

# Parts Replacement Manual for TORQUE-ARM® Speed Reducers Straight Bore & Taper Bushed

SIZES: TDT615 - TDT625 and TDT715 - TDT725

These instructions must be read thoroughly before installing or operating this product.

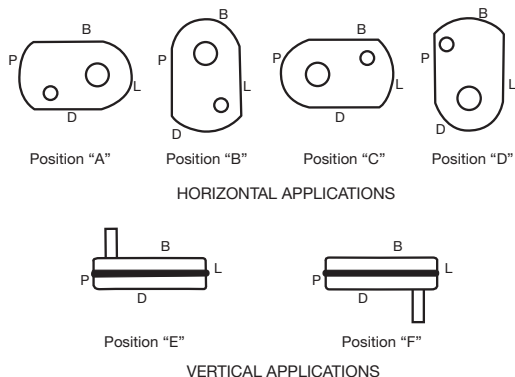
**WARNING: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.**

## INSTALLATION

1. Replace the plastic plug that protects the threaded hole in the reducer housing with the eyebolt supplied with the reducer.
2. Determine the running positions of the reducer. (See Fig. 1) Note that the reducer is supplied with either 4 or 7 plugs; 4 around the sides for horizontal installations and 1 on each face for vertical installations. These plugs must be arranged relative to the running positions as follows:

**Horizontal Installations** - Install the magnetic drain plug in the hole closest to the bottom of the reducer. Of the 3 remaining plugs on the sides of the reducer, the lowest one is the minimum oil level plug.

**Vertical Installations** - Install the filler/ventilation plug in the hole provided in the top face of the reducer housing. Use the hole in the bottom face for the magnetic drain plug. Of the 5 remaining holes on the sides of the reducer, use a plug in the upper housing half for the minimum oil level plug.



B: Breather; D: Drain; L: Oil Level Plug; P: Plug

Figure 1 - Mounting Positions

**WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed: Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Baldor Electric Company nor are the responsibility of Baldor Electric Company. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.**

The running position of the reducer in a horizontal application is not limited to the four positions shown in Figure 1. However, if running position is over 20° either way from sketches, the oil level plug cannot be safely used to check the oil level, unless during the checking the torque arm is disconnected and the reducer is swung to within 20° of the positions shown in Figure 1. Because of the many possible positions of the reducer, it may be necessary or desirable to make special adaptations using the lubrication fitting holes furnished along with other standard pipe fittings, stand pipes and oil level gauges as required.

3. Mount reducer on driven shaft as follows:

**For Straight Bore:** Mount reducer on driven shaft as close to bearing as practical. If bushings are used, assemble bushings in reducer first. A set of bushings for one reducer consists of one keyseated bushing and one plain bushing. Extra length setscrews are furnished with the reducer. Driven shaft should extend through full length of speed reducer. Tighten both setscrews in each collar.

**For Taper Bushed:** Mount reducer on driven shaft per instruction sheet packed with tapered bushings.

4. Install sheave on input shaft as close to reducer as practical. (See Fig. 2)

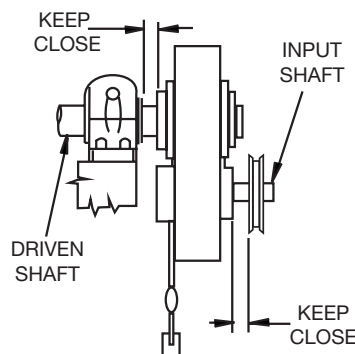


Figure 2 - Sheave Installation

5. Install motor and V-belt drive so belt pull will approximately be at right angles to the center line between driven and input shaft. (See Fig. 3) This will permit tightening the V-belt drive with the torque arm.

