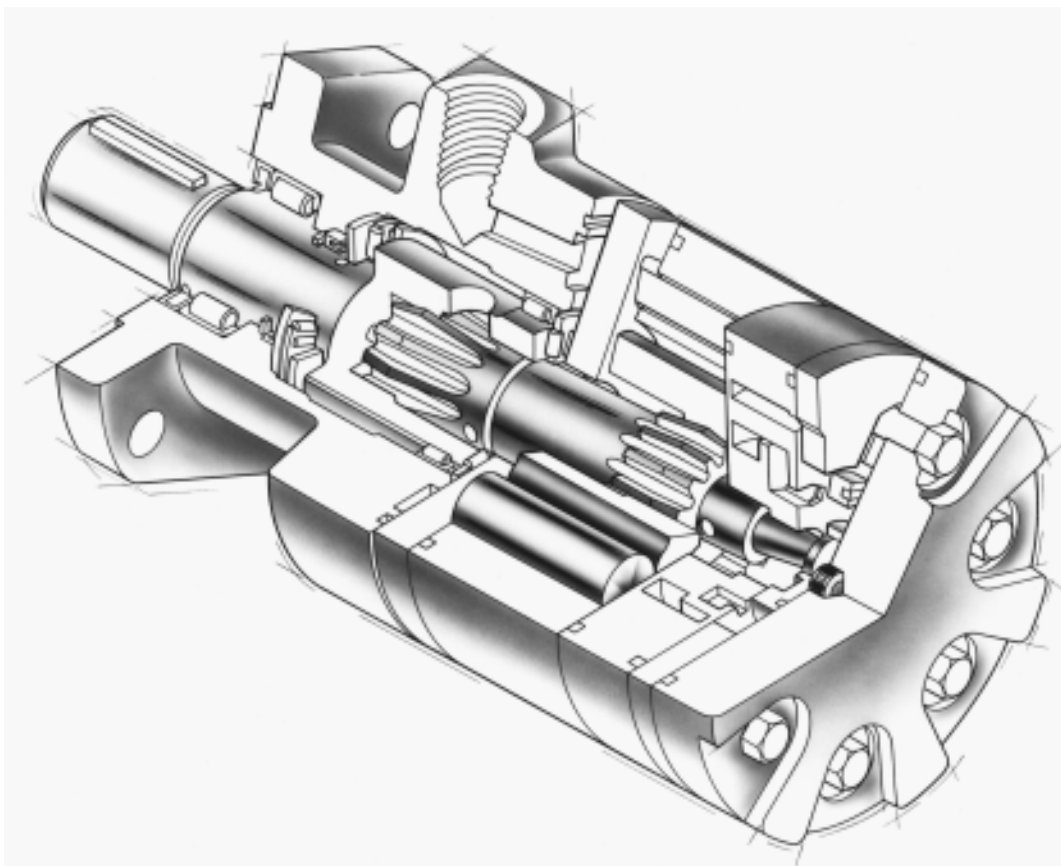


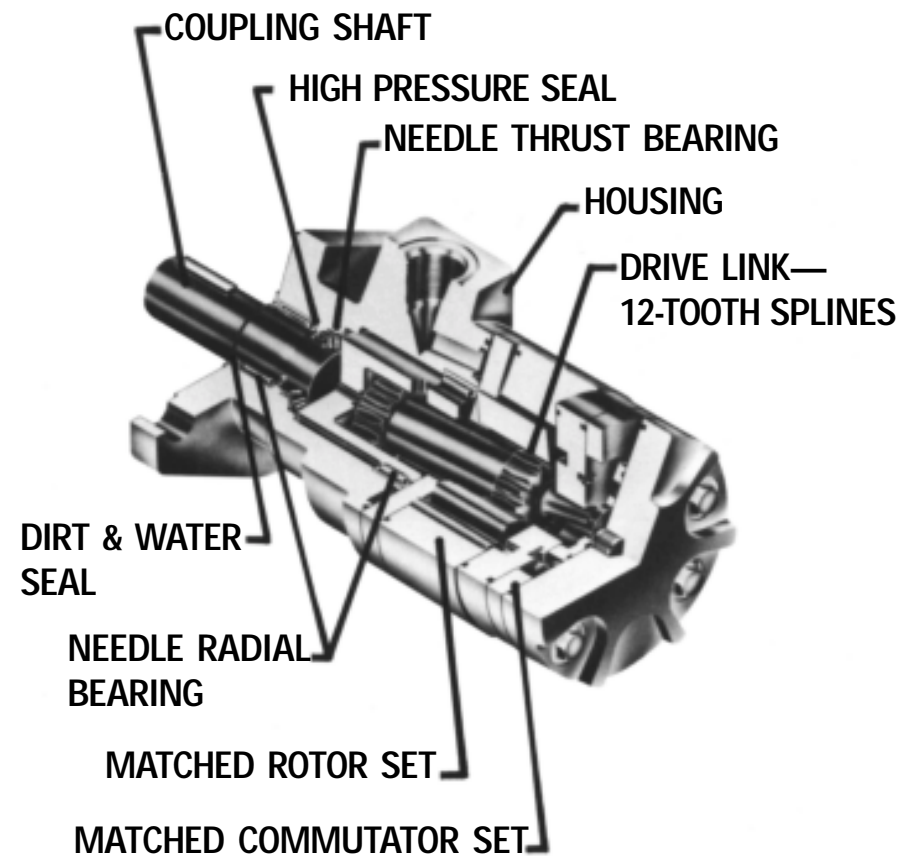
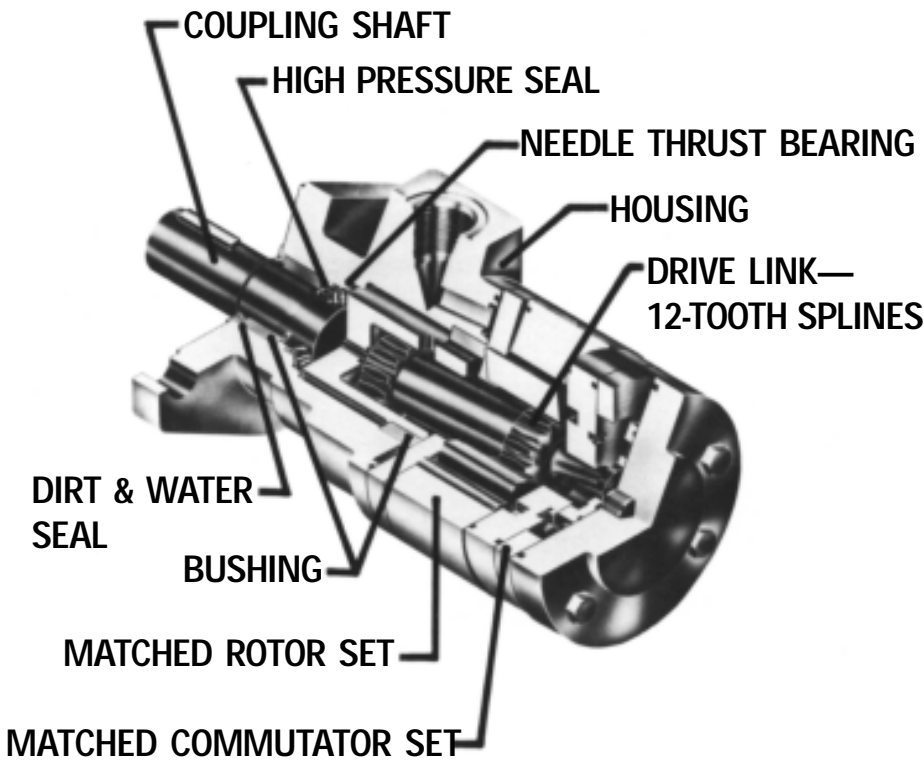


Torqmotor™

MG, MF, MP, MB, ME, MJ Series Service Procedure



Torqmotor™ Design Features



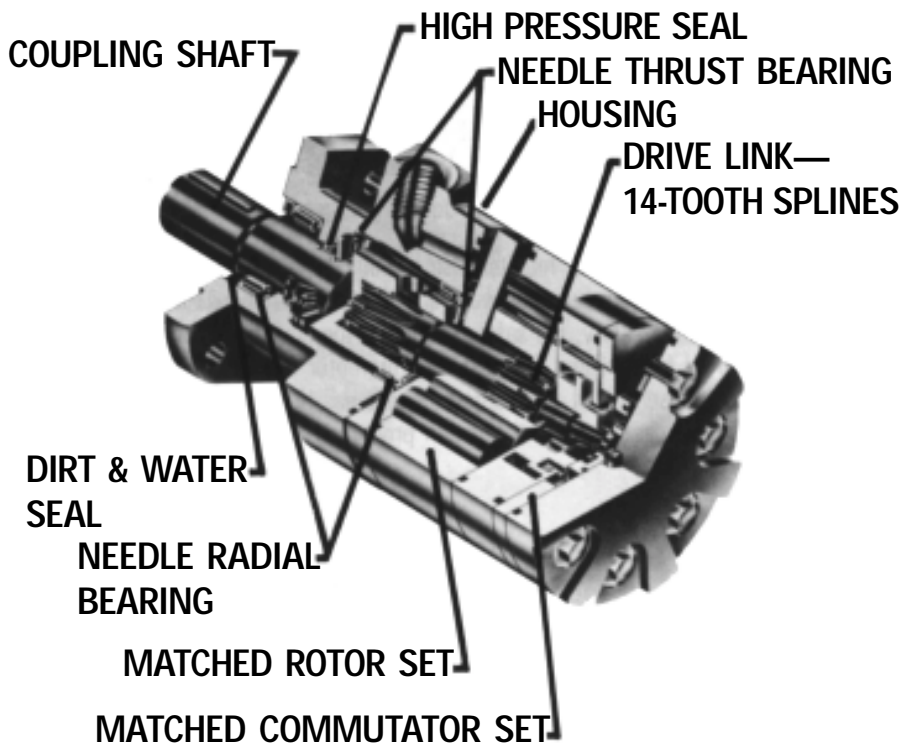
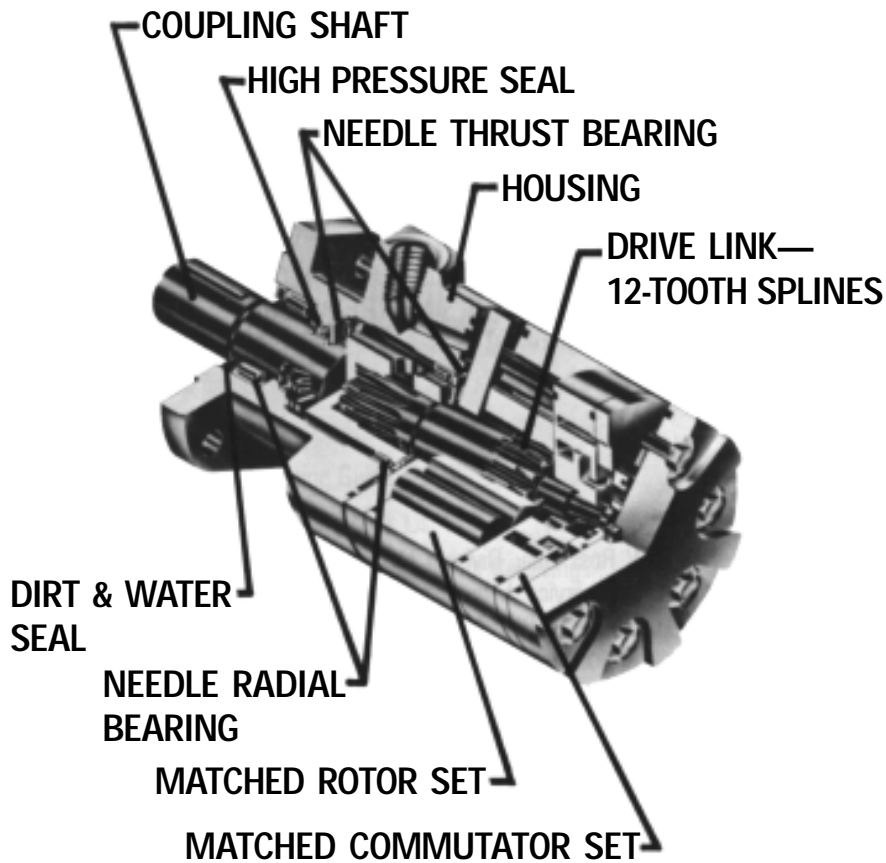
Torqmotor™ MG Series features include:

- The roller vane rotor set design offers a low-friction, wear compensation which maximizes the useful performance life of the motor.
- **Zero leak** commutation valve provides greater, more consistent volumetric efficiency.
- Design flexibility - MG offers the widest selection of shaft options, displacements and mounting flanges in the industry.
- Patented 60-40 spline member arrangement transmits more torque with less weight.
- Full flow lubrication maximizes cooling and may provide up to 50% longer life than motors not having this feature.
- Higher pressure rating provide greater torque than competitive brands.
- Full interchangeability with other motors which are designed according to industry standards.
- Compatible with most hydraulic systems with regard to pressure, torque and speed.
- A unique high-pressure shaft seal that eliminates the need for case drains.
- Up to 13 horse power output.

Torqmotor™ MF Series features include:

- Roller vanes to reduce friction and internal leakage and to maintain efficiency.
- **Zero leak** commutation valve provides greater, more consistent volumetric efficiency.
- Wheel mount version available.
- More starting torque than competitive motors in applications where the shaft is side loaded. (Competitive brands require more pressure to start the motor.)
- A needle-roller mounted coupling shaft and steel-caged thrust bearing which can withstand 1000-pound thrust loads.
- Side load capacity is 1600 lbs. (727.3 kg) maximum at center of output shaft.
- A unique high-pressure shaft seal that eliminates the need for case drains, check valves and extra plumbing.
- Up to 17 horsepower output.
- Greater durability due to superior lubrication and minimum drive spline wear.
- Patented 60-40 spline member arrangement transmits more torque with less weight.

Torqmotor™ Design Features



Torqmotor™ MB Series features include:

- Heavy-duty thrust and roller bearings for up to twice side-load capacity to the previous motor.
- Roller vanes to reduce friction and internal leakage, and to maintain efficiency.
- A patented orbiting commutation system for less wear and longer life.
- A patented 60:40 arrangement of internal and external spline members to transmit more torque with less weight.
- A unique high-pressure shaft seal that eliminates the need for case drains, check valves and extra plumbing.
- A unique manifold designed to improve operating efficiency.
- Up to 1000 lbs. (453.6 kg) end-thrust capacity in either direction.
- A design that is less sensitive to contamination than competitive motors.
- Up to 36 horsepower output.
- Greater durability because of superior lubrication and minimum drive spline wear.
- Superior low speed performance.
- **Zero leak** commutation valve provides greater, more consistent volumetric efficiency.

Torqmotor™ ME & MJ Series features include:

- Roller vanes to reduce friction and internal leakage and to maintain efficiency.
- A patented orbiting commutation system for less wear and longer life.
- A patented 60:40 arrangement of internal and external spline members to transmit more torque with less weight.
- A unique high-pressure shaft seal that eliminates the need for case drains, check valves and extra plumbing.
- A manifold designed to improve operating efficiency.
- Heavy-duty thrust and roller bearings for up to twice the side-load capacity to the previous motor.
- Up to 1000 lbs. (453.6 kg) end-thrust capacity in either direction.
- A design that is less sensitive to contamination than competitive motors.
- Up to 49 horsepower output.
- Greater durability because of superior lubrication and minimum drive spline wear.
- **Zero leak** commutation valve provides greater, more consistent volumetric efficiency.

Definitions

- NOTE:** A NOTE provides key information to make a procedure easier or quicker to complete.
- CAUTION:** A CAUTION refers to procedure that must be followed to avoid damaging the Torqmotor™ or other system components.
- WARNING:** A WARNING REFERS TO PROCEDURE THAT MUST BE FOLLOWED FOR THE SAFETY OF THE EQUIPMENT OPERATOR AND THE PERSON INSPECTING OR REPAIRING THE TORQMOTOR™.

Disclaimer

This Service Manual has been prepared by Ross Operation for reference and use by mechanics who have been trained to repair and service hydraulic motors and systems on commercial and non-commercial equipment applications. Ross Operation has exercised reasonable care and diligence to present accurate, clear and complete information and instructions regarding the techniques and tools required for maintaining, repairing and servicing the complete line of Ross MG, MF, MP, MB, ME, & MJ Torqmotor™ Units. However, despite the care and effort taken in preparing this general Service Manual, Ross **makes no warranties** that (a) the Service Manual or any explanations, illustrations, information, techniques or tools described herein are either accurate, complete or correct as applied to a specific Torqmotor™ unit, or (b) any repairs or service of a particular Torqmotor™ unit will result in a properly functioning Torqmotor™ unit.

If inspection or testing reveals evidence of abnormal wear or damage to the Torqmotor™ unit or if you encounter circumstances not covered in the Manual, STOP – CONSULT THE EQUIPMENT MANUFACTURER'S SERVICE MANUAL AND WARRANTY. DO NOT TRY TO REPAIR OR SERVICE A TORQMOTOR™ UNIT WHICH HAS BEEN DAMAGED OR INCLUDES ANY PART THAT SHOWS EXCESSIVE WEAR UNLESS THE DAMAGED AND WORN PARTS ARE REPLACED WITH ORIGINAL ROSS REPLACEMENT AND SERVICE PARTS AND THE UNIT IS RESTORED TO ROSS SPECIFICATIONS FOR THE TORQMOTOR™ UNIT.

It is the responsibility of the mechanic performing the maintenance, repairs or service on a particular Torqmotor™ unit to (a) inspect the unit for abnormal wear and damage, (b) choose a repair procedure which will not endanger his/her safety, the safety of others, the equipment, or the safe operation of the Torqmotor™, and (c) fully inspect and test the Torqmotor™ unit and the hydraulic system to insure that the repair or service of the Torqmotor™ unit has been properly performed and that the Torqmotor™ and hydraulic system will function properly.

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Introduction

Service Manual for Series MG, MF, MP, MB, ME, MJ

This service manual has one purpose: to guide you in maintaining, troubleshooting, and servicing the MG, MF, MP, MB, ME, & MJ Torqmotor™ (low-speed, high-torque hydraulic motor).

Material in this manual is organized so you can work on the Torqmotor™ and get results without wasting time or being confused. To get these results, you should read this entire manual before you begin any work on the Torqmotor™.

This manual also contains troubleshooting information and checklist. If you must service the Torqmotor™, the checklist will help you to determine where the problem may be.

The three-column format of the Disassembly and Inspection, and Assembly sections will make it easier for you to conduct major work on the Torqmotor™. Column 1 gives a brief key for each procedure. Column 2 explains in detail the procedure you should follow. Column 3 illustrates this procedure with photographs. Read all material carefully and pay special attention to the notes, cautions, and warnings.

A page with the Torqmotor™ exploded assembly view is provided several places in this manual. The component part names and item numbers assigned on this exploded assembly view correspond with names and item numbers (in parentheses) used in the disassembly and assembly procedures set forth in this manual.

