



**THE ENSTROM HELICOPTER CORPORATION**

**TWIN COUNTY AIRPORT, P.O. BOX 490, MENOMINEE, MICHIGAN 49858**

## **SERVICE DIRECTIVE BULLETIN**

SERVICE DIRECTIVE BULLETIN NO. 0065  
REVISION B  
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DATE: July 9, 1990

SUBJECT: Tail Rotor Driveshaft Spline Couplings, PN 28-13609

MODELS: F-28A, 280, F-28C, F-28C-2, 280C, F-28F and 280F Helicopters  
Equipped With PN 28-13609 Couplings

EFFECTIVITY: All F-28A, 280, F-28C, F-28C-2 and 280C Helicopters. S/N's 506, 507, 509, 510, 511, 512, 513, 514, 515, 517, 527, 700, 701, 702, 704 and 280F S/N's 1212 and 1500.

COMPLIANCE: Immediately, or Prior to the Next Flight and as Further Noted in the Following Text.

Two reported instances of loss of tail rotor control in flight have been reported. These occurrences have been attributed to the failure of the tail rotor spline drive coupling resulting from excessive spline wear. The reported failures appear to be the direct result of inadequate lubrication, material hardness, and/or the combination of both, resulting in premature wear and deterioration of the coupling.

### REQUIRED INSPECTIONS

Immediately or prior to the next flight, both the forward and aft couplings must be disassembled and thoroughly inspected for excessive spline wear. To accomplish this a complete disassembly and cleaning of the coupling is essential to determine its condition. The forward coupling can easily be disassembled by removing the 4 cap screws and taper pins. The male portion of the coupling can be slid aft after the hardware is removed to clear the female portion. The drive shaft then can be pulled slightly off-center to facilitate complete removal of the forward coupling. The disassembly of the aft coupling is most easily accomplished by removing the tail rotor gearbox from the tail cone stinger tube. Both the female and male components of the coupling should be thoroughly cleaned and the splines visually inspected with a 10 power glass for signs of excessive premature galling, fretting and wear. Some minimal fretting and wear is typical. Those couplings exhibiting this condition may still be acceptable and should be thoroughly inspected per this bulletin for

serviceability. A piece of .010 shim stock is attached to this service directive bulletin for checking the wear depth, reference Figure 1.

**CAUTION:** The couplings must be disassembled to satisfactorily inspect them for premature wear that may have occurred in the past due to inadequate lubrication. Because of the axial play allowance provided within the coupling, external visual tooth contact can be misleading in the event the male coupling typically runs in the middle or bottom of the female adaptor. Similarly, a backlash check could also be misleading if the coupling was not checked in the axial position having the greatest wear.

- A. The crown of the female coupling spline is approximately .040 inch in width. If the wear pattern is in excess of .010 inch, it is unairworthy and must be replaced by a serviceable component. The procedure to measure the wear on the female section splines is illustrated in Figure 1.

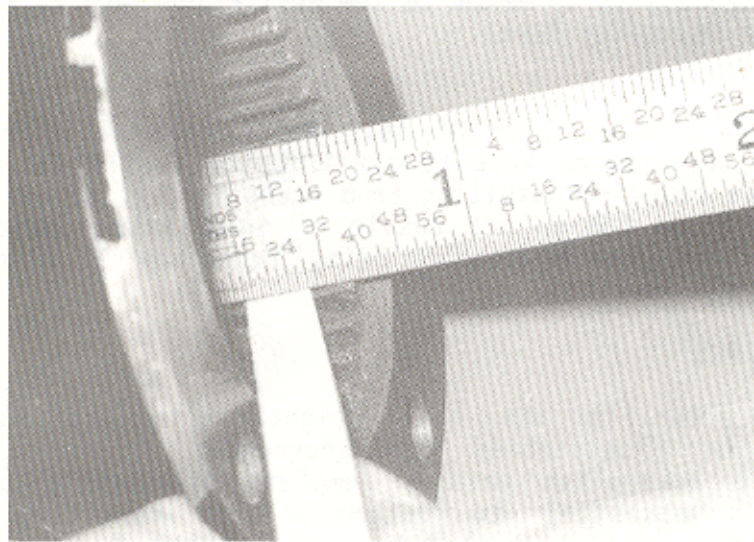


Figure 1. Checking inner spline wear on coupling.

**NOTE:** Tooth wear is measured by placing a 6 inch steel rule parallel to the crown at the top edge of the driven side. A piece of .125 x .010 inch shim stock is then placed between the tooth and the rule, and pressing the rule against the tooth, check if the shim can be removed. If the shim slips out, the coupling is to be rejected and replaced with an air-worthy component.

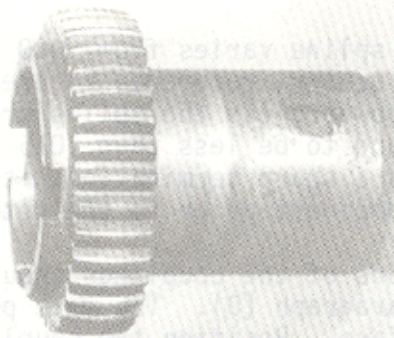


Figure 2. Checking outer spline wear on male coupling.

