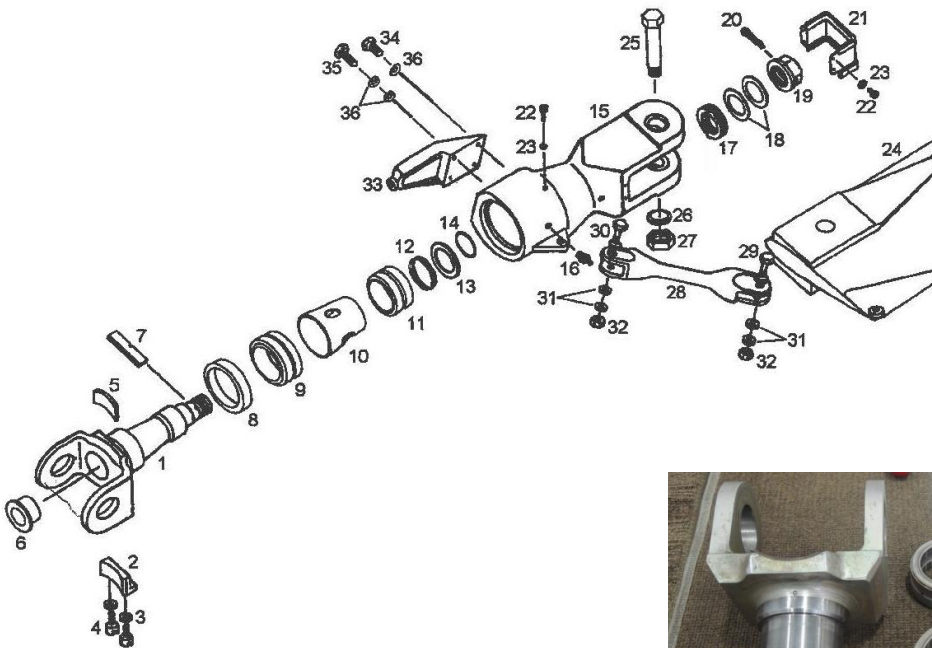




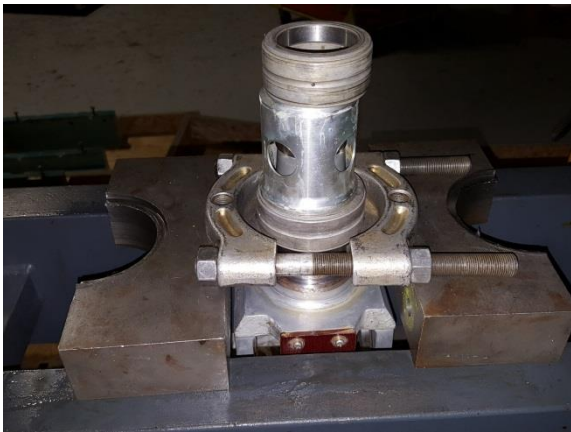
Tribal Knowledge, converting an Enstrom Piston helicopter from Lamiflex bearings to TT straps

The Airwolf kit comes with all parts necessary for assembly and is pre-packaged in shock proof packaging.



A. Disassembling Spindles (Prior to sending them to Airwolf)

1. Remove spiral retaining ring from the end of the spindle.
2. Install the bearing press tool between the rubber seal and the bottom most bearing.
 - a. Tighten the tool so that it will grip the bearing inner race but will not scrape the spindle as it pulls the bearing off.
3. Install the assembly in the press and press off the two bearings and the center spacer.
4. If the bearings won't come loose it may help to heat them with a heat gun.



Removing the phenolic pads from the spindles

Please refer to:

- F-28F/280F Series Maintenance Manual, Paragraph 9-4 (RETENTION ASSEMBLY – Assembly), A (1)
- TH-28/480 Series Maintenance Manual, Paragraph 9-18 (ASSEMBLY – RETENTION ASSEMBLY), A (1)

The pads are installed using Scotch Weld DP 420. They can be removed by soaking in acetone. It also may help to warm the pad up with a hair dryer, and then use a wood chisel to pop it off of the spindle.

UNIVERSAL BLOCK CLEARANCE

A few helicopters that have been converted have had a Universal Block clearance issue. Enstrom has issued: SERVICE INFORMATION LETTER NO. 0187 Page 1 of 3 DATE: November 9, 2016 1. SUBJECT: Universal Block, P/N 28-14117-11 2. MODEL: F-28A, F-28C, F-28F, 280, 280C, 280F, and 280FX 3. EFFECTIVITY: All S/N having received or are scheduled for T-T strap modification via STC SR03465CH; Excludes F-28F S/N 832 and subsequent and 280FX S/N 2147 and subsequent. This SB allows rework of the surface of the Universal Block.

