HY13-1518-001-M1/US

TK Series
Service Procedure

Effective: October 2020

Low Speed High Torque Hydraulic Motors

⚠ WARNING
This product can expose you to chemicals including lead and DEHP, which are known to the State of California to cause cancer, and birth defects or other reproductive harm.
For more information go to www.p65warnings.ca.gov

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Definitions

WARNING	**A warning describes hazards or unsafe practices which could result in severe personal injury or death.**

CAUTION	A caution describes hazards or unsafe practices which could result in personal injury or product or property damage.

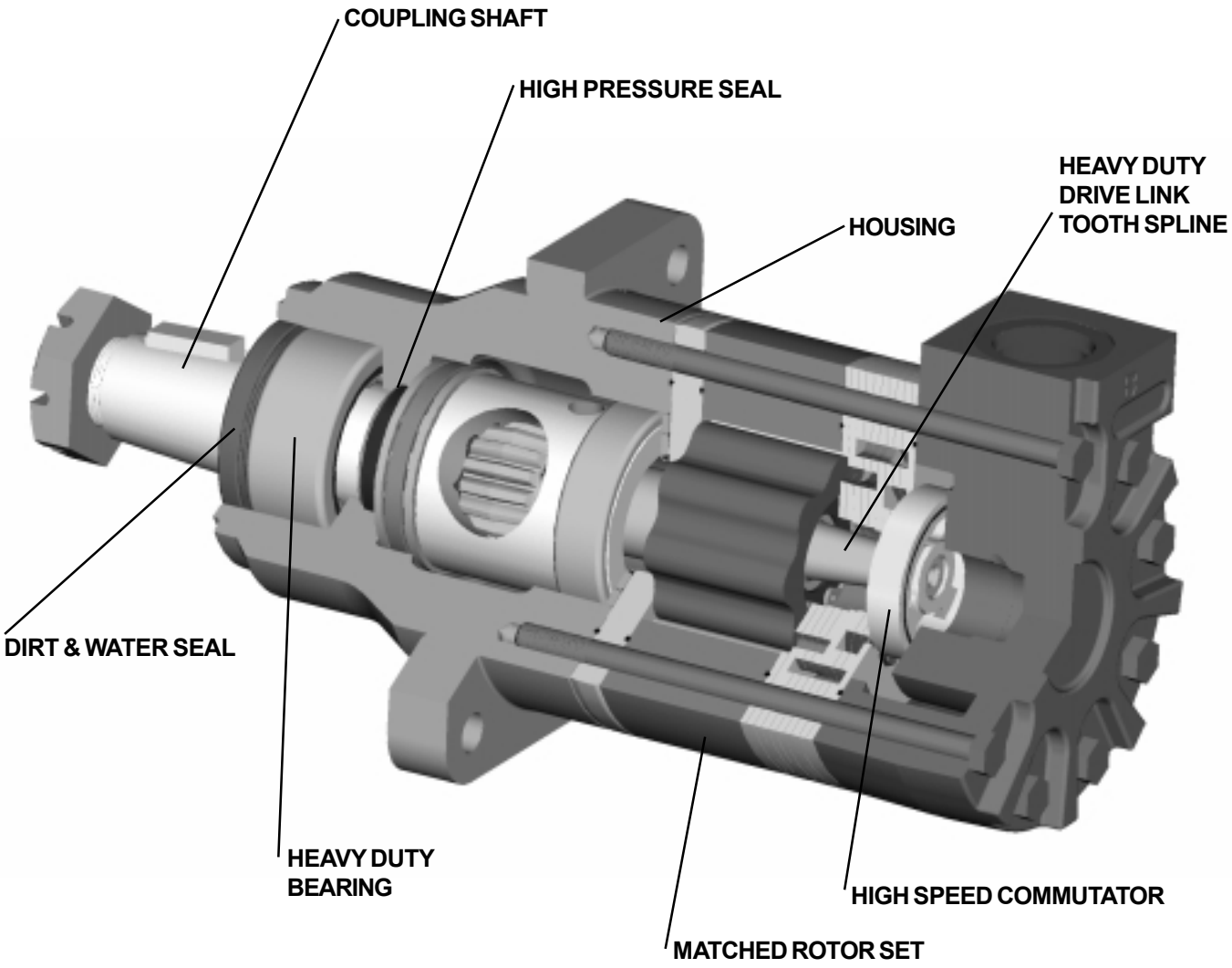
NOTE	A note gives key information to make following a procedure easier or quicker.

Disclaimer

This Service Manual has been prepared by Parker Hannifin Corporation for reference and use by mechanics who have been trained to repair and service hydraulic motors on commercial and non-commercial equipment applications. Parker Hannifin Corporation 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 Parker TK LSHT Motors. Since this is a general Service Manual, the photographs and illustrations may not look exactly like the motor being serviced. The procedures, therefore, must be carefully read and understood before servicing.

If inspection or testing reveals evidence of abnormal wear or damage to the TK motor 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 TK MOTOR WHICH HAS BEEN DAMAGED OR INCLUDES ANY PART THAT SHOWS EXCESSIVE WEAR UNLESS THE DAMAGED AND WORN PARTS ARE REPLACED WITH ORIGINAL PARKER REPLACEMENT AND SERVICE PARTS AND THE UNIT IS RESTORED TO PARKER SPECIFICATIONS FOR THE TK MOTOR.

It is the responsibility of the mechanic performing the maintenance, repairs or service on a particular motor 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 motor, and (c) fully inspect and test the motor and the hydraulic system to ensure that the repair or service of the motor has been properly performed and that the motor and hydraulic system will function properly.



TGK Series features include:

- The roller vane rotor set design offers low-friction and wear compensation which maximizes the useful performance life of the motor.
- Zero leak commutation valve provides greater, more consistent volumetric efficiency.
- Heavy duty spline geometry.
- Flow thru lubrication provides cooling extending motor life.
- 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 45 horsepower output.
- Heavy duty roller bearings for high side loads.

