Bell Helicopter Textron 47 (All Variants) Series Helicopters

AIRWORTHINESS DIRECTIVE

For the reasons set out in the background section, the CASA delegate whose signature appears below revokes Airworthiness Directive (AD) AD/BELL 47/92 Amdt 4 and issues the following AD under subregulation 39.1 (1) of CAR 1998. The AD requires that the action set out in the requirement section (being action that the delegate considers necessary to correct the unsafe condition) be taken in relation to the aircraft or aeronautical product mentioned in the applicability section: (a) in the circumstances mentioned in the requirement section; and (b) in accordance with the instructions set out in the requirement section; and (c) at the time mentioned in the compliance section.

AD/BELL 47/92 Amdt 5 — Main Rotor Blade Grips — 2/2001 TX

Applicability: All models.

Requirement:

1. Inspect the internal threaded portion of each main rotor blade grip barrel using eddy current procedure DOA/NDI/EC6. Copies of this procedure are available from the Authority.

2. Retire the main rotor blade grips from service before exceeding 5000 hours time in service.

Note: Grip assemblies part number 47-120-252-5 are not approved for use in Australia.

Compliance: Unless the initial inspection is already accomplished, at the threshold of 600 hours component time since new or within 25 hours time in service after 21 December 2000, whichever occurs later. Repeat thereafter at intervals not to exceed 600 hours component time in service until retired in accordance with Requirement 2.

Note: Compliance with the requirements of this Directive permits operation beyond the retirement life stipulated in the manufacturer's documentation.

This amendment becomes effective on 21 December 2000.

Background: Numerous fatigue cracks in the internal threads of the main rotor blade grips have been detected in-service by the specified eddy current procedure, which would not be detectable by dye penetrant methods. To control this risk of failure, the previously substantiated 5,000 hour retirement life was reintroduced.

The previous issue of this Directive and Transport Canada AD CF-1988-08 required eddy current inspections at the same initial inspection threshold, with the TC AD 300 hour repeat interval being the only difference. FAA AD 86-06-08 R1 required a fluorescent dye penetrant inspection method, a 1,200 hour threshold and a 300 hour repeat interval.

A new FAA AD, 2000-18-51, requires a liquid penetrant or eddy current inspection at significantly reduced inspection intervals and establishes a 1,200 hour retirement life. The changes were prompted by the results of an accident investigation and a field survey; findings not supported by Bell.

Amendment 5 retains the inspection method and the repetitive inspection interval, but changes the initial inspection threshold. This change is in response to Transport Canada AD CF-1988-08 R1 which was prompted by three cases of cracks being found before the initial inspection threshold. The Authority has received several MDRs of cracked blade grips that were found before the initial 1200 hour inspection threshold.

Amendment 4 of this Airworthiness Directive became effective on 12 October 1985.

Amendment 3 of this Airworthiness Directive became effective on 30 June 1985.

The original issue of this Airworthiness Directive became effective on 2 July 1985.

William Ronald Smith
Delegate of the Civil Aviation Safety Authority

19 December 2000

The above AD is notified in the *Commonwealth of Australia Gazette* on 21 December 2000.

Australian Government

Civil Aviation Safety Authority

NDT PROCEDURE: Bell 47 Main Rotor Grips

PROCEDURE NO: **DOA/NDI/EC 6**

TEST METHOD: EDDY CURRENT TESTING

AMENDMENT NO: THREE (3)

DATE: 30 December 2004

PAGE: 1 of 6

	NAME	SIGNATURE	DATE
Approved By	N Joiner		30/12/2004
CAR 2A Delegate	D. PATTIE		18 FEB 2005.

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1.0 PURPOSE

The purpose of this inspection is to detect the presence of fatigue cracking in the root of the internal thread positioned at the inboard and of Bell 47 Main Rotor Grips as required by Civil Aviation Safety Authority Airworthiness Directive AD Bell 47/92.

2.0 PRPARATION

The components must be removed from the aircraft in accordance with the Manufactures Maintenance Manual. During the Rotor Blade removal, ensure that the engine is isolated and all access to the cockpit is restricted.
The threaded section of the Main Rotor Grip must be thoroughly cleaned and free from dirt, grit, grease, metal flakes or any foreign material which may provide a test restriction or false test indications.

3.0 PERSONNEL

Personnel performing this inspection must be approved by Civil Aviation Safety Authority or their approved delegated signatory within the Maintenance Organisation.

