DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL, DS, GS, AND DEPOT MAINTENANCE MANUAL

TESTER, STARTER TORQUE, TYPE B-1
PART NO. RT320-200
FSN 4920-739-4584

This publication is a reprint of TM 55-4920-234-15,
26 February 1965, including changes 1 and 2.

HEADQUARTERS
DEPARTMENT OF THE ARMY
1965

SAFETY PRECAUTIONS

Do not allow starter torque tester to become overbalanced during loading operations or damage to the equipment or injury to personnel may occur.

Make certain starter torque tester is firmly secured to carrier, as movement during shipment may cause the starter torque tester to be damaged, injury or death to personnel on the carrier, or damage to the carrier.

CHANGE

No. 2,

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *2 February 1972*

Organizational, DS, GS, and Depot Maintenance Manual

TESTER, STARTER TORQUE, TYPE B-1

PART NO. RT320-200, FSN 4920-739-4584

TM 55-4920-234-15, 26 February 1965, is changed as follows:

Pages 25 and 26. Paragraphs 65 through 69 are deleted in their entirety. The following sentence is added after "Section III. Demolition of Materiel to Prevent Enemy Use": (Refer to TM 750-244-1-4 for demolition instructions).

Page 26. Figure 17 is deleted.

By Order of the Secretary of the Army:

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

Official:
VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31 (qty rqr block No. 94) requirements for Organizational Maintenance Instructions for all Fixed and Rotor Wing Aircraft.

Organizational, DS, GS, and Depot Maintenance Manual

TESTER, STARTER TORQUE TYPE B-1

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 19 April 1967

TM 55-4920-234-15, 26 February 1965, is changed as follows:

Page 30. Appendix III, is superseded as follows-

APPENDIX III

REPAIR PARTS AND SPECIAL TOOLS LISTS

SECTION I
INTRODUCTION

1. General

This appendix lists the repair parts and maintenance supplies authorized and required for organizational through depot maintenance of the Tester, Starter Torque, Part No. RT320-200, FSN 4920-739-4584. This is the authority to requisition. It supplements tables of equipment and allowances and other applicable authorization documents. The quantities of repair parts and special tools required to be on hand or on order at all times for performance of operator/crew and organizational maintenance in units and/or organizations constitute a prescribed load which will be maintained in accordance with AR 735-35.

2. Arrangement

This appendix consists of four sections, as follows-

Section I Introduction

Section II Illustrated Parts List. All repair parts are listed in disassembly order and indented when required to indicate relationship to the next higher assembly. Items appearing more than once in an assembly will be repeated to show relationship to the illustration. Illustrations appear in the maintenance portion of this manual.

Section III Special Tools List

Section IV Cross-Reference Indices.
This section is divided into two parts as follows-

a. Part I., the alpha-numerical part number index contains a listing of all part numbers appearing in the text pages of this manual. Cross-reference is made to figure and index numbers, federal stock number, federal supply (ode for manufacturer, and item name.

b. Part 11. federal stock number cross-reference index is arranged in numerical order by, stock number. Cross-reference is made to figure and index numbers, part number, federal supply code for manufacturer, and item name

3. Explanation of Columns

a. AMC Materiel Code-Materiel Basic Number. Items which are the logistic responsibility of a commodity command, other than U. S. Army Aviation Materiel Command (USAAVCOM), are indicated by the basic number assigned to the commodity command. This basic number used is 9-Ordnance Materiel.

b. Source Code. Source codes are shown in this column as assigned to items by USAAVCOM. The code symbols indicate the selection status and source of supply for each repair part as defined hereinafter: Code P applies to repair parts which are high mortality parts; stocked in and supplied from the service depot system, and authorized for use at indicated maintenance categories.

c. Maintenance Level Code. The code symbol used in the maintenance level column indicates the lowest maintenance category authorized to install the repair parts. Capabilities of higher maintenance categories are considered equal or better.

(1) Code F--Direct support maintenance category.

(2) Code H--General support maintenance category.

d. Recoverability Code. Recoverability codes reflect the recoverability or reparability characteristics of repair parts upon removal from equipment at time of maintenance, repair, or overhaul.

(1) Code R applies to repair parts and assemblies which are economically reparable at direct and general support maintenance activities and normally are furnished by supply on an exchange basis.

(2) Repair parts and assemblies not assigned a recoverability code shall be considered "throwaway" items.

e. Federal Stock Number. The federal stock number consists of the applicable 4-digit FSC code number plus the 7-digit federal item identification number, and is to be utilized for

requisitioning, storage, and accountability purposes.

f. Description. This column furnishes the item name, a brief description, when necessary, and authorized abbreviations or dimensions when required to provide further identification. A comma will be used to separate the basic noun or noun phrase from its modifiers. As an additional reference, the manufacturer's part number is indicated following the description.

g. Unit of Issue. This column lists the standard or the basic quantity in which the item is issued (each, pound, set, etc.).

h. Quantity per Assembly. Quantities in this column are those required for one assembly only, including instances when similar assemblies are broken down together.

i. Quantity Authorized. An asterisk * code contained within this column indicates that the item is authorized for use at that level, but is not authorized to be stocked, assembled, or manufactured. When such an item is required, it must be requisitioned for immediate use only from the next higher maintenance category.

j. Figure and Index Numbers. When applicable, the numbers which appear in the last right-hand column of each text page, key items contained in the text to the proper part on the appropriate illustration. This enables ready reference from illustration to text and from text to illustration. Figure and index numbers are also shown in the indices for every part which appears in the manual. This provides a reference to the proper illustration and item on the text listing. When a breakdown covers both left and right-hand assemblies, only the left-hand parts are indexed and illustrated.

4. Abbreviations

The following abbreviations are used

AN ..... Air Force-Navy
ASSY..... Assembly(ies)
EA ..... Each
IN..... Inch(es)
LG..... Length (long)
MTG ..... Mounting(s)
NC ..... American national coarse thread
NO ..... Number(s)
P/N ..... Part number
SAE ..... Society of automotive engineers
STD ..... Standard(s)

5. Federal Supply Code for Manufacturer

Code	*Manufacturer and Locations*
26337	GREER HYDRAULICS INC 59.30 W JEFFERSON BLVD LOS ANGELES CALIF 900016
57733	STEWART-WARNER CORP 1826 DIVERSEY PARKWAY CHICAGO ILL 60614
88044	AERONAUTICAL STANDARDS GROUP DEPT OF NAVY AND AIR FORCE
96906	MILITARY STANDARDS PROMULGATED BY STANDARDI-ZATION DIV DIRECTORATE OF LOGISTIC SERVICES DSA

6.How to Find a Part

a. When the Part Number is Known. Locate the part number in the alpha-numerical part number index. section IV, part I of this appendix. Note the figure and index number indicating where the part is shown in the illustrated parts list. Turn to the figure and index number on appropriate page indicated to obtain the desired information.

b. When the Stock Number is Known, locate the stock number in the numerical stock number index, section IV, part II of this appendix. Note the figure and index number indicating where the part is shown in the illustrated parts list. Turn to the figure and index number on appropriate page to obtain the desired information.

c. When Neither the Part Number Nor the Stock Number for an Item is Known. Refer to the exploded view of the starter torque tester (fig. 5) and select the required part. Note the index number referenced to the item. Turn to section IV and note the index number of the part. On indicated page and opposite the index number will be shown the stock number or part number, item name, and all other necessary information.

Source codes				Federal Stock No.	SECTION III ILLUSTRATED PARTS LIST Description	Unit of issue	Ex-pend ability	Qty Per-Assy-	Qty Auth	Illustrations	
Mat-eriel	Source	Mainte-nance	Re-cover-ability							Fig No.	Item No.
	P	H	R	4920-739-4584	TESTER, STARTER TORQUE, type B-1, P/N RT320-200.	EA		1	*	1	
	P	F		4920-056-0534	.ADAPTER, P/N DT320-247	EA		1	*	5	23
					.ADAPTER, P/N DT320-294	EA		1		5	27
					.ARM, carrying, P/N GT320-263	EA		1		5	30
					.BASE AND FRAME ASSEMBLY	EA		1		5	31
					.BOLT, aircraft, brake assy mtg, P/N AN9-35A	EA		5		5	8
9	P	F		5306-702-9955	.BOLT, aircraft, brake pressure control mtg, P/N AN9-40A	EA		2	*	5	12
	P	F		4920-056-0538	.BRAKE ASSEMBLY, P/N H2-353	EA		1	*	5	5
					.BRAKE DRUM AND MOUNTING PLATE ASSEMBLY, P/N DT320-256	EA		1		5	1
	P	F		4920-056-0539	.BRAKE PRESSURE CONTROL ASSEMBLY, P/N BT320-265	EA		1	*	5	9
	P	F		4920-511-8428	.CABLE, P,'N 95000	EA		1	*	5	18
	P	F		4920-511-8407	.COUPLING, P/N BT320-25	EA		1	*	5	25
	P	F		4920-511-8408	.COUPLING, P/N BT320-29	EA		1	*	5	25
	P	F		4920-511-8409	.COUPLING, P/N BT320-297	EA		1	*	5	26
	P	F		4920-511-8410	.COUPLING, P/N BT320-28	EA		1	*	5	25
	P	F		4920-511-8404	.DRIVE ASSEMBLY, P/N BT320-204	EA		1	*	5	19
					.DRIVE ASSEMBLY. tachometer, reduction, 10 to 1 reduction. P/N 64B100 .	EA		1		5	20
					.HUB, carrying arm, P/N DT320-204	EA		1		5	29
	P	F		4920-398-1175	.JAW, three tooth, left hand large, P/N BT320-255-2	EA		1	*	5	21
	P	F		4920-398-1372	.JAW, three tooth, left hand small, P/N BT320-252-2	EA		1	*	5	21
	P	F		4920-398-1374	.JAW, three tooth, right hand large, P/N BT320-255-1	EA		1	*	5	21
	P	F		4920-398-1371	.JAW, three tooth, right hand small, P/N BT320-252-1	EA		1	*	5	21
	P	F		4920-098-6540	.JAW, twelve tooth, left hand large, P/N BT320-254-2	EA		1	*	5	21
	P	F		4920-303-0606	.JAW, twelve(, tooth, left hand small, P/N BT320-253-2	EA		1	*	5	21
	P	F		4920-098-6539	.JAW, twelve tooth, right hand large, P/N BT320-254-1	EA		1	*	6	21
	P	F		4920-398-1373	.JAW, twelve tooth, right hand small, P/N BT320-253-1	EA		1	*	5	21
					.KEY, drive shaft, brake drum mtg, P/N AT320-259	EA		2		5	4
					.LOCKNUT, ball bearing. sae No. n-11	EA		1		5	2
					.LOCKWASHER, std ball bearing, sae No. w-11	EA		1		5	3
9	P	F		5310-982-6808	.NUT, SELF-LOCKING, HEXAGON, P/N MS21044N9	EA		7	*		
					2 EA brake pressure control mtg					5	10
					5 EA brake assy mtg					5	6
9	P	F		5315-059-0491	.PIN, COTTER, torquemeter mtg, P/N MS24665-372	EA		4	*	5	14
					.PIN, PIVOT, LOWER, torquemeter mtg, P/N AT320-284	EA		1		5	16
					.PIN, PIVOT, UPPER, torquemeter mtg, P/N AT320-235	EA		1		5	15
					.SCREW, cap, socket head, 5/16-18 NC3 X 2 in. lg, adapter mtg	EA		1		5	24
					.SCREW, cap, socket head, 5/16-18 NC3 X 2-3/8 in. lg, coupling mtg	EA		1		5	26
					.SCREW, cap, socket head, 5/16-18 NC3 X 2-3/4 in. lg, jaw mtg	EA		1		5	22
					.SCREW, cap, socket head, 5/16-18 NC3 X 2 in. lg, adapter mtg	EA		1		5	28
	P	F		6680-680-4864	TACHOMETER, P/N 870C	EA		1	*		17
	P	F		4920-099-8364	TORQUEMETER, P/N DT320-213	EA		1	*		13
	P	F		4920-513-6675	TORQUEMETER, P/N DT320-290	EA		1	*	5	13
	P	F		4920-056-0536	TORQUEMETER, P/N DT320-293	EA		1	*	5	1
	P	F		5310-167-0824	WASHER, PLAIN, P/N AN960-916	EA		7	*		
					2 EA brake pressure control mtg					5	11
					5 EA brake assy mtg					5	7

Source codes				Federal Stock No.	SECTION III ILLUSTRATED PARTS LIST Description	Unit of issue	Ex-pend ability	Qty Per-Assy-	Qty Auth	Illustrations	
Mat-eriel	Source	Mainte-nance	Re-cover-ability							Fig No.	Item No.
					WRENCH, CLUTCH NUT, P/N BT320-285	EA		1			16
					WRENCH, CLUTCH NUT, P/N BT320-287	EA		1			16

