



SERVICE DIRECTIVE BULLETIN

SERVICE DIRECTIVE BULLETIN NO. 0056

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Date: December 2, 1981

Subject: Replacement of Pitch Link Retainer and Service Improvement of the Pitch Control System

Models: F-28C and 280C

Effectivity: Helicopters manufactured prior to January, 1981

Compliance: Within the next 100 Hours of Operation

There have been isolated reports of the P/N 2 8-16373 stud failures in the pitch link retainer. This failure is readily detected as a tail rotor vibration but results in the partial loss of tail rotor effectiveness. The probable cause of these failures is the loss of torque on the stud resulting from a sudden stoppage (Ref. SIL 0088A).

The pitch link retainer has been redesigned to eliminate this stud and its dependence on torque for structural integrity. Additionally, the pitch control system has been redesigned to significantly improve its wear characteristics which will lower the operating cost of this system.

All owners and operators with affected model helicopters must install the revised tail rotor pitch control system at their earliest convenience or within the next 100 hours of operation.

Note: Aircraft with forged tail rotor blade grips, P/N 28-150013-1, will require replacement of the grips (Ref. Service Directive Bulletin No. 0048A) to be compatible with the revised pitch control system.

Parts may be ordered from Enstrom Customer Service or an authorized Enstrom Service Center.

Disassembly, modification and assembly instructions are as follows:

1. Disassembly (Ref. Illustration on MM-24-6)
 - a. Remove tail rotor assembly per MM-24-1, (a) thru (d).
 - b. Remove control system from helicopter and disassemble per Maintenance Manual MM-24-5, (a) thru (e).
 - c. Press pitch control bearing (16) from bearing housing (8). DO NOT remove bearing (14) from bearing housing (8).
 - d. Discard items 4, 5, 6, 15, 16, 17 and 18.
2. Assembly (Ref. Fig. 1)
 - a. Press pitch control bearing (5) into bearing (8) and bearing housing (7).
 - b. Install two wave spring washers (10) on bearing (5).
 - c. Align dowel pin holes on pitch link retainer (12) with holes in bearing (5) and press retainer on bearing with flat side outboard.
 - d. Support bearing (5) and press dowel pins (11) to depth of .10 inch below surface of pitch link retainer (12).

Caution: Support pitch control bearing (5) using tool T-0112, suitable stock, scrap spacer or equivalent to prevent damage to the control bearing when installing dowel pins.
 - e. Install cotter pins (13).
 - f. Install seal (4) in groove on I. D. of outboard end of bearing (5).

3. Installation (Ref. Fig. 1)

- a. Slide seal retainer (3) and seal (4) on spacer (2) to a position inboard of spacer slots.
- b. Install keys (1) into slots of spacer (2).
- c. Align pitch control bearing (5) keyways with keys (1) and install pitch control assembly on spacer (2).
- d. Attach bearing housing (7) to control brackets by inserting the 28-16310-2 bolt through bushing (6) in bearing housing (7), 2 8-16308-1 washer, control bracket, AN 960-516 washers (as required) and secure with F12-NE4717-054 nut and AN381-2-10 cotter pin.

Note: Check control assembly travel to insure there is no binding prior to securing retainer (3) and seal (4) into pitch control bearing (5).

- e. install seal (4) into retainer (3).
- f. Apply a small amount of Loctite Super Bonder 495 or Eastman 910 to outside diameter of retainer (3) and install retainer in recessed area of pitch control bearing (5).
- g. Install tail rotor assembly (Ref. page 5).

Parts List (Figures 1 thru 4)

<u>Item</u>	<u>Part Number</u>	<u>Part Name</u>	<u>Quantity</u>
1	28-16395-1	Key	2
2	28-13511-1	Spacer	1
3	28-16374-1	Retainer	1
4	T-533-023	Seal	2
5	28-16394-2	Bearing	1

