Section 12
Engine, Torque Link and Clutch

Procedures covered in this section:
Install upper engine mount cup; install engine; fit and install torque link; assemble and install clutch and idler pulley; install and tension main drive belts.

Cards used in this section:

HARDWARE CARD	E24 CARD 1F	E24 CARD 3F	E33 CARD 1F
E13 CARD 1F	E24 CARD 2F	E27 CARD 1F	

Prints used in this section:

E27-2000	E49-2001

Templates used in this section:
E13-1

Tools required for this section:

Air or electric drill	Floor jack or	Metal cutting snips	Spring scale
Allen wrench 1/4"	scissors jack	Pliers	Straight edge
Band saw	Grinder	Pop rivet gun	Tap: 5/16-24
Dial calipers	Level	Ruler	Tap handle

Drill bits of the following sizes: 1/8", 5/16", 7/16"
Ratchet with sockets of the following sizes: 1/4", 5/16", 3/8", 7/16", 1/2", 3/4", 11/16", 7/8"
Wrenches of the following sizes: 1/4", 5/16", 3/8", 7/16", 1/2", 3/4", 11/16", 7/8"

Notes:

1. ENGINE: Before beginning any work with the engine, make sure the exhaust port holes have been taped over with duct tape. If this is not done and a washer or other object is accidentally dropped into the exhaust port, you will run the risk of damaging a valve the first time the engine is started.

2. LOWER ENGINE MOUNT SHIMS: Determine if the engine should be shimmed up or down and cut out the appropriate shims. (Refer to Section 3, page 2, photo #4.)

3. CLUTCH: The clutch applies a constant spring tension against the inside surfaces of the main drive belts. It is important that the centerline of the clutch idler pulley shaft be parallel to that of the secondary shaft in both the fore and aft and lateral planes. The top of the idler pulley should be installed in line with the top of the secondary drive pulley.

4. TORQUE LINK: Leave enough thread in the rod end for future adjustment.

5. IDLER PULLEY: When installing the idler pulley, be careful to hold close alignment with the main and secondary drive pulleys, as the idler pulley determines belt tracking.

6. TAIL BOOM SUPPORT: The tail boom support brace tubes can be removed form the airframe for easier access to the engine mount area. BEFORE REMOVING THESE TUBES, BE SURE THAT THE TAIL BOOM IS REMOVED OR PROPERLY SUPPORTED, OR DAMAGE TO THE AIRFRAME WILL RESULT.

ENGINE INSTALLATION

Photo #1

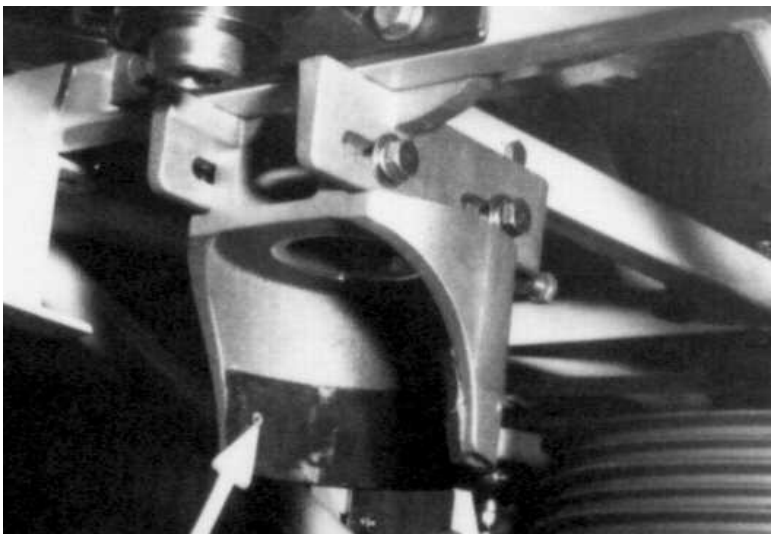
Use print E13-2000 and template E13-1 when installing the R.I. 162F engine assembly.
Parts as received from RotorWay International.

Photo #2

Fit the rubber strip so it covers the machined area on the inside of the upper engine mount cup. Glue the rubber to the cup with the 3M 2 part epoxy adhesive, also called “blade glue” (found on E33 CARD 1F). Rivet the rubber strip in place, using 1/8" washers on both pop rivets.

Photo #3

The cup is shown here bolted to the clevis for a better understanding of how they fit together.