SECTION IV

CROSS-REFERENCE INDICES

PART ONE ALPHA-NUMERICAL PART NUMBER

PART NUMBER	FEDERAL MFR CODE	FEDERAL STOCK NUMBER	ITEM NAME	FIGURE AND INDEX NUMBER
AN9-35A	88044		BOLT, AIRCRAFT	5-8
AN9-40A	88044	5306-702-9955	BOLT, AIRCRAFT	5-12
AN960-616	88044	5310-167-0824	WASHER, PLAIN	5-11
AN960-616	88044	5310-167-0824	WASHER, PLAIN	5-7
AT320-234	26337		PIN, PIVOT	5-14
AT320-235	26337		PIN, PIVOT	5-16
AT320-259	26337		KEY, DRIVE SHAFT	5-4
BT320-204	26337	4920-511-8401	DRIVE ASSEMBLY	5-19
BT320-252-1	26337	4920-398-1371	JAW	5-21
BT320-252-2	26337	4920-398-1372	JAW	5-21
BT320-253-1	26337	4920-398-1373	JAW	5-21
BT320-253-2	26337	4920-303-0606	JAW	5-21
BT320-254-1	26337	4920-098-6539	JAW	5-21
BT320-254-2	26337	4920-098-6540	JAW	5-21
BT320-255-1	26337	4920-398-1374	JAW	5-21
BT320-255-2	26337	4920-398-1375	JAW	5-21
BT320-265	26337	4920-056-0539	BRAKE PRESSURE CONTROL ASSEMBLY	5-9
BT320-295	26337	4920-511-8407	COUPLING	5-25
BT320-296	26337	4920-511-8408	COUPLING	5-25
BT320-297	26337	4920-511-8409	COUPLING	5-25
BT320-298	26337	4920-511-8410	COUPLING	5-25
DT320-213	26337	4920-099-8364	TORQUEMETER	5-13
DT320-247	26337	4920-056-0534	ADAPTER	5-23
DT320-256	26337		BRAKE DRUM	5-1
DT320-261	26337		HUB	5-29
DT320-290	26337	4920-513-6675	TORQUEMETER	5-13
DT320-293	26337	4920-056-0536	TORQUEMETER	5-13
DT320-294	26337		ADAPTER	5-27
GT320-263	26337		ARM, CARRYING	5-30
H2-253	74080	4920-056-0538	BRAKE ASSEMBLY	5-5
MS21044N9	96906	5310-982-6808	NUT	5-10
MS21044N9	96906	5310-982-6808	NUT	5-6
MS24665-372	96906	5315-059-0491	PIN, COTTER	5-14
RT320-200	26337	4920-739-4584	TESTER, STARTER TORQUE	1
649B100			DRIVE ASSEMBLY	5-20
95000	57733	4920-511-8428	CABLE	5-18

SECTION IV

CROSS-REFERENCE INDICES

PART TWO NUMERICAL STOCK NUMBER

FEDERAL STOCK NUMBER	FEDERAL MFR CODE	PART NUMBER	ITEM NAME	FIGURE AND INDEX NUMBER
4920-056-0534	26337	DT320-247	ADAPTER	5-23
4920-056-0536	26337	DT320-293	TORQUEMETER	5-13
4920-056-0538	26337	H2-253	BRAKE ASSEMBLY	5-5
4920-056-0539	26337	BT320-265	BRAKE PRESSURE CONTROL ASSEMBLY	5-9
4920-098-6539	26337	BT320-254-1	JAW	5-21
4920-098-6540	26337	BT320-254-2	JAW	5-21
4920-099-8364	26337	DT320-213	TORQUEMETER	5-13
4920-303-0606	26337	BT320-253-2	JAW	5-21
4920-398-1371	26337	BT320-252-1	JAW	5-21
4920-298-1372	26337	BT320-252-2	JAW	5-21
4920-398-1373	26337	BT320-253-1	JAW	5-21
4920-398-1374	26337	BT320-255-1	JAW	5-21
4920-398-1375	26337	BT320-255-2	JAW	5-21
4920-511-8404	26337	BT320-204	DRIVE ASSEMBLY	5-4
4920-511-8407	26337	BT320-295	COUPLING	5-25
4920-511-8408	26337	BT320-296	COUPLING	5-25
4920-511-8409	26337	BT320-297	COUPLING	6-25
4920-511-8410	26337	BT320-298	COUPLING	5-25
4920-511-8428	57733	95000	CABLE	5-18
4920-513-6675	26337	DT320-290	TORQUEMETER	5-13
4920-739-4584	26337	RT320-200	TESTER, STARTER TORQUE	1
5306-702-9955	88044	AN9-40A	BOLT, AIRCRAFT	5-12
5310-167-0824	88044	AN960-616	WASHER, PLAIN	5-11
5310-167-0824	88044	AN960-616	WASHER, PLAIN	5-7
5310-982-6808	96906	MS21044N9	NUT	5-10
5310-982-6808	96906	MS21044N9	NUT	5-6
5315-059-0491	96906	MS24665-372	PIN, COTTER	5-14

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
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 requirements for Operator and Crew Maintenance Instructions for all Fixed Wing and Rotary Wing aircraft.

TECHNICAL MANUAL
No. 55-4920-234-15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C.

Organizational, Direct Support, General Support, and Depot Maintenance Manual

TESTER, STARTER TORQUE
TYPE B-1
PART NO. RT320-200
FSN 4920-739-4584

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. SCOPE

a. General. These instructions are published for use of the personnel who operate and are responsible for organizational, direct support, general support, and depot maintenance of the Starter Torque Tester, Type B-1, part No. RT320-200, manufactured by Greer Hydraulics, Inc., Los Angeles, California (fig. 1). They provide information on the operation, lubrication, troubleshooting, preventive maintenance services, and repair of the equipment, accessories, components, and attachments as prescribed by the maintenance allocation chart.

b. Appendix I. Appendix I contains a standard list of all publications applicable to this manual and available to operating and maintenance personnel.

c. Appendix II Appendix II contains the maintenance allocation chart. This chart assigns maintenance functions and repair operations to be performed by the lowest appropriate echelon.

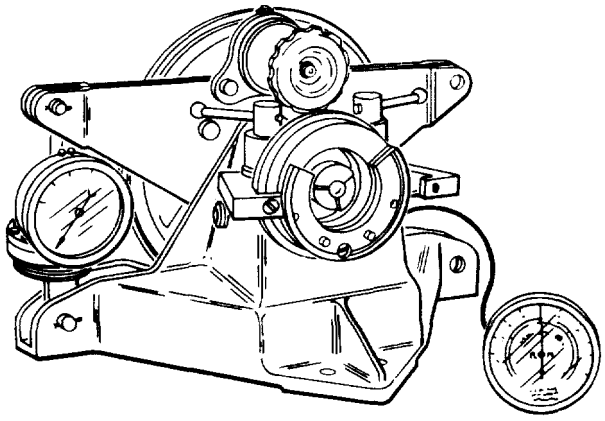


Figure 1. Starter Torque Tester, Type B-1, Part No. RT320-200

d. Appendix III. Appendix III lists the repair parts and special tools list. It is comprised of maintenance accessories, tools, supplies, spare assemblies, repair parts, and the quantities authorized maintenance personnel.

e. Recommendations. The direct reporting of errors, omissions, and recommendations for improving this technical manual by the individual user is authorized and encouraged. DA Form 2028 will be used for reporting these improvements. This form may be completed using pencil, pen, or typewriter. DA Form 2028 will be completed by the individual using the manual and forwarded directly to Commanding General, U.S. Army Aviation Materiel Command, P.O. Box 209, Main Office, St. Louis, Missouri 63166.

2. RECORD AND REPORT FORMS

The record and report forms listed in the following subdivisions will be used by operating and maintenance personnel for recording and reporting operation and maintenance. For instructions as to the use of listed forms, refer to TM 38-750.

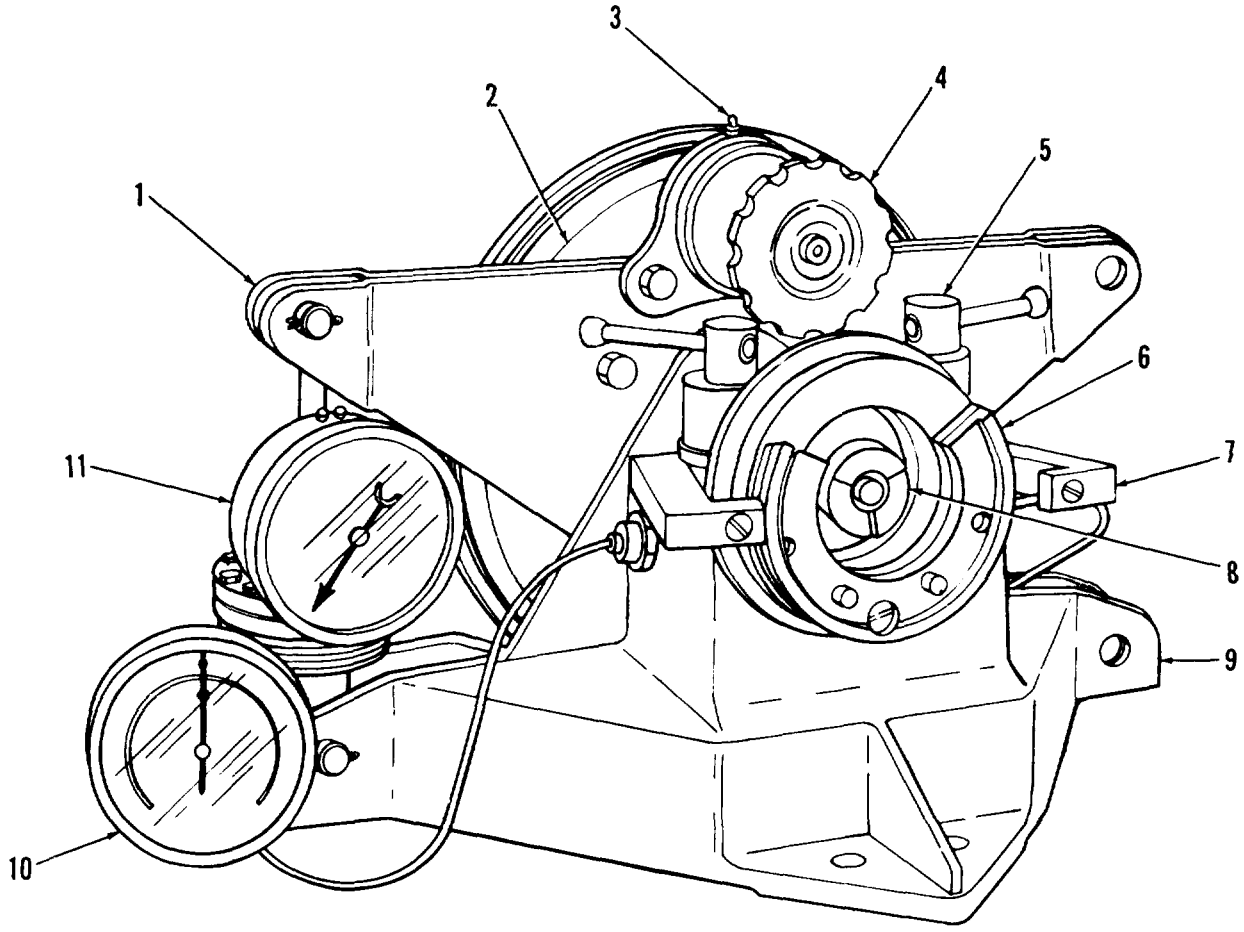
a. DD Form 314 Preventive Maintenance Schedule and Record
b. DA Form 2402 Exchange Tag
c. DA Form 2404 Equipment Inspection and Maintenance Worksheet
d. DA Form 2405 Maintenance Request Register
e. DA Form 2406 Materiel Readiness Report
f. DA Form 2407 Maintenance Request
g. DA Form 2409 Equipment Maintenance Log (Consolidated)

Section II. DESCRIPTION AND DATA

3. DESCRIPTION

a. The starter torque tester Type B-1, part No. RT320-200, Federal Stock No. 4920-739-4584, consists of a base and frame assembly (9, fig. 2) cast in one piece upon which are mounted a prony brake, a torquemeter (11), and a mounting adapter (6) for mounting the starter to be tested. The base and frame assembly is provided with four mounting holes for attaching it to a suitable test bench or other sturdy foundation. Torque is transmitted through the engaging jaw (8) to a ball-bearing mounted drive shaft which is rigidly connected to a brake drum and mounting plate assembly (2). The starter is held securely to the mounting adapter by means of two quick-acting, self-positioning mounting clamps (7)

b. The starter torque tester is primarily designed for testing the performance and clutch



1. CARRYING ARM
2. BRAKE DRUM ANDMOUNTING PLATE ASSEMBLY
3. FILLER PLUG
4. BRAKE PRESSURE CONTROL ASSEMBLY
5. CAM SHAFT
6. MOUNTING ADAPTER
7. MOUNTING CLAMP
8. ENGAGING JAW
9. BASE AND FRAME ASSEMBLY
10. TACHOMETER
11. TORQUEMETER

Figure 2. Starter Torque Tester Component Identification

setting (holding torque) of all starters incorporating standard mounting pads, as well as starters equipped with the new quick-disconnect features for mounting. The tester is also equipped with suitable accessories to be used for testing electrical actuators and retraction motors.

4. IDENTIFICATION

The nameplate (fig. 3) for the starter torque tester is located on the lower right-hand side of

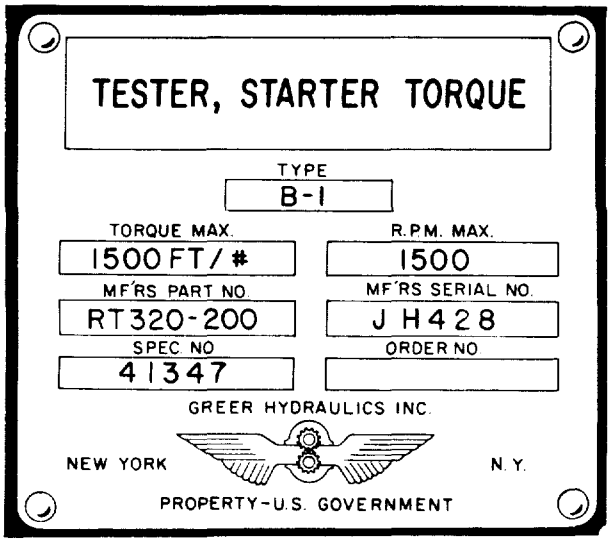


Figure 3. Nameplate

tester base. It identifies the manufacturer, giving the type, part number, model number, and serial number.