Introduction

This service manual has one purpose: to guide you in maintaining, troubleshooting and servicing the TK 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 prior to beginning 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 information carefully and pay special attention to the notes, cautions and warnings.

A page the with 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 Parker service part numbers. Service parts are available through the Original Equipment Manufacturer or Parker approved TK 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 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
- 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 usable hoses that are kinked, severely bent, or that rest against hot 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 filters. Check fluid level and look for air bubbles. Check the filter(s). A filter with a maximum of 20 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 temperatures 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).

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 (5) deteriorated by excess heat.	Replace oil seal rings by disassembling Torqmotor unit.
	3. Special bolt (1) loose or its sealing area deteriorated by corrosion.	(a) Loosen then tighten single bolt to torque specification. (b) Replace bolt.
	4. Internal shaft seal (18) worn or damaged.	Replace seal. Disassembly of Torqmotor unit necessary.
	5. Worn coupling shaft (14) and internal seal (18).	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	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

- Clean, petroleum-based solvent
- Emery paper
- Vice with soft jaws
- Air-pressure source
- Arbor press
- Flat screwdriver
- Masking tape
- Breaker bar
- 1/4" torque wrench
- Sockets: 1/2 or 9/16 inch thin wall, 1 inch
- Allen wrenches: 3/16, 3/8 inch
- Adjustable crescent wrench or hose fitting wrenches
- SAE 10W40 SE or SF oil
- Special bearing mandrel for TK Torqmotor (See Figure 1)
- Feeler gage .005 inch (.13 mm)
- TK Torqmotor requires blind hole bearing puller for a 1.750 inch dia. (44.45 mm) and 2.750 inch dia. (69.85 mm)
- Clean corrosion resistant grease. Part #406018 is included in each seal kit. Recommended grease is Parker Specification #045236 or Mobil Mobilith SHC® 460.

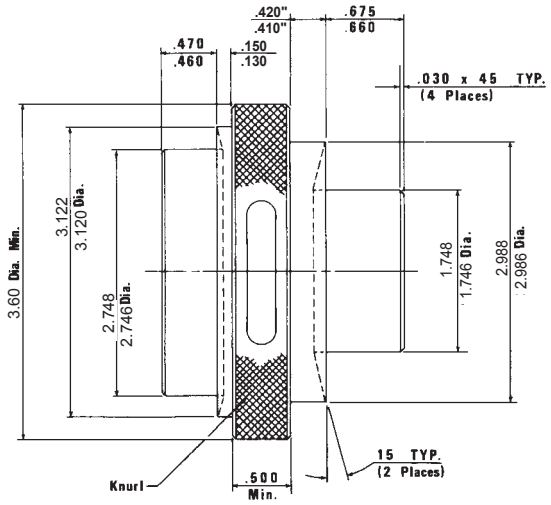
⚠ CAUTION	Mixing greases that have different bases can be detrimental to bearing life.

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

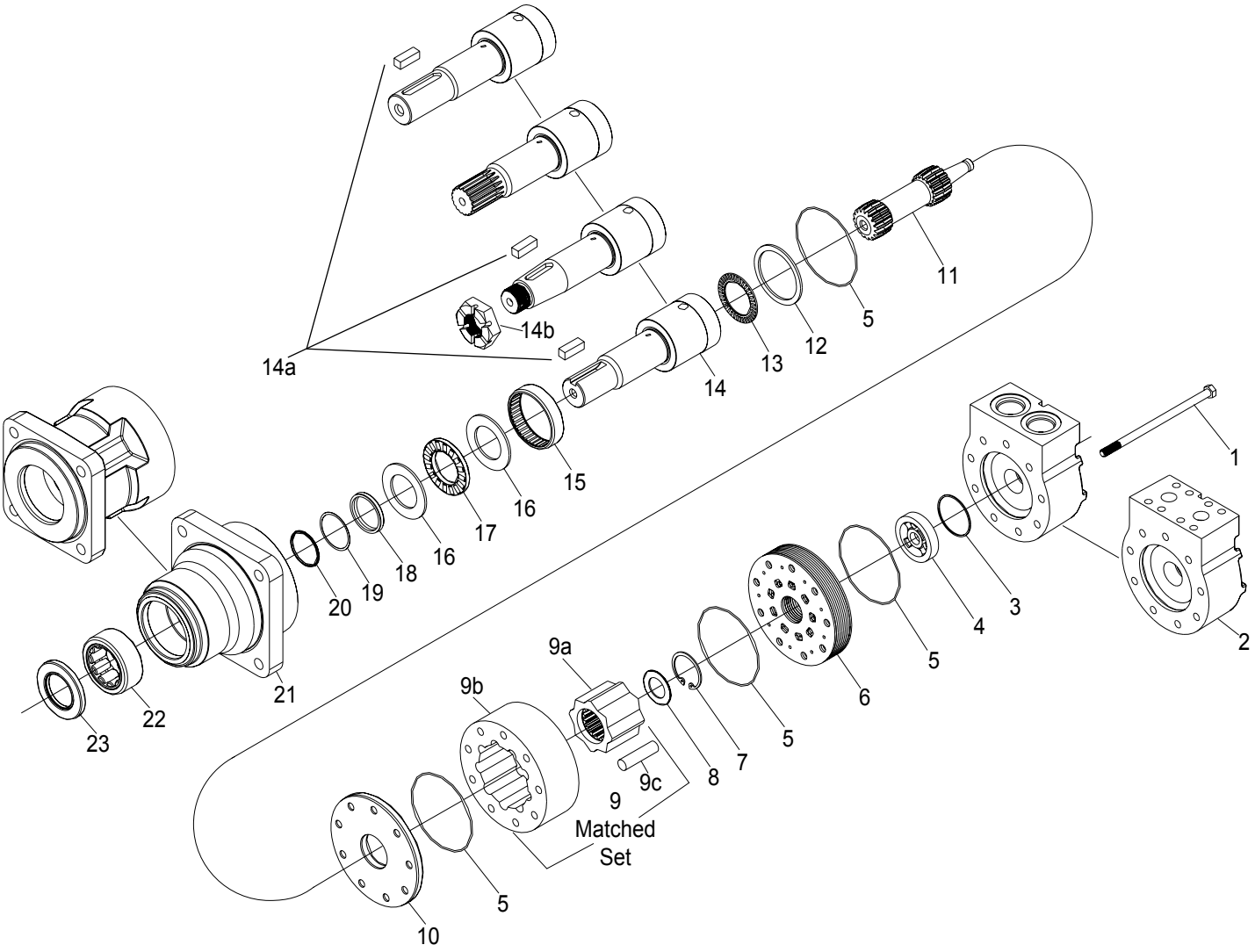
Part Name	Item Number	Torque
bolt 3/8 24 UNF 2A	1	45-55 ft. lbs. (60-76 N m)
nut 1-1/4 18 UNEF 2B	29A or 29B	300-400 ft. lbs. (407-542 N m)