Service part list charts are also provided in this manual with the part names and exploded view item numbers cross referenced to Ross service part numbers.

Service parts are available through the Original Equipment Manufacturer or Ross approved MG, MF, MP, MB, ME, & MJ Distributors.

As you gain experience in servicing the Torqmotor™, you may find that some information in this manual could be clearer or more complete. If so, let us know about it. Do not try to second guess the manual. If you are stuck, contact us. Servicing the Torqmotor™ should be a safe and productive procedure, in order for the unit to deliver the reliable, long-life operation engineered into it.

Troubleshooting Guide

NOTE: Before troubleshooting any system problem, check service literature published by the equipment and/or component manufacturers. Follow their instructions, if given, for checking any component other than the Torqmotor™ unit.

Preparation

Make your troubleshooting easier by preparing as follows:

- work in a clean, well-lighted place;
- have proper tools and materials nearby;
- have an adequate supply of clean petroleum-based solvent.

WARNING: SINCE SOLVENTS ARE FLAMMABLE, BE EXTREMELY CAREFUL WHEN USING ANY SOLVENT, EVEN A SMALL EXPLOSION OR FIRE COULD CAUSE INJURY OR DEATH.

WARNING: WEAR EYE PROTECTION AND BE SURE TO COMPLY WITH OSHA AND OTHER MAXIMUM AIR PRESSURE REQUIREMENTS.

Preliminary Checks

Hydraulic systems are often trouble-free. Hence, the problem an operator complains of could be caused by something other than the hydraulic components.

Thus, once you have determined that a problem exists, start with the easy-to-check items, such as:

- parts damaged from impact that were not properly repaired, or that should have been replaced; and
- improper replacement parts used in previous servicing
- mechanical linkage problems such as binding, broken, or loose parts or slipping belts

Hydraulic Components

If you think the problem is caused by a hydraulic component, start by checking the easy-to-reach items.

Check all hoses and lines for cracks, hardening, or other signs of wear. Reroute any useable hoses that are kinked, severely bent, or that rest against hot engine parts. Look for leaks, especially at couplings and fittings. Replace any hoses or lines that don't meet system flow and pressure ratings.

Next, go to the reservoir and filter or filters. Check fluid level and look for air bubbles. Check the filter(s). A filter with a maximum 50 micron filtration is recommended for the Torqmotor system.

Visually check other components to see if they are loosely mounted, show signs of leaks, or other damage or wear.

Excessive heat in a hydraulic system can create problems that can easily be overlooked. Every system has its limitation for the maximum amount of temperature. After the temperature is attained and passed, the following can occur:

- oil seal leaks
- loss of efficiency such as speed and torque
- pump loss of efficiency
- pump failure
- hoses become hard and brittle
- hose failure

A normal temperature range means an efficient hydraulic system. Consult the manuals published by equipment and/or component manufacturers for maximum allowable temperature and hydraulic tests that may be necessary to run on the performance of the hydraulic components. The Torqmotor™ is not recommended for hydraulic systems with maximum temperatures above 200°F (93.3°C).

Troubleshooting Checklist

Trouble	Cause	Remedy
Oil Leakage	1. Hose fittings loose, worn or damaged.	Check & replace damaged fittings or "O" Rings. Torque to manufacturers specifications.
	2. Oil seal rings (4) deteriorated by excess heat.	Replace oil seal rings by disassembling Torqmotor™ unit.
	3. Special bolt (1, 1A, 1B or 1C) loose or its sealing area deteriorated by corrosion.	(a) Loosen then tighten single bolt to torque specification. (b) Replace bolt.
	4. Internal shaft seal (16) worn or damaged.	Replace seal. Disassembly of Torqmotor™ unit necessary.
	5. Worn coupling shaft (12) and internal seal (16).	Replace coupling shaft and seal by disassembling Torqmotor™ unit.
Significant loss of speed under load	1. Lack of sufficient oil supply	(a) Check for faulty relief valve and adjust or replace as required.
		(b) Check for and repair worn pump.
		(c) Check for and use correct oil for temperature of operation.
	2. High internal motor leakage	(a) Replace worn rotor set by disassembling Torqmotor™ unit.
3. Severely worn or damaged internal splines.	Replace rotor set, drive link and coupling shaft by disassembling Torqmotor™ unit.	
4. Excessive heat.	Locate excessive heat source (usually a restriction) in the system and correct the condition.	
Low mechanical efficiency or undue high pressure required to operate Torqmotor™ unit	1. Line blockage	Locate blockage source and repair or replace.
	2. Internal interference	Disassemble Torqmotor™ unit, identify and remedy cause and repair, replacing parts as necessary.
	3. Lack of pumping pressure	Check for and repair worn pump.
	4. Excessive binding or loading in system external to Torqmotor™ unit.	Locate source and eliminate cause.

CAUTION: If the hydraulic system fluid becomes overheated [in excess of 200°F (93.3°C)], seals in the system can shrink, harden or crack, thus losing their sealing ability.

Tools and Materials Required for Servicing MG, MF, MP, MB, ME, MJ Series Service Manual

Clean, petroleum-based solvent

Emery paper

Vise with soft jaws

Air pressure source

Arbor press

Screw driver

Masking tape

Breaker bar

Torque wrench-ft. lbs. (N m)

Sockets: 1/2 or 9/16 inch thin wall, 1 inch

Allen Sockets: 3/16, 3/8 inch

Adjustable crescent wrench or hose fitting wrenches

SAE 10W40 SE or SF oil

Special bearing mandrel for MG & MF Torqmotors
(SEE FIGURE 1)

Special bearing mandrel for MJ Torqmotors (consult factory)

Special bearing mandrel for MB, ME & MP Torqmotors
(SEE FIGURE 2)

Feeler gage .005 inch (.13 mm)

MG & MF Torqmotors require blind hole bearing puller for 1.06 inch (26.9 mm) and 1.62 inch (41.1 mm) diameter bearing/bushing.

MJ Torqmotors require blind hole bearing puller for a 1.575 inch dia. (40.0 mm) and 2.130 inch dia. (54.1 mm) bearings.

MB, ME & MP Torqmotors require blind hole bearing puller for 1.400 inch dia. (35.6 mm) and 2.130 inch dia. (54.1 mm) bearings.

Clean corrosion resistant grease. Part #406018 is included in each seal kit. Recommended grease is Ross Specification #045236 or Mobil Mobilith SHC® 460

NOTE: The available service seal kits include the recommended grease as a grease pack #406018

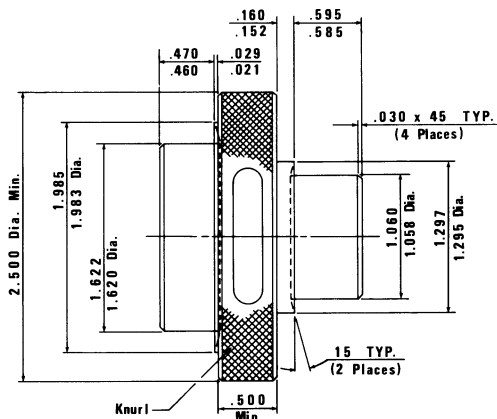
CAUTION: Mixing greases that have different bases can be detrimental to bearing life.

CONVERSIONS

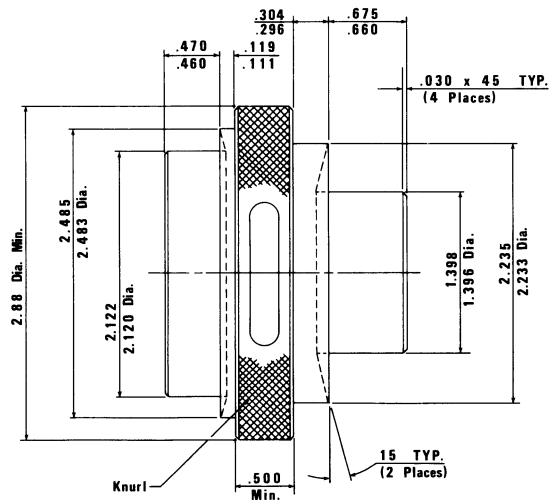
INCHES	mm	INCHES	mm
.020	.51	1.060	26.92
.021	.53	1.295	32.89
.029	.74	1.297	32.94
.030	.76	1.396	35.46
.111	2.81	1.398	35.51
.119	3.02	1.620	41.15
.152	3.86	1.622	41.20
.160	4.06	1.983	50.37
.296	7.52	1.985	50.42
.304	7.72	2.120	53.85
.460	11.68	2.122	53.90
.470	11.94	2.233	56.72
.500	12.70	2.235	56.77
.585	14.86	2.483	63.07
.595	15.11	2.485	63.12
.660	16.76	2.500	63.5
.675	17.15	2.88	73.2
1.058	26.87		

Torque Chart

Part Name	Item Number	Torque
bolt 5/16 24 UNF 2A	1, 1A, 1B or 1C	22-26 ft. lbs. (30-35 N m)
bolt 3/8 24 UNF 2A	1, 1A, 1B or 1C	45-55 ft. lbs. (60-76 N m)
bolt 5/8 18 UNF 2A	12D	140-180 ft. lbs. (190-244 N m)
nut 3/4 16 UNF 2B	12B (MG, MF)	175-255 ft. lbs. (237-305 N m)
nut 1-20 UNEF 2B	12B (MB, ME)	300-400 ft. lbs. (407-542 N m)
nut 1-1/8 18 UNEF 2B	12B (ME)	300-400 ft. lbs. (407-542 N m)

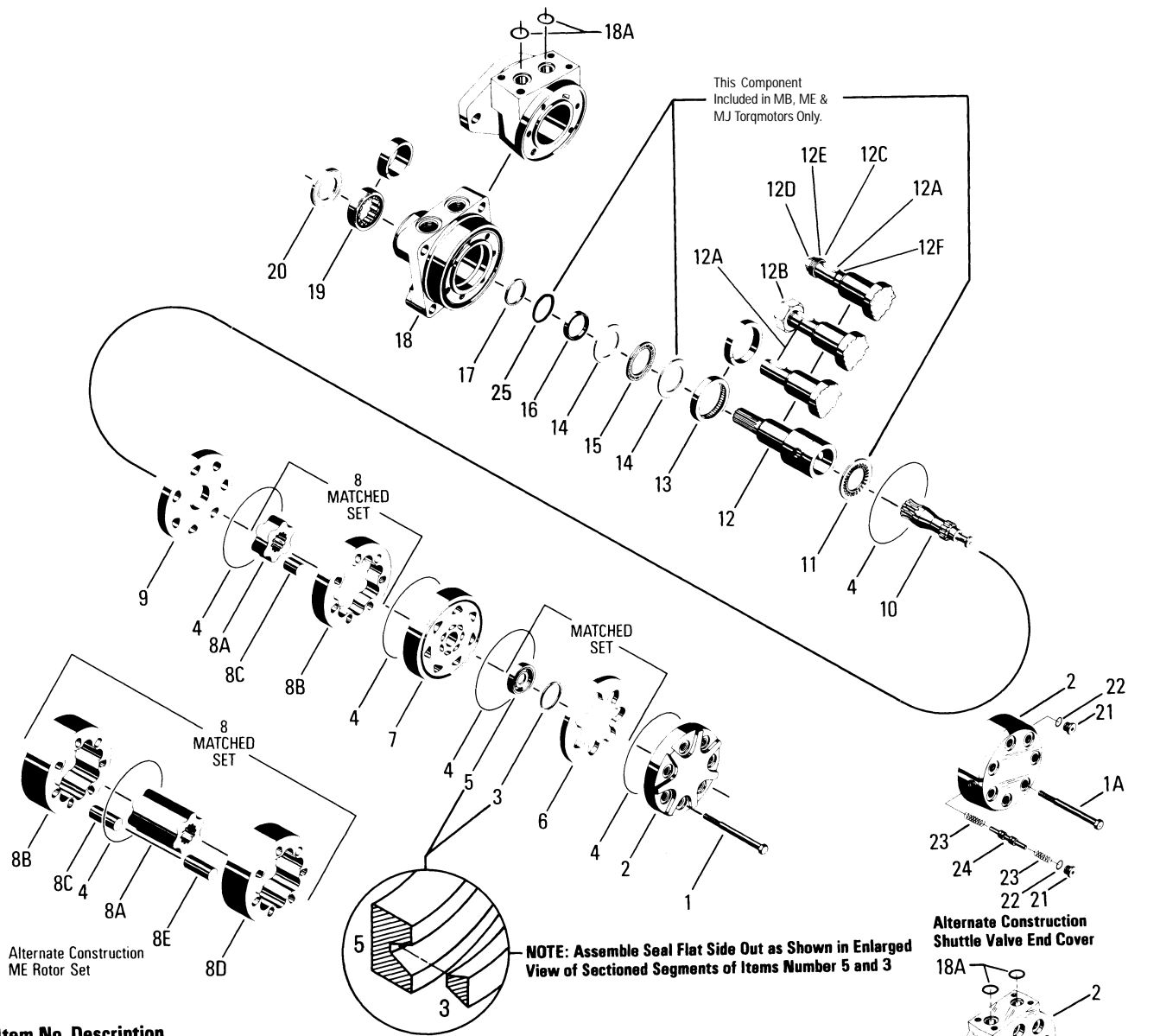


(Fabricate if considered necessary)
FIGURE 1—MG & MF



(Fabricate if considered necessary)
FIGURE 2—MB & ME

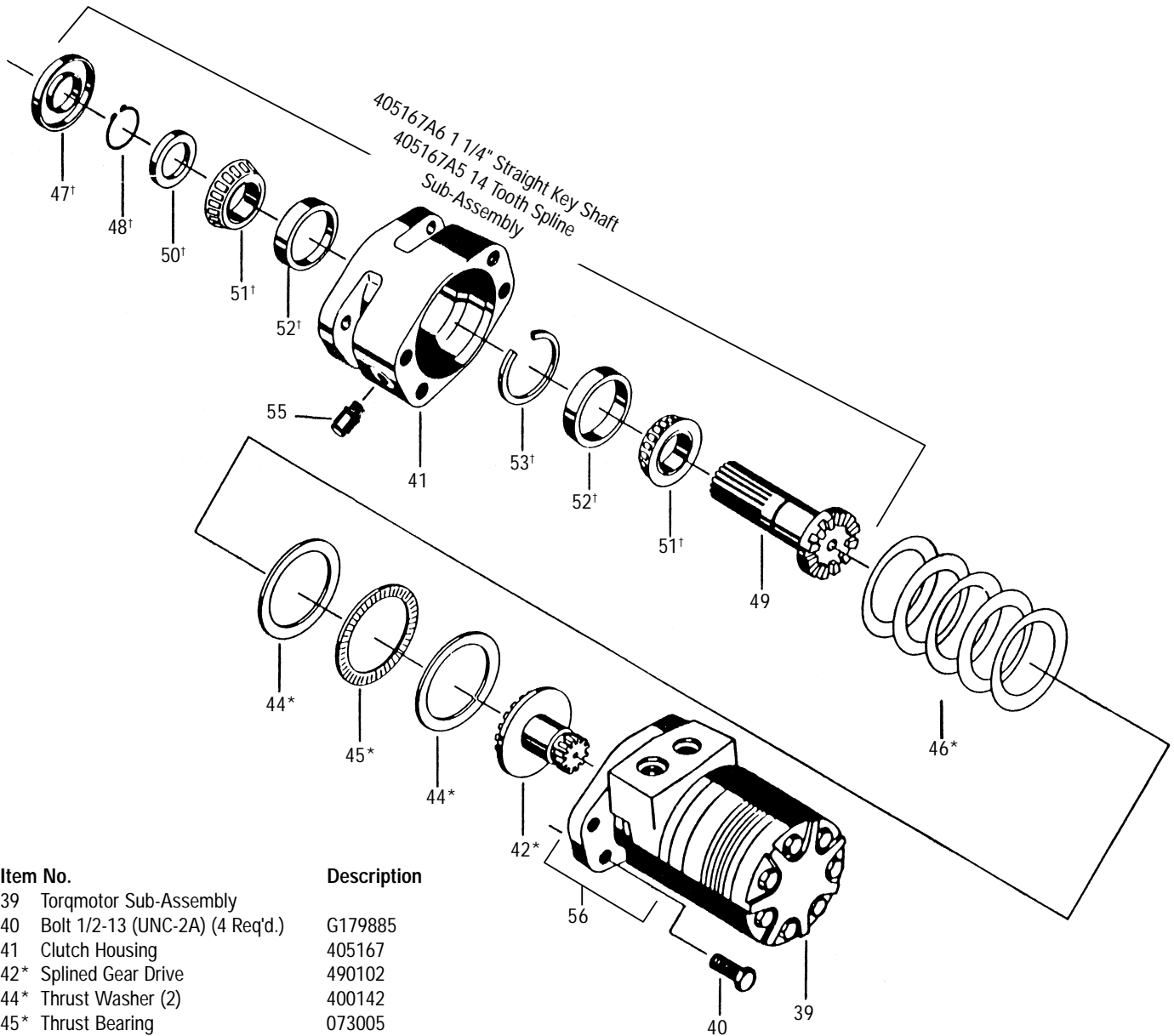
Torqmotor™ Exploded Assembly View — Typical



Item No. Description

- | | | |
|-------------------------------|----------------------------|-------------------------------|
| 1. Special Bolts (5, 6, or 7) | 11. Thrust Bearing | 20. Dirt & Water Seal |
| 1A. Special Bolts (7) | 12. Coupling Shaft | 21. Plug (2) |
| 1B. Special Bolts (7) | 12A. Key | 22. O-Ring (2) |
| 1C. Special Bolts (7) | 12B. Nut | 23. Spring |
| 2. End Cover | 12C. Washer | 24. Valve (Shuttle or Relief) |
| 3. Seal Ring-Commutator | 12D. Bolt | 25. Backup Washer |
| 4. Seal Ring (5) | 12E. Lockwasher | |
| 5. Commutator | 12F. Retaining Ring | |
| 6. Commutator Ring | 13. Bearing/Bushing, Inner | |
| 7. Manifold | 14. Thrust Washer | |
| 8. Rotor Set | 15. Thrust Bearing | |
| 8A. Rotor | 16. Seal | |
| 8B. Stator or Stator Half | 17. Backup Washer | |
| 8C. Vane (7) | 18. Housing | |
| 8D. Stator Half | 18A. O-Ring (2) | |
| 8E. Vane (7) | 19. Bearing/Bushing, Outer | |
| 9. Wear Plate | | |
| 10. Drive Link | | |

Integral Clutch Housing Assembly Exploded View — Typical



Item No.	Description
39	Torqmotor Sub-Assembly
40	Bolt 1/2-13 (UNC-2A) (4 Req'd.)
41	Clutch Housing
42*	Splined Gear Drive
44*	Thrust Washer (2)
45*	Thrust Bearing
46*	Disc Spring (5)
47†	Seal - Dirt and Water
48†	Snap Ring
49	Drive Shaft 14 Tooth Spline
49	Straight Key Shaft 1 1/4"
50†	Thrust Washer
51†	Bearing and Cone Assembly (2)
52†	Bearing Cup (2)
53†	Retaining Ring
55	Plug
56	Housing

NOTE: Apply .06 in. (1.5 mm) Bead of Loctite #51514 Around Full Circumference of Pilot

* Items sold separately: not included in Seal Kit

† SK000039 for Clutch Assembly only

SK000092 Seal Kit for Hydraulic Motor only Item #39.

