

TECHNICAL BULLETIN

Bell Helicopter **TEXTRON**

A Subsidiary of Textron Inc

NO. 214ST-99-160

DATE 01-26-99

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DATE
REV

MODEL AFFECTED: 214ST

SUBJECT: STARTER MOTOR CLUTCH ASSEMBLY,
P/N 36B510954G2, CLEANING/OVERHAUL
PROCEDURE.

HELICOPTERS AFFECTED: Model 214ST S/N 28101 and Subsequent.

COMPLIANCE: At customers option.

DESCRIPTION:

Smith Industries Aerospace – Leland has published a Service Bulletin 2CM272B1-80-09 (see attached) which provides procedures for cleaning and overhaul of the Clutch Assembly P/N 36B510954G2, a subassembly of Starter Motor P/N 214-060-056-103. Compliance with the overhaul portion of the Service Bulletin will allow Clutch assemblies return to service and supercede the previous seven (7) years retirement recommendation

APPROVAL:

The Engineering aspects of this bulletin are FAA approved.

MANPOWER:

Refer to Service Bulletin 2CM272B1-80-09

MATERIAL:

Refer to Service Bulletin 2CM272B1-80-09
Required materials should be ordered from Smith Industries Aerospace-Leland, Vandalia, Ohio

SPECIAL TOOLS:

Refer to Service Bulletin 2CM272B1-80-09

WEIGHT AND BALANCE:

Not affected

7851 58913 REV 1198

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

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ELECTRICAL LOAD DATA:

Not affected

REFERENCES:

Refer to Service Bulletin 2CM272B1-80-09

PUBLICATIONS AFFECTED:

Refer to Service Bulletin 2CM272B1-80-09

ACCOMPLISHMENT INSTRUCTIONS:

Refer to Service Bulletin 2CM272B1-80-09

**SMITHS INDUSTRIES AEROSPACE - LELAND
VANDALIA, OHIO**

SERVICE BULLETIN

Electrical Starter

Model Number

2CM272B1

Clutch Cleaning/Overhaul Procedure

36B510954G2

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. In no event shall Leland Electrosystems be responsible for any loss or damage arising from the use of the information contained herein. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to Leland Electrosystems.

The recipient agrees that this document is furnished for the purpose of servicing, maintaining, and overhauling Leland Electrosystems equipment; no dissemination or other use thereof may be made without the written permission of Leland Electrosystems.



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1. Planning Information

A. Effectivity

- (1) This Service Bulletin applies to the Leland ElectroSystems electrical starter model 2CM272B1. This unit was formerly manufactured by General Electric Co.
- (2) Incorporation of this service bulletin is recommended with frequency of cleaning as specified by Bell Helicopter BHT 214ST Maintenance Manual Chapter 5.

B. Reason

This service bulletin is being issued to allow cleaning and overhaul of the clutch assemblies part number 36B510954G2, that are found to be out of specification for slip/breakaway torque and end play during normal starter service intervals.

C. Description

This service bulletin provides:

- (1) A listing of test equipment required
- (2) Cleaning Procedures
- (3) Visual inspection procedure
- (4) Test procedure to measure the clutch assembly for breakaway and slip torque
- (5) Measurement of end play between clutch sleeve and clutch housing
- (6) Clutch run-in requirements
- (7) Disposition of clutches after testing

D. Manpower

Approximately one hour is required to implement the cleaning/overhaul procedures as described in this service bulletin. The time is based on the assumption that the clutch assembly will be tested and measured after scheduled removal from the electrical starter as specified in the Field Maintenance Manual. (GEK-34467 Revision 1 Page 22, paragraph D.2).

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E. Tooling and Test Equipment

Equivalent substitutes may be used for listed items.

Internal Retaining Ring Pliers P/N PR-349A

Locking Arbor Press (Bench Type)

15mm 12 point socket

Dial comparator

Jaw, Coupling.....Leland P/N 36D831552P1,

Holding Fixture, Clutch Assembly (Local make,

see Figure 7 or Leland P/N G10334).

Pressing Tool (Local make, see Figure 1 or Leland P/N K34692)

Torque Wrench (0-600 in-lbs)

Clutch Run-In Fixture P/N K34639

2. Accomplishment Instructions

A. Disassembly

Clutch assembly shall be disassembled from the electrical starter as specified in the Field Maintenance Manual (GEK-34467 Revision 1, page 21, paragraph C).