(Fabricate if considered necessary)

Figure 1

Typical Assembly



Item No.	Description
1	Special Bolt
2	Endcover
3	Seal Ring - Commutator
4	Commutator
5	Seal Ring
6	Manifold
7	Retaining Ring
8	Rotor Washer
9	Rotor Set
9a	Rotor
9b	Stator
9c	Vane (9)
10	Wear Plate
11	Drive Link
12	Retaining Washer
13	Thrust Bearing
14	Coupling Shaft
14a	Key
14b	Nut
15	Radial Bearing
16	Thrust Washer
17	Thrust Bearing
18	Shaft Seal
19	Back Up Washer
20	Back Up Ring
21	Housing
22	Radial Bearing
23	Dirt & Water Seal

Note: See “Service Parts List Chart” page 11 for all part numbers.

Chart Use Example:
TK0250K5320AAAB Torqmotor includes part numbers listed to the right of TK (SERIES), 0250 (DISP.), K (MOUNTING), 5 (PORTING), 32 (SHAFT), 0 (ROTATION), and AAAB (OPTION) shown in the left hand column of the 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#	4	6	10	13	15	16	17	18	19
DESCRIPTION	COMMUTATOR	MANIFOLD (SEE NOTE)	WEAR PLATE	THRUST BEARING	INNER BEARING	THRUST WASHER(2)	THRUST SEAL	SHAFT BEARING	BACKUP WASHER
TK-Service Part#	TK014000	TK015000	477983	070029	073007	069033(2)	070028	032850	028549

EXPLODED VIEW ITEM#	20	22	23
DESCRIPTION	BACKUP RING	OUTER BEARNG	DIRT&WATER SEAL
TK-Service Part#	032851	070027	478082

DISPLACEMENT GROUP

EXPLODED VIEW ITEM#	1		9	11		7	8	12
DISPLACEMENT (in3/rev)	BOLT	THICKNESS OF ROTOR	ROTOR SET	DRIVE LINK	DRIVE LINK "L DIM"	RETAINING RING	WASHER	RETAINING WASHER
0250-15.3	021378	**.8601**	TK02507003	TK02503000	**5.692**	**401161**	**028550**	**028551**
0315-19.2	021366	**1.0836**	TK03157003	TK03153000	**5.916**			
0400-24.4	021394	**1.3761**	TK04007003	TK04003000	**6.209**			
0500-30.5	021473	**1.7199**	TK05007003	TK05003000	**6.553**			
0630-38.4	021474	**2.1668**	TK06307003	TK06303000	**7.000**			
0800-48.8	021388	**2.7522**	TK08007004	TK08003000	**7.585**			
1000-61.0	021475	**3.4398**	TK10007004	TK10003000	**8.273**			

FRONT HOUSING Mounting Code

EXPLODED VIEW ITEM#	21	
DESCRIPTION	SERVICE HOUSING	HOUSING ASSEMBLY
K- SAE CC (4 Bolt)	TK012002	TK012002A1
T- Wheel Mt. (4 Bolt)	TK012001	TK012001A1
R- Four Bolt	TK012003	TK012003A1

REAR COVER* Porting Code

EXPLODED VIEW ITEM#	2
DESCRIPTION	END COVER
5- Rear Port (1 5/16" O-Ring; Radial)	TK016000
4- Rear Port (Manifold; Radial)	TK016001
6- Rear Port (G 3/4" Rear Radial)	TK016002

*TK Series Motors only available in rear ported option.

For reverse timed manifold, use TK015001. Standard seal kit SK000167 includes five #032807 seal rings, #032438 high temp commutator seal, #032850 inner seal, #028549, #032851 backup washer, backup ring, #478082 dirt & water seal, #406018 grease pack and bulletin #050034.

COUPLING SHAFT CODE

EXPLODED VIEW ITEM#	14	14a	14b
Shaft Code / COUPLING DESCRIPTION	SHAFT	KEY	NUT
32-1.5" Straight Key, 3/8 Tap	TK019002	039040*	
36-17 Tooth Spline (12/24 P.) 5/8 Tap	TK019003		
62-14 Tooth Spline (12/24 P) SAE	TK019005		
63-1.75" Tapered, 1.25-18 Thread	TK019001	039049**	025133
64-40mm Straight Keyed, M12 Tap T	K019004	039050***	

* .375 sq. x 1.437
** 7/16 x 7/16 x 1.245
*** 12mm x 8mm x 63mm

OPTION GROUP

EXPLODED VIEW ITEM# / DESCRIPTION	3 HIGH TEMP COMMUTATOR SEAL	5 SEAL RING (5)	18 INNER SEAL
AAAA-"Standard", Black Paint	032438	032807	032850
AAAB-"Standard", No Paint	032438	032807	032850
AAAC-"Standard", Double Paint	032438	032807	032850
AAAF- Castle Nut, Black Paint	032438	032807	032850
AAAG-Fluorocarbon (Section Seal Only), Black Paint	032438	032810	032850
AAAH-Fluorocarbon (Section Seal Only), No Paint	032438	032810	032850
AADD-Fluorocarbon (Section Seal Only), Castle Nut, No Paint	032438	032810	032850
AAFW-Fluorocarbon (Section Seal Only), Black Paint	032438	032810	032850
AAWT-Fluorocarbon (Section Seal Only), Castle Nut, Double Paint Black Paint	032438	032810	032850

*Note: All TK motor options have High Temp Commutator Seal

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.
- 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 Parker or OEM approved service parts.