Clutch Motor applies to MB Series only (Not available in 22, 25, 29 cu in.)

SHC Oil 90 WT 45± 5CC

MG Service Parts List Chart

CHART USE EXAMPLE: MG020601AAAB TORQMOTOR™ INCLUDES PART NUMBERS LISTED TO THE RIGHT OF MG (SERIES), 02 (DISP), 06(HOUS-ING), 01(SHAFT), AND AAAB (OPTION) SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

SERIES	EXPLODED VIEW									
	ITEM #	5 & 6	7	9	^A 13	14	15	17	^A 19	20
	DESCRIPTION	COMMUTATOR & RING ASSY	MANIFOLD (SEE NOTE)	WEAR PLATE	BRONZE BUSHING	THRUST WASHER	THRUST BEARING	BACKUP WASHER	"DU" BEARING	DIRT & WATER SEAL
MG-	Service Part #	MF018000A1	MF015000	477341	069511	028483	065066	028516	065505	478036

DISPLACEMENT GROUP	EXPLODED VIEW					
	ITEM #	1	ROTOR THICKNESS	8A	8B	10
	DISPLACEMENT (in ³ /rev)	BOLT (5)	"L" DIM OF ROTOR THICKNESS	ROTOR SET	FREE RUNNING ROTOR SET	DRIVE LINK
02-	2.7	021311	.3169	MF027003	MF027005	MF023000
03-	3.0	021311	.3751	MF037003	MF037005	MF033000
04-	4.0	021306	.5001	MF047003	MF047005	MF043000
05-	5.0	021382	.6258	MF057003	MF057005	MF053000
06-	6.0	021357	.7508	MF067003	MF067005	MF063000
08-	8.0	021307	1.0008	MF087003	MF087005	MF083000
10-	9.9	021358	1.2508	MF107003	MF107005	MF103000
12-	11.9	021308	1.5008	MF127003	MF127005	MF123000
14-	13.9	021359	1.7508	MF147003	MF147005	MF143000
16-	15.9	021310	2.0008	MF167003	MF167005	MF163000
18-	17.9	021383	2.2508	MF187003	MF187005	MF183000
20-	20.0	021384	2.5008	MF207003	MF207005	MF203000
22-	22.6	021460	2.8406	MF227003	N/A	MF223000
24-	24.0	021414	3.0030	MF247003	N/A	MF243000

COUPLING SHAFT GROUP	EXPLODED VIEW			
	ITEM #	12	12A	12B
	DESCRIPTION	COUPLING SHAFT	WOODRUFF KEY	NUT
01-	Long 6B Snapwire Groove	MF019007		
09-	1" Ø, 0.38 Pinhole, 0.55" from end	MF019000		
10-	1" Short Woodruff Key 1/4" Tap	MF019006	G124553	
11-	1" Short 6B Spline, 1/4" Snapwire Groove	MF019003		
12-	1" Tapered (Short)	MF019004	G124553	025136
13-	1" Long Woodruff Snapwire Groove	MF019005	G124553	
14-	1" Ø, Double Pinhole	MF019001		
15-	1" Ø, 0.32 Pinhole 0.4" from end	MF019002		
21-	"-10 Code" plus Corrosion Resistant	MF019008		
25-	1" Tapered SAE	MF019011		
26-	25 mm Straight with 8 mm Keyway	MF019012		
28-	13 Tooth Spline	MF019014		

MG Service Parts List Chart

EXPLODED VIEW			
ITEM #		^a 18	^a 18A
HOUSING GROUP	DESCRIPTION	HOUSING SERVICE PART #	O-RING (2)
	01-	Standard (4 Bolt) 7/8 O-Ring	MF012014A2
06-	SAE A (2 Bolt) 7/8 O-Ring	MF012001A2	
07-	SAE A (2 Bolt) Rear Port	MF012008A2	
09-	4 Bolt 7/8 O-Ring	MF012003A2	
10-	SAE A (2 Bolt) Manifold	MF012004J2	032790
11-	4 Bolt Manifold	MF012005J2	032790
12-	SAE A (2 Bolt) 1/2 NPTF	MF012006A2	
13-	4 Bolt 1/2 NPTF	MF012007A2	
25-	Standard (4 Bolt) Manifold	MF012049A2	032790

EXPLODED VIEW									
ITEM #		2	3	4	16	21	22	23	24
OPTION GROUP	DESCRIPTION	END COVER	COMMUTATOR SEAL	SEAL RING (5)	INNER SEAL	Plug & O-Ring Assy.	O-Ring		VALVE W/ SPRING
	AAAB	No Paint	MF016000	032435	032821	032377			
AAAC	Corrosion Resistant Paint	MF016000	032435	032821	032377				
AAAH	Fluorocarbon Seals	MF016000	032435	032822	032809				
AAAK	3/4" O-Ring Rear Ports	MF016001	032435	032821	032377				
BBCB	1740 PSI Internal Bidirectional Relief, No Paint	MF016006A7	032435	032821	032377	411068A1	032750		4100107
BBCM	1200 PSI Internal Bidirectional Relief, No Paint	MF016006A31	032435	032821	032377	411068A1	032750		41001031
BBCN	2030 PSI Internal Bidirectional Relief, No Paint	MF016006A5	032435	032821	032377	411068A1	032750		4100105
BBCP	1450 PSI Internal Bidirectional Relief, No Paint	MF016006A10	032435	032821	032377	411068A1	032750		41001010
BBCU	1560 PSI Internal Bidirectional Relief, No Paint	MF016006A2	032435	032821	032377	411068A1	032750		4100101
BBCU	1450 PSI Internal Bidirectional Relief, Spl. Port Fitting, No Paint	MF016006A10	032435	032821	032377	411068A1	032750		41001010
AAJV	Bidirectional Shuttle Valve (3:30), Black Paint	MF016003A1	032435	032821	032377	036297	032750	401674	415603

^a Service housing ass'y ITEM #18 with part number suffix-A2 includes ITEM #13 and #19. Service housing ass'y ITEM #18 with part number suffix-J2 includes ITEM #13, #19 AND two ITEM 18A.

Standard seal kit SK000090 includes six #032821 seal rings, #032435 commutator seal, #032377 inner seal, #028516 back up washer, #478036 dirt & water seal, #406018 grease pack, bulletin #887.

Special seal kit SK000091 for units that use fire retardant fluids include six #032822 seal rings, #032435 commutator seal, #032809 inner seal, #028516 back up washer, #478036 dirt & water seal, #406018 grease pack, bulletin #887.

For reverse flow manifold, use MF015001.

* Speed sensor not available in MG Series.

Commutator set for rear ported units MF018001A1

MF Service Parts List Chart

CHART USE EXAMPLE: MF020601AAAA TORQMOTOR™ INCLUDES PART NUMBERS LISTED TO THE RIGHT OF MF (SERIES), 02 (DISP), 06 (HOUSING), 01(SHAFT), AND AAAA (OPTION) SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

SERIES	EXPLODED VIEW									
	ITEM #	5 & 6	7	9	^A 13	14	15	17	^A 19	20
	DESCRIPTION	COMMUTATOR & RING ASSY	MANIFOLD (SEE NOTE)	WEAR PLATE	INNER BEARING	THRUST WASHER	THRUST BEARING	BACKUP WASHER	OUTER BEARING	DIRT & WATER SEAL
MF-	Service Part #	MF018000A1	MF015000	477341	069512	028483	065066	028516	065506	478036

DISPLACEMENT GROUP	EXPLODED VIEW		ROTOR THICKNESS		8A	8B	10
	ITEM #	1	"L" DIM. OF ROTOR THICKNESS	ROTOR SET	FREE RUNNING ROTOR SET	DRIVE LINK	
	DISPLACEMENT (in ³ /rev)	BOLT (6)					
02-	2.7	021311	.3169	MF027003	MF027005	MF023000	
03-	3.0	021311	.3751	MF037003	MF037005	MF033000	
04-	4.0	021306	.5001	MF047003	MF047005	MF043000	
05-	5.0	021382	.6258	MF057003	MF057005	MF053000	
06-	6.0	021357	.7508	MF067003	MF067005	MF063000	
08-	8.0	021307	1.0008	MF087003	MF087005	MF083000	
10-	9.9	021358	1.2508	MF107003	MF107005	MF103000	
12-	11.9	021308	1.5008	MF127003	MF127005	MF123000	
14-	13.9	021359	1.7508	MF147003	MF147005	MF143000	
16-	15.9	021310	2.0008	MF167003	MF167005	MF163000	
18-	17.9	021383	2.2508	MF187003	MF187005	MF183000	
20-	20.0	021384	2.5008	MF207003	MF207005	MF203000	
22-	22.6	021460	2.8406	MF227003	N/A	MF223000	
24-	24.0	021414	3.0030	MF247003	N/A	MF243000	

COUPLING SHAFT GROUP	EXPLODED VIEW			
	ITEM #	12	12A	12B
	DESCRIPTION	COUPLING SHAFT	WOODRUFF KEY	NUT
01-	Long 6B Snapwire Groove	MF019007		
09-	1" Ø, 0.38 "Pinhole, 0.55" from end	MF019000		
10-	1" Short Woodruff Key 1/4" Tap	MF019006	G124553	
11-	1" Short 6B Spline, 1/4 Snapwire Groove	MF019003		
12-	1" Tapered (Short)	MF019004	G124553	025136
13-	1" Long Woodruff Snapwire Groove	MF019005	G124553	
14-	1" Ø, Double Pinhole	MF019001		
15-	1" Ø, 0.32 "Pinhole 0.4" from end	MF019002		
21-	"-10 Code" plus Corrosion Resistant	MF019008		
22-	25 mm Straight Shaft with 7 mm Keyway	MF019009	039041	
25-	1" Tapered SAE	MF019011	G124553	025136
26-	25 mm Straight with 8 mm Keyway	MF019012	039042	
28-	13 Tooth Spline	MF019014		

SPEED SENSOR SHAFT GROUP	EXPLODED VIEW	
	ITEM #	12
	DESCRIPTION	SPEED SENSOR SHAFT
01-	Long 6B Snapwire Groove	MF019307
10-	1" Short Woodruff Key 1/4" Tap	MF019306
13-	1" Long Woodruff Snapwire Groove	MF019305
25-	1" Tapered SAE	MF019311
26-	25 mm Straight with 8 mm Keyway	MF019312
28-	13 Tooth Spline	MF019314

MF Service Parts List Chart

EXPLODED VIEW

EXPLODED VIEW		18		18		18A	
ITEM #	DESCRIPTION	5 BOLT HOUSING SERVICE PART #	6 BOLT HOUSING SERVICE PART #	O-RING (2)			
HOUSING GROUP	01- Standard (4 Bolt) 7/8 O-Ring	MF012014A1	MF012214A1				
	04- Standard (4 Bolt) Rear Port	MF012021A1	N/A				
	06- SAE A (2 Bolt) 7/8 O-Ring	MF012001A1	MF012201A1				
	08- Wheel Mount 7/8 O-Ring	MF012002A1	MF012202A1				
	09- 4 Bolt 7/8 O-Ring	MF012003A1	MF012203A1				
	10- SAE A (2 Bolt) Manifold	MF012004A1	MF012204A1	032790			
	11- 4 Bolt Manifold	MF012005A1	MF012205A1	032790			
	12- SAE A (2 Bolt) 1/2 NPTF	MF012006A1	MF012206A1				
	13- 4 Bolt 1/2 NPTF	MF012007A1	MF012207A1				
	16- SAE A (2 Bolt) 1/2 BSPF	MF012011A1	MF012211A1				
	17- Small Wheel Mount Rear Port	MF012009A1	N/A				
	18- 4 Bolt Mount Rear Port	MF012010A1	N/A				
	25- Standard (4 Bolt) Manifold	MF012049A1	MF012249A1	032790			

EXPLODED VIEW

EXPLODED VIEW		18		18			
ITEM #	DESCRIPTION	5 BOLT HOUSING SERVICE PART #	6 BOLT HOUSING SERVICE PART #	SENSOR			
SPEED SENSOR HOUSING GROUP	01- Standard (4 Bolt) 7/8 O-Ring	N/A	MF012314A1	455069			
	06- SAE A (2 Bolt) 7/8 O-Ring	N/A	MF012301A1	455069			
	07- SAE A (2 Bolt) Rear Port	MF012308A1	N/A	455069			
	08- Wheel Mount 7/8 O-Ring	N/A	MF012302A1	455069			
	09- 4 Bolt 7/8 O-Ring	N/A	MF012303A1	455069			
	10- SAE A (2 Bolt) Manifold	N/A	MF012304A1	455069			
	12- SAE A (2 Bolt) 1/2 NPTF	N/A	MF012306A1	455069			
	13- 4 Bolt 1/2 NPTF	N/A	MF012307A1	455069			
	17- Small Wheel Mount Rear Port	MF012309A1	N/A	455069			
	20- SAE A (2 Bolt)-7 mm (Long Pilot) 1/2 BSPF	N/A	MF012312A1	455069			

EXPLODED VIEW

EXPLODED VIEW		2		3		4		16		21		22		23		24	
ITEM #	DESCRIPTION	5 BOLT END COVER	6 BOLT END COVER	COMMUTATOR SEAL	SEAL RING (5)	INNER SEAL	Plugs/O-Ring Assy.	O-Ring	Valve w/Spring								
OPTION GROUP	AAAA Standard Black Paint	MF016000	MF016007	032435	032821	032377											
	AAAB No Paint	MF016000	MF016007	032435	032821	032377											
	AAAC Corrosion Resistant Paint	MF016000	MF016007	032435	032821	032377											
	AAAH Fluorocarbon Seals	MF016000	MF016007	032435	032822	032809											
	AAAK 3/4" O-Ring Rear Ports	MF016001	N/A	032435	032821	032377											
	BBCB 1740 PSI Internal Bidirectional Relief, No Paint	MF016006A7	N/A	032435	032821	032377	411068A1	032750			4100107						
	BBCM 1200 PSI Internal Bidirectional Relief, No Paint	MF016006A31	N/A	032435	032821	032377	411068A1	032750			41001031						
	BBCN 2030 PSI Internal Bidirectional Relief, No Paint	MF016006A5	N/A	032435	032821	032377	411068A1	032750			4100105						
	BBCP 1450 PSI Internal Bidirectional Relief, No Paint	MF016006A10	N/A	032435	032821	032377	411068A1	032750			41001010						
	BBCB 1560 PSI Internal Bidirectional Relief, No Paint	MF016006A2	N/A	032435	032821	032377	411068A1	032750			4100101						
	BBCU 1450 PSI Internal Bidirectional Relief, Spl. Port Fitting, No Paint	MF016006A10	N/A	032435	032821	032377	411068A1	032750			41001010						
	AAJV Bidirectional Shuttle Valve (3:30), Black Paint	MF016003A1	MF016009A1	032435	032821	032377	411068A1	032750			411068A1						
	FSAA Speed Sensor, Black Paint	N/A	MF016007	032435	032821	032377											
	FSAB Speed Sensor, No Paint	N/A	MF016007	032435	032821	032377											
	FAAH Speed Sensor, Castle Nut, No Paint	N/A	MF016007	032435	032821	032377											
FAAJ Speed Sensor, Castle Nut, Black Paint	N/A	MF016007	032435	032821	032377												

^a Service housing ass'y ITEM #18 with part number suffix-A1 includes ITEM #13, #14, #15 and #19.

^b Select the required bolt number in designated "DISPLACEMENT GROUP" under bolt ITEM #1, 1A, 1B or 1C shown in designated "OPTION GROUP"

^c Castle Nut #025156 is required if the designated "OPTION GROUP" is AAAF, AAAN, or AAU.

Standard seal kit SK000090 includes six #032821 seal rings, #032435 commutator seal, #032377 inner seal, #028516 back up washer, #478036 dirt & water seal, #406018 grease pack, bulletin #887.

Special seal kit SK000091 for units that use fire retardant fluids include six #032822 seal rings, #032435 commutator seal, #032809 inner seal, #028516 back up washer, #478036 dirt & water seal, #406018 grease pack, bulletin #887.

For reverse flow manifold, use MF015001.

Commutator set for rear ported unit MF018001A1

MP Service Parts List Chart

CHART USE EXAMPLE: MP050101AAAA TORQMOTOR™ INCLUDES PART NUMBERS LISTED TO THE RIGHT OF MP(SERIES), 05(DISP.), 01(HOUSING), 01(SHAFT) AND AAAA (OPTION) SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

SERIES	EXPLODED VIEW										
	ITEM #	⁹⁵ & 6	7	9	¹³	¹⁴	¹⁵	17	¹⁹	20	25
	DESCRIPTION	COMMUTATOR ASSEMBLY	MANIFOLD (SEE NOTE)	WEAR PLATE	INNER BEARING	THRUST WASHER(2)	THRUST BEARING	BACKUP WASHER	OUTER BEARING	DIRT & WATER SEAL	BACKUP WASHER
MP-	Service Part #	MF018000A1	MF015000	477341	069513	028348	069030	028515	068027	478035	029118

DISPLACEMENT GROUP	EXPLODED VIEW					
	ITEM #	1	8A	8B	10	
	DISPLACEMENT (in³/rev)	BOLT (6)	ROTOR SET	FREE RUNNING ROTOR SET	DRIVE LINK	
02-	2.7	021311	MF027003	MF027005	MF023000	
03-	3.0	021311	MF037003	MF037005	MF033000	
04-	4.0	021306	MF047003	MF047005	MF043000	
05-	5.0	021382	MF057003	MF057005	MF053000	
06-	6.0	021357	MF067003	MF067005	MF063000	
08-	8.0	021307	MF087003	MF087005	MF083000	
10-	10.0	021358	MF107003	MF107005	MF103000	
12-	12.0	021308	MF127003	MF127005	MF123000	
14-	14.0	021359	MF147003	MF147005	MF143000	
16-	16.0	021310	MF167003	MF167005	MF163000	
18-	18.0	021383	MF187003	MF187005	MF183000	
20-	20.0	021384	MF207003	N/A	MF203000	
22-	22.6	021460	MF227003	N/A	MF223000	
24-	24.0	021414	MF247003	N/A	MF243000	

COUPLING SHAFT GROUP	EXPLODED VIEW			
	ITEM #	12	12A	12B
	DESCRIPTION	COUPLING SHAFT	KEY	NUT
08-	1 1/4" Tapered	MP019000	G124554	025126

HOUSING GROUP	EXPLODED VIEW	
	ITEM #	¹¹⁸
	DESCRIPTION	SERVICE HOUSING ASS'Y
02-	Wheel Mount (4 Bolt) 7/8"-14 SAE O-Ring	MP012002A1

OPTION GROUP	EXPLODED VIEW				
	ITEM #	2	3	4	16
	DESCRIPTION	END COVER	COMMUTATOR SEAL	SEAL RING (5)	INNER SEAL
AAAB	No Paint	MF016007	032435	032821	032817
AAAC	Corrosion Resistant Paint	MF016007	032435	032821	032817
AAAG	Fluorocarbon Seals	MF016007	032435	032822	032818
AABJ	Free Running Rotor Set	MF016007	032435	032821	032817
BBCB	1740 PSI Internal Bidirectional Relief, No Paint	MF016006A7			
BBCM	1200 PSI Internal Bidirectional Relief, No Paint	MF016006A31			
BBCN	2030 PSI Internal Bidirectional Relief, No Paint	MF016006A5			
BBCP	1450 PSI Internal Bidirectional Relief, No Paint	MF016006A10			
BBCT	1560 PSI Internal Bidirectional Relief, No Paint	MF016006A2			
BBCU	1450 PSI Internal Bidirectional Relief, Spl. Port Fitting, No Paint	MF016006A10			
AAJV	Bidirectional Shuttle Valve (3:30), Black Paint	MF016009A1	032435	032821	032817

⁹ Service housing ass'y ITEM #18 with part number suffix-A1 includes ITEM #13, #14, #15 and #19.