B. Clutch Disassembly

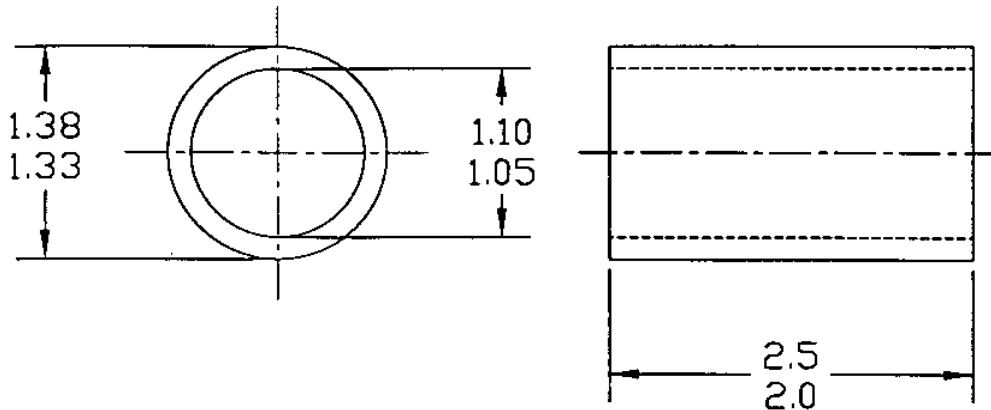
- (1) Install clutch in locking arbor press. Use pressing tool P/N K34692 to press down on cover (3) and compress belleville washers (6), as shown in Figure 1 and Figure 2.
- (2) Use retaining ring pliers to remove internal retaining ring (11).
- (3) Remove clutch from arbor press.
- (4) Remove shims (12), (13), (14), (15) and (16).
- (5) Remove cover (3)
- (6) Remove washers (7), (8), (9) and (10).

NOTE Keep plates (4) and friction plates (5) in order using safety wire through the center of the plates. If plates (4) and friction plates (5) become mixed up and are out of order refer to the Overhaul section of this Service Bulletin for clutch run-in procedures

- (7) Remove plates (4), friction plates (5) and belleville washers (6).

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Material: 4140 Steel heattreat to 30-35 Rockwell C.
Marking: Vibro etch part number on outside diameter.
NOTE: All measurements are in inches.

Pressing Tool
Figure 1

(8) Remove clutch sleeve (1) and washer (17) from clutch housing (2).

C Cleaning

WARNING ALCOHOL IS FLAMMABLE AND TOXIC TO SKIN, EYES, AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION IS REQUIRED. AVOID REPEATED OR PROLONGED CONTACT. USE IN A WELL-VENTILATED AREA.

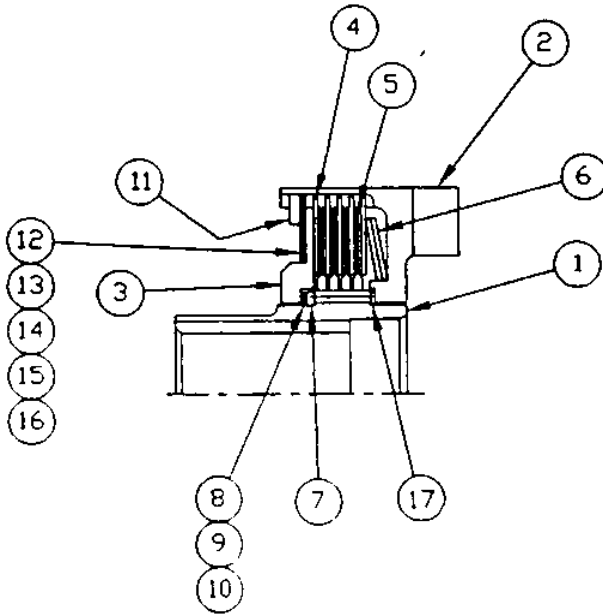
(1) Clean all parts with soft bristle brush dipped in TT-I-735 Isopropyl Alcohol or equivalent substitutes to remove dirt and oil/grease. Use clean paper towel to remove excessive alcohol and allow to air dry.