5. DIFFERENCES IN MODELS

This manual covers only type B-1 starter torque tester, part No. RT320-200. No known unit differences exist for the design covered by this manual.

6. TABULATED DATA

a. General:

Manufacturer .	Greer Hydraulics, Inc., Los Angeles, Calif.
Part No.....	RT320-200
Type.....	Prony Brake, Type B-1
Dimensions ..	20 in. wide x 24 in. high x 36 in. long
Weight	400 lb (estimated)

b. Torquemeters:

Manufacturer	Greer Hydraulics, Inc., Los Angeles, Calif.
Part No	DT320-293, DT320-290, DT320-213
Range	0 - 150 foot-pounds 0 - 500 foot-pounds 0 - 1500 foot-pounds

c. Tachometer:

Part No..... .	870C
Range.....	0 - 1500 rpm

d. Brake Shoe Assembly:

Part No	H-2-353
Range	Up to 7 horsepower absorption

e. Brake Pressure Control Assembly:

Part No.....	BT320-265
Type.....	Screw

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

7. GENERAL

When received, the starter torque tester and accessories are suitably protected with a moisture resistant cover and are enclosed in a suitable wooden crate.

8. UNPACKING

It is essential that extreme care be exercised in opening the crate to avoid damaging the instruments, controls, and other components and accessories.

a. Carefully remove starter torque tester, instruments, and accessories from shipping crate.

b. Remove moisture-resistant covers from starter torque tester and accessories.

9. INSPECTION

After unpacking, inspect the starter torque tester thoroughly to insure that no damage has been incurred in shipment. Inspect the starter torque tester as follows:

a. Visually inspect tachometer (10, fig. 2) and torquemeter (11) to ascertain there has been no damage incurred during shipment.

b. Inspect starter torque tester for damaged or broken parts.

c. Ascertain that all adapters, couplings, jaws, and other accessories have been provided.

10. SERVICING

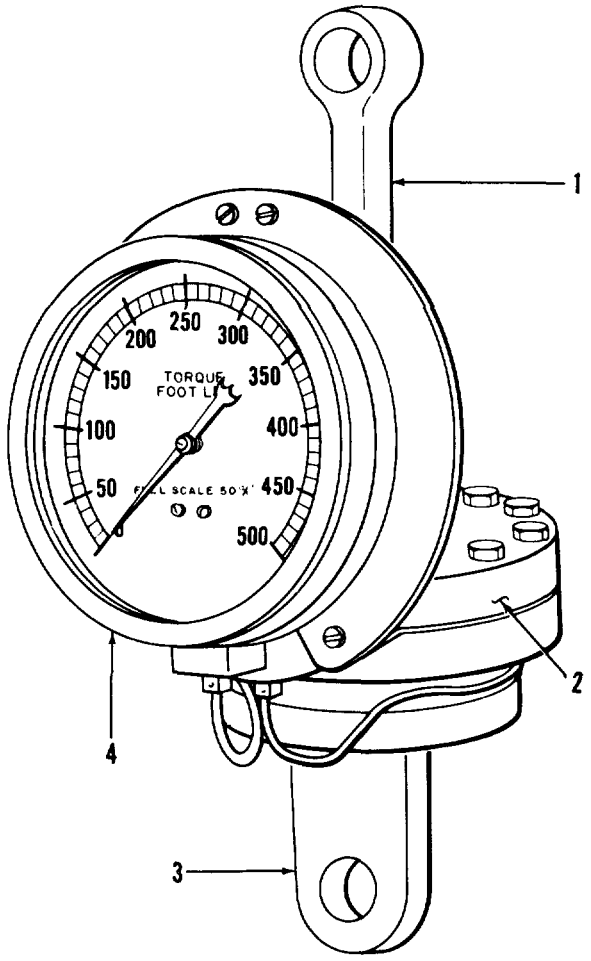
Clean the starter torque tester and accessories with dry cleaning solvent, Federal Specification P-D-680. No other servicing is required.

11. INSTALLATION OF SEPARATELY PACKED COMPONENTS

a. Torquemeters. Three torquemeters (fig. 4) are provided for the starter torque tester. The torquemeters are packed separately to protect them from possible damage. The three torquemeters are similar in construction and operating principle and vary only in their operating range. Each torquemeter operates in compression; consequently, it is placed on the right-hand carrying arm to test a starter for right-hand rotation, and on the left-hand carrying arm to test for left-hand rotation. Install the torquemeter as follows:

(1) Place torquemeter (13, fig. 5) in position on carrying arm (30) and base and frame assembly (31).

(2) Install upper pivot pin (15) through carrying arm (30) and end of torquemeter push rod (1, fig. 4).



1. PUSHROD
2. HYDRAULIC CAPSULE
3. MOUNTING SUPPORT
4. TORQUEINDICATOR

Figure 4. Torquemeter

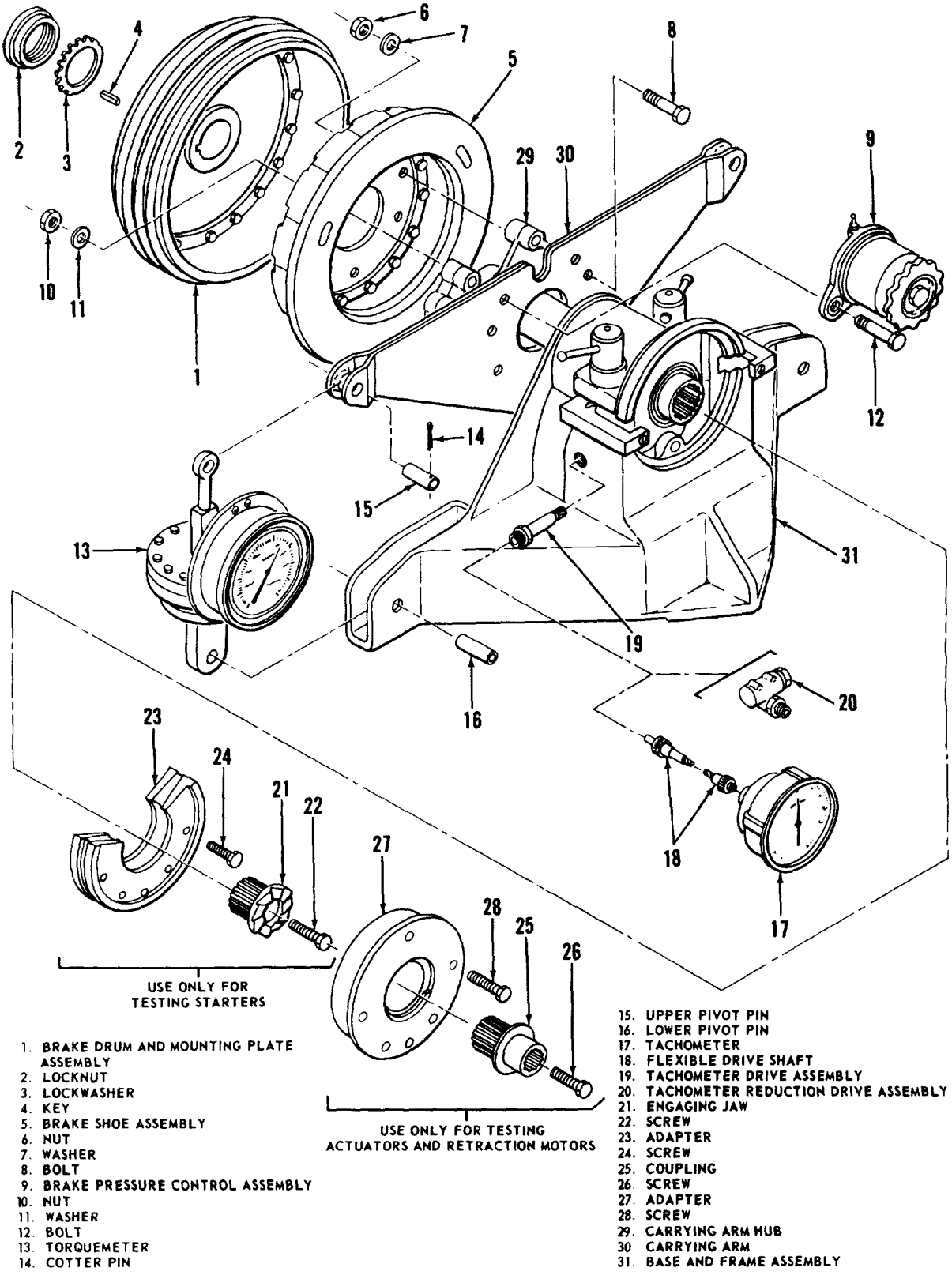


Figure 5. Starter Torque Tester (Exploded View)

(3) Install cotter pins (14, fig. 5) through each end of upper pivot pin (15).

(4) Install lower pivot pin (16) through base and frame assembly (31) and through mounting support (3, fig. 4) of torquemeter.

(5) Install cotter pins (14, fig. 5) through each end of lower pivot pin (16).

b. Tachometer. The tachometer (17, fig. 5) can be installed on either side of the test stand by interchanging the flexible drive shaft.

12. INSTALLATION OF STARTER TORQUE TESTER

Install the starter torque tester as follows:

a. Mount starter torque tester on a heavy bench or other firm structure using four mounting bolts.

b. Mount tachometer to bench or a suitable stand to prevent damage during operation of tester.

c. Connect power source wires to an external adjustable dc power supply, varying from 6 to 30 volts and capable of supplying 300 amperes continuously.

d. Connect flexible drive shaft (18, fig. 5) from tachometer to starter torque tester at tachometer drive assembly (19).

e. Ground starter torque tester to negative side of external power source.

***Note*: Testing actuators or retraction motors requires a different wiring setup from that shown for starters. See figures 6 and 7 for typical difference in wiring setup.**

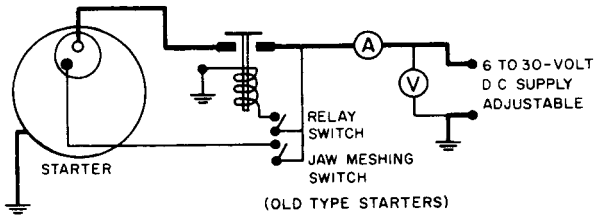


Figure 6. Typical Wiring Diagram for Testing Starters

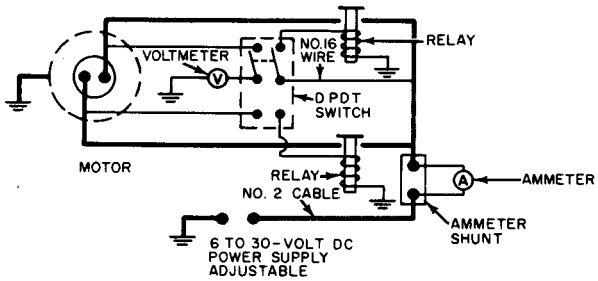


Figure 7. Typical Wiring Diagram for Testing Actuators

Section II. CONTROLS AND INSTRUMENTS

13. GENERAL

This section describes, locates, illustrates, and furnishes the operator or crew sufficient information pertaining to the controls provided for the proper operation of the starter torque tester. Careless operation or improper setting of the controls will cause damage to the equipment. For this reason, it is important to know the function of every control.

14. OPERATOR'S CONTROLS

The brake pressure control assembly (4, fig. 2) is located top center on the starter torque tester. Brake pressure is applied by turning the control cap on the brake pressure control assembly. Turning the cap clockwise will apply pressure to the brake; turning the cap counterclockwise will release the brake.

15. OPERATOR'S INSTRUMENTS

a. Torquemeter. A torquemeter (11, fig. 2) is attached between either the right or left carrying arm (1) of the starter torque tester and the base and frame assembly (9). The location depends on whether the starter being tested has left-hand or right-hand rotation. The torquemeter measures the torque of the starter in foot-pounds. Three torquemeter assemblies with different ranges are provided for testing starters, actuators, or retraction motors.

b. Tachometer. The tachometer (4, fig. 8) is mounted to the bench or a suitable stand. The tachometer indicates the rotational speed of the starter jaw in either clockwise or counterclockwise direction. The tachometer can be connected directly on the starter torque tester for speeds up to 150 rpm; for higher speeds, however, the tachometer reduction drive assembly (3) supplied with the starter torque tester must be used.

