

# **Parts Replacement Manual**

## **For**

# **Torque-Arm™**

# **Speed Reducers**

# **Straight Bore & Taper Bushed**

**SIZES: T18**  
**T19**

**WARNING:** Because of the possible danger to persons(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.



## 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. Throw away the tape that covers the filler/ventilation plug in shipment and install plug in topmost hole. 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.

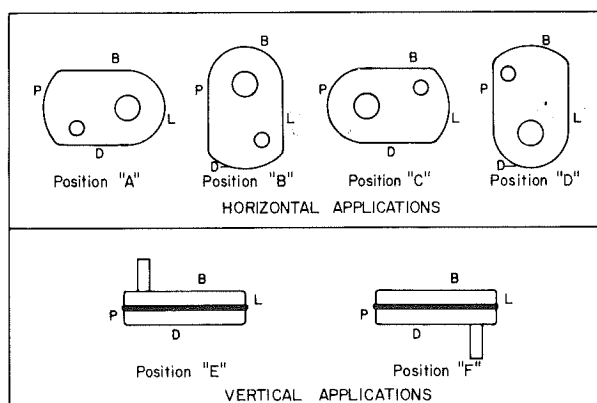


FIG. 1 — Mounting Positions

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 gages as required.

**LUBRICATION**  
Important: 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

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 gages 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.

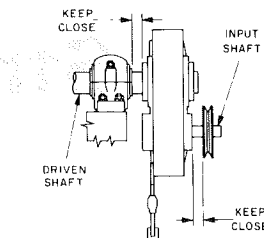


Fig. 2

**For Taper Bushed:** Mount reducer on driven shaft per instruction sheet No. 499629 packed with tapered bushings.

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

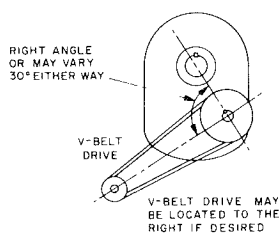


Fig. 3

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.

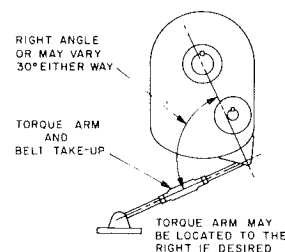


Fig. 4

6. Install torque arm and adapter 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.

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																	
	† Position A			† Position B			† Position C			† Position D			† Position E			† Position F		
	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)	Fluid Ounces (Approx)	Quarts <sup>▲</sup> (Approx)	Liters (Approx)
T18	192	6	5.7	480	15	14.2	320	10	9.5	272	8½	8.0	704	22	20.8	600	18¾	17.7
T19	472	14¾	14.0	480	15	14.2	216	6¾	6.4	440	13¾	13.0	1020	31⅞	30.2	1020	31⅞	30.2

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

▲ 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. ° Fahr.	OIL		VISCOSITY	
		S. A. E. No.	AGMA Lub. No.	ASTM SUS @ 100° F.	Metric Equiv. c St @ 37.8° C.
5:1 — Up to 225 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
5:1 — 226 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

**NOTE:**

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 manufacturers representative for his recommendation.

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**

The motor mount must be installed on output end of reducer as shown in Figure 5. Note: The T-A motor mount is not recommended for applications requiring the use of TRI-MATIC® Overload Release.

Remove two or three (as required) housing bolts on output end of reducer. Install back support 1 and front support 2 with new housing bolts 8. Install mounting bolts 3.

Install mounting plate 5 with adjusting studs 4 as shown in Figure 5.

Assemble one motor rail 6 by loosely bolting through the two front holes on each side of mounting plate (See Figure 5) with mounting rail bolts 7.

Measure the distance between front and rear mounting holes of motor. Position the rear motor rail to this distance and loosely bolt to the mounting plate.

Center the motor on the motor rails. Use a plain washer under each slot in the motor rails when the motor mounting bolts are less than 5/8" diameter. Bolt motor snugly to motor rails.