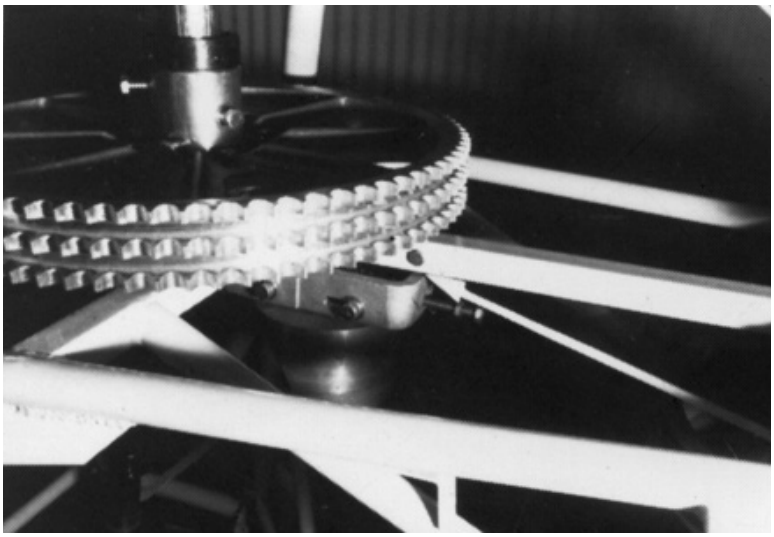


Photo #4

There should be a 1/8" gap between the rear of the upper engine mount clevis and the bottom of the square drive mount tubes. (See Section 8 page 2, photo #3.)

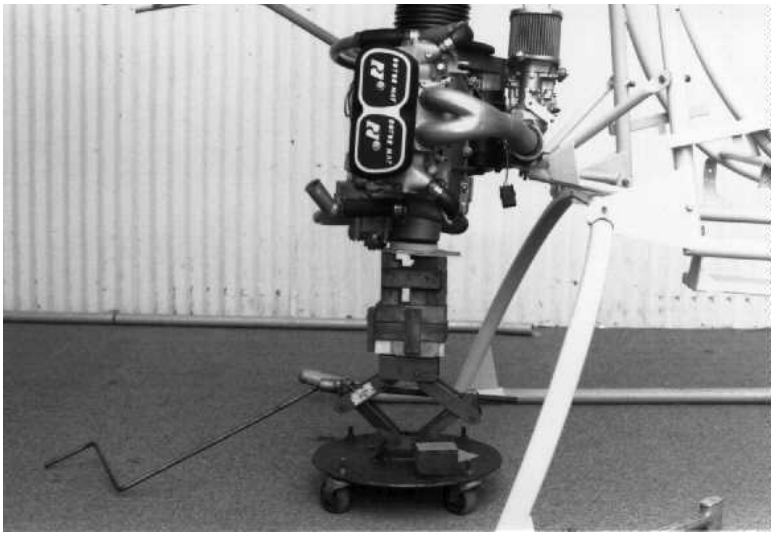


Photo #5

Place the engine mount support ring on a scissors jack and set the engine in it vertically, in a manner that will not allow it to slip off. The jack should be raised to a height of about 15". Have someone help you hold the engine; a drop to the floor from this height could cause considerable damage to the engine.
Note: Place the main drive belts over the top of the engine pulley while installing the engine.

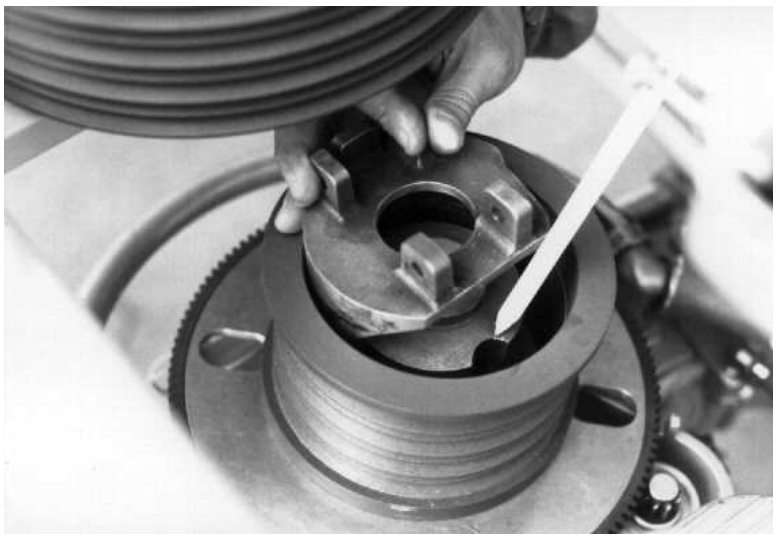


Photo #6

Place the upper engine mount cup into the main drive pulley mounted on top of the engine. Rotate the upper drive cup in the pulley so that the half moon (arrow) is toward the front of the engine.
Note: Although similar in size, the round boss on top of the drive cup is not supposed to fit inside the hole in the engine mount cup. When installed, the only point of contact between the two pieces should be the rubber lining.

