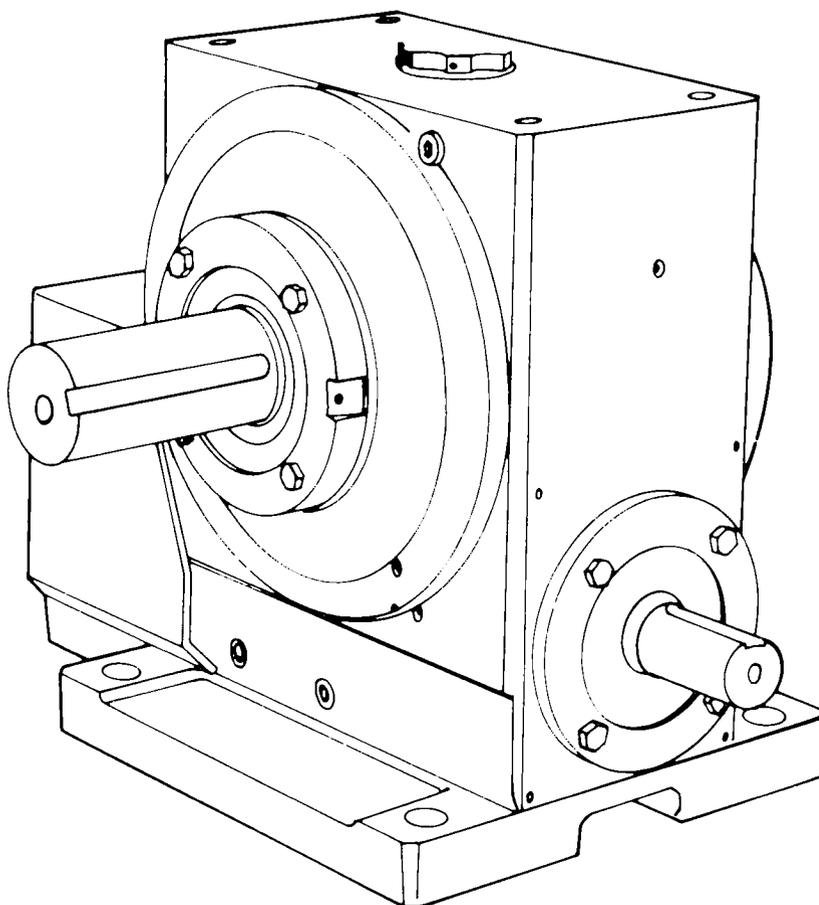
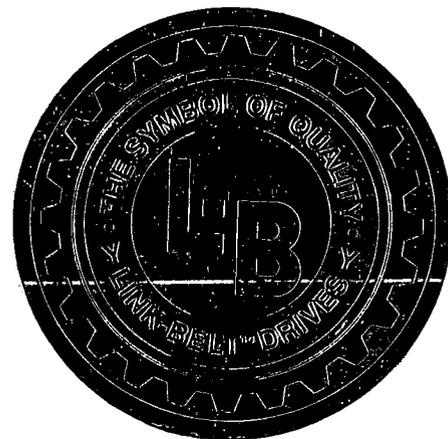


**Service Instructions**  
**3152 Revised 11/90**

# Link-Belt<sup>®</sup> Worm Gear Speed Reducers

- Model MW
- Large Worm Gear Reducers



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# Installation and Operating Instructions

For long life and trouble-free operation of your Link-Belt® Worm Gear Speed Reducer, it is essential that the installation and operating procedures outlined in this service manual be followed.

**Safety is a basic factor to consider at all times in the operation of these drives. Through the use of proper clothing and tools, with proper application and methods of handling, you can prevent serious accidents and injury to yourself and your fellow workers.**

**Warning: Never operate drive at speeds higher than shown on nameplate, or personal injury can result. Consult Link-Belt Drive Division if there is any change of operating conditions from that for which the unit was sold, as stamped on nameplate specifications. Failure to comply could result in personal injury and/or machinery damage.**

## Foundation

Avoid excessive over-hung load on shafts, bearings, and housings by using a rigid support and providing accurate initial alignment. Simplified installation can be obtained when the speed reducer and other drive components are mounted on a steel baseplate, grounded in concrete. To make sure factory alignment has been maintained during shipment and installation, check the alignment of each drive component after bolting the baseplate in place.

For all other methods of mounting, align the speed reducer, or baseplate with mounted speed reducer, by careful shimming until it rests evenly on the foundation. After a few days operation, check alignment and tighten mounting bolts if necessary. Re-check alignment after bolts are tight.

**Warning: When this drive is connected to motor or driven equipment through the use of couplings, sprockets, gears or belt drive, proper guards meeting requirements of OSHA must be used to prevent personal injury or property damage.**

**Warning: When using worm drive in conjunction with an electric motor, do not connect motor without making sure power supply is disconnected. Failure to comply can cause injury to personnel and/or damage to equipment.**

## Handling

Use extreme care when unloading and unpacking reducer to prevent damage or distortion of the unit.

The eyebolts and lifting lugs on the housing are designed for lifting the reducer only and should not be used to lift complete assembly, motor, brake, etc

Complete assemblies: such as a worm reducer, motor, and brake mounted on a baseplate may be lifted using a sling of suitable length and strength, properly placed around the baseplate.

**Warning: Lifting entire assemblies by the housing eyebolts or lifting lugs may result in personal injury or damage to the equipment. Make sure the load is properly secured and balanced to prevent shifting during suspension.**

**For safe handling, use only proper lifting equipment having ample load carrying capacity.**

## Mounting of Couplings, Gears, Sprockets or Sheaves

Gears, sprockets, or sheaves impose overhung loads on speed reducer shaft extensions. Your Link-Belt Speed Reducer has been designed to withstand this type of loading within the ratings listed in our worm gear speed reducer product catalog. Keep overhung loads to a minimum by mounting gears, sprockets or sheaves with the center line of the overhung load within the limits listed in the worm gear speed reducer product catalog, and as close to the housing as possible

**Caution: Do not drive couplings, sprockets, gears, or pulleys onto shaft with hard hammer blows, since damage to internal gears or bearings will result. If necessary, heat part in oil to expand bore.**

Hand lifting is dangerous. To prevent personal injury, use a hoist when mounting heavy couplings, gears, sprockets, or sheaves.

## Standby and Storage

To assure that standby equipment will operate satisfactorily when needed, operate the reducer once a month at rated speeds for short periods of time. If worm reducers are to be stored, full protection will be best obtained if they are stored indoors in a dry, even temperature. When outdoor storage is necessary, provide protection from the elements.

Speed reducer housing interiors and operating parts are protected by a rust preventive such as Gulf 182 No Rust when they leave the factory. This oil meets Military Specification MIL-L-21260 for preservation engine oils. The protective oil film is made more effective because the housing is sealed to prevent the escape of oil vapors and the entrance of water and dampness. For this reason, the plugs which replace breathers, eyebolts, and oil gauges should remain in place until the speed reducer is ready for operation. At that time, replace these plugs with the breather, etc., shipped with the reducer.

Proper storage of worm reducers will provide protection for approximately one year against corrosion from condensation. For longer storage periods consult Link-Belt Drive Division as oil seals may deteriorate.

The protective coating on the shaft extensions and seals is easily removed by using a suitable, non-flammable solvent.

When reducer is removed from storage and before placing it in service, fill to proper level with grade of lubricant specified on the nameplate.

## Operation and Maintenance

### Lubrication

**Caution: All Link-Belt® Worm Gear Speed Reducers are shipped without oil. Remove oil level plug. Add oil to reducer until oil begins to run out of plug hole. Replace plug.**

To provide proper lubrication for the gears and bearings, Link-Belt Worm Gear Speed Reducers are mounted with the high-speed shaft horizontal, and the low speed shaft either horizontal or vertical depending on the type furnished. Other mountings may require factory installed lubrication provisions

Low speed shaft bearings are grease lubricated at the factory with New York and New Jersey grease number F925, (except type WT which is oil lubricated). Apply grease at lubrication fitting locator 17. A pressure relief fitting indicates when the grease chamber is full. Lubricate these bearings with the type grease listed in Table 1, page 3, and at the intervals shown in Table 2, page 3.

The grade of oil to be used in any speed reducer will vary with the ambient temperature under which it will operate. Therefore, all speed reducers are shipped **Without Oil**. Determine proper lubricant number by referring to the worm reducer nameplate or to Table 3, page 3. Then refer to Table 4, page 4, for trade names of typical oils meeting AGMA recommendations. Remove oil level plug. Add oil to reducer until oil begins to run out of plug hole. Replace plug. To determine **Approximate** amount of oil required, See Table 5, pages 4 and 5.

For maximum protection, check the oil level periodically while the speed reducer is **Not Operating**. Be sure level is maintained. Excessive oil can result in oil leakage and overheating, while insufficient oil can result in damage to rotating parts. During the run-in

period, operating temperatures will be somewhat above normal. Maximum efficiency operation will be attained after a period of full load operation and resulting full tooth contact. Slight gear tooth run-in may be evident after initial operating period. This condition is normal and results in full gear tooth-worm thread contact.

**To dispose of initial field run-in particles, drain and flush housing after the first 150 hours of operation.**

Refer to Table 3, page 3, or the reducer nameplate for subsequent oil change periods and grade of lubricant.

**Special lubrication instructions for double reduction MW Type reducers and double reduction large worm reducers having either helical or worm gear input attachment:**

The oil must flow from the main housing locator 1 (See parts drawing) through bearing locator 36 (adjacent to input housing) to get into the input housing. To ensure an adequate oil level in the input housing, fill worm reducer to the level indicated on the oil level gauge, then leave the reducer stand 10 to 15 minutes to allow oil seepage through bearing (locator 36) into the input housing. Check oil level and add oil. Repeat checks until the oil level remains constant. Operate reducer for 3 to 5 minutes, re-check oil level and add or drain oil to indicated level.

**Warning: Never remove breather or oil level indicator while the worm reducer is in operation, or personal injury may result. Check only when reducer is not operating.**

**Table 1 • Grease lubricants for bearings**

Operating Conditions	Manufacturer	Brand Name
No moisture Ambient Temperature 32 <sup>o</sup> to 125 <sup>o</sup> F	Amoco Arco Exxon Gulf Mobil Texaco	Rykon 2 Litholine HEP 2 Unirex N2 Gulf Crown EP-2 Mobilux 2 Regal AFB-2
Heavy condensation and Direct Water Splash	Amoco Arco Exxon Gulf Mobil Texaco	Rykon 2EP Litholine HEP 2 Ronex WB Gulf Hightemp Mobilux EP-1 Marfak 1
Ambient Temperature minus 40 <sup>o</sup> to plus 32 <sup>o</sup> F	Amoco Arco Exxon Gulf Mobil Texaco	Rykon 1 Litholine HEP 1 Unirex N2 Gulf Crown EP-1 Mobil-Temp-1 Multifak EP-1

**Table 2 • Grease lubrication intervals**

Operating conditions	Operating temperature of bearings	Greasing intervals
Fairly clean	Up to 120 <sup>o</sup> F.	6 to 12 months
Fairly clean	120 <sup>o</sup> to 160 <sup>o</sup> F.	1 to 2 months
Fairly clean	160 <sup>o</sup> to 200 <sup>o</sup> F.	1 to 4 weeks
Moderately to extremely dirty	Up to 160 <sup>o</sup> F.	1 to 4 weeks
	160 <sup>o</sup> to 200 <sup>o</sup> F.	1 week
Cold storage room		Every defrosting period or no longer than 4 months
Heavy moisture and water splash		1 week

**Table 3 • AGMA lubricant numbers and change periods for gearing**

Unit size	AGMA lubricant number			Oil change hours	
	Ambient Temperature			Initial	Periodic
	Below 15 <sup>o</sup> F	15 <sup>o</sup> to 60 <sup>o</sup> F	50 <sup>o</sup> to 125 <sup>o</sup> F		
Up to 145mm ctrs. & 1750 rpm 145mm to 14" ctrs. & up to 450 rpm	6EP	7 comp.	8 comp.	150	2,500
145mm to 14" ctrs. 450 to 1750 rpm	6EP	7 comp.	7 comp.		

