

ALERT SERVICE BULLETIN

REVISION NOTICE

Bell Helicopter **TEXTRON**

A Subsidiary of Textron Inc.

DATE

Sep 27, 04

TO: All Owners/Operators of Bell 412 Helicopters

**SUBJECT: REVISION "B" TO ALERT SERVICE BULLETIN 412-03-112:
(MAIN ROTOR SPINDLE ASSEMBLY 412-010-156-105, 412-010-190-
101 AND 412-010-190-105, INSPECTION OF.)**

Revision "B" to this bulletin changes the aircraft serial number effectivity for the inspection of the subject spindles. Product Support Engineering has received reports that other hub assemblies have also been found with CPC or other lubricant on the bolt to spindle joint. Therefore all spindle assemblies must be inspected in accordance with this Bulletin.

AN APPROPRIATE ENTRY SHOULD BE MADE IN THE AIRCRAFT LOGBOOK UPON ACCOMPLISHMENT
IF OWNERSHIP OF AIRCRAFT HAS CHANGED PLEASE FORWARD TO NEW OWNER

ALERT SERVICE BULLETIN
Bell Helicopter **TEXTRON**

NO. 412-03-112

DATE **Sep 27, 04**

A Subsidiary of Textron Inc.

DATE **Sep 9, 2003**

REV **B**

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MODEL AFFECTED: 412 & 412EP

SUBJECT: MAIN ROTOR SPINDLE ASSEMBLY 412-010-156-105, 412-010-190-101, 412-010-190-103 AND 412-010-190-105, INSPECTION OF.

HELICOPTERS AFFECTED: Model 412 / 412EP helicopters serial number 33001 through 33213, 36001 through 36320.

[Model 412 / 412EP helicopters serial numbers 36321 and subsequent will have the intent of this bulletin accomplished prior to delivery.]

COMPLIANCE: Within the next 300 hours after receipt of this bulletin but no later than January 31, 2005 for spindles with greater than 2100 hours time in service.

Within the next 600 hours after receipt of this bulletin but no later than January 31, 2005 for spindles with 1500 hours or less time in service. Spindles between 1500 and 2100 hours time in service shall be inspected upon reaching 2100 hours but no later than January 31, 2005.

DESCRIPTION:

Bell Helicopter recently investigated a main rotor spindle that had a crack circumferentially around the pitch horn attachment area. Investigation revealed that the threads of the spindle and the pitch horn attachment bolt NAS6616H1 had been lubricated during assembly. With these threads lubricated, the preload in the joint area was significantly increased after install and torque of the pitch horn attachment bolt. The increase preload resulted in thread deformation and higher stresses being imposed to the end of the spindle, which in turn resulted in cracks starting on the inboard face of the spindle under the pitch horn. Other spindles were inspected that had also been lubricated at the attachment threads and in three of six cases cracks and/or thread deformation was noted.

This ASB is released to inspect all spindles for evidence of grease, CPC or other substance on the pitch horn attachment threads. Any spindle that shows current signs or has a history of grease, CPC or other foreign substance on the threads is to be visually (10X) and Eddy Current inspected for cracks and a thread deformation check carried out with a Go-No Go gauge. Spindles that were assembled in accordance with the CR&O (without the application of any substance on the threads) do not require inspection.

B

APPROVAL:

The engineering design aspects of this bulletin are FAA/DER approved.

MANPOWER:

Part A

Approximately 10 man-hours are required to complete Part A of this bulletin. Man-hours are based on hands-on time, and may vary with personnel and facilities available.

Part B

Approximately 10 man-hours are required to complete Part B of this bulletin. Man-hours are based on hands-on time, and may vary with personnel and facilities available.

WARRANTY:

Owners/operators of 412 / 412EP helicopter's who comply with the instructions outlined in this bulletin may be eligible for a special prorated warranty credit for the replacement parts contained in the "Required Material" section of this bulletin if your spindles meet the following criteria:

1. Your spindle(s) fail the inspection per this ASB.
2. You have not performed maintenance on the spindle.
3. And, the subject spindle has not reached 2500 hours.