Photo #7

On the engine pulley, note that the distance from the top of the uppermost groove to the top surface is .200" greater than that of the secondary pulley. If the engine was installed with the top of the engine pulley at the same height as the top of the secondary pulley, the drive belt would be .200" lower at the engine pulley. For future alignment, place a piece of masking tape on the engine pulley as shown and mark a reference line .200" below the top. Raise the engine until the upper engine mount cup fits into the clevis. Install the three 5/16" bolts that hold the engine mount support ring to the engine mount weldment.

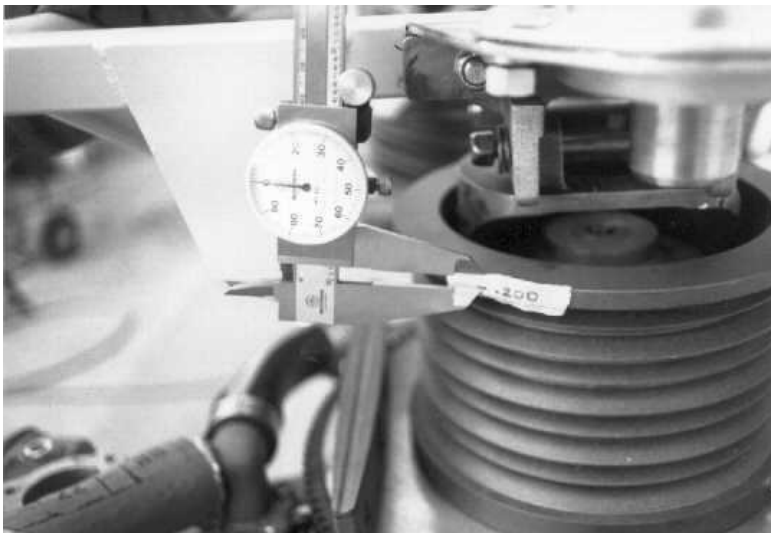


Photo #8

Place a level on the secondary pulley and shim under the skids until the bubble centers fore/aft and laterally.

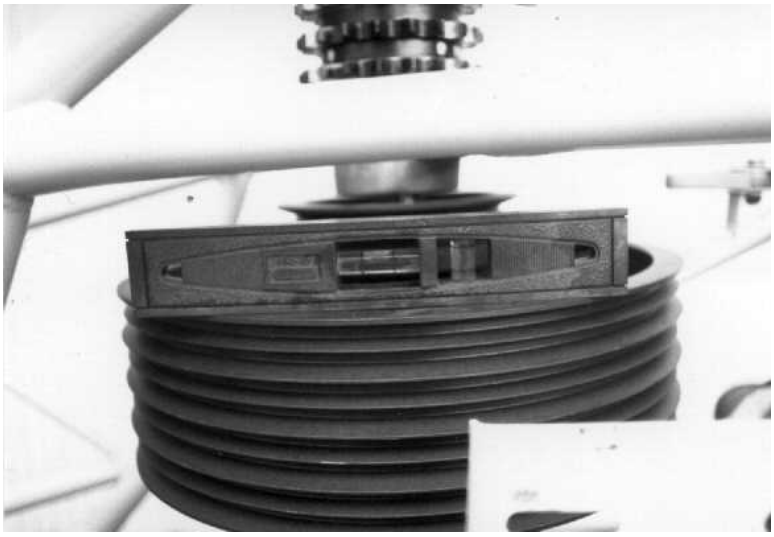
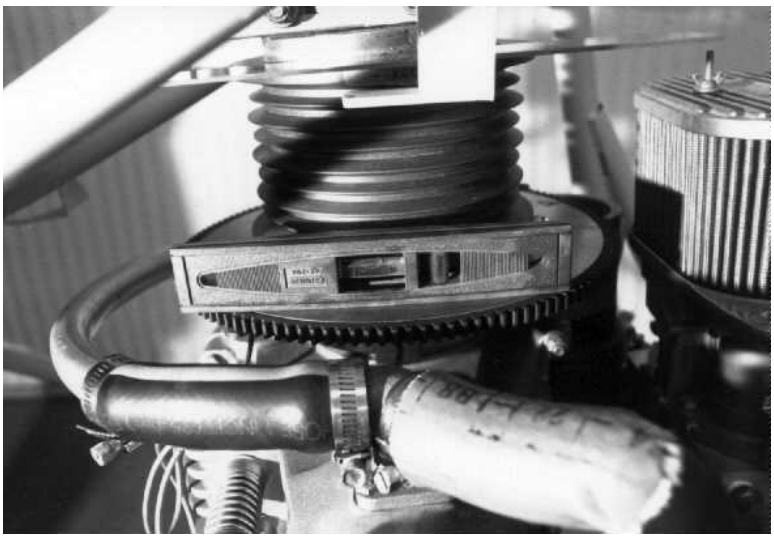


Photo #9

Place a level on the engine flywheel to check the fore and aft level. Move the top or bottom of the engine until the bubble centers.