AGMA lubricant numbers appear on individual nameplates attached to speed reducers

Pour point of lubricant must be less than ambient temperature

For low temperature applications where widely varied seasonal temperature changes occur, it is recommended that oil be changed according to ambient conditions

**Table 4 • Typical oils meeting AGMA recommendations**

Oil Company	Trade name		
	AGMA No. 6 EP	AGMA No. 7 comp.	AGMA No. 8 comp.
Amoco	Amogear EP4 Permagear EP110	American wormgear oil	American wormgear oil
Arco	Pennant NL or EP S-1500	Modoc 135	Modoc 165
Exxon	Spartan EP320	Cylesstic TK140	Cylesstic TK180
Gulf	EP lub S120	Transgear 140	Transgear 175
Mobil	Mobilgear 632	600W cylinder oil	600W super cylinder oil
Texaco	Meropa 320	Vanguard cylinder oil	Honor cylinder oil

**Table 5 • Approximate oil capacities\* — U.S. gallons**

**Single reduction worm gear speed reducers**

Reducer Size	MW worm reducers — single reduction		
	Type S-B (worm bottom)	Type S-T (worm top)	Type S-V (vertical output shaft)
120	3/4	1 1/2	1 1/4
145	3/4	2 1/2	1 1/2
175	1 1/4	3 3/4	3
210	1 1/4	5 1/2	4
250	2 1/4	7 3/4	5 1/4
	Large worm reducers — single reduction		
	Type WB (worm bottom)	Type WT (worm top)	Type WV (vertical output shaft)
1200	2 1/2	6 1/4	5 1/2
1400	7	—	14

\*The approximate oil capacities listed in this table are for reference only, to help you determine how much oil to provide for each reducer. The proper amount of oil for each specific reducer can be correctly added by removing the oil level plug and adding oil until oil begins to run out of the plug hole. Replace plug. Oil capacities listed are for horizontal, floor mounted reducers only. For wall, ceiling or angle mounting, capacities will vary.

**Table 5 • Approximate oil capacities\* — U.S. gallons (Continued)**

**Helical — worm gear speed reducers and extended bearing drives**

Reducer Size	MW worm reducers — helical and extended bearing		
	Type H (helical-worm)	Type H-V (vertical output shaft)	Type E (extended bearing)
85	1/2	1	—
100	3/4	1 1/2	—
120	1	1 1/2	1 3/4
145	1 1/2	2	2 1/4
175	1 3/4	5 1/2	3 1/4
210	2 1/4	6	3 3/4
250	5 3/4	7	5 3/4
Large worm reducers — helical-worm			
	Type HWB (worm bottom)	Type HWV (vertical output shaft)	—
1200	4	8	—
1400	7 3/4	15	—

**Double reduction worm gear speed reducers**

Reducer Size	MW worm reducers — double worm		
	Type D-B (worm bottom)	Type D-T (worm top)	Type D-V (vertical output shaft)
120	3/4	1 3/4	1 1/2
145	1	2 3/4	2 1/4
175	1 1/2	4 1/4	3 1/2
210	1 1/2	5 3/4	4 3/4
250	2 1/2	7 3/4	6 1/2
Large worm reducers — double worm			
	Type DWB (worm bottom)	Type DWT (worm top)	Type DWV (vertical output shaft)
1200	3 1/2	—	6 3/4
1400	9 1/2	—	—

\*The approximate oil capacities listed in this table are for reference only, to help you determine how much oil to provide for each reducer. The proper amount of oil for each specific reducer can be correctly added by removing the oil level plug and adding oil until oil begins to run out of the plug hole. Replace plug. Oil capacities listed are for horizontal, floor mounted reducers only. For wall, ceiling or angle mounting, capacities will vary.

## Bearing Adjustment

Worm Gear Speed Reducers use tapered roller bearings and ball bearings. Ball bearings are used on input shafts of all sizes of helical worm gear reducers, and on primary worm shafts of double worm gear reducers size 120. All other shafts are supported by tapered roller bearings. Ball bearings do not require axial adjustment.

**For proper unit operation, tapered roller bearings must be adjusted axially within limits shown in Table 6.**

Bearing adjustment is accomplished by adding or removing shims between the housing and bearing retainer. If axial end play of the **Low Speed Shaft** exceeds the maximum value shown in Table 6, remove equal thicknesses of shims from each bearing retainer. Conversely, if the axial end play of the low speed shaft is less than the minimum value shown in Table 6, add equal thicknesses of shims to each bearing retainer. All other shafts supported by tapered roller bearings can be axially adjusted from either bearing retainer by adding or removing shims.

**Table 6 • Allowable axial end play  
Single worm gear speed reducers**

Speed reducer size	Low speed shaft 48	Worm shaft 78
120	.003" to .005"	.006" to .010"
145	.003" to .005"	.006" to .010"
175	.003" to .005"	.006" to .010"
210	.003" to .005"	.004" to .008"
250	.003" to .005"	.004" to .008"
1200	.003" to .005"	.004" to .008"
1400	.003" to .005"	.004" to .008"

### Helical worm gear speed reducers

Speed reducer size	Low speed shaft 48	Worm shaft 78
85	.003" to .005"	.003" to .007"
100	.003" to .005"	.003" to .007"
120	.003" to .005"	.006" to .010"
145	.003" to .005"	.006" to .010"
175	.003" to .005"	.006" to .010"
210	.003" to .005"	.004" to .008"
250	.003" to .005"	.004" to .008"
1200	.003" to .005"	.004" to .008"
1400	.003" to .005"	.004" to .008"

### Double worm gear speed reducers

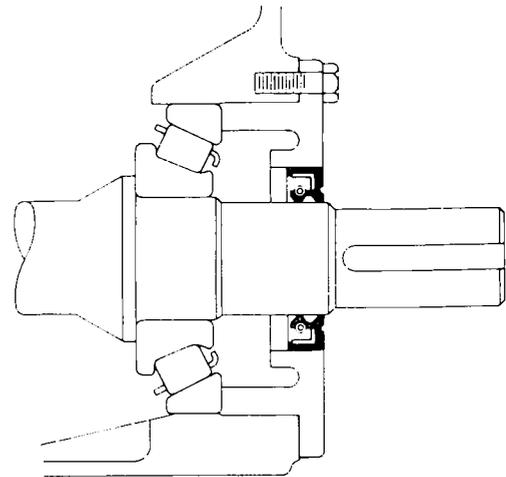
Speed reducer size	Low speed shaft 48	Primary worm shaft 76	Secondary worm shaft 78
120	.003" to .005"	— — —	.006" to .010"
145	.003" to .005"	.003" to .007"	.006" to .010"
175	.003" to .005"	.003" to .007"	.006" to .010"
210	.003" to .005"	.003" to .007"	.004" to .008"
250	.003" to .005"	.006" to .010"	.004" to .008"
1200	.003" to .005"	.006" to .010"	.004" to .008"
1400	.003" to .005"	.006" to .010"	.004" to .008"

## Shaft Seals

Lip type shaft seals are provided on all shaft openings at the factory and require little maintenance under normal conditions.

When operating conditions require replacement of seal for repairs, take these precautions in installing new seals:

1. Make sure shaft surfaces contacting seals are smooth and free of corrosion, scratches, or rough spots.
2. In fitting seal over shaft projection with sharp key-way edges, protect sealing element from scoring. Eliminate burrs and sharp edges, lubricate seals and shaft to permit free passage of shaft. Hold seal away from shaft or cover keyway with cellophane tape to protect seal. Be sure to remove tape.
3. Apply lubricant between seal lips of shaft seals prior to installation.



TYPICAL SHAFT SEAL ASSEMBLY

## Locating and Ordering Parts

For ease and accuracy in identifying and ordering spare or replacement parts, use locator numbers in parts drawings and parts lists on pages 11 through 33.

Spare parts may be obtained for all Link-Belt® Worm Reducers through the nearest Regional Office listed on the back of this manual.

When ordering a replacement part for a Link-Belt Worm Gear Speed Reducer, the following information should be furnished from the reducer nameplate:

1. Unit Identification
2. What, if anything, appears in the nameplate serial number box.
3. What, if anything, appears in the nameplate special features box.

Data required from parts drawings and parts lists:

1. Locator number
2. Name of part

With the above information, any reducer or reducer part can be correctly identified from complete factory records maintained by Link-Belt Drive Division.

### Model MW

Link-Belt® worm gear speed reducer						
Model	Type	Size	Mtr. Mtg. Assy.	Motor Frame	Ratio	Special
MW						
Input RPM	Input HP Rating	Service Fact.	Output Torque Lb-in			
Serial No.	Before starting fill with _____ gallons of lubricant					
Ambient Temperature and AGMA Lubricant						
Worm Speed RPM	Below 15°F	15° to 60°F	50° to 125°F			
450 & Under	See Service Instructions	No. 7 Compound	No. 8 Compound			
Over 450	See Service Instructions	No. 7 Compound	No. 7 Compound			
Change lubricant every 2500 hrs. or 6 months of normal service. For severe service, change lubricant every 1 to 3 months. Use grease with ASTM penetration 250 to 295 at 77°F in fittings provided. See service instructions.						
		Link-Belt Drive Division Philadelphia, Pennsylvania	1974W64-1			

### Previous Models and Large Worms — Sizes 1200 & 1400

Link-Belt® worm gear speed reducer			
Model No.	Serial No.		
Size	Service Factor	AGMA HP Rating	
Input RPM	Output Torque	Ratio	
Before starting fill with _____ gallons of lubricant			
Worm Speed	Up to 1750 RPM		
Ambient Temp.	Below 15°F	15° to 60°F	50° to 125°F
AGMA Lubricant	See Service Instructions	No. 7 Compound	No. 8 Compound
Change lubricant every 1500 hours or 6 months of normal service. For severe service change lubricant every 1 to 3 months. Use grease with AGMA penetration 250 to 295 at 77°F in fittings provided.			
		Link-Belt Drive Division Philadelphia, Pennsylvania	1974W25-1 REV. A

## Recommended Spare Parts

One set of spare parts is usually adequate for 1 to 5 identical reducers operating in the same general area, under average conditions, where a possible breakdown will affect only one reducer. Where continued operation is extremely vital and/or type of service is unusually severe, consideration should be given to carrying additional sets of spare parts.

For installations having 5 to 10 identical reducers where continued operation is extremely vital, and/or where type of service is unusually severe, some customers carry a complete spare reducer, in addition to spare parts.

For installations having more than 10 identical reducers or for large quantities of same size reducers

regardless whether identical or not, consult Link-Belt Drive Division for spare parts recommendations. State the exact nature of the application, its importance regarding continued operation, and any other factors which will aid us in making proper recommendations.

One set of spare parts for a Link-Belt® Worm Gear Speed Reducer consists of:

- One Input Shaft
- One set of Bearings for Input Shaft
- One Set of Oil Seals for Input Shaft
- One set of Oil Seals for Output Shaft

# General Disassembly and Reassembly Instructions

**Caution: Before beginning any work on the unit be sure motor is disengaged from power source and cannot be accidentally started.**

Simplified design permits systematic disassembly and reassembly that can be accomplished with the usual good practices employed by those normally accustomed to servicing transmission equipment. *Always use ample load carrying equipment for lifting. Be careful not to get fingers caught under heavy machinery.* Time can be saved in servicing any size or type reducer by following these general notes.

## Disassembly

1. Drain lubricant before disassembly.
2. Remove shaft keys by indenting end of key with center punch and tapping punch with hammer.
3. Be sure to note arrangement of all internal parts, including shims, so they can be reassembled as originally installed.
4. When reducer is disassembled, clean and protect parts from dirt and moisture.

## Reassembly

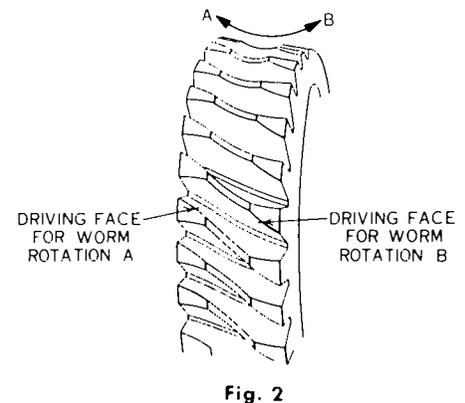
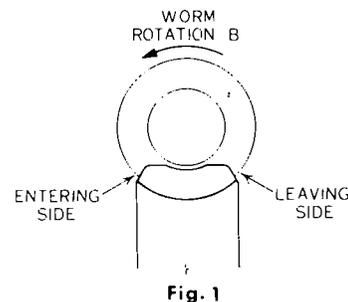
1. Obtain housing oil tightness by cleaning housing joints and using an acceptable sealing compound on all metal-to-metal parts, and on shim-to-metal parts. Use Permatex or an equivalent.
2. Obtain proper adjustment of worm and gear shaft bearings by holding axial end play to limits shown in Table 6, page 6.
3. Obtain oil tightness along shafts by replacing oil seals with new oil seals. Follow installation instructions, Shaft seals, on page 7.

