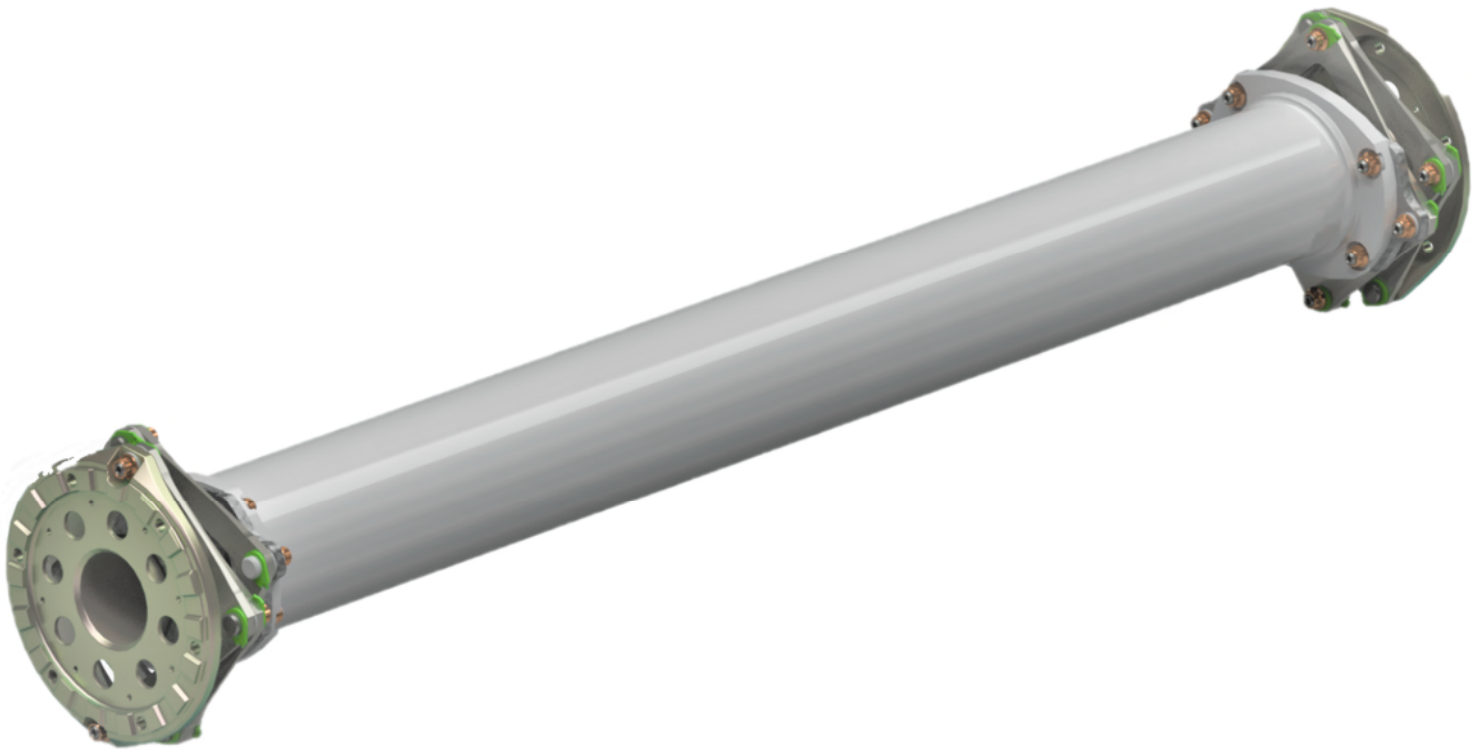


Installation, Maintenance and Repair of the KAflex®
Driveshaft for the Bell 212 and 412 (Standard & SP)
Helicopters.



KAMATICS CORPORATION SERVICE INSTRUCTION NUMBER 3587

Installation, maintenance and repair of the KAflex® Driveshaft for the Bell Models 212 and 412 (Standard & SP only) Helicopters. As a prerequisite to installation of the Kaflex driveshaft, the following **must** have been completed:

Aircraft operating with PT6T-3/-3B/-3BF Engines:

- Engine Reduction Gearbox Assembly must be upgraded in accordance with Pratt & Whitney Canada service bulletin S.B. No. 5412R2

and

- Bell Firewall Tunnel Mod Kit (P/N: 212-704-167-101) must be installed to allow space needed for the Kaflex driveshaft per service instruction BHT-212-SI-99

This Service Instruction Consists of the following sections:

1. KAflex Driveshaft Retrofit
2. KAflex Driveshaft Removal and Installation
3. KAflex Driveshaft Inspection
4. Maintenance of the KAflex Driveshaft
5. Repair of the KAflex Driveshaft
6. Supplemental Type Certificate

The KAflex Driveshaft Installation Kit contains the following:

1. KAflex Driveshaft P/N SKCP3587-1
2. Certificate of Compliance
3. Kamatics Corporation Service Instruction Number 3587
4. Historical Service Record (in back pocket of Service Instruction)

New mounting hardware is required (not included in the kit) for each driveshaft install as described in sections 1 and 2. Hardware needed is listed below. A quantity of 12 is needed for each item listed.