Install motor sheave and reducer sheave on their shafts as close as possible to the motor and reducer housings. **Note:** The motor rails may be moved forward or backward from the position shown in Figure 5 to permit alignment of the V-belt sheaves. It is permissible for the front motor rail to extend beyond the mounting plate 5. Align the V-belt sheaves carefully and tighten all bolts securely.

Install V-belts and adjust belt tension. Figure 5 shows the mount near the minimum belt center position. To increase the center distance, loosen the four nuts "A" on the adjusting studs and tighten the four nuts "B" alternately and evenly until the belts are properly tensioned.

Check all bolts to see that they are securely tightened.

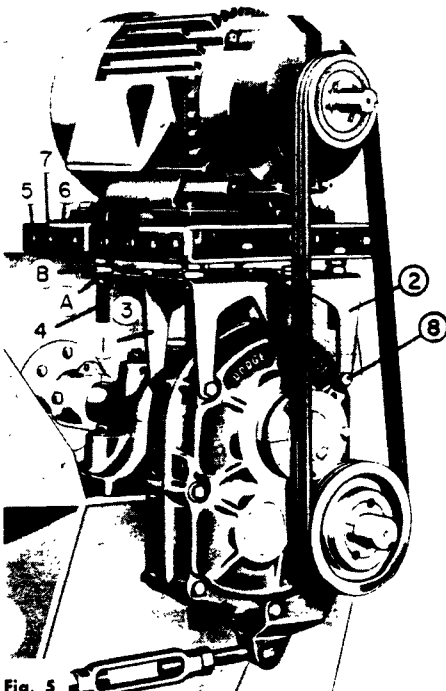
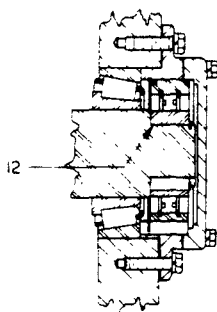
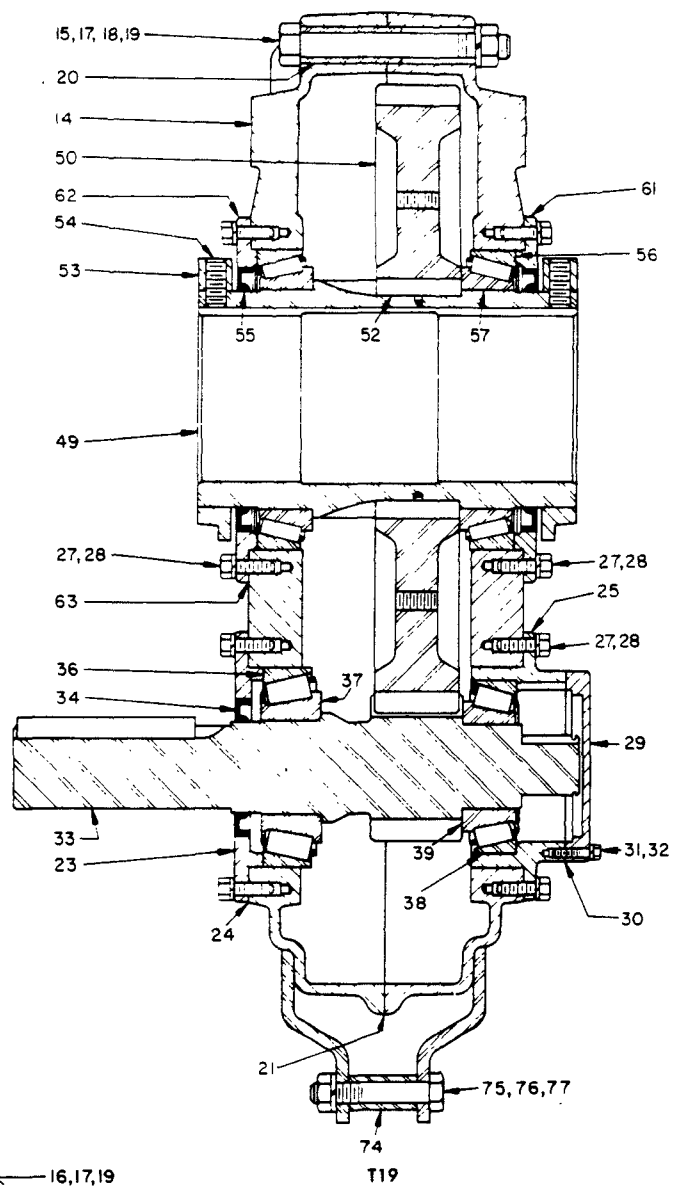
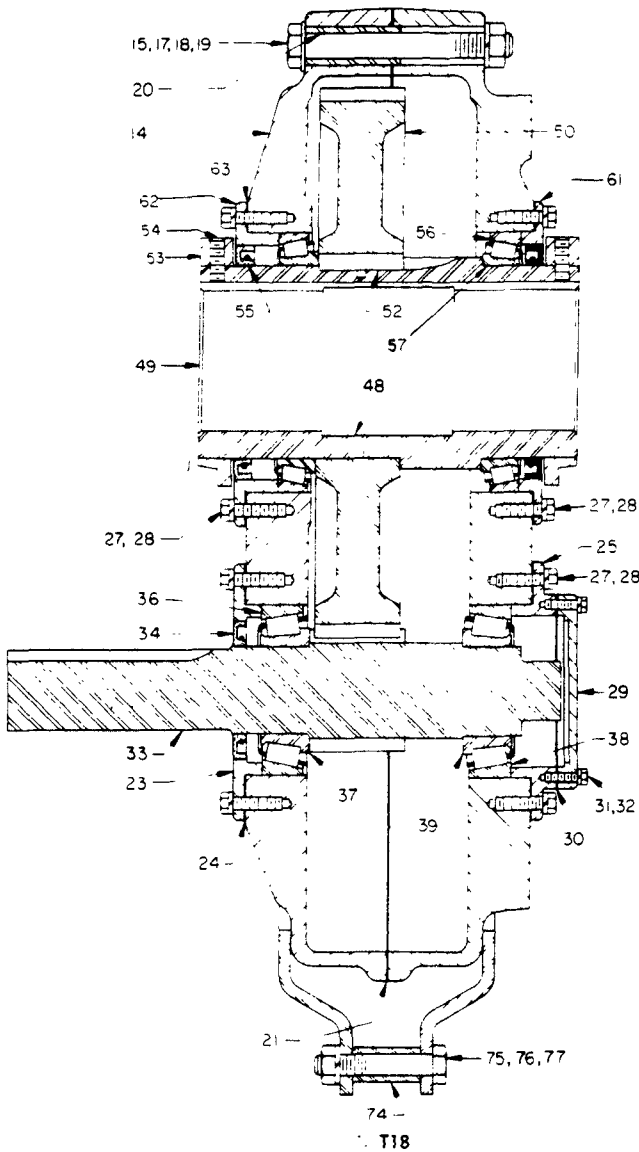