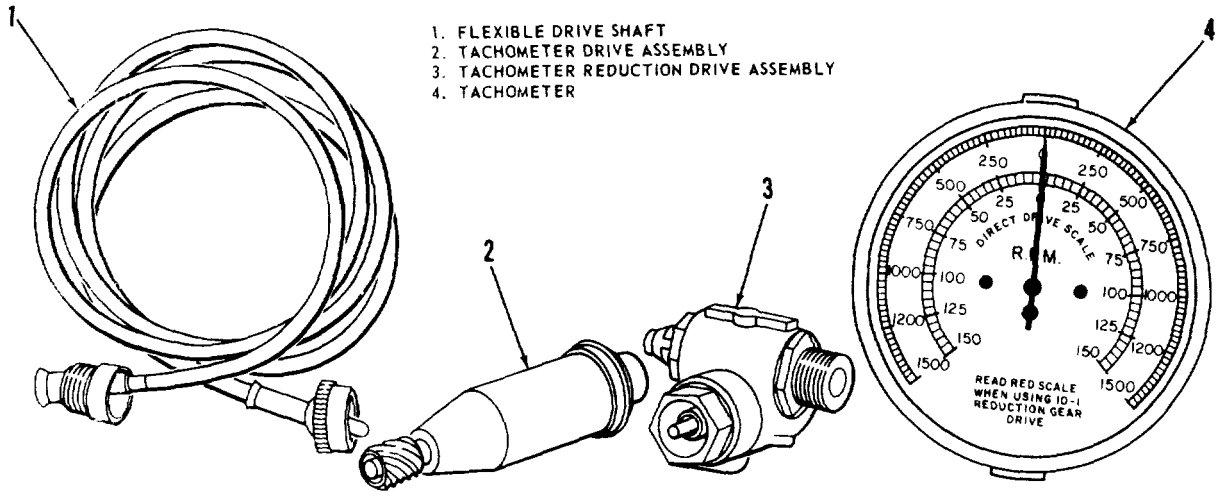


Figure 8. Tachometer and Accessories

Section III. OPERATION UNDER USUAL CONDITIONS

16. GENERAL

a. This section gives instructions on preparations to be made before starting, operating, and stopping the starter torque tester. It also gives the basic capabilities of the equipment and coordinates these capabilities to the specific tasks for which the equipment is designed.

b. It is essential that the operator know how to perform every operation that the starter torque tester is capable of accomplishing. Since many jobs present different problems, it may be necessary that the operator vary the given procedures to fit the assignment.

17. PREPARATION BEFORE STARTING STARTER TORQUE TESTER

The following steps should be accomplished before starting the starter torque tester:

a. Examine engaging jaw of starter to be tested and determine size, direction of rotation, and number of teeth.

b. From supply of starter engaging jaws (fig. 9) supplied with starter torque tester, select an engaging jaw of starter to be tested.

c. Install engaging jaw (21, fig. 5) on starter torque tester. *d*. Install mounting pad adapter (23) on starter torque tester. (See fig. 10 for difference in mounting pad adapters.)

e. Mount starter to be tested on starter torque tester and lock mounting clamps (7, fig. 2) with cam shafts (5).

f. Connect external power source to starter (fig. 11).

g. Ascertain that starter jaw is fully retracted and clears starter torque tester engaging jaw (21, fig. 5).

h. Visually inspect starter torque tester for loose connections and security of all components and accessories.

18. STARTING AND OPERATING THE STARTER TORQUE TESTER

a. Install a starter known to be serviceable on starter torque tester as outlined in preceding paragraph 17.

b. Apply a small amount of hydraulic pressure to brake assembly by turning control cap located on brake pressure control assembly (4, fig. 2)

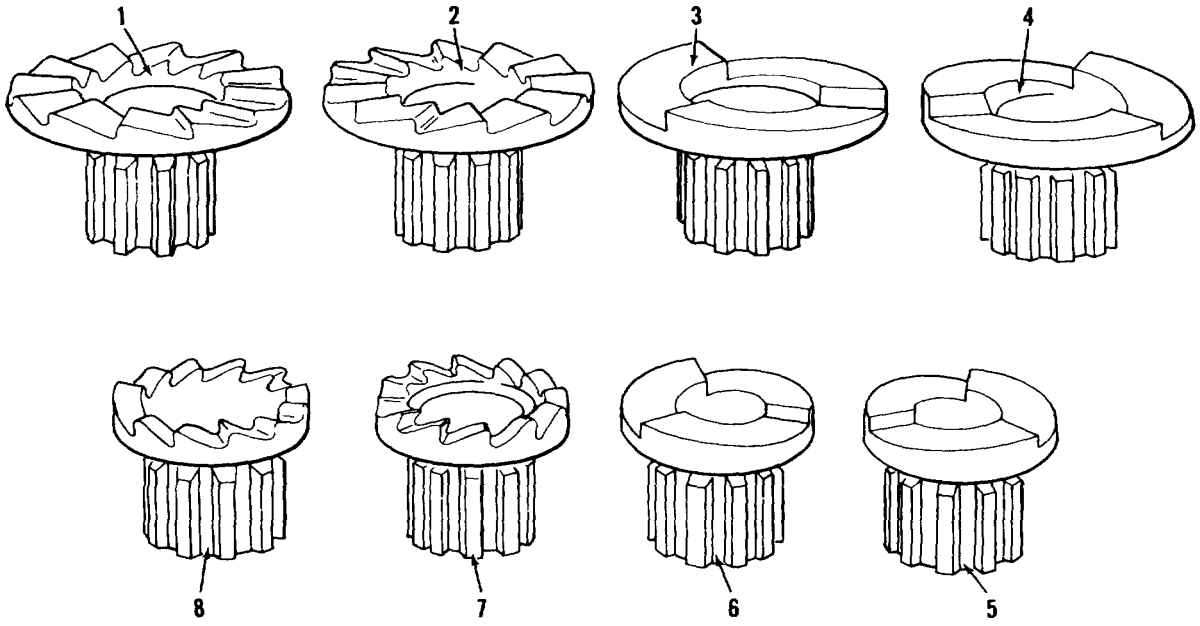


Figure 9. Starter Engaging Jaws

clockwise. This will prevent over-speeding of starter being tested.

c. Switch external power source on. This energizes starter, causing starter jaw to engage jaw of starter torque tester.

d. Increase speed of starter torque tester to break away rpm designated in applicable technical manual for starter being tested. Make sure starter breaks away from starter torque tester when tachometer (10) reads designated rpm.

e. Increase current applied to starter until tachometer reaches rpm designated in applicable technical manual for starter being tested to perform slippage test. Apply braking pressure by turning control cap located on brake pressure control assembly (4) and note that starter begins to slip when torquemeter (11) reads specified braking pressure for starter being tested.

f. Increase voltage to starter by means of variable resistor and decrease braking pressure by turning control cap on brake pressure control assembly (4) counterclockwise. This check is to make sure starter torque tester will reach specified rpm and current output designated in applicable technical manual for starter being tested.

19. STOPPING OPERATIONS

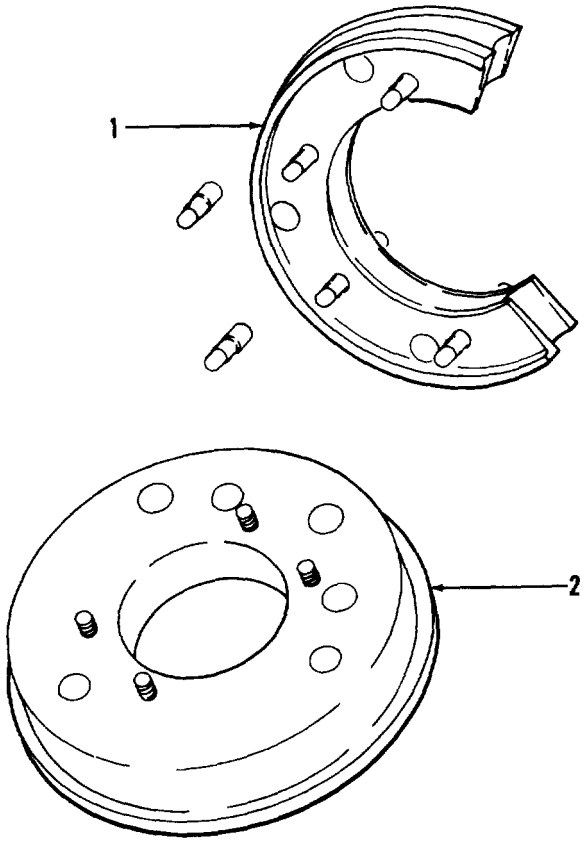
Stopping operations consist of switching external power source off and releasing brake pressure by turning control cap located on brake pressure control assembly (4, fig. 2) counterclockwise.

20. EQUIPMENT HANDLING

a. Exercise extreme care in unpacking and handling instruments and other accessories of starter torque tester.

b. If an instrument is dropped, thoroughly check and test before use.

> ***Caution*: The tachometer will be damaged if the gear reduction unit is not used when testing starters or actuators with output shaft speeds over 150 rpm.**



1. STARTER MOUNTING PAD
2. ACTUATOR MOUNTING PAD

Figure 10. Mounting Pad Adapters

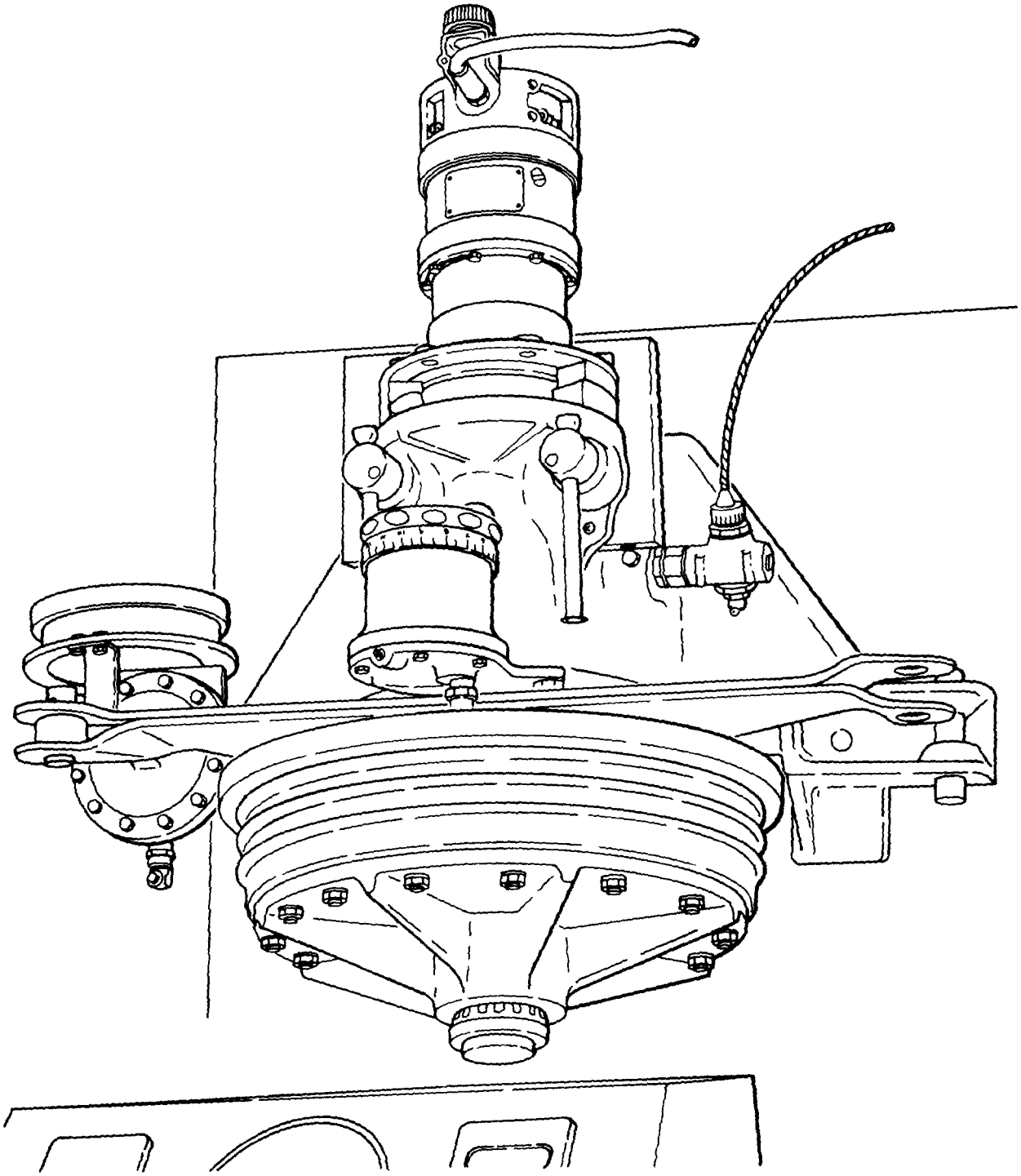


Figure 11. Starter Torque Tester (Starter Mounted for Testing)