## Worm and gear set

All worm gears are made to provide an entry gap for lubricant on the entering side of the gear teeth; consequently, contact is required from middle to the leaving side of the gear tooth driving face (Fig. 1). To properly align the worm and gear set, use the following procedures.

1. Before reassembly of worm shaft 97 apply prussian blue or lamp black to the threads of worm shaft.
2. Reassemble reducer in accordance with instructions for the specific type of unit.
3. After reassembly, turn worm shaft 97 so that low speed shaft 48 makes one complete revolution in each direction of rotation.

4. Observe markings on teeth of worm gear 96 (Fig. 2). If required, adjust marking by changing shims from one side of housing to the other.
5. Recheck per instructions 3 and 4 above. If marking is on entering side of worm gear tooth driving face, move entering side away from center by shimming which will cause the contact to move to the leaving side of the gear.



## Model MW Worm Gear Reducers

### Disassembly and Reassembly

For proper disassembly and reassembly refer to safety precautions and general instructions on page 9 and the following recommended procedures.

### Single Worm — Type S

#### Removing Internal Parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing 1. Refer to parts drawing and parts list on page 11.

#### To Replace Worm Gear and Supporting Bearings

1. Match mark housing 1 and housing cover 3 or 7 at joint to facilitate correct assembly.
2. Remove cap screws which fasten housing cover 3 or 7 to housing 1.
3. Remove housing cover 3 or 7. For safety use a properly secured sling and hoist capable of handling the load. Overloading may result in personal injury and damage to the reducer. **Never Lift by Hand.**
4. Lift low speed shaft assembly with bearings from housing as a unit, using a rope sling of adequate capacity. When a chain is used, be sure to pad it with protective material such as burlap to prevent damage to shaft 48, worm gear 77, and bearings 35.

5. Remove bearings 35 from low speed shaft 48 with a wheel puller.
6. Remove spacers from each side of worm gear 77 and press low speed shaft 48 through the worm gear.
7. Remove cap screws which fasten bearing retainer 4 or 6 to housing 1 and remove retainer.

#### To Replace Worm Shaft and Supporting Bearings

1. Remove worm gear and supporting bearings in accordance with instructions above.
2. Remove fan housing and then fan.
3. Remove cap screws which fasten bearing retainers 5 or 8 to housing 1. Remove bearing retainers.
4. Tap on keyseated end of worm shaft 78 until outer race of bearing 36 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore. (Size 210 & 250 remove locknut 80 and lockwasher 79).
5. Remove bearings from worm shaft 78 with a wheel puller.

#### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9. Take special care in replacing seals.

# Parts Drawings

## Single Worm — Type S

Parts list type S — single worm

Locator	Description	Quantity per reducer	
		74 to 175	210 to 250
1	Housing	1	1
3	Housing cover	★	★
4	Bearing retainer	◆	◆
5	Bearing retainer	2	1
6	Bearing retainer	◆	◆
7	Housing cover	★	★
8	Bearing retainer	—	1
26	Oil seal	2	2
27	Oil seal	◆	◆
31	Shim	1	1
32	Shim	1	1
33	Shim	1	1
35	Bearing	2	2
36	Bearing	2	2
37	Bearing	—	1
48	Low speed shaft	1	1
77	Worm gear	1	1
78	Worm shaft	1	1
79	Lockwasher	—	1
80	Locknut	—	1
9	Foot	*	2
17	Lubrication fitting	★	★
21	Breather	1	1

### Single worm — type S

★ Quantity per mounting

Locator	Description	Mounting		
		B	T	V
3	Housing cover	1	1	1 (Assy 2V, 4V, 6V, 8V)
7	Housing cover	0	0	1 (Assy 1V, 3V, 5V, 7V)
17	Lubrication fitting	2	0	2 ◆

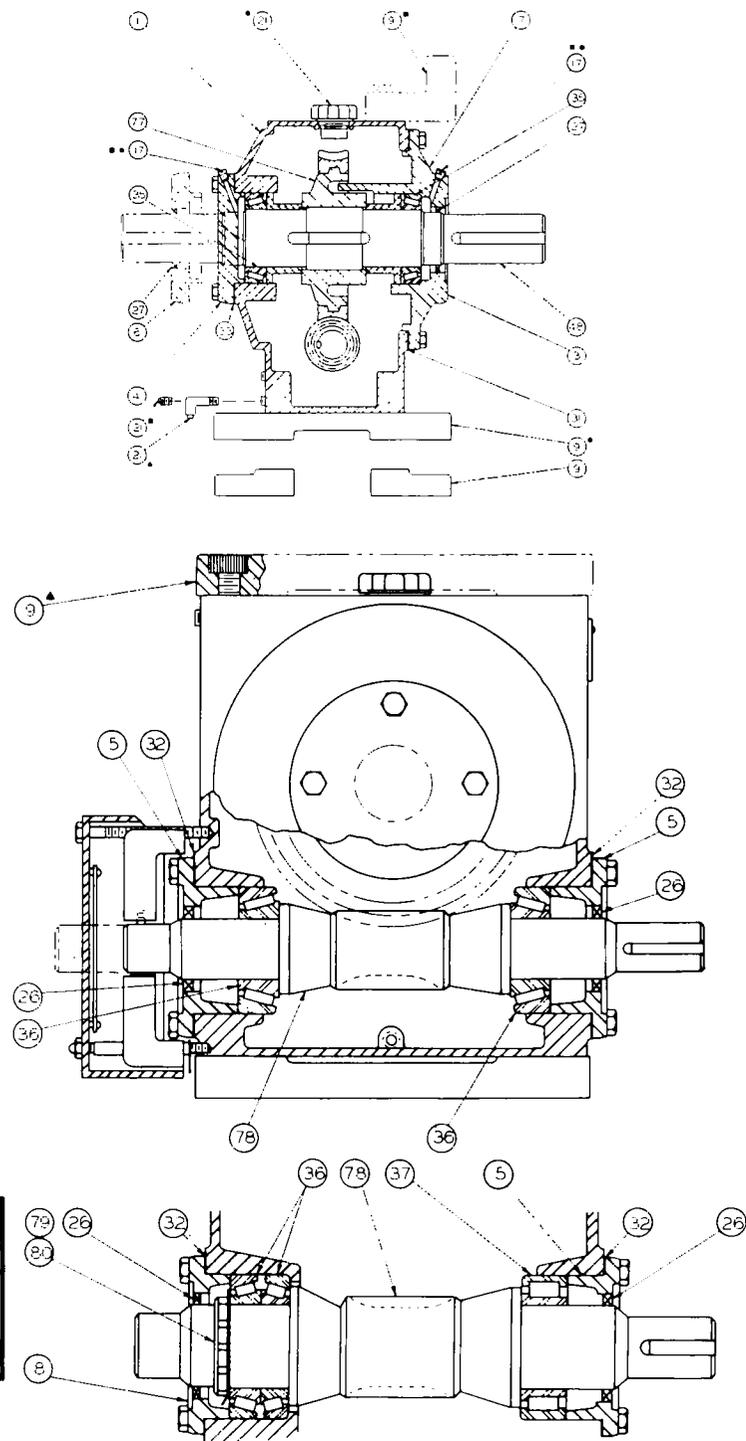
◆ One lubrication fitting and one plug required when using housing cover 3.

### Single worm — type S

◆ Quantity per mounting

Locator	Description	Assembly					
		1-2	3	4-5	6	1V thru 4V	5V thru 8V
4	Bearing retainer	1	0	1	0	1	1
6	Bearing retainer	0	1	0	1	0	0
27	Oil seal	1	2	1	2	1	1

\*One foot for WB and WT mounting, two feet for WV mounting



Arrangement for size's 210 & 250 only

◆ Applies to WB Only

▲ Applies to WT Only

■ Applies to WV Only

## Helical Worm — Type H.

### Removing Internal Parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing 1 or 2. Refer to parts drawing and parts list on page 13.

### To Replace High Speed Shaft and Supporting Bearings

1. Remove key from high speed shaft 74.
2. Remove cap screws which fasten cover 73 to housing.
3. Lift cover and shaft assembly from reducer using a rope sling if necessary. Bearing 38 will stay in place in housing.
4. Remove snap ring 49 and tap shaft out with light hammer blows from projection end. Bearing 39 remains on shaft. Remove seal 26 from cover.
5. If pinion is keyed to shaft, remove snap ring 51 and press pinion from shaft with a power press.
6. Remove snap ring 50 and press bearing 39 from shaft.
7. Remove bearing 38 from housing with a wheel puller. It may be necessary to remove high speed gear 75.

### To Replace High Speed Gear

1. Remove cover 73 and high speed shaft assembly as described in step 1 thru 3 in accordance with instructions above.
2. Remove cap screw 68, lockwasher 67, and washer 66.
3. Remove gear 75 with wheel puller.

### To Replace Worm Gear and Supporting Bearings

1. Match mark housing 1 and housing cover 3 or housing 2 and housing cover 7 at joint to facilitate correct assembly.
2. Remove cap screws which fasten housing cover 3 to housing 1 or housing cover 7 to housing 2.

3. Remove housing cover. For safety use a properly secured sling and hoist capable of handling the load. Overloading may result in personal injury and damage to the reducer. **Never Lift by Hand.**
4. Lift low speed shaft assembly with bearings from housing as a unit, using a rope sling of adequate capacity. When a chain is used, be sure to pad it with protective materials such as burlap to prevent damage to shaft 48, worm gear 77, and bearings 35.
5. Remove bearings 35 from low speed shaft 48 with a wheel puller.
6. Remove spacers from each side of worm gear 77 and press low speed shaft 48 through worm gear.
7. Remove cap screws which fasten bearing retainer 4 or 6 to housing and remove retainer.

### To Replace Worm Shaft and Supporting Bearings

1. Remove high speed shaft assembly and high speed gear in accordance with instructions above.
2. Remove worm gear and supporting bearings in accordance with instructions above.
3. Remove cap screws which fasten bearing retainer 5 to housing 1 or 2. Remove bearing retainer.
4. Tap on keyseated end of worm shaft 78 until outer race of bearing 36 is free of housing. Support worm shaft to avoid damage to the shaft and bearings. Pull worm shaft assembly through housing bore. (Size 210 & 250 remove locknut 80 and lockwasher 79).
5. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9. Take special care in replacing seals.

