AFT LANDING GEAR CROSS TUBES THICKNESS INSPECTION (UT) Sonic 1200

23 June 2006

1.0 Description (Fig 4-1, Index No. 38, TM 1-1520-256-23). The landing gear assembly has two arched aluminum cross tubes secured to the fuselage structure by four padded caps. Cross tubes are fitted with bearing straps at fuselage attachment locations.

2.0 Defects. The cross tube may vary in thickness around the circumference and requires an ultrasonic thickness test to determine if the thickness dimensions are within the design criteria.

3.0 Primary Method. Ultrasonic specific

4.0 NDI Equipment and Materials. (Refer to Appendix B, TM 1-1520-256-23)

a. Ultrasonic Inspection Unit, Sonic 1200 HR or equivalent
b. Transducer, Harisonic CM 1004-S, 10 MHz, 0.250" diameter
c. Cable Assembly, BNC to Microdot
d. Aluminum, 5 Step Block (0.100”, 0.200”, 0.300”, 0.400” and 0.500”) – (Thickness Calibration)
e. Consumable Materials, refer to Table 1-8
f. Aircraft Marking Pencil, refer to Table 1-8
g. Electrical Tiedown Strap, NSN 5975-01-048-2922

5.0 Preparation of Helicopter. The helicopter shall be prepared for safe ground maintenance in accordance with the applicable technical manuals listed in table 1-1.

6.0 Access. Not applicable

7.0 Preparation of Part. The part shall be cleaned and the CARC paint removed in an area 0.500" in diameter leaving the primer undercoat to provide a smooth measuring surface. Refer to Preparation of Part for NDI, paragraph 1.4.4, TM 1-1520-256-23.

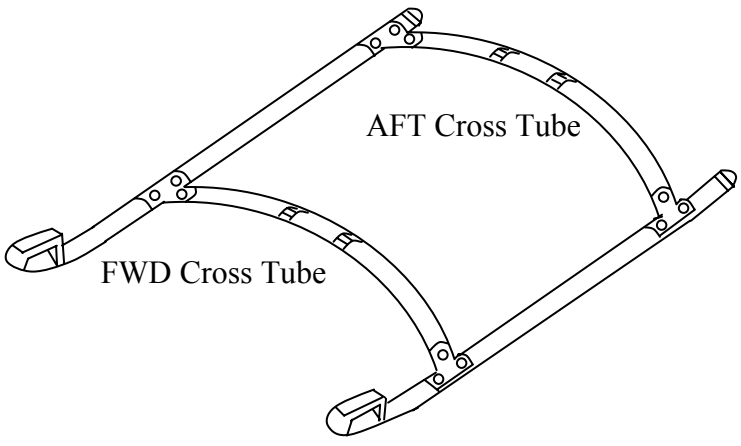


Figure 1. Landing Gear Assembly

8.0 NDI Equipment Settings

a. Make the following initial settings on the Ultrasonic Inspection Unit, Sonic 1200:

SET-UP	DEFAULT SETTINGS	SET-UP	DEFAULT SETTINGS
(PULSER)		**(GATE 2)**	
GAIN	25 db	GATE 2	+
PULSE	35 ns	POSN	0.064 IN
DAMPING	50 ohms	WIDTH	0.450 IN
MODE	SINGLE	LEVEL	50 %
VOLTAGE	150 V		
		(THICK)	
(RCVR)			
DB DIFF	0 db	T-GAUGE	E-E
DISPLAY	FULLWAVE	TRIGGER	PEAK
FREQ	15 MHz	OFFSET	*0.059 µs
REJECT	0 %	T-VEL	0.2481
(RANGE)		**(ANGLE)**	
RANGE	0.931 IN	TRIG	OFF
DELAY	ZERO		
VEL	0.2485 IN/µS	**(SPCL)**	
MAX REP	1000 Hz	UNITS	INCH
(GATE 1)			
GATE 1	+	DAC	OFF
POSN	0.095 IN		
WIDTH	0.834 IN	**(MAIN)**	
LEVEL	40 %	FREEZE	OFF
		ZOOM	OFF

* OFFSET values may require minor adjustments to compensate for transducer variations

b. Refer to the Ultrasonic Method, paragraph 1.4.12. Calibrate the ultrasonic instrument as follows:

(1) SET UP

(a) Using the 5-Step calibration block, place a small amount of couplant on a suitable surface. Touch the face of the transducer to the couplant.