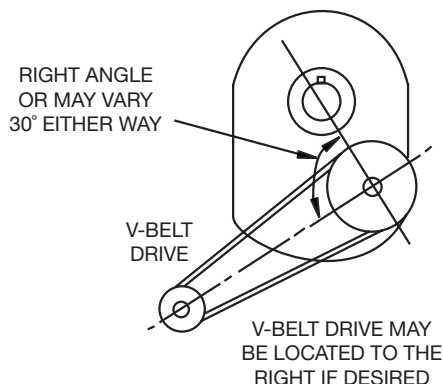
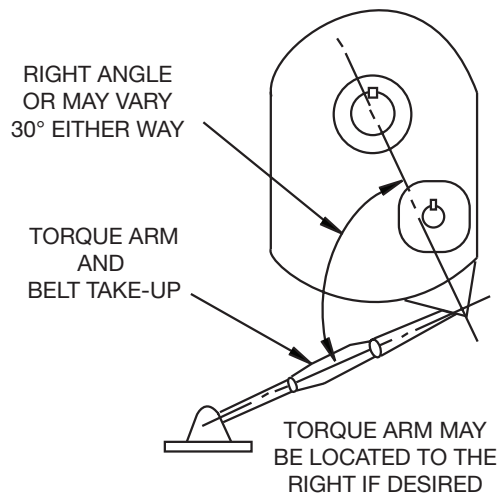


Figure 3 - Installation of Motor and V-Belt Drive

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6. Install torque arm and adaptor plates using the long reducer bolts. The bolts may be shifted to any of the holes on the input end of the reducer.
7. Install torque arm fulcrum on a rigid support so that the torque arm will be approximately at right angles to the center line through the driven shaft and the torque arm anchor screw. (See Fig. 4) Make sure that there is sufficient take-up in the turnbuckle for belt tension adjustment when using V-belt drive.



**Figure 4 -**

## LUBRICATION

**NOTE:** Because reducer is shipped without oil, it is necessary to add the proper amount of oil before running. Use a high grade petroleum base, rust and oxidation inhibited (R & O) gear oil - see tables. Follow instructions on reducer nameplate, warning tags, and in the installation manual.

Under average industrial operating conditions, the lubricant should be changed every 2500 hours of operation or every 6 months, whichever occurs first. Drain reducer and flush with kerosene, clean magnetic drain plug and refill to proper level with new lubricant.

**CAUTION:** Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200° F, the oil should be changed every 1 to 3 months depending on severity of conditions.

**Table 1 - Oil Volumes**

REDUCER SIZE	Volume of Oil Required to Fill Reducer to Oil Level Plug																	
	① Position A			① Position B			① Position C			① Position D			① Position E			① Position F		
	Fluid Ounces (Approx)	Quarts ② (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts ② (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts ② (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts ② (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts ② (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts ② (Approx)	Liters (Approx)
TDT615	136	4-1/4	4.0	160	5	4.7	136	4-1/4	4.0	160	5	4.7	276	8-5/8	8.2	292	9-1/8	8.6
TDT625																		
TDT715	208	6-1/2	6.1	256	8	7.6	232	7-1/4	6.9	296	9-1/4	8.7	492	15-3/8	14.6	524	16-3/8	15.5
TDT725																		

① Refer to Fig. 1 on page 2 for mounting positions.

② U. S. Measure: 1 quart = 32 fluid ounces = .94646 liters.

NOTE: If reducer position is to vary from those shown in Figure 1 either more or less oil may be required. Consult factory.

**Table 2 - Oil Recommendations for Average Operating Conditions**

Ratio and Output RPM	Room Temp. ° Fahrenheit	OIL		VISCOSITY	
		S. A. E Number	AGMA Lubrication Number	ASTM SUS @ 100° F.	Metric Equiv. C Sf @ 37.8° C.
25:1 - Up to 45 RPM 15:1 - Up to 75 RPM	- 25° thru 60°	10W40	- - -	- - -	- - -
	0° thru 100°	40	4	626 to 765	135 to 165
	101° thru 180°	50	5	918 to 1122	198 to 242
25:1 - 46 RPM and Up 15:1 - 76 RPM and Up	- 25° thru 60°	10W30	- - -	- - -	- - -
	0° thru 100°	30	3	417 to 510	90 to 110
	101° thru 180°	40	4	626 to 765	135 to 165

### NOTES:

Pour point of lubricant selected should be at least 10° F. lower than expected minimum ambient starting temperature.