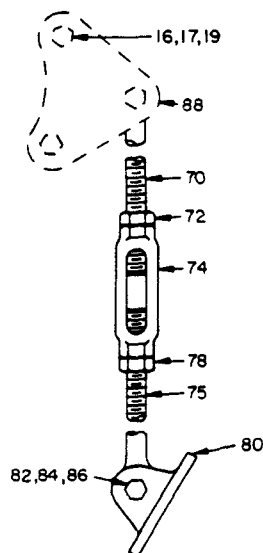
Fig. 5  
Note: Belt guard removed for photographic purposes.

## PARTS FOR T18 and T19 STRAIGHT BORE SPEED REDUCERS

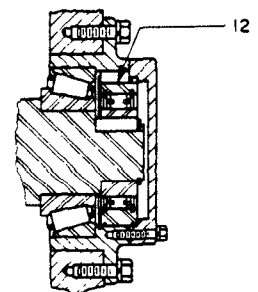
NOTE: The two digit numbers are for reference only. Order parts by the six digit numbers in the Parts List. Each six digit number is a complete identification of the part or assembly.



T18 Backstop Assembly



Torque-Arm Assembly



T19 Backstop Assembly

Refer- ence	Name of Part	No. Req'd.	T18	T19	Refer- ence	Name of Part	No. Req'd.	T18	T19		
			Part No.	Part No.				Part No.	Part No.		
12	Backstop Assembly	1	246092	247260	61*	Output Hub Brg. Shim Pack	⊕ Set ‡	391187	390171		
14	HOUSING ASSEMBLY ★	1	391204	391206		.002" Thick	†	427470	427505		
⚙	▲ Air Vent with Bushing	1	390061	390061		.005" Thick	†	427471	427518		
15	▲ Housing Bolt	9	411499	411499		.010" Thick	†	427472	427530		
16	▲ Adapter — Housing Bolt	2	411502	411502		.025" Thick	†	427473	427560		
17	▲ Lockwasher	11	419016	419016	62	Output Hub Collar ⚙	2	246209	247309		
18	▲ Plain Washer	2	419082	419082	63	Collar Screw ⚙	4	400190	249209		
19	▲ Hex Nut	11	407095	407095	64	Bushing Back-up Plate ■	2	272037	272082		
20	▲ Dowel Pin	2	420128	420128	65	Retaining Ring ■	+	421098	421097		
21*	▲ Housing Gasket	1	248219	249219	66	BUSHING ASSEMBLY ★	{	2 15/16" Bore	1	272048	
⚙	▲ Pipe Plug	+	430035	430035				3 1/8" Bore	1	272045	
⚙	▲ Magnetic Plug	1	430064	430064				3 7/8" Bore	1	272032	272056
23	Input Shaft Seal Carrier	1	258034	249211				3 15/16" Bore	1	272033	272077
24*	Input Shaft Shim Pack	⊕ ‡	390038	390168				4 3/16" Bore	1	272034	272078
	.002" Thick	†	427579	427580				4 7/16" Bore	1	272035	272079
	.005" Thick	†	427595	427591							
	.010" Thick	†	427602	427601	67	▲ Bushing Screw	6	411457	411484		
	.025" Thick	†	427621	427619	68	▲ Lockwasher	6	419013	419014		
25	Backstop Carrier	1	258036	259035	⚙	▲ Key, Bushing to Shaft	{	2 15/16" Bore	1	443247	
27	Carrier Screw	32	411408	411408				3 3/8" Bore	1	443247	
28	Lockwasher	32	419011	419011				3 7/8" Bore	1	443171	443249
29	Backstop Cover	1	248221	259037				3 15/16" Bore	1	443173	272119
30	Backstop Cover Gasket	1	248220	259038				4 3/8" Bore	1	443174	272108
31	Backstop Cover Screw	6	411402	411402				4 7/16" Bore	1	443196	272086
32	Lockwasher	6	419009	419009							
					⚙	▲ Key, Bushing to Output Hub ⚙	1	443162	443121		
33*	Input Shaft with Pinion	1	258033	259034	TORQUE-ARM ASSEMBLY ★						
34*	Input Shaft Seal	1	248203	248203	70	▲ Rod End	1	271050	271050		
⚙*	Input Shaft Key	1	443133	443133	72	▲ Hex Nut	1	407104	407104		
36*	Cup	1	391985	390329	74	▲ Turnbuckle	1	271051	271051		
37*	Cone	1	391983	390328	76	▲ Extension	1	271052	271052		
	Input Shaft Bearing — Backstop Side				78	▲ L.H. Hex Nut	1	407250	407250		
38*	Cup	1	391985	391856	80	▲ Fulcrum	1	271054	271054		
39*	Cone	1	391984	391830	82	▲ Fulcrum Bolt	1	411516	411516		
OUTPUT HUB ASSEMBLY ★					84	▲ Lockwasher	1	419020	419020		
	Taper Bushed	1			86	▲ Hex Nut	1	407099	407099		
	Straight Bore	1	390993	390159	ADAPTER ASSEMBLY ★						
48*	▲ Output Hub (Taper Bushed)	1	272036	272081	88	▲ Adapter Plate	2	272053	272053		
49*	▲ Output Hub (Straight Bore)	1	248332	249208	92	▲ Adapter Bushing	1	271046	271046		
50*	▲ Output Gear	1	248215	249007	94	▲ Adapter Bolt	1	411510	411510		
52*	▲ Output Gear Key & Roll Pin	2	390112	390112	96	▲ Lockwasher	1	419020	419020		
54*	Output Hub Seal	2	258004	249202	98	▲ Hex Nut	1	407099	407099		
	Output Hub Seal Carrier										
55	Input Side	1	258021	249221							
56	Backstop Side	1	258020	249220							
	Output Hub Bearing										
57*	Cone	2	390353	390334							
58*	Cup	2	390354	390335							

