

# **Section 15**

## **Cog Belt Drive**

---

**Procedures covered in this section:**

Install and tension cog belt; install cog belt tensioner; fabricate and install main shaft safety spacer.

**Cards used in this section:**

E49 CARD 2T (Rotor System)                      E49 CARD 3T (Spring Tensioner)

**Prints used in this section:**

E23-2000 (Secondary)                      E49-2001 (Main shaft/cog)                      E49-8600 (cog tensioner)

**Templates used in this section:**

None

**Tools require for this section:**

Air or electric drill	Belt tension tool	Drift punch	Torque wrench
Allen wrenches	Center punch	Hacksaw	Screw drivers
Band saw or hacksaw	Digital protractor	Ruler	Straight edge

Drill bits of the following sizes: 3/16"

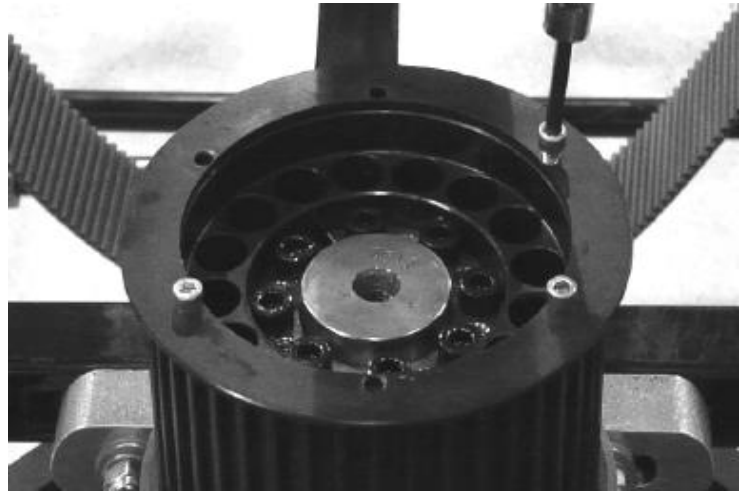
Ratchet with sockets of the following sizes: 3/8", 1/2"

Wrenches of the following sizes: 3/8", 7/16", 1/2"



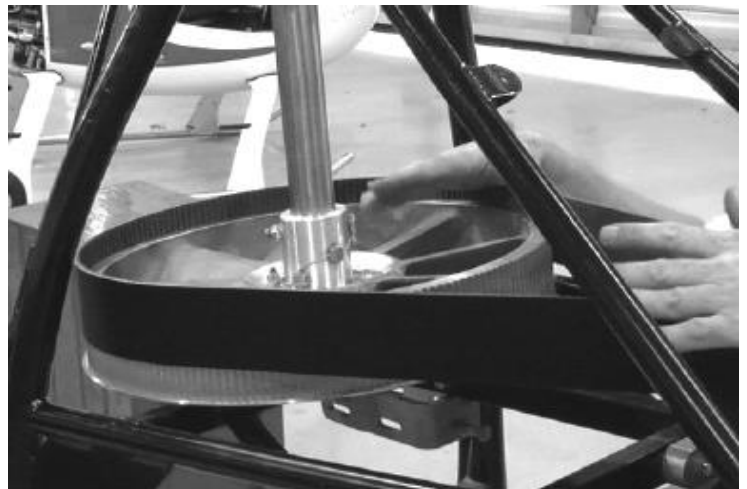
**Photo #1**

Remove the top excursion ring from the secondary cog belt sprocket by removing the six socket head bolts.



**Photo #2**

Slide the belt carefully down until it bottoms against the bottom excursion rings on both sprockets.



**Photo #3**

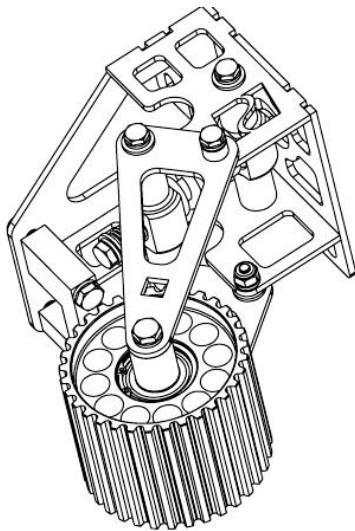
Push inward on the belt with a force of five pounds, then push outward with a force of five pounds. The total distance should be  $5/8$  to  $3/4$  inch. This should be measured mid-span between the two sprockets. To tighten the belt, install shims equally between the square drive tubes and the top and bottom bearing mounts on the secondary drive unit.