Parts List (Figures 1 thru 4) continued

<u>Item</u>	<u>Part Number</u>	<u>Part Name</u>	<u>Quantity</u>
6*	28-16311-1	Bushing	2
7	28-16331-1	Bearing Housing	1
8*	107KSZZ6	Bearing	1
9*	N5002-268PP	Retainer - Snap Ring	1
10	W-47	Wave Spring Washer	2
11	28-16397-11	Pin-Dowel	2
12	28-16392-13	Retainer - Pitch Link	1
13	MS24665-26	Cotter Pin	2
14	AN4-13	Bolt	2
15	1/4" Harper	Washer	A/R
16	28-16353-4	Spacer	2
17	01-691-04	Rod End Bearing	2
18	28-16353-3	Spacer	2
19	AN960-416	Washer	A/R
20	F12-NE4753-048	Nut	4
21	AN381-2-8	Cotter Pin	4
22	AN4-14	Bolt	2
23	28-16353-5	Spacer	4
24	11-691-04	Rod End Bearing	2

* Items 6, 8 and 9 are shown for parts reference only and do not have to be removed for this system change.

Note: Bolt length (14) and washer stack-up (19), under nut (20) of Fig. 3, may vary during dynamic balance of the assembly. A recheck and adjustment of static balance is suggested if bolt length exceeds AN4-14 and five 1/4" Harper washers.

Tail Rotor Assembly

1. Installation (Ref. Fig. 5)

- a. Visually align the center of the teeter bearing grease fitting or screw with the inside surface of the pitch link retainer ear (Ref. Fig. 5) as the tail rotor assembly is installed on the transmission output shaft.

Note: This relationship causes the tail rotor hub to lag behind the pitch link retainer by 80 (relative to direction of rotation), to prevent the introduction of stress into the system and also provides clearance for installation and full travel of the pitch links.

- b. Wrap .041 safety wire around one arm of hub and twist to a length which will just pass through the teeter stop when installed.
- c. Install twisted safety wire through safety wire hole in teeter stop.
- d. Position teeter stop on output shaft with rubber bumpers adjacent to spindle and oriented approximately 90° to hub.
- e. Install retention bolt and washer in end of output shaft.
- f. Torque retention bolt to 300 in. lbs. and complete safety wiring through bolt head.

Pitch Change Link

1. Preliminary Adjustment (Ref. Fig. 2)

- a. Loosen check nuts and adjust rod end (17) with right-hand thread until the threads just cover the inspection hole in the barrel.
- b. Adjust rod end (24) to get an overall dimension of approximately 4.26 inches.

Note: Tail rotor assemblies which employ washers under the heads of the bolts attaching the pitch arms to the blade grips will require the following modification to insure clearance between the pitch link rod ends and the bolt heads.

- 1) Remove the AN4H-5A bolt and washer (one of eight attaching pitch arm to blade grip) located inboard of the pitch link attachment point on each pitch arm.
- 2) Install an AN4H-4A bolt in these locations without a washer.
- 3) Safety wire bolts.

c. Install pitch change link on aircraft prior to securing check nuts.

2. Installation (Ref. Fig. 3 & 4)

- a. Lock control pedals with blades in neutral position.
- b. Install pitch links with hardware as illustrated.
- c. Adjust barrel of pitch change links to obtain an overall dimension of 4.26.

- Note
- 1) Final rod end length will be determined during Chadwick balancing and tracking procedures.
 - 2) Rod end bearings (17) and (24) must be centered on their attachment points.

Caution:

Insure rod end threads cover inspection holes of barrel when adjustment is complete.

- d. Hold barrel of pitch link with a wrench and secure check nuts.
- e. Cycle controls and tail rotor assembly to their extreme travel; then teeter tail rotor and observe for positive clearance between rod ends and spindle.

- f. Check tail rotor rigging.

Tail Rotor

1. Rigging

- a. Clamp pedals in line (neutral position).
- b. Insert “neutral” position of rigging tool T-0080 between bearing retainer and output shaft seal retainer (Ref. Fig. 6 for location of tool. Tool is shown in right pedal rigging position). Install locally manufactured wedge between right side of transmission and control bracket to hold rigging tool in position while adjusting cable tension.