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VANDALIA, OHIO

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LEGEND			
<u>ITEM NO.</u>	<u>NOMENCLATURE</u>	<u>QTY</u>	<u>PART NO.</u>
1	CLUTCH SLEEVE	1	36D831545P2
2	CLUTCH HOUSING	1	36D831547P2
3	COVER	1	36B510956P1
4	PLATE	5	36B510788P1
5	FRICTION PLATE	4	36B510787G2
6	BELLEVILLE WASHER	2	36B510792P1
7	WASHER	1	36B510797P1
8	WASHER	AR	36B510797P2
9	WASHER	AR	36B510797P3
10	WASHER	AR	36B510797P7
11	INTERNAL RETAINING RING	1	MS16625-2200
12	SHIM	AR	36A228447P1
13	SHIM	AR	36A228447P2
14	SHIM	AR	36A228447P4
15	SHIM	AR	36A228447P5
16	SHIM	AR	36A228447P6
17	WASHER	1	36A228486P1



Clutch Disassembly
Figure 2

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**SMITHS INDUSTRIES AEROSPACE - LELAND
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- (2) If necessary, use abrasive hand pad to remove stubborn dirt, burrs and grime from surface of parts as shown in Figure 3. Repeat step (1) to remove all loose particles.

D. Inspection

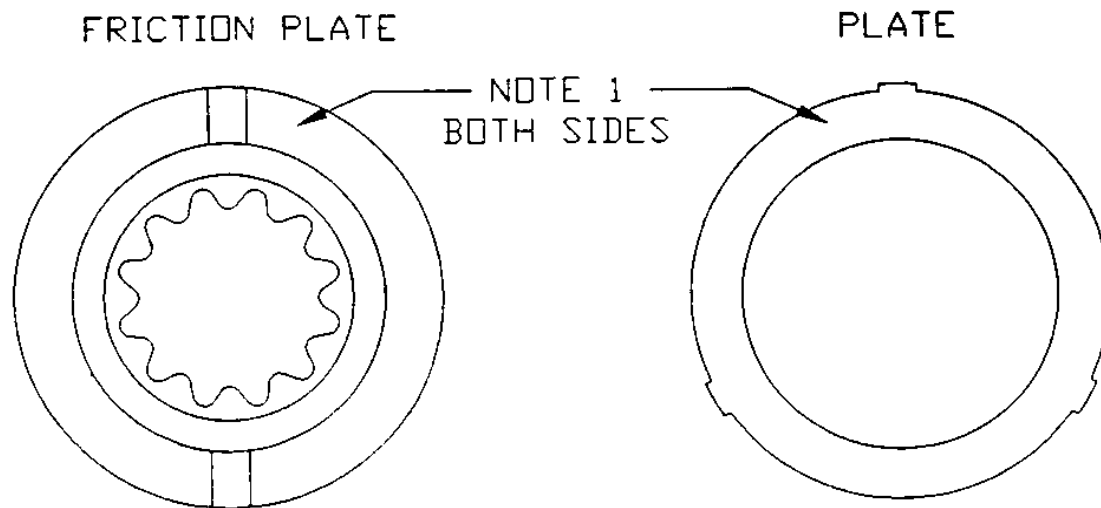
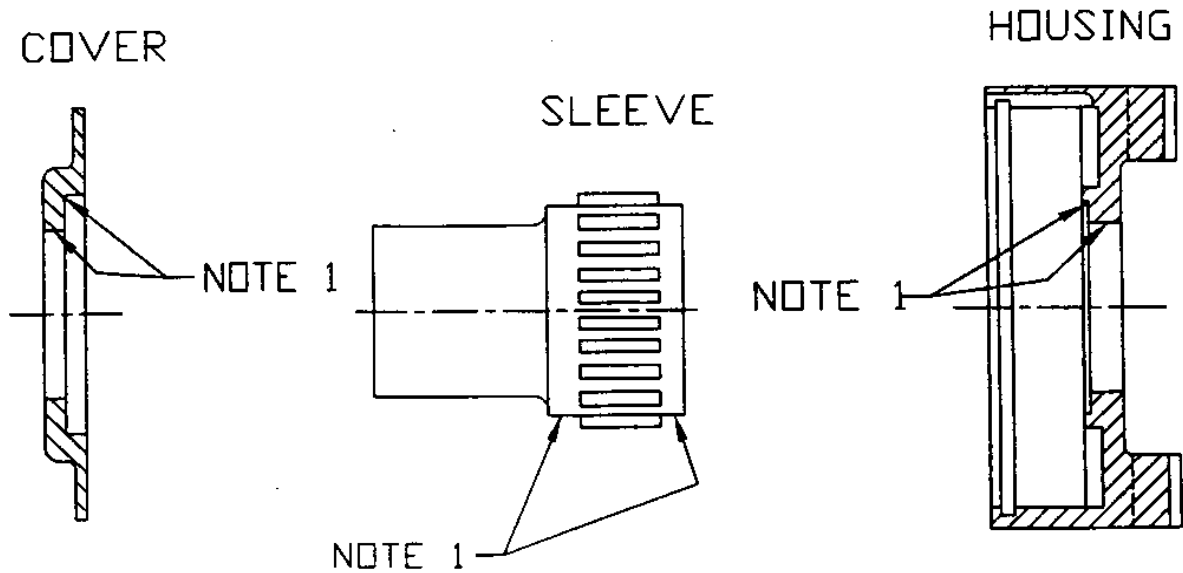
- (1) All parts shall be inspected to the requirements listed on Table 1, of this procedure.

