

TM 55-2925-240-40

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

GS MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS

DC STARTER-GENERATOR PART NO. 23064-001

(LEAR SIEGLER)

Headquarters, Department of the Army, Washington, D.C.
6 April 1970

WARNING PRECAUTIONARY DATA

Personnel performing instructions involving operations, procedures, and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury, death, or an aborted mission.

CLEANING SOLVENT. Cleaning solvent maybe toxic. Use in well-ventilated area. Avoid prolonged inhalation or contact with skin. Do not use solvent near open flame or in area where very high temperatures prevail.

COMPRESSED AIR. Do not direct compressed air in close proximity to or directly against skin.

This copy is a reprint which includes current
pages from Change 1. 2, 3

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HEADQUARTERS
 DEPARTMENT OF THE ARMY
 WASHINGTON, D. C., 14 February 1992

**GS Maintenance Manual
 Including Repair Parts and Special Tools Lists**

**DC STARTER-GENERATOR
 PART NO. 23064-001
 (LEAR SIEGLER)**

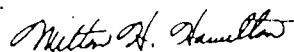
TM 55-2925 -240-40, 6 April 1970, is changed as follows:

Page 3-6, paragraph 3-5, add subparagraph h as follows:

h. Clutch Dampener Wear Tolerance. Clutch dampeners with a maximum average groove depth of 0.009 may be reused. Measure wear area in four places approximately 90 degrees apart.

By Order of the Secretary of the Army:

Official:



MILTON H. HAMILTON
 Administrative Assistant to the
 Secretary of the Army

01304

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31-E, block no. 2070, AVIM maintenance requirements for TM 55-2925-240-40.

CHANGE }
No. 2 }

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WASHINGTON, D. C., 3 July 1989

GS Maintenance Manual
Including Repair Parts and Special Tools List

DC STARTER-GENERATOR

PART NO. 23064-001

(LEAR SIEGLER)

TM 55-2925-240-40, 6 April 1970, is changed as follows:

Page 1-1, para b. 6th & 7th lines. AMSAV-R-M, P.O. Box 209, St. Louis, Missouri 63166 is changed to read, ATTN: AMSAV-MMD, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798.

Page 1-1, para 1-3. 2nd and 3rd lines. TM 38-750 is changed to read, DA PAM 738-751.

Page 1-1, para 1-5. Painting Requirements. "Not applicable" has been superseded.

Page 1-1, para 1-5. Painting Requirements. Superseded as follows:

Page 1-1, para 1-5. Painting Requirements.

- a. Primer with two coats of epoxy polyamide primer, MIL-P-23377, TYPE I or II.
- b. Paint with two coats of epoxy, MIL-C-22750, FED-STD-595, flat black color no. 37038.

Page 1-1, para 1-6. Add after the first sentence: For general technical information on preparation for storage and shipment refer to TM 55-1500-204-25/1 and TM 743-200-1.

Page 2-1, Table 2-3, Item 6. P-P-101 is changed to read P-P-121CL1.

Page 2-1, Table 2-3, Items 7 and 8 are added after Item 6.

Item No.	Material	Type or Grade	Government Specification
7.	Primer	I or II	MIL-P-23377
8.	Paint	FED-STD-595, flat black color No. 37038	MIL-C-22750

Page 3-1, Figure 3-1 is superseded. Add new page 3-1 Figure 3-1.

Page 3-2, Figure 3-1, Index 2. Change "Part Number AN 535-2-2 to MS 21318-13."

Page 3-2, Figure 3-1, Index 4. Change "Part Number AN 535-2-2 to MS 21318-13."

Page 3-2, Figure 3-1, Index 10. Change "Part Number 05-341300 to MS 16995-25."

Page 3-2, Figure 3-1, Index 12. Change "Part Number 05-322503 to 02-4107-02." Change Item Name from .Nut, Two-Piece Lock to . Locknut, Hexagon.

Page 3-2, Figure 3-1, Index 14. Change "Part Number 30059-1040 to 23032-1901." Change Item .Clutch, Dampener to .Hub Body.

Page 3-2, Figure 3-1, Index 14A. Add "Part Number 30059-1480", Item Name .Plate, Dampener, Qty Per Assy 1.

Page 3-2, Figure 3-1, Index 15. Change "Part Number 31228-1095 to 02-5600-06". Change Item Name from . Back Plate Dampener to . Gasket.

Page 3-2, Figure 3-1, Index 15A. Add "Part Number 30059-1470", Item Name Backing Plate, Gener, Qty Per Assy 1.

Page 3-2, Figure 3-1, Index 21. Change "Part Number AN 501A10-10 to MS 35266-64".

Page 3-2, Figure 3-1. Add Index No. 23A to "Part Number 23064-1270". TAKE OUT (complete).

Page 3-2, Figure 3-1. Add Index No. 23B to "Part Number 23064-1280". TAKE OUT (complete). Change Item Name from . . Brush Holder Assy to . . Holder, Electrical.

Page 3-2, Figure 3-1. Delete Index No. 28, "Part Number 23064-1350."

Page 3-3, Figure 3-1, Index 34. Change "Part Number AN 509-8-8 to MS 24694S5".

Page 3-3, Figure 3-1, Index 37. Change "Part Number AN 935-10L to MS 35338-43".

Page 3-3, Figure 3-1, Index 38. Change "Part Number AN 960-10L to AN 960-10".

Page 3-3, Figure 3-1, Index 39. Change "Part Number MS 20364B-624C to MS 21083B6".

Page 3-3, Figure 3-1, Index 40. Change "Part Number AN 960B616 to AN 961-616".

Page 3-3, Figure 3-1, Index 41. Change "Part Number MS 20364B-1032C to MS 21083B3".

Page 3-3, para 3-2.d. 1st line. Remove two-piece lock nut 12 is changed to read, Remove lock nut (12).

Page 3-3, NOTE is added after para 3-2d.

NOTE

See modification criteria if shaft assembly has a two piece dampener.

Page 3-3, para 3-2.e. This para has been superseded.

Page 3-3, para 3-2.e. is superseded as follows: e. Using a plastic hammer tap out drive shaft (13) and remove dampener hub (14) and dampener plate (14A) from drive shaft. Remove friction ring (15) from dampener back plate (15A) and using a suitable bearing puller, remove dampener plate (15A) from armature.

Page 3-3, para 3-2.f. This para has been superseded.

Page 3-3, para 3-2.f. is superseded as follows: f. Remove screws (34), end bell (33), bearing (22), and brush holder assembly (30) with armature assembly.

Page 3-3, para 3-2.h. line 1. "bearing is changed to read bearings".

Page 3-7, Para, 3-7 MODIFICATION CRITERIA, Add the following:

CLUTCH DAMPENER

a. Starter - generators may be received that have a two piece dampener. This dampener must be replaced during reassembly with a new improved clutch dampener assembly.

b. The two-piece dampener is located at the drive end spline of the drive shaft. The new clutch dampener assembly is completely interchangeable, and consists of the following four parts: dampener plate, back-plate, hub, and friction ring. Refer to figure 3-5 for cross-sectional view of the new improved dampener assembly. Paragraph 3-2, Disassembly, and Paragraph 3-9, Reassembly, have been revised to reflect the new dampener assembly.

Page 3-7, para 3-9.f. This para has been superseded.

Page 3-7, para 3-9.f. is superseded as follows: f. Install the dampener (15A) on armature shaft, making certain that back plate taber is fully seated on the armature shaft taper. See figure 3-5.

Page 3-7, para 3-9.g. is, superseded as follows: g. Install the dampener hub (14) over small spline end of the drive shaft (13) making certain that hub taper is fully seated on the taper of drive shaft.

Page 3-7, Add this caution after para 3-9.g.

CAUTION

Do not use arbor press to force drive shaft taper into tapered hole of hub.

Page 3-7, Add this NOTE after para 3-9.g. and caution.

NOTE

Proper seating of the dampener hub on the drive shaft, and of the back plate on the armature shaft, will be accomplished when nut (12) is correctly installed per paragraph 3-9.k.

Page 3-7, para 3-9.h. This para has been superseded.

Page 3-7, para 3-9.h. is superseded as follows: h. Install the dampener plate (14A) on the splined OD of the dampener hub. Make certain the dampener plate is fully seated against the shoulder of the hub as shown in figure 3-5.

Page 3-7, para 3-9.h. Add this NOTE after para 3-9.h

NOTE

Make certain that friction ring does not slip out of the dampener hub back plate recess, but remains captured as illustrated in figure 3-5.

Page 3-7 New Figure 3-5 will come after Figure 3-4.

Page 3-7, para 3-9.i. This para has been superseded.

Page 3-7, para 3-9.i. is superseded as follows: i. Install the friction ring (15) in the recess on the dampener back plate (15A).

Page 3-7, para 3-9.j. This para has been superseded.

Page 3-7, para 3-9.j. is superseded as follows: j. Install drive shaft through armature, making certain splines of drive shaft are fully engaged with splines of armature.

Page 3-7, para 3-9.k. This para has been superseded.

Page 3-7, para 3-9.k. is superseded as follows: k. Install fan (11) on end of drive shaft and secure with locknut (12). Hold shaft (13) with wrench (QB80059-3, table 2-2). Torque locknut to 180-200 inch-pounds.

Page 3-7, para 3-9.l. This para has been superseded.

Page 3-7, para 3-9.l. is superseded as follows: l. Install brushes (7); then secure brush and field leads with screws (8). Make electrical connections as per figure 3-5.

Page 3-7, para 3-9. Add 3-9.m. after para 3-9.l.

m. Install brush cover (5) and secure with screw (6). Cover may be assembled in any angular position.

Page 3-7, para 3-9. Add 3-9.n after para 3-9.m.

n. Install air deflection shroud (9) and secure with screws (10).

Page 3-8. New Figure 3-5 will follow Figure 3-4.

Delete pages A-1 thru B-6.

Add page A-1

Add

Page B-8 Add illustration Figure B-1. Starter — Generator, Engine

Page B-9 Add Figure B-1-1 (RPSTL)

Page B-10 Add NSN Index I-1

Page B-11 Add P/N Index I-2

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

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To be distributed in accordance with DA Form 12-31, AVIM Maintenance requirements for All UH-1 Series Aircraft and AH-1G/S/F/P/E Helicopter, Attack.

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 No. 1 }

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 DEPARTMENT OF THE ARMY
 WASHINGTON, D. C., 15 March 1971

GS Maintenance Manual
 Including Repair Parts and Special Tools List

DC STARTER-GENERATOR

PART NO. 23064-001

(LEAR SIEGLER)

TM 55-2925-240-40, 6 April 1970, is changed as follows:

Page 2-1, table 2-3. Change item 6, Government Specification column "P-P-101" to read "P-P-121 CL1."