FLAPPING HINGE BEARINGS

We have heard from an Enstrom shop that a track and balance issue after the mod kit was installed was caused by worn flapping hinge bearings. They suggest that you look **VERY** closely at your flapping hinge bearings when it is apart and make sure they are not notchy. They had two customers put in the kit and then they could not make it stay in track. So they had to take it apart once more and change out 2 of the flapping bearings(there are 6 total).

Installation Procedures

(2)

1. Install the grip seal onto the spindle.

- Remove the spring from inside the grip seal (Fig 2, Item 8) and discard. (Fig 3).
- Coat the lip surface of the seal and the surface of the spindle (1) with the same grease that will be used in the retention assembly and install the seal (8) onto the spindle.

Tip- the grip seal, item 8, is already installed in the grip. All you need to do is apply grease to the lips of the seal, prior to installing the grip. An Allen screw which is supplied and can be found in the hardware bag needs to be installed in each grip. The original Allen screw will be too long and should not be used.

NOTE

The open side of the seal must be facing inboard (towards the center of the hub, this is to prevent the retention assembly from being pressurized when it is greased)

2. Assemble the feather bearings (9 & 11) and the spacer (10) onto the spindle. (Fig 3)
 - Place the spindle on a block, (Fig 4) coat the bearing surface on the spindle (1) and the inside of the feather bearing (9) with grease.
 - Carefully place the larger of the two feather bearings in place. Tap it lightly to seat it on the bearing and press it into place. (Fig 5)
 - An alternative method of installation is to heat the bearing to about 200°F with a heat gun. The bearing should then slip onto the spindle without pressing.
 - Install the spacer (10) and the outboard bearing (11).
 - Install the retaining ring (12).
 - Install tool T-0036 between the spindle (Item 1, Fig 2) and the inboard seal (8).
 - Thoroughly lubricate the inside of the outboard seal (Item 16 Fig 6) and the outboard end of the spindle with grease.
 - Install the grip over the spindle, making sure that the outboard seal pushes up over the chamfer on the outboard end of the spindle and that inboard seal starts into the grip.
 - Use a rubber hammer to fully seat the grip over the inboard seal.
 - Remove T-0036 and tap the grip fully onto the spindle.



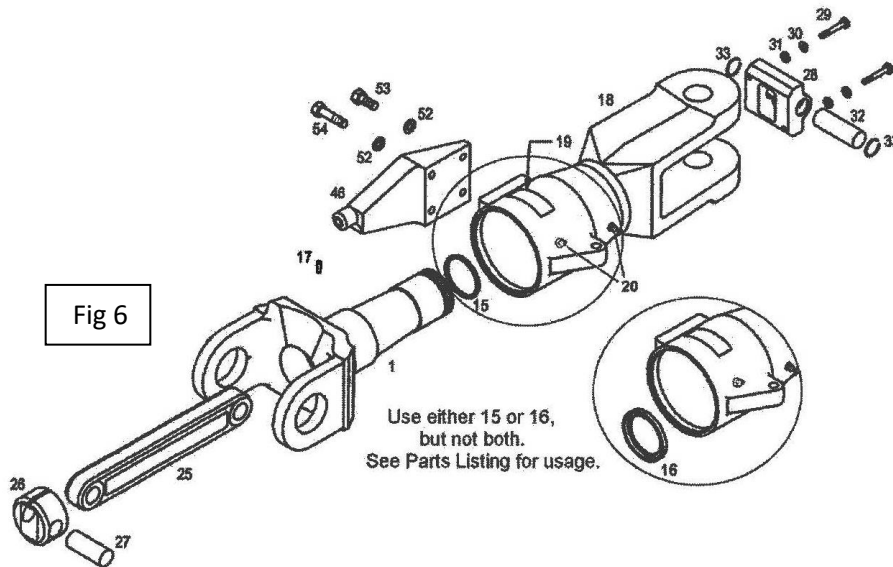
Fig 4



Fig 5

NOTE

The bearings should press onto the spindle with very little force. If a lot of force is required, the bearing is most likely cocked.