# Parts Drawings Helical Worm — Type H

## Parts list — type H — helical worm

Locator	Description	Quantity per reducer	
		85 to 175	210 to 250
1	Housing	★	★
2	Vertical housing	★	★
3	Housing cover	★	★
4	Bearing retainer	◆	◆
5	Bearing retainer	1	1
6	Bearing retainer	◆	◆
7	Housing cover	★	★
9	Foot	★	★
17	Lubrication fitting	2	2
21	Breather	1	1
26	Oil seal	1	1
27	Oil seal	◆	◆
31	Shim	1	1
32	Shim	1	1
33	Shim	1	1
35	Bearing	2	2
36	Bearing	2	2
37	Bearing	—	1
38	Bearing	1	1
39	Bearing	1	1
48	Shaft	1	1
49	Retaining ring	1	1
50	Retaining ring	2	2
51	Retaining ring	1	1
66	Slotted washer	1	1
67	Lockwasher	1	1
68	Cap screw	1	1
74	Highspeed shaft	1	1
75	High speed gear	1	1
76	High speed pinion	1	1
77	Worm gear	1	1
78	Worm shaft	1	1
79	Lockwasher	—	1
80	Locknut	—	1

◆ One lubrication fitting and one plug required when using housing cover 3

## Helical worm — Type H

★ Quantity per mounting

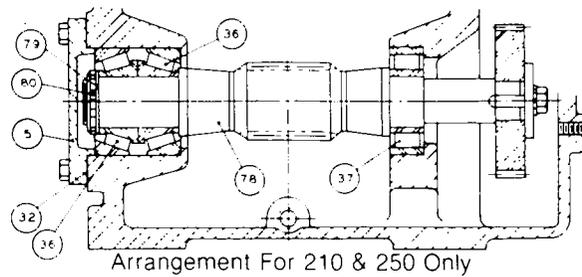
Locator	Description	Mounting	
		H	H-V
1	Housing	1	0
2	Vertical housing	0	1
3	Housing cover	1	1*
7	Housing cover	0	1±
9	Foot	—	2

\* Assy 2 ± Assy 1

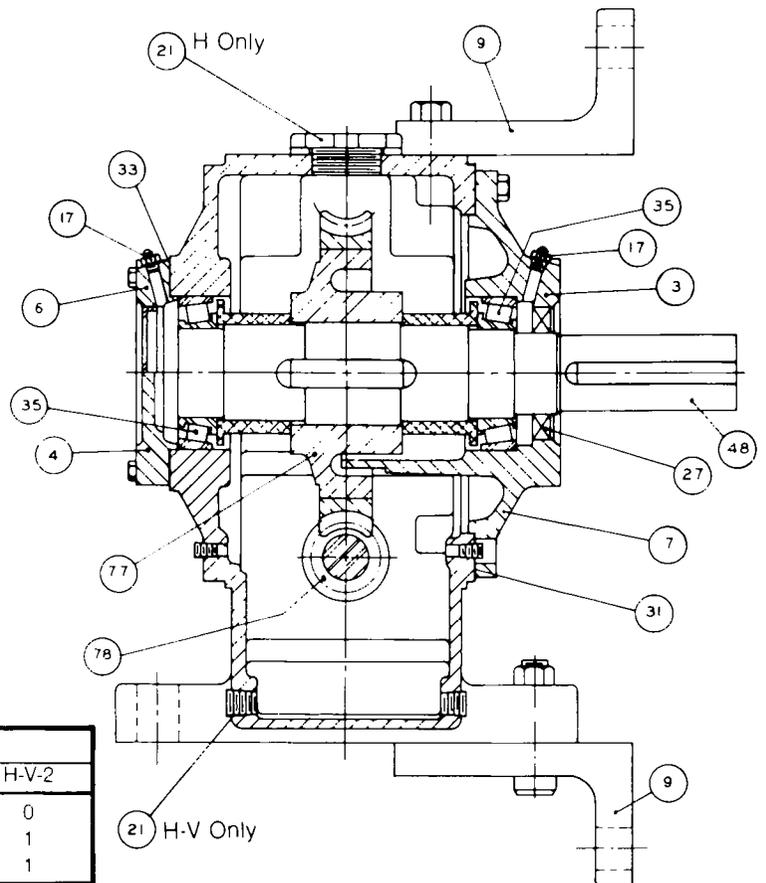
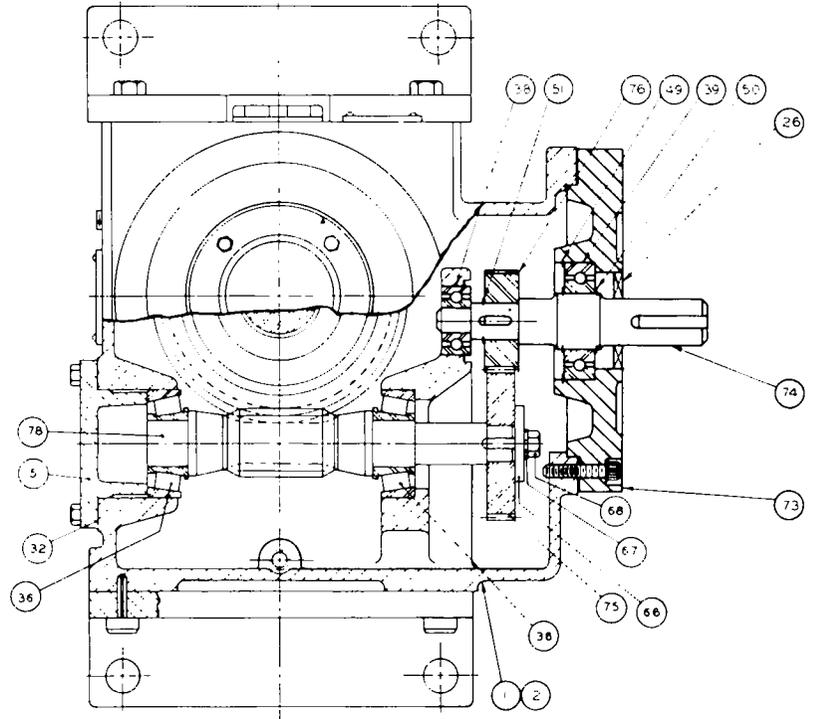
## Helical worm — Type H

◆ Quantity per mounting

Locator	Description	Assembly				
		H-1	H-2	H-3	H-V-1	H-V-2
4	Bearing retainer	1	0	0	1	0
6	Bearing retainer	0	1	1	0	1
27	Oil seal	1	1	2	1	1



Arrangement For 210 & 250 Only



## Double Worm — Type D.

### Removing Internal Parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing 1 and primary housing 72. Refer to parts drawing and parts list on page 15.

### To Replace Secondary Worm Gear and Supporting Bearings

1. Match mark housing 1 and housing cover 3 or 7 at joint to facilitate correct assembly.
2. Remove cap screws which fasten housing cover 3 or 7 to housing 1.
3. Remove housing cover 3 or 7. For safety use a properly secured sling and hoist capable of handling the load. Overloading may result in personal injury and damage to the reducer. **Never Lift by Hand.**
4. Lift low speed shaft assembly with bearings from housing as a unit, using a rope sling of adequate capacity. When a chain is used, be sure to pad it with protective material such as burlap to prevent damage to shaft 48, bearings 35, and teeth of worm gear 77.
5. Remove bearings 35 from low speed shaft 48 with a wheel puller.
6. Remove spacers from each side of worm gear 77 and press low speed shaft 48 through the worm gear.
7. Remove cap screws which fasten bearing retainer 4 or 6 to housing 1 and remove retainer.

### To Replace Primary Worm Gear Set and Supporting Bearings—Size 120

1. Remove cap screws for housing cover 73 and then remove cover.
2. Remove fan housing and then fan.
3. Remove oil seal 26 and retaining ring 92.
4. Tap out bearing 38 from housing 72.

5. Remove retaining ring 88.
6. Complete steps 5 through 7 listed above.

### To Replace Primary Worm Gear Set and Supporting Bearings—Sizes 145 Thru 250

1. Remove cap screws for housing cover 73 and then remove cover.
2. Remove fan housing and then fan.
3. Remove cap screws which fasten bearing retainers 84 to housing 72. Remove bearing retainers.
4. Complete steps 5 through 7 listed above.

### To Replace Secondary Worm Shaft and Supporting Bearings

1. Remove secondary worm gear and supporting bearings in accordance with instructions above.
2. Remove primary worm gear set and supporting bearings in accordance with instructions above.
3. Remove cap screws which fasten housing 72 to housing 1. Remove housing 72.
4. Remove cap screws which fasten bearing retainer 5 to housing 1. Remove bearing retainer.
5. Tap on keyseated end of worm shaft 78 until outer race of bearing 36 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore. (Size 210 & 250 remove locknut 80 and lockwasher 79).
6. Remove bearings from worm shaft 78 with a wheel puller.

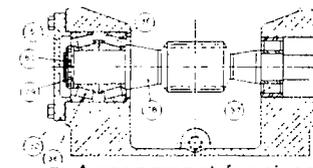
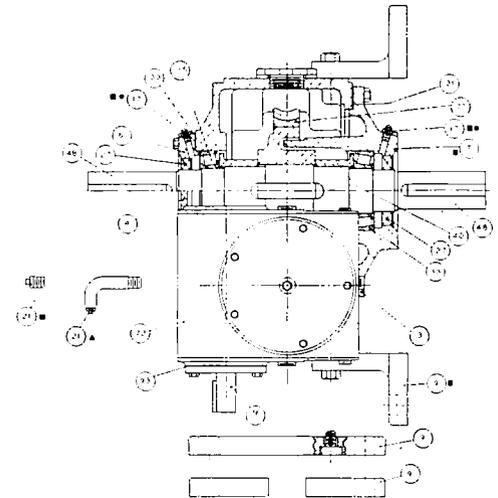
### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9. Take special care in replacing seals.

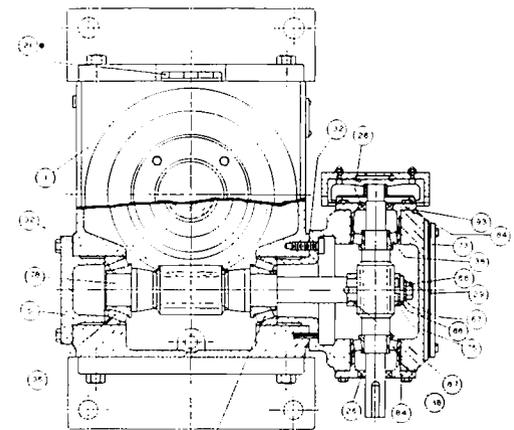
# Parts Drawing Double Worm — Type D

## Parts List - Type D Double Worm

Locator	Description	Quantity per reducer		
		120	145 and 175	210 and 250
1	Housing	1	1	1
3	Housing cover	★	★	★
4	Bearing retainer	◆	◆	◆
5	Bearing retainer	1	1	1
6	Bearing retainer	◆	◆	◆
7	Housing cover	★	★	★
9	Foot	*	*	2
17	Lubrication fitting	★	★	★
21	Breather	1	1	1
26	Oil seal	2	2	2
27	Oil seal	◆	◆	◆
29	Gasket	1	1	1
31	Shim	1	1	1
32	Shim	1	1	1
33	Shim	1	1	1
35	Bearing	2	2	2
36	Bearing	2	2	2
37	Bearing	—	—	1
38	Bearing	2	2	2
39	Bearing	—	—	—
48	Shaft	1	1	1
53	Closure	—	—	—
66	Slotted washer	1	1	1
67	Lockwasher	1	1	1
68	Cap screw	1	1	1
72	Primary housing	1	1	1
73	Primary hsg. cover	1	1	1
75	Primary worm gear	1	1	1
76	Primary worm shaft	1	1	1
77	Secondary worm gear	1	1	1
78	Secondary worm shaft	1	1	1
79	Lockwasher	—	—	1
80	Locknut	—	—	1
84	Bearing retainer	—	2	2
87	Shim	1	1	1
88	Retaining ring	2	—	—
92	Retaining ring	2	—	—
93	Shim	—	1	1



Arrangement for sizes 210 and 250 only



- Used On WB Only
- ▲ Used On WT Only
- Used On WV Only

### Double Worm — Type D

★ Quantity per mounting

Locator	Description	Mounting		
		B	T	V
3	Housing cover	1	1	1 (Assy 2 and 4)
7	Housing cover	0	0	1 (Assy 1 and 3)
17	Lubrication fitting	2	0	2

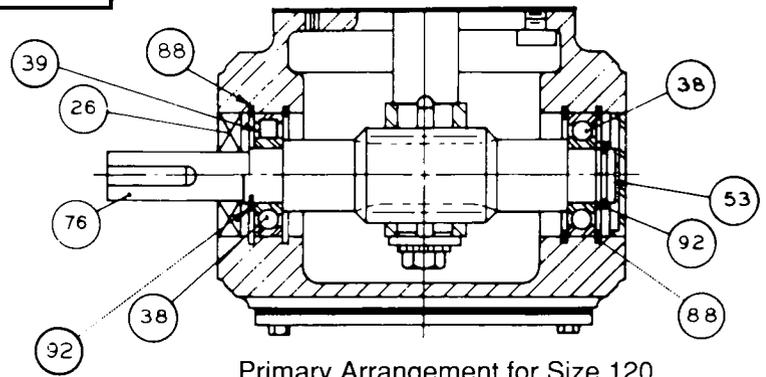
● One lubrication fitting and one plug required when using housing cover 3

### Double worm — Type D

◆ Quantity per mounting

Locator	Description	Assembly							
		D-B/D-T				D-V			
		1	2	3	4	1	2	3	4
4	Bearing retainer	1	1	0	0	1	1	1	1
6	Bearing retainer	0	0	1	1	0	0	0	0
27	Oil seal	1	1	2	2	1	1	1	1

\*One foot for WB and WT mounting two feet for WV mounting



Primary Arrangement for Size 120.