To receive this credit:

1. Purchase the required parts listed in the "Required Material" section of this bulletin.
2. Comply with the instructions contained in this bulletin no later than the times mentioned in the compliance section of this ASB.
3. Submit a completed malfunction report with a copy of the historical record for the failed spindle to BHTI Warranty no later than 30 days after completion of this bulletin.

B

NOTE

Customers who fail to comply with the instruction in this bulletin after January 31, 2005 are not eligible for the special warranty credit provisions listed above.

B

MATERIAL:**Required Material:**

The following material is required for the accomplishment of this bulletin and may be obtained through your Bell Helicopter Textron Supply Center.

| <u>Part Number</u> | <u>Nomenclature</u> | <u>Quantity</u> |
|--------------------|---------------------|-----------------|
| 412-010-190-103 | Spindle | TBD* |
| 412-010-190-105 | Spindle | TBD* |
| NAS6616H1 | Bolt | TBD* |

-NOTE-

* Only required if inspection reveals cracks or thread deformation.

Consumable Material:

None required

SPECIAL TOOLS:

The following special tool is required for the accomplishment of Part B of this bulletin and may be obtained through your Bell Helicopter Textron Supply Center if required

| <u>Part Number</u> | <u>Nomenclature</u> | <u>Quantity</u> |
|--------------------|-----------------------|-----------------|
| 1.000-12 UNF-3B | Thread Go-No Go Gauge | 1 |

-NOTE-

Thread Go-No Go gauges bought from sources other than Bell Helicopter may not be manufactured to a close enough tolerance to accurately give operators a true condition of spindle thread condition. It has been found that some gauges may actually indicate that the thread has failed inspection when in fact these spindles may be serviceable. If a large percentage of spindles fail thread profile checks with a thread Go-No Go gauge purchased from sources other than Bell Helicopter, those spindles should be checked with a gauge bought from Bell Helicopter to insure the thread profile has in fact failed the Go-No Go Inspection. Thread gauges that have been purchased from Bell Helicopter have been inspected to insure tolerances are correct for the thread Go-No Go inspection.

WEIGHT AND BALANCE:

Not Affected

ELECTRICAL LOAD DATA:

Not affected

REFERENCES:

BHT-412 -IPB Illustrated Parts Breakdown
BHT-412 -MM Maintenance Manual
BHT-412 -CR&O Component Repair and Overhaul Manual

PUBLICATIONS AFFECTED:

None affected

ACCOMPLISHMENT INSTRUCTIONS - Part A

1. Review main rotor hub overhaul or assembly records and/or contact overhauling agency to determine the method in which the pitch horn and spindle were assembled. If the spindle internal threads for pitch horn attachment or pitch horn attach bolt NAS6616H1 threads were ever assembled with CPC, grease or any other substance, proceed to PART B of this bulletin for inspection of the spindle. Replace any NAS6616H1 bolt found with evidence of lubrication on the threads.

-NOTE-

If the spindle and pitch horn were assembled in accordance with the 412 CR&O, no further action is required.

2. If it is not known or cannot be confirmed whether a compound was ever applied to the threads of the spindle or pitch horn attach bolt during assembly, remove the spindle and pitch horn assembly from the main rotor hub in accordance with the 412 CR&O.
3. Remove the NAS6616H1 bolt attaching the pitch horn to the spindle in accordance with the 412 CR&O. Inspect the threads of the bolt and internal threads of the spindle for evidence of CPC, grease or any other substance. Proceed to part B for spindle inspection if any evidence of CPC, grease or any other substance is noted on the threads of the spindle. Replace any NAS6616H1 bolt with evidence of lubrication on the threads.

-NOTE-

If the threads of the spindle or bolt are dry or only a small amount of zinc chromate primer is noted on the threads then the spindle has been assembled in accordance with the CR&O and no further action is required. The spindles may be returned to service.