Page 3-4, paragraph 3-5a(5). Change second sentence to read, "Replace armature that necessitates turning of commutator to less than a minimum diameter of 2.830 inches."

Paragraph 3-5c. In line 3, change "sandpaper" to read "paper, abrasive."

Page 3-6, paragraphs 3-5g(2), (3), and (4). Wherever the word "sandpaper" appears, change to read "paper, abrasive."

Page 3-7. Paragraph 3-9f is superseded as follows:

f. Install dampener back plate (15) on armature (19) and press back plate into position until wear face is flush with end of armature shaft housing.

Paragraph 3-9g is superseded as follows:

g. Install clutch plate (14) over small end of drive shaft (13) and press the clutch plate onto the drive shaft spline only far enough for a firm meshing of the spline. Further adjustment of the clutch plate is covered in *i* below.

Paragraph 3-9i is superseded as follows:

i. Install fan (11) and inner locknut (12). Hold shaft (13) with wrench (QB80059-3, table 2-2). While tightening locknut, observe the position of the clutch dampener (14). The clutch dampener should retain a concave with recessed side toward back plate (15), of approximately 1/8 inch when inner locknut is tightened to a torque of 180 to 200 inch-pounds. If the clutch dampener shows signs of oil canning or becoming flat, remove the drive shaft from the armature and press the clutch dampener just far enough onto the drive shaft to obtain the proper concave, and repeat this step. If concave is excessive, it may be necessary to replace clutch dampener and repeat this step. Recheck torque of inner locknut (12) to 180-200 inch-pounds. Install outer locknut (12) and torque to 125-150 inch-pounds while holding shaft (13) from rotating with wrench (QB80059-3, table 2-2).

Page B-5. Change "FSN 5350-224-7205" under Maintenance Supplies to read "FSN 5350-271-7930," and "Paper, Abrasive, FED P-P-101" to read "Paper, Abrasive, FED P-P-121 CL1."

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

DISTRIBUTION:

To be distributed in accordance with DA Form 12-31 (qty rqr blocks no. 35, 354, and 39, cumulative for all blocks) requirements for Direct and General Support Maintenance Instructions for UH-1C, UH-1D and 1H, and AH-1G Aircraft.

**SECTION I
INTRODUCTION**

1-1. GENERAL INFORMATION.

a. This technical manual comprises overhaul instructions for the Model 23064-001 DC Starter-Generator (see figure 1-1), manufactured by the Power Equipment Division of Lear Siegler, Inc. (FMC31435) Cleveland Ohio 44101. Sections I through IV of this technical manual contain instructions for this DC Starter-Generator. Overhaul instructions for additional models will be provided in Section V by the use of

Difference Data Sheets.

b. Report of errors, omissions and recommendations for improving this publication is encouraged. Use DA Form 2028 (Recommended Changes to DA Publications) and forward it directly to the Commanding General U.S. Army Aviation Systems Command, ATTN: AMSAV-R-M, P. O. Box 209, St. Louis, Missouri 63166.

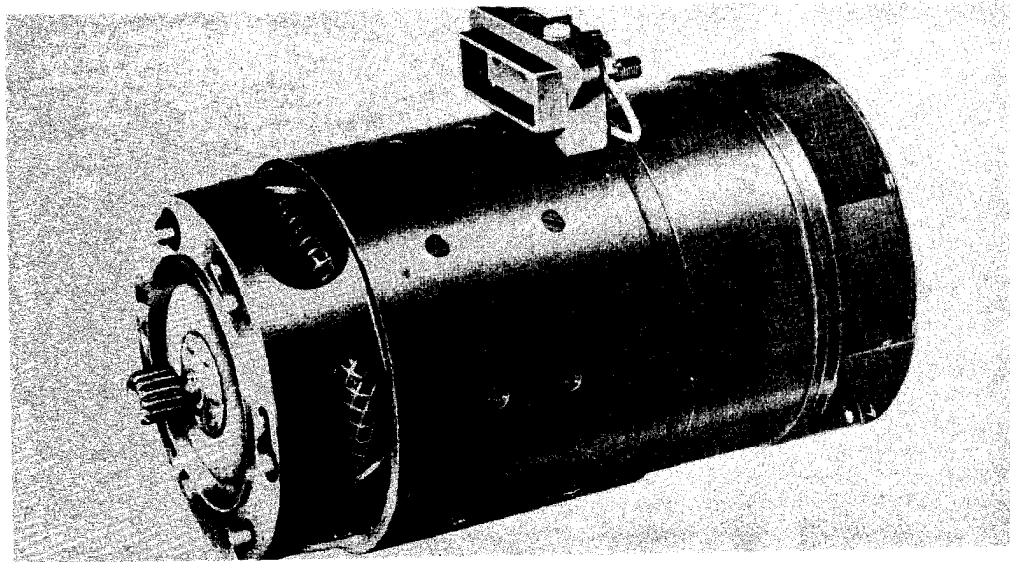


Figure 1-1. Identifying view of 23064-001 DC Starter-Generator.

1-2. PURPOSE.

The purpose of the DC Starter-Generator is to Provide torque for engine starting and to generate DC electrical power.

1-3. EQUIPMENT RECORDS.

The Army equipment record system and procedures established in TM 38-750 apply to this equipment. The applicable forms as required by TM 38-750 shall be used.

1-4. DESCRIPTION AND LEADING PARTICULARS.

The DC Starter-Generator is a self-excited machine incorporating four main poles and four interposes. An integral fan at the antidrive end of the machine draws in air to permit self-cooled operation at all rated conditions. The leading particulars are as follows:

Rating(kw).....	9
Continuous load within speed range (amp)	300
Voltage (gen. output).....	30
Speed range (rpm)	4,400 to 8,000
Direction of rotation when viewing shaft end . . .	CCW
Operating altitude (max. - ft.) . . .	300 Amps - 15,000 ft.

.....	200 Amps -25,000 ft.
Cooling	Self-Cooled
Weight (lb.)	47.5
Overhung moment (in. - lb.)	225
Mounting pad	AND 10262 Type XII-A
Distance between mounting-hole centers (inches) . . .	5
Number of mounting holes	6
Mounting-hole type	Keyhole Slot
Number of teeth in drive spline	16
Drive spline pitch diameter (inches)	0.800
positive terminal designation	B+
Negative terminal designation.	E-
Positive field-terminal designation	A+
Equalizer terminal designation	D
Starting terminal designation	C+
Voltage (starter, max.)	30

1-5. PAINTING REQUIREMENTS.

Not applicable.

1-6. PRESERVATION AND PACKAGING.

The instructions contained in Figure 1-2 will govern preservation, packaging, packing and marking of the starter-generator after overhaul.

PRESERVATION, PACKAGING, PACKING AND MARKING REQUIREMENTS																	
NOMENCLATURE <p style="text-align: center;">Starter Gen.</p>		STOCK NUMBER <p style="text-align: center;">2925-927-9483</p>															
		PART NUMBER <p style="text-align: center;">23064-001</p>															
NET WEIGHT	DIMENSIONS	GROSS WEIGHT	CUBIC FEET														
<i>All specifications and standards applicable to the requirements herein shall be the issue in effect on date of invitation for bids.</i>																	
PACKAGING																	
<input checked="" type="checkbox"/> LEVEL A <input type="checkbox"/> LEVEL C <input checked="" type="checkbox"/> PACKAGING SHALL BE IN ACCORDANCE WITH SPECIFICATION MIL-P-116. THE FOLLOWING DETAILED REQUIREMENTS SHALL APPLY:																	
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">UNIT PKG QTY</th> <th style="width: 15%;">METHOD</th> <th style="width: 15%;">PRESERVATIVE</th> <th style="width: 15%;">WRAP</th> <th style="width: 15%;">DUNNAGE</th> <th style="width: 20%;">CONTAINER</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">IId</td> <td style="text-align: center;">-----</td> <td style="text-align: center;">MIL-B-121 Grade A or Polyethylene MIL-P-26514</td> <td style="text-align: center;">MIL-C-7769 or</td> <td style="text-align: center;">See Packing</td> </tr> </tbody> </table>						UNIT PKG QTY	METHOD	PRESERVATIVE	WRAP	DUNNAGE	CONTAINER	1	IId	-----	MIL-B-121 Grade A or Polyethylene MIL-P-26514	MIL-C-7769 or	See Packing
UNIT PKG QTY	METHOD	PRESERVATIVE	WRAP	DUNNAGE	CONTAINER												
1	IId	-----	MIL-B-121 Grade A or Polyethylene MIL-P-26514	MIL-C-7769 or	See Packing												
PACKING																	
<input checked="" type="checkbox"/> LEVEL A <input type="checkbox"/> LEVEL C <input checked="" type="checkbox"/> ITEMS SHALL BE PACKED IN CONTAINERS CONFORMING TO SPECIFICATION NO. MIL-D-6054 PLYWOOD USED SHALL BE STANDARD GRADE WITH EXTERIOR GLUE OF U.S. PRODUCT STANDARD PS1-56. THIS PLYWOOD SHALL HAVE THE GRADE STAMP OF AN APPROVED TESTING AGENCY. FURTHER, PLYWOOD SHALL BE SURFACE TREATED IN ACCORDANCE WITH SPECIFICATION TT-V-872. WOOD GLUED PLYWOOD CONTAINERS SHALL BE CONSTRUCTED WITH THE TOP INVERTED SO AS TO PROVIDE A FLUSH TOP SURFACE FOR WATER RUNOFF.																	
<input type="checkbox"/> ITEMS SHALL BE PACKED IN A MANNER TO INSURE CARRIER ACCEPTANCE AND SAFE DELIVERY AT DESTINATION. CONTAINERS SHALL BE IN ACCORDANCE WITH UNIFORM FREIGHT CLASSIFICATION RULES OR REGULATIONS OF OTHER CARRIERS APPLICABLE TO THE MODE OF TRANSPORTATION.																	
MARKING																	
<input checked="" type="checkbox"/> a. IN ADDITION TO ANY SPECIAL MARKING REQUIRED BY THE CONTRACT OR ORDER, SHIPMENT SHALL BE MARKED IN ACCORDANCE WITH STANDARD MIL-STD 129D, WITH CHANGE NOTICE 1 THRU 9. "MARKING FOR SHIPMENT AND STORAGE," DATED 28 DECEMBER 1964. THE SERIAL NUMBER AND THE CONTROL NUMBER OF DA FORM 2410 SHALL BE MARKED ON THE UNIT CONTAINER.																	
<input checked="" type="checkbox"/> b. ADDITIONAL MARKING REQUIREMENTS. EACH INTERIOR PACKAGE SHALL BE MARKED ON AT LEAST TWO (2) SIDES WITH A SILHOUETTE OF THE AIRCRAFT. (WHERE THE SIZE OF THE UNIT CONTAINER IS TOO SMALL TO PERMIT THE APPLICATION OF TWO (2) LABELS, A SINGLE LABEL SHALL BE APPLIED. IF THE PACKAGE IS TOO SMALL FOR ONE (1), NONE WILL BE REQUIRED.) WHEN THE UNIT CONTAINER IS THE SHIPPING CONTAINER AND THE ITEM IS PACKED "LEVEL A", EACH CONTAINER SHALL BE MARKED ON TWO (2) SIDES, TOP AND ONE (1) END WITH A SILHOUETTE OF THE AIRCRAFT. THE SIZE OF THE SILHOUETTE MAY VARY, BUT WILL BE LARGE ENOUGH TO FACILITATE EASY VISUAL IDENTIFICATION WITHOUT OBSCURING OTHER MARKINGS. THE CONTRACTING OFFICER WILL SUPPLY LABELS ON REQUEST. THE NOMENCLATURE OF THE MAJOR COMPONENTS SHALL BE EXTENDED TO INDICATE THE END ITEM APPLICATION AND THE POSITION OF THE PART: e.g., GEAR BOX, MAIN FOR (APPLICABLE AIRCRAFT); WING ASSEMBLY, RIGHT, FOR (APPLICABLE AIRCRAFT).																	
<input checked="" type="checkbox"/> c. MATERIEL CONDITION MARKING SHALL BE APPLIED IN ACCORDANCE WITH PARAGRAPH 5.5.17 OF MIL-STD-129. A MATERIEL CONDITION TAG OF THE APPLICABLE TYPE WILL BE SECURELY ATTACHED DIRECTLY TO ALL UNINSTALLED OR STORED AERONAUTICAL OR AIR DELIVERY ITEMS. WHEN SUCH ITEMS ARE PLACED OR STORED IN CARTONS, PACKAGES, CRATES OR METAL SHIPPING CONTAINERS, A DUPLICATE MATERIEL CONDITION TAG OR LABEL WILL BE SECURELY ATTACHED TO THE EXTERIOR OF THE PACKAGE OR CONTAINER IN SUCH A MANNER THAT WILL AFFORD MAXIMUM PROTECTION FROM HANDLING AND WEATHER. TAGS WILL BE COMPLETED EITHER BY TYPEWRITTEN OR PRINTED BLACK LEAD PENCIL ENTRIES. ITEMS OF A COMMON OR Nontechnical Nature (i.e., COMMON HARDWARE, BULK MATERIALS, ETC.) THE SERVICEABILITY OF WHICH IS OBVIOUS, AND THE IDENTITY AND INSPECTION REQUIREMENTS ADEQUATELY INDICATED BY COMMERCIAL TAGS, LABELS OR MARKINGS, MAY BE RECEIVED, STORED, ISSUED OR SHIPPED WITHOUT MATERIEL CONDITION TAGS.																	
APPROVED BY <p style="text-align: center;">E. Lowman</p>		ORGANIZATION <p style="text-align: center;">AMSAV-R-MK</p>		DATE <p style="text-align: center;">18 February 1969</p>													