3. Installing the straps.

- Lay the spindle assembly flat on blocks.
- Check that the TT strap slides all the way through the spindle with no restrictions.
- Coat the bore and machined surfaces of the spindle (1) on both ends with a light coating of grease to prevent corrosion.
- Insert the outboard pin retention block (Fig 5, Item 28) between the grip (18) ears and insert the two retaining bolts. (29) and washers (30 & 31).
 - #31 is an AN960-10 washer
 - #30 is an AN960-10L washer
- Thread the two bolts into the grip but leave them a little loose to facilitate the installation of the strap retention pin.
- Insert the TT strap (25) into the inboard retention cylinder and install the shorter of the two pins (27). (The direction of the TT strap is not important)
- Insert the TT strap and retaining cylinder into the spindle.
 - It will be necessary to slip the outboard end of the TT strap into the outboard retaining block and also to align the slot in the cylinder with the pin that is inserted into the top of the pocket that is machined into the inboard end of the spindle.
 - The TT strap should be installed completely into the outboard retention block so that the outboard pin can be installed.

CAUTION: Ensure that the retention lug seats flat on the surface of the grip. If there is a gap, contact Airwolf



- Install the outboard pin (32).
- Coat the two retaining rings (33) with grease to prevent corrosion and insert them into the retaining block.
- Coat the treads of the two block retaining bolts (29) with low strength Loctite (Purple or Blue) and torque to 20 to 25 in-lb. (Fig 6)
- Seal the gap around the inboard retention cylinder with DOW 732 or an equivalent silicone sealer. Be sure to also coat the machined surfaces of the spindle around the pocket to prevent corrosion. (Fig 7)



Fig 7)

(5)

4. Installation of TT straps on older hubs may require reworking the U block to allow clearance between the U block and the TT strap retention cylinder in accordance with Enstrom SIL 0187.

- Remove the flapping bearings using tool T-0151-1.
- Measure the thickness of both sides of the U block using a micrometer or Vernier caliper.

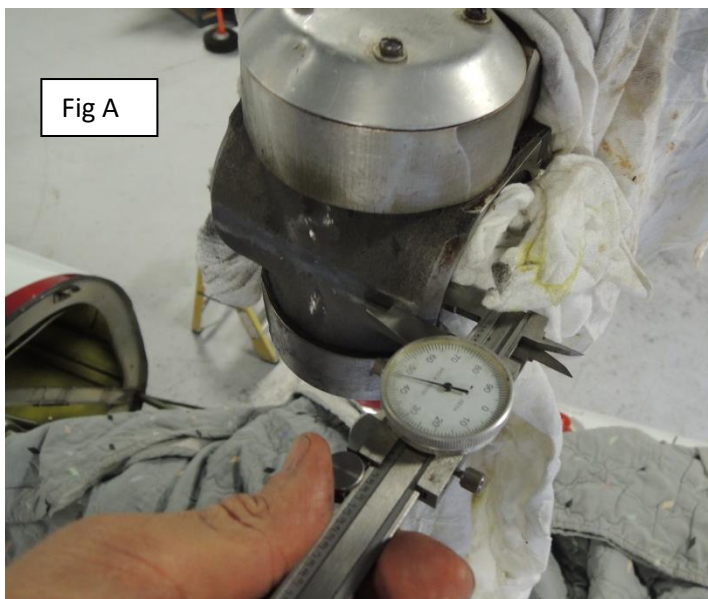


Fig A

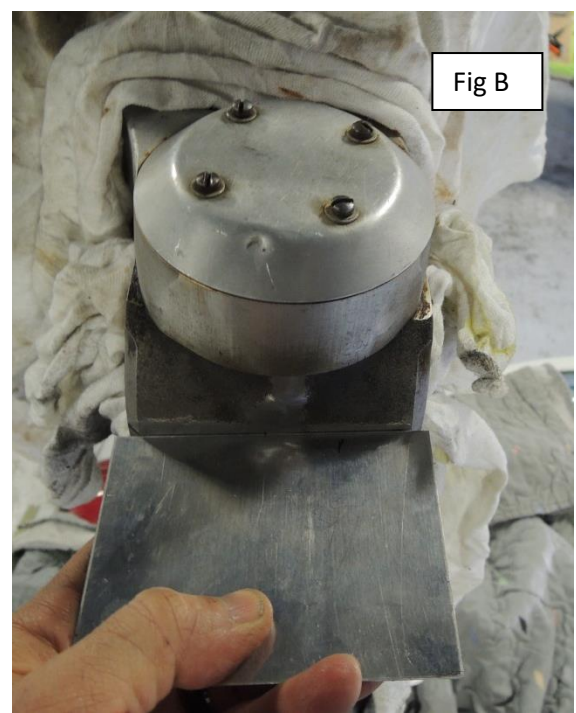


Fig B

Fig C



- Work the two edges to the proper dimension in accordance with the SIL and use a straight edge or similar tool to determine that the wall thickness of the U block is uniform across the entire U block outside surface. (Fig A & B).

