TAIL ROTOR DRIVESHAFT FABRICATION

Properly and carefully aligning the tail rotor driveshaft is a tedious and time-consuming process. It is important that you take time to install it correctly. If the pillow block bearings are not perfectly aligned, the driveshaft will constantly be subjected to stress which can ultimately lead to fatigue fracture. In addition, a driveshaft that is curved will produce vibrations that can’t be "balanced" away. It will cause excessive wear on the couplings on each end of the shaft.

The driveshaft is partially fabricated of 5/8” x .065” 4130 tubing when received, but must be completed. On the main transmission end of the shaft is a pre-made keyway to secure a hub and bushing. On the tail rotor end of the shaft is an insert that must be welded inside the driveshaft when the correct length is determined. It will have a star coupling to mesh with the star coupling installed on the tail rotor assembly. Along the shaft are six pillow block bearings that maintain the position of the driveshaft and allow it to spin.
Begin by installing the pillow block bearings on the driveshaft. The driveshaft should be sanded smooth, and the inside of each bearing sanded until the bearing will barely slide on the shaft. Do most of the sanding on the inside of the bearings, rather than the shaft. Slide all six bearings onto the shaft and space them in the approximate position they will occupy when installed on the tail boom.

From the Tail Rotor Driveshaft Kit, install one half of the orange flex coupling onto the hub and bushing installed on the transmission output to the tail rotor. Use the AN74-A4 bolts with an AN960-416 washer (packed in the box with the coupling) under the bolt head. Finger tighten these bolts.

Position the driveshaft on the tail boom. Loosely install the other hub and bushing onto the tail rotor driveshaft end that has a machined keyway using the key included in the Tail Rotor Driveshaft Kit. The shaft should be flush with the surface of the hub and bushing. Loosely attach the hub to the orange coupling half that you have installed. Allow the tail rotor end of the driveshaft to extend past the side of the tail rotor assembly.

Position each of the pillow block bearings on the mounting plates welded along the top plane of the tail boom so that they support the driveshaft along its length.

Insert the nylon star from the Tail Rotor Driveshaft Kit into the star coupling installed on the tail rotor assembly.

Use a square or other tool to transfer the indicated length of the driveshaft from the transmission attachment to the face of the nylon star, less 1/16” to 1/8”. Cut the shaft, square and smooth the cut, and move it into position. Remember that it is cheaper and easier to cut or sand more off than to replace the driveshaft, so be conservative.

When the shaft is cut to length, push the insert provided with your driveshaft into place flush with the cut end of the shaft and fuse the end.

Smooth any rough edges at the end of the shaft, and slide the star coupling onto the shaft until the end of the shaft is flush with the inside of the coupling. Drill a pilot hole through the hole in the star coupling and through the shaft with insert and then enlarge it to ¼”.

Fasten the star coupling to the shaft using an AN4-15 bolt with an AN960-416 washer under the bolt head and under the AN310-4 castle nut. Torque and cotter pin the nut using an AN380-2-2 cotter pin.
DRIVESHAFT INSTALLATION

The pillow block bearings now need to be moved into their final positions along the shaft. Move each bearing so that it is centered on the mounting plate welded onto the top plane of the tail boom, using the holes in the mounting plates as a guide. The holes in the bearing housing are larger than the holes in the mounting plate. When permanently installed, the bearings will be held in position by the use of penny washers drawn down in the center by the bolt and nut securing the housing. If the front bearings will require shims to be raised into alignment with the other bearings, remove the hub and bushing from the end of the shaft and allow it to fall in line with the others.

When each bearing is in position, tighten the set screws that secure it. The bearing will not be moved again.

Remove the hub and bushing from the transmission end of the shaft. Remove the shaft from the tail boom, and shield the star coupling from paint with tape.

Paint the driveshaft and bearings and allow to dry.

Install the driveshaft on the tail boom. Mesh the star coupling on the tail rotor end of the shaft with the coupling on the tail rotor gearbox. Note: You may want to use a short length of oil hose or heat shrink to cover this joint and protect it from debris. If so, now is the time to put it on the driveshaft.

Once again, install the hub and bushing onto the transmission end of the shaft. This will be a permanent installation, so the set screws should be tightened securely.

Attach the orange flex coupling to the hubs and bushings at the end of the shaft and exiting the transmission using the AN74-A4 bolts with an AN960-416 washer under the bolt head. Torque and safety wire the bolt heads.