## Extended Bearing — Type E

### Removing Internal Parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing 1. Refer to parts drawing and parts list on page 17.

### To Replace High Speed Shaft and Supporting Bearings

1. Remove key from high speed shaft 74.
2. Remove cap screws which fasten cover 73 to housing.
3. Lift cover and shaft assembly from reducer using a rope sling if necessary. Bearing 38 will stay in place in housing.
4. Remove snap ring 49 and tap shaft out with light hammer blows from projection end. Bearing 39 remains on shaft. Remove seal 26 from cover.
5. If pinion is keyed to shaft, remove snap ring 51 and press pinion from shaft with a power press.
6. Remove snap ring 50 and press bearing 39 from shaft.
7. Remove bearing 38 from housing with a wheel puller. It may be necessary to remove high speed gear 75.

### To Replace High Speed Gear

1. Remove cover 73 and high speed shaft assembly as described in step 1 thru 3 in accordance with instructions above.
2. Remove cap screws which fasten bearing retainer 6 to shaft housing 81.
3. Remove gear 75 with a wheel puller.

### To Replace Worm Gear and Supporting Bearings

1. Match mark housing 1 and shaft housing 81 at joint to facilitate correct assembly.
2. Remove cap screws which fasten bearing retainer 6 to shaft housing 81.

3. Remove shaft housing. For safety use a properly secured sling and hoist capable of handling the load. Overloading may result in personal injury and damage to the reducer. **Never Lift by Hand.**
4. Lift low speed shaft assembly with bearings from housing as a unit, using a rope sling of adequate capacity. When a chain is used, be sure to pad it with protective material such as burlap to prevent damage to shaft 48, worm gear 77, and bearings 35.
5. Remove bearings 35 or 34 from low speed shaft 48 with a wheel puller.
6. Remove spacers from shaft 48 and press worm gear 77 from shaft 48.
7. Remove cap screws which fasten bearing retainer 4 to housing 1 and remove retainer.

### To Replace Worm Shaft and Supporting Bearings

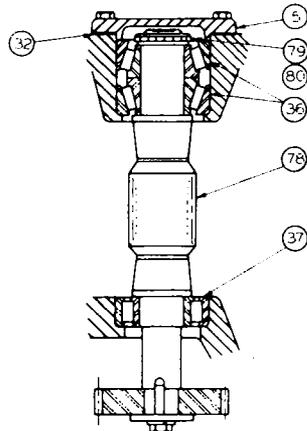
1. Remove high speed shaft assembly and high speed gear in accordance with instructions above.
2. Remove worm gear and supporting bearings in accordance with instructions above.
3. Remove cap screws which fasten bearing retainer 5 to housing 1. Remove bearing retainer.
4. Tap on keyseated end of worm shaft 78 until outer race of bearing 36 is free of housing. Support worm shaft to avoid damage to the shaft and bearings. Pull worm shaft assembly through housing bore. (Size 210 & 250 remove locknut 80 and lockwasher 79).
5. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

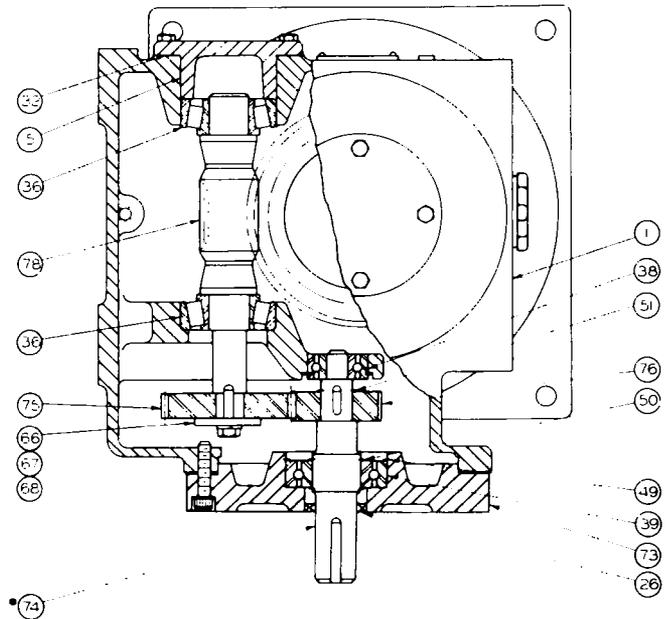
To reassemble, follow above steps in reverse order and general instructions on page 9. Take special care in replacing seals.

# Parts Drawings

## Extended Bearing — Type E

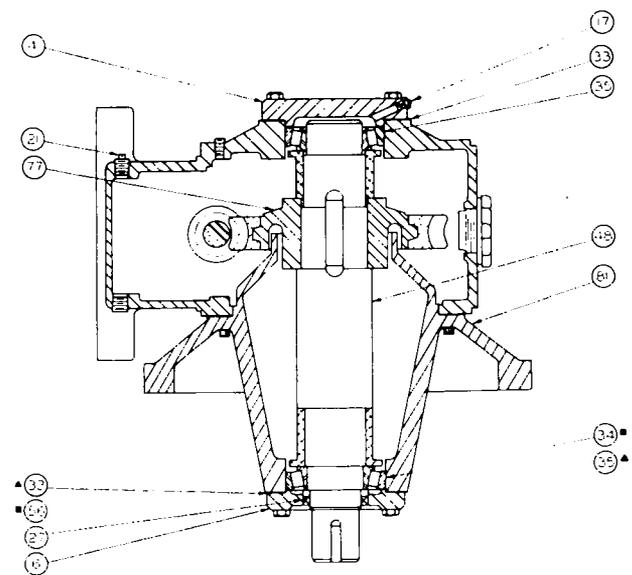


Arrangement for size's 210 & 250 only



### Parts list — Type E Extended Bearing

Locator	Description	Quantity per reducer			
		120-145	175	210	250
1	Housing	1	1	1	1
4	Bearing retainer	1	1	1	1
5	Bearing retainer	1	1	1	1
6	Bearing retainer	1	1	1	1
17	Lubrication fitting	1	1	1	1
21	Breather	1	1	1	1
26	Oil seal	1	1	1	1
27	Oil seal	1	1	1	1
32	Shim	1	1	1	1
33	Shim	1	1	1	1
34	Bearing	—	1	1	—
35	Bearing	2	1	1	2
36	Bearing	2	2	2	2
37	Bearing	—	—	1	1
38	Bearing	1	1	1	1
39	Bearing	1	1	1	1
48	Shaft	1	1	1	1
49	Retaining ring	1	1	1	1
50	Retaining ring	2	2	2	2
51	Retaining ring	1	1	1	1
56	Shim	—	1	1	—
66	Slotted washer	1	1	1	1
67	Lockwasher	1	1	1	1
68	Cap screw	1	1	1	1
73	Housing cover	1	1	1	1
74	High speed shaft	1	1	1	1
75	High speed gear	1	1	1	1
76	High speed pinion	1	1	1	1
77	Worm gear	1	1	1	1
78	Worm shaft	1	1	1	1
79	Lockwasher	—	—	1	1
80	Locknut	—	—	1	1
81	Shaft housing	1	1	1	1



- Not Required When Pinion is Integral
- ▲ Applies to 120-145-250
- Applies to 175-210

## Attachments to Basic Drives

### Caution Note:

**For safety when working with items of some weight use a properly secured sling and hoist capable of handling the load. Overloading may result in personal injury and damage to the reducer. NEVER LIFT BY HAND.**

### Type S (with C face motor adapter)

1. Remove screen from motor adapter (size 120 & larger)
2. Remove cap screws holding motor to adapter.
3. Remove motor. **See Caution Note.**
4. Remove coupling half and key from high speed shaft.
5. Remove cap screws holding adapter and then adapter. Remove oil seal from adapter.
6. Proceed with instructions listed under **Type S.** (Page 10)

### Type S (with over-the-top motor bracket)

1. Remove "V"-belt guard.
2. Lower motor and remove "V"-belt.
- ~~3. Remove pulley and key from high speed shaft.~~
4. Proceed with instructions listed under **Type S.** (Page 10)

### Type H and E (with C face motor adapter)

1. Remove cap screws holding adapter to housing cover.
2. Remove motor and adapter from high speed shaft. **See Caution Note.**
3. Remove coupling half from high speed shaft.
4. Remove key from high speed shaft.
5. Proceed with instructions listed under **Type H.** (Page 12)

### Type H and E (with scoop type motor bracket for foot type motor)

1. Remove coupling guard
2. Remove motor from bracket. **See Caution Note.**

3. Remove coupling half from high speed shaft.
4. Support bracket and remove capscrews holding bracket to housing.
5. Lift bracket away from housing, using a rope sling if necessary.
6. Remove key from high speed shaft.
7. Proceed with instructions listed under **Type H.** (Page 12)

### Type H and E (with Link-Belt® Flange mounted motor)

1. Remove cap screws which fasten motor to housing.
2. Lift motor from housing. **See Caution Note.**
3. Remove nut and spacer from motor shaft. Remove high speed pinion with wheel puller.
4. Proceed with instructions listed under **Type H.** (Page 12)

### Type D (with C face motor adapter)

#### Size 120

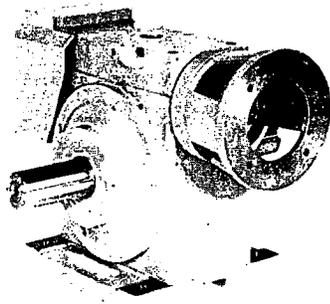
1. Remove cap screws which fasten motor to adapter.
- ~~2. Remove the motor. See Caution Note.~~
3. Remove cap screws holding adapter and then adapter.
4. Proceed with instructions listed under **Type D.** (Page 14)

### Type D (with C face motor adapter)

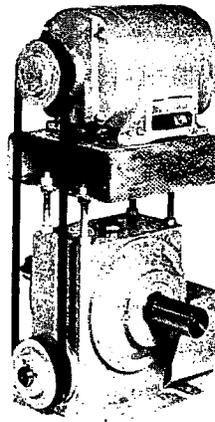
#### Size 145 thru 250

1. Remove screen from motor and adapter (Size 120).
2. Remove cap screws holding motor to adapter.
3. Remove motor. **See Caution Note.**
4. Remove coupling half and key from high speed shaft.
5. Remove cap screws holding adapter and then adapter.
6. Proceed with instructions listed under **Type D.** (Page 14)

## Type S



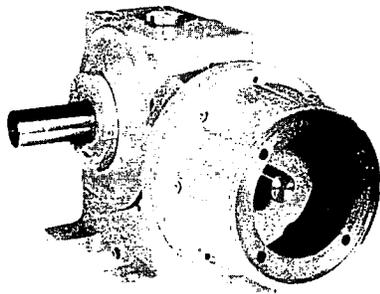
C face  
motor  
adapter



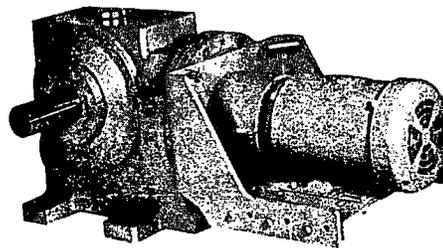
over-the-top  
motor bracket

(V Belt Guard  
Removed For  
Clarity)

## Type H

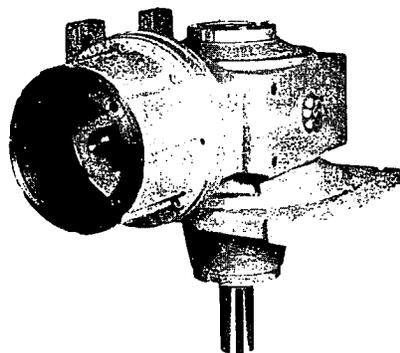


C face motor adapter

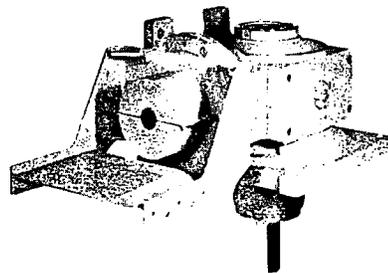


scoop type motor bracket  
for foot type motor

## Type E

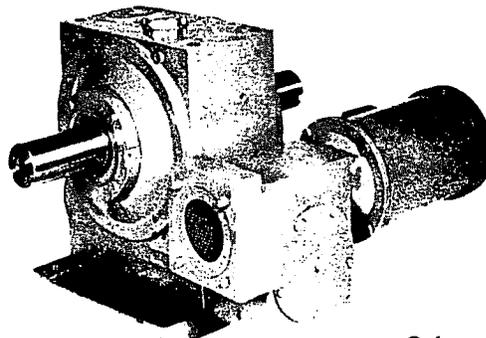


C face motor adapter



scoop type motor bracket  
for foot type motor

## Type D



C face motor adapter

# Large Worm Gear Speed Reducers Sizes 1200 & 1400

## Disassembly and Reassembly

For proper disassembly and reassembly refer to safety precautions and general instructions on page 9 and the following recommended procedures.