(b) Place the transducer on the 0.100" step. Hold the transducer steady with consistent pressure allowing the couplant to normalize under the wear face.

(c) Adjust the instrument gain to establish the second back reflection at 70% FSH. Note the digital thickness measurement, the display should indicate from 0.0980" to 0.1020". Reference Figure 2a below.

(d) Place the transducer on the remaining steps up to 0.400" allowing time for the couplant layer to minimize for the most accurate readings. Adjust the instrument gain as needed to achieve a second back wall reflection of 70% FSH. The digital thickness measurement should read ± 0.002" on any specific step. Reference Figure 2 b, c, and d.

(e) If the ± 0.002" tolerance from the nominal step thickness cannot be obtained carefully adjust the OFFSET value. Increasing OFFSET will decrease the thickness value and vice-versa.

f) Verify **ALL** step thickness values after instrument adjustment.

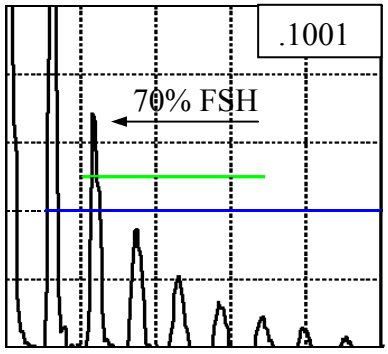


Figure 2a

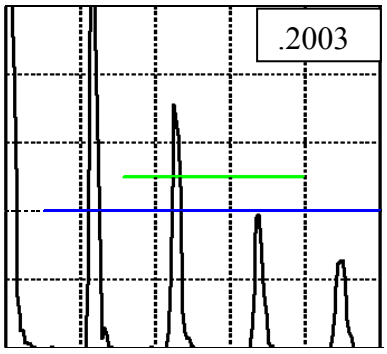


Figure 2b

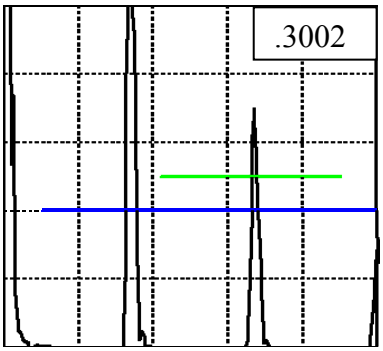


Figure 2c

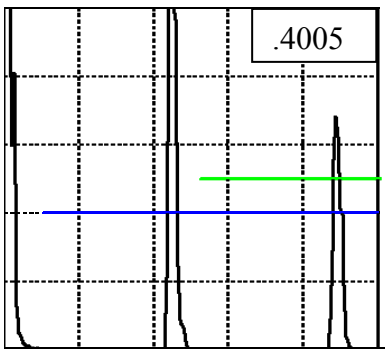
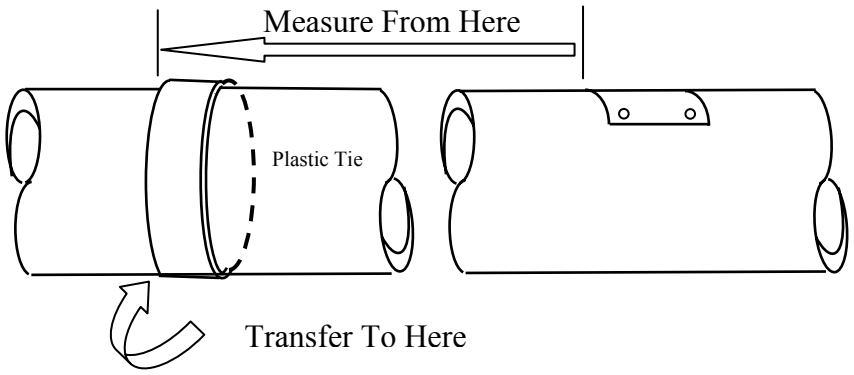


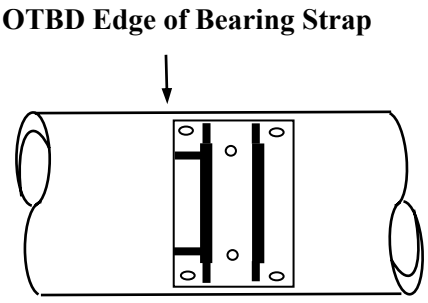
Figure 2d

9.0 Inspection Procedure. **One** thickness measurement shall be taken on the bottom of the cross tube at the following Butt Line (BL) stations, 24.0, 34.0, and 42.0. Measure from the outboard (OTBD) edge of the cross tube bearing strap along the top arc of the cross tube the distance in the chart below to arrive at the prescribed BL. Measurements must be taken on BOTH the LH and RH sides of the cross tube. Reference Figure 3 below.