CAUTION: Special lifting aids may be required to handle/service the TGK motor due to it’s large size and weight. Take steps necessary to ensure that handling/service can be done safely.

Reference Exploded Assembly View

Place Torqmotor in a vise

1. Place the Torqmotor in a soft jawed vice or similar support, with coupling shaft (12) pointed down and the vise jaws clamping firmly on the sides of the housing (19) mounting flange.

Figure 1

WARNING

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

Scribe alignment mark

2. Scribe an alignment mark (V) down and across the Torqmotor components from end cover (2) to housing (19) to facilitate reassembly orientation where required. SEE FIGURE 1.

Remove special bolts & inspect bolts

3. Remove the seven special hex head bolts (1) using a 9/16 inch size socket. SEE FIGURE 3. Inspect bolts for damaged threads. Replace damaged bolts. SEE FIGURE 4.

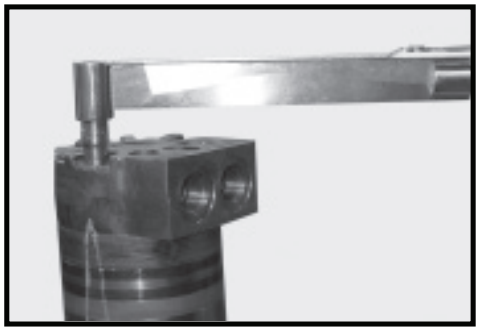


Figure 3

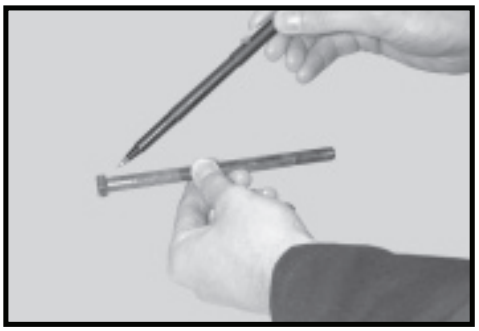


Figure 4

Remove end cover & inspect bolts

4. Remove end cover (2) and seal ring (3). Discard seal ring. SEE FIGURE 5.

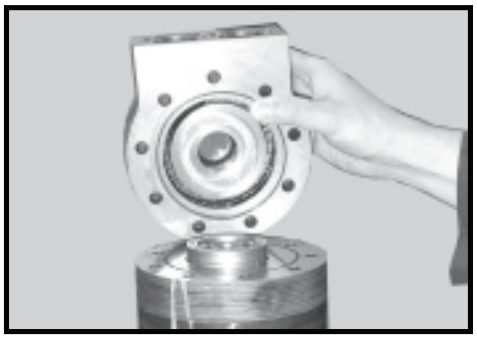


Figure 5

Wash & inspect end cover

6. Thoroughly wash end cover (2) in proper solvent and blow dry. Be sure the end cover flow areas, are free of contamination. Inspect end cover for cracks and the bolt head recesses for damage. Replace end cover as necessary. SEE FIGURE 6.

NOTE

A polished pattern (not scratches) on the cover from rotation of the commutator 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.

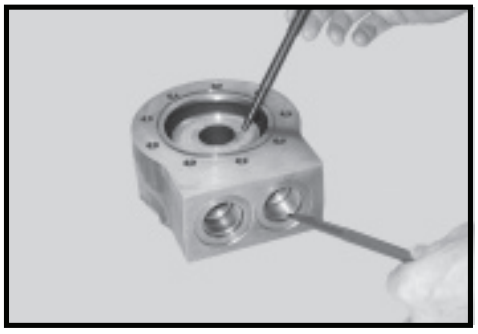


Figure 6

Remove & inspect commutator

8. Remove commutator and seal ring (4) 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. SEE FIGURE 7 & 8.

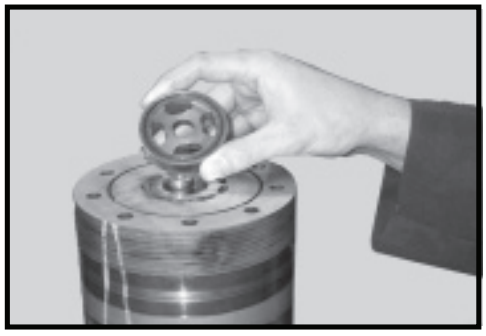


Figure 7

Figure 8

Remove manifold

9. Remove manifold (6) and inspect for cracks surface scoring, brinelling or spalling. Replace manifold if any of these conditions exist. SEE FIGURE 9. A polished pattern on the ground surface from commutator or rotor rotation is normal. Remove and discard the seal ring (3).

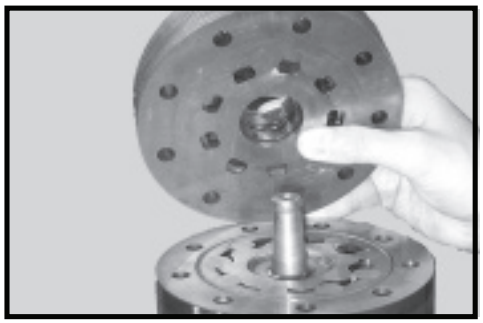


Figure 9

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 (7) and wearplate (8), together to retain the rotor set in its assembled form, maintaining the same rotor vane to stator contact surfaces. SEE FIGURE 10. The drive link (9) 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 and wearplate. 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 rings (3) between the rotor set, and the wearplate.