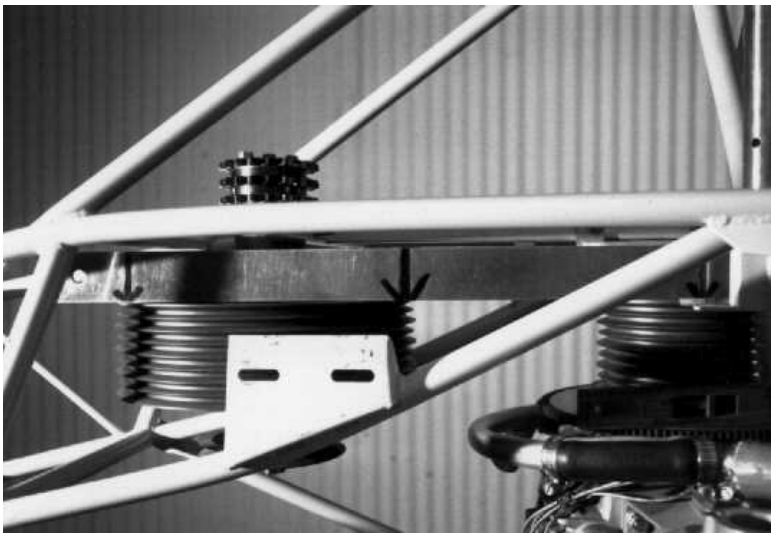


Photo #10

Check the alignment of the secondary pulley and the engine pulley. The straight edge should make contact with both sides of the secondary pulley and align with the mark on the masking tape that is .200" from the top of the engine pulley. Use shims on the lower engine mount to achieve the proper alignment, by either raising or lowering the engine.

Photo #11

Move the engine to the rear as far as the adjustment on the top and bottom mounts will allow.

Photo #12

Check on the pilot side to see that the valve cover drain does not hit the frame. The engine may be rotated by adjusting the torque link.

TORQUE LINK

Photo #13

Tap the arm of the torque link with a 5/16-24 tap and assemble it as shown on print E27-2000.

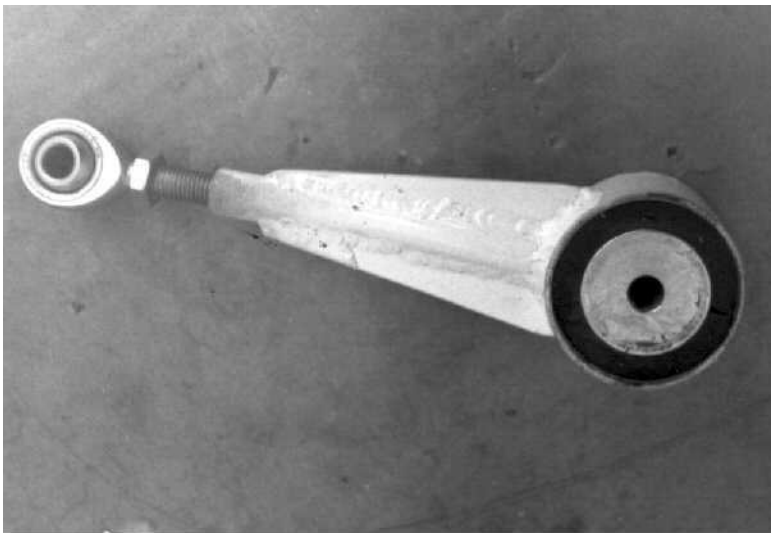
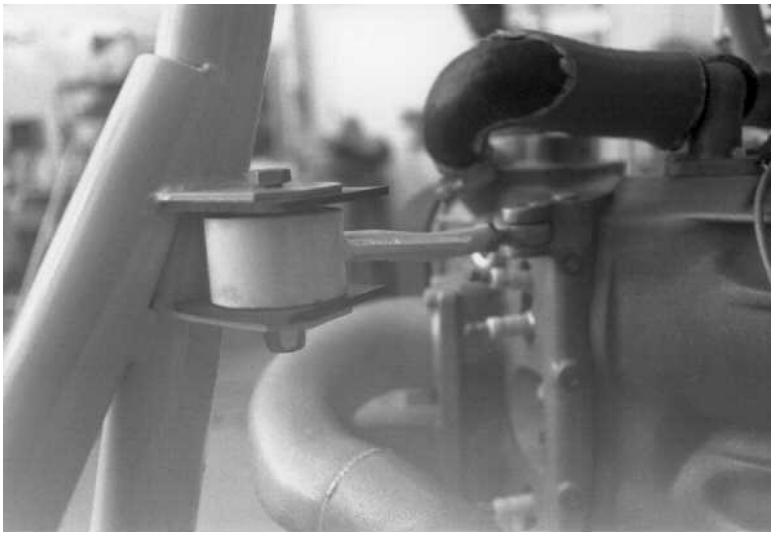