NOTE
Utilize a wide plastic tie around the cross tube to facilitate accurate transfer of the arc locator mark from the top of the cross tube to the bottom measurement location.



Butt Line	Arc Length From Bearing Strap OTBD Edge	Minimum Thickness
24	8.35	0.292"
34	19.1	0.188"
42	29.1	0.105"



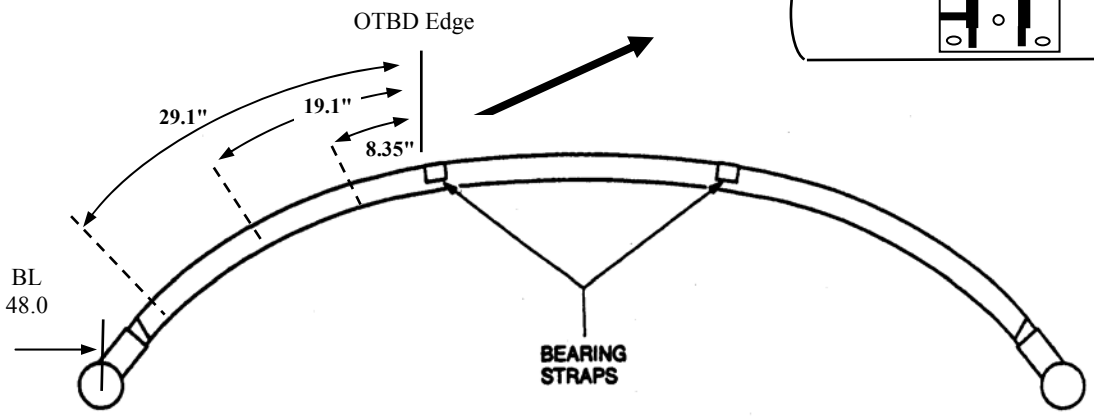


Figure 3. Arc Locations vs. Cross Tube Butt Lines

10.0 Couple the transducer to the cross tube surface. Increase the gain as necessary to establish the second back reflection at 70% FSH. Perform the thickness measurement on the bottom of the cross tube at the prescribed locations. Document the measurement received. Reference Table 1 for an example of a data chart.

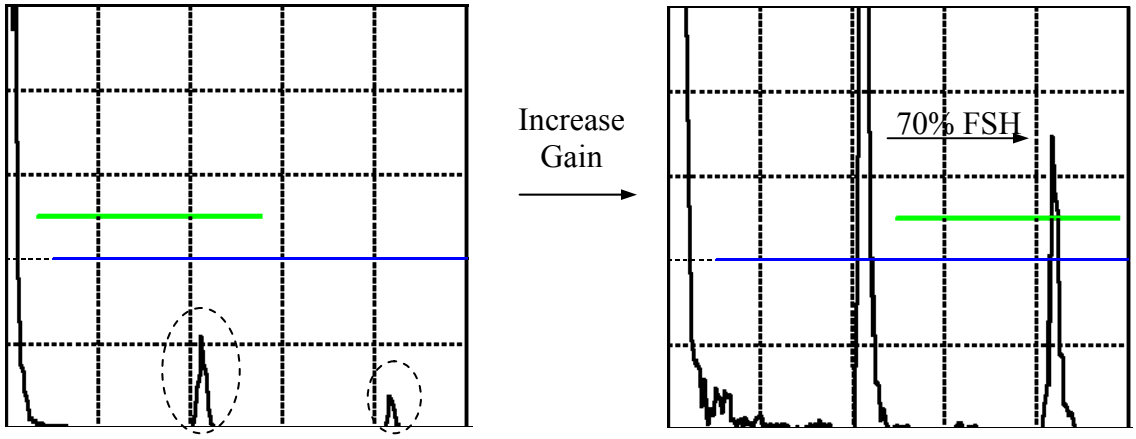


Figure 4. Cross Tube Back Reflection(s) Requiring Additional Gain

UH-1	Tail S/N	Date:	Technician:
Butt Line	Arc Length From Bearing Strap Inbd Rib	Minimum Thickness Allowed	Actual Thickness Measured
24	8.35	0.292"	LH- RH-
34	19.1	0.188"	LH- RH-
42	29.1	0.105”	LH- RH-

Table 1. Data Chart Example

11.0 Marking and Recording of Inspection Results. Mark and record the inspection results as required by paragraph 1.3, TM 1-1520-256-23.