**Photo #4**

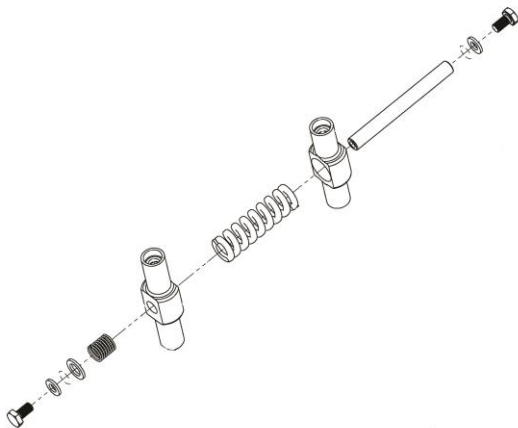
Note: After correct alignment and tension of belt is achieved, rotate the main sprocket a few times to check for smooth operation. The belt should track in the center of sprockets. If the belt walks up when turning by hand, check to see if secondary shaft is tilted. It should be 0.1 degree (one tenth of a degree) aft and 0.1 degree to the pilot side, compared to the main shaft.



**COG BELT TENSIONER**

**Photo #5**

Refer to print E49-8600 and card E49 CARD 3T for assembly of cog belt tensioner.

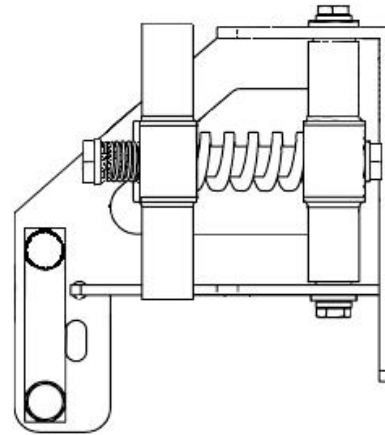


**Photo #6**

Assemble spring assembly.

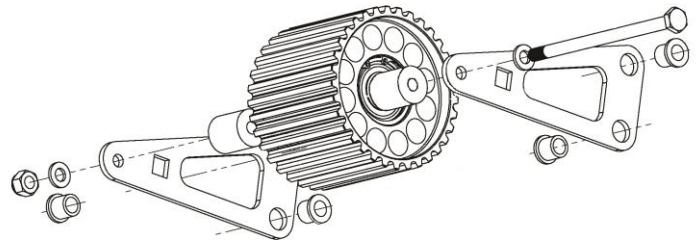
**Photo #7**

Hold spring assembly into tensioner bracket, while pressing or lightly tapping bushings into frame and tensioner spring retainer. Bushings do not require grease. They are made from MDS filled nylon.



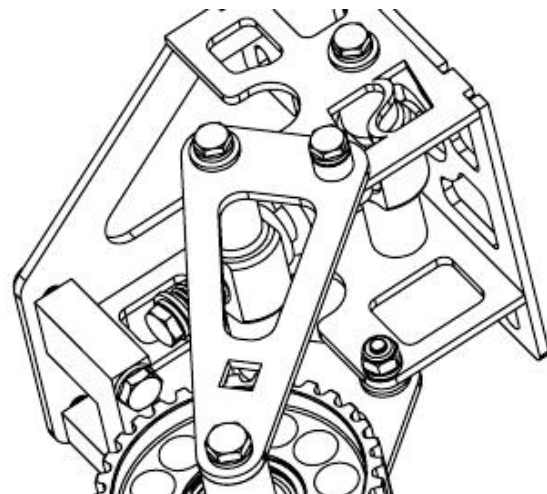
**Photo #8**

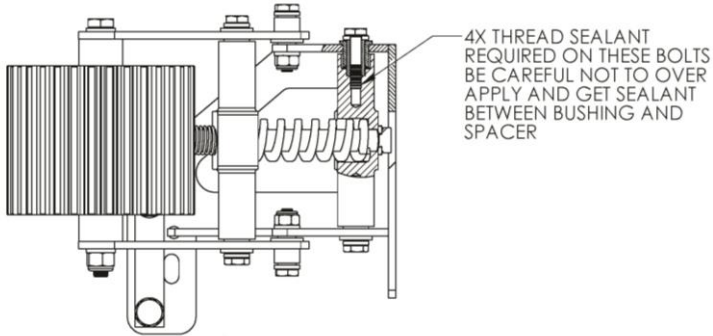
Install bushings into tensioner arm plate, then install pulley and spacers. Torque pulley bolt E00-2041 to 7 ft. lbs. After torquing, the pulley should spin freely.