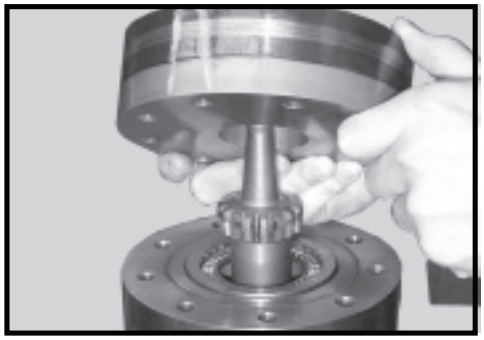


Figure 10

NOTE

The rotor set (7) 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.

NOTE

Series TGK Torqmotor may have a rotor set with two stator halveswith a seal ring (3) between them. Discard seal ring only if stator halves become disassembled during the service procedures.

NOTE

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

Check rotor, vane clearance

11. Place rotor set (7) and wear plate (8) on a flat surface and center rotor in stator such that two rotor lobes (180 degrees apart) and a roller vane 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 11.

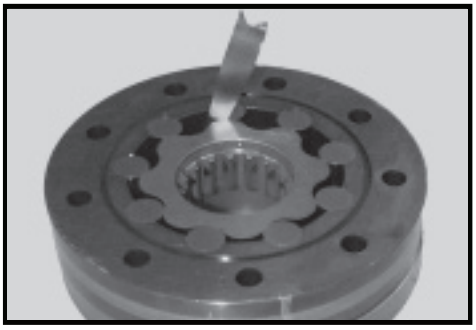


Figure 11

NOTE

If rotor set (7) has two stator halves , check the rotor lobe to roller vane clearance at both ends of rotor.

Remove & inspect drive link

12. Remove drive link (9) 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 12. Remove and discard seal ring (3) from housing (19).

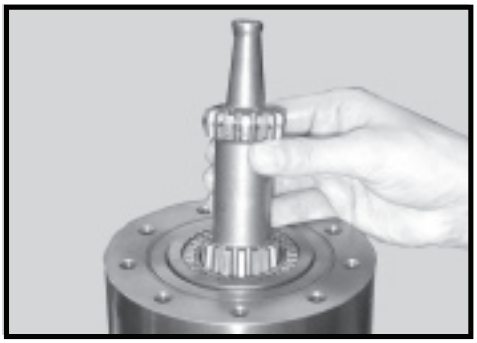


Figure 12

Remove thrust bearing

13. Remove rear thrust bearing (11) and retaining washer (10) from top of coupling shaft (12). Inspect for wear, brinelling, corrosion and a full complement of retained rollers. SEE FIGURE 13.

Figure 13

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. Remove any key (28), nut (29A), washer, bolt, or lock washer still attached to the shaft.

Remove & inspect coupling shaft

15. Remove coupling shaft (12), by pushing on the output end of shaft. SEE FIGURE 14. 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 15. Replace coupling shaft if any of these conditions exist.

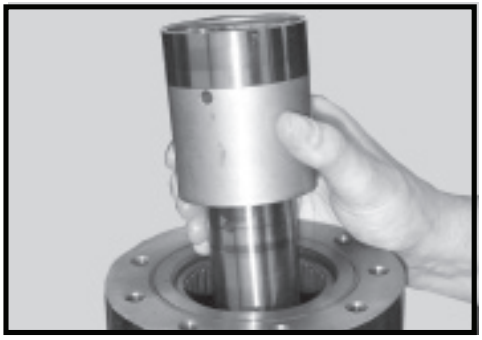


Figure 14

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

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

Figure 15

18. Remove seal (16), backup washer (17), and backup ring (18) from TGK Series 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 16.

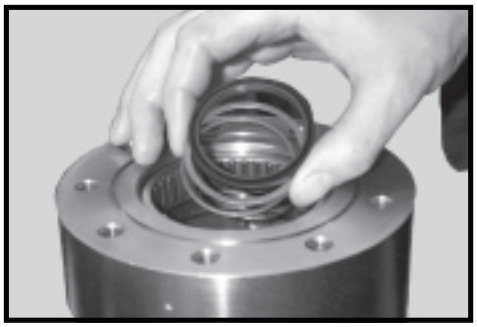


Figure 16

Remove dirt & water seal

19. Remove housing (19) from vise, invert it and remove and discard seal (21). A blind hole bearing or seal puller is required. SEE FIGURE 17.

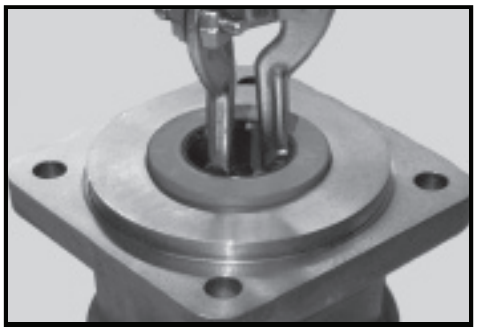


Figure 17

Inspect housing assembly

20. Inspect housing (19) 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 18. If the housing is defective in these areas, discard the housing assembly.

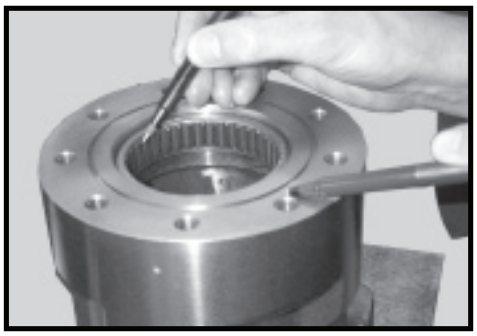


Figure 18

Inspect housing bearings

21. If the housing (19) assembly has passed inspection to this point, inspect the housing bearings (20) and (13) and since 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.