¹ Nut #025113 is required if the designated "OPTION GROUP" is AAAF, AAAN, or AAAU.

Standard seal kit SK000146 includes five #032821 seal rings, #032435 commutator seal, #032817 inner seal, #028515 and #029118 back washers, #478035 dirt & water, #406018 grease pack, bulletin #687.

Special seal kit SK000148 for units that use fire retardant fluids or higher temperature oil includes five #032822 seal rings, #032435 commutator seal, #032818 shaft seal, #028515 back up washer, #478035 dirt & water seal, #406018 grease pack, #029118 thrust washer, #6876 bulletin.

For reverse flow manifold, use MF015001.

MB Service Parts List Chart

CHART USE EXAMPLE: MB050101AAAA TORQMOTOR™ INCLUDES PART NUMBERS LISTED TO THE RIGHT OF MB(SERIES), 05(DISP), 01(HOUSING), 01(SHAFT) AND AAAA (OPTION) SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

SERIES	EXPLODED VIEW											
	ITEM #	^a 5 & 6	7	9	11	^a 13	^a 14	^a 15	17	^a 19	20	25
	DESCRIPTION	COMMUTATOR ASSEMBLY	MANIFOLD (SEE NOTE)	WEAR PLATE	THRUST BEARING	INNER BEARING	THRUST WASHER(2)	THRUST BEARING	BACKUP WASHER	OUTER BEARING	DIRT & WATER SEAL	BACKUP WASHER
MB-	Service Part #	ME018000A1	ME015000	477342	068024	071019	400136	069017	028515	068027	478035	029118

DISPLACEMENT GROUP	EXPLODED VIEW ^b (SELECT ITEM # BOLT PER OPTION GROUP)										
	ITEM #	1	OR 1A	OR 1B	OR 1C		8A	8B	10		
	DISPLACEMENT (in ³ /rev)	BOLT (7)	BOLT (7)	BOLT (7)	BOLT (7)	ROTOR THICKNESS	ROTOR SET	FREE RUNNING ROTOR SET	DRIVE LINK	12 TOOTH	14 TOOTH
05-	4.9	021326	021340	021273	021413	.4393	MB057003	MB057005	MB063000	4.262"	
06-	6.1	021326	021340	021273	021413	.4393	MB067003	MB067005	MB063000	4.262"	
08-	7.8	021271	021386	021273	021379	.5643	MB087003	MB087005	MB083000	4.388"	
09-	8.6	021390	021273	021273	021379	.6268	MB097003	MB097005	MB093000	4.451"	
10-	10.3	021376	021387	021387	021392	.7518	MB107003	MB107005	MB103000	4.577"	
12-	12.0	021352	021379	021379	021291	.8768	MB127003	MB127005	MB123000	4.703"	
15-	14.5	021272	021392	021291	021412	1.0643	MB157003	MB157005	MB153000	4.892"	
18-	17.1	021340	021392	021392	021385	1.2518	MB187003	MB187005	MB183000	5.081"	
22-†	22.2	021387	021378	021378	021415	1.5018	ME237003	ME237007	MB233002		5.458"
23-	22.2	021387	021378	021378	021415	1.6268	MB237003	MB237005	MB233000	5.458"	
25-†	24.7	021379	021366	021415	021374	1.7923	ME247003	ME247007	MB253002		5.604"
29-†	29.1	021392	021394	021394	021393	2.1268	ME297003	ME297007	MB293002		5.947"

† (Not available in clutch motor)

HOUSING GROUP	EXPLODED VIEW	
	ITEM #	^a 18
	DESCRIPTION	SERVICE HOUSING ASS'Y
01-	Standard (4 Bolt) 7/8" O-Ring	ME012001A1
02-	Wheel Mt. (4 Bolt) 7/8" O-Ring	ME012002A1
04-	Standard (4 Bolt) Rear Port	ME012004A1
05-	Wheel Mt. (4 Bolt) Rear Port	ME012005A1
06-	SAE A (2 Bolt) 7/8" O-Ring	ME012006A1
07-	SAE A (2 Bolt) Rear Port	ME012007A1
14-	Whl. (-02) with Machined Pilot Nose	ME012008A1
15-	Whl. w/Brake Mt. (4 Bolt) 7/8" O-Ring	ME012009A1
16-	SAE A (2 Bolt) 1/2" BSPF	ME012027A1
19-	Standard (4 Bolt) 1/2" BSPF	ME012010A1
21-	Optional Wheel (4 Bolt) Rear Port	ME012011A1
25-	Standard (4 Bolt) Manifold	ME012018A1
26-	SAE B (2 Bolt) 7/8	ME012019A1
24*	Clutch Motor 7/8" O-Ring	ME012013A1

* (Clutch Motor Only)

SPEED SENSOR HOUSING GROUP	EXPLODED VIEW	
	ITEM #	18
	DESCRIPTION	SERVICE HOUSING ASS'Y
01-	Standard (4 Bolt) 7/8" O-Ring	MB012301A1
02-	Wheel Mt. (4 Bolt) 7/8" O-Ring	MB012302A1
06-	SAE A (2 Bolt) 7/8" O-Ring	MB012306A1
07-	SAE A (2 Bolt) Rear Port	MB012307A1
10-	SAE A (2 Bolt) Manifold	MB012328A1
19-	Standard (4 Bolt) 1/2" BSPF	MB012310A1
26-	SAE B (2 Bolt) Manifold	MB012319A1

COUPLING SHAFT GROUP	EXPLODED VIEW								
	ITEM #	12	12	12A	12B	12C	12D	12E	12F
	DESCRIPTION	COUPLING SHAFT	COUPLING SHAFT FOR DISP. 22, 25, 29†	KEY	NUT	WASHER	5/8-18 BOLT	LOCK WASHER	RETAINING RING
01-	Long 6B Snapwire Groove	MB019001	ME019001						
02-	Long Woodruff, 1/4" Tap Snapwire Groove	MB019002	ME019002	G124553					
03-	1.25" Straight Keyed 5/8-18 Int. Thd.	MB019003	ME019003	039028		028413	G223734	028992	401333
03*	1.25" Straight Keyed	093044							
04-	10B Spline	MB019004	ME019004						
05-	14 Tooth Spline 5/8-18 Int. Thd.	MB019005	ME019005			028413	G223734	028992	
05*	14 Tooth Spline 5/8-18 Int. Thd.	093043				028413	G223734	028992	
06-	19 Tooth Spline	MB019006	ME019006						
07-	15 Tooth Spline	MB019007	ME019007						
08-	1.25" Tapered Shaft	MB019000	ME019000	G124554	^c 025126				

* (Clutch Motor Only) † (Not available in clutch motor)

MB Service Parts List Chart

COUPLING SHAFT GROUP FOR DISP. -22, -25, -29

EXPLODED VIEW		12
ITEM #	DESCRIPTION	COUPLING SHAFT
01-	Long 2B Snapwire Groove	ME019001
02-	Long Woodruff, 1/4" Tap Snapwire Groove	ME019002
03-	1.25" Straight Keyed 5/8-18 Int. Thd.	ME019003
04-	10B Spline	ME019004
05-	14 Tooth Spline 5/8-18 Int. Thd.	ME019005
06-	19 Tooth Spline	ME019006
07-	15 Tooth Spline	ME019007
08-	1.25" Tapered Shaft	ME019000
19-	1.38" Tapered 1.125-18 Thd.	ME019010
20-	1.38" Straight Key 5/8 Tap	ME019011
01-*	Long 2B Snapwire Groove	ME019301
02-*	Long Woodruff, 1/4" Tap Snapwire Groove	ME019302
03-*	1.25" Straight Keyed 5/8-18 Int. Thd.	ME019303
05-*	14 Tooth Spline 5/8-18 Int. Thd.	ME019305
08-*	1.25" Tapered Shaft	ME019300

* (Speed Sensor only)

EXPLODED VIEW		12
ITEM #	DESCRIPTION	COUPLING SHAFT
03-	1.25" Straight Keyed 5/8-18 Int. Thd.	ME019031
05-	14 Tooth Spline 5/8-18 Int. Thd.	ME019034
08-	1.25" Tapered Shaft	ME019030
31-	1.50" Tapered 1.25-18 Thread	ME019029
32-	1.50" Straight Keyed with 7/8" Tap	ME019032
36-	17 Tooth Spline (12/24P) with 5/8" Tap	ME019033

BRAKE MOTOR COUPLING SHAFT GROUP

CLUTCH MOTOR COUPLING SHAFT GROUP

SPEED SENSOR COUPLING SHAFT GROUP

EXPLODED VIEW		12
ITEM #	DESCRIPTION	COUPLING SHAFT
03-	1.25" Straight Keyed 5/8-18 Int. Thd.	093044
05-	14 Tooth Spline 5/8-18 Int. Thd.	093043

EXPLODED VIEW		12
ITEM #	DESCRIPTION	COUPLING SHAFT
01-	Long 6B Snapwire Groove	MB019301
02-	Long Woodruff, 1/4" Tap Snapwire Groove	MB019302
03-	1.25" Straight Keyed 5/8-18 Int. Thd.	MB019303
05-	14 Tooth Spline 5/8-18 Int. Thd.	MB019305
08-	1.25" Tapered Shaft	MB019300
28-	13 Tooth Spline (16/32)	MB019323

EXPLODED VIEW

ITEM #	DESCRIPTION	'1, 1A, 1B, 1C	2	3	4	16	'21 & 22	'22	'23	'24	12B	
		BOLT (7)	END COVER	COMMUTATOR SEAL	SEAL RING (5)	INNER SEAL	PLUG & O-RING ASSEMBLY	O-RING	SPRING (2)	VALVE	CASTLE NUT	SENSOR
AAAA	Black Paint	Item #1	ME016000	032435	032819	032817						
AAAC	Corrosion Resistant Paint	Item #1	ME016000	032435	032819	032817						
AAAF	Castle Nut Replacing Patch Lock Nut	Item #1	ME016000	032435	032819	032817					025113	
AAAG	Fluorocarbon Seals, Black Paint	Item #1	ME016000	032435	032820	032818						
AAAH	Fluorocarbon Seals, No Paint	Item #1	ME016000	032435	032820	032818						
AAAM	Rear Port 7/8" O-Ring Ports	Item #1B	ME016002	032435	032819	032817						
AAAN	Rear Port 7/8" O-Ring Ports & Castle Nut	Item #1B	ME016002	032435	032819	032817					025113	
AAAP	Rear Port Manifold	Item #1B	*ME016001J1	032435	032819	032817						
AAAT	Hot Oil Shuttle Endcover 11:00	Item #1A	*ME016003A1	032435	032819	032817	415463A2	032791	401642	415569		
AAAU	Hot Oil Shuttle Endcover 11:00 & Castle Nut	Item #1A	*ME016003A1	032435	032819	032817	415463A2	032791	401642	415569	025113	
AAHB	7/8 O-Ring Axial Rear Ports No Paint	Item #1B	ME016009	032435	032819	032817						
BBBA	1000 PSI Cross Port Relief Endcover, Black Paint	Item #1C	*ME016004A1	032435	032819	032817	411063A1	032424		41001210 (2), 1000 PSI		
BBBB	2000 PSI Cross Port Relief Endcover, Black Paint	Item #1C	*ME016004A2	032435	032819	032817	411063A1	032424		41001220 (2), 2000 PSI		
BBCG	2500 PSI Int. Bidirectional Relief Endcover, No Paint	Item # 1C	ME016004A6	032435	032819	032817	411063A1	032424		41001225 (2), 2500 PSI		
BBCX	2500 PSI Int. Bidirectional Relief Endcover, No Nut, Black Paint	Item # 1C	ME016004A6	032435	032819	032817	411063A1	032424		41001225 (2), 2500 PSI		
BBCW	3000 PSI Int. Bidirectional Relief Endcover, No Nut, No Paint	Item # 1C	ME016004A3	032435	032819	032817	411063A1	032424		41001230 (2), 3000 PSI		
BBBC	3000 PSI Cross Port Relief Endcover, Black Paint	Item #1C	*ME016004A3	032435	032819	032817	411063A1	032424		41001230 (2), 3000 PSI		
BBBD	4000 PSI Cross Port Relief Endcover, Black Paint	Item #1C	*ME016004A4	032435	032819	032817	411063A1	032424		41001240 (2), 4000 PSI		
BBBG	1500 PSI Cross Port Relief Endcover, Black Paint	Item #1C	ME016004A5	032435	032819	032817	411063A1	032424		41000976 (2), 1500 PSI		
DDDA	Clutch Motor	Item #1	ME016000	032435	032819	032817						
FSAA	Speed Sensor Option	Item #1	ME016000	032435	032819	032817						455069

For reverse flow manifold, use ME015001.

^a Service housing ass'y ITEM #18 with part number suffix-A1 includes ITEM #13, #14 two req'd, #15 and #19.

^b Select the required bolt number in designated "DISPLACEMENT GROUP" under bolt ITEM #1, 1A, 1B or 1C shown in designated "OPTION GROUP."

^c Slotted nut #025113 is required if the designated "OPTION GROUP" is AAAF, AAAN, or AAAU. 1-20 UNEF

^d ITEM #22 is part of plug & o-ring ass'y's but can be serviced separately.

^e Service and cover ME016001J1 includes two #032790 o-rings, ITEM 18A on the exploded ass'y view that can also be serviced separately.

^f End cover assembly item #2 also includes item #21, #22, #24 and if required item #23. All but item #21 can be serviced separately.

^g ME018001A1 commutator ass'y. is required if the designated "OPTION GROUP" is AAAM, AAAN, or AAAP.

Standard seal kit SK000092 includes six #032819 seal rings, #032435 commutator seal, #032817 inner seal, #028515 and #029118 back washers, #478035 dirt & water, #406018 grease pack, bulletin #687.

Special seal kit SK000093 for units that use fire retardant fluids includes six #032435 commutator seal, #032818 inner seal, #028515 and #029118 back up washers, #478035 dirt & water seal, #406018 grease pack, bulletin #687.

Vespel commutator seal AADJ 032751. High temperature seal black in color.

* Standard seal kit SK000092 for motor only. If repairing clutch, need SK000039. Kit includes two #067033 bearing and cone assemblies, two #400740 bearing cups, one #400141 thrust washer, one #401622 snap ring, one #401632 retaining ring, and one #478030 dirt and water seal.

ME Service Parts List Chart

CHART USE EXAMPLE: ME090101AAAA TORQMOTOR™ INCLUDES PART NUMBERS LISTED TO THE RIGHT OF ME (SERIES), 09(DISP), 01(HOUSING), 01(SHAFT) AND AAAA (OPTION) SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

SERIES	EXPLODED VIEW											
	ITEM #	^{#5 & 6}	7	9	11	^{#13}	^{#14}	^{#15}	17	^{#19}	20	25
	DESCRIPTION	COMMUTATOR ASSEMBLY	MANIFOLD (see note)	WEAR PLATE	THRUST BEARING	INNER BEARING	THRUST WASHER(2)	THRUST BEARING	BACKUP WASHER	OUTER BEARING	DIRT & WATER SEAL	BACKUP WASHER
ME-	Service Part #	ME018000A1	ME015000	477342	068024	071019	400136	069017	028515	068027	478035	029118

DISPLACEMENT GROUP	EXPLODED VIEW		^b (SELECT ITEM # BOLT PER OPTION GROUP)									
	ITEM #		1 OR	1A OR	1B OR	1C	8A	8B	10			
	DISPLACEMENT (in ³ /rev)	BOLT (7)	BOLT (7)	BOLT (7)	BOLT (7)	ROTOR THICKNESS	ROTOR SET	FREE RUNNING ROTOR SET	DRIVE LINK	DRIVE LINK "L DIM"		
09-	8.6	021390	021273	021273	021379	.6286	ME097003	ME097007	ME093000	4.4385		
10-	10.3	021376	021387	021387	021392	.7518	ME107003	ME107007	ME103000	4.5650		
12-	12.0	021352	021379	021379	021291	.8768	ME127003	ME127007	ME123000	4.6905		
15-	14.5	021272	021392	021291	021412	1.0643	ME157003	ME157007	ME153000	4.8795		
18-	17.1	021340	021392	021392	021385	1.2518	ME187003	ME187007	ME183000	5.0685		
21-	20.6	021273	021385	021385	021366	1.5018	ME217003	ME217007	ME213000	5.3195		
24-	24.7	021379	021366	021415	021374	1.7923	ME247003	ME247007	ME243000	5.6045		
29-	29.1	021392	021394	021394	021393	2.1268	ME297003	ME297007	ME293000	5.9475		
33-	32.3	021385	021393	021393	021395	2.3768	ME337003	ME337007	ME333000	6.1985		
37-	38.0	021366	021329	021329	021458	2.7536	ME377003	N/A	ME373000	6.5745		
48-	48.0	021395	021388	021388	021416	3.5036	ME487003	N/A	ME483000	7.3285		
58-	58.5	021396	021389	021389	021399	4.2536	ME587003	N/A	ME583000	8.0815		

HOUSING GROUP	EXPLODED VIEW			
	ITEM #		^{#18}	^{#18A}
	DESCRIPTION	SERVICE HOUSING ASS'Y	O-RING (2)	
01-	Standard (4 Bolt) 7/8" O-Ring	ME012001A1		
02-	Wheel Mt. (4 Bolt) 7/8" O-Ring	ME012002A1		
04-	Standard (4 Bolt) Rear Port	ME012004A1		
05-	Wheel Mt. (4 Bolt) Rear Port	ME012005A1		
06-	SAE A (2 Bolt) 7/8" O-Ring	ME012006A1		
07-	SAE A (2 Bolt) Rear Port	ME012007A1		
10-	SAE A (2 Bolt) Manifold	ME012028A1		
14-	Wheel (-02) with Machined Pilot Nose	ME012008A1		
16-	SAE A (2 Bolt) 1/2" BSPF	ME012027A1		
19-	Standard (4 Bolt) 1/2" BSPF	ME012010A1		
21-	Optional Wheel (4 Bolt) Rear Port	ME012011A1		
25-	Standard (4 Bolt) Manifold	ME012018A1	032790	
26-	SAE B (2 Bolt) 7/8" O-Ring	ME012019A1		

SPEED SENSOR HOUSING GROUP	EXPLODED VIEW	
	ITEM #	18
	DESCRIPTION	SERVICE HOUSING ASS'Y
01-	Standard (4 Bolt) 7/8" O-Ring	ME012301A1
02-	Wheel Mt. (4 Bolt) 7/8" O-Ring	ME012302A1
06-	SAE A (2 Bolt) 7/8" O-Ring	ME012306A1
07-	SAE A (2 Bolt) Rear Port	ME012307A1
10-	SAE A (2 Bolt) Manifold	ME012328A1
19-	Standard (4 Bolt) 1/2" BSPF	ME012310A1
26-	SAE B (2 Bolt) 7/8" O-Ring	ME012319A1

Order (2) 032790 seals for parts when ordering manifold-style housing

For reverse flow manifold, use ME015001.