Photo #14

Fit the torque link by grinding off the top or bottom as necessary for alignment. When the engine is at the rear of the slots in the mounts, the rod end should not be screwed all the way into the torque link arm. It may be necessary to shorten the torque link as the engine is moved forward to achieve proper belt adjustment.



CLUTCH

Photo #15

Exploded view of the clutch assembly.

Photo #16

Drill 5/16" holes at each end of the clutch arm casting. Drill the 7/16" hole and fit the pivot bushing to the clutch arm casting. Cut the bushing to length so that it is slightly longer than the thickness of the casting, and it fits snug in the airframe bracket.

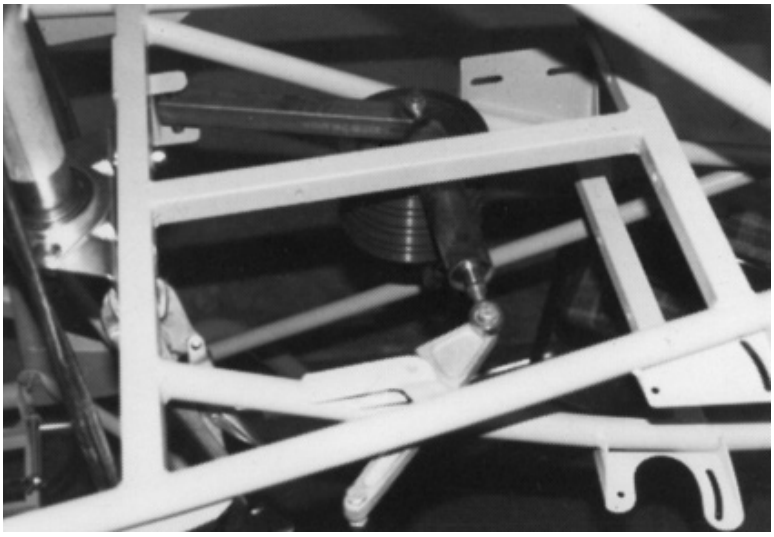


Photo #17

This is an overall view of the engine clutch and idler arm assembly installed in the airframe in the disengaged position.

Photo #18

Clean the inside of the clutch spring tube weldment so that the clutch tube piston will slide freely.
Note: Grease the springs, piston and inside of spring tube on final assembly.

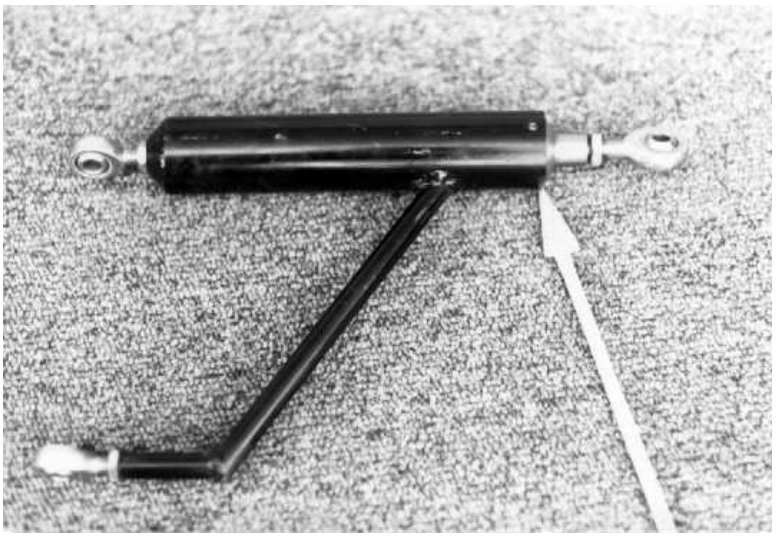


Photo #19

When the springs and piston are in the spring tube, the piston should be even with the end of the spring tube. When the pop rivets are installed, the assembly will have the correct pre-load.
Note: It may be necessary to grind the spring tube in the area shown by the arrow for clearance of the clutch arm casting.