1. Washer: 212-040-790-101
2. Nut: NAS9926-5L
3. Washer: MS20002C5
4. Bolt: 20-065-05011

In addition to standard hand tools, the following tools will be required to complete installation per this Service Instruction:

Section 1 and 2


1. 100-200 in-lbs torque wrench

Section 3 and 5

1. Fine (150 grit) aluminum oxide or silicon carbide stone
2. Fine abrasive pad per A-A-58054, Type 1, Class 1, Grade A
3. Touchup **per drawing SKSP1500-TOUCHUP**
4. Alodine per MIL-DTL-81706, Form III
5. Soft wiping rags
6. Degreaser per MIL-PRF-680, Type II

|

LOG OF REVISIONS TO KAMATICS CORPORATION
SERVICE INSTRUCTION NUMBER 3587

Rev Letter	Revision Date	Change Log	Revised By	Kamatiks Approval
NC	11/02/20	Initial Revision	B. Tyropolis	C. Prain
A	7/30/21	Added STC SR00413BO to page 18	B. Tyropolis	C. Prain
B	07/11/22	Pg 6: Clarified the installation procedures Pg 9: Clarified the installation procedures Pgs 10-11: Clarified the inspection instructions Pg 12: Deleted "and mount"	B. Tyropolis	A. Bellott
C	03/27/23	All Pgs: Updated Kamatiks Logo Pg 2 & 18: Made Type Certificate plural. Pg 3 & 17: Replaced Item 3 "Sermetel 1122" with Touchup drawing. Pg 8 & 9: Added "Mounting hardware" instructions consistent with the OEM "Best Maintenance Practices" to Section 2.1.c. and Section 2.2.c. Pg 19: Added EASA Type Certificate.	B. Tyropolis	

NOTE: ONLY Section 1, item 3, and Section 2, item 2 require FAA approval.
 REFERENCE: Master Drawing List, KAM-3587-MDL-001 Rev IR (or later FAA Approved Revision).

SECTION 1

KAflex DRIVESHAFT RETROFIT

1. Preparation and General Notes

- a. Prior to proceeding, the following pre-requisites stated **must** be met to install a KAflex driveshaft:

Aircraft operating with PT6T-3/-3B/-3BF Engines:

- Engine Reduction Gearbox Assembly must be upgraded in accordance with Pratt & Whitney Canada service bulletin S.B. No. 5412R2

and

- Bell Firewall Tunnel Mod Kit (P/N: 212-704-167-101) must be installed to allow space needed for the KAflex driveshaft per service instruction BHT-212-SI-99

- b. Disconnect battery.

- c. Remove inlet fairings and engine top cowling to gain access to the main driveshaft per the BHT Maintenance Manual

2. Removal of Bell Driveshaft

- a. Remove shaft 212-040-005-103 driveshaft per the Bell Maintenance Manual

3. KAflex Driveshaft Installation

- a. Measure the distance between the adapter face (Figure 2, item 7) and the input drive quill face (Figure 2, item 11). The distance must be 47.480 to 47.780 inches. If the distance is not met, adjust per the Bell maintenance manual chapter 71 section 7. See Figure 1 for additional reference.