Figure 1-2. Preservation, Packaging, Packing and Marking Requirements.

SECTION II

TEST EQUIPMENT, SPECIAL TOOLS, AND MATERIALS

2-1. TEST EQUIPMENT.

Refer to table 2-1 for a list of test equipment required for the general support maintenance of Model 23064-001 DC Starter-Generator.

Table 2-1. Test Equipment Required

FMC	PART, MODEL, MILDES OR EQUIVALENT	NOMENCLATURE	TECHNICAL DESCRIPTION
99664	7199	Test Stand, Aircraft Gen.	Capable of driving generator at 6200- 12,000 rpm, full load or 14,000 rpm, no load.
99664	708-5	Test Stand, Electrical	Load Bank for testing DC equipment.
81349	MIL-T-6448 Type B1	Tester, Starter Torque	Used for checking torque.

2-2. SPECIAL TOOLS.

Refer to table 2-2 for a list of special tools required for the general support maintenance of Model 23064-001 DC Starter-Generator.

Table 2-2. Special Tools Required

FMC	PART, MODEL, MILDES OR EQUIVALENT	NOMENCLATURE	TECHNICAL DESCRIPTION
83298	QB80059-3	Spline wrench	To hold shaft while removing fan lock nut.
19315	QB80338-1	Bearing puller	To remove bearing, and to remove armature from stator.
54522	#4	Arbor Press	To support end bell assy during disassembly
06365	BE KOMATIC 400B	Dynamic balance machine	To check armature for proper balance.
64359	1050	Scale	To check brush spring tension

2-3. CONSUMABLE MATERIALS.

Refer to table 2-3 for a list of consumable materials required for the general support maintenance of Model 23064-001 DC Starter-Generator,

TABLE 2-3. CONSUMABLE MATERIALS REQUIRED

ITEM NO.	MATERIAL	TYPE OR GRADE	GOVERNMENT SPECIFICATION
1.	Cleaning solvent	-	P-D-680
2.	Varnish	-	MIL-V-173
3.	Anti-se ize compound	-	JAN-A-669
4.	Grease	-	MIL-G-23827
5.	Lockwire	-	MS20995C32
6.	Sandpaper	5/0	P-P-101

SECTION III

GENERAL SUPPORT MAINTENANCE

3-1. ILLUSTRATED PARTS BREAKDOWN.

Each part listed on the Illustrated Parts Breakdown is shown in disassembly order, except

that attaching parts are listed after the parts they attach, under the heading of "ATTACHING PARTS."

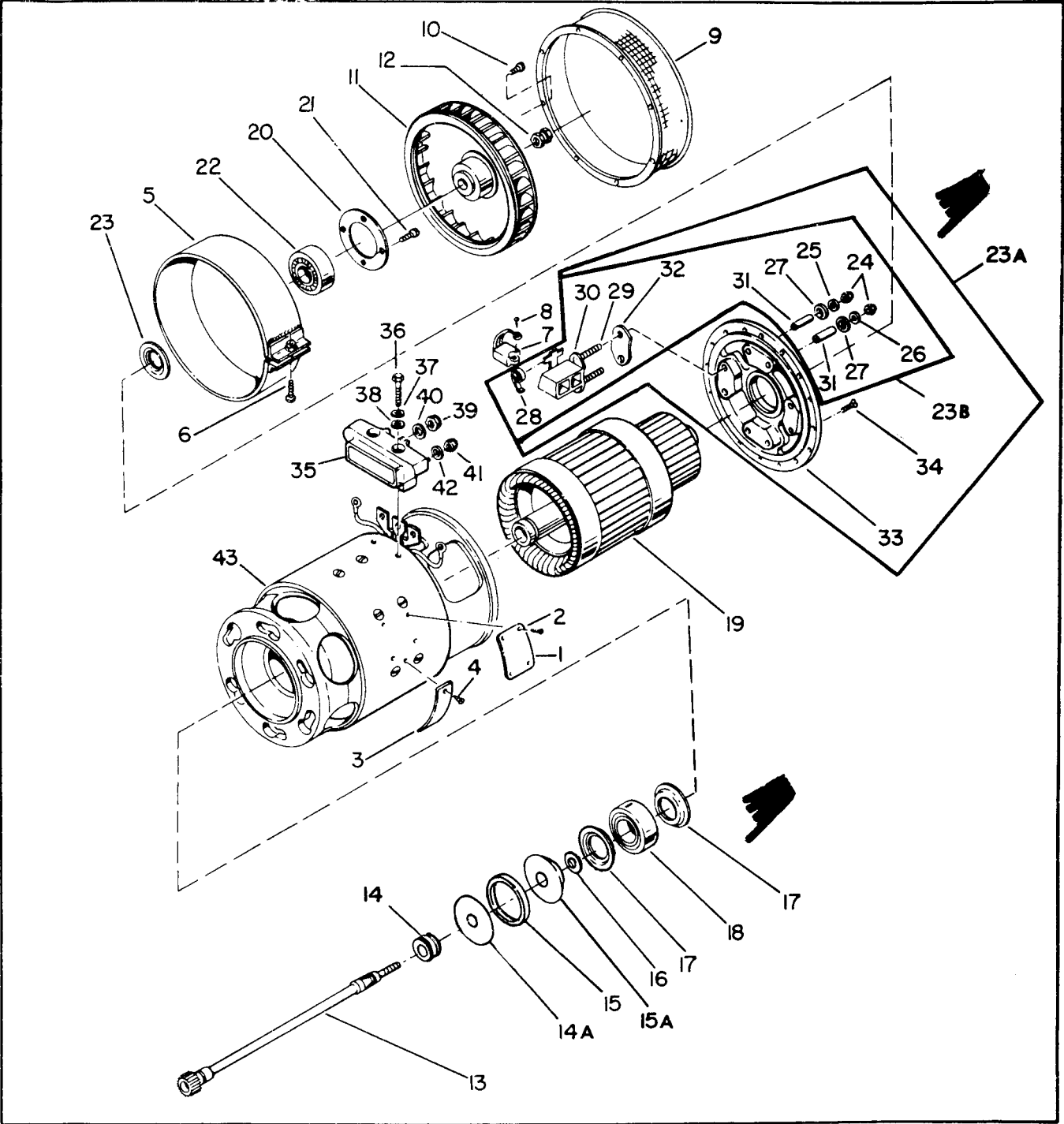


Figure 3-1. Exploded View of 23064-001 DC Starter Generator.

