



SCHWEIZER SERVICE BULLETIN

B-255.1*
01 Feb 1993

MANDATORY

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SUBJECT: MAIN ROTOR DRIVE SHAFT INSPECTION

APPROVAL STATUS: MODIFICATION FAA APPROVED

MODELS AFFECTED: All Model 269A, TH-55, 269A-1, 269B, and 269C Helicopters

TIME OF COMPLIANCE: ● PART I is applicable to main rotor drive shafts, P/N 269A5305-3 and -11 (installed in helicopter, and spares). (All drive shafts manufactured by Schweizer Aircraft after 27 Jan 1993 are identified with the serial number prefix "SZ" or "ZS" and are EXEMPT from PART I requirements of this Service Bulletin.) PART I compliance of all remaining drive shafts shall be accomplished in accordance with the following, as applicable.

- Models 269A, TH-55, 269A-1, 269B - Any drive shaft with a serial number that does not carry the prefix "SZ" or "ZS"; AND
- Model 269C - Any drive shaft with Serial Number S0001 through S1111, and any drive shaft that does not carry the serial prefix "S";

Time of Compliance shall be in accordance with one of the following, as applicable:

- If drive shaft has LESS than 1200 hours flight time;
 - a) The next time drive shaft is removed OR
 - b) Within the next 600 hours flight time OR
 - c) Within 100 hours additional flight time upon reaching 1200 hours OR
 - d) Within one year from issue date of this Service Bulletin, whichever occurs first.
- If drive shaft has 1200 or more hours flight time; within the next 100 hours flight time, or within one year from issue date of this Service Bulletin, whichever occurs first.
- Model 269C - Any drive shaft with Serial Number S1112 and subsequent; Time of Compliance is within the next 25 hours flight time, or within one year from issue date of this Service Bulletin, whichever occurs first.
- For all drive shafts currently in spares stock; prior to installation in helicopter or before 01 May 1993, whichever occurs first.
- If PART I compliance is required by PART II; prior to further flight.

(|) Denotes portion of text added or revised

*Supersedes B-255, dated 27 Oct 1992

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TIME OF COMPLIANCE: (cont)

- PART II shall be accomplished prior to further flight:
 - If there is excessive main rotor vibration and/or main rotor track and balance procedures do not result in normal responses.
 - If excessive time and/or adjustment is required during main rotor track and balance procedures.

WARNING

**HELICOPTER WITH ANY OF THE ABOVE
PART II SYMPTOMS SHALL BE GROUNDED
UNTIL PART II PROCEDURE IS
ACCOMPLISHED.**

- PART II shall be accomplished whenever main rotor drive shaft is removed

REFERENCE: ● 269 Series Basic HMI (Reissued: 15 March 1982; Revised 08 May 1992)

- NDE Radiographic Inspection Procedure, Number 2035 (Attached)

PREFACE:

- A field report has shown that tooling marks may exist in the I.D. of main rotor drive shaft and could lead to drive shaft failure.
- Field reports indicate that main rotor track and balance problems that arise suddenly and/or those that do not respond to normal corrective actions, could be the result of a cracked main rotor drive shaft. Persistent vibration and/or track and balance difficulties may be an indication of imminent drive shaft failure.
- Failure to comply with this Service Bulletin may lead to loss of control of the helicopter and subsequent serious injury, death and/or property damage.

PROCEDURE:

PART I: MANDATORY ONE-TIME INSPECTION OF MAIN ROTOR DRIVE SHAFT

- a. If not already accomplished, remove main rotor drive shaft in accordance with Basic HMI, Section 10.
- b. Fill in "A/C Owner" and "A/C Serial Number" blanks (including drive shaft part number and serial number) on a copy of Figure 3 of attached NDE Radiographic Inspection Procedure, Number 2035. (A handwritten form containing the same information may be used in place of a Figure 3 copy, and additional copies (or forms) may be used for additional drive shafts.)
- c. Submit the drive shaft (with copy of Figure 3 attached) for inspection, in accordance with step (1), (2), or (3) below. (Inspection at/by Schweizer Aircraft Corp. (SAC) is recommended.)
 - (1) Have non-destructive inspection performed at/by SAC.