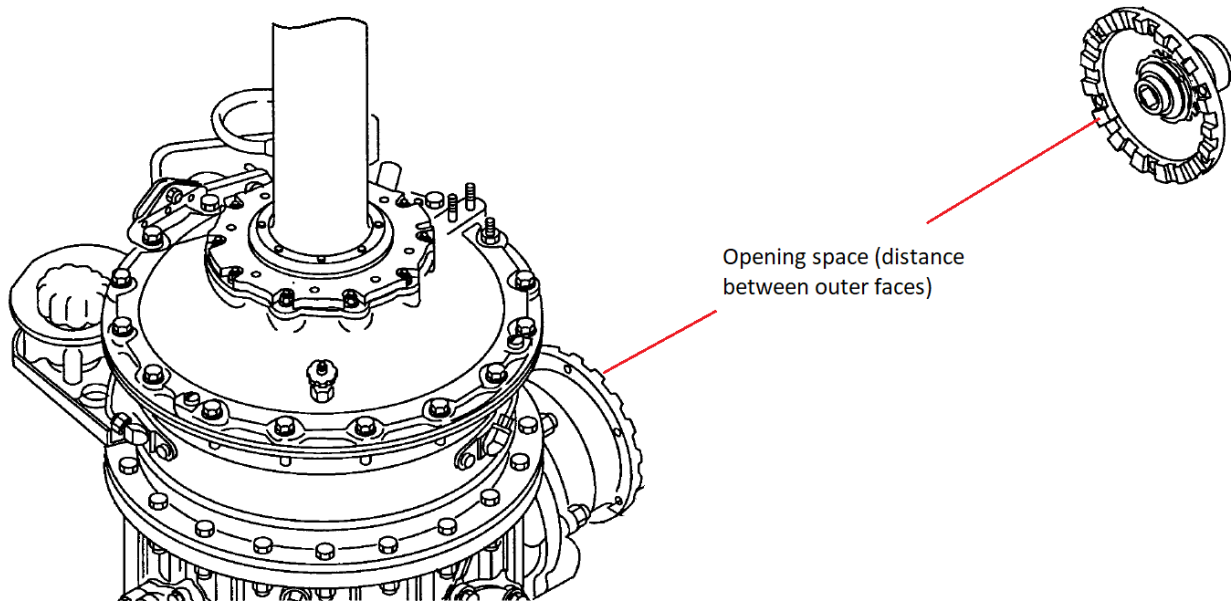


Figure 1, Opening Dimension Reference

- b. Move the driveshaft into position between adapter face (Figure 2, item 7) and the input drive quill face (Figure 2, item 11).
 - i. **Caution: Do not compress ends of driveshaft beyond 0.400". This will prevent damage.**
 - ii. **Caution: Do not use any tools to compress the driveshaft as it can damage the driveshaft**
 - iii. **Caution: The driveshaft must be supported at either end during installation. Loose bolts at the 12 o'clock position may be used to support the shaft.**
- c. Install hardware using Figure 2 with the associated figure numbers. Install recessed washers (5) on bolts (6) chamfer side to bolt-head. Install bolts (6) from existing engine adapter (7)/transmission input drive quill (11) side. Install washers (2) and nuts (3) on bolts (6) against flexible couplings (1). Nut torques shall be accomplished in three steps: one-third torque, two thirds torque, and full torque respectively. Torque nuts (3) in sequence 1, 3, 5, 6, 2, 4. See Detail A in Figure 2. Repeat sequence at each torque step. Full torque is 135 to 180 inch-pounds. Apply a torque stripe, using a "Skydrol" resistant torque stripe (tamper-proof mark), across the nut (3), washer (2) and end fitting of the flexible coupling (1). Similarly apply a torque stripe across the bolt (6), washer (5) and the mounting point [Transmission input quill (11) or Existing engine adapter (7)]. Do not re-use previous mounting hardware.
- d. The KAflex shaft does not require balance after installation.

CAUTION

Carefully check all electrical lines, fuel lines, hydraulic lines, bleed air lines and other nearby components for damage, interference, looseness or leakage.