Extreme pressure (EP) lubricants are not recommended for average operating conditions.

Special lubricants may be required for food and drug industry applications where contact with the product being manufactured may occur. Consult a lubrication manufacturer for recommendations.

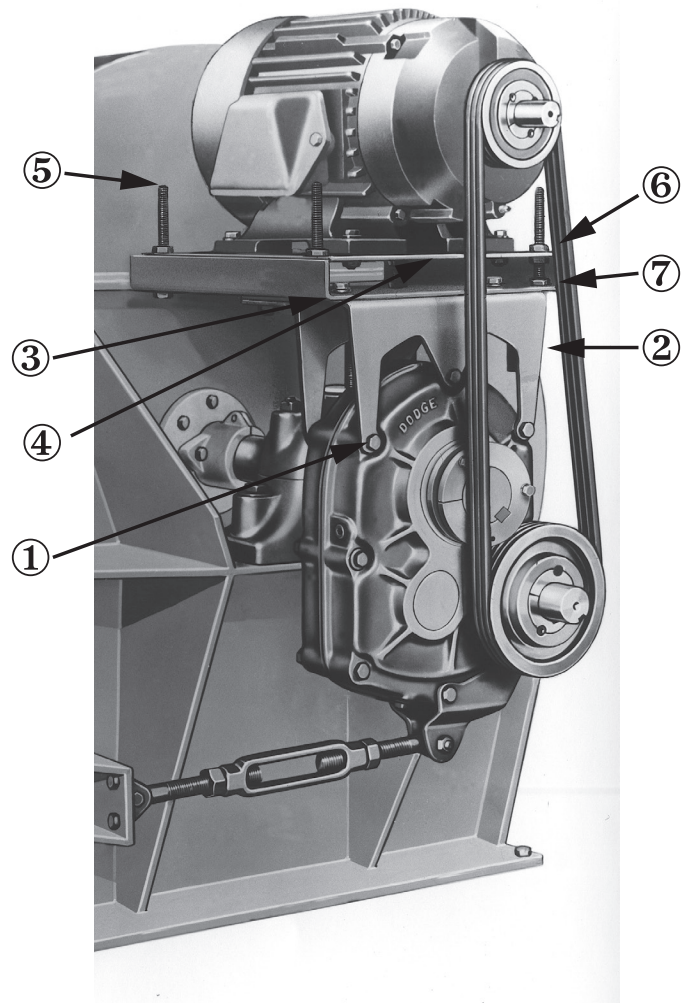
Do not use oils containing slippery additives such as graphite or molybdenum disulphide in the reducer when backstop is used. These additives will destroy sprag action.

## MOTOR MOUNTS

**WARNING:** Ensure that all guards are properly installed before proceeding. Exercise extreme care to avoid contacting rotating parts. Failure to observe this precaution may result in bodily injury.

**NOTE:** Refer to photo for position of all parts before installation.

1. Remove the two or three bolts required for mounting the TAM Motor Mount from the reducer housing. Install the front and rear supports (2) using the new reducer bolts (1) supplied with the motor mount. Make sure support flanges face output side of reducer. Tighten bolts securely.
2. Mount bottom plate (3) on supports with bolts supplied. Insert bolts (7) from top through slotted holes. Add flatwasher, lockwasher, and nut. Hand tighten.
3. Thread two nuts (6) on each threaded stud (5) leaving approximately 1" of stud protruding at one end. Insert threaded stud with 1" of threads through corner holes of bottom plate, thread a hex nut (6) on the stud and tighten securely.
4. Slide top plate (4) over the threaded stud, making sure center handling hole is positioned opposite input side of reducer. Thread a hex nut (6) on the studs and tighten securely.
5. Locate the proper position for the motor and bolt it to the top plate. Tighten bolts securely.
6. Install motor sheave and reducer sheave as close to motor and reducer housings as possible. Accurately align the motor and reducer sheave by sliding bottom plate in relation to supports. Tighten bolts (7) securely.
7. Install V-belts and tension belts by alternately adjusting nuts (6) on the threaded studs (jackscrews). Make certain that all bolts are securely tightened, the V-belt drive is properly aligned and the belt guard is installed before operating the drive.