-NOTE-

If primer is on threads and it was "wet" when installed, then it must be considered a lubricant.

ACCOMPLISHMENT INSTRUCTIONS - Part B

Only spindles found with current signs or with a history of grease, CPC or other substance on the threads per Part A require the following inspections.

Visual (10X) Inspection

1. Clean pitch horn slotted joint of spindle, especially inboard face.
2. Conduct visual (10X) inspection of slotted joint, especially inboard face Areas 1 and 2 as shown in Figure 1. Detection of cracks is cause for rejection of the spindle.

Thread GO-NO GO Inspection

Perform a thread Go-No Go inspection of all affected spindles with thread gage 1.000-12 UNF-3B as follows:

1. Thoroughly clean spindle internal threads and Go-No Go external threads for inspection. Lightly coat threads of spindle and GO gage threads with oil.
2. Engage "GO Gage" into part threads.
 - a. Gage should thread smoothly over the entire length of the threaded portion of the spindle.
 - b. If binding or unexpected resistance is encountered, remove Gage and visually inspect threads portion for dirt and loose debris.
 - c. If dirt or loose debris is noted to be the cause for the "GO Gage" binding, repeat thread-cleaning operation.
 - d. Any binding of the "Go gage" during this inspection is cause for rejection of the spindle.
3. Lightly coat "No Go Gage" threads with oil.
4. Engage "NO GO Gage" into part threads.

-NOTE-

"No Go" threaded end of gauge: Threads are acceptable when the "No Go" is applied to the product internal threads if (a) it does not enter or if (b) product threads can be enter provided that a **definite** drag from contact with the product material results on or before the third turn of entry. The gauge should not be forced after the drag is definite.

- a. The gage should not engage onto the threaded portion of the spindle at all or should not engage more than the first two threads.
 - b. If gage engages and runs past the first two threads and/or runs freely over the entire threaded portion of the spindle, this is cause for rejection of the spindle.
5. Upon completion of Go-No Go inspection all parts must be thoroughly cleaned and free of oil.

All spindles that fail the Go-No Go thread inspection are no longer repairable or serviceable. Spindles that pass the thread Go-No Go inspection shall be inspected for cracks at the inboard end of the spindle in accordance with the following Eddy Current Inspection.

EDDY CURRENT INSPECTION

The following inspection procedure should only be used as a general guideline. The actual technique/procedure used must be generated by the inspection facility and approved by a qualified representative certified as level III per NAS 410 or SNT-TC-1A or equivalent.

This inspection shall be capable of detecting a 0.008" (0.2 mm) deep indication on the surfaces indicated.

1. EQUIPMENT

- a. Eddy Current equipment shall be capable of detecting surface and/or near surface discontinuities in electrically conductive materials, and shall be capable of detecting impedance changes induced by variations in material properties as well as metallurgically and mechanically induced discontinuities. The equipment shall also contain a means to display detected impedance changes.
- b. A differential **pencil probe**, approximately 0.125" diameter, shielded, with an operating frequency between 100 kHz and 500 KHz.
- c. Ferrous or ferrous alloy crack calibration standard that contains a simulated crack defect of 0.008" – 0.010" (~0.2 mm) deep.

2. PERSONNEL

All personnel performing Eddy Current inspection shall be qualified and certified to level II or level III requirements established in NAS 410, SNT-TC-1A, or equivalent.

3. CALIBRATION

- a. Visually inspect the inboard end of the spindle for foreign material, debris, or any other contaminate that may interfere with the Eddy Current inspection.
- b. Using the Eddy Current probe, place the probe on the top of the standard (reference figure 3) and balance (null) the probe in a flaw free area of the standard.
- c. Place the probe on the standard and adjust the instrument phase so that the lift-off signal moves horizontally from the left side of the screen to the balance position. Slide the probe over the 0.008" simulated crack of the reference standard and verify the crack response moves in a vertical direction (see figure 2a).
- d. Adjust the signal amplitude using the gain control so the signal amplitude from the crack is about 1-2 divisions above the balance (null) point on the screen display.