Table 1. Inspection Requirement - Clutch Parts

Index No.	Nomenclature	Method of Inspection			Replace at Overhaul	Typical Defects	Remarks and References
		Visual	Electrical	Measure			
G2 1	Clutch Sleeve	X		X			Damage/Wear Limits Fig 4
2	Clutch Housing	X		X			Damage/Wear Limits Fig 5
3	Cover	X					Damage/Wear Limits Fig 6
4	Plate	X					Damage/Wear Limits Fig 7
5	Friction Plate	X		X			Damage/Wear Limits Fig 8
6	Washer Belleville	X					
7	Washer	X				Burrs, Distortion	
8	Washer	X				Burrs, Distortion	
9	Washer	X				Burrs, Distortion	
10	Washer	X				Burrs, Distortion	
11	Internal Retaining Ring	X				Burrs, Distortion	
12	Shim	X				Burrs, Distortion	
13	Shim	X				Burrs, Distortion	
14	Shim	X				Burrs, Distortion	
15	Shim	X				Burrs, Distortion	
16	Shim	X				Burrs, Distortion	
17	Washer	X				Burrs, Distortion	

* Index numbers are item numbers per 36B510954G2

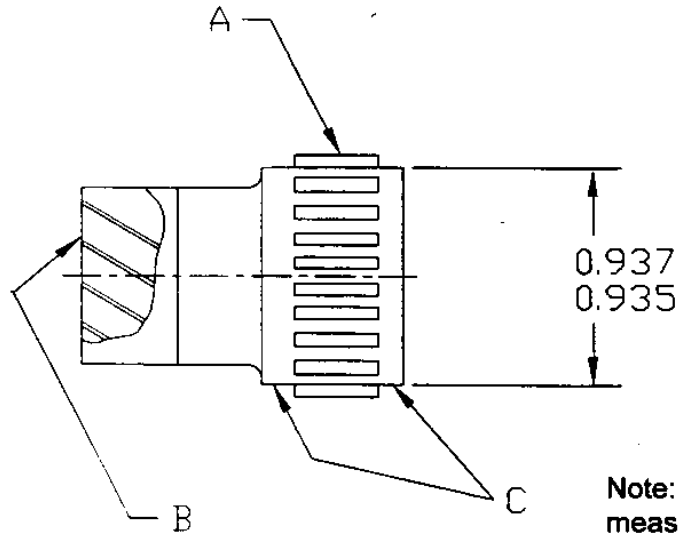
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NOTES:
1. SURFACES MUST BE CLEAN.

Cleaning Detail
Figure 3

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Note: Diameter C is measured in two places as shown.