Section IV. OPERATION OF COMPONENTS USED IN CONJUNCTION WITH MAJOR END ITEM

21. GENERAL

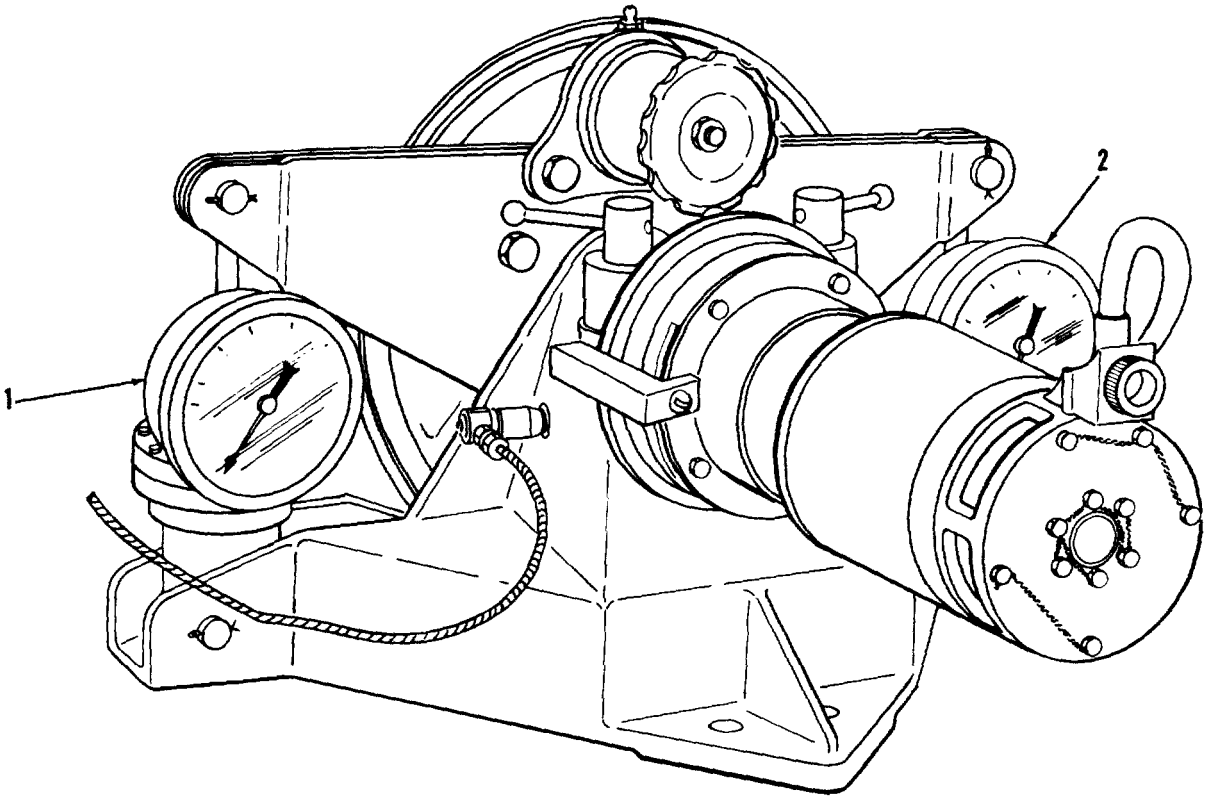
The main purpose of the starter torque tester is to test the torque and speed of starters. The tester is also equipped with suitable accessories and mounting adapters to be used for testing actuators and retraction motors.

22. ACCESSORIES

a. Torquemeters (Low Reading). For testing actuators and retraction motors, replace the high reading torquemeter used for testing starters with two low reading torquemeters (1 and 2, fig. 12). The two low reading torquemeters, one on each carrying arm, will permit reading the torque for either direction of rotation.

b. Couplings. When testing actuators and retraction motors, drive couplings (fig. 13) replace the standard jaws supplied with the starter torque tester. These couplings are splined to mate with the internal drive splines of the tester and actuator shafts.

c. Tachometer Reduction Drive Assembly. The tachometer reduction drive assembly (20, fig. 5) has a gear reduction ratio of 10 to 1 and is used when testing high speed units or starters with special gearing such as Jack and Heintz JH6P, JH6PS, and JH6PK. The tachometer reduction drive assembly is connected to the flexible drive shaft (18)of the tachometer and to the shaft of the starter torque tester.



1. TORQUEMETER
2. TORQUEMETER

Figure 12. Starter Torque Tester (Actuator Mounted for Testing)

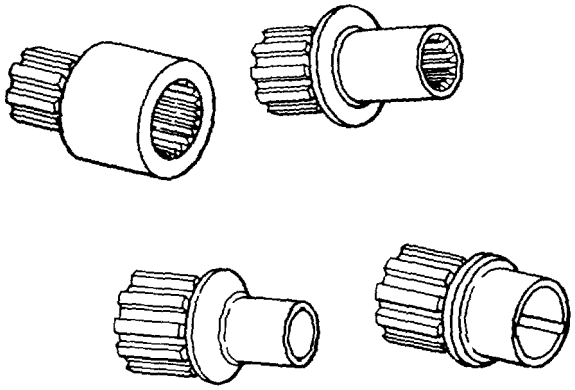


Figure 13. Drive Couplings

23. MOUNTING ADAPTERS

The mounting adapters (23 and 27, fig. 5) are used for the starter or actuator to be mounted on. The adapter is attached to the starter torque tester frame with two socket head screws (24 or 28). The adapter has pins or studs which the starter or actuator mounts on. The starter or actuator is held in position on the adapter by two quick-acting, self-positioning mounting clamps (7, fig. 2). The mounting clamps are actuated by cam shafts (5) and have adjusting screws to insure that the best locking position on the cam shafts is utilized. The mounting clamps are locked in position or released by means of the two cam shafts.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND EQUIPMENT

24. SPECIAL TOOLS AND EQUIPMENT

No special tools or equipment are needed by the operator or organizational maintenance personnel for maintaining the starter torque tester.

25. ORGANIZATIONAL MAINTENANCE REPAIR PARTS

Organizational maintenance repair parts are listed in Appendix III of this manual.

Section II. LUBRICATION

26. GENERAL LUBRICATION INFORMATION

The entire starter torque tester is so constructed that only a minimum amount of lubrication is required.

27. DETAILED LUBRICATION INFORMATION

An oil wick, in each of the cam shafts, supplies all bearing surfaces with sufficient lubrication and simply requires saturation with medium machine oil, Federal Specification VV-0-526 (fig. 14). A few drops of lubricating oil, Military Specification MIL-0-11773, should be applied occasionally at the point where the pushrod enters the torquemeter.

Occasionally apply a light coat of grease, Military Specification MIL-G-7711, to flexible drive shaft (18, fig. 5).

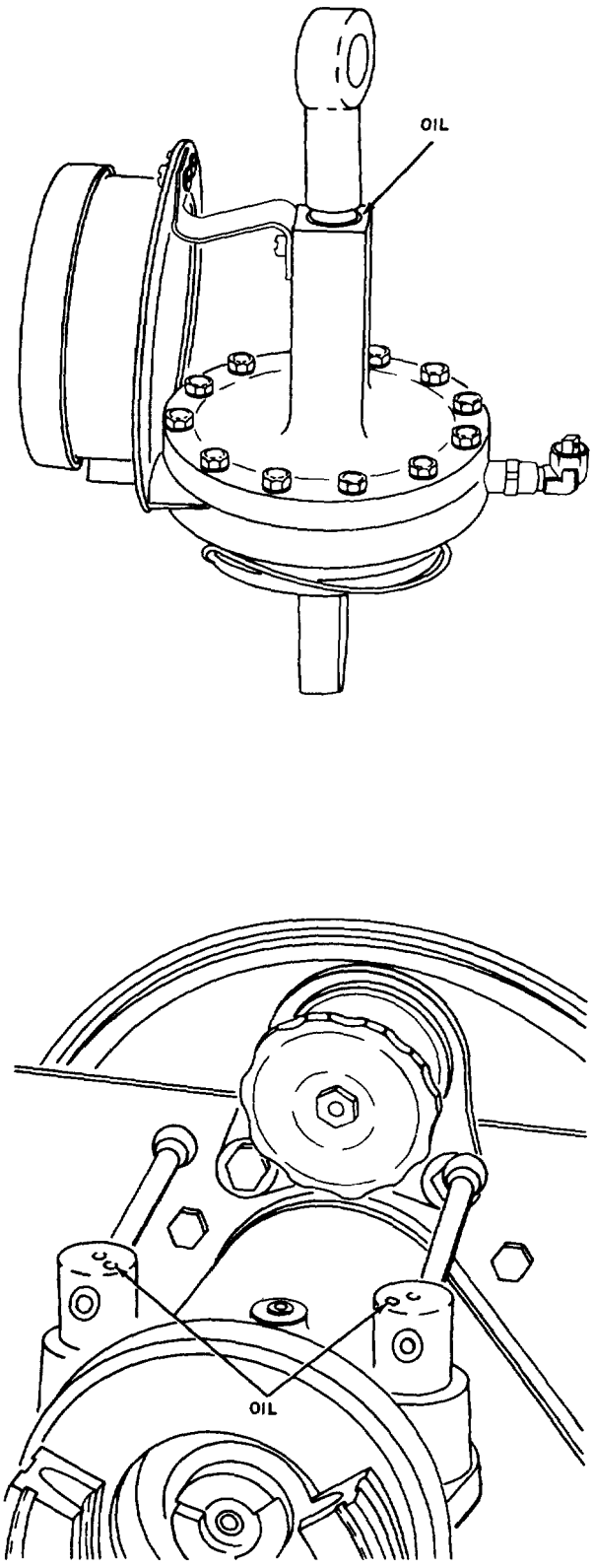


Figure 14. Points o/ Lubrication

Section III. PREVENTIVE MAINTENANCE SERVICES

28. GENERAL

To insure that the starter torque tester is in operational readiness at all times, it must be systematically inspected so defects may be discovered and corrected before resulting in serious damage to, or failure of, the equipment. Systematic preventive maintenance services are based on scheduled inspections and services to be accomplished by operators and organizational personnel. The maintenance inspections will be recorded in accordance with procedures outlined in the equipment inspection and maintenance worksheets listed in paragraph 2. Each form covers a specific inspection period, providing a system of progressive maintenance. These forms are available through normal supply channels.

29. OPERATIONAL PREVENTIVE MAINTENANCE SERVICES

The operational preventive maintenance services are performed before operation, during operation, and after operation. These maintenance services and inspections are listed in the operator's daily preventive maintenance chart.

> ***Caution*: Stop operation immediately if a defect that could cause damage to the equipment by continuing operations is noted.**

Operator's Daily Preventive Maintenance Chart

Procedures	Reference Applicable to Each Item
BEFORE OPERATION	
Inspect tachometer and torquemeter for cracked face.	(10 and 11, fig. 2)
Inspect brake pressure control assembly for leaks.	(4, fig. 2)
Inspect all adapters, couplings, jaws, and other accessories for excessive wear, breaks, and chips.	para 38*a*.
DURING OPERATION	
Inspect all gages for proper function.	para 36 and 37
Inspect all hydraulic couplings for leaks.	para 34
AFTER OPERATION	
Inspect entire assembly for signs of hydraulic leaks.	

30. ORGANIZATIONAL PREVENTIVE MAINTENANCE SERVICES

Preventive maintenance procedures are performed by organizational maintenance personnel periodically. The weekly interval will be equivalent to a maximum of 50 hours of operation. The monthly interval will be equivalent to 4 weeks or a maximum of 250 hours of operation, whichever occurs first. These maintenance services and inspections are listed in the organizational preventive maintenance chart.

Organizational Preventive Maintenance Chart (Sheet 1 of 2)

Procedures	Reference Applicable to Each Item
DAILY	
Inspect hydraulic fluid in brake pressure control assembly for cleanliness and refill as required.	paras 34a.
Inspect mounting clamp for signs of wear.	(7, fig. 2)

Organizational Preventive Maintenance Chart (Sheet 2 of 2)

Procedures	Reference Applicable to Each Item
	WEEKLY
Inspect all parts to ascertain that they are in good mechanical condition and that all nuts and bolts are tight.	
Saturate oil wick in each of the cam shafts with medium machine oil, Federal Specification VV-0-526. Apply a few drops of lubricating oil, Military Specification MIL-0-11773, at the point where the pushrod enters the torquemeter.	para 27
	MONTHLY
Drain and fill brake pressure control assembly with hydraulic fluid, Military Specification MIL-H-5606.	para 34*a.*
	QUARTERLY
Inspect brake assembly for wear	para 33*b.*
	SEMIANNUAL
Inspect the flexible drive shaft for lack of lubrication and apply a light coat of grease, Military Specification MIL-G-7711.	para 32

Section IV. TROUBLESHOOTING

31. GENERAL

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the starter torque tester and its components. Each trouble symptom stated is followed by a list of probable causes of trouble. The possible remedy recommended is described opposite the probable cause. Any operational trouble that is beyond the scope of organizational maintenance must be reported to the next higher echelon as applicable.

32. TACHOMETER NEEDLE TENDS TO OSCILLATE RAPIDLY

Probable Cause	Possible Remedy
Flexible drive shaft (18, Fig. 5) binding	Apply a light coat of grease, Military Specification MIL-G-7711, to the flexible drive shaft (para 27).

Section V. ORGANIZATIONAL MAINTENANCE REPAIR INSTRUCTIONS

33. BRAKE ASSEMBLY

A standard aircraft type hydraulic brake is used on the starter torque tester to absorb the braking load. The brake drum and mounting plate assembly (1, fig. 5) is securely attached to the drive shaft of the starter torque tester while the brake shoe assembly (5) rides free on the same shaft on a bearing. The brake shoe assembly is attached to the steel carrying arm (30) extending to the right and left of the drive shaft.

a. Cleaning. Clean exterior of all parts of brake assembly with dry cleaning solvent, Federal Specification P-D-680.

b. Inspection. Inspect all parts for excessive wear or other damage. Inspect brake drum mounting bolts for security.

34. BRAKE PRESSURE CONTROL ASSEMBLY

A screw-type brake pressure control assembly (9, fig. 5) is conveniently mounted on the carrying arm (30) and to the brake assembly. The purpose of the brake pressure control assembly is to vary the brake loading. Turning the control cap on the brake pressure control assembly clockwise operates a plunger which compresses a bellows containing hydraulic fluid. The compressed fluid flows through a hydraulic line to the brake shoe assembly (5) and applies equal pressure to the brake shoes. Index marks and numbers on the control cap enable the operator to make quick adjustments for different or repetitive loads. A plug is incorporated on the brake pressure control assembly for filling or bleeding the hydraulic system.

a. Servicing. Drain and fill the brake pressure control assembly as follows:

(1) Open lower plug on brake pressure control assembly and allow hydraulic fluid to drain (fig. 15).