12.0 Backup Method. None

13.0 System Securing. The cross tube requires cleaning to remove inspection media. Refer to Post Cleaning and Restoration of Part or Area after NDI, paragraph 1.4.16.

AFT LANDING GEAR CROSSTUBE (UT)

SONIC 1200
12 May 2006

1.0 Description (Fig 4-1, Index No. 38). The landing gear assembly has two arched aluminum crosstubes secured to the fuselage structure by four padded caps. Crosstubes are fitted with bearing straps at fuselage attachment locations.

2.0 Defects. This inspection is utilized to detect Inside Diameter (ID) tears and/or cracks on the aft crosstube. Defects may occur from 3 to 9 o'clock on the crosstube. **No cracks are allowed.**

3.0 Primary Method. Ultrasonic specific

4.0 NDI Equipment and Materials. (Refer to Appendix B, TM 1-1520-256-23)

a. Ultrasonic Inspection Unit, Sonic 1200 or equivalent
b. Transducer, 5.0 MHz, 45s shear wave, ¼ x ¼ inch element
c. Ultrasonic Couplant, NSN 6850-01-157-4348 or equivalent.
d. Aluminum Rompas Block
e. Cable Assembly, BNC to Microdot
f. Consumable Materials, refer to Table 1-8
g. Aircraft Marking Pencil, refer to Table 1-8

5.0 Preparation of Helicopter. The helicopter shall be prepared for safe ground maintenance in accordance with the applicable technical manuals listed in Table1-1, TM 1-1520-256-23.

6.0 Access. The aft crosstube **SHALL** be removed from the skid tubes and fuselage for this inspection in accordance with the applicable manuals listed in Table 1-1, TM 1-1520-256-23.

7.0 Preparation of Part. Rough surfaces and flaking paint may cause nonrelevant indications. Rough surfaces shall be smoothed in accordance with the applicable manuals listed in Table 1-1. Excessive baseline noise may require the crosstube to be stripped of paint IAW TM 55-1500-345-23. Refer to Preparation or Area for NDI, paragraph 1.4.4.

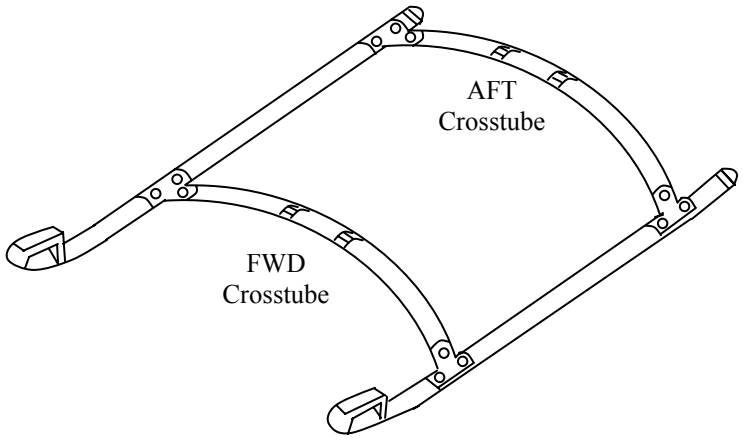


Figure 1. Landing Gear Assembly.

AFT LANDING GEAR CROSSTUBE (UT)

SONIC 1200
12 May 2006

8.0 NDI Equipment Settings.

a. Make the following initial settings on the Ultrasonic Inspection Unit

PULSER	
GAIN	43 db
PULSE	30 ns
DAMPING	50 ohms
MODE	Single
VOLTAGE	150 V

RCVR	
DB DIFF	0 db
DISPLAY	Full wave
FREQ	5 MHz
REJECT	0 %

RANGE	
RANGE	1.32 IN
DELAY	0.00 IN
VEL	0.1240 IN
MAX REP	1000 Hz

GATE 1	
GATE 1	+
POSN	0.300 IN
WIDTH	0.610 IN
LEVEL	40 %

GATE 2	
GATE 2	OFF

THICK	
T-GAUGE	OFF

ANGLE	
TRIG	OFF

SPCL
DEFAULT SETTINGS

DAC	
DAC	OFF

MAIN	
FREEZE	OFF
ZOOM	OFF

b. Refer to the Ultrasonic Method, paragraph 1.4.12, TM 1-1520-256-23. Calibrate the ultrasonic instrument as follows:

(1) SET UP

(a) Using the aluminum Rompas block, position the transducer as shown in Figure 2. Maximize the signal from the 0.080" Side Drilled Hole (SDH) and adjust the GAIN to obtain a signal of 80% FSH. Add 15 dB to establish the scanning sensitivity.