4.0 EQUIPMENT

This procedure was developed using the Hocking Locator UH, however any other equipment meeting the performance characteristics of this procedure shall be considered acceptable. Phase analysis is considered superior to the Locator UH and may also be used for this inspection. The suitability of alternative equipment shall be assessed by a qualified NDT Level III specialist.

a. Hocking Locator UH

b. High Frequency eddy current probe specifically designed to fit the thread and the coil is positioned to ensure that the ferrite core is contiguous with the root of the thread. The width of the probe shall be sufficient to ensure that the probe does not rock or lift during normal scanning (Refer to Figure 1 for probe design) the probe frequency range shall be between 100kHz and 2mHz

c. A standard aluminium reference standard containing a known EDM slot of 0.5mm (0.020") deep and not more than 0.25mm (0.010") wide.

d. A suitable turntable with a fixture to support the grip with its threaded and uppermost (This equipment is not essential however may greatly assist in scanning of the probe during inspection)

5.0 PROCEDURE

a. Switch the instrument on, connect the probe and adjust the frequency selector to 500kHz and the material selector AI.Mg

b. Place the probe on the standard calibration block with the test coil at least 6mm (0.25") away from the reference slot or edge of the reference standard

c. Press the drain button (lift off control) and ensure that the lower L.E.D is illuminated. Adjust for lift off by rocking the probe to illuminate each L.E.D in turn until both are extinguished. At the completion of this procedure rocking of the probe should result in negligible movement of the meter needle (less than 10% full scale) if greater than 10% reading is obtained repeat step c. until the requirement is met.

d. Press the zero button to obtain a low position scale reading between 0-10. Traverse the probe over the 0.5mm deep slot and adjust the sensitivity control so that the maximum needle deflection produced by the slot equals 50-60 scale diversions (50-60% full scale deflection)

e. Place the probe in the threaded section of the grip to be inspected so that the coil is positioned in second thread from the inboard end. Press the train button around the thread in a clockwise direction and inspect the entire thread to the outboard run-out. (Refer to figure 2)

f. All crack like indications resulting in rapid needle deflection of 25% FSD shall be investigated. If no reason can be determined for the cause of the indication the grip shall be rejected. Crack like indications are characterised by a relatively fast needle deflection at the extremities of the indication. Crack like indications are repeatable. These indications must be distinguished from any conductivity changes in the test Article which will be characterised by a slow steady needle deflection which are repeatable as the probe traverses adjacent threads in the forging.

6.0 WORKSHEETS

Worksheets shall include the following information:

Name of testing laboratory
Client
Report Number
Test technique
Aircraft Registration Number
Blade Serial No.
Acceptance Standard
Statement of compliance
Date of test
Identity of test personnel
Test location
Sketch of defect locations

7.0 REPORTING

Reporting requirements shall be satisfied by a test report containing the following information:

Name of testing laboratory
Identification of the eddy current testing equipment
Aircraft Registration Number
Reference to this procedure any variation of the method imposed
Identity of test personnel
Date of examination
Location of test
Results of test
Report Number and date of issue
Sketches of defect locations when appropriate

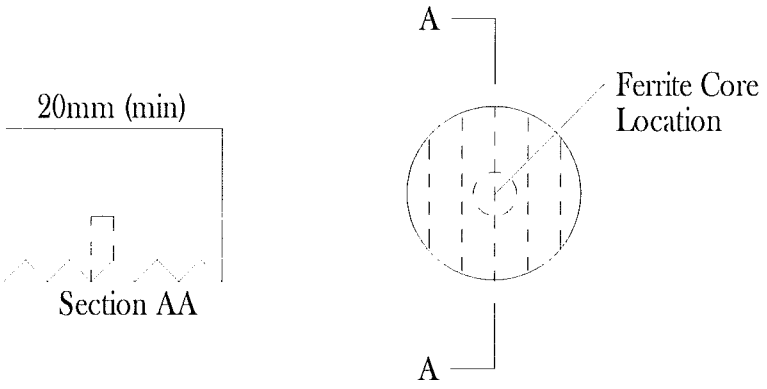

Figure 1: Probe Configuration

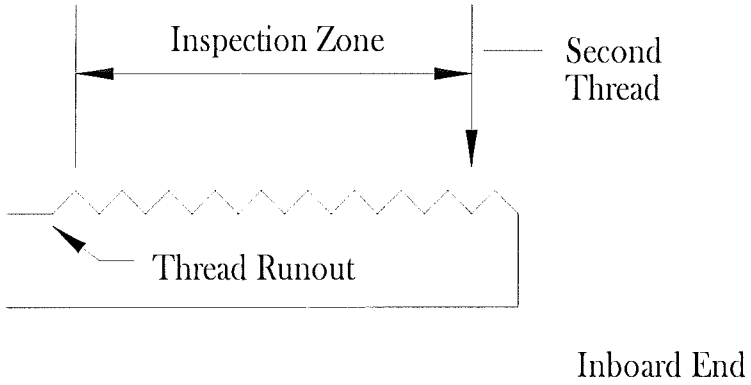

Figure 2: Cross Section of Main Rotor Grip