- (2) Have inspection performed on drive shaft at one of the laboratories listed below. These laboratories are equipped with a special test kit provided by SAC; to be used in conjunction with the NDE Radiographic Inspection Procedure, Number 2035. (The test kit includes detailed instructions and necessary components for accurate calibration of test equipment.) Drive shafts rejected by step 7.2 of NDE Radiographic Inspection Procedure must be retired from service. Rejected drive shafts may be returned to SAC for additional non-destructive inspection and evaluation for possible rework.
- (3) If it is not practical or desirable to have the inspection performed in accordance with step (1) or (2), the inspection may be performed locally at a qualified laboratory. In this event, it will be necessary to contact SAC Product Support ((607) 739-3821 Ext. 303) to arrange for delivery of the test kit. A copy of the lab certification must be submitted to SAC prior to shipment of test kit.
- d. If inspection is performed at laboratory, ensure that completed Figure 3 of attached NDE Radiographic Inspection Procedure is returned to SAC.
- e. Install serviceable main rotor drive shaft in accordance with Basic HMI, Section 10 (or return serviceable spare to stock).
- f. Record compliance with PART I of this Service Bulletin in the aircraft records (or tag spare drive shaft accordingly).

LABORATORIES APPROVED FOR MAIN ROTOT DRIVE SHAFT INSPECTION:

Q C Inspection, Inc.
15514 S. E. Plaza Ave.
P. O. Box 141
Clackamas, Oregon 97015
Russell Black, Operations Manager
Tele: (503) 656-4013
Fax: (503) 650-2498

General Inspection Laboratories, Inc.
8427 Atlantic Ave.
Cudahy, Calif. 90201
Gary Smalley, Q C Manager
Tele: (213) 583-1653
Fax: (213) 560-1627

Q C Laboratories, Inc.
2870 Stirling Road
Hollywood Fla. 33020-1199
Dean Stickler
Tele: (305) 925-0499
Fax: (305) 925-0988

Grinnell Corporation
1341 Elmwood Ave.
Cranston, RI 02910
Bill Golini
Tele: (401) 941-8000
Fax: (401) 781-7150

X.R.I. Testing
1961 Thunderbird St.
Troy, Mich. 48084
Rick Bourdon
Tele: (313) 362-5050
Fax: (313) 362-4422

NDE Inc.
1189 Mercedes St.
Benbrook, Texas 76126
Don Cosgrove
Tele: (817) 249-4760
Fax: (817) 249-6715

PART II: VISUAL INSPECTION OF MAIN ROTOR DRIVE SHAFT

- a. If not already accomplished, inspect main rotor drive shaft in accordance with PART I of this Service Bulletin.
- b. If installed in helicopter, remove main rotor drive shaft assembly in accordance with Basic HMI, Section 10 using Method II.
- c. Clean accessible areas of main rotor drive shaft. Using a high intensity light, visually inspect interior and exterior of main rotor drive shaft for cracks, distortion, and major surface damage (particular emphasis on the area just below the main rotor thrust bearing). If damage is suspected but not confirmed, perform dye penetrant inspection (removal of paint not required) to check for hidden cracks.

NOTE

If corrosion is found on main rotor drive shaft, perform corrosion inspection in accordance with criteria specified in Basic HMI, Section 10.

- d. If defects are found, replace main rotor drive shaft (Basic HMI Section 10) with serviceable unit.
- e. Install main rotor drive shaft assembly (Basic HMI, Section 10).
- f. Perform track and balance procedures. If vibration problem IS NOT resolved, proceed to step g. If vibration problem IS resolved, record compliance (step h.).
- g. Perform main rotor vibration troubleshooting procedure (Basic HMI, Section 8, Table 8-1).
- h. Record compliance with PART II of this Service Bulletin in the aircraft records.

WEIGHT AND BALANCE

Weight and balance are not affected.

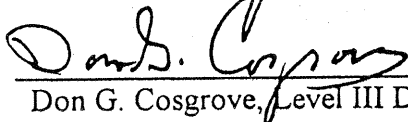
P.O. Box 121326
Ft. Worth, Tex., 76121
Metro (817)429-8823

1189 Mercedes St.
Benbrook, Tex., 76126
(817)249-4760

NDE, Inc.