**Figure 5 - Motor Mount**

**NOTE:** Belt Guard has been removed for photographic purposes.

## REPLACEMENT OF PARTS

Using tools normally found in a maintenance department, a Dodge Torque-Arm Speed Reducer can be disassembled and reassembled by careful attention to the instructions following;

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press and equipment for heating bearings and gears should be available for shrinking these parts on shafts.

The oil seals are of the rubbing type and considerable care should be exercised during disassembly and reassembly to avoid damage to surfaces which the seals rub on.

### ORDERING PARTS

When ordering parts for reducer specify reducer size number, part name, part number and quantity.

It is strongly recommended that when a pinion or gear is replaced, the mating gear or pinion also be replaced.

If the large gear on the output hub must be replaced, it is recommended that an output hub assembly of a gear assembled on a hub be ordered to insure undamaged surfaces on the output hub where the oil seals rub. However if it is desired to use the old output hub, press the gear and bearing off and carefully examine the rubbing surface under the oil seal for possible scratching or other damage resulting from the pressing operation. To prevent oil leakage at the oil seals, the smooth surface of the output hub must not be damaged.

If any parts must be pressed from a shaft or the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal.

Because old seals may be damaged in disassembly, it is advisable to order replacements for these parts.

If replacing a bearing or a shaft, it is advisable to order a set of shims for adjustment of bearings on the shaft assembly. If replacing a housing, a set of shims should be ordered for each shaft assembly because the adjustment of the bearings on each shaft assembly is affected.

## REMOVING REDUCER FROM SHAFT

### STRAIGHT BORE

Loosen screws in both output hub collars. Remove the collar next to end of shaft. This exposes three puller holes in output hub to permit use of wheel puller. In removing reducer from shaft be careful not to damage ends of hub.

### TAPER BUSHED

1. Remove bushing screws.
2. Place the screws in the threaded holes provided in the bushing flanges. Tighten the screws alternately and evenly until the bushings are free on the shaft. For ease of tightening screws make sure screw threads and threaded holes in bushing flanges are clean.
3. Remove the outside bushing, the reducer and then the inboard bushing.

### DISASSEMBLY

1. Remove all bolts from housing. Remove back-up plates and snap rings on the output hub on taper-bushed reducers. Open housing evenly to prevent damage to parts inside.
2. Lift shaft, gear and bearing assemblies from housing.
3. Remove seals, seal carriers and bearing cups from housing.

## REASSEMBLY

1. Output Hub Assembly: Heat gear to 325 to 350°F. to shrink on output hub. Heat bearing cones to 270 to 290°F. to shrink on hub.
2. Countershaft Assembly: Heat gear to 325 to 350°F. and bearing cones to 270 to 290°F. to shrink on shaft.
3. Input Shaft Assembly: Heat bearing cones to 270 to 290°F. to shrink on shaft.
4. Place a .010" shim on output hub seal carrier for right hand half of housing (as viewed in drawing). Place a 1/8" diameter bead on Dow Corning RTV732 sealant on the face around the I.D. of the shim (seal is to be between reducer housing and shim).

**Caution: If too much sealant is used it will run into bearing and too little sealant will result in an ineffective seal.**

Install output hub seal carrier and countershaft bearing cover in right hand housing half and tighten screws to recommended torque in Table 1. Place bearing cups in right hand housing half. Make certain the cups are properly seated in housing. Place housing half on blocks to allow for protruding end of output hub.