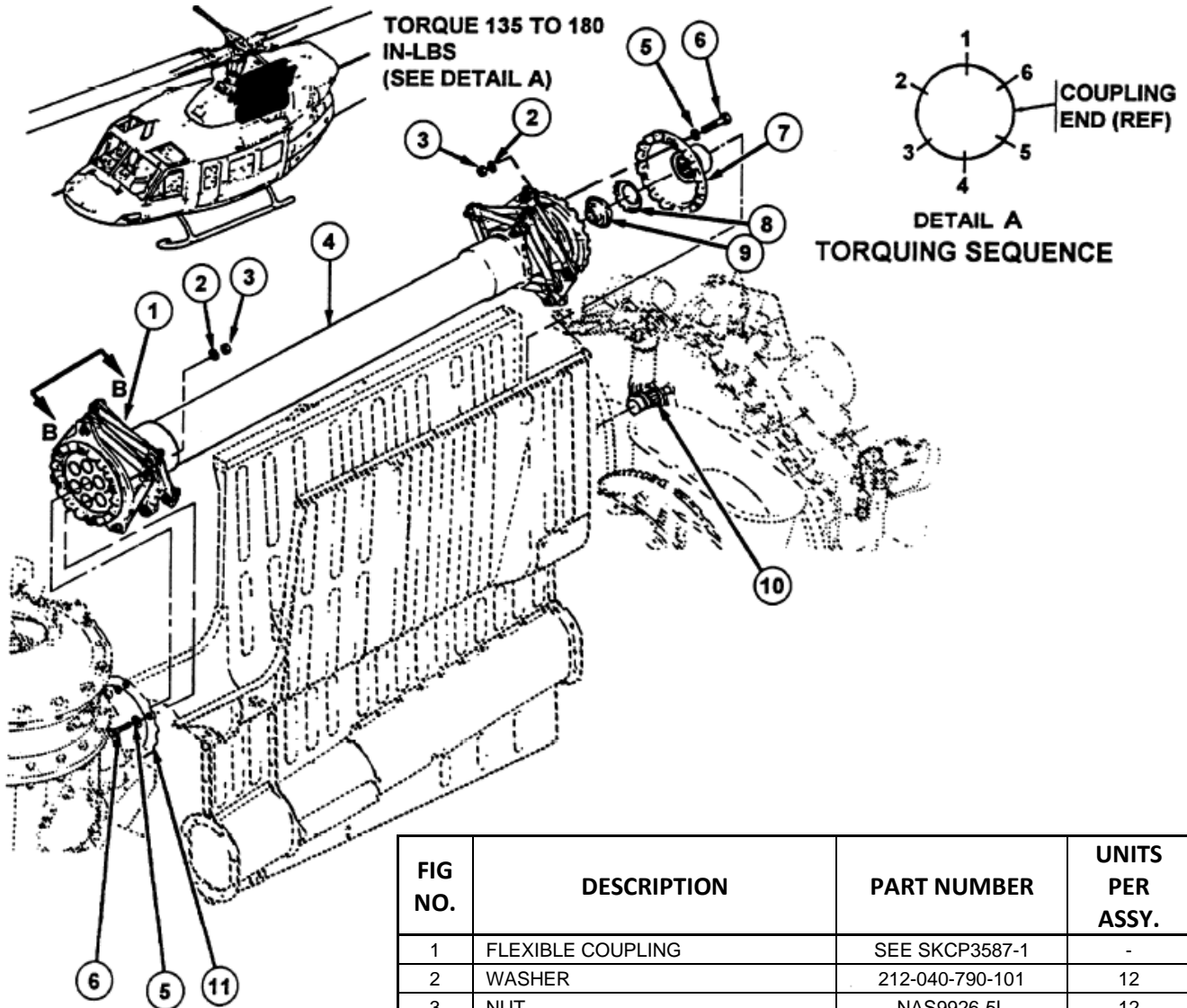


FIG NO.	DESCRIPTION	PART NUMBER	UNITS PER ASSY.
1	FLEXIBLE COUPLING	SEE SKCP3587-1	-
2	WASHER	212-040-790-101	12
3	NUT	NAS9926-5L	12
4	KAFLEX DRIVESHAFT ASSEMBLY	SKCP3587-1	1
5	RECESSED WASHER	MS20002C5	12
6	BOLT	20-065-05011	12
7	EXISTING ENGINE ADAPTER	-	-
8	WASHER, KEY	-	-
9	RETAINING NUT	-	-
10	ENGINE OUTPUT SHAFT	-	-
11	TRANSMISSION INPUT DRIVE QUILL	-	-

Figure 2, Installation/Removal

SECTION 2

KAflex DRIVESHAFT REMOVAL AND INSTALLATION

1. DRIVESHAFT REMOVAL

- a. Disconnect battery.
- b. Remove inlet fairings and engine top cowling to gain access to the main driveshaft per the BHT Maintenance Manual
- c. Remove mounting hardware (Figure 2, items 2, 3, 5 and 6). **Mounting hardware, excluding nuts, may be reused in accordance with best maintenance practices. Self-locking nuts must be replaced with new units each time the shaft is removed from the aircraft.**
- i. **Caution: The driveshaft must be supported at either end during installation. Loose bolts at the 12 o'clock position may be used to support the shaft.**
- d. Remove the driveshaft
 - i. **Caution: Do not compress ends of driveshaft beyond 0.400". This will prevent damage.**
 - ii. **Caution: Do not use any tools to compress the driveshaft as it can damage the driveshaft**
 - iii. **Caution: The driveshaft must be supported at either end during installation. Loose bolts at the 12 o'clock position may be used to support the shaft.**