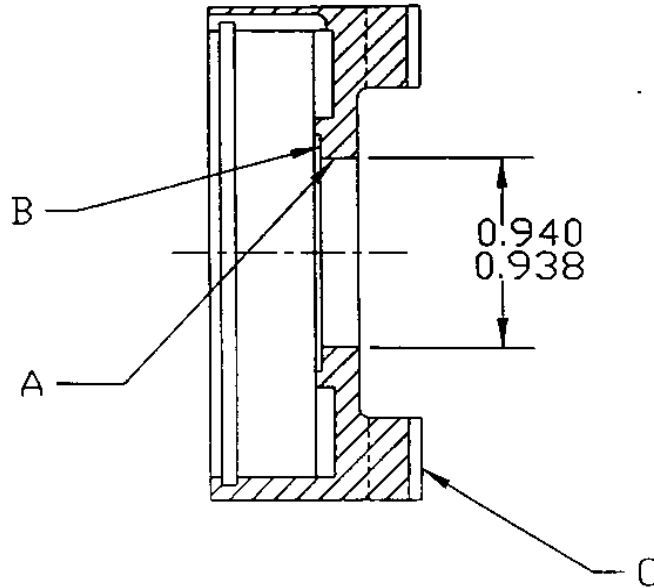
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AREA/ ITEM NO.	TYPE OF DAMAGE	NOMENCLATURE	INSPECTION METHOD	MAXIMUM LIMITS
	Burrs, Cracks and Corrosion	Clutch Sleeve	Visual	No cracks allowed. Remove burrs. Surface corrosion to be cleaned off.
A	Burrs and teeth damage	Spline	Visual	Wear marks are acceptable. No chipped, broken or cracked jaw teeth
B	Burrs on end of threads and teeth damage	Internal Threads	Visual	Wear marks are acceptable. Remove burrs. No teeth damage allowed
C	Nicks and Galling	Outside Diameter	Visual	Wear marks are acceptable. No deep galing or obvious nicks
	Dimensional	Outside Diameter	Measure	As Shown

Clutch Sleeve (36D831545P2)
Damage & Wear Limits
Figure 4

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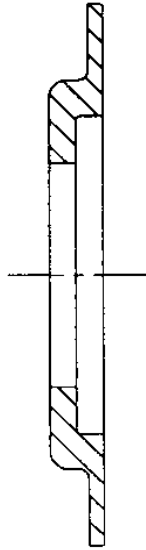


AREA/ ITEM NO.	TYPE OF DAMAGE	NOMENCLATURE	INSPECTION METHOD	MAXIMUM LIMITS
	Cracks, Burrs, and Corrosion	Clutch Housing	Visual	No protrusion or burrs that will restrict movement of plates.
A	Galling	Internal Diameter	Visual	Wear marks are acceptable. No blueing or deep incisions allowed.
B	Galling	Rabbit	Visual	Remove burrs Surface should be smooth with no pitting or inclusions
C	Cracked, Nicked and Missing	Teeth	Visual	Wear marks are acceptable. No chipped, broken or cracked teeth. Remove burrs

Clutch Housing (36D831547P2)
Damage & Wear Limits
Figure 5

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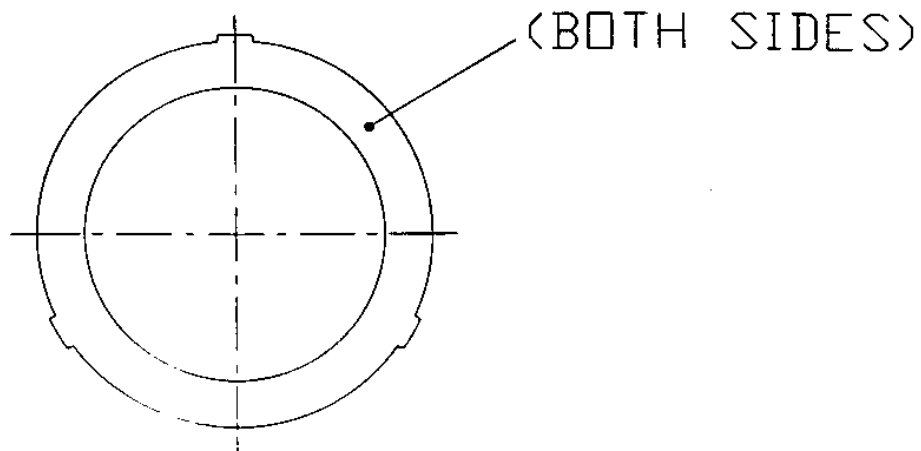


AREA/ ITEM NO	TYPE OF DAMAGE	NOMENCLATURE	INSPECTION METHOD	MAXIMUM LIMITS
	Burrs, Galling, Cracks and Distortion	Clutch End Cover	Visual	Wear marks are acceptable. No burrs, cracks or major distortion.