NOTE

The depth or location of bearing (13) in relation to the housing wear plate surface should be measured and noted before removing the bearings. This will facilitate the correct reassembly of new bearings. SEE FIGURE 19.

Figure 19

Remove bearings & thrust washers

22. If the bearings, or thrust washers must be replaced use a suitable size bearing puller to remove bearing (13) from housing (19) without damaging the housing. Remove thrust washers (14) and thrust bearing (15) and replace. SEE FIGURES 20 & 21.

Figure 20

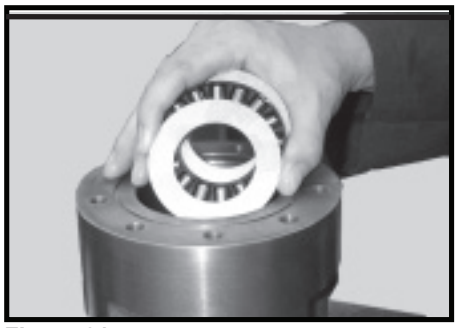


Figure 21

THE DISASSEMBLY OF TORQMOTOR IS NOW COMPLETE.

- 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: Complete seal kits are available. SEE FIGURE 22. The parts should be available through most OEM parts distributors or Parker 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 **SINCE THEY 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.**

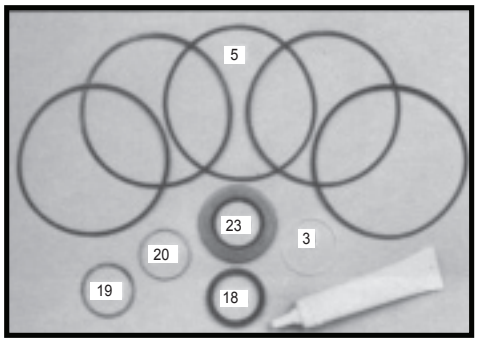


Figure 22 Seal Kit

Press in outer bearing

1. If the housing (19) bearing components were removed for replacement, thoroughly coat and pack a **new** outer bearing (20) with clean corrosion resistant grease recommended in the material section. Press the new bearing into the counterbore at the mounting flange end of the housing, using the appropriate sized bearing mandrel such as described in figure 1 which will control the bearing depth to .410/ .420” from the outside face of the counter bore.

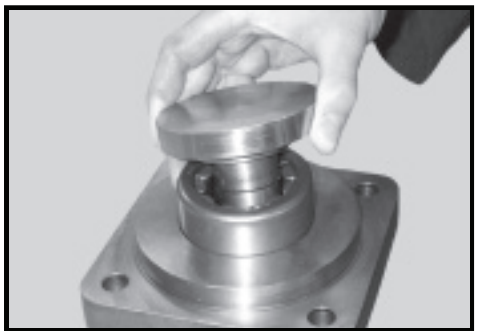


Figure 23

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 is not cocked when pressing a bearing into the housing.

Figure 24

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 (13) or (20) be careful to ensure that the bearing depths specified are achieved to insure adequate bearing support and correct relationship to adjacent components when assembled. SEE FIGURE 24.

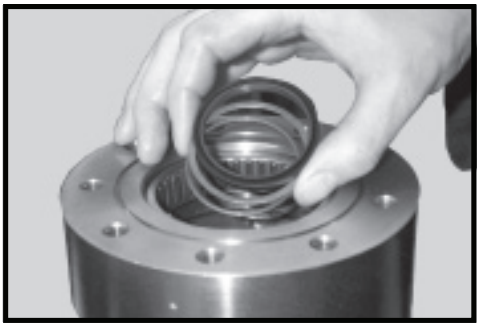


Figure 25

CAUTION

Because bearings (13) and (20) have a press fit into the housing they must be discarded when removed. They must not be reused.

Press in inner bearing

2. The Large Frame TGK Series Torqmotor housing (19) requires that you assemble **new** backup ring (18), a **new** backup washer (17), **new** seal (16), with the lip facing to the inside of Torqmotor (see figure 45), **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 14 & 15. When these components are in place, press **new** bearing (13) into the housing (19) to a depth of .130/.150 inches. Use the opposite end of the bearing mandrel used to press in outer bearing (20). Reference figure 1, in the "Tools and Materials Required for Servicing" section. SEE FIGURE 27.

Figure 26

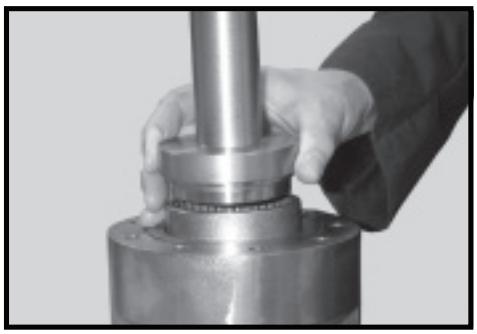


Figure 27

Press in dirt & water seal

3. Press a **new** dirt and water seal (21) into the housing (19) outer bearing counterbore. The dirt and water seal (21) 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 28.

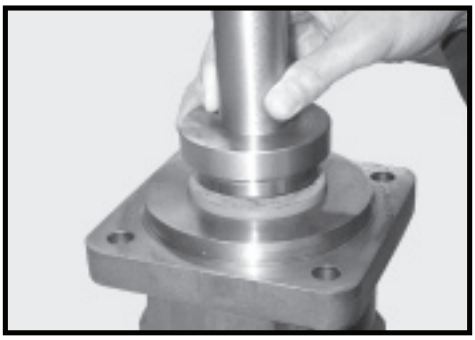


Figure 28

Place housing assembly into vice

4. Place housing (19) assembly into a soft jawed vise or similar support with the coupling shaft bore down, clamping against the mounting flange. SEE FIGURE 29.