Fig. & Index No.	Part No.	Description							Qty Per Assy
		1	2	3	4	5	6	7	
3-1-	23064-001	Starter-Generator Assy							1
-1	06-201034	Plate, Instruction							1
		(Attaching Parts)							
-2	AN535-2-2	Screw, Drive							4
		---*---							
-3	06-109978	Nameplate							1
		(Attaching Parts)							
-4	AN535-2-2	Screw, Drive							2
		---*---							
-5	23064-1150	Cover							1
		(Attaching Parts)							
-6	AN502-10-14	Screw							1
		---*---							
-7	30300-1282	Brush							4
		(Attaching Parts)							
-8	05-340201	Screw							4
		---*---							
-9	23064-1380	Shroud, Air deflection							1
		(Attaching Parts)							
-10	05-341300	Screw							8
		---*---							
-11	23064-1360	Fan							1
		(Attaching Parts)							
-12	05-322503	Nut, Two-piece lock							1
		---*---							
-13	23064-1011	Shaft, Drive							1
-14	30059-1040	Clutch, Dampener							1
-15	31228-1095	Back Plate dampener							1
-16	MS16626-1098	Ring, Retaining							1
-17	05-101001	Baffle, Disc							2
-18	07-111337	Bearing							1
-19	23047-1052	Armature							1
-20	23064-1370	Retainer, Bearing							1
		(Attaching Parts)							
-21	AN501A10-10	Screw							4
		---*---							
-22	07-111259	Bearing							1
-23	G128-178	Baffle, Bearing							1
	23064-1270	End Bell Assy							1
		. (complete) A-7 1001							
	23064-1280	Brush Holder Assy							4
		. (complete) A-77 K							
-24	MS20365-1032C	. . . . . Nut, Self-locking							8
-25	AN960-10L	. . . . . Washer							8
-26	05-374101	. . . . . Washer							4
-27	05-374093	. . . . . Washer							4
-28	23033-1120	. . . . . Spring							8
-28	23064-1350	. . . . . Spring (alternate)							8
-29	05-360015	. . . . . Stud							8
-30	23064-1180	. . . . . Holder, Brush							4
-31	05-631122	. . . . . Sleeving							8
-32	23014-1039	. . . . . Plate, Insulator							4
-33	23064-1260	End Bell							1

3-1-		(Attaching Parts)	
-34	AN509-8-8	. . Screw	8
		---*---	
-35	23064-1410	Block, Terminal	1
		(Attaching Parts)	
-36	AN3-15 A	. Screw	2
-37	AN935-10L	. Washer	2
-38	AN960-10L	Washer	2
-39	MS20364B-624C	. Nut	3
-40	AN960B616	. Washer	3
-41	MS20364B-1032C	. Nut	2
-42	AN960B10	. Washer	2
-43	23064-300	Stator	1

3-2. DISASSEMBLY.

All numbers in this paragraph refer to the index numbers of items illustrated in figure 3-1.

a. Loosen screw (6) that clamps brush cover (5) to housing; spread and remove brush cover.

b. Remove screws (8) fastening brush and field leads; then remove brushes (7) from brush holders.

c. Remove screws (10) fastening air deflection shroud (9) and remove shroud.

d. Remove two-piece lock nut (12) and fan (Ii) from drive shaft.

NOTE

Hold shaft at spline end, with wrench, Port No. QB80059-3 (table 2-2), when removing lock nut.

e. Tap out drive shaft (13), using a plastic hammer; then remove clutch dampener (14) from shaft (13) by using arbor press (table 2-2).

f. Remove screws (34), end bell (33), bearing, and brush holder assembly (30) with armature assembly. Remove dampener back plate (15) from drive end of armature shaft by using puller (table 2-2), which also removes armature assembly from housing (43).

g. To separate armature assembly from end bell (33), support end bell in a suitable arbor press; then press armature assembly out of end bell bearing, using a suitable adapter on end of shaft. Remove baffle (23) from shaft. To disassemble armature, remove retaining ring (16) and disc-baffle (17) from the armature shaft. Remove bearing (18) from armature, using a bearing puller (table 2-2); then remove the disc-baffle (17) from armature (19).

h. Remove screws (21); then remove bearing retainer (20). Press ball bearing (22) out of end bell (33).

i. Do not disassemble brush holder (30) and springs (28) from end bell (33) unless inspection reveals that replacement of parts is necessary.

j. Do not disassemble terminal block (35) from stator assembly unless inspection shows that it is necessary. Do not disassemble stator assembly (43). If inspection reveals that replacement of coils is necessary, replace complete stator assembly.

3-3. CLEANING.

Clean all parts except armature, bearings, brushes, and stator by washing in dry cleaning solvent, (item 1, table 2-3). Clean armature by wiping with a cloth moistened in solvent. Clean bearings and brushes with a dry cloth. Blow dust and other foreign matter from inside stator with compressed air; then wipe with a cloth moistened in solvent.

CAUTION

Do not use carbon tetrachloride for cleaning.

3-4. TESTING REQUIREMENTS (DURING OVERHAUL, BEFORE ASSEMBLY OF UNIT.)

a. *End Bell Assembly Test.* Check each brush holder to end bell, using 110-volt AC or DC power source, with one 7- 1/2 watt test lamp, and apply for one (1) second between brush holders and casting at one time. If grounded, the end bell must be repaired.

b. *Armature Test.* Using test circuit described in paragraph 3-4c, touch one lead of the test circuit to the armature shaft and the other lead to the commutator risers. Also check between each of the two commutator bands and the commutator risers. If lamp lights, armature is grounded and must be replaced.

NOTE

Terminal block must be removed for this test.

c. *Stator Assembly Test.* Use a 110-volt AC or DC power source, with one 7-1/2 watt test lamp con-

netted in series, for testing armature and field windings. Touch one lead to terminal "A"; if lamp lights, stator is grounded and must be replaced. Using an ohmmeter, check for continuity by touching one lead of ohmmeter to negative field lead, and the other lead to terminal "A".

3-5. REPAIR AND REPLACEMENT.

a. Repair Armature Commutator.

(1) If inspection reveals that commutator is rough, pitted, scored, or burned, refinish in a lathe that is accurately set up and adjusted.

(2) The commutator shall be turned with the armature mounted on its finished bearing journals and driven so as to maintain a commutator surface speed of 740 to 1110 feet per minute.

(3) The finished surface shall consist of 60 to 90 degree threads maintaining a finish of 150 micro-inches, RMS.

(4) The undercut slots shall be free of mica and burrs. Any deburring operation shall not affect the commutator finish.

NOTE

A diamond tipped tool having a maximum tool tip radius of 0.006 inch including tool wear is necessary for uniformity of finish.

(5) Remove only the material necessary to clean and true-up the commutator surface. Replace armature that necessitates turning of commutator to less than a minimum diameter of 2.030 inches. Hold commutator diameter concentric with bearing journals within 0.0005-inch T.I.R.

b. Undercutting the Mica. If the depth of undercut remaining after the turning operation has been completed is less than 0.015 inch, the mica between the commutator bars should be re-undercut to 0.032 inch deep maximum, by 0.052 inch wide. Use a triangular scraper to remove all excess mica, sharp edges, and burrs from between the commutator bars. Use a bristle brush to remove metal chips and mica particles from the slots between the commutator bars. Check for concentricity as described in paragraph 3-5a(5).

c. Polishing the Commutator. Mount the armature in a lathe and operate at a speed of 500 to 600 rpm. Polish commutator by applying 5/0 sandpaper (not emery paper)(item 6, table 2-3) backed up by an accurately cut block of rigid material that will fit the commutator over its entire length, and for at least one-third of its periphery. Remove any dust or particles from between the commutator bars with a bristle brush.

d. Balancing. After commutator refinishing, the armature should be checked for proper balance, using dynamic balance machine (table 2-2), which should be within 20 grain-inches at each end. If a balance correction is required, mill the stainless steel retaining bands at each end of the armature lamination stack (0.020 inch deep, maximum, and 0.62 inch wide, maximum) until the proper degree of balance is obtained. Cuts must be a minimum of 0.15 inch from the edge of the hoop.

e. Brush Spring Tension.

(1) Using a new brush assembly, (see figure 3-2), cut a groove down the center of each side and across the bottom of both sections. When prepared in this manner, each brush section will have a continuous groove around two sides and the bottom.

CAUTION

This operation renders this brush assembly unfit for service. Use only for checking spring tension.

(2) Place a thin wire around the brush in the groove; then insert the brush in one of the brush holders. Tie the two ends of the wire together and hook a spring scale in the loop formed.

(3) Raise the brush, by means of the scale, until the lower end of the brush is even with the bottom edge of the brush holder. When in this position, the brush spring tension should be between 55 and 65 ounces. Take an average of several readings. If the spring tension is out of this range, replace the spring.

(4) Measure the brush spring tension of each section in the remaining brush holders for uniformity.

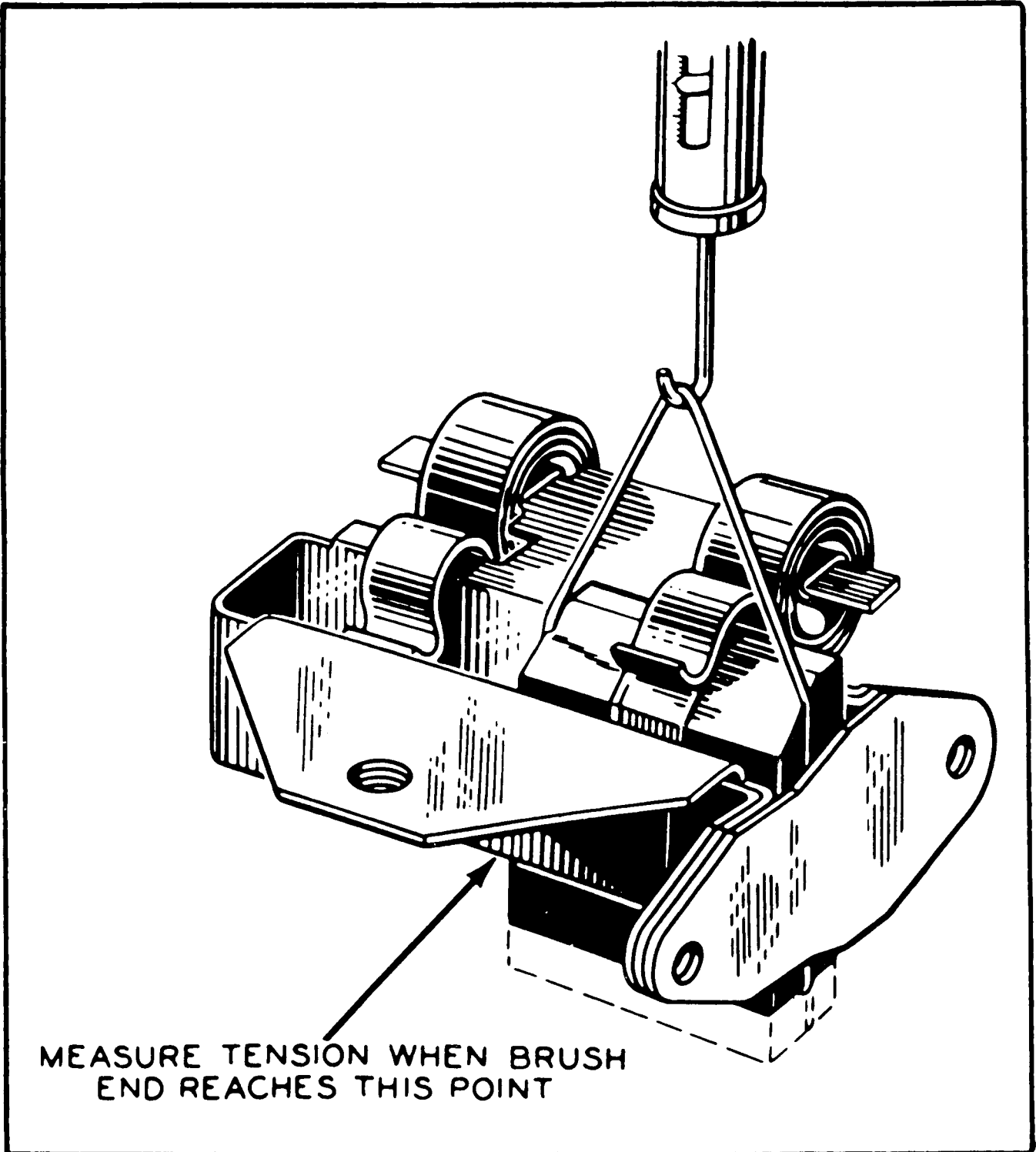


Figure 3-2. Checking Brush Spring Tension.