★ Includes parts listed immediately below marked "▲". T16 housing assembly also includes a two-piece housing. Bushing assembly includes 2 bushings.

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

⚙ Not shown on drawing.

⊕ 1 set req'd. for T18; 2 sets req'd. for T19.

⊕ 2 sets req'd. for T18; 1 set req'd. for T19.

\* One set consists of one each of the shims listed immediately below marked "†".

† See last paragraph under "ORDERING PARTS".

⚙ Straight Bore Only.

■ Taper Bushed Only.

† 2 req'd. on size T18; 4 req'd. on size T19.

⚙ For 2 1/8" & 3 7/8" Bores on T18 and 3 1/8" & 4 1/8" Bores on T19.

\* Recommended spare parts.

## REPLACEMENT OF PARTS

### IMPORTANT:

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.

Our factory is prepared to repair reducers for customers who do not have proper facilities or who, for any reason, desire factory service.

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.

The keyseat in the input shaft as well as any sharp edges on the output hub should be covered with scotch tape or paper before disassembly or reassembly. Also be careful to remove any burrs or nicks on surfaces of the input shaft or output hub before disassembly or reassembly.

#### ORDERING PARTS:

When ordering parts for reducer specify Reducer Size No., Reducer Serial No., 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. Position reducer on its side and remove all bolts. Gently tap the output hub and input shaft with a soft hammer (rawhide not lead hammer) to separate the housing halves. Open housing evenly to prevent damage to the parts inside.
2. Lift shaft, gear and bearing assemblies from housing.
3. Remove seals 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. **Input Shaft Assembly:** Heat bearing cones to 270 to 290 F. to shrink on shaft.

3. Drive the two dowel pins into place in the right hand housing half. Position right half of housing (as shown in drawing) on blocks to allow clearance for protruding end of output hub.

4. Place a .010" shim on output hub seal carrier for right hand half of housing (as viewed in drawing). Place a 1/8" dia. 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 in right hand housing half and torque screws to 360 pound-inches. 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. Clean housing flange surfaces on both halves, making sure not to nick or scratch flange face. Place a new housing gasket on housing half. Place the other half of housing (without covers or carrier installed) in position and tap with a soft hammer (rawhide not lead hammer) until housing halves are together. Install housing bolts and tighten evenly. The final recommended wrench torque should be 1620 pound-inches.

6. 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 retorque 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" dia. 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. Torque carrier bolts to 360 pound-inches. Output hub should have an axial end play of .001" to .003".

7. Using similar procedure as in step 6, adjust the bearing on the input shaft. Backstop cover must be removed. Remove or add shim stock until indicator reading is from .002" to .008".

8. Install backstop cover and oil seals. Extreme care should be observed when installing seals on the output hub and input shaft to avoid contact with the keyseat or any sharp edges. This danger of damage and consequent oil leakage can be decreased by covering all sharp edges with tape or paper. 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 carrier, applying force only on outer edge of seals. A slight oil leakage at the seals may be evident during initial running in, but will disappear unless seals have been damaged.



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