- e. Place the probe on each of the spindle surfaces as shown in figure 1, re-balance the probe, and rock the probe slightly on the surface. The signal phase should not change more than 20 degrees from the calibration standard.

-NOTE-

Some variations to the signals shown in figures 2a – 2b may exist. Proper interpretation of signal response is the responsibility of the personnel performing the inspection.

Independent gain controls (vertical gain / horizontal gain) should be used to optimize displayed signals. Increasing the vertical gain will help separate the crack response signal from the lift-off signal. Decreasing the horizontal gain will enable the lift-off signal to remain within the limits of the screen.

Special designed probes or probe holding fixtures may be utilized for this inspection provided the sensitivity, area of interest, and technical content of this procedure is followed.

4. PRE-INSPECTION

All areas requiring Eddy Current inspection shall be free of burrs and/or corrosion.

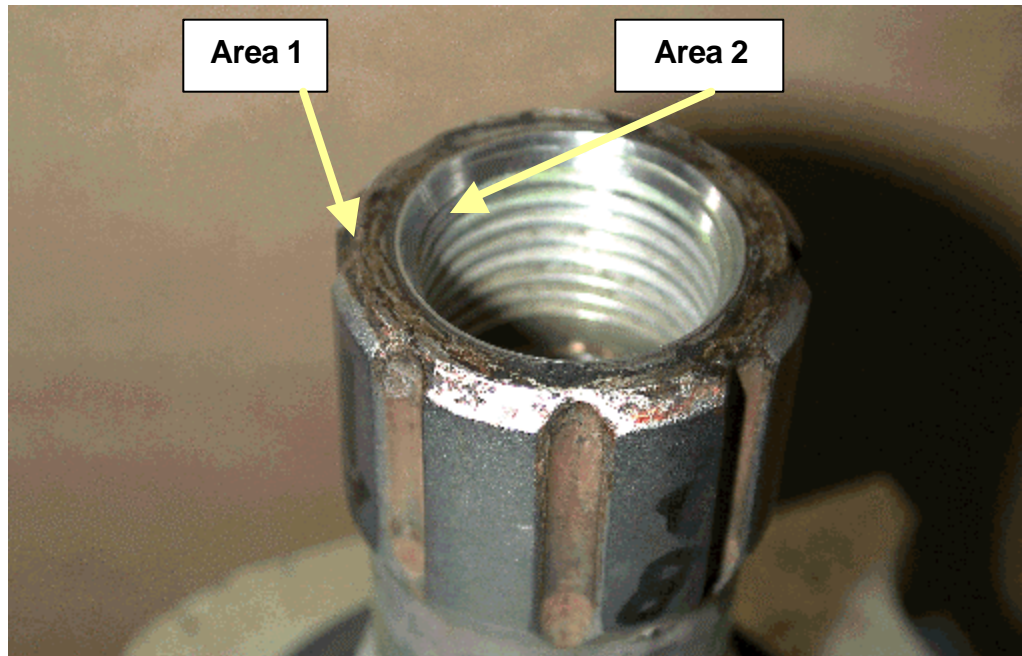
5. INSPECTION

- a. Inspect 100% only the areas as shown in figures 1.
- b. Balance the Eddy Current probe to each spindle area prior to performing an inspection of that area.
- c. Inspection of area 2 consists of only the inboard chamfer, and not the actual threads themselves.

6. **ACCEPT / REJECT CRITERIA**

Any indication interpreted as a crack shall be cause for rejection.

After completion of the Eddy Current and thread Go-No Go tests, reassemble all acceptable spindles in accordance with the 412 CR&O. Annotate historical service records to indicate compliance with this bulletin.



Area 1 – Inboard flat surface adjacent to Area 2.

Area 2 – Inboard chamfer adjacent to internal threads.

Eddy Current inspect areas 1 and 2 of the spindle. It is common for the lift-off signal to change phase angle when moving from area 1 to area 2. This effect is mainly due to the ID contour of the chamfer.

FIGURE 1