f. Brush Replacement. New brushes must be properly seated on the commutator surface before starting the Starter-Generator performance tests. Although they are of the so-called instant filming type, new brushes should be sanded and run in to properly seat them on the commutator surface before applying full load to the Starter-Generator. Failure to properly seat the brushes can result in excessive sparking, which will cause burning and pitting of the commutator.

g. Preliminary Brush Seating. Provide a partial seating of the brushes as follows:

(1) Raise each brush spring with a stiff wire hook and lift the brush away from the commutator, until the brush spring can hold the brush in position by resting against the side of the brush.

(2) Place a strip of 5/0 or finer sandpaper (item 6, table 2-3) slightly wider than the combined width of the two brush halves, around the commutator with the sand side out. Cut the sandpaper strip to 1/8 inch less than the commutator circumference. Secure one end of the sandpaper strip to the commutator surface with masking tape so that the taped end will lead in the direction of rotation, and the other end will remain loose.

(3) Lower one set of the brushes in place against the sandpaper, and carefully rotate the armature by

hand in the normal direction of rotation (see figure 3-3) until a full seat is obtained on each brush. Do not sand excessively. Remove excess carbon dust from sandpaper before sanding next set of brushes. Sand one set of brushes at a time.

(4) Remove the sandpaper; remove all carbon dust with dry, compressed air.

3-6. FLASHING THE FIELD.

Starter-Generators with reversed polarity in the output voltage may be corrected by flashing the field as outlined below.

CAUTION

Do not flash the field while Starter-Generator is in operation.

a. Disconnect leads to external voltage regulator.

b. Connect negative terminal of battery to terminal "E"

c. Connect the positive terminal of battery to terminal "A" through a knife switch.

d. Close the switch for 5 seconds - then open switch and disconnect from battery.

NOTE

If flashing the field fails to correct generator polarity, check for incorrect connections or defective field circuit.

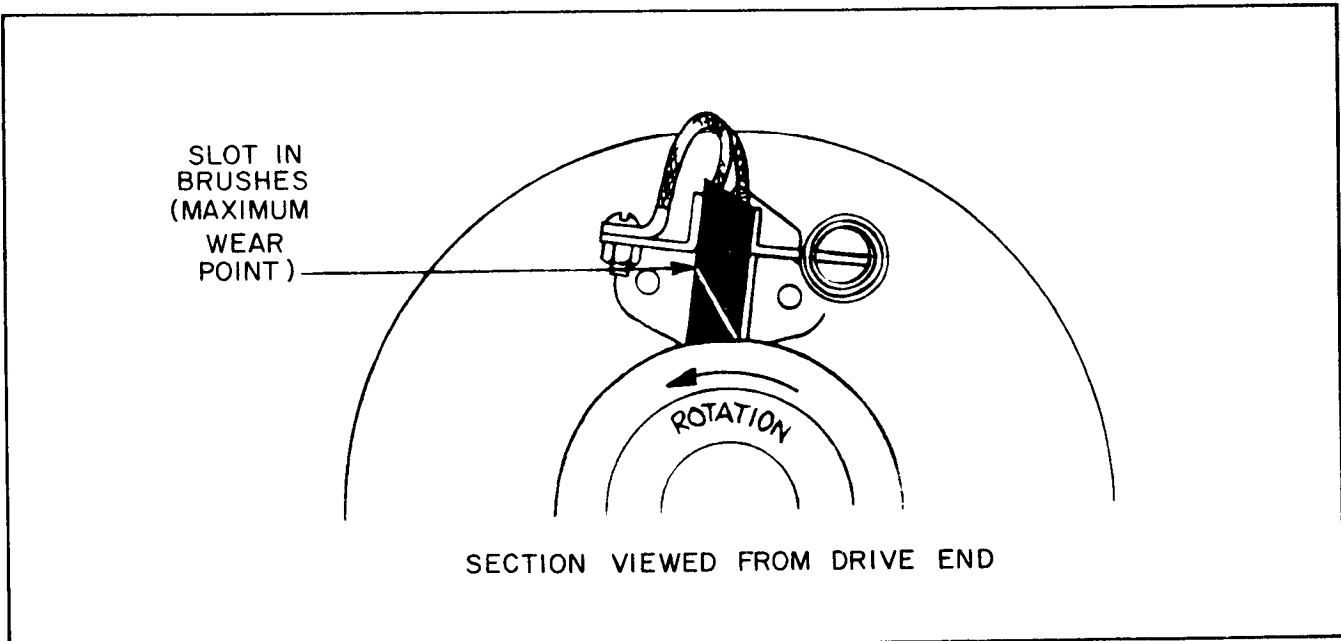


Figure 3-3. Correct Position of Brushes and Springs with Regard to Armature Rotation.

3-7. MODIFICATION CRITERIA.

None required.

3-8. LUBRICATION.

Fill ball bearings (18 and 22, figure 3-1) one-third to one-half full with grease, (item 4, table 2-3). (Approximately 0.076-0.125 grams of grease will be required per bearing.)

3-9. REASSEMBLY.

All numbers in this paragraph refer to the index numbers of items illustrated in figure 3-1.

a. If identification plate (1) was removed during disassembly, assemble with attaching drive screws (2), and coat surface lightly with varnish, (item 2, table 2-3) or equivalent.

b. Press ball bearing (22), using arbor press (table 2-2), in end bell (33); then secure with bearing retainer (20). Apply anti-seize compound (item 3, table 2-3) to threads of screws (21). Install and lockwire (item 5, table 2-3).

c. Install disc-baffle (17) on drive end of armature with recessed area facing armature. Support armature in an arbor press; then press new ball bearing (18) on armature shaft, pressing on bearing inner race. Install other disc-baffle (17) over armature shaft with recessed area facing away from armature. Install retaining ring (16) and make certain that ring engages the groove fully.

d. Install disc-baffle (23) with recess toward commutator, on commutator end of armature shaft. Support

armature in an arbor press; then position end bell with bearing assembled, over commutator end of armature shaft and press bearing on armature shaft end. Press on inner race of bearing.

e. Position end bell, with armature assembly over end of stator. Apply anti-seize compound (item 3, table 2-3) and secure with screws (34). Make certain drive end bell bearing is fully seated in stator housing.

f. Install dampener back plate (15) on armature. Wear face of dampener plate should be 9.009 from the gage point on the drive shaft.

g. Install clutch dampener (14) over small spline end of drive shaft (13). Back face of hub should be 8.822 from gage point on the drive shaft.

h. Install drive shaft through armature, making certain splines of drive shaft are fully engaged with splines of armature.

i. Install fan (11) and secure with two-piece nut (12). Tighten inner nut to 180-200 inch-pounds, and outer nut to 125-150 inch-pounds while holding shaft (13) from rotating with wrench, Part No. QB80059-3 (table 2-2).

j. Install brushes (7); then secure brush and field leads with screws (8). Make electrical connections as per figure 3-4.

k. Install brush cover (5) and secure with screw (6). Cover may be assembled in any angular position.

l. Install air deflection shroud (9) and secure with screws (10).

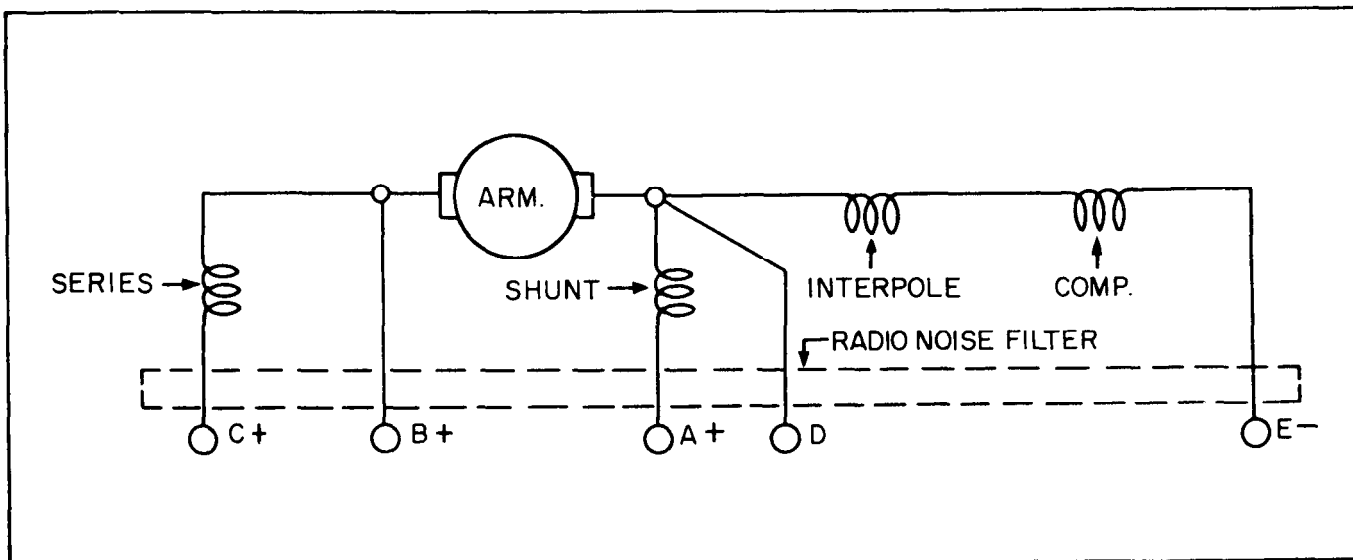


Figure 3-4. Electrical Connections.