5. Mesh output hub and countershaft assembly together and place in housing half. Place input shaft in position. Make sure rollers are properly seated in bearing cups.
6. Clean housing flange surfaces on both halves, making sure not to nick or scratch flange face. Place a new bead of gasket replacer on flange face and spread evenly over entire flange leaving no bare spots. Note: If reducer was originally supplied with a housing gasket do not use gasket replacer. Reorder gasket per part number given in parts list. Place other housing half into position and tap with a soft hammer (rawhide not a lead hammer) until housing bolts can be used or draw housing halves together. Torque housing bolts per torque values listed in Table 3.

Table 3 - Torque Values

Reducer Size	Recommended Torque (lb.-ins.)			
	Housing Bolts	Countershaft Cover Screws	Output Hub Seal Carrier Screws	Input Bearing Cover Screws
TDT6	900	360	360	120
TDT7	1620	600	600	120

7. Place the output hub seal carrier in position without shims and install two cap screws diametrically opposed. Torque each screw to 25 lb.-in. Rotate the shaft to roll, in the bearings and then torque each screw once to 50 lb.-in., do not retorquer the screws. Turn shaft again to roll in the bearings. With a feeler gauge, check the gap between carrier and housing, clockwise from and next to each screw. To determine required shim thickness, add the average of the two feeler gauge readings to .013". Remove the carrier and install the required shims.

**Note: Total shim thickness per carrier or cover should not include more than .009" plastic shims. All other shims should be metal and each plastic shim should be inserted between two metal shims.**

Place a 1/8" diameter bead of Dow Corning RTV732 sealant on the face around the I.D. of the last shim and install output hub carrier in reducer housing. Tighten carrier bolts to recommended torque in Table 3. Output hub should have an axial end play of .001" to .003".

8. Adjust the countershaft bearings using the same method as in step 7, except to determine shim thickness required add the overage of the feeler gauge readings to .013" and the axial end play should be .001" to .007".

9. Again using the same procedure as in step 7, adjust the input shaft bearings, except add the average of the feeler gauge readings to 0.16" to determine required shim thickness and the axial end play should be .002" to .008".
10. Apply sealant to backstop cover gasket and install backstop cover. Extreme care should be used in installing seals to avoid damage due to contact with sharp edges of the keyseat in the input shaft and holes in the output hub. This danger of damage and consequent oil leakage can be decreased by covering the keyseat and the holes with paper or tape which can be removed after seals are in place. Chamfer or burr housing bore if end of bore is sharp or rough. Fill cavity between lips of seal with grease. Seals should be pressed or tapped with a soft hammer evenly into place in the housing, applying force only on the outer corner of the seals. A slight oil leakage at the seal may be evident during initial running in, but will disappear unless the seals have been damaged.
11. Install bushing back-up plate and snap rings on Taper Bushed reducers.



## Straight Bore Reducer



Technical drawing of a mechanical assembly in cross-section, showing a multi-tiered structure with various components labeled with numbers. The drawing includes a detailed view of a component labeled 40 on the left side.

Labels and their corresponding components:

- 16, 19, 20: Topmost assembly components.
- 22, 24: Components below the top assembly.
- 62: A large central component.
- 82: A component on the left side.
- 32, 33: Components on the left side.
- 86, 88: Components on the left side.
- 84: A component on the left side.
- 64: A component on the left side.
- 60: A central component.
- 90: A component at the bottom of the central section.
- 74: A component on the left side.
- 76: A component on the left side.
- 59: A component on the left side.
- 32, 33: Components on the left side.
- 58: A component on the left side.
- 54, 55: Components on the left side.
- 28: A component on the left side.
- 32, 33: Components on the left side.
- 40: A detailed view of a component on the left side.
- 42: A component on the left side.
- 44, 45: Components on the left side.
- 30: A component on the left side.
- 114: A component at the bottom left.
- 25: A component at the bottom left.
- 116: A component at the bottom left.
- 72: A component on the right side.
- 80, 91: Components on the right side.
- 50: A component on the right side.
- 52: A component on the right side.
- 26: A component on the right side.
- 48: A component on the right side.
- 56, 57: Components on the right side.
- 46, 47: Components on the right side.
- 34: A component on the right side.
- 38, 39: Components on the right side.
- 112: A component at the bottom right.
- 118, 120, 122: Components at the bottom right.
- 66: A component on the right side.
- 77: A component on the right side.
- 78: A component on the right side.