Clutch End Cover (36B510956P1)
Damage & Wear Limits
Figure 6

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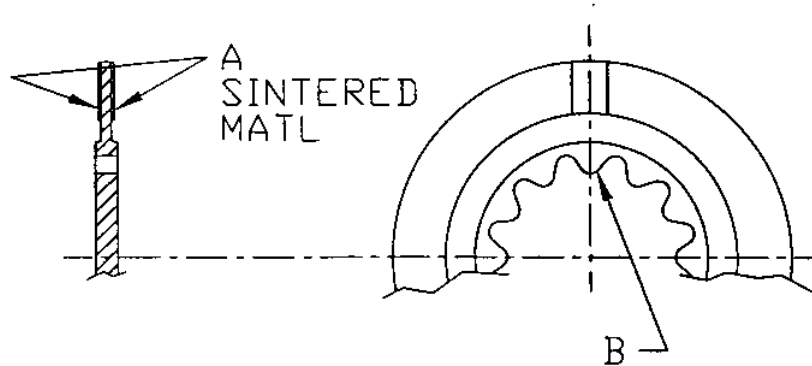


AREA/ ITEM NO	TYPE OF DAMAGE	NOMENCLATURE	INSPECTION METHOD	MAXIMUM LIMITS
	Bluish color from over heating. Burrs. Distortion, Corrosion Chip Plating and Grainy Finish		Visual	Clean, smooth finish Wear marks are acceptable. No blueing, chips or deep grooves Remove burrs and surface corrosion

Plate (36B510788P1)
Damage & Wear Limits
Figure 7

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AREA/ ITEM NO.	TYPE OF DAMAGE	NOMENCLATURE	INSPECTION METHOD	MAXIMUM LIMITS
	Bluish color from over heating. Burrs, Distortion and Corrosion	Friction Plate	Visual	Wear marks are acceptable. Remove burrs and surface corrosion. No nicks or distortion allowed
A	Missing Material and Glazed, minimum 0.040	Surface	Visual	No missing material Wear marks are acceptable.
B	Burrs, Distorted, and Broken	Spline	Visual	Wear marks are acceptable. No broken or damaged teeth. Remove burrs.

Friction Plate (36B510787G2)
Damage & Wear Limits
Figure 8

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- (2) Parts not meeting these requirements shall be replaced. There are no repair procedures for individual parts.

E. Clutch Assembly

- (1) Re-assemble washer (17) to clutch housing (2). Check that chamfer on washer is located away from housing as shown in Figure 9.
- (2) Re-assemble clutch sleeve (1).
- (3) Re-assemble two belleville washers (6). Belleville washer to be located against clutch housing (2). (Dish side up).

NOTE: Re-assemble plates (4) and friction plates (5) in same order as removed. Verify plates move freely on spline.

- (4) Re-assemble clutch plates (4) and friction plates (5) in clutch housing (2) in the same order and with the same wear surfaces mating as when removed. If plates (4) and friction plates (5) become mixed up and are out of order refer to the Overhaul section of this Service Bulletin for clutch run-in procedures.

CAUTION: ASSEMBLE WASHERS, SUCH THAT THE THINNEST WASHERS ARE AT THE WASHER STACK CENTER AND THE THICKEST WASHERS ARE OUTSIDE SO AS TO PROVIDE BEST SUPPORT.

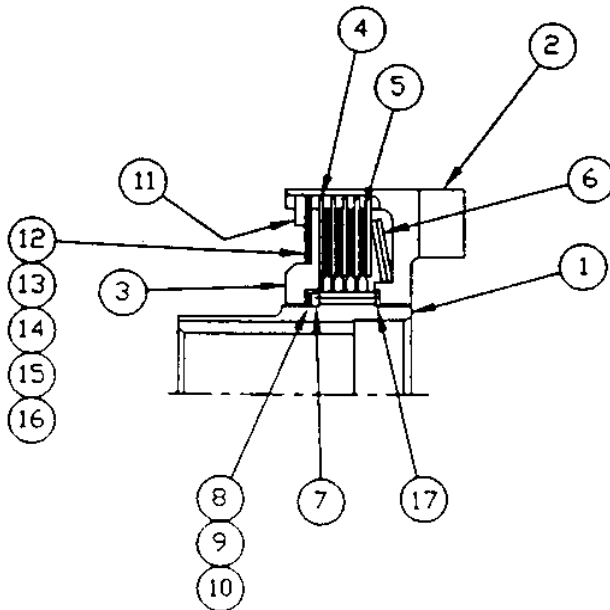
CAUTION: MAXIMUM WASHER THICKNESS SHALL BE USED TO ACHIEVE REQUIRED STACK THICKNESS. FOR EXAMPLE: FOUR 0.010 THICK WASHERS SHOULD NOT BE USED WHEN TWO 0.020 THICK WASHERS WILL SATISFY THE TOTAL THICKNESS.