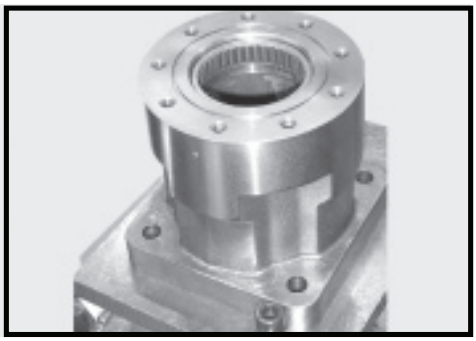


Figure 29

Assemble backup washers & seal

Housings (19) 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 ring (18), new backup washer (17), 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 45). Be sure the thrust bearing package is reseated correctly after assembly of the seal and backup washer. SEE FIGURES 30, 31 & 32.

Figure 30

Figure 31

Figure 32

Apply masking tape to shaft

7. Apply masking tape around splines or keyway on shaft (12) to prevent damage to seal. SEE FIGURE 33.

Install coupling shaft

8. Be sure that a generous amount of clean corrosion resistant grease has been applied to the lower (outer) housing bearing (20). Install the coupling shaft (12) into housing (19), seating it against the second thrust washer (14). SEE FIGURE 33.

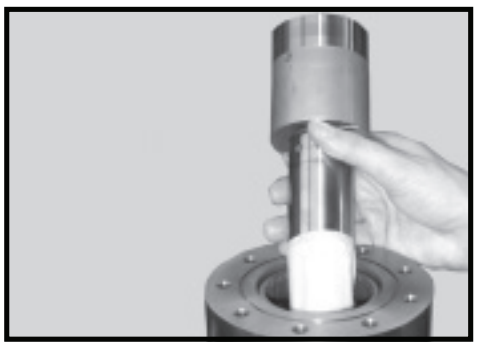


Figure 33

CAUTION

The outer bearing (20) is not lubricated by the system's hydraulic fluid. Be sure it is thoroughly packed with the recommended grease, Parker Gear grease specification #045236, E/M Lubricant #K-70M or Mobil Mobilith SHC ® 460 A packet of grease (P/N 406018) is included in each seal kit.

NOTE

The coupling shaft (12) will be approximately .10 inch (2.54 mm) below the housing wear plate surface when correctly installed to allow the assembly of thrust bearing (11) and retaining washer (10). The coupling shaft must rotate smoothly on the thrust bearing package.

Install thrust bearing

9. Install thrust bearing (11) and retaining washer (10) onto the end of coupling shaft (12). SEE FIGURE 34.

Figure 34

Insert seal ring

10. Apply a small amount of clean grease to a **new** seal ring (3) and insert it into the housing (19) seal ring groove. SEE FIGURE 35.

NOTE

One or two alignment studs screwed finger tight into housing (19) 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 3/8-24 UNF 2A bolts that are over .5 inch (12.7 mm) longer than the bolts (1) used in the Torqmotor.

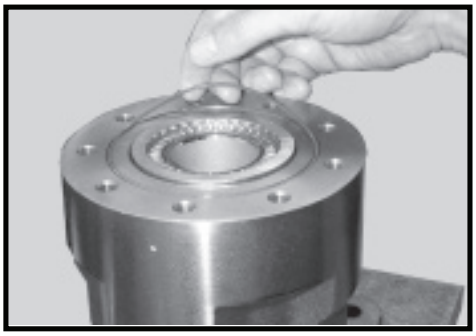


Figure 35

Install drive link

11. Install drive link (9) with 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 36.

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.

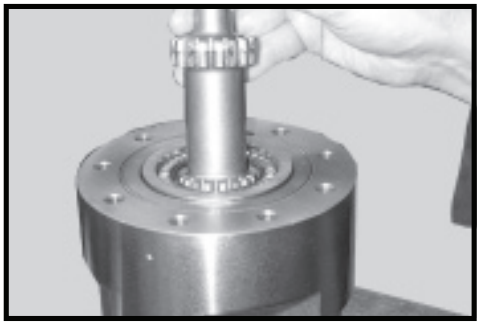


Figure 36

Assemble seal ring

12. Apply a small amount of clean grease to new seal rings (3) and assemble them into the seal ring grooves on the rotor set side of the wear plate (8) and on the manifold plate side of the rotor set stator .

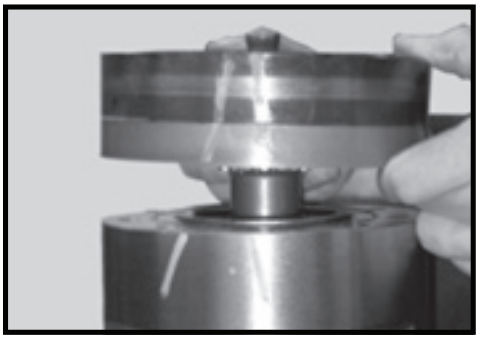


Figure 37

Assemble wear plate and rotor set

13. Assemble wear plate (8) with rotor set over the drive link (9) and alignment studs onto the housing (19) and the rotor splines into mesh with the drive link splines. SEE FIGURE 37.

NOTE

It may be necessary to turn one alignment stud out of the housing (19) temporarily to assemble rotor set (7) over the drive link.

NOTE

The manifold (6) 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 (6) over the alignment studs and drive link (9) and onto the rotor set. Be sure the correct manifold surface is against the rotor set. SEE FIGURE 38.