^a Service housing ass'y ITEM #18 with part number suffix-A1 includes ITEM #13, #14 two req'd, #15 and #19.

^b Select the required bolt number in designated "DISPLACEMENT GROUP" under bolt ITEM #1, 1A, 1B or 1C shown in designated "OPTION GROUP"

^c 1-20 UNEF nut #025113 is required if the designated "OPTION GROUP" is AAAF, AAAN, or AAAU.

^d ITEM #22 is part of plug & o-ring assy's but can be serviced separately.

^e Service end cover ME016001J1 includes two #032790 o-rings, ITEM 18A on the exploded ass'y view that can also be serviced separately.

^f End cover assembly item #2 also includes item #21, #22, #24 and if required item #23. All but item #21 can be serviced separately.

^g 1 1/8-18 UNEF nut #025139 is required if the designated "OPTION GROUP" is AAAF, AAAN, or AAAU

^h ME018001A1 commutator ass'y. is required if the designated "OPTION GROUP" is AAAM, AAAN, or AAAP.

Standard seal kit SK000092 includes six #032819 seal rings, #032435 commutator seal, #032817 inner seal, #028515 and #029118 back washers, #478035 dirt & water seal, #406018 grease pack, bulletin #687.

Special seal kit SK000093 for units that use fire retardant fluids includes six #032820 seal rings, #032435 commutator seal, #032818 inner seal, #028515 and #029118 back up washers, #478035 dirt & water seal, #406018 grease pack, bulletin #687.

Vespel commutator seal AAAJ 032751. High temp seal black in color.

(08) 1-1/4 Castle nut zinc di chromate 025154.

(08) 1-1/4 shaft castle nut 025113 1-20 slotted nut

(19) castle nut 025139 1-3/8 slotted nut.

ME Service Parts List Chart

EXPLODED VIEW		12	12A	12B	12C	12D	12E	12F
ITEM #	DESCRIPTION	COUPLING SHAFT	KEY	NUT	WASHER	5/8-18 BOLT	LOCK WASHER	RETAINING RING
COUPLING SHAFT GROUP	01- Long 2B Snapwire Groove	ME019001						
	02- Long Woodruff, 1/4" Tap Snapwire Groove	ME019002	G124553 (1/4 x 1.00)					
	03- 1.25" Straight Keyed 5/8-18 Int. Thd.	ME019003	039028		028413	G223734	028992	401333
	04- 10B Spline	ME019004						
	05- 14 Tooth Spline 5/8-18 Int. Thd.	ME019005			028413	G223734	028992	
	06- 19 Tooth Spline	ME019006						
	07- 15 Tooth Spline	ME019007						
	08- 1.25" Tapered Shaft	ME019000	G124554	025126				
	19- 1.38" Tapered 1.125-18 Thd.	ME019010	G124554	025138				
	20- 1.38" Straight Key 5/8 Tap	ME019011	039028		028518	G223734	028992	401658

EXPLODED VIEW		12	EXPLODED VIEW		12
ITEM #	DESCRIPTION	COUPLING SHAFT	ITEM #	DESCRIPTION	COUPLING SHAFT
SPEED SENSOR COUPLING SHAFT GROUP	01- Long 2B Snapwire Groove	ME019301	BRAKE MOTOR COUPLING SHAFT GROUP	03- 1.25" Straight Keyed 5/8-18 Int. Thd.	ME019031
	02- Long Woodruff, 1/4" Tap Snapwire Groove	ME019302		05- 14 Tooth Spline 5/8-18 Int. Thd.	ME019034
	03- 1.25" Straight Keyed 5/8-18 Int. Thd.	ME019303		08- 1.25" Tapered Shaft	ME019030
	05- 14 Tooth Spline 5/8-18 Int. Thd.	ME019305		31- 1.50" Tapered 1.25-18 Thread	ME019029
	08- 1.25" Tapered Shaft	ME019300		32- 1.50 Straight Keyed with 7/8" Tap	ME019032
				36- 17 Tooth Spline (12/24P) with 5/8" Tap	ME019033

EXPLODED VIEW		'1, 1A, 1B, 1C	2	3	4	16/8A	'21 & 22	'22	'23	'24	
ITEM #	DESCRIPTION	BOLT (7)	END COVER	COMMUTATOR SEAL	SEAL RING (5)	INNER SEAL	PLUG & O-RING ASSEMBLY	O-RING	SPRING (2)	VALVE	SENSOR
AAAA	Black Paint	Item #1	ME016000	032435	032819	032817					
AAAC	Corrosion Resistant Paint	Item #1	ME016000	032435	032819	032817					
AAAF	Castle Nut Replacing Patch Lock Nut	Item #1	ME016000	032435	032819	032817					
AAAG	Fluorocarbon Seals	Item #1	ME016000	032435	032820	032818					
AAAM	Rear Port 7/8" O-Ring Ports	Item #1B	ME016002	032435	032819	032817					
AAAN	Rear Port 7/8" O-Ring Ports & Castle Nut	Item #1B	ME016002	032435	032819	032817					
AAAP	Manifold Side Rear Ports Black Paint	Item #1B	ME016001J1	032435	032819	032817,		032790			
AAAT	Hot Oil Shuttle Endcover 11:00	Item #1A	ME016003A1	032435	032819	032817	415463A2	032791	401642	415569	
AAAU	Hot Oil Shuttle Endcover 11:00 & Castle Nut	Item #1A	ME016003A1	032435	032819	032817	415463A2	032791	401642	415569	
AAHB	7/8 O-Ring Axial Rear Ports, No Paint	Item #1B	ME016009	032435	032819	032817					
BBBA	1000 PSI Cross Port Relief Endcover	Item #1C	ME016004A1	032435	032819	032817	411063A1	032424		41001210	1000 PSI
BBBB	2000 PSI Cross Port Relief Endcover	Item #1C	ME016004A2	032435	032819	032817	411063A1	032424		41001220	2000 PSI
BBCG	2500 PSI Cross Port Relief Endcover	Item #1C	ME016004A2	032435	032819	032817	411063A1	032424		41001225	2500 PSI
BBBC	3000 PSI Cross Port Relief Endcover	Item #1C	ME016004A3	032435	032819	032817	411063A1	032424		41001230	3000 PSI
BBBD	4000 PSI Cross Port Relief Endcover	Item #1C	ME016004A4	032435	032819	032817	411063A1	032424		41001240	4000 PSI
BBBG	1500 PSI Cross Port Relief Endcover	Item #1C	ME016004A5	032435	032819	032817	411063A1	032424		41000976	1500 PSI
FSAA	Speed Sensor Option	Item #1	ME016000	032435	032819	032817					455069

MJ Service Parts List Chart

CHART USE EXAMPLE: MJ090101AAAA TORQMOTOR™ INCLUDES PARTS NUMBERS LISTED TO THE RIGHT OF MJ(SERIES), 09(DISP), 01(HOUSING), 01(SHAFT) AND AAAA (OPTION) SHOWN IN LEFT HAND COLUMN OF CHART.

CAUTION: THE CHARTED COMPONENT SERVICE INFORMATION IS FOR THE TORQMOTORS LISTED ONLY. REFER TO THE ORIGINAL EQUIPMENT MANUFACTURER OF THE EQUIPMENT USING THE TORQMOTOR FOR ASSEMBLY NUMBERS NOT LISTED BELOW.

SERIES	EXPLODED VIEW											
	ITEM #	^b 5 & 6	7	9	11	^a 13	^a 14	^a 15	17	^a 19	20	25
	DESCRIPTION	COMMUTATOR ASSEMBLY	MANIFOLD (SEE NOTE)	WEAR PLATE	THRUST BEARING	INNER BEARING	THRUST WASHER(2)	THRUST BEARING	BACKUP WASHER	OUTER BEARING	DIRT & WATER SEAL	BACKUP WASHER
MJ-	Service Part #	ME018000A1	ME015000	477342	068024	071031	069023 (2)	069022	028537	069021	487063	028538

DISPLACEMENT GROUP	EXPLODED VIEW										
	ITEM #	^b (SELECT ITEM # BOLT PER OPTION GROUP)				8A	8B	10			
	DISPLACEMENT (in ³ /rev)	BOLT (7)	BOLT (7)	BOLT (7)	BOLT (7)	ROTOR THICKNESS	ROTOR SET	FREE RUNNING ROTOR SET	DRIVE LINK	DRIVE LINK "L DIM"	
09-	8.6	021390	021273	021273	021379	.6286	ME097003	ME097005	ME093000	4.4385	
10-	10.3	021376	021387	021387	021392	.7518	ME107003	ME107007	ME103000	4.5650	
12-	12.0	021352	021379	021379	021291	.8768	ME127003	ME127005	ME123000	4.6905	
15-	14.5	021272	021392	021291	021412	1.0643	ME157003	ME157005	ME153000	4.8795	
18-	17.1	021340	021392	021392	021385	1.2518	ME187003	ME187005	ME183000	5.0685	
21-	20.6	021273	021385	021385	021366	1.5018	ME217003	ME217005	ME213000	5.3195	
24-	24.7	021379	021366	021415	021374	1.7923	ME247003	ME247005	ME243000	5.6045	
29-	29.1	021392	021394	021394	021393	2.1268	ME297003	ME297005	ME293000	5.9475	
33-	32.3	021385	021393	021393	021395	2.3768	ME337003	ME337005	ME333000	6.1985	
37-	38.0	021366	021329	021329	021458	2.7536	ME377003	N/A	ME373000	6.5745	
48-	48.0	021395	021388	021388	021416	3.5036	ME487003	N/A	ME483000	7.3285	
58-	58.5	021396	021389	021389	021399	4.2536	ME587003	N/A	ME583000	8.0815	

COUPLING SHAFT GROUP	EXPLODED VIEW								HOUSING GROUP	EXPLODED VIEW	
	ITEM #	12	12A	12B	12C	12D	12E	12F		ITEM #	^a 18
	DESCRIPTION	COUPLING SHAFT	KEY	NUT	WASHER	7/8-14 BOLT	LOCK WASHER	RETAINING RING		DESCRIPTION	SERVICE HOUSING ASS'Y
31-	1-1/2" Tapered Shaft	MJ019000	039039	025131					01-	SAE A (4 Bolt) 7/8" O-Ring	MJ012002A1
32-	1-1/2" Straight Key	MJ019001	039040		028492	G426477	G103327	401464	02-	Wheel Mt. (4 Bolt) 7/8" O-Ring	MJ012001A1
36-	17 Tooth Spline	MJ019002							04-	Standard Mount (4 Bolt) Rear Port	MJ012004A1
									05-	Wheel Mt. (4 Bolt) Rear Port	MJ012003A1

OPTION GROUP	EXPLODED VIEW												
	ITEM #	^b 1, 1A, 1B, 1C				2	3	4	16	^f 21 & 22	^d 22	^e 23	^e 24
	DESCRIPTION	BOLT (7)	END COVER	COMMUTATOR SEAL	SEAL RING (5)	INNER SEAL	PLUG & O-RING ASSEMBLY	O-RING	SPRING (2)	VALVE			
AAAA	Black Paint	Item #1	MB016000	032435	032819	032836							
AAAC	Corrosion Resistant Paint	Item #1	MB016000	032435	032819	032836							
AAAF	Castle Nut Replacing Patch Lock Nut	Item #1	MB016000	032435	032819	032836							
AAAG	Viton Seals Black Paint	Item #1	MB016000	032435	032820	032836							
AAAH	Viton Seals No Paint	Item #1	MB016000	032435	032820	032836							
AAAM	Rear Port 7/8" O-Ring Ports	Item #1B	ME016002	032435	032819	032836							
AAAN	Rear Port 7/8" O-Ring Ports & Castle Nut	Item #1B	ME016002	032435	032819	032836							
AAAP	Manifold Side Rear Port Black Paint	Item #1B	^a ME016001J1	032435	032819	032836							
AAAT	Hot Oil Shuttle Endcover 11:00	Item #1A	^a ME016003A1	032435	032819	032836	415463A2	032790	401642	415569			
AAAU	Hot Oil Shuttle Endcover 11:00 & Castle Nut	Item #1A	^a ME016003A1	032435	032819	032836	415463A2	032790	401642	415569			
BBBA	1000 PSI Cross Port Relief Endcover	Item #1C	^a ME016004A1	032435	032819	032836	411063A1	032424			41001210 (2), 1000PSI		
BBBB	2000 PSI Cross Port Relief Endcover	Item #1C	^a ME016004A2	032435	032819	032836	411063A1	032424			41001220 (2), 2000PSI		
BBBC	3000 PSI Cross Port Relief Endcover	Item #1C	^a ME016004A3	032435	032819	032836	411063A1	032424			41001230 (2), 3000PSI		
BBBD	4000 PSI Cross Port Relief Endcover	Item #1C	^a ME016004A4	032435	032819	032836	411063A1	032424			41001240 (2), 4000PSI		
BBBG	1500 PSI Cross Port Relief Endcover	Item #1C	^a ME016004A5	032435	032819	032836	411063A1	032424			41000976 (2), 1500PSI		
BBCG	2500 PSI Cross Port Relief Endcover	Item #1C	^a ME016004A2	032435	032819	032836	411063A1	032424			41001225 (2), 2500 PSI		

For reverse flow manifold, use MF015001.

^a Service housing ass'y ITEM #18 with part number suffix-A1 includes ITEM #13, #14 two req'd, #15 and #19.

^b Select the required bolt number in designated "DISPLACEMENT GROUP" under bolt ITEM #1, 1A, 1B or 1C shown in designated "OPTION GROUP"

^c Slotted nut #025133 is required if the designated "OPTION GROUP" is AAAG, AAAN, or AAAU.

1-20 UNEF

^d ITEM #22 is part of plug & o-ring ass'y's but can be serviced separately.

^e Service and cover ME016001J1 includes two #032790 o-rings, ITEM 18A on the exploded ass'y view that can also be serviced separately.

^f End cover assembly item #2 also includes item #21, #22, #24 and if required item #23. All but item #21 can be serviced separately.

^g ME018001A1 commutator ass'y. is required if the designated "OPTION GROUP" is AAAM, AAAN, or AAAP.

Standard seal kit SK000115 includes six #032819 seal rings, #032435 commutator seal, #032836 inner seal, #028537 and #028538 back washers, #478063 dirt & water, #406018 grease pack, bulletin #687.

Disassembly and Inspection

(Preparation Before Disassembly)

- Before you disassemble the Torqmotor™ unit or any of its components read this entire manual. It provides important information on parts and procedures you will need to know to service the Torqmotor™.
- Determine whether the Torqmotor™ you are about to disassemble is the Small Frame Series MG, MF or MP or the Large Frame Series MB, ME, or MJ so you can follow those procedures that pertain to that Series Torqmotor™. The first two letters of the “spec” number on the Torqmotor™ identification tag is the Series designation. Also determine the type of end construction from the alternate views shown on the exploded view.
- The Small Frame Series MG & MF Torqmotors™ will have a 3.66 inch (92.9 mm) main body outside diameter and 5 or 6 16-24 UNF 2A cover bolts. The Medium Frame Series MP Torqmotors™ will have a 3.66 inch (92.9 mm) main body outside diameter and six 5/16-24 UNF 2A cover bolts. The Large Frame Series MB, ME, & MJ Torqmotors™ will have a 5 inch (127.9 mm) main body outside diameter and seven 3/8 24 UNF 2A cover bolts.
- Refer to “Tools and Materials Required for Services” section for tools and other items required to service the Torqmotor™ and have them available.
- Thoroughly clean off all outside dirt, especially from around fittings and hose connections, before disconnecting and removing the Torqmotor™. Remove rust or corrosion from coupling shaft.
- Remove coupling shaft connections and hose fittings and immediately plug port holes and fluid lines.
- Remove the Torqmotor™ from system, drain it of fluid and take it to a clean work surface.
- Clean and dry the Torqmotor™ before you start to disassemble the unit.
- As you disassemble the Torqmotor™ clean all parts, except seals, in clean petroleum-based solvent, and blow them dry.

WARNING: petroleum-base solvents are flammable. Be extremely careful when using any solvent. Even a small explosion or fire could cause injury or death.

WARNING: WEAR EYE PROTECTION AND BE SURE TO COMPLY WITH OSHA OR OTHER MAXIMUM AIR PRESSURE REQUIREMENTS.

CAUTION: Never steam or high pressure wash hydraulic components. Do not force or abuse closely fitted parts.

- Keep parts separate to avoid nicks and burrs.
- Discard all seals and seal rings as they are removed from the Torqmotor™. Replace all seals, seal rings and any damaged or worn parts with genuine Ross or OEM approved service parts.

Disassembly and Inspection

(Reference Exploded Assembly View)

Place Torqmotor in a vise

1. Place the Torqmotor™ in a soft jawed vice, with coupling shaft (12) pointed down and the vise jaws clamping firmly on the sides of the housing (18) mounting flange or port bosses. Remove manifold port O-Rings (18A) if applicable.

WARNING

WARNING: IF THE TORQMOTOR™ IS NOT FIRMLY HELD IN THE VISE, IT COULD BE DISLODGED DURING THE SERVICE PROCEDURES, CAUSING INJURY.

Scribe alignment mark & loose valve plugs

2. Scribe an alignment mark down and across the Torqmotor™ components from end cover (2) to housing (18) to facilitate reassembly orientation where required. Loosen two shuttle or relief valve plugs (21) for disassembly later if included in end cover. 3/16 or 3/8 inch Allen wrench or 1 inch hex socket required. SEE FIGURE 3 & 4.