- Note:
- 1) Neutral measurement is $.590 \pm .010$ inches.
 - 2) If neutral measurement is out of tolerance it will be necessary to adjust cable tension (35 - 40 lbs.).
 - a) Remove clips from turnbuckle barrels in engine compartment.
 - b) Check inboard cable tension with tensiometer.
 - c) Adjust turnbuckle as necessary and reinstall safety clip.
 - d) Repeat (b) and (c) on outboard cable and recheck Note 1.
 - 3) No more than three threads to be exposed at inboard end on turnbuckle.
- c. Remove rigging tool and pedal clamps.
 - d. Insert “right pedal” end of rigging tool in position (Ref. Fig. 6).
 - e. Depress right pedal to its stop to check adjustment.
 - f. If rigging tool is excessively tight, adjust pedal stop on left side of forward bellcrank assembly under left side of cabin floor.

- g. Insert rigging tool in position using its thickness to check left pedal adjustment.
- h. Depress left pedal to its stop.
- i. Adjust pedal stop in right side of forward bellcrank assembly under left side of cabin floor if rigging tool is loose.

Note: If rigging tool T-0080 is not available, it is possible to measure angular blade travel with a prop protractor to determine proper pedal adjustment.

- 1) Check “neutral” position of tail rotor per steps (a) thru (c) above.
- 2) Position tail rotor horizontal (check with level on forward blade leading edge) and parallel to tail rotor drive shaft.
- 3) Secure spindle in position by inserting locally manufactured wood wedges between spindle and teeter stops. Check to insure tail rotor is parallel to tail rotor drive shaft.
- 4) Depress right pedal to its stop.
- 5) Position prop protractor on flat side of inboard blade grip. Right pedal blade angle should be $-5^{\circ} \pm 5^{\circ}$
- 6) Adjust right pedal stop as necessary.
- 7) Depress left pedal to its stop.
- 8) Left pedal blade angle should be $+ 32^{\circ} \pm .5^{\circ}$.
- 9) Adjust left pedal stop as necessary.
- 10) Remove wedges from teeter stops.