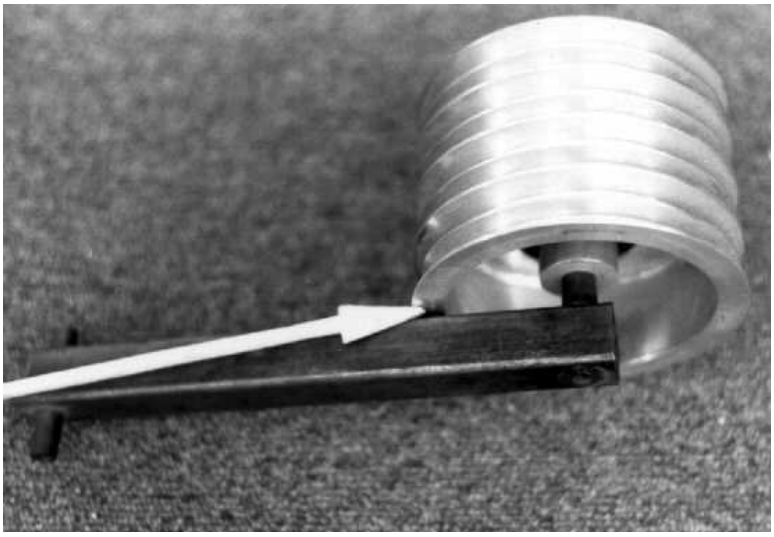


Photo #20

Install the idler pulley assembly on the idler arm weldment so there is 1/8" between the pulley and the square tube. Use washers to achieve this distance. Install the 1/2" nut on the idler arm weldment and secure the nut with blue Loctite.

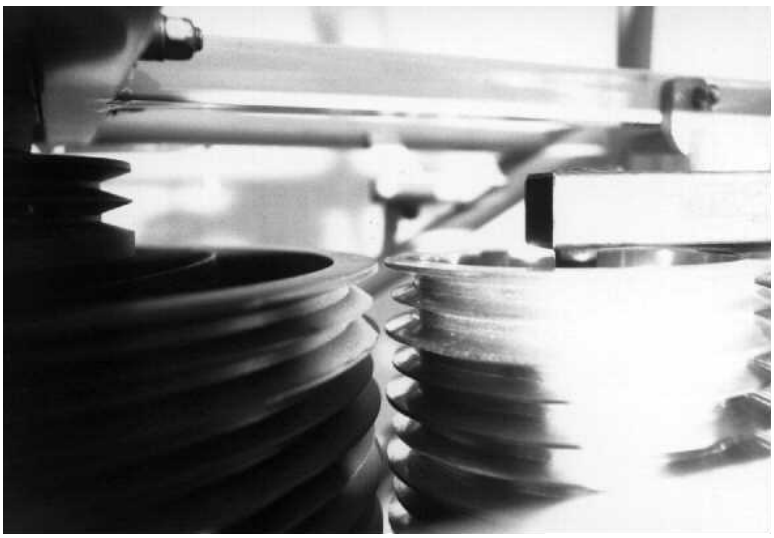


Photo #21

When the idler pulley is installed, it must be in alignment with the secondary pulley.

Photo #22

To adjust the pulley up or down, grind off the top or bottom of the bushing (arrow) as needed. (The ends must be ground 90 degrees to the bolt hole.) After grinding, the bushing must fit snug in the airframe bracket without any end play. Drill through the bushing with a 5/16" bit to fit the bolt.

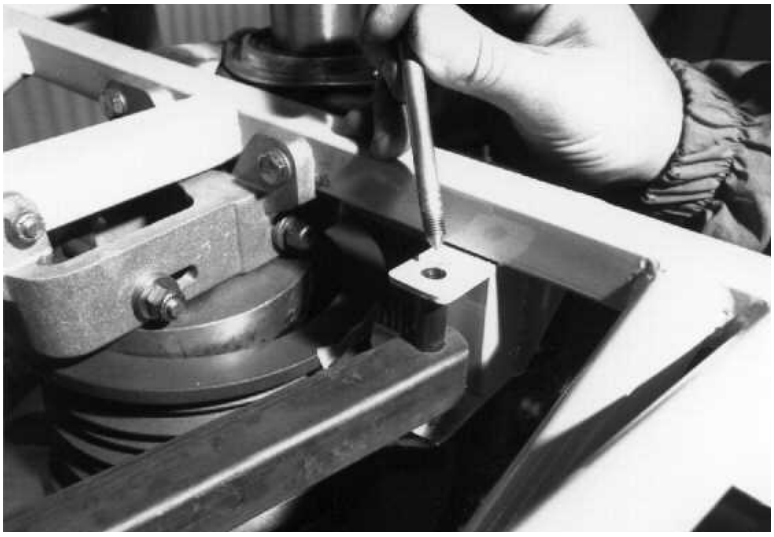


Photo #23

Drill a 5/16" hole through the top ear of the bracket only. Grind a 5/16" bolt to a point.