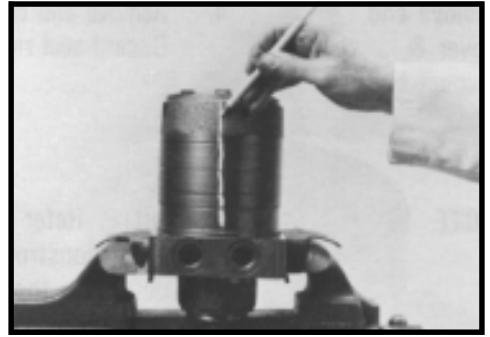


Figure 3

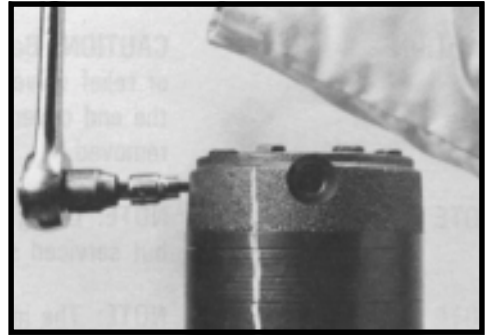


Figure 4

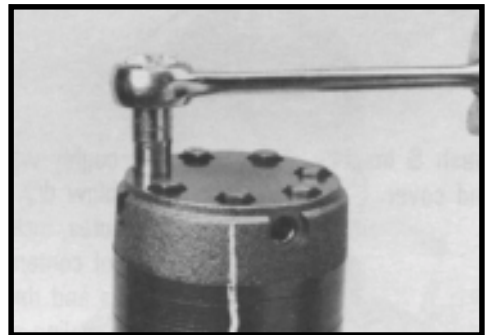


Figure 5

Remove special bolts & inspect bolts

3. Remove the six or seven special ring head bolts (1, 1A, 1B, or 1C) using an appropriate 1/2 or 9/16 inch size socket. SEE FIGURE 5. Inspect bolts for damaged threads, or sealing rings, under the bolt head. Replace damaged bolts. SEE FIGURE 6.

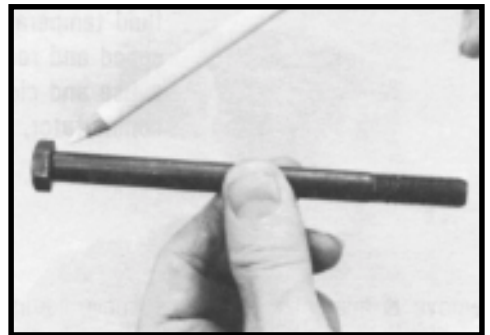


Figure 6

Remove end cover & inspect bolts

4. Remove end cover assembly (2) and seal ring (4). Discard seal ring. SEE FIGURE 7.

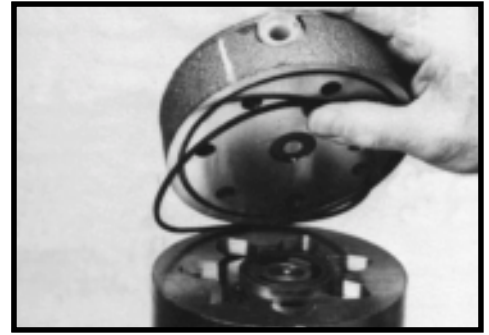


Figure 7

NOTE

NOTE: Refer to the appropriate "alternate cover construction" on the exploded view to determine the end cover construction being serviced.

Remove plugs and valves

5. If the end cover (2) is equipped with shuttle valve or relief valve (24) components, remove the two previously loosened plugs (21) and o-rings (22). SEE FIGURE 8.

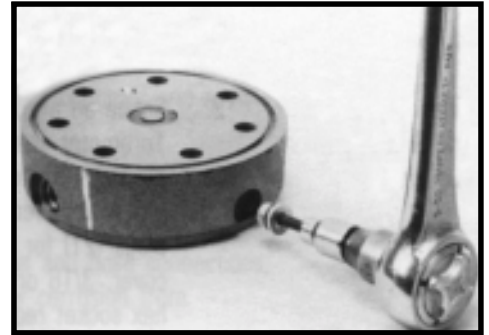


Figure 8

CAUTION

CAUTION: Be ready to catch the shuttle valve or relief valve components that will fall out of the end cover valve cavity when the plugs are removed.

NOTE

NOTE: O-ring (22) is not included in seal kits but serviced separately if required.

NOTE

NOTE: The insert and if included the orifice plug in the end cover (2) must not be removed as they are serviced as an integral part of the end cover.

Wash & inspect end cover

6. Thoroughly wash end cover (2) in proper solvent and blow dry. Be sure the end cover valve apertures, including the internal orifice plug, are free of contamination. Inspect end cover for cracks and the bolt head recesses for good bolt head sealing surfaces. Replace end cover as necessary. SEE FIGURE 9.

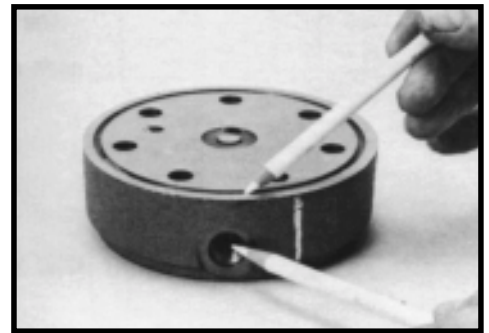


Figure 9

NOTE

NOTE: A polished pattern (not scratches) on the cover from rotation of the commutator (5) is normal. Discoloration would indicate excess fluid temperature, thermal shock, or excess speed and require system investigation for cause and close inspection of end cover, commutator, manifold, and rotor set.

Remove & inspect commutator ring

7. Remove commutator ring (6). SEE FIGURE 10. Inspect commutator ring for cracks, or burrs.



Figure 10

Remove & inspect commutator

8. Remove commutator (5) and seal ring (3) Remove seal ring from commutator, using an air hose to blow air into ring groove until seal ring is lifted out and discard seal ring. Inspect commutator for cracks or burrs, wear, scoring, spalling or brinelling. If any of these conditions exist, replace commutator and commutator ring as a matched set. SEE FIGURE 11 & 12.



Figure 11

Remove manifold

9. Remove manifold (7) and inspect for cracks surface scoring, brinelling or spalling. Replace manifold if any of these conditions exist. SEE FIGURE 13. A polished pattern on the ground surface from commutator or rotor rotation is normal. Remove and discard the seal rings (4) that are on both sides of the manifold.



Figure 12

NOTE

NOTE: The manifold is constructed of plates bonded together to form an integral component not subject to further disassembly for service. Compare configuration of both sides of the manifold to ensure that same surface is reassembled against the rotor set.

Remove & inspect rotor set & wearplate

10. Remove rotor set (8) and wearplate (9), together to retain the rotor set in its assembled form, maintaining the same rotor vane (8C) to stator (8B) contact surfaces. SEE FIGURE 14. The drive link (10) may come away from the coupling shaft (12) with the rotor set, and wearplate. You may have to shift the rotor set on the wearplate to work the drive link out of the rotor (8A) and wearplate. SEE FIGURE 15. Inspect the rotor set in its assembled form for nicks, scoring, or spalling on any surface and for broken or worn splines. If the rotor set component requires replacement, the complete rotor set must be replaced as it is a matched set. Inspect the wearplate for cracks, brinelling, or scoring. Discard seal ring (4) that is between the rotor set and wearplate.



Figure 13

NOTE

NOTE: The rotor set (8) components may become disassembled during service procedures. Marking the surface of the rotor and stator that is facing UP, with etching ink or grease pencil before removal from Torqmotor™ will ensure correct reassembly of rotor into stator and rotor set into Torqmotor™. Marking all rotor components and mating spline components for exact repositioning at assembly will ensure maximum wear life and performance of rotor set and Torqmotor™.



Figure 14

NOTE

NOTE: Series ME Torqmotors™ may have a rotor set with two stator halves (8B & 8D) with a seal ring (4) between them and two sets of seven vanes (8C & 8E). Discard seal ring only if stator halves become disassembled during the service procedures.



Figure 15

NOTE

NOTE: A polished pattern on the wear plate from rotor rotation is normal.

Check rotor, vance clearance

- Place rotor set (8) and wear plate (9) on a flat surface and center rotor (8A) in stator (8B) such that two rotor lobes (180 degrees apart) and a roller vane (8C) centerline are on the same stator centerline. Check the rotor lobe to roller vane clearance with a feeler gage at this common centerline. If there is more than .005 inches (0.13 mm) of clearance, replace rotor set. SEE FIGURE 16.

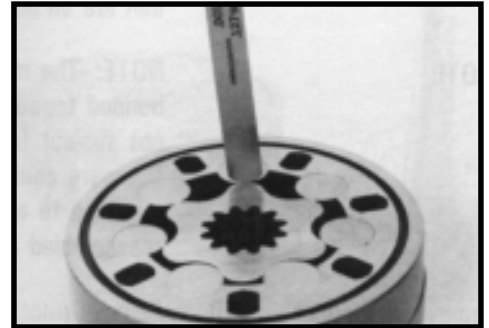


Figure 16

NOTE

NOTE: If rotor set (8) has two stator halves (8B & 8D) and two sets of seven vanes (8C & 8E) as shown in the alternate construction ME rotor set assembly view, check the rotor lobe to roller vane clearance at both ends of rotor.

Remove & inspect drive link

- Remove drive link (10) from coupling shaft (12) if it was not removed with rotor set and wear plate. Inspect drive link for cracks and worn or damaged splines. No perceptible lash (play) should be noted between mating spline parts. SEE FIGURE 17. Remove and discard seal ring (4) from housing (18).

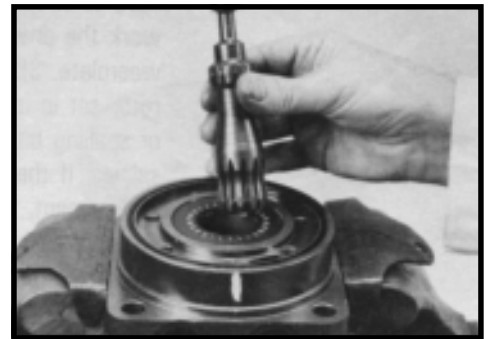


Figure 17

Remove thrust bearing

- Remove thrust bearing (11) from top of coupling shaft (12) if Torqmotor is a Series MB or ME. Inspect for wear, brinelling, corrosion and a full complement of retained rollers. SEE FIGURE 18.



Figure 18

Check coupling shaft for rust or corrosion

14. Check exposed portion of coupling shaft (12) to be sure you have removed all signs of rust and corrosion which might prevent its withdrawal through the seal and bearing. Crocus cloth or fine emery paper may be used. SEE FIGURE 19. Remove any key (12A), nut (12B), washer (12C), bolt (12D), lock washer (12E), or retaining ring (12F).

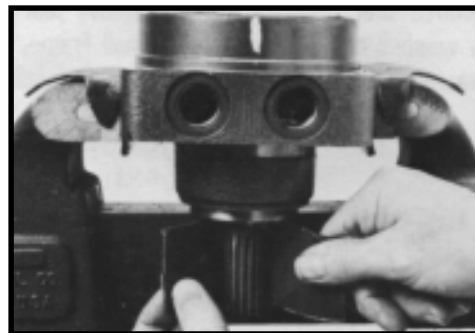


Figure 19

Remove & inspect coupling shaft

15. Remove coupling shaft (12), by pushing on the output end of shaft. SEE FIGURE 20. Inspect coupling shaft bearing and seal surfaces for spalling, nicks, grooves, severe wear or corrosion and discoloration. Inspect for damaged or worn internal and external splines or keyway. SEE FIGURE 21. Replace coupling shaft if any of these conditions exist.

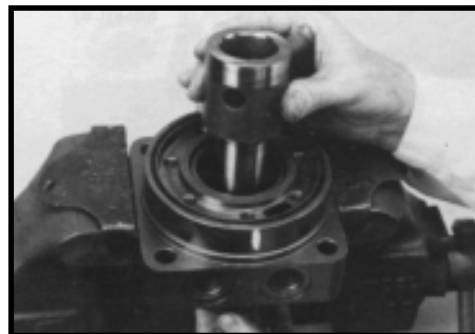


Figure 20

NOTE

NOTE: Minor shaft wear in seal area is permissible. If wear exceeds .020 inches (0.51 mm) diametrically, replace coupling shaft.

NOTE

NOTE: A slight "polish" is permissible in the shaft bearing areas. Anything more would require coupling shaft replacement.

Remove seal ring from housing

16. Remove and discard seal ring (4) from housing (18).

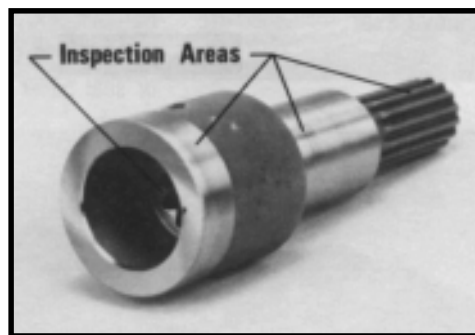


Figure 21

Remove & inspect thrust washer & thrust bearing

17. Remove thrust bearing (15) and thrust washer (14) if the unit is a Series MG or MF. Inspect for wear, brinelling, corrosion and a full complement of retained rollers. SEE FIGURE 22.



Figure 22

NOTE

NOTE: Large Frame Series MB, ME & MP Torqmotors have a thrust bearing (15) sandwiched between two thrust washers (14) that cannot be removed from housing (18) unless bearing (13) is removed for replacement.

Remove seal & washer or washers

18. Remove seal (16) and backup washer (17) from Small Frame, MG & MF housing (18). Discard both. SEE FIGURE 23.

Remove seal (16), backup washer (17), and backup washer (25) from Large Frame, Series MB, ME & MP Torqmotor™ housing by working them around unseated thrust washers (14) and thrust bearing (15) and out of the housing. Discard seal and washers. SEE FIGURE 24.



Figure 23

NOTE

NOTE: The original design units of Large Frame, Series MB & ME Torqmotors™ did not include backup washer (25), but must include backup washer (25) when reassembled for service.



Figure 24

Remove seal

19. Remove housing (18) from vise, invert it and remove and discard seal (20). A blind hole bearing or seal puller required. SEE FIGURE 25.

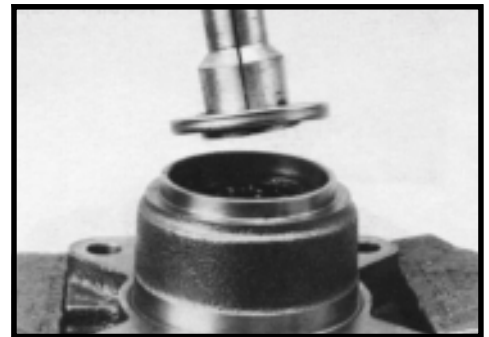


Figure 25

Inspect housing assembly

20. Inspect housing (18) assembly for cracks, the machined surfaces for nicks, burrs, brinelling or corrosion. Remove burrs that can be removed without changing dimensional characteristics. Inspect tapped holes for thread damage. SEE FIGURE 26. If the housing is defective in these areas, discard the housing assembly.



Figure 26

Inspect housing bearing/bushing

21. If the housing (18) assembly has passed inspection to this point, inspect the housing bearings/bushings (19) and (13) and if they are captured in the housing cavity the two thrust washers (14) and thrust bearing (15). The bearing rollers must be firmly retained in the bearing cages, but must rotate and orbit freely. All rollers and thrust washers must be free of brinelling and corrosion. SEE FIGURE 27. The MG Series bushing (19) or (13) to coupling shaft diameter clearance must not exceed .010 inch (.025 mm). A bearing, bushing, or thrust washer that does not pass inspection must be replaced. SEE FIGURE 28. If the housing has passed this inspection the disassembly of the Torqmotor™ is completed.

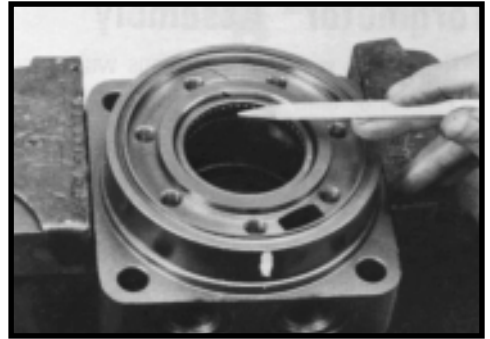


Figure 27

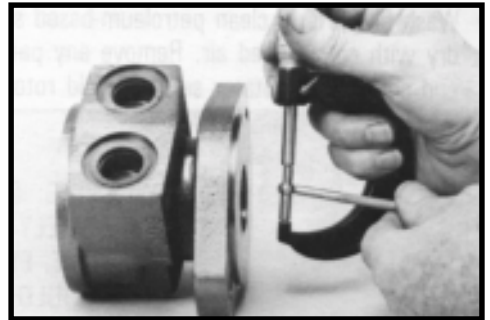


Figure 28

NOTE

NOTE: The depth or location of bearing/bushing (13) in relation to the housing wear plate surface and the depth or location of bearing/bushing (19) in relation to the beginning of bearing/bushing counter bore should be measured and noted before removing the bearings/bushings. This will facilitate the correct reassembly of new bearings/bushings. SEE FIGURE 29.

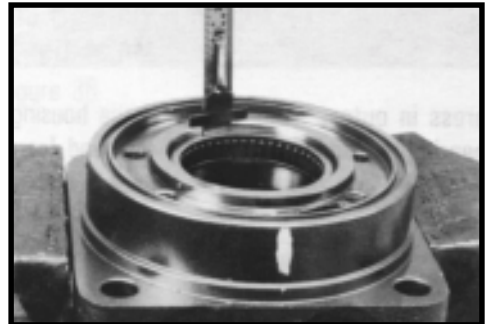


Figure 29

Remove bearings or bushings & thrust washers

22. If the bearings, bushing or thrust washers must be replaced use a suitable size bearing puller to remove bearing/bushings (19) and (13) from housing (18) without damaging the housing. Remove thrust washers (14) and thrust bearing (15) if they were previously retained in the housing by bearing (13). SEE FIGURES 30 & 31.

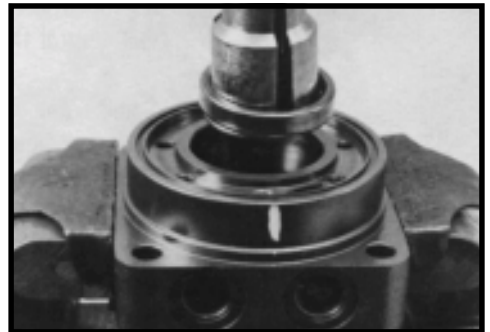


Figure 30

THE DISASSEMBLY OF TORQMOTOR™ IS COMPLETED.