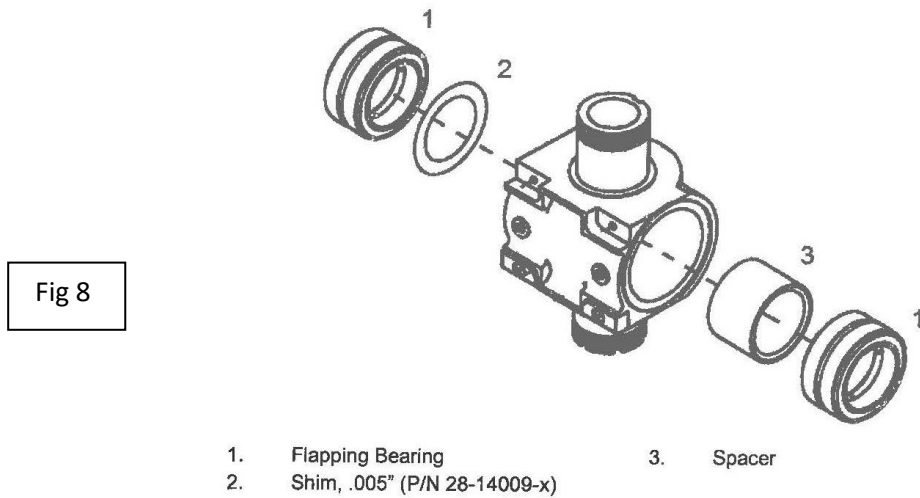
- A feeler gauge and a straight edge laid vertically across the hub plates can be used to determine that the U block surface is universal in the vertical axis. (Fig C)

4A. Installing the retention assemblies on the hub. There is a modified procedure for shimming flapping bearings outlined in SIL 0147R1.

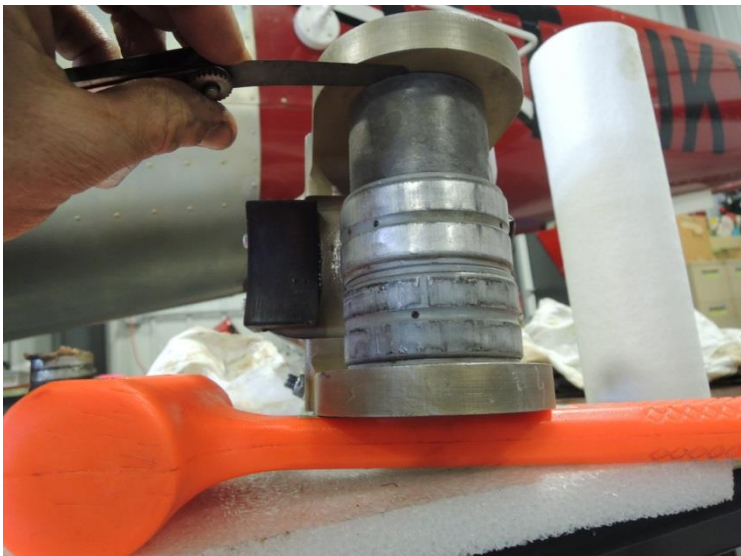
- Determine if the flapping bearings are in good condition.
 - Insert the flapping pin into one of the flapping bearings enough that it penetrates only one bearing.
 - Pullout on the pin (mimicking the direction that the blade would pull on the bearing in flight) and rotate the pin back and forth to feel the bearing.
 - If the bearing feels rough, it requires replacement.

- Insert the pin into the other bearing from the other direction and check its condition.
- Replace any flapping bearings that feel rough. If more than one bearing requires replacement, Enstrom suggests complying with SIL0147R1. (See next section) You may contact Enstrom Customer Support for additional information and instructions about how to replace flapping bearings.