Ref.	Name of Part	No. Req'd	TD6 Part No.	TD7 Part No.
12	Backstop Assembly	1	246092	247260
①	HOUSING ASSEMBLY ②	1	246202	247191
16	③ Air Vent	1	245237	390061
18	③ Housing Bolt	6	411466	411498
19	③ Adapter Housing Bolt	2	411468	411499
20	③ Washer	2	419096	419082
22	③ Lockwasher	8	419013	419016
24	③ Hex Nut	8	407091	407095
①	③ Dowel Pin	2	420112	420128
25	③ Pipe Plug	2	430033	430035
26	③ Magnetic Plug	1	430062	430064
28	③ Countershaft Brg. Cover (Backstop Side)	1	244224	355060
30	Input Shaft Seal Carrier	1	246184	247320
③	Input Shaft Bearing Shim Pack	2 ④	391164	390420
	.002" Thick	⑤	427478	427578
	.005" Thick	⑤	427480	427584
	.010" Thick	⑤	427480	427604
	.025" Thick	⑤	427481	427618
32	Carrier and Cover Screws	⑧	411408	411433
33	Lockwasher	⑧	419011	419012
34	Backstop Cover	1	246221	247221
38	Backstop Cover Screw	6	411404	411402
39	Lockwasher	6	419009	419009
40	Input Shaft with Pinion	15:1 Ratio	1	246290
		25:1 Ratio	1	246291
41	① Input Shaft Key	1	443113	443127
44	③ Input Shaft Brg.	Cone	1	390445
45	③ (Input Side)	Cup	1	390687
46	③ Input Shaft Brg.	Cone	1	390446
47	③ (Backstop Side)	Cup	1	390687
	COUNTERSHAFT ASSEMBLY ②	15:1 Ratio	1	391171
48	③ Countershaft with Pinion	25:1 Ratio	1	391186
50	③ First Reduction	15:1 Ratio	1	246294
	③ Gear	25:1 Ratio	1	246292
52	③ Key	2	246293	247005
			245218	247218
54	③ Countershaft Brg.	Cone	1	391910
55	③ (Input Side)	Cup	1	391911
56	③ Countershaft Brg.	Cone	1	391912
57	③ (Backstop Side)	Cup	1	391913
58	Countershaft Brg. Cover (Input Side)	1	246185	247194
59	Countershaft Brg. Shim Pack	2 ④	391165	390429
	.002" Thick	⑤	427474	427690
	.005" Thick	⑤	427475	427691
	.010" Thick	⑤	427476	427692
	.025" Thick	⑤	427477	427693
60	OUTPUT HUB ASSEMBLY ②	Straight Bore	1	390988
		Taper Bushed	1	390935
③	Output Hub	Straight Bore	1	246338
		Taper Bushed	1	246269
62	③ Output Gear	1	246295	247215
64	③ Output Gear Key	2	245217	245217
66	③ Output Hub Snap Ring	1	421033	421038
68	Output Hub Collar ⑥	2	246309	247309
70	Collar Screw ⑥	4	400154	400190
72	Bushing Back-Up Plate ⑦	2	246270	272138
74	Retaining Ring ⑦	2	421055	421099
76	Output Hub Seal Carrier (Input Side)	1	246187	247315
77	Output Hub Seal Carrier (Backstop Side)	1	246186	247315
80	③ Output Hub	Cone	2	391935
81	③ Bearing	Cup	2	391936
82	Output Hub Bearing Shim Pack	2 ④	391187	390444
	.002" Thick	⑤	427470	427525
	.005" Thick	⑤	427471	427527
	.010" Thick	⑤	427472	427528
	.025" Thick	⑤	427473	427558
36	SEAL KIT ② ③	1	246340	247345
42	③ Backstop Cover Gasket	1	246220	246220
78	③ Input Shaft Seal	1	242202	242202
①	③ Output Hub Seal	2	246302	247302
①	③ Housing Gasket (for reducers supplied with gaskets only)	1	246219	247219