Radiographic Inspection Procedure
Number 2035
Main Rotor Drive Shaft
Part Number 269A5305

Prepared for Schweizer Aircraft Corporation

By: 
Don G. Cosgrove, Level III DJ690

NDE, Inc.

1. Scope
 - 1.1. This procedure describes the radiographic technique required to perform the required inspection of the Main Rotor Drive Shaft, part number 269A5305, dash numbers -3 and -11.
 - 1.2. It enumerates the required equipment and furnishes the set up parameters needed to obtain the necessary sensitivity to evaluate the quality of existing products.
2. Equipment
 - 2.1. The equipment to perform this task is classified into two categories, "Required" and "Recommended"
 - 2.2. Required
 - 2.2.1. X-ray machine, constant potential, having a maximum kilovoltage capability of at least 150 kv.
 - 2.2.2. Film placement tool, part number NDE 122292 (furnished with this procedure and depicted in Figure 1).
 - 2.2.3. Film equivalent to ASTM Type Class 1 (i.e. NDT 45 by Dupont, Co.)
 - 2.2.4. High intensity film viewer (i.e. Penetrex Model 65-C1, with spot viewer).
 - 2.2.5. Densitometer (i.e. Macbeth Model Number TD 932).
 - 2.2.6. Reference standard and reference film.
 - 2.3. Recommended
 - 2.3.1. Automatic film processor
 - 2.3.2. 70 mm lead screen day pack film
 - 2.3.3. 5/16" lead numbers and letters
 - 2.3.4. 1" wide black masking tape (i.e. 3M #235)
 - 2.3.5. 2" wide standard masking tape
 - 2.3.6. Solid Paint Marker (i.e. Nissen-yellow or white)
3. Personnel Requirements
 - 3.1. Personnel reading and interpreting the film involved in this program shall have the training, experience and certification that meets or exceeds the requirements of SNT-TC-1A (the equivalent of this document that is recognized in any country will suffice for this task).
 - 3.2. Personnel performing this task shall have training and certification as required by the local authorities.
4. Surface Preparation
 - 4.1. All loose paint and surface contaminants shall be removed prior to performing this task.
 - 4.2. The inside surface of the shaft shall be free of all oils.
5. Calibration

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- 5.1. At the beginning of each work shift, the furnished reference standard shall be radiographed to verify consistency of x-ray technique.
- 5.2. The x-ray technique shall be adjusted to produce the required results from the reference standard as compared to the reference standard film furnished with this procedure.
- 5.3. This calibration procedure shall be performed as necessary to assure consistent results throughout the work day
- 5.4. The last exposure of the work day shall be of the reference standard.
- 5.5. If the results of this last exposure does not meet the requirements of this procedure, all exposures made between this last exposure the previous acceptable exposure of the reference standard shall be re-inspected to the requirements of this procedure.

6. Inspection

- 6.1. There are thirty five (35) views to be exposed. These shall be identified as follows:

A1 - 2	B1 - 2	C1 - 2	D1 - 2	E1 - 2
A2 - 3	B2 - 3	C2 - 3	D2 - 3	E2 - 3
A3 - 4	B3 - 4	C3 - 4	D3 - 4	E3 - 4
A4 - 5	B4 - 5	C4 - 5	D4 - 5	E4 - 5
A5 - 6	B5 - 6	C5 - 6	D5 - 6	E5 - 6
A6 - 7	B6 - 7	C6 - 7	D6 - 7	E6 - 7
A7 - 1	B7 - 1	C7 - 1	D7 - 1	E7 - 1