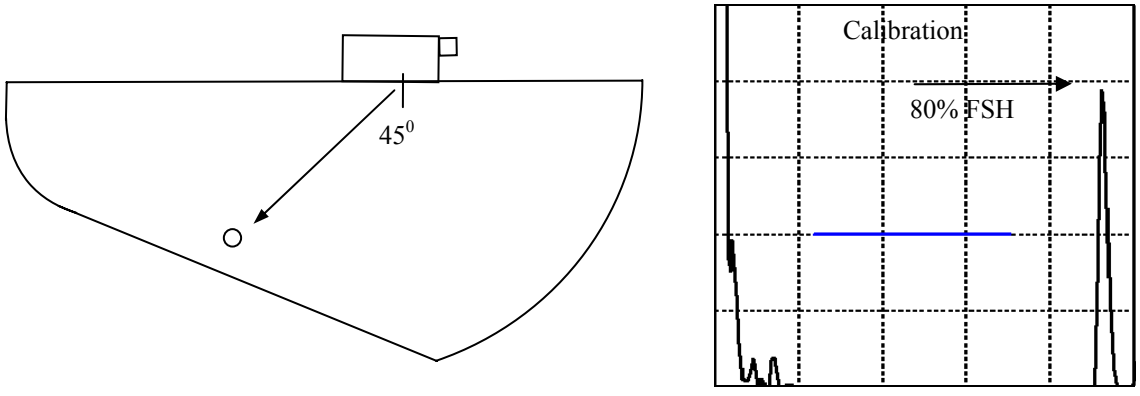


Figure 2. UT Calibration on 0.080" SDH.

9.0 Inspection Procedure.

a. Apply couplant to a small section of crosstube from 3 to 9 o'clock. Reference Figure 3.

b. Transducer scan paths SHALL overlap by **50%** to provide 100% inspection coverage. Reference Figure 4.

c. Inspect the crosstube from 3 to 9 o'clock along the entire length of the crosstube with the exception of the flared end that bolts to the skid tube shoe.

d. While performing this inspection the operator SHOULD NOT receive any signal as the sound beam travels unimpeded through the crosstube material.

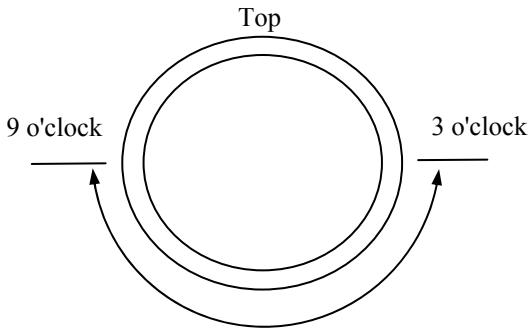


Figure 3. Area of Inspection, 3-9 o'clock

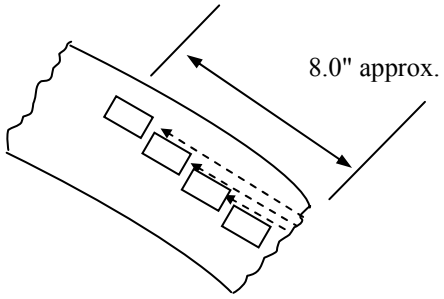


Figure 4. Overlap Scan Passes 50 %.

10.0 Interpretation.

a. Flaws detected in the 1st leg of the sound path will be displayed in the gate depending on the crosstube thickness at that location. Reference Figure 5.

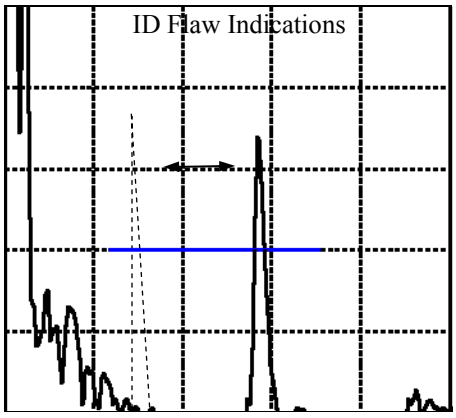


Figure 5. Instrument Display from ID Tears at Varying Material Thicknesses.

b. Relevant indications should be evaluated by slightly angulating the transducer in order to achieve the highest signal response.

c. All relevant indications should be inspected from two directions to acquire the maximum amplitude obtainable.

d. Nonrelevant indications generated from couplant on the surface of the crosstube in front of the transducer are easily identified by removing excess couplant from the surface of the crosstube. Reference Figure 6A and 6B.

e. All relevant indications shall be evaluated by reducing the scanning gain value by 6dB. If the indication continues to exceed the 40% FSH gate threshold it is cause for rejection. Reference Figure 7A & 7B.