(2) Close lower plug on brake pressure control assembly and open upper plug and fill with clean hydraulic fluid, Military Specification MIL-H-5606.

b. Adjustments. There are no adjustments necessary on the brake pressure control assembly.

c. Inspection. Inspect brake pressure control assembly for security and hydraulic leaks.

35. GAGES

Two types of gages are supplied with the starter torque tester. A torquemeter (11, fig. 2) for checking the clutch setting(holding torque) and a tachometer (10) for checking the cranking speed of the starter jaw. The torquemeter is mounted on the right carrying arm of the starter torque tester when testing starters with right-hand rotation and mounted on the left carrying arm for testing starters with left-hand rotation. The tachometer indicates the speed of the starter jaw in either clockwise or counterclockwise direction.

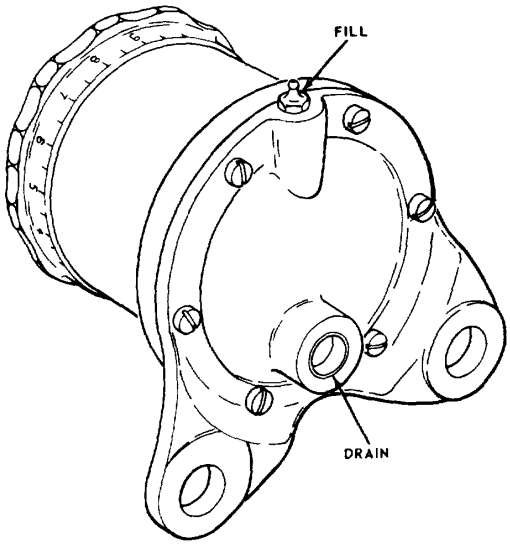


Figure 15. Brake Pressure Control Assembly

36. TORQUEMETER

For convenience of operation and in order to perform all tests for which the starter torque tester was designed, three torquemeter assemblies are provided. The three instruments are similar in construction and operating principle and vary only in their operating range. One has a range of 0 to 150 foot-pounds in increments of 2 foot-pounds. The second torquemeter has a range of 0 to 500 foot-pounds in increments of 10 foot-pounds. The third torquemeter has a range of 0 to 1500 foot-pounds in increments of 20 foot-pounds. To facilitate quick position change, the torquemeter is anchored to the carrying arm and the base with two pivot pins secured with cotter pins.

> ***Caution*: When testing starters, the high range (O to 1500 foot-pounds) torquemeter must be used. However, when testing actuators or retraction motors which have comparatively low torque, the high range torquemeter must be replaced with a low range torquemeter**

a. Cleaning. Clean exterior of torquemeter, including glass cover, with dry cleaning solvent, Federal Specification P-D680.

b. Inspection. Inspect torquemeter for chipped or cracked glass cover, loose or bent indicator hand, and leaks in the integral hydraulic system.

> ***Note:* The torquemeter is a sealed unit which does not permit any servicing in the field and must be returned to the factory in the event of failure.**

37. TACHOMETER

The tachometer can be driven from either side of the starter torque tester by interchanging the flexible drive shaft. The tachometer indicates the rotational speed of the starter drive shaft jaw in either direction. Two scales are provided on the tachometer, 0 to 150 rpm and 0 to 600 rpm. The tachometer is driven by a 5-foot flexible drive shaft which is attached to the tachometer drive assembly which meshes with a helical gear on the starter torque tester drive shaft.

a. Servicing. There is no service required for the tachometer.

b. Inspection. Inspect the tachometer for chipped or cracked glass cover, loose or bent indicator hand, and scale markings for clarity.

c. Removal. Removal of the tachometer is accomplished by disconnecting the tachometer adapter.

d. Installation. Refer to paragraph lb.

38. ADAPTER PADS AND JAWS

The starter torque tester is equipped with a standard mounting pad adapter (23, fig. 5) which is reversible to accommodate starters having either a 5- or 5-3/4 inch diameter bolt circle mounting flange. The adapter is easily reversed by removing the socket head screws (24) securing it to the frame. The top section of the adapter is cut away so that the clutch adjusting wrenches, part No. BT320-285 and BT320-287 (fig. 16), can be inserted to adjust the clutch setting on Eclipse-type starters and view the jaw engagement without removing the Figure 16. Clutch Adjusting Wrenches

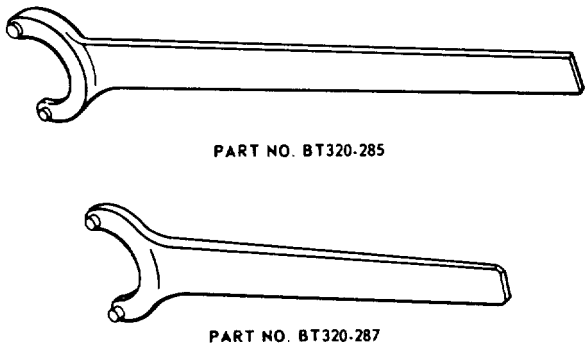


Figure 16. Clutch Adjusting Wrenches

starter from the tester. These jaws include all those required for performing all tests for which the starter torque tester was designed. The set includes engaging jaws to engage starters having large or small, right or left, 3 or 12 tooth jaws.

a. Inspection. Inspect adapter pad and jaws as follows:

(1) Visually examine studs of adapter pad for excessive wear and correct alignment.

(2) Inspect teeth and splines of jaws for breaks, chips, and wear.

b. Removal. Remove attaching socket head screws (22 and 24, fig. 5) to remove adapter pad and engaging jaw (21).

c. Installation. Secure adapter pad and engaging jaw (21) to starter torque tester with attaching socket head screws (22 and 24).

CHAPTER 4
DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE INSTRUCTONS

Section I. SPECIAL TOOLS AND EQUIPMENT

39. SPECIAL TOOLS AND EQUIPMENT

No special tools or equipment are required to perform the repair and overhaul operations on the starter torque tester and its accessories.

40. DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE REPAIR PARTS

Repair parts needed to repair and overhaul the starter torque tester are listed in Appendix III of this manual.

Section II. TROUBLESHOOTING

41. GENERAL

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the starter torque tester or any of its components. Each trouble symptom is followed by a list of probable causes of trouble. The possible remedy recommended is described opposite the probable cause.

42. TACHOMETER NEEDLE TENDS TO OSCILLATE RAPIDLY

Probable Cause	Possible Remedy
Brake drum and mounting plate assembly (1, fig. 5) scored.	Replace brake drum and mounting plate assembly and brake shoe assembly (para 33).

43. TORQUEMETER INOPERATIVE

Probable Cause	Possible Remedy
Ruptured diaphragm	Replace torquemeter (paras 45).

44. BRAKE PRESSURE CONTROL ASSEMBLY INOPERATIVE

Probable Cause	Possible Remedy
Ruptured bellows.	Replace brake pressure control assembly (para 47).

Section III. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

45. TORQUEMETER

a. Removal.

(1) Remove cotter pins (14, fig. 5) from upper pivot pin (15) and lower pivot pin (16).

(2) Remove upper pivot pin (15) and lower pivot pin (16) from carrying arm (30). Remove torquemeter (13).

b. Installation. Refer to paragraph 11a.

46. BRAKE ASSEMBLY

a. Removal.

(1) Remove locknut (2, fig. 5), lockwasher (3), and keys (4) from shaft of base and frame assembly (31). Pull brake drum and mounting plate assembly (1) from flexible drive shaft (18).

(2) Disconnect hydraulic line at brake pressure control assembly (9).

(3) Remove nuts (6 and 10), washers (7 and 11), and bolts (8 and 12) securing brake shoe assembly (5) to carrying arm (30). Remove brake shoe assembly.

b. Installation.

(1) Position brake shoe assembly (5) on carrying arm (30). Secure in place with bolts (8 and 12), washers (7 and 11), and nuts (6 and 10).

(2) Connect hydraulic line to brake pressure control assembly (9).

(3) Position brake drum and mounting plate assembly (1) on drive shaft and over brake shoe assembly (5). Secure in place with keys (4), lockwasher (3), and locknut (2).

47. BRAKE PRESSURE CONTROL ASSEMBLY

a. Removal.

(1) Perform procedures outlined in paragraph 46a.(1) and (2).

(2) Remove nuts (10, fig. 5), washers (11), and bolts (12).

(3) Remove brake pressure control assembly (9) from carrying arm (30).

b. Installation.

(1) Place brake pressure control assembly (9) on carrying arm (30) and secure in position with bolts (12), washers (11), and nuts (10).

(2) Perform procedures outlined in paragraph 46b.(2) and (3).

CHAPTER 5
DIRECT SUPPORT. GENERAL SUPPORT, AND DEPOT MAINTENANCE REPAIR INSTRUCTIONS

Section I. BRAKE ASSEMBLY

48. BRAKE ASSEMBLY DESCRIPTION

The brake assembly is composed of a brake drum and mounting plate assembly (1, fig. 5) and brake shoe assembly (5). The brake drum and mounting plate assembly is attached to the drive shaft and the brake shoe assembly is attached to the steel carrying arm (30). The brake assembly can absorb up to 7 horsepower within the specified speed limits.

49. BRAKE ASSEMBLY REMOVAL

Refer to paragraph 46a. for removal of the brake assembly.

50. BRAKE ASSEMBLY CLEANING, INSPECTION, AND REPAIR

a. Cleaning. Clean all foreign matter from metal parts of the brake assembly using a cloth moistened with dry cleaning solvent, Federal Specification P-D-680.

> ***Note*: Prevent brake drum and mounting plate assembly (1, fig. 5) and brake shoe assembly (5) from coming in contact with oil during cleaning as oil on either assembly will cause the brake to grab during operation and thus give an incorrect reading for the unit being tested.**

b. Inspection and Repair.

(1) Inspect brake drum and mounting plate assembly (1, fig. 5) for scoring and cracks.

(2) Inspect all threaded parts for burrs and stripped threads.

(3) Inspect brake shoe assembly (5) for crystallized brake shoes and cracks.

> ***Note*: No repair will be performed on any parts of the brake assembly. Any defective part within an assembly necessitates replacement of that assembly.**

51. BRAKE ASSEMBLY INSTALLATION

Refer to paragraph 46b. for installation of the brake assembly.

Section II. BRAKE PRESSURE CONTROL ASSEMBLY

52. BRAKE PRESSURE CONTROL ASSEMBLY DESCRIPTION

The brake pressure control assembly (9, fig. 5) is a hydraulic reservoir which supplies hydraulic pressure to the brake shoe assembly (5). Brake pressure is increased by turning the control cap, located on the brake pressure control assembly, clockwise and is decreased by turning it counterclockwise. A plug is incorporated on the brake pressure control assembly for filling and bleeding the hydraulic reservoir and hydraulic lines.

53. BRAKE PRESSURE CONTROL ASSEMBLY REMOVAL

Refer to paragraph 47a. for removal of the brake pressure control assembly (9, fig. 5).

54. BRAKE PRESSURE CONTROL ASSEMBLY INSTALLATION

Refer to paragraph 47b. for installation of the brake pressure control assembly (9, fig. 5).

55. BRAKE PRESSURE CONTROL ASSEMBLY TESTING

Test brake pressure control assembly (9, fig. 5) by installing a starter, actuator, or retraction motor known to be serviceable and test unit in accordance with the applicable handbook of instructions for the particular unit being tested. During testing, note that sufficient brake pressure as specified in the applicable handbook of instructions for the unit being tested can be obtained. If sufficient brake pressure cannot be obtained, add more hydraulic fluid, Military Specification MIL-H-5606. If sufficient brake pressure still cannot be obtained, the brake pressure control assembly is damaged and will be replaced.

Section III. TORQUEMETER

56. TORQUEMETER DESCRIPTION

The torquemeter (13, fig. 5) indicates amount of holding torque, in foot-pounds, applied to unit being tested. Its measuring device is a hydraulic capsule connected to a torque indicator using a Bourdon tube-type pressure unit. The hermetically sealed hydraulic system of the torquemeter contains specially designed self-damping features which eliminate chatter and permit accurate readings.

57. TORQUEMETER REMOVAL

Refer to paragraph 45*a*. for removal of the torquemeter (13, fig. 5).

58. TORQUEMETER CLEANING, INSPECTION, AND REPAIR

a. Cleaning. Refer to paragraph 36*a*. for cleaning of the torquemeter (13, fig. 5).

b. Inspection and Repair.

(1) Refer to paragraph 36*b*. for inspection of the torquemeter (13).

(2) No repair will be performed on parts of the torquemeter (13). The torquemeter will be replaced with a serviceable one if any defect is found.

.

59. TORQUEMETER INSTALLATION

Refer to paragraph 11*a* for installation of the torquemeter (13, fig. 5).

60. TORQUEMETER TESTING

Inasmuch as the torquemeter (11, fig. 2) reads directly in foot-pounds and the torque arm is 1 foot long, the torquemeter can be checked for calibration by releasing brake pressure and applying a known weight at a point immediately above the pushrod (1, fig. 4). For example, a 200-pound weight should register 200 foot-pounds on dial of tachometer.

CHAPTER 6
SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE

Section I. DOMESTIC SHIPMENT

61. PREPARATION OF EQUIPMENT FOR SHIPMENT

a. Inspection. When preparing the starter torque tester for domestic shipment, visually inspect all component parts and assemblies to determine their condition. Correct any discrepancies found prior to packing equipment for shipment.

b. Preservation.

(1) Remove all foreign matter from starter torque tester and its accessories using a cloth moistened with dry cleaning solvent, Federal Specification P-D-680.

(2) Drain and refill brake pressure control assembly (9, fig. 5) as outlined in paragraph 34a.