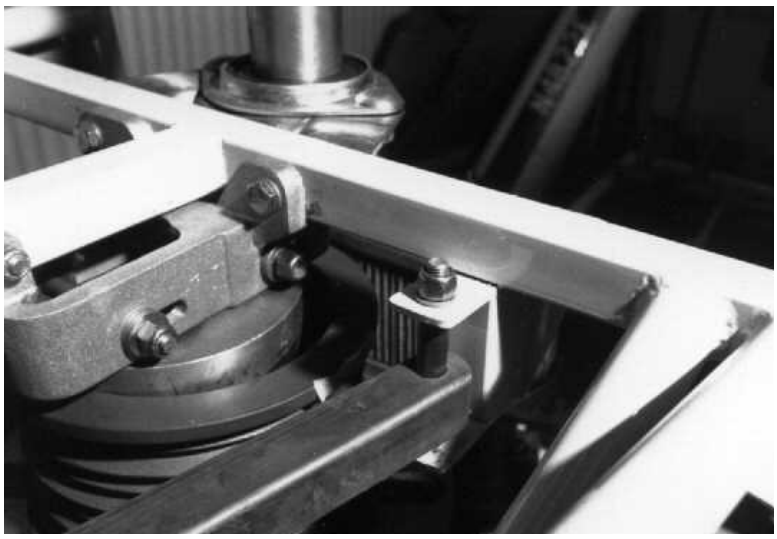


Photo #24

Use the pointed bolt as a punch to locate the center of the 5/16" hole to be drilled in the bottom ear. Drill a small hole then open it to 5/16". Grease the 5/16" bolt and install it from the bottom. (If the bolt is installed from the top, it will be impossible to remove it after the oil bath is installed.) Check all alignments and freedom of movement.

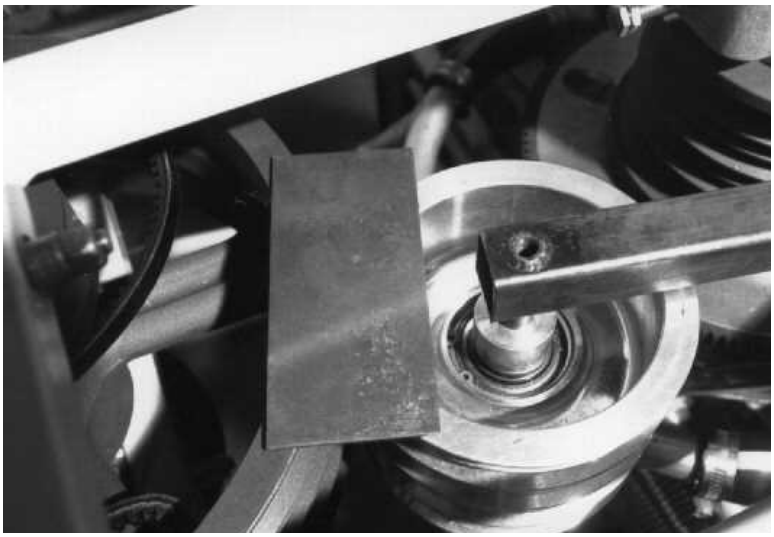


Photo #25

Use a flat piece of material to check the lateral parallel of the idler and secondary pulleys.

Photo #26

Use a straight edge to check the fore and aft parallel of the idler and secondary pulleys.

Photo #27

On final installation, use Loctite on the threads of the bolts on the top and bottom of the idler pulley assembly.
Note: Be careful not to Loctite the bolts to the inner race of the rod ends. Excess bending stress can occur if the rod end moves outward when the bolts are removed.