- (5) Re-assemble same quantity of washers (8), (9) and (10) as removed.
- (6) Re-assemble cover (3) as shown in Figure 9.

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14	SHIM	AR	36A228447P4
15	SHIM	AR	36A228447P5
16	SHIM	AR	36A228447P6
17	WASHER	1	36A228486P1



Clutch Assembly
Figure 9

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CAUTION: ASSEMBLE SHIMS, SUCH THAT THE THINNEST SHIMS ARE AT THE SHIMS STACK CENTER AND THE THICKEST SHIMS ARE OUTSIDE SO AS TO PROVIDE BEST SUPPORT.

CAUTION: MAXIMUM SHIM THICKNESS SHALL BE USED TO ACHIEVE REQUIRED STACK THICKNESS. FOR EXAMPLE: TWO 0.005 THICK SHIMS SHOULD NOT BE USED WHEN ONE 0.010 THICK SHIM WILL SATISFY THE TOTAL THICKNESS.

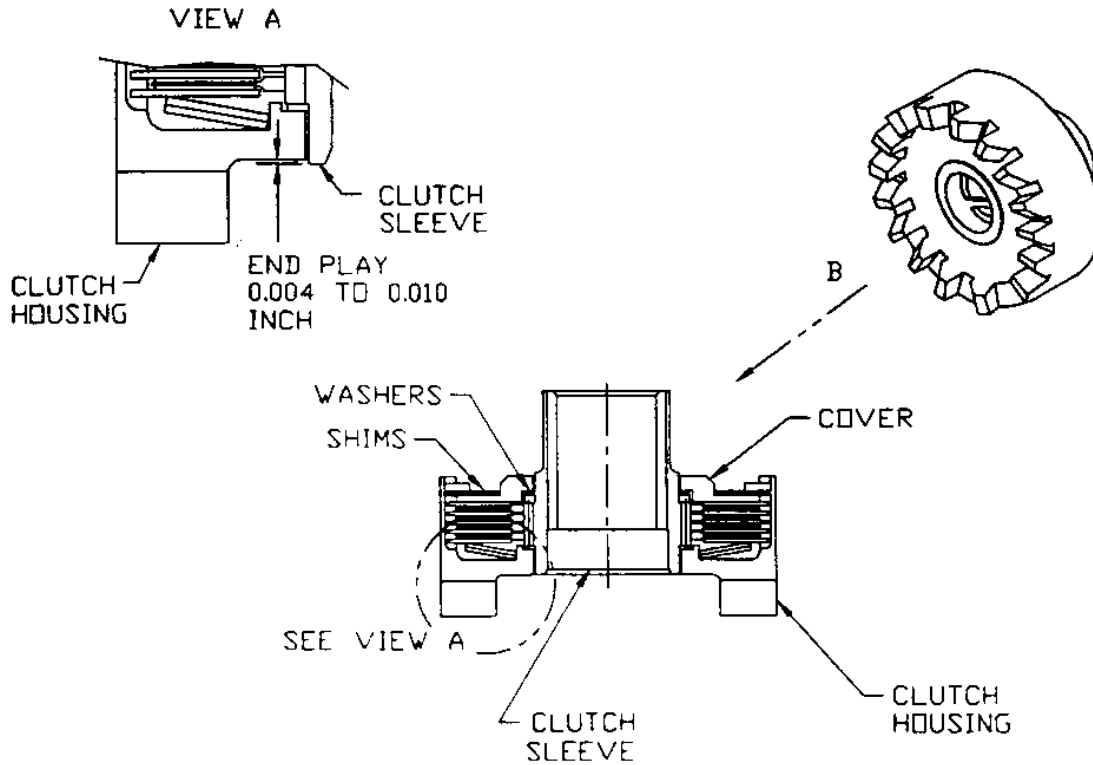
- (7) Re-assemble same quantity of shims (12), (13), (14), (15) and (16) as removed.
- (8) Place assembled parts in a locking arbor press. Use pressing tool to press down on cover (3) and compress belleville washers (6) as shown in Figure 1 and Figure 9. Lock arbor press in this position.
- (9) Re-assemble internal retaining ring (11) to clutch housing (2).
- (10) Unlock arbor press and remove clutch.

F. Clutch Testing

NOTE: End play limits are 0.004 to 0.010 inches. If end play limits are not met, repeat steps (5) through (10), adding or removing washers (8), (9) and (10) until amount of end play is within limits.