(3) Remove tachometer (17) as outlined in paragraph 37c and torquemeter (13) as outlined in paragraph 45a.

(4) Coat all exposed metal surfaces of tachometer (17) and torquemeter (13) with corrosion preventive compound, Military Specification MIL-C-11796.

(5) Wrap tachometer (17)and torquemeter (13) in separate pieces of vaporproof barrier material, Military Specification MIL-B-131, and secure with pressure sensitive tape, Federal Specification PPP-T-60.

(6) Place tachometer (17) and torquemeter (13) in their original shipping containers along with a small bag of activated desiccant, Military Specification MIL-D-3464, and a humidity indicator conforming to Military Standard MS20003.

(7) Install packing around tachometer (17) and torquemeter (13) to prevent movement during shipment.

(8) Seal shipping container.

(9) Coat all unattached jaws (fig. 9), adapters (fig. 10), and couplings (fig. 13) with corrosion preventive compound, Military Specification MIL-C-11796. 24 (10) Wrap jaws, adapters, and couplings within separate pieces of vaporproof barrier material, Military Specification MIL-B-131, and secure with pressure sensitive tape, Federal Specification PPP-T-60.

(11) Place jaws, adapters, and couplings in their original shipping container along with a small bag of activated desiccant, Military Specification MIL-D-3464, and a humidity indicator conforming to Military Standard MS20003.

(12) Install packing around jaws, adapters, and couplings to prevent movement during shipment.

(13) Seal shipping container.

(14) The remaining parts of the starter torque tester will be preserved and packed in accordance with Military Specification MIL-P-116, Method 11. The starter torque tester is enclosed in a metal foil bag along with bags of activated desiccant, Military Specification MIL-D-3464, and a humidity indicator conforming to Military Standard MS20003. Air in the metal foil bag in evacuated and the bag is then heat-sealed. The starter torque tester is then bolted in a wooden crate.

(15) Place tachometer (17, fig. 5), torquemeter (13), jaws (fig. 9), adapters (fig. 10), and couplings (fig. 13) in the wooden crate and secure in place so they will not puncture the airtight metal foil bag during shipment. Install and secure lid on crate.

62. LOADING EQUIPMENT FOR SHIPMENT

Loading of the starter torque tester for shipment within the continental United States will be performed using the following procedures.

a. Lift crated starter torque tester, maintaining it in a normal upright position at all times,

onto its carrier by means of a fork lift, sling hoist, or by hand.

***Warning*: Do not allow starter torque tester to become overbalanced during loading operations or damage to the equipment or injury to personnel may occur.**

b. Secure starter torque tester firmly to its carrier to prevent movement during shipment.

***Warning*: Make certain starter torque tester is firmly secured to carrier, as movement during shipment may cause the starter torque tester to be damaged, injury or death to personnel on the carrier, or damage to the carrier.**

Section II. LIMITED STORAGE

63. PREPARATION OF EQUIPMENT FOR LIMITED STORAGE

Limited storage is defined as periods up to 6 months.

a. Inspection. When preparing starter torque tester for limited storage, visually inspect all component parts and assemblies to determine their condition. Correct any discrepancies found prior to placing equipment in limited storage.

b. Preservation. Drape starter torque tester with canvas or other suitable water repellent material.

64. INSPECTION AND MAINTENANCE OF EQUIPMENT IN STORAGE

Visual inspection of the starter torque tester will be performed every 30 days or at any other time deemed necessary by the maintenance officer of the unit to which the starter torque tester is assigned to ascertain that the equipment is adequately protected against corrosion and rust. Any maintenance necessary to prevent deterioration of the equipment shall be performed.

Section III. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

65. GENERAL

This section includes detailed methods for destroying the starter torque tester to prevent its use by the enemy when it is in danger of imminent capture.

66. DECISION TO DESTROY STARTER TORQUE TESTER

When the starter torque tester is in imminent danger of capture or abandonment to the enemy, the responsible unit commander must make the decision either to destroy or render the equipment inoperative. Regardless of methods employed, it is essential to destroy the same vital parts of all starter torque testers to prevent repair by cannibalization.

67. DEMOLITION TO RENDER THE STARTER TORQUE TESTER INOPERATIVE

Use sledge hammers, crowbars, picks, axes, or any other heavy tools which may be available to destroy the following:

a. Tachometer and torquemeter.

b. Pressure control assembly.

c. Adapters, pads, and jaws.

d. Brake drum assembly.

68. DEMOLITION BY EXPLOSIVES AND WEAPONS FIRE

a. Explosives. Place as many of the following charges as the situation permits, and detonate them simultaneously (fig. 17).

(1) Tape a 1-pound charge beneath brake drum and mounting plate assembly (fig. 17)

(2) Place a second 1-pound charge against drive shaft assembly, adjacent to mounting pad adapter (fig. 17).

b. Weapons Fire. Fire on starter torque tester with the heaviest weapons available.

69. DEMOLITION BY SUBMERSION

If the situation prohibits employing either of the preferred methods outlined in paragraph 68, totally

submerge the starter torque tester in a body of water to produce water damage and conceal the starter torque tester. Salt water will effect the greatest damage to metal parts.

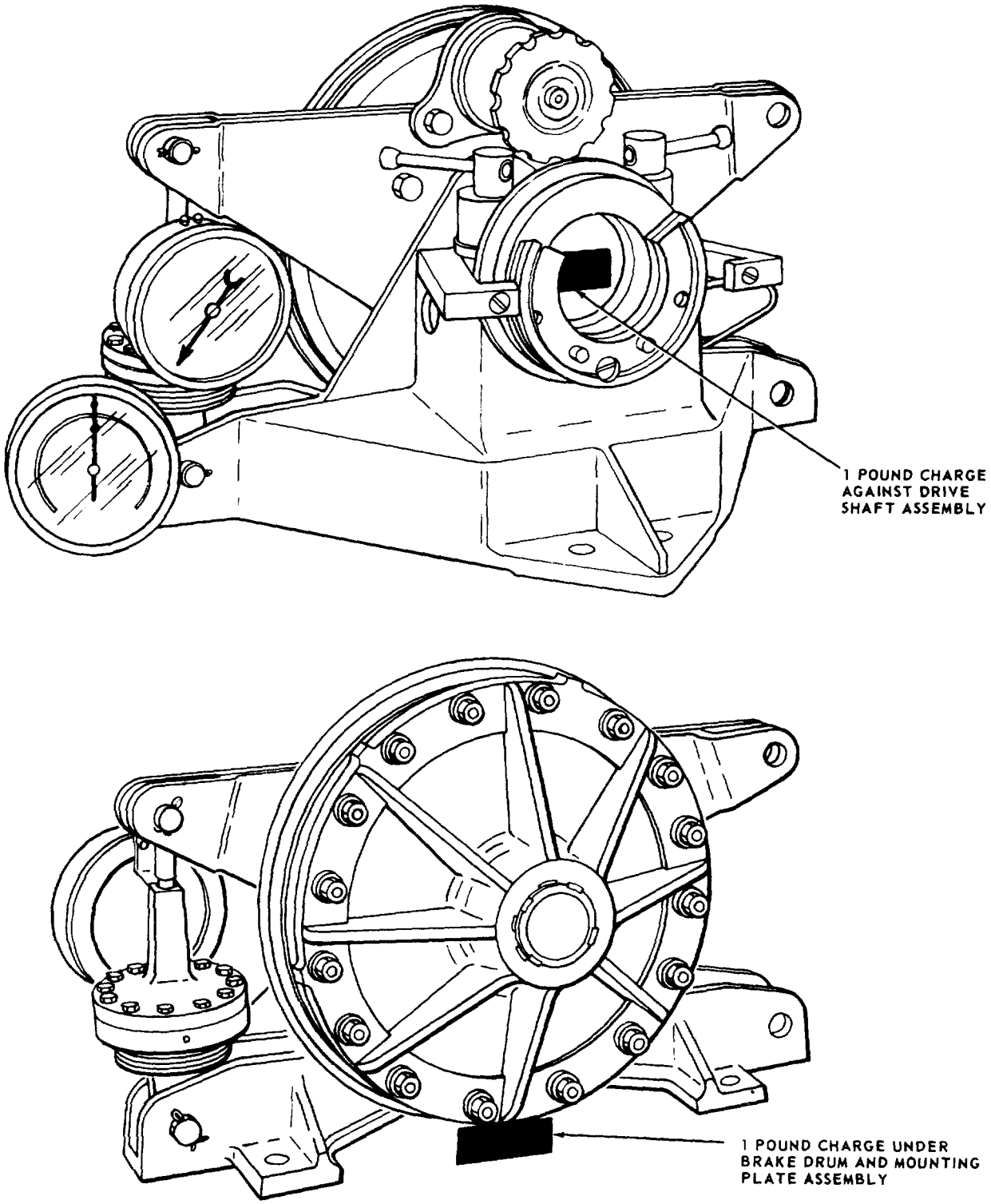


Figure 17. Placement o/ Explosive Charges

APPENDIX I
REFERENCES

1. Dictionaries of Terms and Abbreviations

AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes

2. Publication Indexes

DA PAM 310-1	Index of Administrative Publications
DA PAM 310-4	Index of Technical Manuals, Technical Bulletins, Lubrication Orders, and Modification Work Orders

3. Technical Manuals

TM 38-750	Army Equipment Record Procedures

4. Army Regulations

AR 700-17	Designation of Department of the Army Agents for Military Industrial Supplies
AR 700-18	Repair Parts Allocation and Allowances
AR 700-70	Parts Requirements, Procurement, Stockage, and Issue
AR 711-16	Installation Stock Control and Supply Procedures (Army Field Stock Control System)
AR 725-50	Requisitioning, Receipt, and Issue System
AR 735-35	Supply Procedure for TOE Units, Organization and NON-TOE Activities

5. Military Specifications

MIL-P-116	Methods of Preservation

APPENDIX II
MAINTENANCE ALLOCATION CHART

1. PURPOSE

The purpose of the maintenance allocation chart is to provide all activities with maintenance functions to be performed at each level of maintenance.

2. DEFINITIONS

a. Adjust. To regulate periodically to prevent malfunction.

b. Repair. To return to a serviceable condition within the scope of authorized tools, equipment, supplies, and personnel.

c. Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components to include necessary rigging and/or adjustment.

d. Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, weapons system, or components of a weapons system.

e. Symbol X. The symbol X placed in the appropriate column indicates the maintenance level responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Maintenance levels higher than the level marked by X are authorized to perform the indicated operation.

3. GENERAL

a. A maintenance function assigned to a maintenance level, which for any reason is beyond its capability, becomes the responsibility of the next higher maintenance level.

b. The authority to perform a maintenance function does not constitute authority to requisition or otherwise secure necessary repair parts as specified in current supply directives.

4. DEVIATIONS

a. Normally there will be no deviations from the assigned maintenance level. In cases of operational necessity, a maintenance function assigned to a maintenance level may, on a one-time basis and at request of the lower maintenance level, be authorized to the lower maintenance level by the maintenance officer of the level to which the function is assigned.

b. The furnishing of special tools, equipment, and the like, required by the lower maintenance level to perform this function, will be the responsibility of the level to which the function is assigned.

5. ADDITIONAL INFORMATION

a. Changes in the maintenance allocation chart will be based on continuing evaluation and analysis by responsible technical personnel and on Maintenance Request Forms DA 2407 received from field activities.

b. All maintenance prescribed herein will be performed in accordance with applicable publications.

c. In any instance of conflict with current tool and equipment lists or current supply manuals, this maintenance allocation chart will be the final authority. Each such instance should be promptly reported by Maintenance Request Form DA 2407.

MAINTENANCE ALLOCATION CHART
FOR
Tester, Starter Torque, FSN 4920-739-4584

(1) GROUP NO	(2) COMPONENT AND RELATED OPERATIONS	(3) OC	(4) O	(5) DS	(6) GS	(7) D	(8) TOOLS REQ'D	(9) REMARKS
1.0	General							
1.1	Complete Assembly							
	Service		X					
	Adjust		X					
	Inspect		X					
	Test			X				
	Replace			X				
2.0	Brake Assembly							
	Inspect		X					
	Replace			X				
2.1	Brake Pressure Control Assembly							
	Service		X					
	Adjust		X					
	Inspect		X					
	Test			X				
	Replace			X				
3.0	Gages							
	Inspect		X					
	Replace		X					
3.1	Torquemeter							
	Inspect		X					
	Test			X				
	Replace			X				
3.2	Tachometer							
	Service		X					
	Inspect		X					
	Replace		X					
4.0	Adapter Pads and Jaws							
	Inspect		X					
	Replace		X					

APPENDIX III
REPAIR PARTS AND SPECIAL TOOLS LISTS

SECTION I
INTRODUCTION

1. GENERAL

This appendix lists the repair parts and maintenance supplies authorized and required for organizational thru depot maintenance of the Tester, Starter Torque, Part No. RT320-200, FSN 4920-7394584. This is the authority to requisition. It supplements tables of equipment and allowance and other applicable authorization documents. The quantities of repair parts and special tools required to be on hand or on order at all times for performance of operator/crew organizational maintenance in units and/or organizations constitute a prescribed load which will be maintained in accordance with AR 735-35.