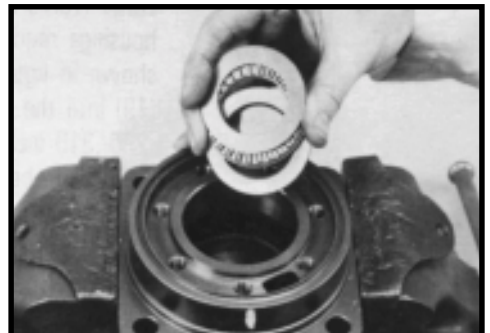


Figure 31

Torqmotor™ Assembly

- Replace all seals and seal rings with new ones each time you reassemble the Torqmotor™ unit. Lubricate all seals and seal rings with SAE 10W40 oil or clean grease before assembly.
- **NOTE: Individual seals and seal rings as well as a complete seal kit are available. SEE FIGURE 32. The parts should be available through most OEM parts distributors or Ross approved Torqmotor™ distributors. (Contact your local dealer for availability).**
- **NOTE: Unless otherwise indicated, do not oil or grease parts before assembly.**
- Wash all parts in clean petroleum-based solvents before assembly. Blow them dry with compressed air. Remove any paint chips from mating surfaces of the end cover, commutator set, manifold rotor set, wear plate and housing and from port and sealing areas.

WARNING

WARNING: SINCE THEY ARE FLAMMABLE, BE EXTREMELY CAREFUL WHEN USING ANY SOLVENT. EVEN A SMALL EXPLOSION OR FIRE COULD CAUSE INJURY OR DEATH.

WARNING

WARNING: WEAR EYE PROTECTION AND BE SURE TO COMPLY WITH OSHA OR OTHER MAXIMUM AIR PRESSURE REQUIREMENTS.

Press in outer bearing/bushing

1. If the housing (18) bearing components were removed for replacement, thoroughly coat and pack a **new** outer bearing/bushing (19) with clean corrosion resistant grease recommended in the material section. Press the new bearing/bushing into the counterbore at the mounting flange end of the housing, using the appropriate sized bearing mandrel such as described in figure 1 or figure 2 which will control the bearing/ bushing depth.

Small Frame Series MG and MF Torqmotor™ housings require the use of bearing mandrel shown in figure 1 to press bearing/ bushing (19) into the housing to a required depth of .151/.161 inches (3.84/4.09 mm) from the end of the bearing counterbore. SEE FIGURE 33.

Large Frame Series MB, ME & MP Torqmotor™ housings require the use of the bearing mandrel shown in figure 2 to press bearing (19) into the housing to a required depth of .290/.310 inches (7.37/7.87 mm) from the outside end of the bearing counterbore. SEE FIGURE 34.

Large Frame Series MJ Torqmotor housings require the use of a bearing mandrel. Consult factory for specifications.

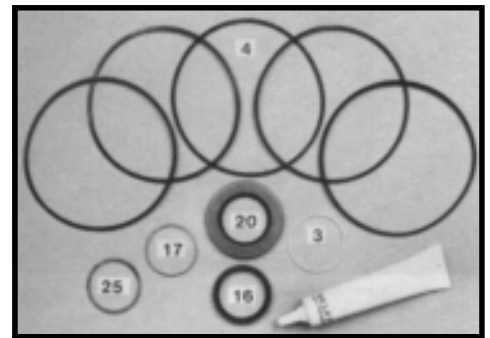


Figure 32, MB, ME seal kit



Figure 33



Figure 34

NOTE

NOTE: Bearing mandrel must be pressed against the lettered end of bearing shell. Take care that the housing bore is square with the press base and the bearing/bushing is not cocked when pressing a bearing/bushing into the housing.

CAUTION

CAUTION: If the bearing mandrel specified in the "Tools and Materials Required for Servicing" section is not available and alternate methods are used to press in bearing/bushing (13) and (19) the bearing/bushing depths specified must be achieved to insure adequate bearing support and correct relationship to adjacent components when assembled. SEE FIGURE 35.

CAUTION

CAUTION: Because the bearing/bushings (13) and (19) have a press fit into the housing they must be discarded when removed. They must not be reused.

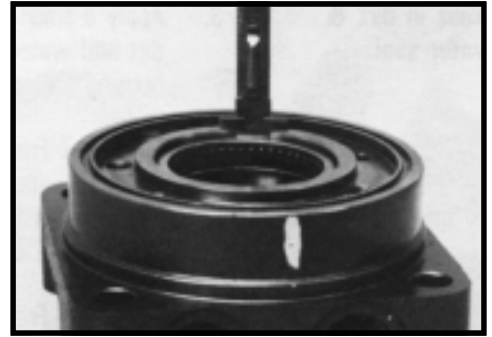


Figure 35

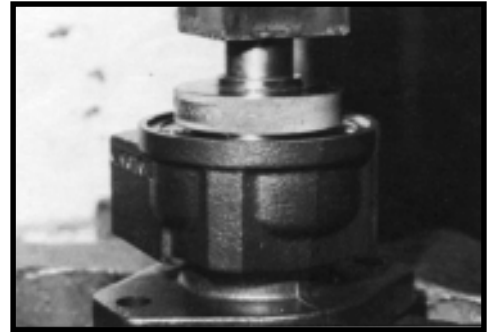


Figure 36

Press in inner bearing/bushing

2. The Small Frame Series MG and MF Torqmotor™ inner housing bearing/bushing (13) can now be pressed into its counterbore in housing (18) flush to .03 inch (.76 mm) below the housing wear plate contact face. Use the opposite end of the bearing mandrel that was used to press in the outer bearing/bushing (19). Reference figure 1, "Tools and Materials Required for Servicing" section. SEE FIGURE 36.

The Large Frame Series MB, ME & MP Torqmotor™ housing (18) requires that you assemble a **new** backup washer (25), **new** seal (16), with the lip facing to the inside of Torqmotor (see figure 69A), **new** thrust washer (14), **new** thrust bearing (15) and a **new** second thrust washer (14) in that order before pressing in the inner housing bearing (13). SEE FIGURE 37 & 38. When these components are in place, press **new** bearing (13) into the housing (18) to a depth of .105/.125 inches (2.67/3.18), .03 inches max for MP (.76) below the housing wear plate contact face. Use the opposite end of the bearing mandrel used to press in outer bearing (19). Reference figure 2, in the "Tools and Materials Required for Servicing" section. SEE FIGURE 39.



Figure 37



Figure 38

Press in dirt & water seal

3. Press a **new** dirt and water seal (20) into the housing (18) outer bearing counterbore.



Figure 39

The Small Frame Series MG and MF Torqmotor™ dirt and water seal (20) must be pressed in until its' flange is flush against the housing. SEE FIGURE 40.

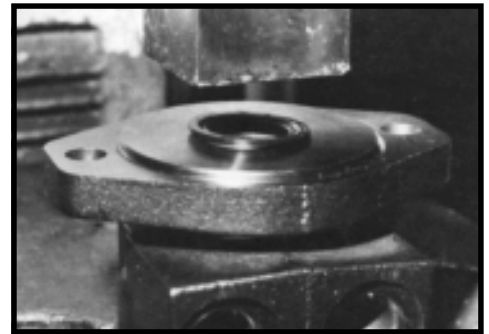


Figure 40

The Large Frame Series MB, ME & MP Torqmotor™ dirt and water seal (20) must be pressed in with the lip facing out and until the seal is flush to .020 inches (.51 mm) below the end of housing. SEE FIGURE 41.

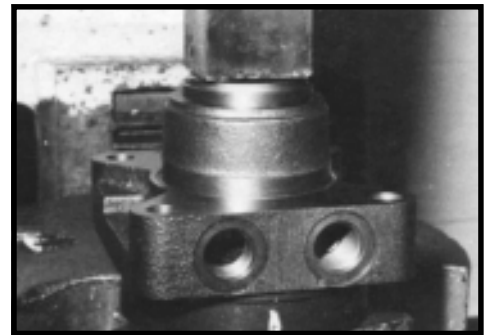


Figure 41

Place housing assembly into vice

4. Place housing (18) assembly into a soft jawed vise with the coupling shaft bore down, clamping against the mounting flange. SEE FIGURE 42.

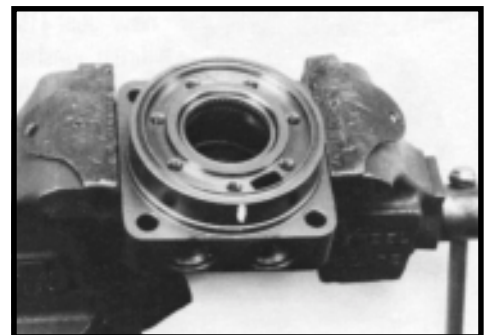


Figure 42

Assemble backup washer & seal

5. On Small Frame, Series MG & MF Torqmotors™ assemble a **new** backup washer (17) and **new** seal (16) with the seal lip facing toward the inside of Torqmotor™ (see Figure 69B), into their respective counterbores in housing (18) if they were not assembled in procedure 2.

Large Frame, Series MB, ME & MP Torqmotor™ housing (18) that did not require replacement of the bearing package will require that the two “captured” thrust washers (14) and thrust bearing (15) be unseated and vertical to the counterbore and the **new** backup washer (17), **new** backup washer (25), and **new** seal (16) be worked around the thrust bearing package and placed into their respective counterbores. The seal lip must face out of the seal counterbore and toward the inside of Torqmotor™ (see figure 69A). Be sure the thrust bearing package is resealed correctly after assembly of the seal and backup washer. SEE FIGURES 43 & 44.

CAUTION

CAUTION: Original design Large Frame, MB & ME Torqmotors™ that do not have backup washer (25) when disassembled must be assembled with a new backup washer (17), new backup washer (25), and new seal (16).

Assemble thrust washer & bearing

6. Assemble thrust washer (14) then thrust bearing (15) that was removed from the Series MG or MF Torqmotor™. SEE FIGURE 45.

NOTE

NOTE: Small Frame Series MG and MF Torqmotors™ require one thrust washer (14) with thrust bearing (15). The coupling shaft will be seated directly against the thrust bearing.

Apply masking tape to shaft

7. Apply masking tape around splines or keyway on shaft (12) to prevent damage to seal. SEE FIGURE 46.

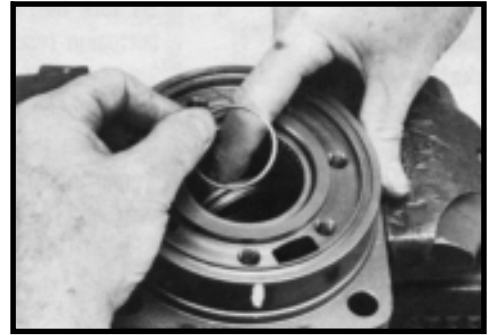


Figure 43



Figure 44

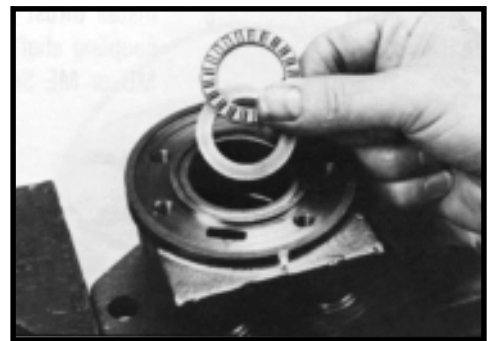


Figure 45



Figure 46

Install coupling shaft

8. Be sure that a generous amount of clean corrosion resistant grease has been applied to the lower (outer) housing bearing/bushing (19). Install the coupling shaft (12) into housing (18), seating it against the thrust bearing (15) in MG and MF Series housings and against the second thrust washer (14) in MB and ME Series housings. SEE FIGURE 47.



Figure 47

CAUTION

CAUTION: The outer bearing (19) is not lubricated by the system's hydraulic fluid. Be sure it is thoroughly packed with the recommended grease, Ross Gear grease specification #045236, E/M Lubricant #K-70M.

NOTE

NOTE: Mobil Mobilith SHC ® 460
NOTE: A 102 Tube (P/N 406010) is included in each seal kit.

NOTE

NOTE: The coupling shaft (12) will be flush or just below the housing wear plate surface on Small Frame, Series MG, MF & MP Torqmotors™ when properly seated while the coupling shaft (12) on Large Frame, Series MB and ME Torqmotors™ will be approximately .10 inch (2.54 mm) below the housing wear plate surface to allow the assembly of thrust bearing (11). The coupling shaft must rotate smoothly on the thrust bearing package. SEE FIGURE 48.

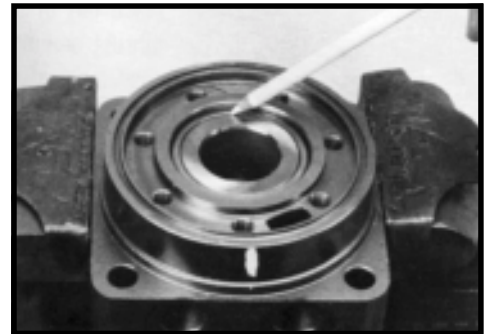


Figure 48

Install thrust bearing

9. Install thrust bearing (11) onto the end of coupling shaft (12) only if you are servicing an MB or ME Series Torqmotor™. SEE FIGURE 49.



Figure 49

Insert seal ring

10. Apply a small amount of clean grease to a new seal ring (4) and insert it into the housing (18) seal ring groove. SEE FIGURE 50.

NOTE

NOTE: One or two alignment studs screwed finger tight into housing (18) bolt holes, approximately 180 degrees apart, will facilitate the assembly and alignment of components as required in the following procedures. The studs can be made by cutting off the heads of either 3/8-24 UNF 2A or 5/16-24 UNF 2A bolts as required that are over .5 inch (12.7 mm) longer than the bolts (1, 1A, 1B, or 1C) used in the Torqmotor™.

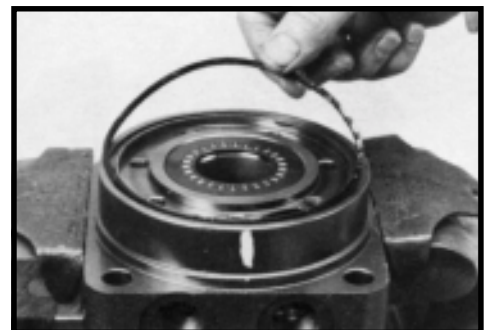


Figure 50

Install drive link

11. Install drive link (10) the long splined end down into the coupling shaft (12) and engage the drive link splines into mesh with the coupling shaft splines. SEE FIGURE 51.

NOTE

NOTE: Use any alignment marks put on the coupling shaft and drive link before disassembly to assemble the drive link splines in their original position in the mating coupling shaft splines.



Figure 51

Assemble wear plate

12. Assemble wear plate (9) over the drive link (10) and alignment studs onto the housing (18). SEE FIGURE 52.



Figure 52

Assemble seal ring

13. Apply a small amount of clean grease to a new seal ring (4) and assemble it into the seal ring groove on the wear plate side of the rotor set stator (8B). SEE FIGURE 53.

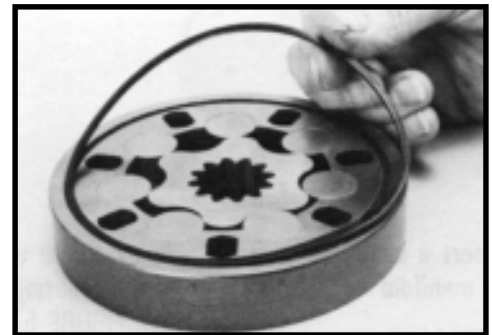


Figure 53

Install the assembled rotor set

14. Install the assembled rotor set (8) onto wear plate (9) with rotor (8A) counterbore and seal ring side down and the splines into mesh with the drive link splines. SEE FIGURE 54.

NOTE

NOTE: It may be necessary to turn one alignment stud out of the housing (18) temporarily to assemble rotor set (8) or manifold (7) over the drive link.

NOTE

NOTE: If necessary, go to the appropriate, "Rotor Set Component Assembly Procedure."

NOTE

NOTE: The rotor set rotor counterbore side must be down against wear plate for drive link clearance and to maintain the original rotor-drive link spline contact. A rotor set without a counterbore and that was not etched before disassembly can be reinstalled using the drive link spline pattern on the rotor splines if apparent, to determine which side was down. The rotor set seal ring groove faces toward the wear plate (9).

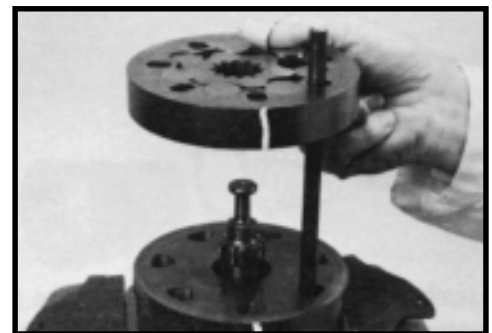


Figure 54

Assemble seal ring in manifold

15. Apply clean grease to a **new** seal ring (4) and assemble it in the seal ring groove in the rotor set contact side of manifold (7). SEE FIGURE 55.

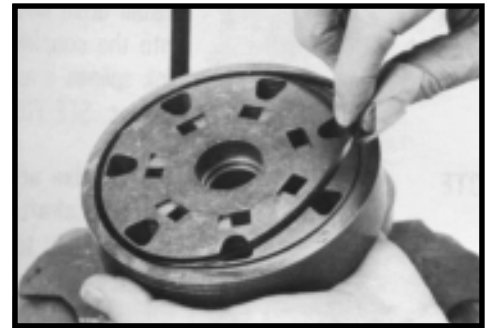


Figure 55

NOTE

NOTE: The manifold (7) is made up of several plates bonded together permanently to form an integral component. The manifold surface that must contact the rotor set has it's series of irregular shaped cavities on the largest circumference or circle around the inside diameter. The polished impression left on the manifold by the rotor set is another indication of which surface must contact the rotor set.

Assemble manifold

16. Assemble the manifold (7) over the alignment studs and drive link (10) and onto the rotor set. Be sure the correct manifold surface is against the rotor set. SEE FIGURE 56.

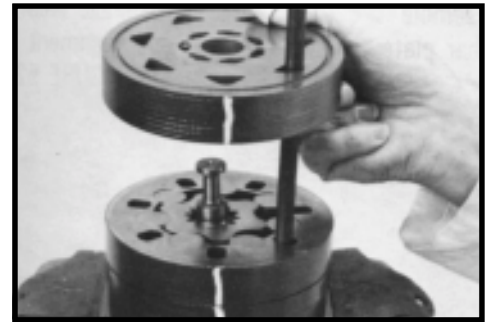


Figure 56

Insert a seal in manifold

17. Apply grease to a **new** seal ring (4) and insert it in the seal ring groove exposed on the manifold. SEE FIGURE 57.