**Photo #9**

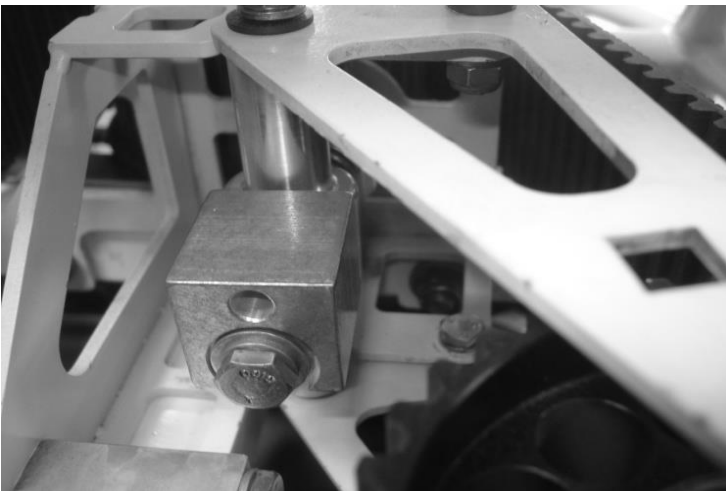
Install pulley and arm assembly on bracket.





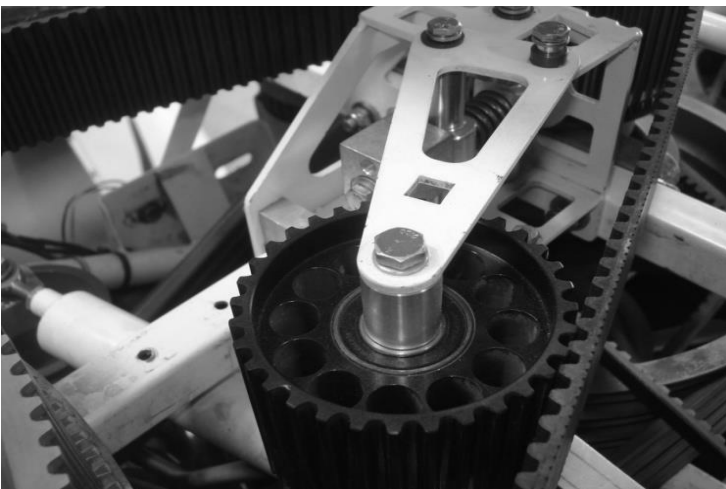
**Photo #10**

Use loctite 242 on the four bolts installed into the spring tension retainers. E49-8670, E49-8680.



**Photo #11**

Install the tension relief block tool (E49-8681) into the tensioner assembly. This will hold idler arm and pulley away from the belt for easy installation.



**Photo #12**

Mount the cog belt tensioner on the airframe square drive tubes. The idler sprocket should be towards the inside of the belt on the pilot's side of ship. The tensioner is held in place by the two 5/16" bolts that attach the secondary upper bearing mount to the airframe. Place two large washers between tensioner and nuts on the 5/16" bolts. Lightly snug the two 5/16" nuts allowing for adjustment of the tensioner.

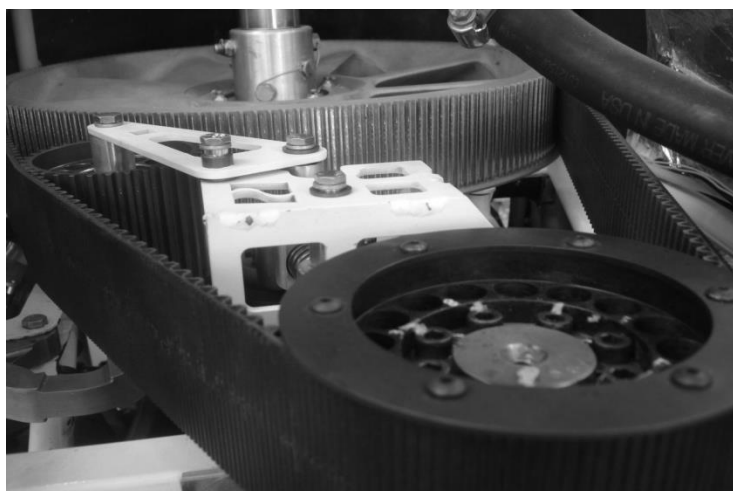
**Photo #13**

Make sure the tensioner pulley is parallel both fore/aft and laterally to the secondary.