## Single Worm — Type WB

### Removing internal parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing base 1. Refer to parts drawings, page 21, and parts list on this page. Two examples follow:

### To replace worm gear and supporting bearings

1. Match-mark housing base 1 and housing cover 2 at joint to facilitate correct reassembly.
2. Remove cap screws which fasten housing cover 2 to housing base 1 and remove cap screws which fasten bearing retainers 3 and 4 to housing base and housing cover.
3. Remove bearing retainers.
4. Hook onto lifting lugs and remove housing cover 2. For safety, use a properly secured sling and hoist capable of handling the load.

### **Overloading may result in personal injury and damage to reducer.**

5. Lift low speed shaft assembly with bearings from housing as a unit, using rope sling if necessary. When a chain is used, be sure to pad it with protective material, such as burlap, to prevent damage to shaft 48, bearings 35, and teeth of worm gear 77.
6. Remove bearings 35 from low speed shaft 48 with a wheel puller.
7. Remove grease retainer and spacer from each side of worm gear 77 and press low speed shaft 48 through worm gear.

### To replace worm shaft and supporting bearings

1. Remove worm gear and supporting bearings in accordance with instructions above.
2. Remove fan housing. Remove locking screw and set screw from fan hub and remove fan.
3. Remove cap screws which fasten bearing retainers 5 and 6 to housing base 1. Remove bearing retainers.
4. Tap on keyseated end of worm shaft 78 until outer race of bearing 36, or 37 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
5. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9.

Parts List

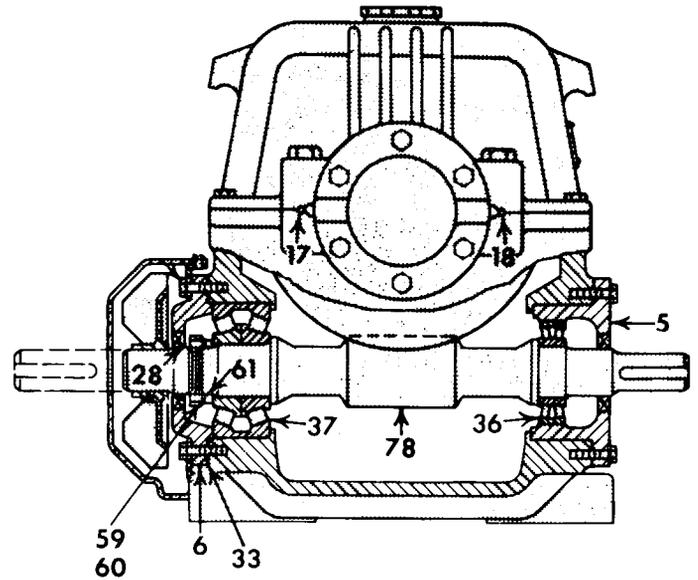
Locator	Description	Quantity per reducer	
		1200	1400
1	Housing base (furnished with cover, Locator 2)	1	
2	Housing cover (furnished with base, Locator 1)	1	
3	Bearing retainer	◆	
4	Bearing retainer	◆	
5	Bearing retainer	1	
6	Bearing retainer	1	
17	Lubrication fitting	2	
18	Pressure relief fitting	2	
27	Oil seal	◆	
28	Oil seal	2	
31	Shim	1	
32	Shim	—	
33	Shim	1	
35	Bearing	2	
36	Bearing	1	
37	Bearing	2	
48	Low speed shaft	1	
59	Locknut	1	
60	Lockwasher	1	
61	Spacer	1	
77	Worm gear	1	
78	Worm shaft	1	

◆ Quantity per reducer						
Locator	Assembly number					
	1	2	3	4	5	6
3	1	1	2	1	1	2
4	1	1	None	1	1	None
27	1	1	2	1	1	2

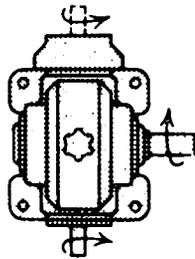
# Parts Drawings

## Type WB

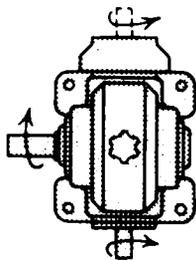
Sizes 1200 and 1400



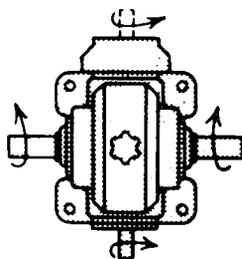
### ASSEMBLIES



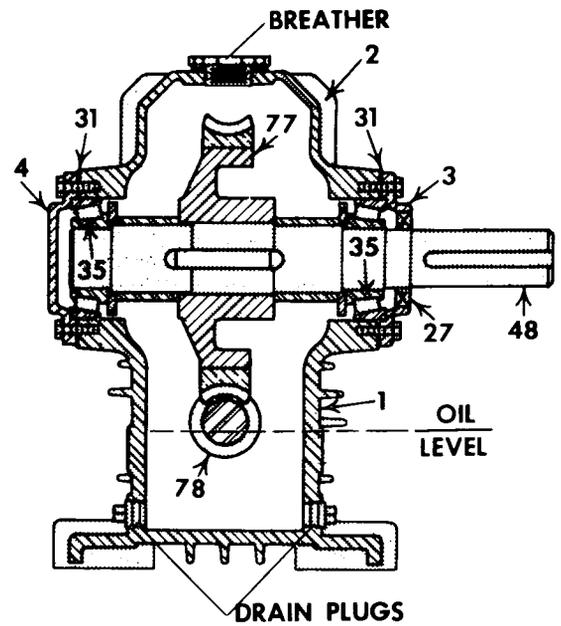
**SINGLE INPUT SHAFT • 1**  
**DOUBLE INPUT SHAFT • 4**



**SINGLE INPUT SHAFT • 2**  
**DOUBLE INPUT SHAFT • 5**



**SINGLE INPUT SHAFT • 3**  
**DOUBLE INPUT SHAFT • 6**



## Single Worm — Type WT\*

### Removing internal parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing base 1. Refer to parts drawings, page 23, and parts list on this page. Two examples follow:

### To replace worm gear and supporting bearings

1. Match-mark housing base 1 and housing cover 2 at joint to facilitate correct reassembly.
2. Remove cap screws which fasten housing cover 2 to housing base 1 and remove cap screws which fasten bearing retainers 3 and 4 to housing base and housing cover.
3. Remove bearing retainers.
4. Hook onto lifting lugs and remove housing cover 2. For safety, use a properly secured sling and hoist capable of handling the load. **Overloading may result in personal injury and damage to reducer.**
5. Lift low speed shaft assembly with bearings from housing as a unit, using rope sling if necessary. When a chain is used, be sure to pad it with protective material, such as burlap, to prevent damage to shaft 48, bearings 35, and teeth of worm gear 77.
6. Remove bearings 35 from low speed shaft 48 with a wheel puller.
7. Remove spacer from each side of worm gear 77 and press low speed shaft 48 through worm gear.

### To replace worm shaft and supporting bearings

1. Remove housing cover 2 in accordance with instructions above, items 1, 2, 3, and 4.
2. Remove fan housing. Remove locking screw and set screw from fan hub and remove fan.
3. Remove cap screws which fasten bearing retainers 5 and 6 to housing cover 2. Remove bearing retainers.
4. Tap on keyseated end of worm shaft 78 until outer race of bearing 36, or 37 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
5. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9.

\*Type WT not available in size 1400.

Parts List

Locator	Description	Quantity per reducer
		1200 Only
1	Housing base (furnished with cover, Locator 2)	1
2	Housing cover (furnished with base, Locator 1)	1
3	Bearing retainer	◆
4	Bearing retainer	◆
5	Bearing retainer	1
6	Bearing retainer	1
27	Oil seal	◆
28	Oil seal	2
31	Shim	1
32	Shim	—
33	Gasket	1
35	Bearing	2
36	Bearing	1
37	Bearing	1
48	Low speed shaft	1
59	Locknut	1
60	Lockwasher	1
61	Spacer	1
77	Worm gear	1
78	Worm shaft	1

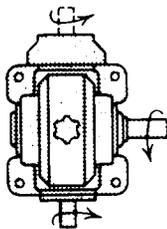
Locator	◆ Quantity per reducer					
	Assembly number					
	1	2	3	4	5	6
3	1	1	2	1	1	2
4	1	1	None	1	1	None
27	1	1	2	1	1	2

# Parts Drawings

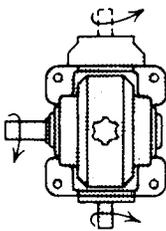
## Type WT

Size 1200

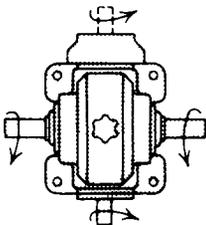
### ASSEMBLIES



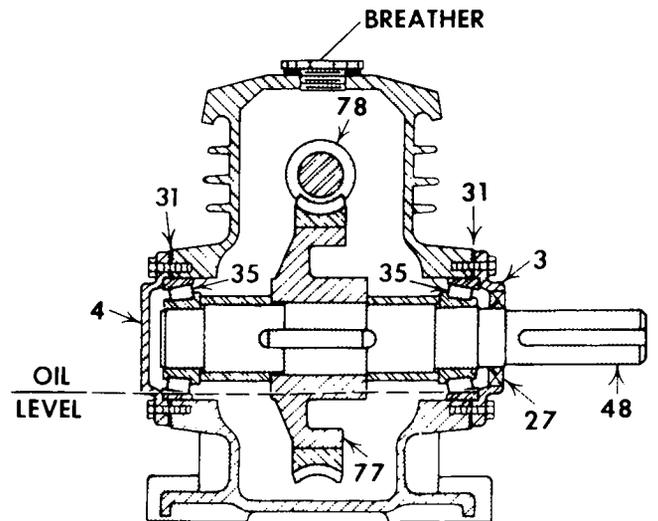
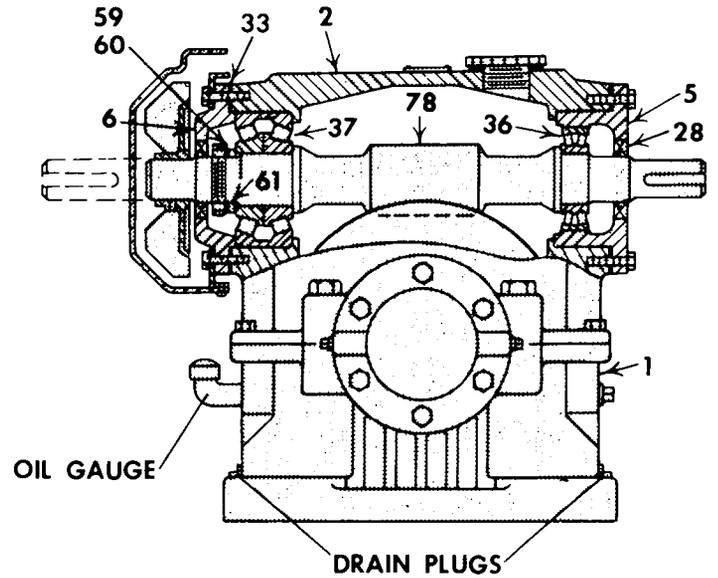
SINGLE INPUT SHAFT•1  
DOUBLE INPUT SHAFT•4



SINGLE INPUT SHAFT•2  
DOUBLE INPUT SHAFT•5



SINGLE INPUT SHAFT•3  
DOUBLE INPUT SHAFT•6



## Single Worm — Type WV

### Removing internal parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing 1. Refer to parts drawings, page 25, and parts list on this page. Two examples follow:

### To replace worm gear and supporting bearings

1. Match-mark housing 1 and housing cover 2 at joint to facilitate correct reassembly.
2. Remove cap screws and eye bolts which fasten housing cover 2 to housing 1, and remove cap screws which fasten bearing retainer 3 (output shaft up) or 4 (output shaft down) to housing cover 2.
3. Remove bearing retainer.
4. Remove housing cover 2. For safety, use a properly secured sling and hoist capable of handling the load. **Overloading may result in personal injury and damage to reducer.**
5. Lift low speed shaft assembly with bearings from housing as a unit, using rope sling if necessary. When a chain is used, be sure to pad it with protective material, such as burlap, to prevent damage to shaft 48, bearings 35, and teeth of worm gear 77.
6. Remove bearings 35 from low speed shaft 48 with a wheel puller.
7. Remove grease retainer and spacer from each side of worm gear 77 and press low speed shaft 48 through worm gear.
8. Remove cap screws which fasten lower bearing retainer to housing 1 and remove bearing retainer.