- (1) Measure end play of clutch sleeve to clutch housing as shown in Figure 10.
- (2) Assemble clutch to test fixture and using torque wrench measure breakaway torque as shown in Figure 11.
 - (a) Breakaway torque limits are 325 to 375 inch-pounds.
 - (b) If breakaway torque is not met, repeat steps (5) through (12) adding or removing shims (12), (13), (14), (15) and (16) as required in Figure 9
- (3) With clutch running at 6 RPM read running torque on torque wrench. Torque shall be 325-374 in-lbs Record value.

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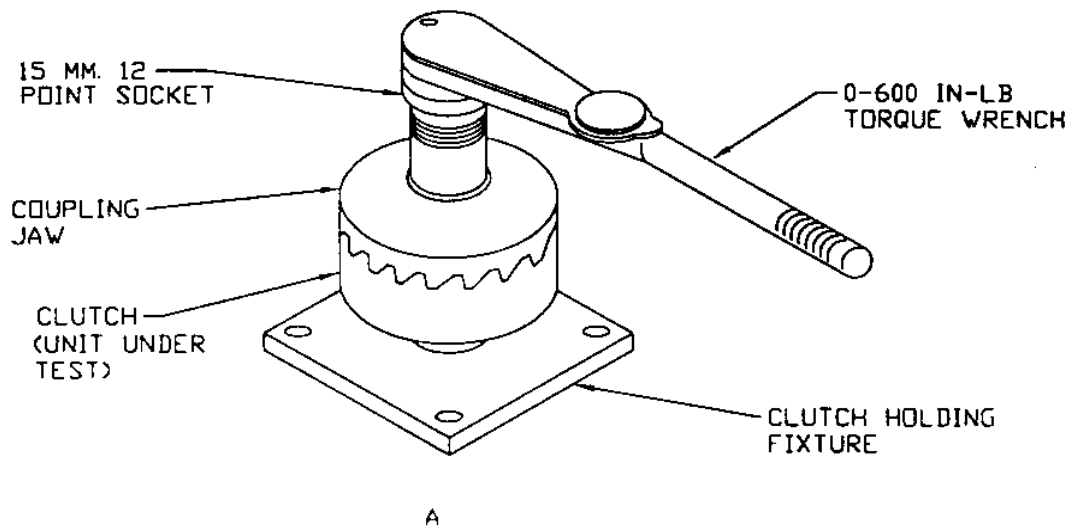
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AREA/ ITEM NO.	TYPE OF DAMAGE	NOMENCLATURE	INSPECTION METHOD	MAXIMUM LIMITS
B	End Play	Clutch	Measure	0.004 to 0.010 inch

Clutch End Play
Figure 10

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AREA/ ITEM NO	TYPE OF DAMAGE	NOMENCLATURE	INSPECTION METHOD	MAXIMUM LIMITS
A	Breakaway and Slip Torques	Clutch	Measure	325 to 375 Inch- pounds

Clutch Torque
Figure 11

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G. Clutch Overhaul

NOTE: If plates (4) and friction plates (5) have become mixed up, assemble plates in any order with every other plate a friction plate. Continue with clutch assembly.

NOTE: If plates (4) or friction plates (5) fail inspection requirements, replace all the like plates to that set. Continue with clutch assembly.

- (1) Assemble clutch to K34639 Clutch Run-In Fixture and operate so the clutch sleeve rotates in a counter-clockwise direction. Run-in clutch for 10 minutes at six rpms or less.
- (2) Allow the clutch to cool to room temperature.
- (3) After the run-in and the clutch has cooled off. The contents should be cleaned again to remove any material that is loose in the clutch from the run-in test.
- (4) When the final measurements are taken, the clutch should run for 10 seconds at least to make sure it will stay between 325-375 in-lbs. The measurement must remain between 325-375 in-lbs during the entire 10 seconds.
- (5) Perform the breakaway and slip torque test. Breakaway and slip torque shall be 325 to 375 inch-pounds. If not, repeat paragraph E steps (5) through (10).

H. Disposition of Parts

- (1) Clutch assemblies meeting the requirements of this Service Bulletin are suitable for lubrication and assembly to electrical starter as specified in Field Maintenance manual GEK-34467.
- (2) Clutch assemblies or parts not meeting the criteria of this Service Bulletin shall be replaced

The limits and condition of parts specified in this Service Bulletin shall be used as a criteria for determining the suitability of parts. This supercedes the previous criteria of 7 years