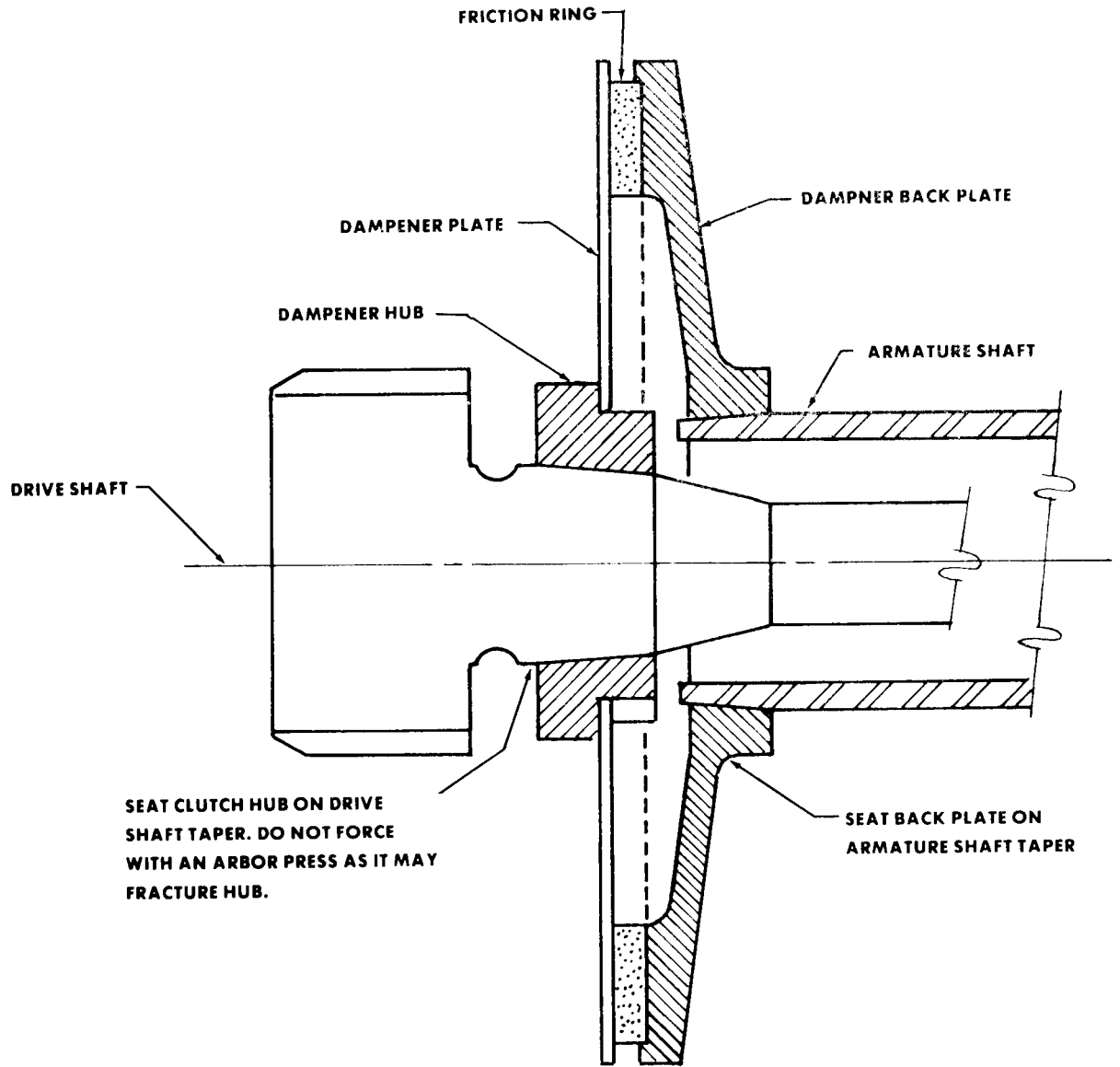


Figure 3-5. New Dampener Assembly.

SECTION IV FINAL TEST PROCEDURES

4-1. TEST EQUIPMENT.

Test equipment shall include a variable speed test stand capable of driving the generator at speeds from 4,400 to 8,000 rpm at full load and 10,000 rpm at no load (see table 2-1). The test stand should be equipped with suitable instrumentation to measure torque, speed, voltage, current, and temperature. Adequate circuitry must also be provided to load the generator. Mount Starter-Generator on test stand. Connect generator terminals to test stand as shown on figure 3-4.

4-2. TEST CONDITIONS.

Air inlet temperature shall be between 50° -104°F (10° -40°C). Brushes shall be seated 100 percent minimum in the direction of rotation, and 90 percent in the axial direction before starting test. Brush seating may be accomplished by operating the Starter-Generator as a generator at approximately 5,000 rpm at reduced load.

4-3. TEST REQUIREMENTS (AFTER OVERHAUL).

a. Maximum Speed for Regulation. With regulator connected to the Starter-Generator, but with operational warm-up, operate the Starter-Generator self-excited at 9,000 rpm, 30 volts, and no load. Record field current, commutation, and frame temperature. Shunt field current shall not be less than 0.81 amperes. There must be no arcing between brushes and commutator.

b. Continuous Operating Speed. With regulator connected to Starter-Generator, operate Starter-Generator at 8,000 rpm, 30 volts, 300 amps, until the frame temperature shows no more than 2°F rise in five (5) minutes. Measure and record the voltage between "D" and "E", air blast inlet temperature, commutation, field current, and frame temperature. Commutation should not exceed pinpoint arcing along the edges of the brushes. The paralleling voltage must be within the limits shown on Figure 4-1. If D-E volts is not within limits, see Troubleshooting, table 4-1. Frame temperature must not exceed the air-in by more than 175°F. See Troubleshooting, table 4-1.

c. Compounding and Commutation. Operate at 8,000 rpm, 30 volts. Check for compounding at 0, 75, 150, 225, and 300 amps. Field current must increase with load, and commutation must not exceed pinpoint arcing.

d. Minimum Speed for Regulation. Operate at 4,400

rpm, 30 volts, 300 amps, for demonstrating ability to operate at minimum speed for regulation. Record field current, frame temperature, and commutation. Shunt field current shall not exceed 8.0 amperes, and the external load resistance must be above 1.25 ohms. Commutation should not exceed pinpoint arcing.

e. No-load Speed. Operate the starter-generator as a starter with no load. Apply 23 volts to terminals C(+) and E(-). The shunt field (terminal B(+)) should be open. The no-load speed shall be at least 3,140 rpm.

f. Radial Vibration. With the Starter-Generator mounted in a resilient test stand and the drive shaft supported, operate the unit with no load as in e above. ~~Radial~~ vibration shall not exceed 0.001-inch total deflection.

g. Dielectric Test. Remove generator from test stand and, while still hot as a result of testing, conduct a hi-pot to ground test of 110 volts, ac rms, 60 cps for one minute. The leads from the terminal block must be removed from studs due to imbedded capacitors connected to ground. A dummy block without imbedded capacitors may be used for test. Generator shall not be grounded in any circuit.

h. Locked Rotor Test.

CAUTION

Do not connect shunt field (terminal B(+)) to any other terminal during the locked rotor test.

(1) With rotor locked, apply voltage between "C" and "E" terminals and increase until output torque is 475 inch-pounds. Do not energize the unit for more than two (2) seconds. Record current and voltage. Current shall be not greater than 600 amperes, and voltage shall not exceed 30 volts.

(2) Repeat (1) above except increase voltage until output torque is 175 inch-pounds. Voltage and current shall not exceed curve in figure 4-2. See Troubleshooting, table 4-1.

i. Commutator Run-out Check. Make commutator run-out checks while rotating the armature on its own bearings. Record the total indicated run-out and the maximum bar-to-bar difference. Maximum total indicated run-out is to be 0.0005 inch, and the bar-to-bar difference must not be more than 0.0002 inch.

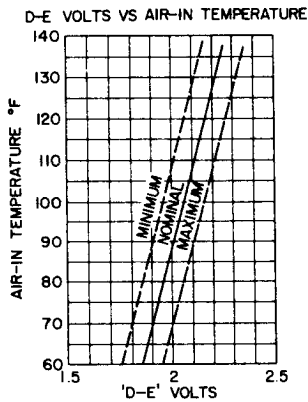


Figure 4-1. Paralleling Voltage Chart.

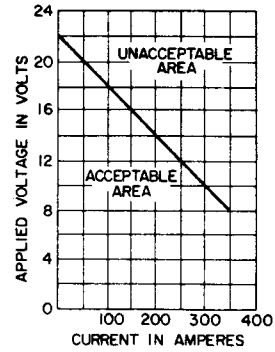


Figure 4-2. Voltage Vs Current for Locked Rotor Test at 175 Inch-Pounds Torque.

4-4. TROUBLESHOOTING.

Table 4-1 contains a list of troubles, their probable causes, and suggested remedies which may be encountered during testing or actual operation.

Table 4-1. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Unit fails to operate or does not attain normal speed.	Low voltage power source.	Check power source to make certain full voltage is being applied to starter terminals.
	Defective switch in power supply line.	Replace switch.
	Damaged armature.	Replace armature assembly.
	Short circuited or open stator windings.	Replace stator assembly.
	Improperly seated brushes.	Check brush seats and increase brush run-in time.
	Eccentric commutator.	Refinish commutator. (Refer to paragraph 3-5a.)

Table 4-1. Troubleshooting (cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive sparking at brushes.	Short circuited or grounded field windings.	Replace stator assembly.
	Excessive clearance in bearings or rough bearing races.	Replace bearings.
	Eccentric commutator.	Refinish commutator. (Refer to paragraph 3-5a.)
	Short circuit in armature windings.	Replace armature assembly.
	Brushes incorrectly installed with top bevel reversed.	Reverse and reseal brushes.
	Insufficient brush run-in with improper seating.	Run in brushes until seated.
	Severe overload or short circuit in aircraft electrical system.	Locate and correct fault.
	Brushes sticking in holders.	Free brushes.
	Weak brush springs.	Replace brush holders.
Noisy operation.	Brushes loose in holders.	Replace brushes. If still loose, replace brush holder assemblies.
	Rough bearings.	Replace bearings.
	Scored or worn drive splines.	Replace drive shaft.
Unit vibrates.	Fan bent and/or rubbing.	Straighten or replace fan.
	Unbalanced armature assembly.	Balance or replace armature assembly.
Generator produces full voltage – but with reversed polarity.	Excessive run-out of armature bearings.	Replace armature bearings.
	Voltmeter leads reversed.	Connect voltmeter correctly.
	Residual magnetism in field poles creates wrong polarity.	Flash the field in accordance with paragraph 3-6.