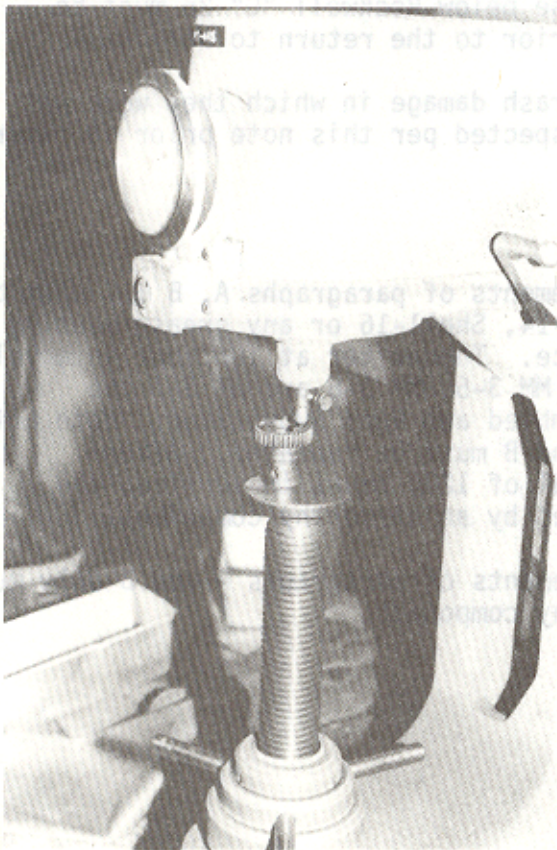


Figure 3.  
Checking hardness on male  
portion of coupling.

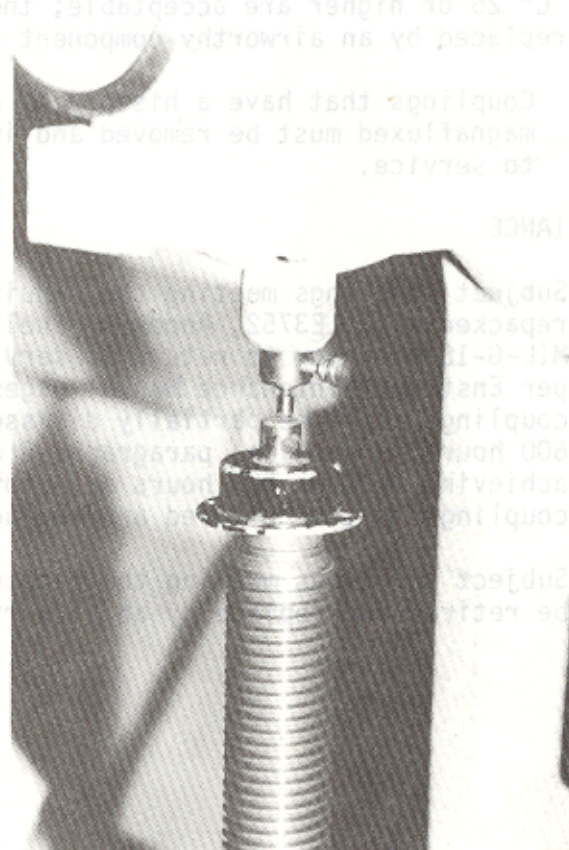


Figure 4.  
Checking hardness on female  
portion of coupling.

- B. The crown of the male coupling spline varies from .030 inch at the ends to approximately .020 inch at the center, reference Figure 2. By using a steel 1/100ths scale and a 10 power glass the spline crown should be measured at the center. If found to be less than .015 inch, and has rolled burrs on its edge or has a sharp termination, it must be rejected and replaced by an airworthy component prior to the return to service.
- C. Both the male and female portions of the couplings should be checked for material hardness, reference paragraph (D). The male portion should be checked on the inner circular face. Position the coupling half with the splined end and inner face looking up on the Rockwell machine support mandrel, making the inner face accessible, reference Figure 3. The female portion should be placed with its inner diameter over the mandrel and the attaching stub facing up. The end of the stub should be checked, reference Figure 4. Care should be taken when checking the hardness to properly support the components, and the surfaces to be checked should be clean and smooth. Three readings should be made on each half to obtain a good average on the Rockwell "C" scale. Components that average Rockwell "C" 25 or higher are acceptable; those below Rockwell "C" 25 must be replaced by an airworthy component prior to the return to service.

NOTE: Couplings that have a history of crash damage in which they were not magnafluxed must be removed and inspected per this note prior to return to service.

#### COMPLIANCE

- D. Subject couplings meeting the requirements of paragraphs A, B & C must be repacked with LE3752, Andok-B, Shell-14, Shell-16 or any grease meeting MIL-G-18709 prior to return to service. Thereafter at 100 hour intervals, per Enstrom Maintenance Manual pages MM 3-5, MM 3-6 and MM 3-7 the couplings shall be partially disassembled and hand lubricated. Note after 600 hours in service, paragraphs A and B must be repeated. After achieving another 600 hours or a total of 1200 hours in service, the couplings must be retired and replaced by an airworthy component.
- E. Subject couplings meeting the requirements of paragraphs A and B only must be retired and replace by an airworthy component.