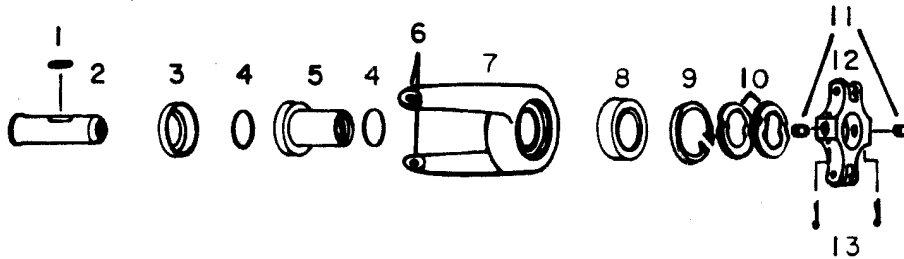


FIGURE 1

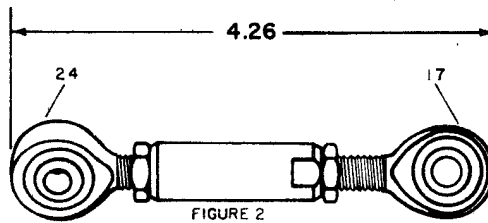


FIGURE 2

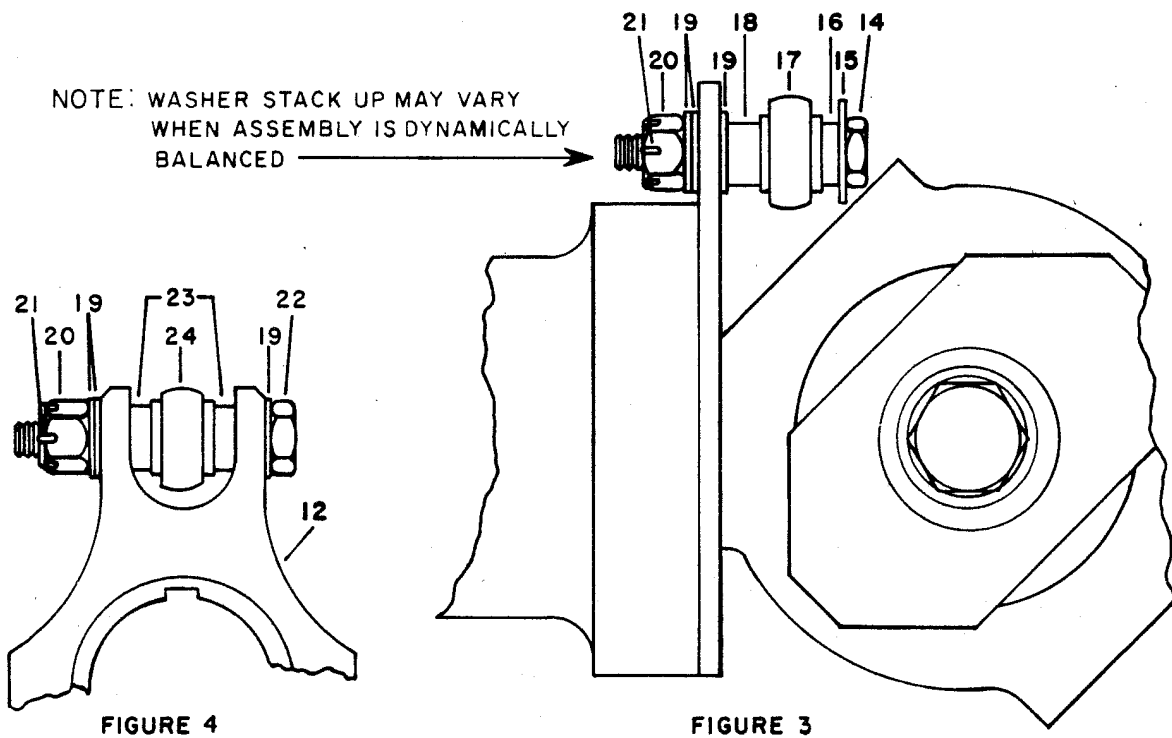


FIGURE 4

FIGURE 3

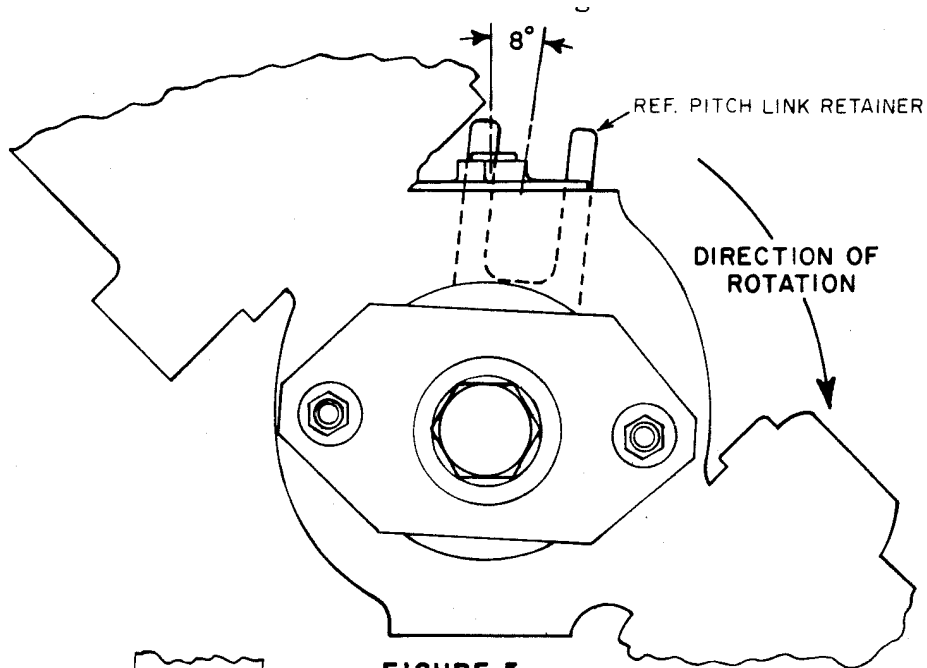


FIGURE 5

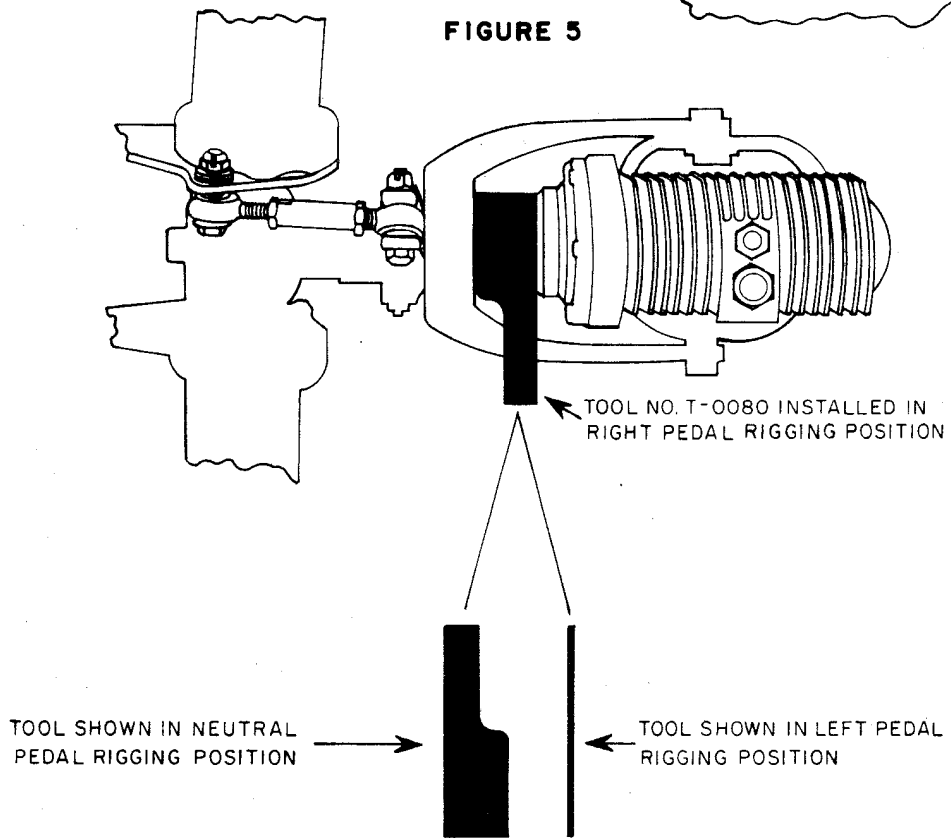


FIGURE 6

New Pitch Control Assembly

1. Removal (See Fig. 1)

- a. Disconnect pitch links from pitch link retainer (13).
- b. Remove tail rotor assembly.
- c. Remove cotter pins, nuts, and pivot bolts from bearing yolk (7) and control brackets.

Note: The stainless steel washers located between control brackets and oilite bushings of pitch control assembly must be saved for reinstallation.

- d. Slide pitch control assembly off of chrome sleeve (2).

Note: Seal retainer (3) and seal (4) are damaged on keys each time the pitch control assembly is removed. Install new seal and retainer on reassembly.

- e. Remove keys (1).

2. Disassembly

- a. Remove seal retainer (3) and seal (4).
- b. Remove cotter pins (13) from retainer (12).
- c. Fabricate a tool from a piece of 1.078 diameter bar stock, approximately 6.0 inches long. Drill a .250 diameter hole through the bar perpendicular to the longitudinal axis. Place the tool inside the pitch control bearing and align .250 diameter hole with dowel pins.

- d. With tool installed, place pitch link retainer (12) in small arbor press and press dowel pin (11) through retainer.
- e. Rotate retainer and repeat on opposite pin.
- f. Gently press pitch control bearing (5) through pitch link retainer (12), wave spring washers (10) and bearing (8).
- g. Remove snap ring (9).
- h. Heat bearing housing (7) and gently tap bearing (8) to remove.

Note: Upon reassembly of the completely disassembled pitch control assembly, it is necessary to:

- 1) Heat bearing housing (7) (Ref. Fig. 1) and install bearing (8).

Note: Bearing (8) is installed with slots for removal of inner bearing section facing outboard toward pitch link retainer. These slots are located 90° to pivot arms of bearing housing (7) on installation.

- 2) Install snap ring (9) with opening of snap ring in line with pivot arms of bearing housing (7).

Complete reassembly as described in “Assembly” on page 2 of this bulletin.