### To replace worm shaft and supporting bearings

1. Remove worm gear and supporting bearings in accordance with instructions above.
2. Remove fan housing. Remove locking screw and set screw from fan hub and remove fan.
3. Remove cap screws which fasten bearing retainers 5 and 6 to housing 1. Remove bearing retainers.
4. Tap on keyseated end of worm shaft 78 until outer race of bearing 36, or 37 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
5. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9.

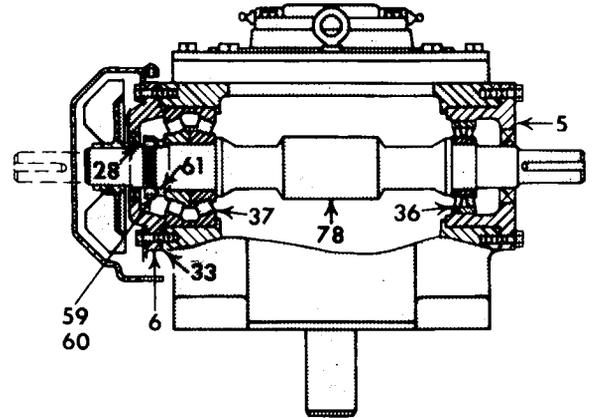
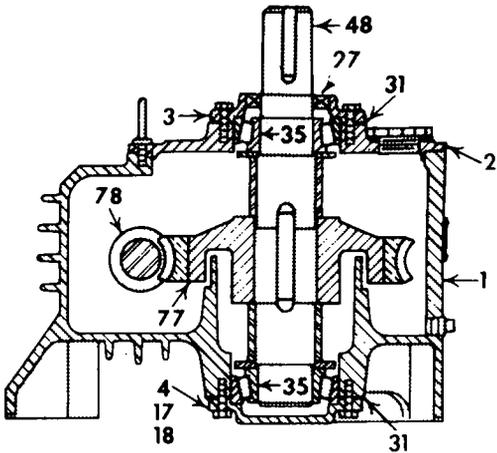
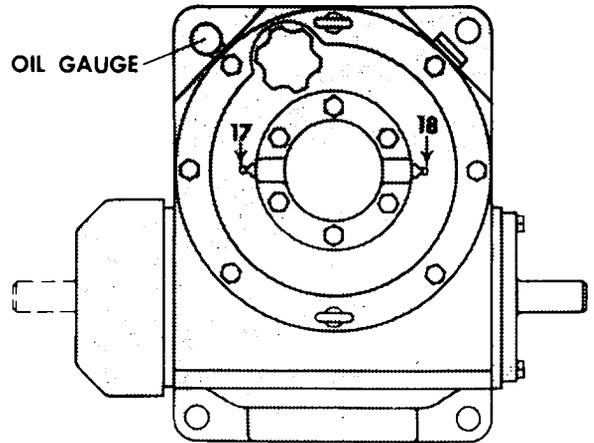
Parts List

Locator	Description	Quantity per reducer	
		1200	1400
1	Housing	1	
2	Housing cover	1	
3	Bearing retainer	1	
4	Bearing retainer	1	
5	Bearing retainer	1	
6	Bearing-retainer	1	
17	Lubrication fitting	2	
18	Pressure relief fitting	2	
27	Oil seal	1	
28	Oil seal	2	
31	Shim	1	
32	Shim	—	
33	Shim	1	
35	Bearing	2	
36	Bearing	1	
37	Bearing	2	
48	Low speed shaft	1	
59	Locknut	1	
60	Lockwasher	1	
61	Spacer	1	
77	Worm gear	1	
78	Worm shaft	1	

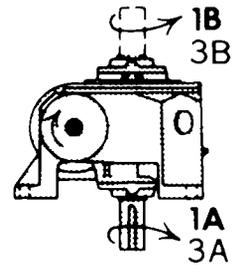
# Parts Drawings

## Type WV

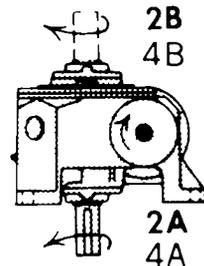
Sizes 1200 and 1400



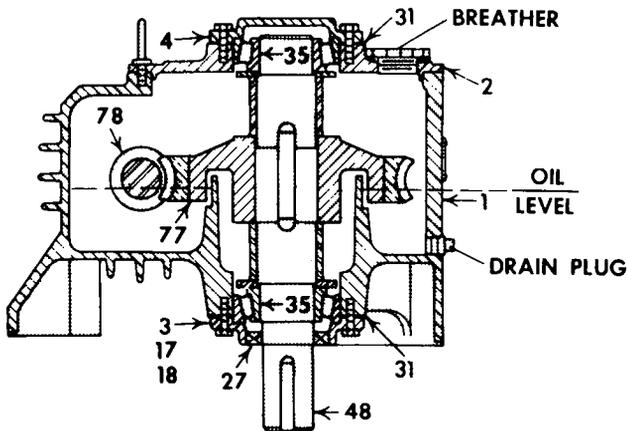
### ASSEMBLIES



Single Input Shaft • 1A Or 1B  
Double Input Shaft • 3A or 3B



Single Input Shaft • 2A Or 2B  
Double Input Shaft • 4A Or 4B



## Helical Worm — Type HWB

### Removing internal parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing base 1 and helical housing 72. Refer to parts drawings, page 27, and parts list on this page. Three examples follow:

### To replace worm gear and supporting bearings

1. Match-mark housing base 1 and housing cover 2 at joint to facilitate correct reassembly.
2. Remove cap screws which fasten housing cover 2 to housing base 1 and remove cap screws which fasten bearing retainers 3 and 4 to housing base and housing cover.
3. Remove bearing retainers.
4. Hook onto lifting lugs and remove housing cover 2. For safety, use a properly secured sling and hoist capable of handling the load.  
**Overloading may result in personal injury and damage to reducer.**
5. Lift low speed shaft assembly with bearings from housing as a unit, using rope sling if necessary. When a chain is used, be sure to pad it with protective material, such as burlap, to prevent damage to shaft 48, bearings 35, and teeth of worm gear 77.
6. Remove bearings 35 from low speed shaft 48 with a wheel puller.
7. Remove grease retainer and spacer from each side of worm gear 77 and press low speed shaft 48 through worm gear.

### To replace helical gear set and supporting bearings

1. Remove cap screws which fasten cover 73 to housing 72. Break the bond between housing and cover by turning jack screws in cover flange.
2. Remove cover 73. Remove helical pinion assembly with bearings from housing as a unit.
3. Remove bearings 38 and 38A from helical pinion 76 with a wheel puller.
4. Remove screw and washer assembly from worm shaft 78 and remove helical gear 75.

### To replace worm shaft and supporting bearings

1. Remove worm gear and supporting bearings in accordance with instructions above.
2. Remove helical gear set and supporting bearings in accordance with instructions above.
3. Remove cap screws and lockwashers which fasten housing 72 to housing base 1. Remove housing 72.
4. Remove fan housing. Remove locking screw and set screws from fan hub and remove fan.
5. Remove cap screws which fasten bearing retainer 5, or 6 to housing base 1. Remove bearing retainer.
6. Tap on keyseated end of worm shaft 78 until outer race of bearing 36, or 37 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
7. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9.

### Parts List

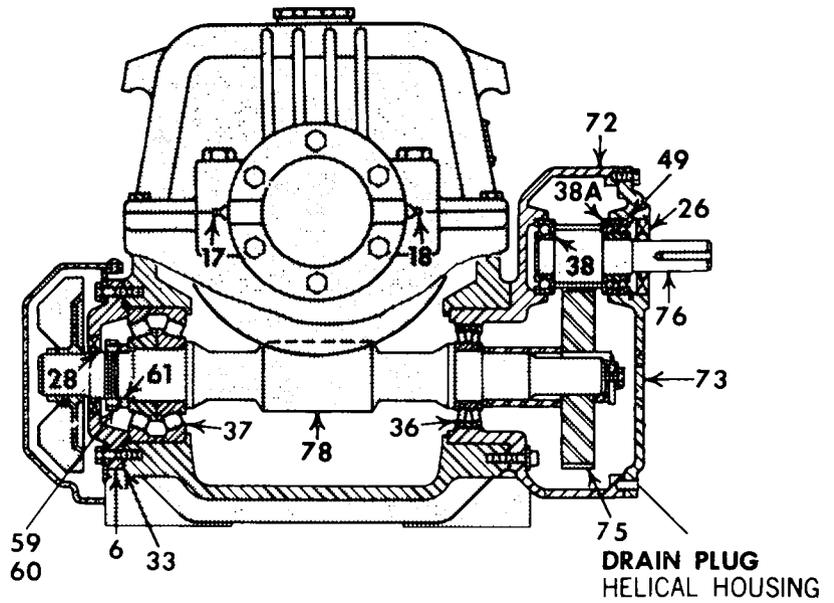
Locator	Description	Quantity per reducer
		1200 1400
1	Housing base (furnished with cover, Locator 2)	1
2	Housing cover (furnished with base, Locator 1)	1
3	Bearing retainer	◆
4	Bearing retainer	◆
5	Bearing retainer	—
6	Bearing retainer	1
17	Lubrication fitting	2
18	Pressure relief fitting	2
26	Oil seal	1
27	Oil seal	◆
28	Oil seal	— 1
31	Shim	1
32	Shim	—
33	Shim	1
35	Bearing	2
36	Bearing	1
37	Bearing	2
38	Bearing	1
38A	Bearing	1
48	Low speed shaft	1
49	Snap ring	1
59	Locknut	1
60	Lockwasher	1
61	Spacer	1
72	Helical housing (furnished with cover, Locator 73)	1
73	Helical housing cover (furnished with housing Locator 72)	1
75	Helical gear	1
76	Helical pinion	1
77	Worm gear	1
78	Worm shaft	1

◆ Quantity per reducer			
Locator	Assembly number		
	1	2	3
3	1	1	2
4	1	1	None
27	1	1	2

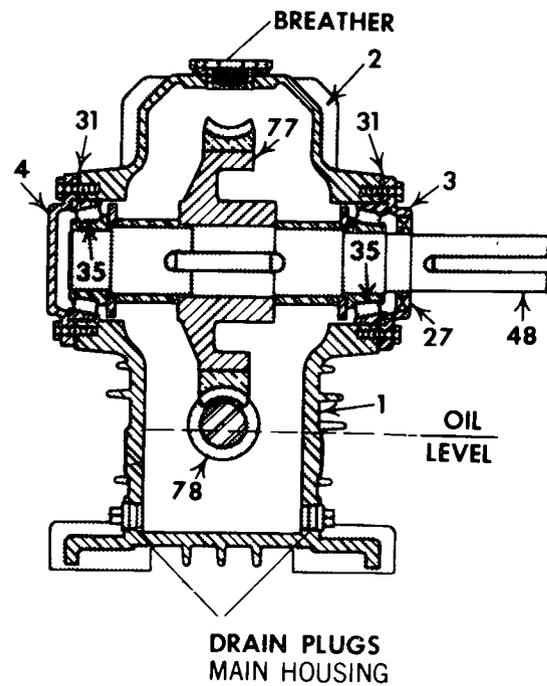
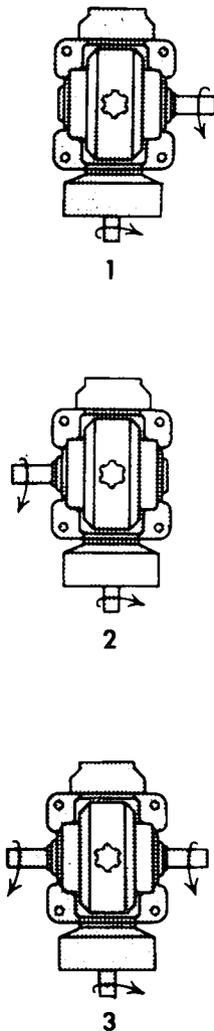
# Parts Drawings

## Type HWB

Sizes 1200 and 1400



### ASSEMBLIES



## Helical Worm — Type HWV

### Removing internal parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing 1 and helical housing 72. Refer to parts drawings, page 29, and parts list on this page. Three examples follow:

### To replace worm gear and supporting bearings

1. Match-mark housing 1 and housing cover 2 at joint to facilitate correct assembly.
2. Remove cap screws and eye bolts which fasten housing cover 2 to housing 1, and remove cap screws which fasten bearing retainer 3 (output shaft up) or 4 (output shaft down), to housing cover 2.
3. Remove bearing retainer.
4. Remove housing cover 2. For safety, use a properly secured sling and hoist capable of handling the load. **Overloading may result in personal injury and damage to reducer.**
5. Lift low speed shaft assembly with bearings from housing as a unit, using rope sling if necessary. When a chain is used, be sure to pad it with protective material, such as burlap, to prevent damage to shaft 48, bearings 35 and teeth of worm gear 77.
6. Remove bearings 35 from low speed shaft 48 with a wheel puller.
7. Remove grease retainer and spacer from each side of worm gear 77 and press low speed shaft 48 through worm gear.
8. Remove cap screws which fastens lower bearing retainer to housing 1 and remove bearing retainer.