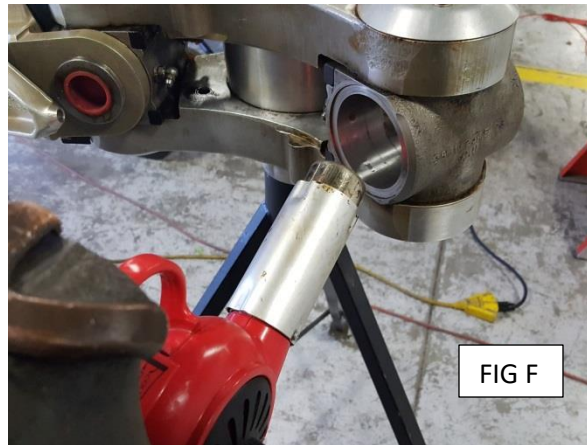
- Determine if the flapping bearings were shimmed internally.



- This can be done by researching the service letter compliance history of the helicopter and also by looking into the center of the flapping bearings with a flash light.
- If the hub has been modified, you will see the edge of one of the internal shims, (Item 2, Fig 8).
- Shim the flapping bearings internally in accordance with SIL-0147. An easy way to determine the shim thickness is to lay the spindle on its side and to lay the two flapping bearings and the spacer on the bottom ear. Use a feeler gauge or the 28-14009-() shims to determine the proper thickness of the shim stack up. (Fig D & E)



- Installing the flapping bearings into the U block is easier if the U blocks are heated to approximately 230F. (Fig F)



- Use T-0151-1 to ensure that the flapping bearings, spacer, and shims are pressed together and that the flapping bearings extend out of the U block the same amount on both sides.
 - If the hub has been modified IAW SIL 0147, the retention assembly should be installed in accordance with MM-9-28 Paragraph F, (1-5), 6 (b) and 7-11.
 - If the hub has not been modified in accordance with SIL0147, install the retention assemblies in accordance with MM-9-28 Paragraph F, (1-5), 6 (a) and 7-11.
5. Lubricate the hub & grips IAW MM-4-34, paragraphs 4-27 through 4-30.
 6. Install dampers and blades, and bleed dampers.

POST INSTALLATION TEST FLIGHT

IMPORTANT SAFETY NOTE

It can be expected that there will be a significant change in the collective pressures resulting from the change to TT straps. Expect significant light collective forces during initial test flights until the collective spring capsule has been adjusted.

PLEASE BE SURE TO INFORM THE PILOT PRIOR TO TEST FLIGHT

Spring Part No	Position	Nominal length
28-16229-13	Outside	8 in
28-16229-15	Outside	7 in
ECD037-11	Outside	6 in
28-162004-11	Inside	8 in
28-16222-1	Inside	7 in

The table above is a list of available springs; the longer springs have the highest spring tension.

7. Make an initial test hover flight to check blade track and collective spring forces in accordance with section 12-12 on page MM-12-66 in the F-28F/280F series maintenance manual.

- If the helicopter requires tracking, track blades in accordance with the instructions in the Tracking Tip's work aid in the technical support section of the web site.