- 6.1.1. The relative positions of these views are as depicted in Figure 1 and are located by moving the positioning collar to an alphabet letter, such as A, B, C, etc.
 - 6.1.1.1. This will allow the film to be located at different distances from the entrance end of the shaft.
 - 6.1.1.2. By placing the locating pins astraddle a given tooth, such as 1, 5, 9, etc., this will position the film in the required circumferential locations. Figure 1 depicts the location of the locating pins in relation to the tooth.
- 6.1.2. The area of interest of each view is approximately seven (7) inches long by one (1) inch wide.
- 6.1.3. The film size shall be approximately 2.75" (70 mm) wide and 12" (304 mm) long.
- 6.2. Film preparation shall consist of cutting a 12 inch length of 70 mm leaded day pack (or equivalent) and sealing both ends with black masking tape.
 - 6.2.1. Identify this film with an alphabet letter and the two view numbers placed at approximately 7 inches from one end of the film pack.
 - 6.2.2. Place the shaft serial number along the center line of the film starting approximately 7 1/2 inches from the same end.
 - 6.2.3. Place the film pack onto the film placement tool with the 7 inches of the film in intimate contact with the lead patch on the tool. Tape with 2 inch wide masking tape in at least two locations.

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- 6.2.4. The view and serial number identification numbers shall be off of the lead patch and on the top surface of the film pack as depicted in Figure 1.
- 6.3. Film Placement
 - 6.3.1. Insert the film placement tool into the rotor shaft as depicted in Figure 1 after verifying that the tool pressure point is retracted below the surface of the tool.
 - 6.3.2. Insert the tool in such a manner that the film pack does not drag on the inside of the shaft.
 - 6.3.3. With the tool completely inserted, rotate the adjustment knob approximately three (3) turns, clockwise. This is a snug fit, not a tight fit.
- 6.4. Making the Exposure
 - 6.4.1. A typical x-ray machine setting that will produce acceptable radiographs is depicted in Figure 2.
 - 6.4.2. It is not mandatory to use these exact settings.
 - 6.4.3. It is mandatory that the film class, density range, source to film distance and number of views be adhered to.
- 7. Evaluation
 - 7.1. Accept/Reject of each shaft shall be based upon a comparison of the x-ray film of the shaft being inspected to the film obtained from the furnished reference standard.
 - 7.2. All shafts containing an indication equivalent to the 0.004" deep indication in the reference standard shall be rejected.
- 8. Report
 - 8.1. Using a copy of Figure 3 or a form containing at least the same information, record all the data requested on each main rotor drive shaft.
 - 8.2. These completed forms shall be submitted to:

Schweizer Aircraft Corp.
P.O. Box 147
Elmira, N.Y., 14902. USA

Attn: Roger DeWolfe
Quality Engineering

NDE, Inc.