**Photo #14**

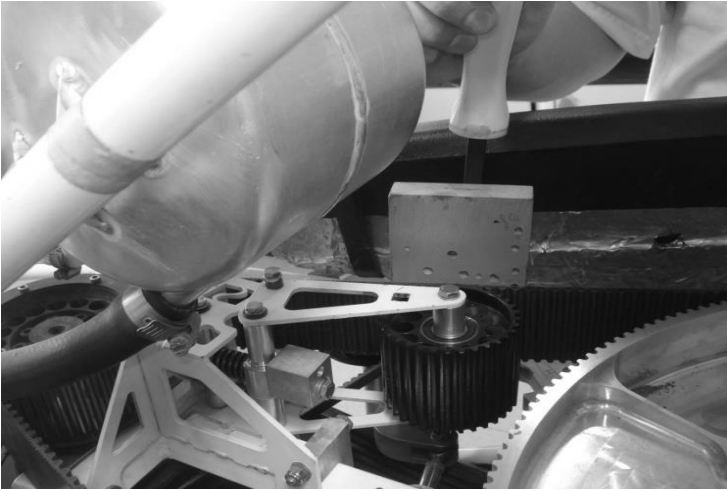
Adjust vertically for sprocket and belt alignment.



**Photo #15**

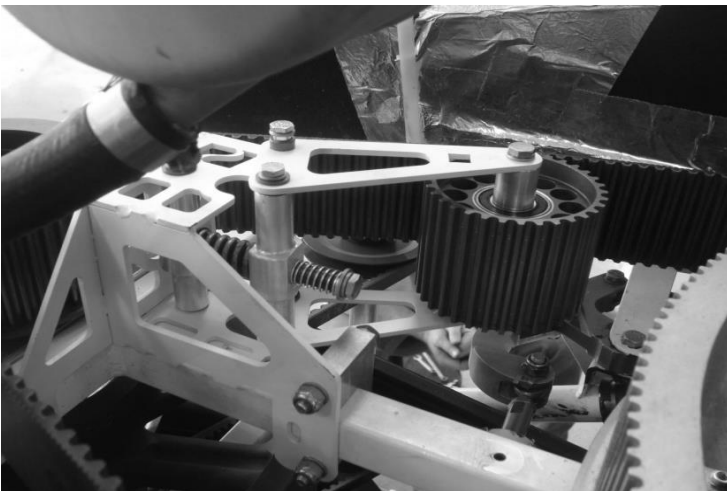
Install tensioner clamp E49-8695. Torque 5/16" nuts to 15 ft. lbs. that were left snug in Photo #12.





**Photo #16**

To remove the tension relief block you can use a piece of wood and pry bar, prying against airframe round tube below the tensioner pulley. Rotate the main sprocket to check the tensioner pulley height on the belt. The pulley should be centered on the belt.



**Break In Procedure**

**Photo #17**

Run the helicopter for 1/2 hour on the ground. Check belt alignment and tension after temperatures normalize. When checking belt tension use tension relief block to hold tensioner away from belt.



**Photo #18**

Install the top excursion ring on the rear sprocket using Loctite 242 on the threads of the bolts.



## **MAIN SHAFT SAFETY SPACER**

### **Photo #19**

Place the safety spacer E49-1260 (E49 CARD 2T) next to the main rotor shaft and mark where it will be cut for a snug fit. Seen on print E49-2001.

Note: Make sure the concentric part of the lock ring on the main shaft bearing is seated against the bearing before the aluminum safety spacer is measured. Failure to do this will cause an excessive gap between the main shaft lock ring and the sprocket hub. This must be a snug fit. On final assembly, set the lock ring with a punch and hammer and tighten the set screw.