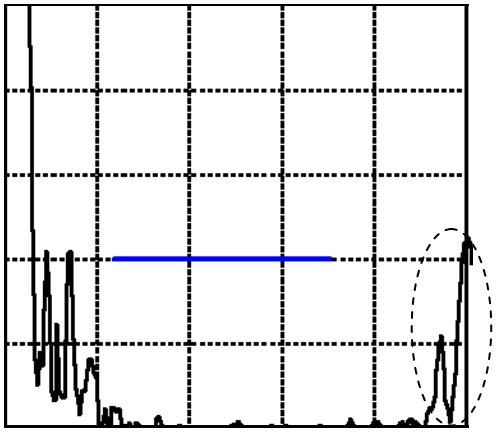


Figure 6A. Nonrelevant Indication from Couplant on the Crosstube OD.

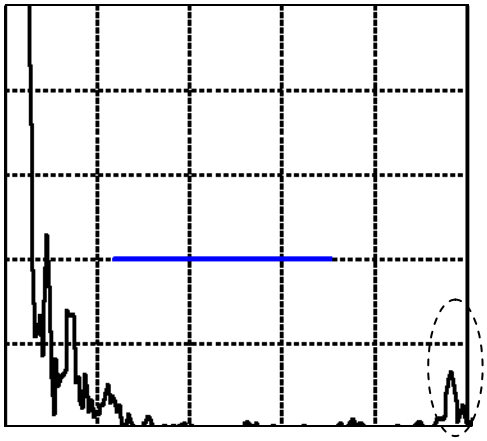


Figure 6B. Indication Eliminated After Couplant Removal.

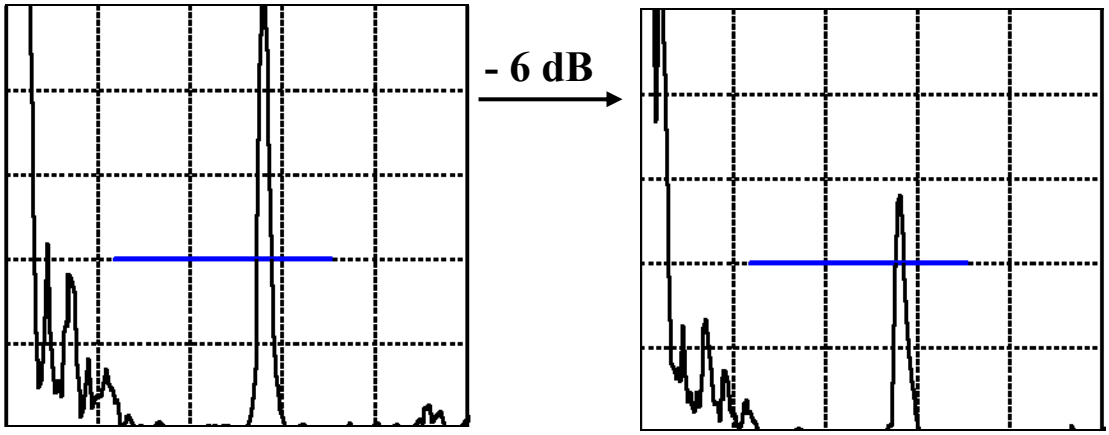


Figure 7A. Relevant Indication at Scanning Gain.

Figure 7B. Indication Evaluation AFTER 6 dB Reduction.

AFT LANDING GEAR CROSSTUBE (UT)

SONIC 1200
12 May 2006

11.0 Marking and Recording of Inspection Results. Mark and record the inspection results as required by paragraph 1.3, TM 1-1520-256-23.

12.0 Backup Method. None

13.0 System Securing. The crosstube requires cleaning to remove inspection media. Refer to Post Cleaning and Restoration of Part or Area after NDI, paragraph 1.4.16.