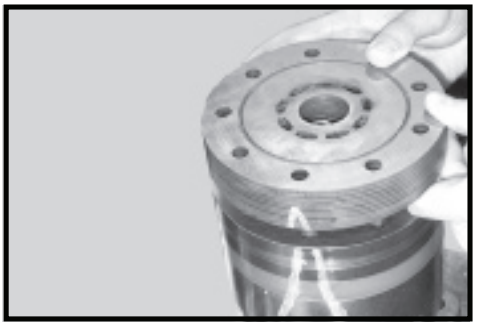


Figure 38

Insert a seal in manifold

17. Apply grease to a **new** seal ring (3) and insert it in the seal ring groove exposed on the manifold.

Assemble seal & commutator

19. Assemble a **new** seal ring (4) into commutator (4) and assemble commutator over the end of drive link (9) onto manifold (6) with seal ring side up. SEE FIGURE 39.

Note

Remove alignment studs (if used) prior to assembly of end cover.

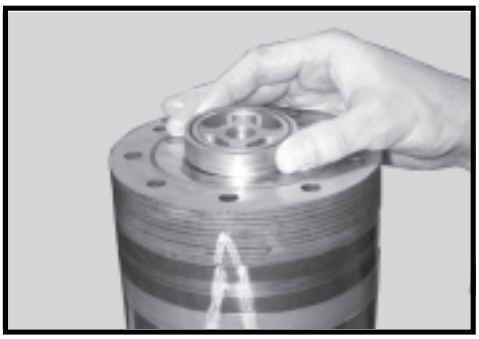


Figure 39

Assemble end cover

22. Assemble end cover over the commutator and in line with the alignment marks on the exterior of the motor. SEE FIGURE 40 and 41.

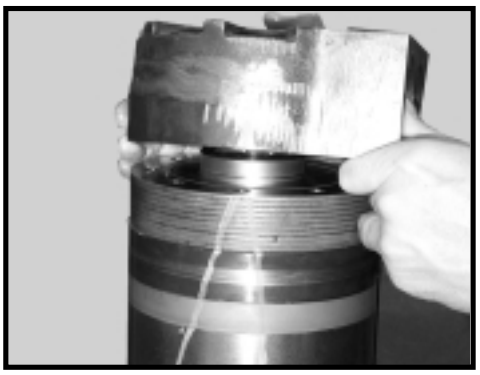


Figure 40

Figure 41

Assemble cover bolts

23. Assemble the 9 special bolts (1) 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 (SEE FIGURE 44),to pull the end cover and other components into place with a final torque of 44-55 ft. lbs. on each bolt. SEE FIGURE 42 & 43.

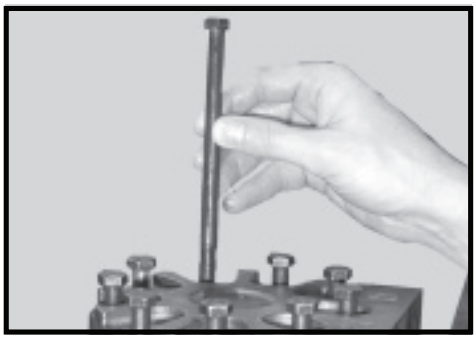


Figure 42

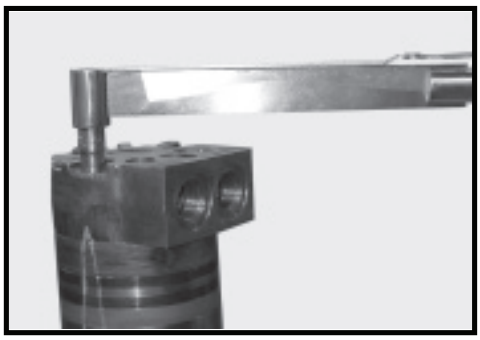


Figure 43

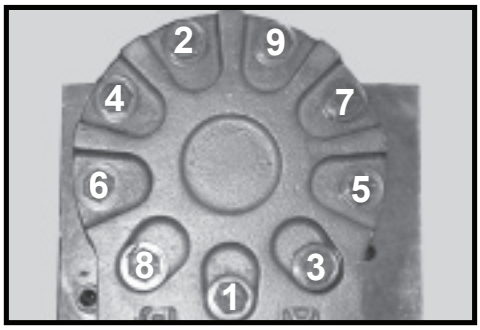


Figure 44

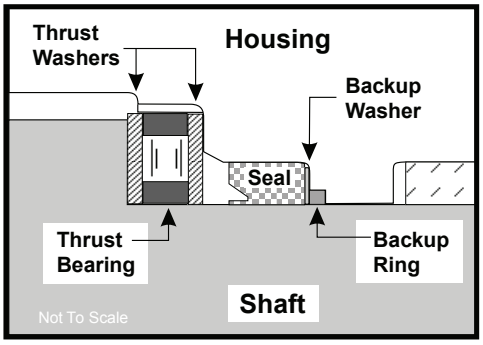


Figure 45 **Large Frame**

THE ASSEMBLY OF THE TORQMOTOR IS NOW COMPLETE EXCEPT FOR KEY (28), NUT (29), or OTHER EXTERNAL HARDWARE IF APPLICABLE. PROCEED TO FINAL CHECKS SECTION.

Final Checks

• Pressurize the Torqmotor with 100 PSI dry air or nitrogen and submerge in a water-based solvent to check for external leaks. Make sure to plug the remaining ports prior to submerging.

• Check Torqmotor for rotation. Torque required to rotate coupling shaft should not be more than 50 lb/ft (68 N m).

• On TK Series Torqmotor, pressure port with "A" cast under it on endcover (2) is for clockwise coupling shaft rotation as viewed from the output end of coupling shaft. Pressure port with "B" cast under it for counter clockwise coupling shaft rotation.

• Use test stand if available, to check operation of the Torqmotor.

Hydraulic Fluids

Keep the hydraulic system filled with one of the following:

• 10W40 SE or SF, or manufacturer's 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).

System Maintenance Tips

• 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 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 in 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.

Parker Pump/Motor Operation extends close technical cooperation and assistance. If problems occur which you cannot solve, please contact our service department at (423) 639-8151, or your local Parker approved distributor.

Notes

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