2. ARRANGEMENT

This appendix consists of four sections, as follows:

a. 1, Introduction.

b. 2, Illustrated Parts List. All repair parts are listed in disassembly order and indented when required to indicate relationship t,. the next higher assembly. Items appearing more than once in an assembly will be repeated to show relation to the illustration. Illustrations appear in the maintenance portion of this manual.

c. 3. Reference Publications. (Refer to Appendix I.)

d. 4, Cross-Reference Indices. This section is divided into two as follows:

(1) I, the alpha-numerical part number index, contains a listing of all part numbers appearing in the text pages of this manual. Cross-reference is made to figure and index number, Federal stock number, Federal supply code for manufacturer, and page number in order.

(2) II, Federal stock number cross-reference index, is arranged in numerical order by stock number. Cross-reference is made to figure and index number, part number, Federal supply code for manufacturer, and page number in order.

3. EXPLANATION OF COLUMNS

a. AMC Materiel Codes. Not applicable.

b. Source Codes. Source codes are shown in this column as assigned to items by U.S. Army Aviation Materiel Command. The code symbols indicate the selection status and source of supply for each repair part as defined hereafter:
Code P1 applies to repair parts which are low mortality parts; procured by commodity command, stocked only in and supplied from commodity command key depots, and authorized for installation at in dictated maintenance echelons.

c. Maintenance Level Code. The code symbol used in the maintenance level column indicates the lowest maintenance echelon authorized to install the repair parts. Capabilities of higher echelons are considered equal or better.

(1) Code O -- Organizational Maintenance Category.
(2) Code F -- Direct Support Maintenance Category.
(3) Code H -- General Support Maintenance Category.
(4) Code D -- Depot Maintenance Category.

d. Recoverability Code. Recoverability codes reflect the recoverability or reparability characteristics of repair parts upon removal from equipments at time of maintenance, repair, or overhaul.

(1) Code R applies to repair parts and assemblies which are economically reparable at direct and general support maintenance activities and are normally furnished by supply on an exchange basis.

(2) Repair parts and assemblies not assigned a recoverability code shall be considered "throwaway" items.

e. Federal Stock Number. The Federal stock number consists of the applicable 4-digit FSC code number plus the 7-digit Federal item identification number which are to be utilized for requisitioning, storage, and accountability purposes. Items without

a source code will not be assigned a Federal stock number.

f. Description. This column furnishes the item name, a brief description, when necessary, and authorized abbreviations or dimensions when required to provide further identification. A comma will be used to separate the basic noun or noun phrase from its modifiers. As an additional reference the manufacturer's part number is indicated following the description.

g. Unit of Issue. This column lists the standard or the basic quantity in which the item is issued (each, pound, set, and the like).

h. Quantity Per Assembly. Quantities in this column are those required for one assembly only, including instances where similar assemblies are broken down together.

i. Expendability Code. When any item is nonexpendable, it will be indicated by an N. This column will be left blank for all other items which are expendable.

j. Quantity Authorized. An asterisk (*) code contained within this column indicates that the item is authorized for use at that level, but is not authorized to be stocked, assembled, or manufactured. When such an item is required, it must be requisitioned for immediate use only from the next higher maintenance category.

k. Figure and Index Numbers. When applicable, the numbers which appear in the last right-hand column of each text page key items contained in the text to the proper part on the appropriate illustration. This enables ready reference from illustration to text and from text to illustration. Figure and index numbers are also shown in the indices for every part which appears in the manual. This provides a reference to the proper illustration and item on the text listing. When a breakdown covers both left- and right-hand assemblies, only the left-hand parts are indexed and illustrated.

4. ABBREVIATIONS

The following abbreviations are used:

AN	Air Force-Navy
ASSY	Assembly
EA.....	Each
NC	American National Coarse Thread
No	Number
P/N	Part Number
SAE	Society of Automotive Engineers
STD	Standard

5. FEDERAL SUPPLY CODE FOR MANUFACTURERS

Code	Manufacturer
26337	Greer Hydraulics Inc., Los Angeles, Calif.
57733	Stewart-Warner Corp., Chicago, I11.
74080	Hayes Industries Inc., Jackson, Mich.
81343	Society of Automotive Engineers, New York, N.Y.
88044	Aeronautical Standards Group, Department of Navy and Air Force, Washington, D.C.

6. HOW TO FIND A PART

a. When the Part Number is Known. Locate the part number in the Alpha-Numerical Part Number Index, Section IV of this appendix. Note the figure and index number and page indicating where the part is shown in the Illustrated Parts List. Turn to the figure and index number on appropriate page indicated to obtain the desired information.

b. When the Stock Number is Known. Locate the stock number in the Numerical Stock Number Index, Section IV of this appendix. Note the figure and index number and page indicating where the part is shown in the Illustrated Parts List. Turn to the figure and index number on appropriate page to obtain the desired information.

c. When Neither the Part Number nor Stock Number for an Item is Known. Refer to the exploded view of the starter torque tester (fig. 5) and select the required part. Note the index number referenced to the item. Turn to Section IV and note the page number opposite the index number of the part. On indicated page and opposite the index number will be shown the stock number or part number, part name, and all other necessary information.

SECTION II
ILLUSTRATED PARTS LIST

Source codes				Federal Stock No.	Description	Unit of issue	Qty per assy	ex--penda-bility	Qty au-thor-ized	Illustrations	
Mate-riel	Source	Maint.-level	Re-cover-ability							Fig no	Item no
	P1	H		4920-739-4584	STARTER TORQUE TESTER, Type B-1, P/N RT320-200						
					INTRCH 4920-223-8877	EA	1		*	1	
					BRAKE DRUM AND MOUNTING PLATE ASSY, P/N DT320-256	EA	1			5	1
					LOCKNUT, Ball Bearing (SAE No. N-11)	EA	1			5	2
					LOCKWASHER, STD Ball Bearing (SAE No. W-11)		1			5	3
					KEY, Drive Shaft, P/N AT320-259		2			5	4
	P1	H		4920-056-0538	BRAKE ASSY, P/N H2-353	EA	1		*	5	5
					NUT, Self-Locking, P/N AN365-918		5			5	6
					WASHER, Plain, P/N AN960-916		5			5	7
					BOLT, Aircraft, P/N AN9-35A		5			5	8
	P1	H	R	4920-056-0539	BRAKE PRESSURE CONTROL ASSY, P/N BT320-265	EA	1		*	5	9
					NUT, Self-Locking, P/N AN365-918		2			5	10
					WASHER, Plain, P/N AN960-916		2			5	11
					BOLT, Aircraft, P/N AN9-40A		2			5	12
	P1	H		4920-056-0536	TORQUEMETER, P/N DT320-293	EA	1		*	5	13
	P1	H		4920-513-6675	TORQUEMETER, P/N DT320-290	EA	1		*	5	13
	P1	H		4920-099-8364	TORQUEMETER, P/N DT320-213	EA	1		*	5	13
					PIN, Cotter, P/N AN381-4-18		4			5	14
					PIN, Pivot, Upper, P/N AT320-235	EA	1			5	15
					PIN, Pivot, Lower, P/N AT320-234		1			5	16
	P1	H		6115-522-4441	TACHOMETER, P/N 870C .	EA	1		*	5	17
	P1	H		4920-511-8428	CABLE, P/N 95000	EA	1		*	5	18
	P1	H		4920-511-8404	DRIVE ASSY, P/N BT320-204	EA	1		*	5	19
					DRIVE ASSY, Tachometer, Reduction, 10 to 1, Reduction P/N 649B 100	EA	1			5	20
	P1	H		4920-398-1371	JAW, Three-Tooth, Right-Hand Small, P/N BT320-252-1	EA	1		*	5	21
	P1	H		4920-398-1372	JAW, Three-Tooth, Left-Hand Small, P/N BT320-252-2	EA	1		*	5	21
	P1	H		4920-398-1373	JAW, Twelve-Tooth, Right-Hand Small, P/N BT320-253-1	EA	1		*	5	21
	P1	H		4920-303-0606	JAW, Twelve-Tooth, Left-Hand Small, P/N BT320-253-2	EA	1		*	5	21
	P1	H		4920-098-6539	JAW, Twelve-Tooth, Right-Hand Large, P/N BT320-254-1	EA	1		*	5	21
	P1	H		4920-098-6540	JAW, Twelve-Tooth, Left-Hand Large, P/N BT320-254-2	EA	1		*	5	21
	P1	H		4920-398-1374	JAW, Three-Tooth, Right-Hand Large, P/N BT320-255-1	EA	1		*	5	21
	P1	H		4920-398-1375	JAW, Three-Tooth, Left-Hand Large, P/N BT320-255-2	EA	1		*	5	21'
					SCREW, Cap, Socket Head, 5/16-18NC3 by 2-3/4 Inches	EA	1			5	22

P1	H		4920-056-0534	ADAPTER, P/N DT320-247	EA	1		*	5	23
				SCREW, Cap, Socket Head, 5/16-18NC3 by 2 Inches	EA	1			5	24
P1	H		4920-511-8407	COUPLING, P/N BT320-295	EA	1		*	5	25
P1	H		4920-511-8408	COUPLING, P/N BT320-296	EA	1		*	5	25
P1	H		4920-511-8409	COUPLING, P/N BT320-297	EA	1		*	5	25
P1	H		4920-511-8410	COUPLING, P/N BT320-298	EA	1		*	5	25
				SCREW, Cap, Socket Head, 5/16-18NC3 by 2-3/8 Inches	EA	1			5	26
P1	H		4920-056-0534	ADAPTER, P/N DT320-247	EA	1		*	5	27
				SCREW, Cap, Socket Head, 5/16-18NC3 by 2 Inches	EA	1			5	28
				HUB, Carrying Arm, P/N DT320-261	EA	1			5	29
				ARM, Carrying, P/N GT320-263	EA	1			5	30
				BASE AND FRAME ASSY, No Number	EA	1			5	31
				WRENCH, Clutch Nut, P/N BT320-285	EA	1			16	
				WRENCH, Clutch Nut, P/N BT320-287	EA	1			16	

SECTION III
REFERENCE PUBLICATIONS

Refer to Appendix I.

SECTION IV
CROSS-REFERENCE INDICES

ALPHA-NUMERICAL PART NUMBER INDEX

Part No.	Fig. and Index No.	Federal Stock NO.	Federal Code for Manufacturer	Page
AN365-918	5-6, 5-10		88044	33
AN381-4-18	5-14		88044	33
AN9-35A	5-8		88044	33
AN9-40A	5-12		88044	33
AN960-916	5-7, 5-11		88044	33
AT320-234	5-16		26337	33
AT320-235	5-15		26337	33
AT320-259	5-4		26337	33
BT320-204	5-19	4920-511-8404	26337	33
BT320-252-1	5-21	4920-398-1371	26337	33
BT320-252-2	5-21	4920-398-1372	26337	33
BT320-253-1	5-21	4920-398-1373	26337	33
BT320-253-2	5-21	4920-303-0606	26337	33
BT320-254-1	5-21	4920-098-6539	26337	33
BT320-254-2	5-21	4920-098-6540	26337	33
BT320-255-1	5-21	4920-398-1374	26337	33
BT320-255-2	5-21	4920-398-1375	26337	33
BT320-265	5-9	4920-056-0539	26337	33
BT320-285	16-		26337	34
BT320-287	16-		26337	34
BT320-295	5-25	4920-511-8407	26337	34
BT320-296	5-25	4920-511-8408	26337	34
BT320-297	5-25	4920-511-8409	26337	34
BT320-298	5-25	4920-511-8410	26337	34
DT320-213	5-13	4920-099-8364	26337	33
DT320-247	5-23, 5-27	4920-056-0534	26337	34
DT320-256	5-1		26337	33
DT320-261	5-29		26337	34
DT320-290	5-13	4920-513-6675	26337	33
DT320-293	5-13	4920-056-0536	26337	33
GT320-263	5-30		26337	34
H2-353	5-5	4920-056-0538	74080	33
RT320-200	1-	4920-739-4584	26337	33
649B100	5-20		26337	33
870C	5-17	6115-522-4441	57733	33
95000	5-18	4920-511-8428	57733	33

NUMERICAL STOCK NUMBER INDEX

Federal Stock No.	Fig. and Index No.	Part No.	Federal Code for Manufacturer	Page
4920-056-0534	5-23, 5-27	DT320-247	26337	34
4920-056-0536	5-13	DT320-293	26337	33
4920-056-0538	5-5	H2-353	74080	33
4920-056-0539	5-9	BT320-265	26337	33
4920-098-6539	5-21	BT320-254-1	26337	33
4920-098-6540	5-21	BT320-254-2	26337	33
4920-099-8364	5-13	DT320-213	26337	33
4920-303-0606	5-21	BT320-253-2	26337	33
4920-398-1371	5-21	BT320-252-1	26337	33
4920-398-1372	5-21	BT320-252-2	26337	33
4920-398-1373	5-21	BT320-253-1	26337	33
4920-398-1374	5-21	BT320-255-1	26337	33
4920-398-1375	5-21	BT320-255-2	26337	33
4920-511-8404	5-19	BT320-204	26337	33
4920-511-8407	5-25	BT320-295	26337	34
4920-511-8408	5-25	BT320-296	26337	34
4920-511-8409	5-25	BT320-297	26337	34
4920-511-8410	5-25	BT320-298	26337	34
4920-511-8428	5-18	95000	57733	33
4920-513-6675	5-13	DT320-290	26337	33
4920-739-4584	1-	RT320-200	26337	33
6115-522-4441	5-17	870C	57733	33

INDEX

HEADQUARTER S
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 26 February 1965

TM 55-4920-234-15 is published for the use of all concerned.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Official:
J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

DISTRIBUTION:
To be distributed in accordance with DA Form 12-31 requirements for other literature of a general nature.

* U.S. GOVERNMENT PRINTING OFFICE : 1989 0 - 242-894 (07015)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 009590-000