2. DRIVESHAFT INSTALLATION

- a. Measure the distance between the adapter face (Figure 2, item 7) and the input drive quill face (Figure 2, item 11). The distance must be 47.480 to 47.780 inches. If the distance is not met, adjust per the Bell maintenance manual. See Figure 1 for additional reference.
- b. Move the driveshaft into position between adapter face (Figure 2, item 7) and the input drive quill face (Figure 2, item 11).
 - i. **Caution: Do not compress ends of driveshaft beyond 0.400". This will prevent damage.**
 - ii. **Caution: Do not use any tools to compress the driveshaft as it can damage the driveshaft**
 - iii. **Caution: The driveshaft must be supported at either end during installation. Loose bolts at the 12 o'clock position may be used to support the shaft.**
- c. Install hardware using Figure 2 with the associated figure numbers. Install recessed washers (5) on bolts (6) chamfer side to bolt-head. Install bolts (6) from existing engine adapter (7)/transmission input drive quill (11) side. Install washers (2) and nuts (3) on bolts (6) against flexible couplings (1). Nut torques shall be accomplished in three steps: one-third torque, two thirds torque, and full torque respectively. Torque nuts (3) in sequence 1, 3, 5, 6, 2, 4. See Detail A in Figure 2. Repeat sequence at each torque step. Full torque is 135 to 180 inch-pounds. Apply a torque stripe, using a "Skydrol" resistant torque stripe (tamper-proof mark), across the nut (3), washer (2) and end fitting of the flexible coupling (1). Similarly apply a torque stripe across the bolt (6), washer (5) and the mounting point [Transmission input quill (11) or Existing engine adapter (7)]. (Figure 2, items 2, 3, 5 and 6). **Mounting hardware, excluding nuts, may be reused in accordance with best maintenance practices. Self-locking nuts must be replaced with new units each time the shaft is removed from the aircraft.**
- d. The KAflex shaft does not require balance after installation.

CAUTION

Carefully check all electrical lines, fuel lines, hydraulic lines, bleed air lines and other nearby components for damage, interference, looseness or leakage.

SECTION 3**INSPECTION OF KAflex DRIVESHAFT**1. Inspection**NOTE**

The following checklists are to be used in place of those used for the spline coupling driveshaft.

**DAILY INSPECTION
BEFORE FIRST FLIGHT OF THE DAY**

1. Check general condition of KAflex Driveshaft.
 - a. Check for loose and missing hardware on the KAflex driveshaft (bolts, nuts, washers). If there is any loose or missing hardware on the KAflex driveshaft frame joints replace with a serviceable unit. Loose mounting hardware (Figure 1, items 2, 3, 5 and 6) are field serviceable by replacing with new hardware in accordance with this document. Indications of loose hardware may include traces of “red metallic residue” (fretting particulate) coming from any fastener area.
 - b. Inspect flex frame and mount bolt torque stripes for evidence of slippage. If evidence is found, follow the instructions for loose hardware in 1.a. above.

WARNING

DO NOT disturb or tighten flex frame nuts or bolts. Evidence of turning fasteners by wrench or other means is cause for rejection.

100 HOUR INSPECTION

2. Check general condition of KAflex Driveshaft.
 - a. The driveshaft may be cleaned with soft clean rags moistened with degreasing solvent per MIL-PRF-680, Type II.
 - b. Check for loose and missing hardware on the KAflex driveshaft (bolts, nuts, washers). If there is any loose or missing hardware on the KAflex driveshaft replace with a serviceable unit. Loose mounting hardware (Figure 1, items 2, 3, 5 and 6) are field serviceable by replacing with new hardware in accordance with this document.
 - c. Inspect KAflex Driveshaft for damage and corrosion. Refer to Figure 3 (Section 5) for damage and repair limits.
 - d. Inspect flex frame and mount bolt torque stripes for evidence of slippage. If the torque stripes have faded, touch up using a "Skydrol" resistant torque stripe (tamper-proof mark).

WARNING

DO NOT disturb or tighten flex frame nuts or bolts. Evidence of turning fasteners by wrench or other means is cause for rejection.

2500 Hr. Off Aircraft Inspection

1. Check general condition of KAflex Driveshaft.
 - a. The driveshaft may be cleaned with a soft clean wiping rag moistened with degreasing solvent per MIL-PRF-680, Type II.
 - b. Check for loose and missing hardware (bolts, nuts, washers). If there is any loose or missing hardware replace with a serviceable unit.
 - c. Inspect flex frame bolt torque stripes (white) for evidence of slippage. If the torque stripes have faded, touch up a "Skydrol" resistant torque stripe (tamper-proof mark).

