



SERVICE DIRECTIVE BULLETIN

SERVICE DIRECTIVE BULLETIN NO. 0037

REVISION A

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Date: January 17, 1977

Subject: Tail Rotor Spindle

Models: F-28A, 280, F-28C, and 280C with 3. 3" Chord Tail Rotors (Narrow Chord Tail Rotors)

Effectivity: All Aircraft with Part No. 28-15202 except Serial No. 01-001-76ST and above (if unidentified with serial number on spindle flat circular surface, this bulletin applies).

Several in-flight failures of the tail rotor blade spindle have been reported. It is believed that the failure was the result of tail rotor strikes and/or improper torquing of the spindle retention locknut. Accordingly, the directions and information in this bulletin are divided into the four parts as follows:

Part 1 A repetitive inspection of the tail rotor spindle and addition of strike tabs.

Part 2 Instructions for reworking tail rotor spindle which obviate the need for repetitive inspections.

Part 3 Inspection procedure after tail rotor blade strikes.

Part 4 Flight procedures in the event of tail rotor failure.

Part 1

Unless previously performed within the last 50 hours, all owners and operators shall perform a tail rotor inspection prior to next flight comprising the steps listed below. The inspection shall be repeated every 50 hours.

- a. Remove tail rotor assembly in accordance with the procedures designated in Part 15 of the Maintenance Manual.
- b. Disassemble tail rotor assembly in accordance with procedures (a) and (b) designated on page MM 15-2, one side at a time. Keep parts separated and in proper order. Extreme care should be used to assure that all hardware is reassembled exactly as removed to prevent the unbalance tug of the tail rotor assembly.
- c. Check the installed torque of the bearing retaining locknut by applying torque in the increased torque direction to move the nut. The nut must move at a torque value in excess of 35 ft-lbs to indicate a satisfactory installation. (Note care must be exercised in the removal of the Shur-Lok washer to gently work it off from side to side to avoid damage to the spindle threads.)
- d. Remove the thrust bearings, spacer, large bearing, and retention plate from the spindle. (Note that the large bearing will be damaged if a puller is attached to the outer race of the bearing. In this case, it must be replaced with a new bearing.) Remove teeter bearings.
- e. Examine spindle preferably by magnetic fluorescent particle, otherwise by fluorescent dye-penetrant inspection at the first shoulder where the 3-thrust-bearing stack seats, focusing on the forward and aft direction (i.e. in-plane bending). The operator should inspect the radius under magnification and black light for adequate definition in this sharp radius.
- f. Spindles should be checked for runout by placing the large diameter of the spindle in "V" blocks on a surface plate supported at the large inboard bearing journals. (Note: If the journals are scuffed or cadmium plating is irregular, the surfaces should be buffed smooth prior to runout checks.) Indications should be measured adjacent to the thread relief at the spindle tips. Runout should be .001 inches or less.
- g. If the nut does not meet the torque requirements, if a crack is suspected, if the spindle is scored radially by the bearing, or if the shaft fails to be within tolerance for runout measurements, notify Enstrom Customer Service for further instructions.

- h. If spindle passes all of the above inspections, reassemble tail rotor in reverse order per Maintenance Manual. (Caution: Do not mix left-hand and right-hand parts as tail rotor balance will be disturbed.)
- i. Install strike tab, Part No. 28-17308 (delivered with Bulletin 0037), under the outer balancing screw extending forward to the leading edge, with the tip of the tab projecting beyond the leading edge of the blade. These tabs are for the operator's protection in that they indicate strikes in soft materials such as sand, water, snow, brush, etc., which may critically damage a spindle but otherwise show little visible external damage.

Part 2

Enstrom has developed a rework of the narrow chord tail rotor spindle (new Part No. 28-15202-13) which essentially doubles the strength of the critical shoulder location. With this strength increase, should the torque of the spindle retention locknut be below specifications for any reason, the reworked spindle has sufficient strength to safely carry the load through the altered load path. In essence, the critical step is removed and replaced by a spacer. The spindle is machined with a gentle radius and shot-peened.

Either reworking your specific spindle or obtaining a reworked spindle (with appropriate spacers) can be arranged through Enstrom Customer Service for a cost of \$50. 00. To minimize the impact on flight operations, Enstrom Customer Service has procured a supply of spindles and will maintain a floating supply of reworked spindles that can be ordered in advance on an exchange basis. Upon satisfactory rework and installation of the 28-15202-13 spindles, the inspection requirements set forth in Part 1 are no longer required.

All Enstrom owners or operators with narrow chord tail rotor blades are urged to replace their spindle with the reworked design as soon as practical.

Part 3

At any time that strike tabs are deformed indicating a possible tail rotor strike, perform an inspection per Part 1 above.

Additionally, perform the following:

- a. Check the tail rotor control system from control cable attachments to pitch arms for obvious damage. System should work freely without binding.
- b. Inspect tail rotor transmission housing for cracks or distortion. Check condition of gear teeth. Check runout of output shaft. A maximum of .005 inches is permitted. Transmission should turn freely without "hard spots.
- c. Inspect tail rotor drive shaft for damage. Taper pin holes should be free from elongation. Replace taper pins.
- d. Magnaflux or replace the three tail cone-to-tubular pylon bolts.
- e. Inspect tail rotor guard and fittings for damage. Replace if damaged.

Note: If there is obvious visible damage to the tail rotor blades, call Enstrom Customer Service for further instructions (906/863-8482).

Part 4

In the event of a tail rotor failure, flight procedures are fully specified in the Emergency Operating Procedures Section of the Flight Manual, page FM 4-2. All operators and owners should fully familiarize themselves with these procedures.

During cruising flight, the aircraft will rotate to the right and not respond to left pedal. Enter autorotation, cutting power off immediately. Complete autorotation to the ground. In the flare to a hover, the aircraft will rotate slowly to the right such that the aircraft will land from 45° to 90° of the autorotative flight path.

If no suitable area is available within autorotative distance, the pilot should establish the minimum power-required speed (approximately 60 mph) and slowly increase collective pitch and power, permitting up to 45° of yaw. Continue flight in this fashion, using cyclic stick as directional control, until a suitable autorotational landing area is reached. Complete autorotational landing as previously described.

Spooner Aviation Limited in England is authorized to perform the spindle rework in accordance with Enstrom special process specifications.

Cautionary Note:

If proper torque on the tail rotor bearing retaining locknut is not maintained, the structural load paths are altered such as to change the loadings on the standard spindle. Deformation of the spindle because of blade strikes not only damages the spindle, but causes the loss of torque mentioned above. Blade strikes in soft earth, tall grass, sand, water, etc., do not necessarily show an external damage to the blade. Operators who suspect any of the above type strikes should immediately inspect the tail rotor spindle in accordance with Part 1 above.