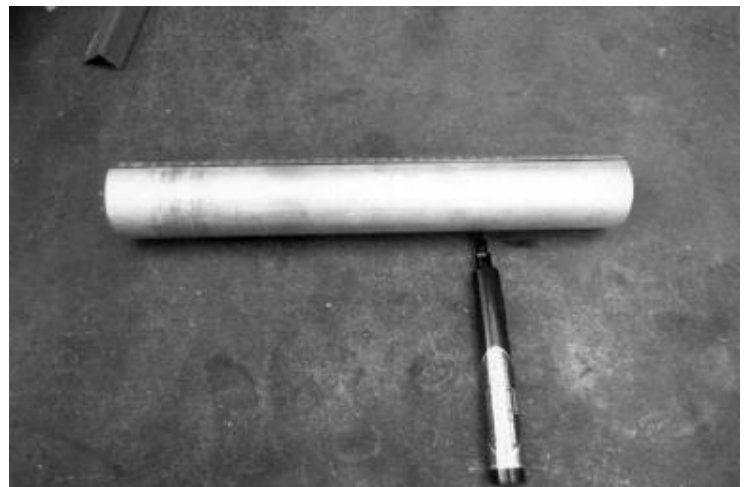
### **Photo #20**

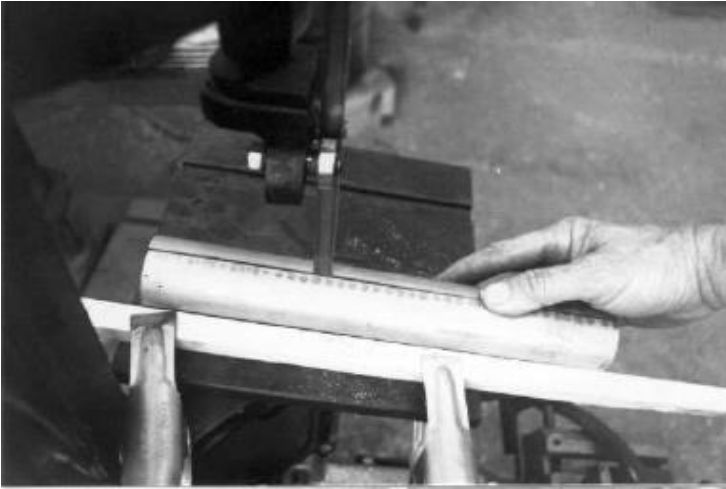
Check the fit of the safety spacer. It must fit snug between the lock ring and the sprocket hub.



### **Photo #21**

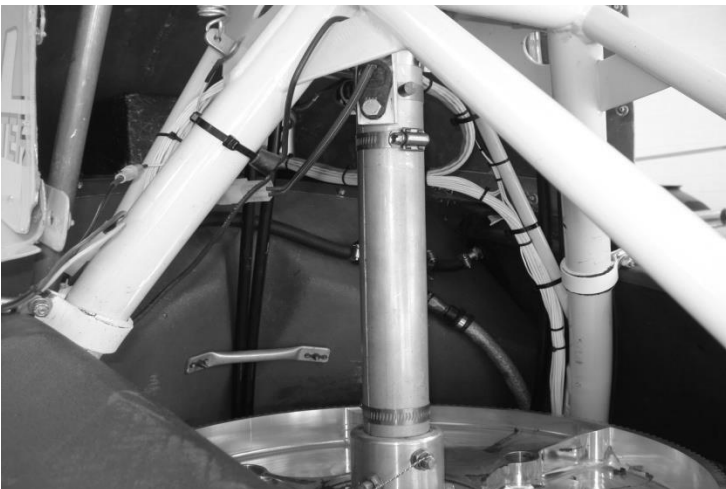
To make a straight line along the length of a tube, lay it on a flat surface. Lay a marker on the surface and slide it from one end of the tube to the other.





**Photo #22**

Clamp a board on the band saw table so that when the tube is against the board, the saw blade is centered on the tube. Turn on the saw and slide the tube along the board. The saw blade should stay on the line, cutting the tube in half.



**Photo #23**

Deburr the edges of the safety spacer and install it on the shaft with hose clamps. Upon final assembly apply a coating of grease to the main rotor shaft to prevent surface rust.

## **FINAL CHECKLIST**

1. Front and rear sprockets should be the same height. Measure from bottom excursion rings.
2. Secondary and idler sprockets should be parallel to each other both fore/aft and laterally.
3. Secondary sprocket should be tilted 0.1 degree aft and 0.1 degree to pilot's side compared to main rotor shaft. This ensures good belt tracking.
4. Make sure all bolts are properly tensioned, safety wired and/or Loctited. Also check that bearings are Loctited, locking rings set and set screws are tightened.
5. Cog belt should be tensioned (with tensioner relief block installed) so that 5 pounds force in each direction gives 5/8" to 3/4" total belt movement at 70 degrees F.
6. Tensioner pulley should be centered on cog belt.
7. Cog belt should stay centered on sprockets. Belt should not ride up on the excursion ring.