Ref.	Name of Part	No. Req'd	TD6 Part No.	TD7 Part No.
①	⑩ RTV Sealant, Tube	1	465044	465044
84	BUSHING ASSEMBLY ②	1-15/16" Bore	1	246259
		2" Bore	1	246260
		2-3/16" Bore	1	246261
		2-1/4" Bore	1	246262
		2-7/16" Bore	1	246263
		2-1/2" Bore	1	246264
		2-11/16" Bore	1	246265
		2-13/16" Bore	1	.....
		2-7/8" Bore	1	246266
		2-15/16" Bore	1	246267
		3" Bore	1	246283
		3-3/16" Bore	1	.....
		3-7/16" Bore	1	246268
		3-15/16" Bore	1	.....
86	③ Bushing Screw	6	411435	411456
88	③ Lockwasher	6	419012	419013
90	③ Key, Bushing to Shaft	1-15/16" Bore	1	443211
		2" Bore	1	443211
		2-3/16" Bore	1	443211
		2-1/4" Bore	1	443211
		2-7/16" Bore	1	443214
		2-1/2" Bore	1	443214
		2-11/16" Bore	1	443238
		2-13/16" Bore	1	.....
		2-7/8" Bore	1	443236
		2-15/16" Bore	1	443237
		3" Bore	1	443252
		3-3/16" Bore	1	.....
		3-7/16" Bore	1	443213
		3-15/16" Bore	1	.....
①	③ Key, Bushing to Output Hub	1-15/16" thru 2-1/2" Bore	1	443212
		2-7/8" thru 3" Bore	1	.....
94	TORQUE-ARM ASSEMBLY ②	1	246097	247098
96	③ Rod End	1	245245	247239
98	③ Hex Nut	1	407097	407099
100	③ Turnbuckle	1	245246	247246
	③ Extension	1	245247	247240
102	③ L. H. Hex Nut	1	407246	407248
104	③ Fulcrum	1	247248	247248
106	③ Fulcrum Screw	1	411489	411489
108	③ Lockwasher	1	419014	419014
110	③ Hex Nut	1	407093	407093
112	ADAPTER ASSEMBLY ②	1	259156	259157
114	③ R. H. Adapter Plate	1	246242	247242
	③ L. H. Adapter Plate	1	246241	247241
116	③ Adapter Bushing	1	245243	247244
118	③ Adapter Bolt	1	411460	411485
120	③ Lockwasher	1	419013	419014
122	③ Hex Nut	1	407091	407093

① Not shown on drawing

② Includes parts listed immediately below. TD6 housing assembly also includes a two-piece housing. Bushing Assemblies include 2 bushings.

③ Parts marked make up the assemblies under which they are listed.

④ One set consists of one each of the shims listed immediately below.

⑤ If replacing a bearing or a shaft, it is advisable to order a set of shims for adjustment of bearings on the shaft assembly. If replacing a housing, a set of shims should be ordered for each shaft assembly because the adjustment of the bearings on each shaft assembly is affected.

⑥ Straight Bore Only

⑦ Taper Bushed Only

⑧ 24 required on size TD6; 28 required on size TD7

⑨ Recommend spare parts.

⑩ **NOTE:** When replacing housing gasket or sealant, clean housing flange surfaces on both halves, making sure not to nick or scratch flange surfaces. If reducer was originally supplied with a gasket, do not use gasket replacer (Dow Corning RTV732). Use gasket replacer (Dow Corning RTV732) only when the reducer was supplied without a housing gasket.



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