Table 4-2. Troubleshooting (cont.)

TROUBLE	PROBABLE CAUSE	REMEDY
Starter-Generator overheats (frame temperature 175°F in excess of air inlet temperature).	Continuous overload.	Check aircraft electrical system for grounds, etc. Make corrections as necessary.
D-E volts not within limits of figure 4-1. Also see causes and remedies below.	Obstruction to air flow through generator.	Remove obstruction.
	Commutation.	Refinish commutator and reseal brushes.
Using procedures in paragraph 4-3-b(2) but unit does not meet requirements of curve in figure 4-2.	Open circuit in armature.	Replace armature.
	Open or short circuit in stator winding.	Replace stator winding.

**SECTION V
DIFFERENCE DATA SHEETS**

5-1. Not applicable.

APPENDIX A

REFERENCES

NOTE

The following references of the issue in effect at the date of this publication are required for use by operational personnel in performance of their duties.

DA PAM 738-751	Functional Users Manual for the Army Maintenance Management Systems Aviation (TAMMS-A)
TM 55-1500-204-25/1	General Aircraft Maintenance Manual
TM 55-1500-345-23	Painting and Marking of Army Aircraft
TM 743-200-1	Storage and Materials Handling

APPENDIX B

REPAIR PARTS AND SPECIAL TOOLS LIST

SECTION I. INTRODUCTION

B-1. Scope.

This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of General Support Maintenance of the DC Starter Generator. It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the source, maintenance and recoverability (SMR) codes.

B-2. General.

In addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed in item name sequence. Repair parts kits are listed separately in their own functional group within Section II. Repair parts for repairable special tools are also listed in this section. Items listed are shown on the associated illustration(s)/figure(s).

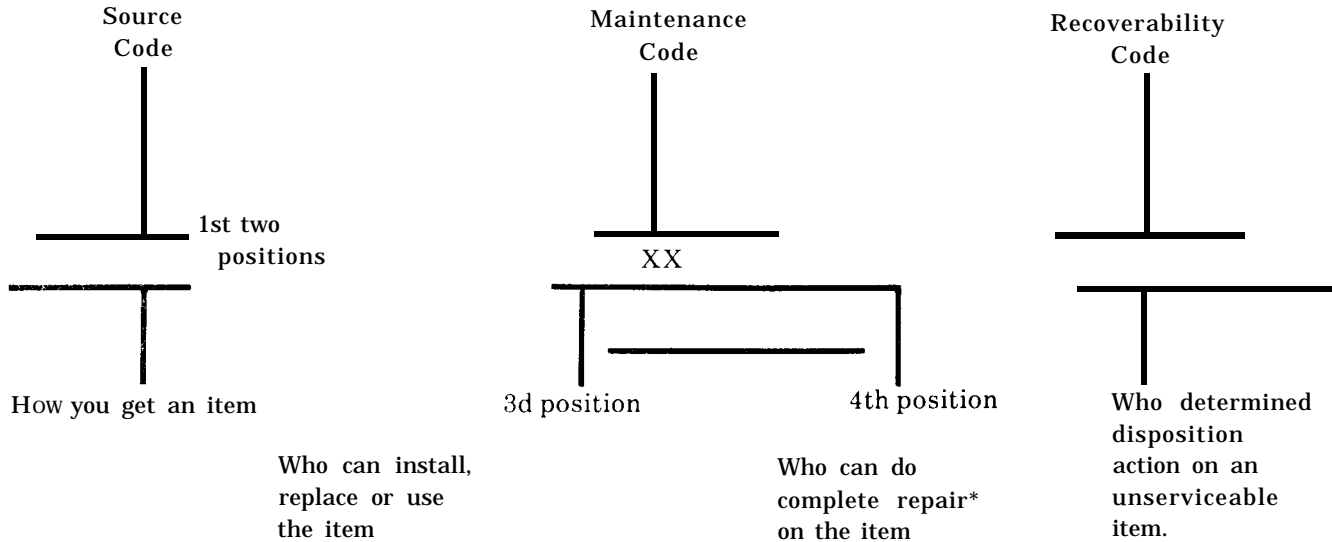
b. Section III. Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE column) for the performance of maintenance. (Not Applicable)

c. Section IV. National Stock Number and Part Number Index. A list in National Item Identification Number (NIIN) sequence, of all National stock numbered items appearing in the listing, followed by a list in alphanumeric sequence of all part numbers appearing in the listings. National stock number and part numbers are cross-referenced to each illustration figure and item number appearance.

B-3. Explanation of Columns (Sections II and III).

a. ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration

b. SMR CODE (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:



*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item equipment. Explanations of source codes follows:

Code	Explanation
PA PB PC** PD PE PF PG	Stocked items; use the applicable NSN to request/requisition items these source codes. They are authorized to the category indicated by the code entered in the 3d position of the SMR code. **NOTE: Items coded PC are subject to deterioration.
KD PF KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3d position of the SMR code. The complete kit must be requisitioned and applied.
MO- (Made at org/AVUM Level) MF- (Made at DS/AVUM Level) MH- (Made at GS Level) ML- (Made at Specialized Repair Act (SRA)) MD- (Made at Depot)	Items with these codes are nor, to be requested requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the Bulk Material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3d position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.

CODE	Explanation
AO- (Assembled by org/AVUM Level)	items with these codes are not to be requested/requisitioned individually. The parts that make up these assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code, If the 3d position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
AF- (Assembled by DS AVIM Level)	
AH- (Assembled by GS Category)	
AL- (Assembled by SRA)	
AD- (Assembled by Depot)	

XA- Do not requisition an "XA"-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)

XB- If an "XB" item is not available from salvage, order it using the FSCM and part number given.

XC- Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.

XD- Item is not stocked, Order an "XD"-coded item through normal supply channels using the FSCM and part number given, if no NSN is available.

NOTE: Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 700-42.

(2) Maintenance Code. Maintenance codes tells you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR Code as follows:

(a) The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

Code	Application Explanation
C	-Crew or operator maintenance done within organizational or aviation unit maintenance.
O	-Organizational or aviation unit category can remove, replace, and use the item.
F	-Direct support or aviation intermediate level can remove, replace, and use the item.
H	-General support level can remove, replace, and use the item.
L	-Specialized repair activity can remove, replace, and use the item.
D	-Depot level can remove, replace, and use the item.

(b) The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions). (NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.) This position will contain one of the following maintenance codes.

CODE	Application/Explanation
O	-Organizational or (aviation unit) is the lowest level that can do complete repair of the item.
F	-Direct support or aviation intermediate is the lowest level that can do complete repair of the item.
H	-General support is the lowest level that can do complete repair of the item.
L	-Specialized repair activity (designate the specialized repair activity) is the lowest level that can do complete repair of the item.
D	-Depot is the lowest level that can do complete repair of the item.
Z	-Nonreparable. No repair is authorized
B	-No repair is authorized. (No parts or special tools are authorized for the maintenance of a "B" coded item). However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code as follows:

Recoverability Codes	Application/Explanation
Z	-Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR Code.
O	-Reparable item. When uneconomically repairable, condemn and dispose of the item at organizational or aviation unit level.
F	-Reparable item. When uneconomically repairable, condemn and dispose of the item at the direct support or aviation intermediate level.
H	-Reparable item. When uneconomically repairable, condemn and dispose of the item at the general support level.
D	-Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.

- L -Reparable item. Condemnation and disposal not authorized below specialized repair activity (SRA).
- A -Item requires special handling or condemnation procedures because of specific reasons (e. g., precious met, al content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals directives for specific instructions.

c. FSCM (Column 3). The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

d. PART NUMBER (Column 4). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE: When you use a NSN to requisition an item, the item you receive may have a different part number from the part ordered.

e. DESCRIPTION AND USABLE ON CODE (UOC) (Column 5). This column includes the following information:

- (1) The Federal item name and, when required, a minimum description to identify the item.
- (2) The physical security classification of the item is indicated by the parenthetical entry (insert applicable physical security classification abbreviation, e.g., Phy Sec C1 (C) -Confidential, Phy Sec C1 (S) -Secret, Phy Sec C1 (T)-Top Secret)
- (3) Items that are included in kits and sets are listed below the name of the kit or set.
- (4) Spare repair parts that make up an assembled item are listed immediately following the assembled item line entry,
- (5) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.
- (6) When the item is not used with all serial numbers of the same model, the effective serial numbers are shown on the last line(s) of the description (before UOC).
- (7) The usable on code, when applicable (see paragraph B-5, Special information).
- (8) In the Special Tools List section. the basis of issue (BOI) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of issue, the total authorization is increased proportionately.
- (9) The statement "END OF FIGURE" appears just below the last item description in Column 5 for a given figure in both Section II and Section III.

f. QTY(Column 6). The QTY (quantity per figure column) indicates the quantity of the item used in the breakdown shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity is variable and the quantity may vary from application to application.

B-4. Explanation of Columns (Sect. IV).

a. NATIONAL STOCK NUMBER (NSN) INDEX.

(1) STOCK NUMBER Column. This column lists the NSN by National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN (i.e., 5305-01-674-1467 ^{NSN} When using _{NIIN} this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) FIG. column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II and Section III.

(3) ITEM column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

b. PART NUMBER INDEX. Part numbers in this index are listed by part number in ascending alphanumeric sequence (i.e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

(1) FSCM column. The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(2) PART NUMBER column. Indicate the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

(3) STOCK NUMBER column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and FSCM columns to the left.

(4) FIG. column. This column lists the number of the figure where the item is identified/located in Section II and III.

(5) ITEM column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

B-5. Special Information. Use the following subparagraphs as applicable:

a. USABLE ON CODE. The usable on code appears in the lower left corner of the Description column heading. Usable on codes are shown as "UOC: " in the Description Column (justified left) on the first line applicable item description nomenclature. Uncoded items are applicable to all models. Identification of the usable on codes used in the RPSTL are:

Code	Used On	
PAA	Model M1 14	
PAB	Model M114A	(These codes and model numbers are examples only)
PAC	Model M114B	

b. INDEX NUMBERS. Items which leave the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the National Stock Number Part Number Index and the bulk material list in Section II.

c. ASSOCIATED PUBLICATIONS. The publication(s) listed below pertain to and its components:

<u>Publication</u>	<u>Short Title</u>
N/A	N/A

NOTE: Associated publications shall not be listed her in combined narrative and RPSTL manuals.