WARNING

DO NOT disturb or tighten flex frame nuts or bolts. Evidence of turning fasteners by wrench or other means is cause for rejection.

- d. Inspect KAflex Driveshaft for damage and corrosion. Refer to Figure 3 (in Section 5) for damage and repair limits.
- e. Inspect KAflex Driveshaft flex frame joints for fretting dust which will appear as red metallic residue. If grease, oil or dirt is covering suspected area, or any doubt exists as to whether actual fretting has occurred, clean suspected areas thoroughly and recheck in conjunction with next daily inspection.

If fretting is apparent, replace unit with a serviceable unit.

- f. Inspect KAflex Driveshaft for signs of contact, rubbing, and/or chafing.

KAflex Driveshaft Conditional Inspection

NOTE

The following inspections detail special inspection instruction applicable to the KAflex Driveshaft.

For any conditional events which remove the shaft from service, the incident shall be described in the historical record

1. Overtorque

- a. 110-120% overtorque, perform a 100 hour inspection on KAflex Driveshaft.
- b. >120% overtorque, replace driveshaft with a serviceable unit.

2. Sudden Stoppage

- a. Perform a 100 hour inspection on the KAflex Driveshaft. Inspect freewheeling clutch assembly for evidence of overtorque. If clutch sprags are chipped or broken, if there is evidence of static brinelling of clutch races or other evidence of torsional overload, replace the shaft with a serviceable unit.

3. Hard Landing

- a. If any of the following components do not pass their respective inspection criteria as detailed in the Bell maintenance manual, the KAflex Driveshaft shall be replaced with a serviceable unit:
 - i. Main Rotor Hub
 - ii. Main Rotor Mast
 - iii. Main Transmission, Main Transmission Mounts Nodal Beam System, Drag Pin, Drag Plate
 - iv. Freewheeling Clutch Assembly
 - v. Engine or Engine Mounts
- b. Even if none of the items in Item 'a' above show the effects of the hard landing, perform a 100 hour inspection on the KAflex Driveshaft.
- c. Carefully inspect components near driveshaft for evidence of contact with driveshaft.

4. After Lightning Strike

- a. Lightning damage can show as burn marks, heat discoloration, arc marks, or as small weld marks (where the metal has melted and became solid again)
- b. If evidence of lightning damage is found on the driveshaft as described in Item 'a' above, replace the driveshaft with a serviceable unit.