AFT LANDING GEAR CROSSTUBE (ET)

Nortec 2000
12 May 2006

1.0 Description (Figure 4-1, Index No. 38). The landing gear assembly has two arched aluminum crosstubes secured to the fuselage structure by four padded caps. The crosstubes are fitted with bearing straps at the fuselage attachment locations.

2.0 Defects. This inspection is utilized to detect outside diameter (OD) laps and/or cracks on the aft crosstube. Defects can occur from 3 to 9 o'clock on the crosstube. **No cracks are allowed.**

3.0 Primary Method. Eddy Current

4.0 NDI Equipment and Materials. (Refer to Appendix B)

a. Eddy Current inspection unit, Nortec 2000, or equivalent

b. Probe, straight, shielded surface, 1-2 MHz

c. Probe, right angle, shielded surface, 1-2 MHz

d. Cable Assembly, BNC to Microdot

e. Reference Block, three-notched aluminum (0.008", 0.020" and 0.040" EDM notches)

f. Teflon Tape, refer to Table 1-8, TM 1-1520-256-23

g. Nonaqeous Developer, refer to Appendix B, TM 1-1520-256-23

h. Aircraft Marking Pencil, refer to Table 1-8, TM 1-1520-256-23

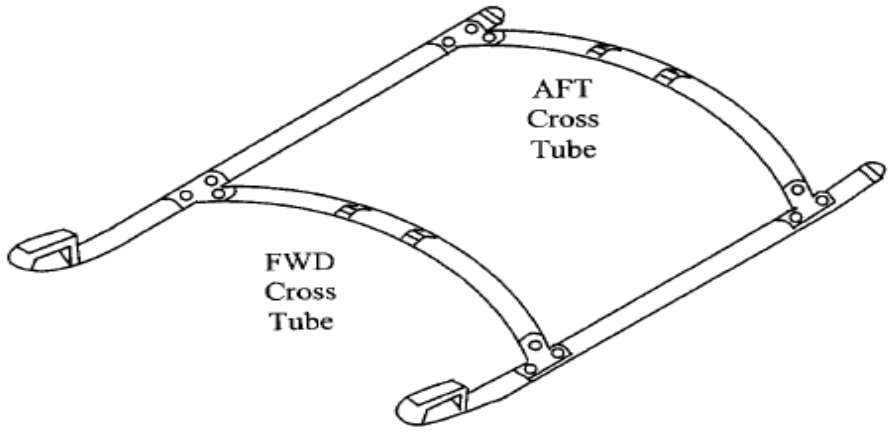


Figure 1. Landing Gear Assembly

AFT LANDING GEAR CROSSTUBE (ET)

Nortec 2000
12 May 2006

5.0 Preparation of Helicopter. The helicopter shall be prepared for safe ground maintenance in accordance with the applicable technical manuals listed in Table1-1.

6.0 Access. The aft crosstube **SHALL** be removed from the skid tubes and fuselage for this inspection in accordance with the applicable manuals listed in Table 1-1.

7.0 Preparation of Part. Rough surfaces and flaking paint may cause nonrelevant indications. Rough surfaces should be smoothed in accordance with the applicable manuals listed in Table 1-1. The crosstube shall be thoroughly cleaned. Refer to Preparation or Area for NDI, paragraph 1.4.4.

8.0 NDI Equipment Settings.

a. Make the following initial settings on the Eddy Current Inspection Unit.

Note: Place the frequency switch in the HI position on the BNC/Burndy adapter.

Frequency	1 MHz
HdB	56.0
VdB	68.0
Rot	44°
Probe Drive	HI
LPF	100
HPF	0
H Pos	80%
V Pos	20%

b. Refer to Eddy Current Method, paragraph 1.4.11. Set up on the test block as follows:

(1) Null the selected probe on the test block.

(2) Adjust the phase angle as required to obtain horizontal lift-off.

(3) Slide the probe over all three notches in the test block. Adjust the gain to obtain a one and one half (1 1/2) division vertical deflection when the probe is passed over the 0.008 inch notch. Reference the instrument display shown below.

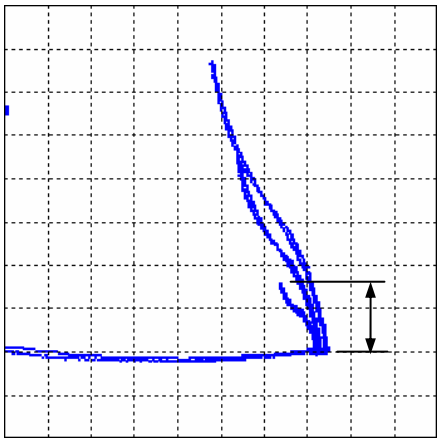


Figure 2. Reference Standard Display, 0.008" EDM Notch @ 1 1/2 Vertical Divisions.