B-6. How to Locate Repair Parts.

a. When National Stock Number or Part Number is Not Known.

(1) First. Using the table of contents, determine the assembly group or subassembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(3) Third. Identify the item on the figure and note the item number.

(4) Fourth. Refer to the Repair Parts Lists for the figure to find the part number for the item number noted on the figure.

(5) Fifth. Refer to the Part Number Index to find the NSN, if assigned.

b. When National Stock Number or Part Number is Known:

(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National Stock Number or Part Number. The NSN index is in National Item Identification Number (NIIN) sequence (see B-4a(1)). The part numbers in the Part Number index are listed in ascending alphanumeric sequence (see B-4.b.). Both indexes cross-reference you to the illustration figure and item number of the item you are looking for.

(2) Second. After finding the figure and item number, verify that the item is the one you're looking for, then locate the item number in the repair parts list for the figure.

SECTION II			TM55-2925-240-40			(6)
(1)	(2)	(3)	(4)	(5)		
ITEM NO	SMR CODE	FSCM	PART NUMBER	DESCRIPTION AND USABLE ON CODES(UOC)	QTY	
GROUP 01. STARTER-GENERATOR,ENGINE						
FIGURE B-1. STARTER-GENERATOR, ENGINE						
1	XBFZZ	31435	06-201034	INST. PLATE.....	1	
2	PAFZZ	96906	MS21318-13	SCREW DRIVE.....	4	
3	PAFZZ	31435	06-109978:	PLATE, IDENTIFICATIO.....	1	
4	PAFZZ	96906	MS21318-13	.SCREW, DRIVE.....	2	
5	PAFZZ	31435	23064-1150	COVER, ACCESS.....	1	
6	PAFZZ	88044	AN502-10-14	SCREW MACHINE.....	1	
7	PAFZZ	31435	30300-1282	BRUSH, ELECTRICAL CO.....	4	
8	PAFZZ	31435	05-340201	SCREW, MACHINE.....	4	
9	PAFZZ	31435	23064-1380	HOUSING, IMPELLER, FA.....	1	
10	PAFZZ	96906	MS16995-25	SCREW MACHINE.....	8	
11	PAFZZ	31435	23064-1360	IMPELLER, FAN, CENTRI.....	1	
12	PAFZZ	31435	02-4107-02	LOCKNUT, HEXAGON.....	1	
13	PAFZZ	31435	23064-1011	SHAFT, DAMPENER DRIV.....	1	
14	PAFZZ	31435	23032-1901	HUB, BODY.....	1	
14A	PAFZZ	31435	30059-1480	PLATE, DAMPENER.....	1	
15	PAFZZ	31435	02-5600-06	GASKET.....	1	
15A	PAFZZ	31435	30059-1470	BACKING PLATE, GENER.....	1	
16	PAFZZ	96906	MS16626-1098	RING, RETAINING.....	1	
17	PAFZZ	31435	05-101001	DEFLECTOR, DIRT AND.....	2	
18	PAFZZ	31435	07-111337	BEARING, BALL, ANNULA.....	1	
19	PAFZZ	31435	23047-1052	ARMATURE, GENERATOR.....	1	
20	PAFZZ	31435	23064-1370	PLATE, RETAINING, BEA.....	1	
21	PAFZZ	96906	MS35266-64	SCREW MACHINE.....	4	
22	PAFZZ	31435	07-111259	BEARING, BALL, ANNULA.....	1	
23	PAFZZ	31435	G128-178	WASHER, SADDLE.....	1	
23A	XBFZZ	31435	23064-1270	END BELL ASSY.....	1	
23B	PAFZZ	31435	23064-1280	.HOLDER, ELECTRICAL C.....	4	
24	PAFZZ	96906	MS20365-1032C	..NUT.....	8	
25	PAFZZ	88044	AN960-10L	..FLAT WASHER.....	8	
26	XBFZZ	31435	05-374101	..WASHER.....	4	
27	PAFZZ	31435	05-374093	..INSULATOR, WASHER.....	4	
28	PAFZZ	31435	23033-1120	..SPRING.....	2	
29	PAFZZ	31435	05-360015	..STUD, PLAIN.....	2	
30	XAFZZ	31435	23064-1180	..BRUSH HOLDER.....	1	
31	XDDZZ	31435	05-631122	..INSULATOR, BUSHING.....	8	
32	PAFZZ	31435	23014-1039	..PLATE, INSULATION, BR.....	4	
33	XBFZZ	31435	23064-1260	.RING, HOLDER.....	1	
34	PAFZZ	96906	MS24694S5	SCREW MACHINE.....	8	
35	PAFZZ	31435	23064-1410	TERMINAL BOARD AND.....	1	
36	PAFZZ	88044	AN3-15A	BOLT, MACHINE.....	2	
37	PAFZZ	96906	MS35338-43	WASHER.....	2	
38	PAFZZ	88044	AN960-10	WASHER, FLAT.....	2	
39	PAFZZ	96906	MS21083B6	.NUT, SELF LOCK.....	3	
40	PAFZZ	88044	AN961-616	WASHER, FLAT.....	3	
41	PAFZZ	96906	MS21083B3	NUT, SELFLOCKING.....	2	
42	PAFZZ	88044	AN961-10T	WASHER, FLAT.....	2	
43	XAFZZ	31435	23064-300	STATOR.....	1	

END OF FIGURE

CROSS-REFERENCE INDEXES

STOCK NUMBER	NATIONAL STOCK NUMBER	INDEX STOCK NUMBER	FIG.	ITEM
3110-00-014-8335	B-1	22		
3110-00-014-8337	B-1	18		
5310-00-045-3296	B-1	37		
5305-00-057-0491	B-1	34		
5365-00-077-2435	B-1	28		
5970-00-118-8837	B-1	27		
5310-00-136-1471	B-1	42		
5305-00-143-3289	B-1	8		
5977-00-143-6774	B-1	7		
5305-00-150-9209	B-1	6		
5306-00-151-0779	B-1	36		
3020-00-155-9207	B-1	14A		
5310-00-167-0818	B-1	38		
5310-00-167-0834	B-1	25		
5310-00-187-2413	B-1	40		
6115-00-241-2329	B-1	19		
5305-00-253-5609	B-1	2		
	B-1	4		
3040-00-355-7904	B-1	14		
2925-00-363-9878	B-1	15A		
5330-00-395-3782	B-1	15		
5307-00-533-9843	B-1	29		
5310-00-596-3161	B-1	23		
5305-00-614-0247	B-1	21		
5310-00-626-7582	B-1	12		
6115-00-725-5665	B-1	32		
5977-00-728-8113	B-1	23B		
2925-00-728-8117	B-1	11		
2925-00-728-8118	B-1	9		
2925-00-735-7493	B-1	17		
2925-00-763-0863	B-1	5		
2925-00-774-8138	B-1	35		
5365-00-817-8542	B-1	16		
2925-00-890-2743	B-1	13		
3110-00-890-7772	B-1	20		
5310-00-905-8434	B-1	41		
5310-00-926-5832	B-1	39		
5305-00-988-7601	B-1	10		

CROSS-REFERENCE INDEXES

FSCM	PART NUMBER	PART NUMBER INDEX		FIG.	ITEM
			STOCK NUMBER		
88044	AN3-15A		5306-00-151-0779	B-1	36
88044	AN502-10-14		5305-00-150-9209	B-1	6
88044	AN960-10		5310-00-167-0818	B-1	38
88044	AN960-10L		5310-00-167-0834	B-1	25
88044	AN961-10T		5310-00-136-1471	B-1	42
88044	AN961-616		5310-00-187-2413	B-1	40
31435	G128-178		5310-00-596-3161	B-1	23
96906	MS16626-1098		5365-00-817-8542	B-1	16
96906	MS16995-25		5305-00-988-7601	B-1	10
96906	MS20365-1032C			B-1	24
96906	MS21083B3		5310-00-905-8434	B-1	41
96906	MS21083B6		5310-00-926-5832	B-1	39
96906	MS21318-13		5305-00-253-5609	B-1	2
				B-1	4
96906	MS24694S5		5305-00-057-0491	B-1	34
96906	MS35266-64		5305-00-614-0247	B-1	21
96906	MS35338-43		5310-00-045-3296	B-1	37
31435	02-4107-02		5310-00-626-7582	B-1	12
31435	02-5600-06		5330-00-395-3782	B-1	15
31435	05-101001		2925-00-735-7493	B-1	17
31435	05-340201		5305-00-143-3289	B-1	8
31435	05-360015		5307-00-533-9843	B-1	29
31435	05-374093		5970-00-118-8837	B-1	27
31435	05-374101			B-1	26
31435	05-631122			B-1	31
31435	06-109978:			B-1	3
31435	06-201034			B-1	1
31435	07-111259		3110-00-014-8335	B-1	22
31435	07-111337		3110-00-014-8337	B-1	18
31435	23014-1039		6115-00-725-5665	B-1	32
31435	23032-1901		3040-00-355-7904	B-1	14
31435	23033-1120		5365-00-077-2435	B-1	28
31435	23047-1052		6115-00-241-2329	B-1	19
31435	23064-1011		2925-00-890-2743	B-1	13
31435	23064-1150		2925-00-763-0863	B-1	5
31435	23064-1180			B-1	30
31435	23064-1260			B-1	33
31435	23064-1270			B-1	23A
31435	23064-1280		5977-00-728-8113	B-1	23B
31435	23064-1360		2925-00-728-8117	B-1	11
31435	23064-1370		3110-00-890-7772	B-1	20
31435	23064-1380		2925-00-728-8118	B-1	9
31435	23064-1410		2925-00-774-8138	B-1	35
31435	23064-300			B-1	43
31435	30059-1470		2925-00-363-9878	B-1	15A
31435	30059-1480		3020-00-155-9207	B-1	14A
31435	30300-1282		5977-00-143-6774	B-1	7

By Order of the Secretary of the Army:

W.C. WESTMORELAND,

General, United States Army,

Chief of Staff.

Official:

KENNETH G. WICKHAM,

Major General, United States Army,

The Adjutant General.

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THE METRIC SYSTEM AND EQUIVALENTS

WEIGHT MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 lb.
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

TEMPERATURE

$5/9(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
its	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
ometers per Liter	Miles per Gallon	2.354
ometers per Hour	Miles per Hour	0.621



PIN: 021202-003