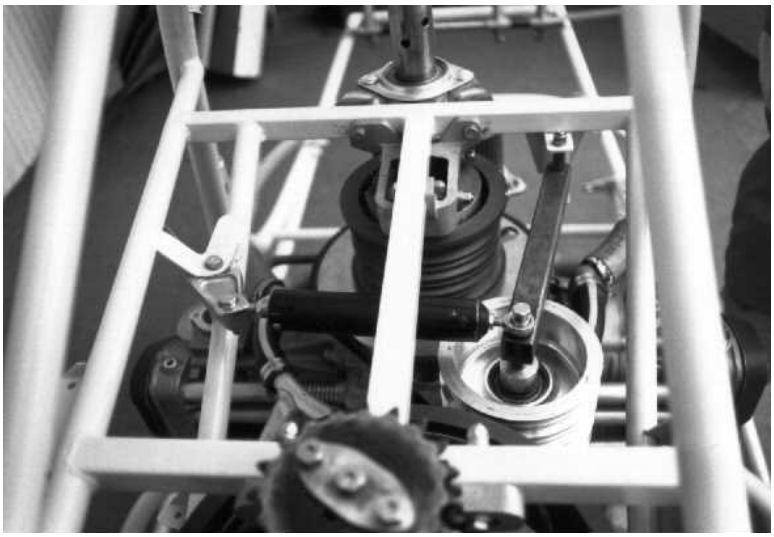


Photo #28

Install the remainder of the clutch assembly.

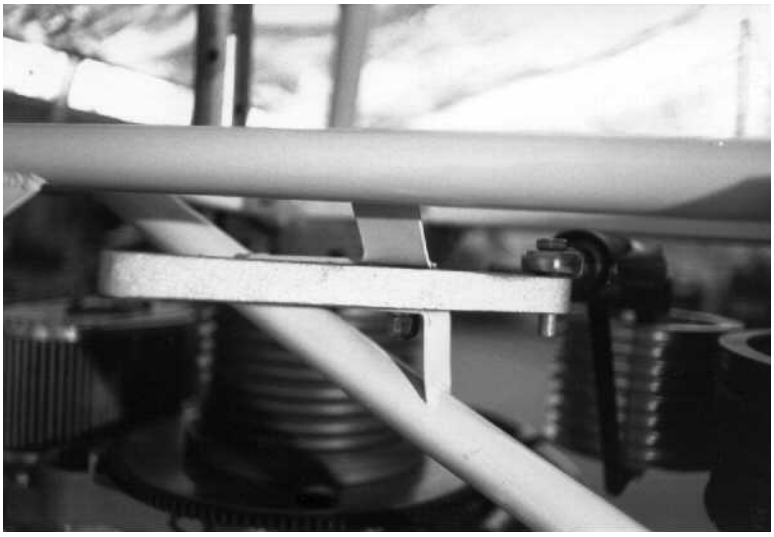


Photo #29

Check the clearance between the bottom of the square tube and the spring tube.

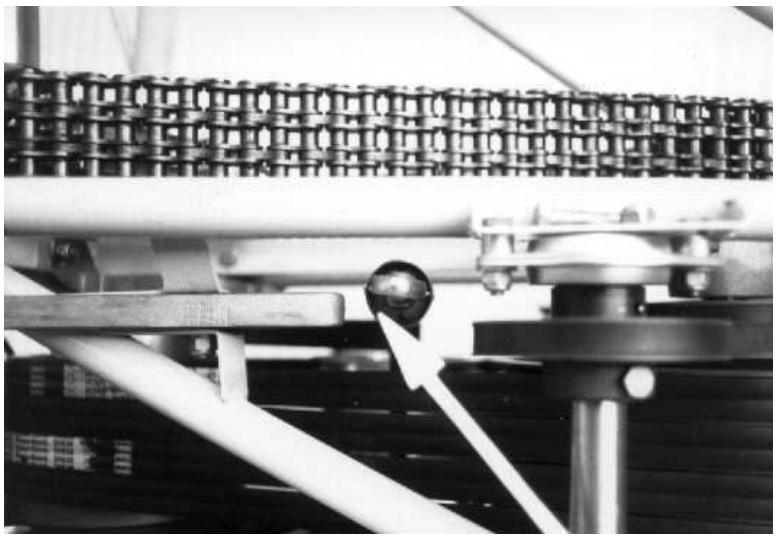


Photo #30

To achieve the correct main drive belt tension, disconnect the rod end from the clutch arm casting.

Photo #31

Make sure the idler pulley is not touching the drive belt.

Photo #32

Using a spring scale, pull seven pounds on one main drive belt. The belt should move 1/2". To change the tension of the main drive belts, move the engine. The top and bottom engine mounts are slotted for this reason. Remember, the secondary pulley and the engine flywheel must remain parallel and the same height. When the clutch is disengaged, the idler pulley should just touch the main drive belts on the passenger side. When the clutch is engaged, the piston should move approximately 1".