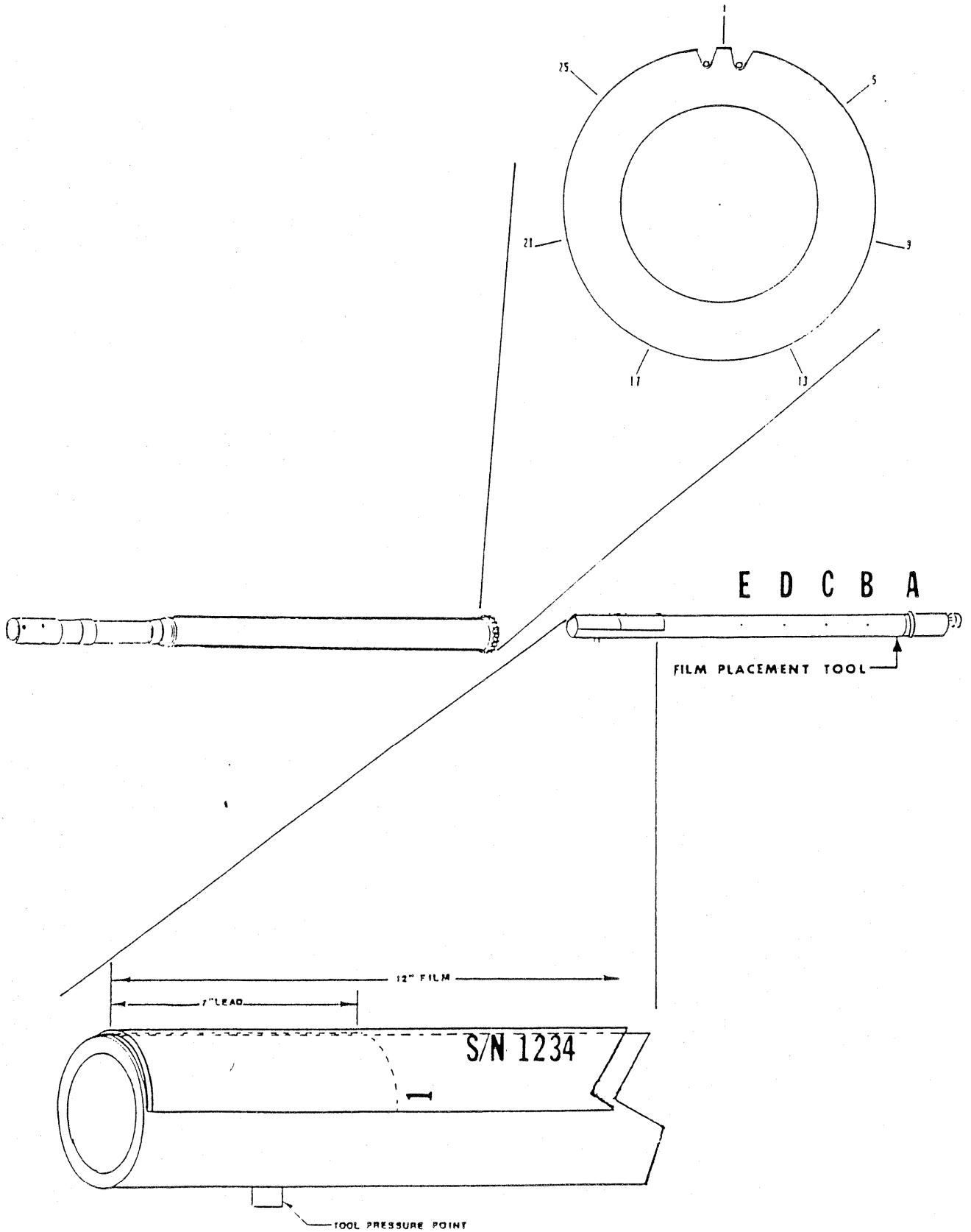


FIGURE 1

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Figure 2

View #	Kv	Ma	Exp. Time	Thickness Range
Typical	130	10	1:00 minutes	0.125"

SFD	Film Type/Size	Screens	Density	Single Wall	Single Film
40"	NDT 45, 70mm x 12"	Pb foil	2.6 - 3.1	yes	yes

Typical X-Ray Machine Set-up Parameters

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Figure 3

Inspection Source: _____ Date: _____

Name: _____ Inspector's Name: _____

Address: _____

A/C Owner:

Name: _____

Address: _____

A/C Serial Number: _____

Main Rotor Drive Shaft Part Number: _____

Serial Number: _____

Shaft Accepted _____

Shaft Rejected _____

View #	A/R	View #	A/R	View #	A/R	View #	A/R	View #	A/R
A1-2		B1-2		C1-2		D1-2		E1-2	
A2-3		B2-3		C2-3		D2-3		E2-3	
A3-4		B3-4		C3-4		D3-4		E3-4	
A4-5		B4-5		C4-5		D4-5		E4-5	
A5-6		B5-6		C5-6		D5-6		E5-6	
A6-7		B6-7		C6-7		D6-7		E6-7	
A7-1		B7-1		C7-1		D7-1		E7-1	

Results certified by:

THIS MAIN ROTOR DRIVE SHAFT HAS BEEN INSPECTED PER SCHWEIZER SERVICE BULLETIN B-255.1 PART 1 AND FOUND TO BE ACCEPTABLE.

P/N _____

S/N _____

DATE OF INSPECTION _____

INSPECTION PERFORMED AT _____

Note: This card may be inserted into A/C Log Book and shall accompany main rotor drive shaft throughout its life.

B-255-RESP (1/93)

THIS MAIN ROTOR DRIVE SHAFT HAS BEEN INSPECTED PER SCHWEIZER SERVICE BULLETIN B-255.1 PART 1 AND FOUND TO BE ACCEPTABLE.

P/N _____

S/N _____

DATE OF INSPECTION _____

INSPECTION PERFORMED AT _____

Note: This card may be inserted into A/C Log Book and shall accompany main rotor drive shaft throughout its life.

B-255-RESP (1/93)