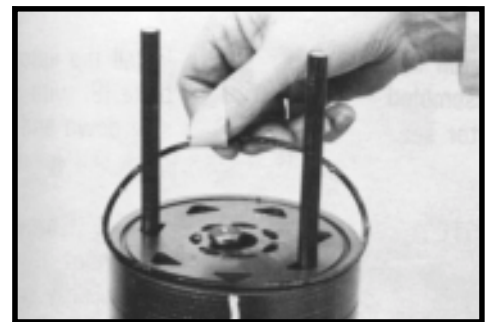


Figure 57

Assemble commutator ring

18. Assemble the commutator ring (6) over alignment studs onto the manifold. SEE FIGURE 58.

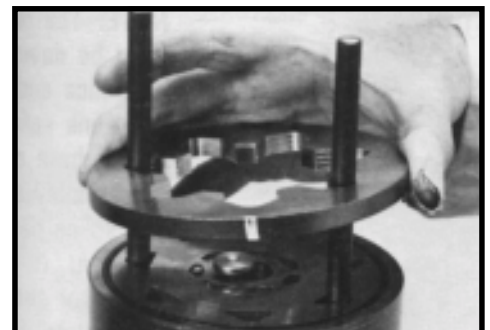


Figure 58

Assemble seal & commutator

19. Assemble a **new** seal ring (3) flat side up, into commutator (5) and assemble commutator over the end of drive link (10) onto manifold (7) with seal ring side up. SEE FIGURE 59, 60.

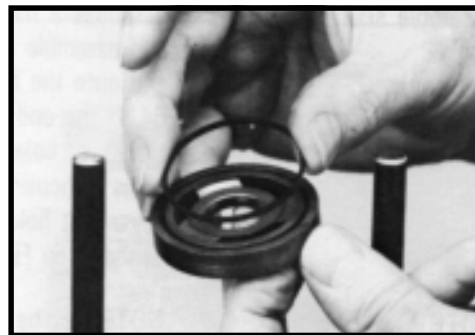


Figure 59

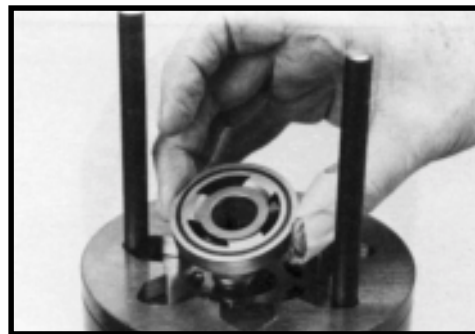


Figure 60

Assemble shuttle valve parts into end cover

20. If shuttle valve components items #21, #22, #23, #24 were removed from the end cover (2) turn a plug (21) with a **new** o-ring (22), loosely into one end of the valve cavity in the end cover. Insert a spring (23) the valve (24) and the second spring (23) into the other end of the valve cavity. Turn the second plug (21) with a **new** o-ring (22) loosely into the end cover valve cavity. 3/16 inch Allen wrench required. SEE FIGURE 61.

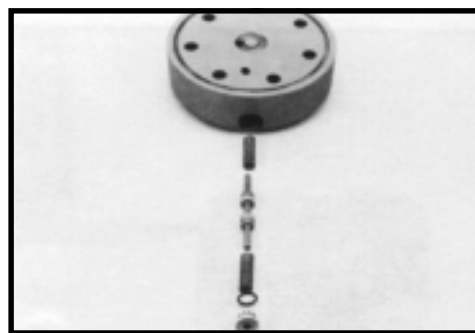


Figure 61

Assemble relief valve parts in end cover

21. If relief valve components items #21, #22, #24 were removed from the end cover (2) assemble a **new** o-ring (22) on the two plugs (21). Assemble a two piece relief valve (24) in each of the plugs, with the large end of the conical spring into the plug first and the small nut of the other valve piece in the small end of the conical spring. Turn each of the plug and relief valve assemblies into the end cover loosely to be torqued later. 3/8 inch Allen or 1 inch Hex socket required. SEE FIGURE 62.

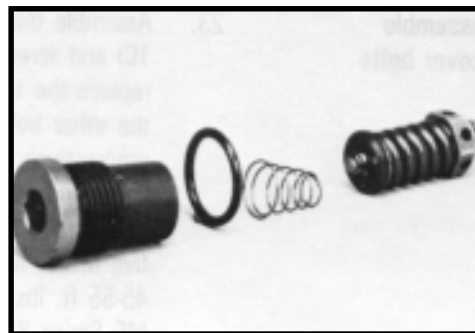


Figure 62

Assemble seal ring & end cover

22. Assemble a **new** seal ring (4) into end cover (2) and assemble end cover over the alignment studs and onto the commutator set. SEE FIGURE 63, 64. If the end cover has only 5 bolt holes be sure the cover holes are aligned with the 5 threaded holes in housing (18). The correct 5 bolt end cover bolt hole relationship to housing port bosses is shown in FIGURE 65.

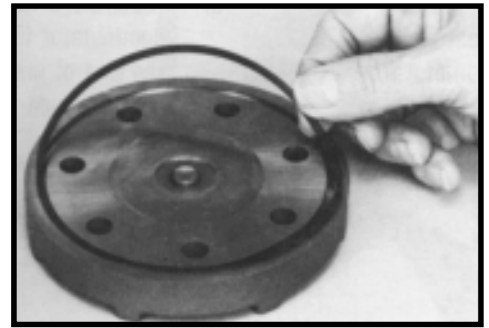


Figure 63

NOTE

NOTE: If the end cover has a valve (24) or has five bolt holes, use the line you previously scribed on the cover to radially align the end cover into its original position.

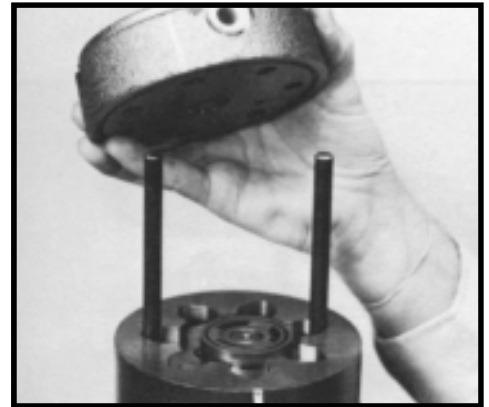


Figure 64

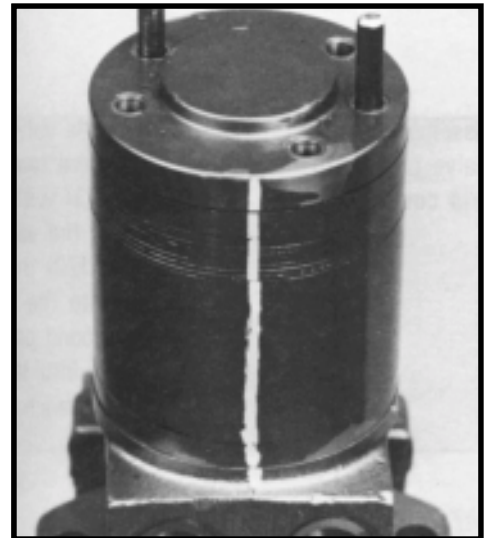


Figure 65

Assemble cover bolts

23. Assemble the 5, 6 or 7 special bolts (1, 1A, 1B or 1C) and screw in finger tight. Remove and replace the two alignment studs with bolts after the other bolts are in place. Alternately and progressively tighten the bolts to pull the end cover and other components into place with a final torque of 22-26 ft. lbs. (30-35 N m) for the five MG & MF Series 5/16 24 threaded bolts or six MP bolts or 45-55 ft. lbs. (61-75 N m) for the seven MB & ME Series 3/8-24 threaded bolts. SEE FIGURE 66, 67, 68.



Figure 66

NOTE

NOTE: The special bolts required for use with the relief or shuttle valve (24) end cover assembly (2) are longer than the bolts required with standard and cover assembly. Refer to the individual service parts lists or parts list charts for correct service part number if replacement is required.



Figure 67

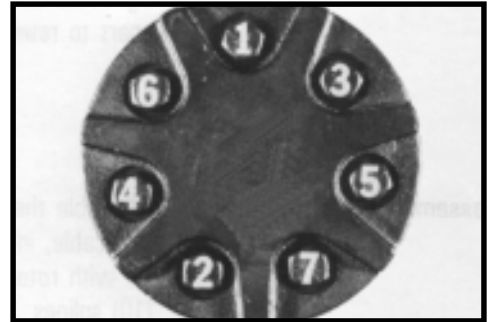


Figure 68

Torque the valve plugs

24. Torque the two shuttle valve plug assemblies (21) in end cover assembly to 9-12 ft. lbs. (12-16 N m) if cover is so equipped. SEE FIGURE 69.

Torque the two relief valve plug assemblies (21) in end cover assembly to 45-55 ft. lbs. (61-75 N m) if cover is so equipped.

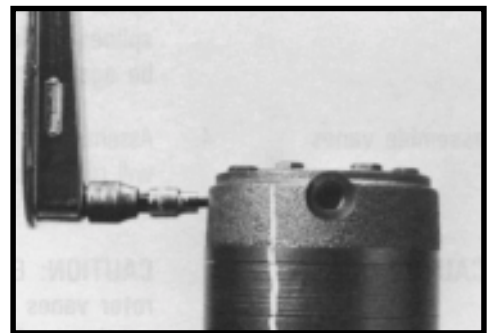


Figure 69

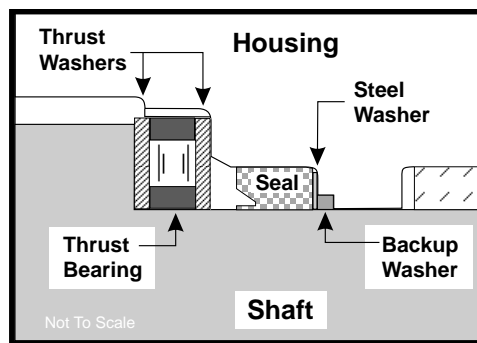


Figure 69A

Large Frame

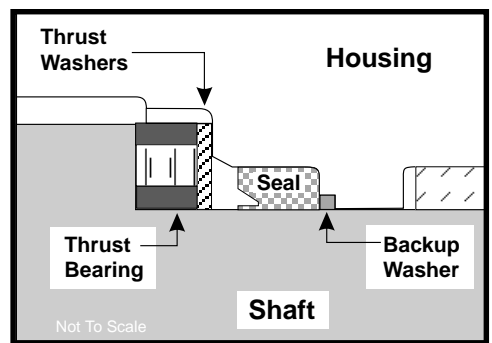


Figure 69B

Small Frame

THE ASSEMBLY OF THE TORQMOTOR™ IS NOW COMPLETE EXCEPT FOR WOODRUFF KEY (12A), NUT (12B), WASHER (12C), BOLT (12D), LOCKWASHER (12E), RETAINER RING (12F) or PORT O-RINGS (18A) AT INSTALLATION IF APPLICABLE. PROCEED TO FINAL CHECKS SECTION.

Rotor Set Component Assembly Procedure

One Piece Stator Construction

A disassembled rotor (8A) stator (8B) and vanes (8C) that cannot be readily assembled by hand can be assembled by the following procedures.

Assemble stator 1. Place stator (8B) onto wear plate (9) with seal ring (4) side down, after following Torqmotor™ assembly procedures 1 through 13. Be sure the seal ring is in place. SEE FIGURE 70.

Insert two bolts 2. If assembly alignment studs are not being utilized, align stator bolt holes with wear plate and housing bolt holes and turn two bolts (1) finger tight into bolt holes approximately 180 degrees apart to retain stator and wear plate stationary.

Assemble rotor 3. Assemble the rotor (8A), counterbore down if applicable, into stator (8B), and onto wear plate (9) with rotor splines into mesh with drive link (10) splines. SEE FIGURE 71.

NOTE **NOTE: If the manifold side of the rotor was etched during Torqmotor disassembly, this side should be up. If the rotor is not etched and does not have a counterbore, use the drive link spline contact pattern apparent on the rotor splines to determine the rotor side that must be against the wear plate.**

Assemble vanes 4. Assemble six vanes (8C), or as many vanes that will readily assemble into the stator vane pockets. SEE FIGURE 72.

CAUTION **CAUTION: Excessive force used to push the rotor vanes into place could shear off the coating applied to the stator vane pockets.**

Assemble full complement of vanes 5. Grasp the output end of coupling shaft (12) with locking pliers or other appropriate turning device and rotate coupling shaft, drive link and rotor to seat the rotor and the assembled vanes (8C) into stator (8B), creating the necessary clearance to assemble the seventh or full complement of seven vanes. Assemble the seven vanes using minimum force. SEE FIGURE 73.

Remove two assembled bolts 6. Remove the two assembled bolts (1) if used to retain stator and wear plate.

Go to Torqmotor™ assembly procedure #15, to continue Torqmotor™ assembly.



Figure 70

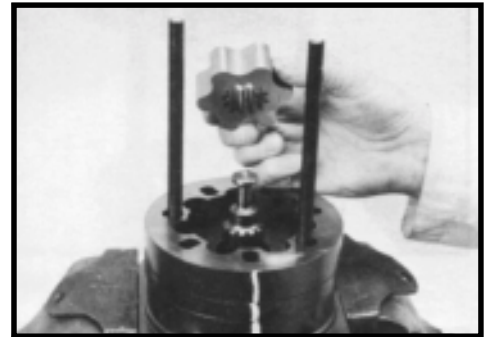


Figure 71



Figure 72

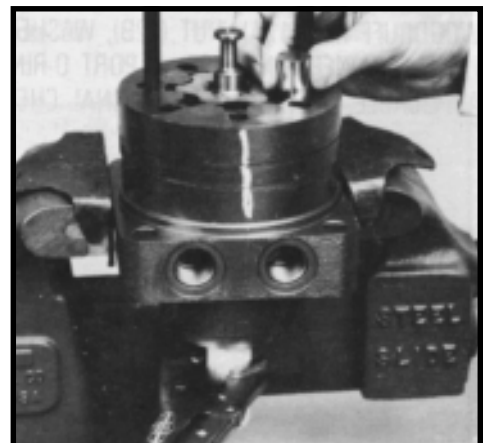


Figure 73

Rotor Set Component Assembly Procedure

Two Piece Stator Construction

A disassembled rotor set (8) that cannot be readily assembled by hand and has a two piece stator can be assembled by the following procedures.

- | | |
|--|--|
| Assemble stator halves | 1. Place stator half (8B) onto wear plate (9) with seal ring (4) side down, after following Torqmotor™ assembly procedures 1 through 13. Be sure the seal ring is in place. |
| Insert two alignment studs | 2. Align stator bolt holes with wear plate and housing bolts and turn two alignment studs finger tight into bolt holes approximately 180 degrees apart to retain stator half and wear plate stationary. |
| Assemble rotor | 3. Assemble rotor (8A), counterbore down if applicable, into stator half (8B), and onto wear plate (9) with rotor splines into mesh with drive link (10) splines. |
| NOTE | NOTE: Use any marking you applied to rotor set components to reassemble the components in their original relationship to ensure ultimate wear life and performance. |
| Assemble vanes | 4. Assemble six vanes (8C), or as many vanes that will readily assemble into the stator vane pockets. |
| CAUTION | CAUTION: Excessive force used to push the rotor vanes into place could shear off the coating applied to the stator vane pockets. |
| Assemble full complement of vanes | 5. Grasp the output end of coupling shaft (12) with locking pliers or other appropriate turning device and rotate coupling shaft, drive link and rotor to seat the rotor and the assembled vanes (8C) into stator half (8B), creating the necessary clearance to assemble the seventh or full complement of seven vanes. Assemble the seven vanes using minimum force. |
| Assemble seal ring in stator half | 6. Place second stator half (8D) on a flat surface with seal ring groove up. Apply a small amount of grease to a new seal ring (4) and assemble it into stator half ring groove. |

- Assemble second stator half**
7. Assemble the second stator half (8D) over the two alignment studs and rotor (8A) with seal ring side down onto the first stator half (8B) aligning any timing marks applied for this purpose.

CAUTION

CAUTION: If the stator half (8B) is a different height (thickness) than stator half (8D) the stator vanes (8C) or (8E) of the same length (height) as the stator half must be reassembled in their respective stator half for the rotor set to function properly.

- Assemble vanes**
8. Assemble six vanes (8E), or as many vanes that will readily assemble into the stator vane pockets.

- Assemble full complement of vanes**
9. Grasp the output end of coupling shaft (12) with locking pliers or other appropriate turning device and rotate coupling shaft, drive link and rotor to seat the rotor and the assembled vanes (8E) into stator (8D), creating the necessary clearance to assemble the seventh or full complement of seven vanes. Assemble the seven vanes using minimum force.

Go to Torqmotor™ assembly procedure #15, to continue Torqmotor™ assembly.

Final Checks

Final Checks

- Pressurize the Torqmotor™ with 100 p.s.i. dry air or nitrogen and submerge in solvent to check for external leaks.
- Check Torqmotor™ for rotation. Torque required to rotate coupling shaft should not be more than 50 ft. lbs. (68 N m)
- On MG, MF & MP Series Torqmotors, pressure port with "A" cast under it on housing (18) is for clockwise coupling shaft rotation as viewed from the output end of coupling shaft. Pressure port with "B" cast under it is for counter clockwise coupling shaft rotation.
- On MB, ME, & MJ Series Torqmotors, pressure port with "B" cast under it on housing (18) is for clockwise coupling shaft rotation as viewed from the output end of coupling shaft. Pressure port with "A" case under it is for counter clockwise coupling shaft rotation.
- Use test stand if available, to check operation of the Torqmotor™.

Hydraulic Fluid

Keep the hydraulic system filled with one of the following:

- 10W40 SE or SF manufacturers suggested oil.
- Hydraulic fluid as recommended by equipment manufacturer, but the viscosity should not drop below 50 SSU or contain less than .125% zinc anti-wear additives.

CAUTION: Do not mix oil types. Any mixture, or an unapproved oil, could deteriorate the seals. Maintain the proper fluid level in the reservoir. When changing fluid, completely drain old oil from the system. It is suggested also that you flush the system with clean oil.

Filtration

Recommended filtration 20-50 micron.

Oil Temperature

Maximum operating temperature 200°F (93.3° C).

Tips for Maintaining the Torqmotor™ Hydraulic System

- Adjust fluid level in reservoir as necessary.
- Encourage all operators to report any malfunction or accident that may have damaged the hydraulic system or component.
- Do not attempt to weld any broken Torqmotor™ component. Replace the component with original equipment only.
- Do not cold straighten, hot straighten, or bend any Torqmotor™ part.
- Prevent dirt or other foreign matter from entering the hydraulic system. Clean the area around and the filler caps before checking oil level.
- Investigate and correct any external leak in the hydraulic system, no matter how minor the leak.
- Comply with manufacturer's specifications for cleaning or replacing the filter.

CAUTION: Do not weld, braze, solder or any way alter any Torqmotor™ component.

CAUTION: Maximum operating pressure must not exceed recommended Torqmotor™ pressure capacity.

CAUTION: Always carefully inspect any system component that may have been struck or damaged during operation or in an accident. Replace any component that is damaged or that is questionable.

CAUTION: Do not force any coupling onto the Torqmotor™ coupling shaft as this could damage the unit internally.

Ross extends close technical cooperation and assistance. If problems occur which you cannot solve, please contact your local Ross approved Distributor or Ross Technical Support. Our phone number and fax number and address are on the back cover of this manual.

Notes

MG, MF, MP, MB, ME, MJ Series Service Procedure



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