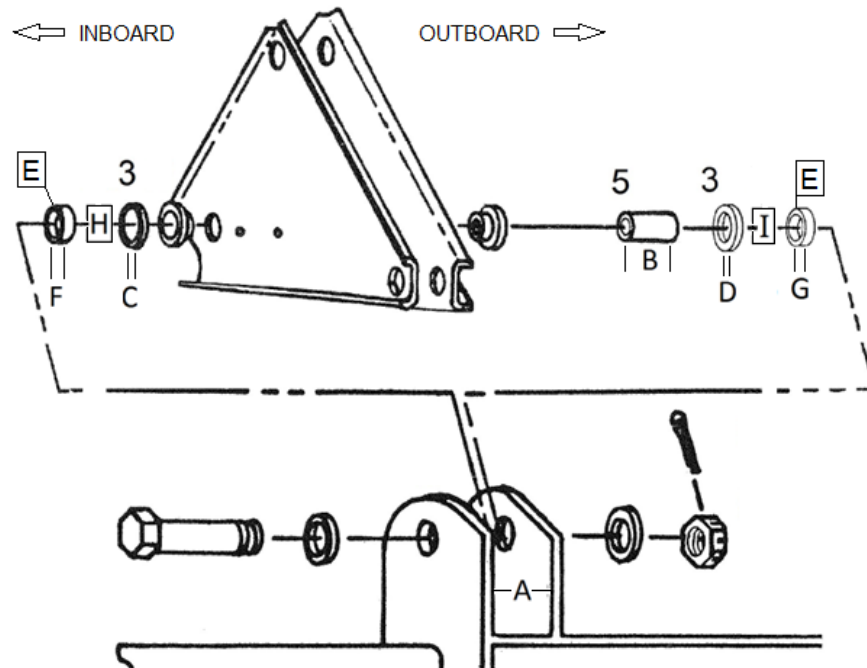
- 6.4 Hardware stack-up for the LH cabin mount. See Figure 5.
- 6.4.1 Measure the distance between the 0.250 inch diameter holes of P/N 28-11307-1 mount. This is Measurement A.
- 6.4.2 Measure the length of spacer (Item 5). This is Measurement B.
- 6.4.3 Measure the thickness of washer (Item 3, inboard). This is Measurement C.
- 6.4.4 Measure the thickness of washer (Item 3, outboard). This is Measurement D.
- 6.4.5 Solve for Δ using this formula: $A - (B + C + D) = \Delta$
- 6.4.6 Determine spacer (Item 4) selection from this formula: $\Delta / 2 = E$
- 6.4.6.1 Select spacer P/N 28-16209-1 if E value is ≥ 0.101 inch.
- 6.4.6.2 Select spacer P/N 28-16209-11 if E value is ≤ 0.100 inch.
- 6.4.7 Measure the thickness of spacer (Item 4, inboard). This is Measurement F.
- 6.4.8 Measure the thickness of spacer (Item 4, outboard). This is Measurement G.
- 6.4.9 Determine the shim thickness required for the inboard side. This will be Measurement H.
- 6.4.9.1 Solve for H using this formula: $E - F = H$
- 6.4.9.2 Select P/N 28-16217-x as required to equal H.
- 6.4.10 Determine the shim thickness required for the outboard side. This will be Measurement I.
- 6.4.10.1 Solve for I using this formula: $E - G = I$
- 6.4.10.2 Select P/N 28-16217-x as required to equal I.
- 6.4.11 Verify that $(B + C + D + F + G + H + I) = A (+0/-0.001)$

- 6.4.12 Install P/N 28-16217-x (Item 16) shims, as required, between Item 3 and Item 4, inboard and outboard, respectively.
- 6.5 Torque (50-70 in-lb/5.6-7.9 Nm) and safety the nut.
- 6.6 Repeat steps 6.4 and 6.5 for the RH cabin mount.
- 6.7 Reinstall the control tube covers, if installed.
- 6.7.1 Reinstall the four cover fasteners.
- 6.7.2 Reposition the boot and secure with cable ties.
- 6.7.3 Seal the cover edge with RTV sealant (Dow Corning 732, or equivalent).
- 6.8 Reinstall the fuel tanks.
- 6.9 Reinstall the seat structure cover.
7. PARTS:

For replacement, if required. See Figure 2 for additional hardware information.

Part Number	Description	Quantity
28-11307-1	Upper Cabin Mount (LH)	1
28-11307-2	Upper Cabin Mount (RH)	1
28-16156-1	Bearing	2 per mount
28-16157-4	Spacer	1 per mount
28-16209-1	Spacer (.105")	As Required
28-16209-11	Spacer (.095")	As Required
28-16217-11	Shim (.0005")	As Required
28-16217-13	Shim (.001")	As Required
28-16217-15	Shim (.0015")	As Required
28-16217-17	Shim (.002")	As Required
28-16217-19	Shim (.003")	As Required
28-16217-21	Shim (.005")	As Required
28-16217-23	Shim (.010")	As Required
MS20426AD4-5	Countersunk Rivet	As Required
MS20470AD4-6	Universal Rivet	As Required
<u>Note:</u> If necessary, RTV sealant (Dow Corning 732, or equivalent) and cleaning solvent may be procured from a local source.		

8. SPECIAL TOOLS:
Spotcheck® Kit or equivalent
9. MAN-HOURS: Inspection – 2.5 hours (NDT, hardware, torque), 1 hour (visual, torque)
10. WARRANTY: Per Enstrom Helicopter Warranty policy
11. WEIGHT CHANGE: None
12. LOG BOOK ENTRY: Enter compliance with this SDB in the aircraft maintenance records.
13. REPETITIVE ACTION:
 - 13.1 Perform an inspection of the cabin bellcrank mounts in accordance with paragraph 6.2 at each 100-hour/annual inspection using a bright light source and a mirror.
 - 13.2 Check the bellcrank attachment hardware for looseness and freedom of movement in accordance with paragraph 6.3 at each 100-hour/annual inspection followed by a torque check, if necessary.



- A = Distance between the 0.250" inch diameter holes of the cabin mount.
 B = Length of spacer (5).
 C = Thickness of washer (3, inboard).
 D = Thickness of washer (3, outboard).
 F = Thickness of spacer (E, inboard).
 G = Thickness of spacer (E, outboard).

Spacer (E) selection:

Spacer (E) calculation: $E = A - \frac{(B + C + D)}{2}$

- If E value is ≥ 0.101 inch, select spacer P/N 28-16209-1.
- If E value is ≤ 0.100 inch, select spacer P/N 28-16209-11.

Shim (H) and (I) selection:

Inboard shim (H) calculation: $H = E - F$

- Select P/N 28-16217-x to equal H.

Outboard shim (I) calculation: $I = E - G$

- Select P/N 28-16217-x to equal I.

Check:

Verify that: $(B + C + F + F + H + I) = A$

(Tolerance +0/-0.0005 to -0.001)

Figure 5. Hardware Stack-up Calculation