SECTION 4

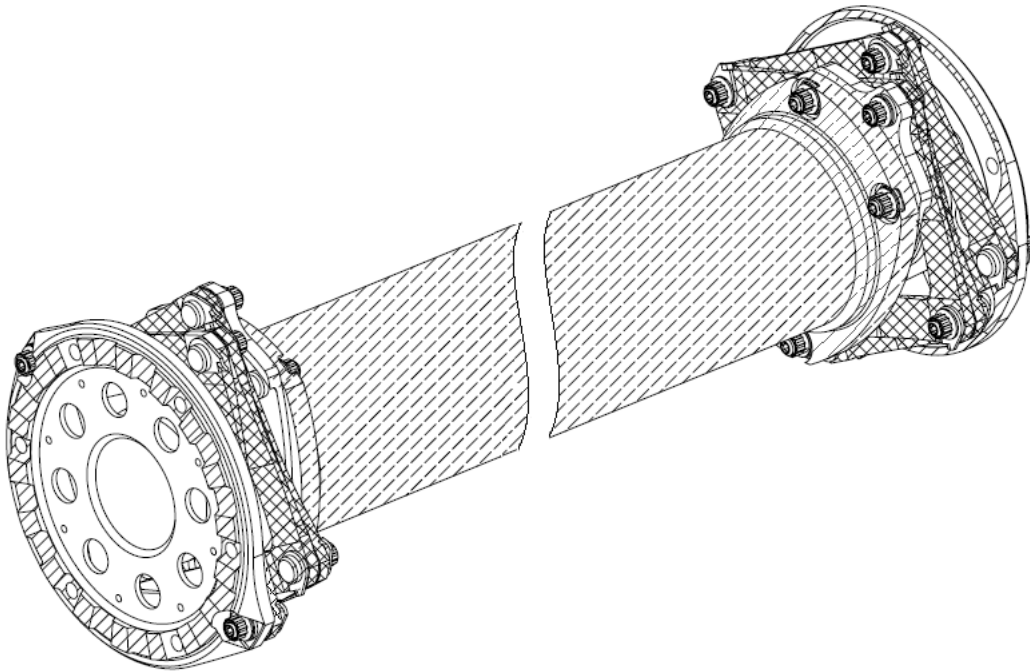
MAINTENANCE OF KAflex DRIVESHAFT

1. There is no periodic maintenance requirement for the KAflex Driveshaft.
2. The following maintenance practices will be incorporated as follows:
 - a. The KAflex Driveshaft is not field overhauled. Disassembly of the shaft (loosening of KAflex driveshaft nuts) will render the unit unserviceable.
 - b. Any time the KAflex Driveshaft is transferred from one aircraft to another the KAflex Driveshaft will require a 100 hour inspection. No disassembly of the shaft is to occur.
 - c. The KAflex Driveshaft is to be removed at 5,000 hours and replaced with a serviceable unit. The KAflex Driveshaft is not field overhauled.

SECTION 5

REPAIR OF KAflex DRIVESHAFT

1. Refer to Figure 3 for repair criteria. All blends shall be smooth at maximum depth and smoothly blended with surrounding surfaces.
2. The KAflex Driveshaft is not field overhauled. Disassembly of the KAflex driveshaft will render it unserviceable.
3. The KAflex Driveshaft is to be removed at 5,000 hours and replaced with a serviceable unit.




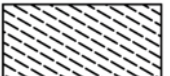
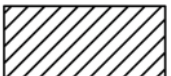

Type of Damage	Maximum Damage and Repair Depth			
AREA				
MECHANICAL	0.001" before and after repair	0.012" before and after repair	1	0.015" before and after repair
CORROSION	Surface, no pits	0.012" before and after repair	2	0.010" before and after repair
MAXIMUM AREA PER FULL DEPTH REPAIR SQ. IN.	0.05 in ²	0.09 in ²	0.25 in ²	0.25 in ²
NUMBER OF REPAIRS	One per leg	10	3	One per 1 in ²
EDGE DENTS, NICKS	0.001 in	7	0.005 in	0.025 in
CRACKS	None	None	None	None

Figure 3, Damage and Repair Limits

NOTES:

For curvic teeth, sides and corners of flex frames:

1. Do not repair indented damage on curvic teeth. Remove raised damage material with fine (150 grit) aluminum oxide or silicon carbide stone by hand polishing flush with surrounding surface. Repair not to exceed 25% of total tooth face. No more than 3 adjacent teeth or a total of 50% of all teeth.
2. Repairs limited to damage that can be removed by hand polishing with fine abrasive pad (scotch brite) A-A-58054, type 1, class 1, grade A. Repairs limited to damage that can be removed by hand polishing

FOR ALUMINUM CERAMIC COATED STEEL PARTS:

3. Repairs no less than 1.00 in APART and 0.50 in from bolt holes
4. Faying surface must be free from any raised metal areas.
5. All repairs to be 32 RMS, 0.25 in minimum radius.
6. Exposed bare metal may be touched up in accordance with drawing SKSP1500-TOUCHUP.

FOR WHITE ALUMINUM INTERCONNECT:

7. Nicks or scratches aligned within 30° of the spanwise axis are acceptable without repair to a maximum depth of 0.004 in.
8. All repairs to be 32 RMS, 0.25 in minimum radius.
9. If damage extends to bare metal, apply chemical film material (Alodine 1201), MIL-DTL-81706, FORM III, per NA 01-1A-509 series.
10. Total area of all repairs not to exceed 10 in² with no two repairs within 2.00 in.
11. All dimensions are in inches unless otherwise stated.

SECTION 6
TYPE CERTIFICATE^S

Following is a copy of FAA Supplemental Type Certificate Number SR00413BO.



United States of America
Department of Transportation
Federal Aviation Administration

Supplemental Type Certificate

Number SR00413BO

This certificate issued to:

Kamatics Corporation
1330 Blue Hills Avenue
Bloomfield, CT 06002

certifies that the change in the type design for the following product with the limitations and conditions therefore as specified hereon meets the airworthiness requirements of Part 29 of the Federal Aviation Regulations.