AFT LANDING GEAR CROSSTUBE (ET)

Nortec 2000
12 May 2006

9.0 Inspection Procedure. Refer to Eddy Current Method, paragraph 1.4.11 and Figure 4-31.

a. Place the probe on a good area of the crosstube and null. Adjust the phase angle as required to obtain horizontal lift-off.

b. Inspect the crosstube's underside from the 3 to 9 o'clock position. Use the scan path as indicated in Figure 3 on the underside of the tube only. Scan paths should slightly overlap to ensure 100% inspection.

NOTE

A technique utilized to ensure consistent scan paths is to map out an area with an approved aircraft marking pencil, spray a light coat of non-aqueous wet developer on the inspection surface and monitor the "tracks" left behind from the probe face.

c. Inspect the crosstube underside from 3-9 o'clock along the entire tube length with the exception of the flared end that bolts to the skid tube shoe.

d. Any signal exceeding the response from the 0.008" EDM notch is cause for rejection. The relevance of an indication shall be determined by localized paint removal and 10x magnification. Suspect areas may also be evaluated by fluorescent penetrant inspection (FPI) to assist with the evaluation process.

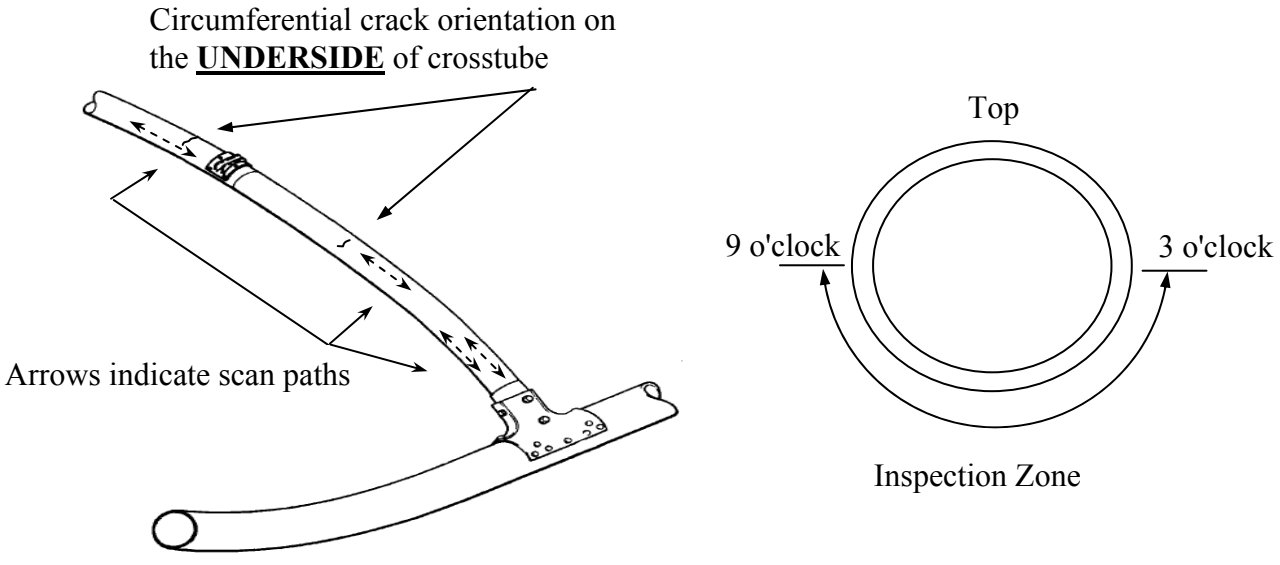


Figure 3. Probe scan paths and inspection zone

AFT LANDING GEAR CROSSTUBE (ET)

Nortec 2000
12 May 2006

10.0 Marking and Recording of Inspection Results. Mark and record inspection results as required by paragraph 1.3.

11.0 Backup Method. A fluorescent penetrant inspection may be performed. Paint removal prior to penetrant inspection shall be accomplished in accordance with applicable manual listed in Table 1-1. The reapplication of CARC paint shall be in accordance with TM 55-1600-345-23.

12.0 System Securing. The crosstube requires installation in accordance with the applicable technical manuals as listed in Table 1-1.