<http://www.enstromhelicopter.com/wp-content/uploads/2013/09/TrackingTips.pdf>

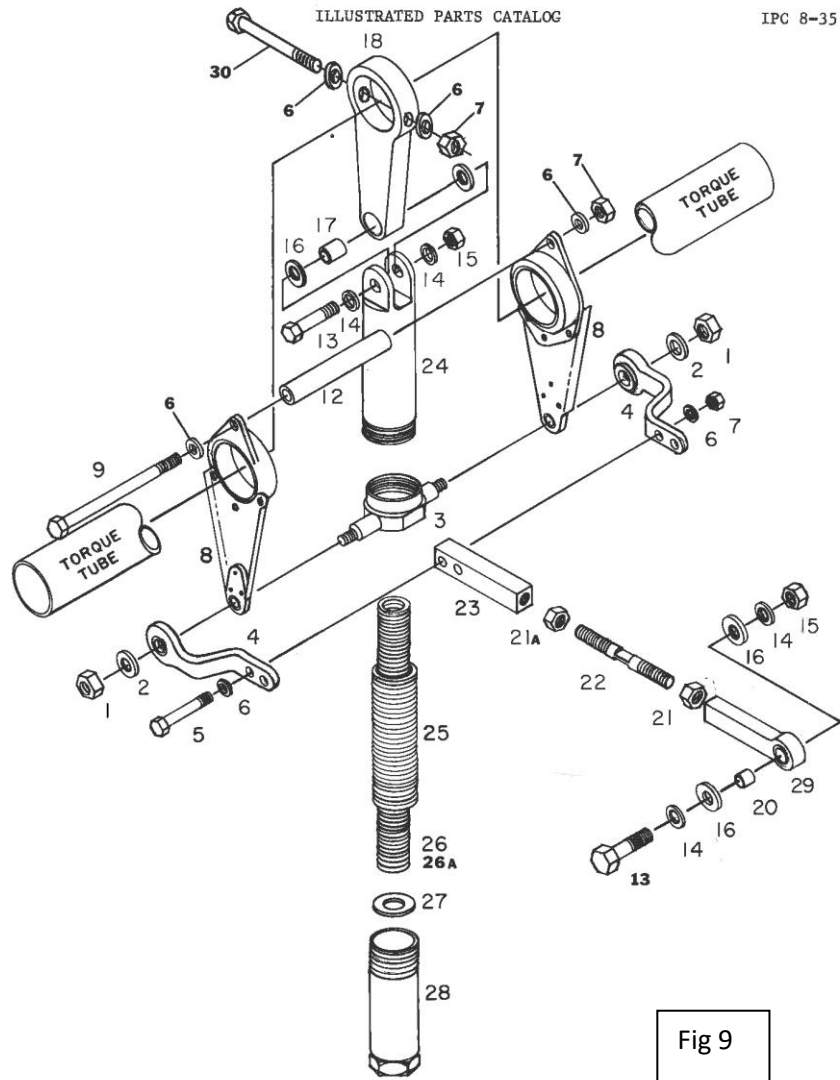
- Adjust the collective in accordance with section E on page MM-12-25 in the F-28F/280FX Maintenance manual.
 - The tie rod changes the relationship between the spring forces pushing the collective up and the spring forces pushing the collective down.

NOTE:

After TT Strap installation the blade tabs should be zeroed out prior to beginning to track and balance the helicopter.



Fig 10



COLLECTIVE TRIM, SPRING CAPSULE
FIGURE 8-11

When the collective spring system is correctly adjusted, the collective will tend to stay down when it is all the way down, and as the pilot starts to pull pitch, the forces felt should remain constant over the entire range of collective movement.

- If the collective initially springs up as the pilot begins to pull pitch, the spring capsule tie rod (Fig 9, Item 22) needs to be shortened.
- If the collective initially feels heavy, as the pilot begins to pull pitch, the collective spring capsule needs to be lengthened.
- Within these parameters, once the helicopter is in a hover, as the pilot pulls up on the collective or pushes down on it, the up and down forces must be equal.
 - This adjustment is controlled by adjusting the spring capsule (28), screwing it in or out.
 - If the force required to push the collective down is greater than the force required to pull it up, the capsule (28) needs to be backed out.

- If the capsule is backed out to the point that the external threads (28) are even with the top of the pivot housing (3), the springs will have to be changed internally. (see Page MM-12-24 in the F-28f/280FX maintenance manual, section B & C)(Fig 10)

CAUTION

There are extremely high spring forces within the capsule when it is compressed. Do not attempt to remove it from the helicopter without installing T-0022 (Capsule restraining tool).

- For C and A series aircraft, the center spring can be removed and discarded.
- F series aircraft incorporate a correlator which has additional springs, and the over-center function of the bellcrank (18) will not actually allow the capsule (28) to move far enough to go over-center without contacting the arms of the pivot brackets (4).
 - Enstrom has developed a slightly redesigned tie rod kit to replace the arms (4) and tie rod assembly (21 – 23). The part number is 28-16242-(XXX) and the installation is described in Enstrom SIL0184R2.
 - Installation of the tie rod kit will allow the bellcrank to go over-center and will allow the collective to remain on the down stop without holding, but may not resolve light collective due to changing from Lamiflex bearings to straps.
 - If the collective can be adjusted to go over-center but cannot be adjusted for equal up and down pilot forces, the spring in the capsule will need to be changed to the ECD037-11 spring.



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Revised: 2-5-18 added "Tip- bearing #8" to page 3/ 2-14-18 added disassembly of spindles / added note for removing phenolics on spindle / Rev 3-13-18 added note for Universal Block Clearance. /Rev 3-28-18 Added note to check flapping hinge bearings. Rev 5-15-18 added U-block clearance info, grip Allen screws need to be installed and added note on zeroing tabs. 8-21-18 made test flight note bold. 1-25-19 changed spring capsule service letter to rev2 SIL0184R2.