Original Product - Type Certificate Number: H4SW

Make: Bell Textron Inc.
Model: 212, 412

Description of Type Design Change:

Installation of Kamatics Corporation KAFlex® Main Rotor Driveshaft, Part Number (P/N) SKCP3587-1 in accordance with Master Drawing List (MDL), KAM-3587-MDL-001, Rev A, dated December 01, 2020, or later FAA approved revision. There is no Rotorcraft Flight Manual Supplement (RFMS) associated with this modification.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, and revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of Application: July 01, 2020

Date reissued:

Date of Issuance: July 27, 2021

Date amended:

By direction of the Administrator

Signing for Nicholas Faust

Manager, Boston ACO Branch

Signature

Nicholas Faust

Manager, Boston Aircraft Certification Office

Title

CONAN
PATRICK
COOK
Digitally signed by
CONAN PATRICK
COOK
Date: 2021.07.27
09:23:12 -0400

Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both. This certificate may be transferred or made available to third persons by licensing agreements in accordance with 14 CFR 21.47. Possession of this Supplemental Type Certificate (STC) document by persons other than the STC holder does not constitute rights to the design data nor to alter an aircraft, aircraft engine, or propeller. The STC's supporting documentation (drawings, instructions, specifications, flight manual supplements, etc.) is the property of the STC holder. An STC holder who allows a person to use the STC to alter an aircraft, aircraft engine, or propeller must provide that person with written permission acceptable to the FAA. (Ref. 14 CFR 21.120).

Following is a copy of EASA Supplemental Type Certificate Number 10081180.



SUPPLEMENTAL TYPE CERTIFICATE

10081180

This Certificate/Approval is issued by EASA, acting in accordance with Regulation (EU) 2018/1139 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 129 of that Regulation and in accordance with Commission Regulation (EU) No. 748/2012 to

KAMATICS CORPORATION

1330 BLUE HILLS AVENUE
BLOOMFIELD 06002
UNITED STATES OF AMERICA

and certifies that the change in the type design for the product listed below with the limitations and conditions specified meets the applicable Type Certification Basis and, if applicable, environmental protection requirements when operated within the conditions and limitations specified below:

Type Certificate Number: EASA.IM.R.106

Type Certificate Holder: BELL TEXTRON, INC.

Type: Bell 212/412

Model: 212, 412

Original STC Number: FAA SR00413BO

Description of Design Change:

Installation of KAflex Main Rotor Driveshaft P/N SKCP3587-1 in the Bell Textron Inc.

EASA Certification Basis:

The Certification Basis for the original product as amended by the following additional or alternative airworthiness requirements:

- The following paragraph(s) at a later amendment: CS 29.1529 at Amendment 8.

The requirements for environmental protection and the associated certified noise and/ or emissions levels of the product are unchanged and remain applicable to this certificate/ approval without any impact on the noise database.

See Continuation Sheet(s)

For the European Union Aviation Safety Agency

Cologne, Germany, 02 February 2023


Marco DIOLI
Section Manager Heavy Rotorcraft



An Agency of the European Union

Task Number: 60080783
KAMATICS CORPORATION - 305396

TE.CERT.00091-005

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Page 1 of 2

COMPONENT NAME: _____

PART NUMBER: _____

SERIAL NUMBER: _____

PAGE OF _____

KAFLEX DRIVESHAFT HISTORICAL SERVICE RECORD

INSTALLATION DATA						A/C HOURS SCH. FOR O/H RETIRE	REMOVAL DATA				
DATE	INSTALLED ON A/C	BY (ACTIVITY)	INSTALLED AT A/C HRS.	COMP. HRS.		HRS./DATE	DATE	REMOVED AT A/C HRS.	COMP. HRS.		REASON FOR REMOVAL
				SINCE NEW	SINCE O/H				SINCE NEW	SINCE O/H	

TECHNICAL DIRECTIVES AND HISTORY OF OVERHAUL

DIRECTIVE NUMBER IF APPLICABLE	TIME/DATE EFFECTIVITY	DESCRIPTION	COMPLIANCE	
			BY (ACTIVITY)	DATE

2,500 HOURS INSPECTION, AND ANY OTHER REPAIRS / MAINTENANCE PERFORMED ON THE DRIVESHAFT MUST BE RECORDED ON THIS HISTORICAL DATA CARD

COMPONENT NAME	SERIAL NUMBERS	ORIGINALLY PLACED IN SERVICE	INSTALLATION DATA		SCHEDULED REMOVAL	REMOVAL DATA		
			ACCUMULATED TIME ON ASSEMBLY OR PART		DATE	DATE	ACCUMULATED TIME ON ASSEMBLY OR PART	
PART NUMBER		DATE COMPONENT HOURS	SINCE NEW (HRS)	SINCE OVERHAUL (HRS)	COMPONENT HOURS	AIRCRAFT HOURS	SINCE NEW (HRS)	SINCE OVERHAUL (HRS)
NAME:								
NO.:								
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