### To replace helical gear set and supporting bearings

1. Remove cap screws which fasten cover 73 to housing 72. Break the bond between housing and cover by turning jack screws in cover flange.
2. Remove cover 73. Remove helical pinion assembly with bearings from housing as a unit.
3. Remove bearings 38 and 38A from helical pinion 76 with a wheel puller.
4. Remove screw and washer assembly from worm shaft 78 and remove helical gear 75.

### To replace worm shaft and supporting bearings

1. Remove worm gear and supporting bearings in accordance with instructions above.
2. Remove helical gear set and supporting bearings in accordance with instructions above.
3. Remove cap screws and lockwashers which fasten housing 72 to housing 1. Remove housing 72.
4. Remove fan housing. Remove locking screw and set screw from fan hub and remove fan.
5. Remove cap screws which fasten bearing retainer to housing 1. Remove bearing retainer.
6. Tap on keyseated end of worm shaft 78 until outer race of bearings is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
7. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9.

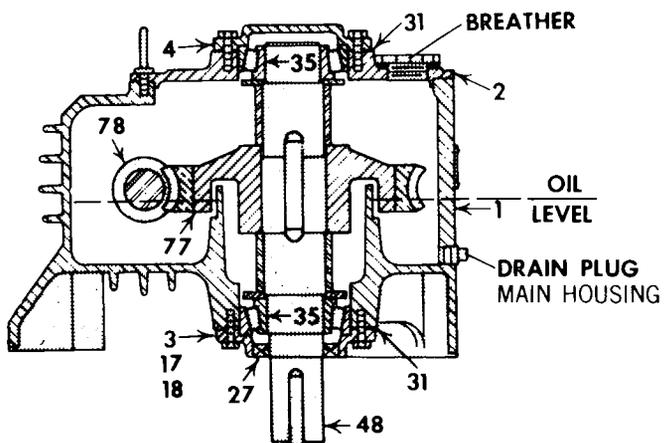
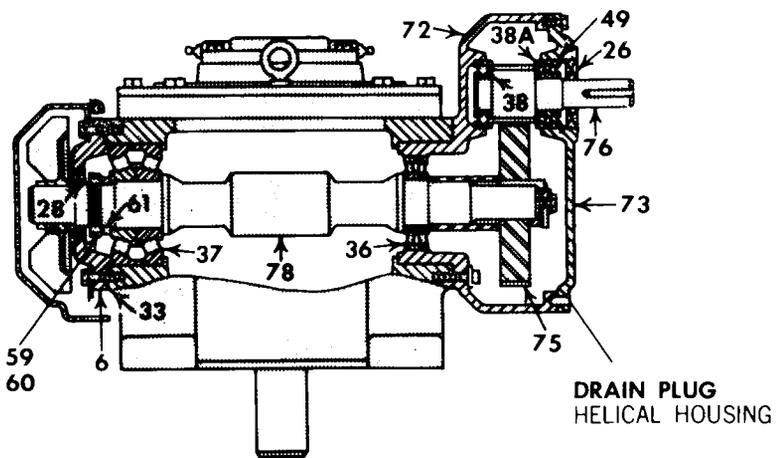
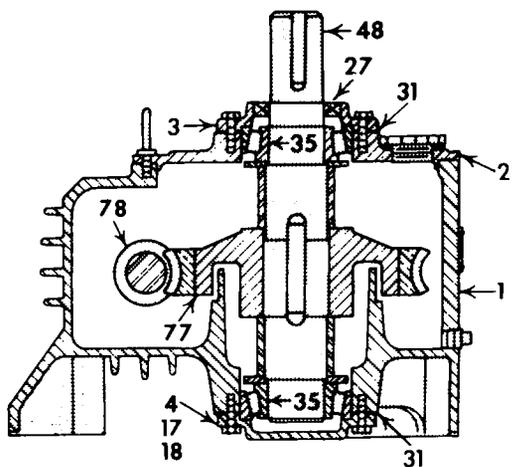
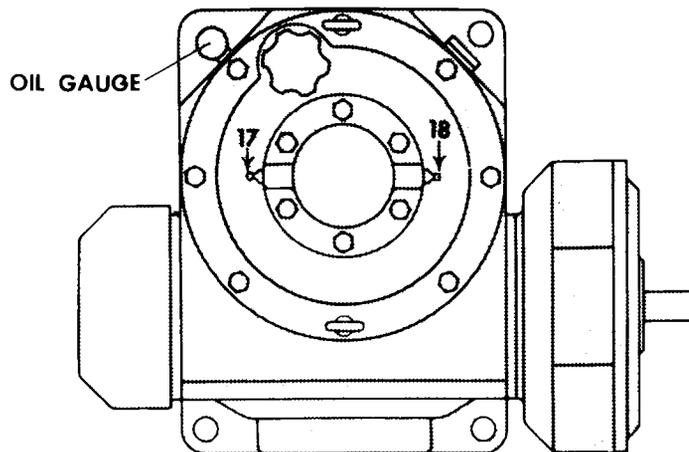
Parts List

Locator	Description	Quantity per reducer
		1200 1400
1	Housing	1
2	Housing cover	1
3	Bearing retainer	1
4	Bearing retainer	1
5	Bearing retainer	—
6	Bearing retainer	1
17	Lubricating fitting	2
18	Pressure relief fitting	2
26	Oil seal	1
27	Oil seal	1
28	Oil seal	1
31	Shim	1
32	Shim	—
33	Shim	1
35	Bearing	2
36	Bearing	1
37	Bearing	2
38	Bearing	1
38A	Bearing	1
48	Low speed shaft	1
49	Snap ring	1
59	Locknut	1
60	Lockwasher	1
61	Spacer	1
72	Helical housing (furnished with cover, Locator 73)	1
73	Helical housing cover (furnished with housing, Locator 72)	1
75	Helical gear	1
76	Helical pinion	1
77	Worm gear	1
78	Worm shaft	1

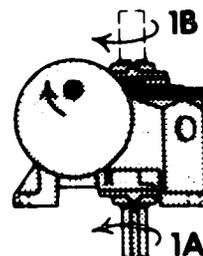
# Parts Drawings

## Type HWV

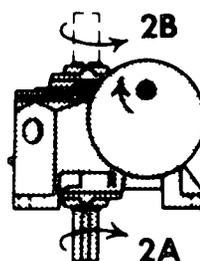
Sizes 1200 and 1400



### ASSEMBLIES



1A OR 1B



2A OR 2B

## Double Worm — Type DWB

### Removing internal parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing base 1 and primary housing 72. Refer to parts drawings, page 31, and parts list on this page. Three examples follow:

### To replace secondary worm gear and supporting bearings

1. Match-mark housing base 1 and housing cover 2 at joint to facilitate correct reassembly.
2. Remove cap screws which fasten housing cover 2 to housing base 1 and remove cap screws which fasten bearing retainers 3 and 4 to housing base and housing cover.
3. Remove bearing retainers.
4. Hook onto lifting lugs and remove housing cover 2. For safety, use a properly secured sling and hoist capable of handling the load.  
**Overloading may result in personal injury and damage to reducer.**
5. Lift low speed shaft assembly with bearings from housing as a unit, using rope sling if necessary. When a chain is used, be sure to pad it with protective material, such as burlap, to prevent damage to shaft 48, bearings 35, and teeth of worm gear 77.
6. Remove bearings 35 from low speed shaft 48 with a wheel puller.
7. Remove grease retainer and spacer from each side of worm gear 77 and press low speed shaft 48 through worm gear.

### To replace primary worm gear set and supporting bearings

1. Remove fan housing. Remove locking screw and set screw from fan hub and remove fan.
2. Remove cap screws which fasten cover 73 to housing 72. Remove cover.
3. Remove cap screws which fasten bearing retainers 74 to housing 72. Remove bearing retainers.
4. Tap on keyseated end of worm shaft 76 until outer race of bearing 38 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
5. Remove bearings 38 from worm shaft 76 with a wheel puller.
6. Remove screw and washer assembly from worm shaft 78 and remove worm gear 75.

### To replace secondary worm shaft and supporting bearings

1. Remove secondary worm gear and supporting bearings in accordance with instructions above.
2. Remove primary worm gear set and supporting bearings in accordance with instructions above.
3. Remove cap screws and lockwashers which fasten housing 72 to housing base 1. Remove housing 72.
4. Remove cap screws which fasten bearing retainer 5 to housing base 1. Remove bearing retainer.
5. Tap on keyseated end of worm shaft 78 until outer race of bearing is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
6. Remove bearings from worm shaft 78 with wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9.

Parts List

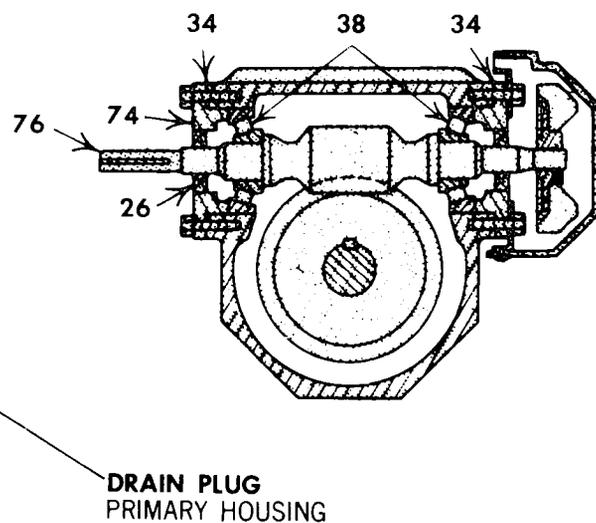
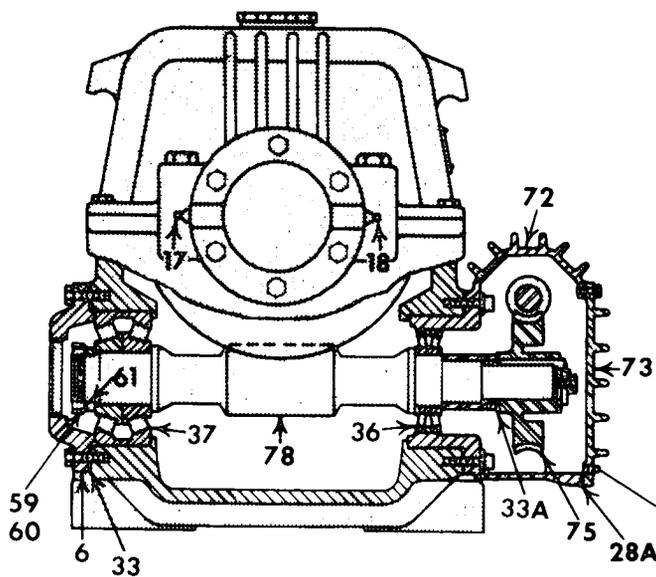
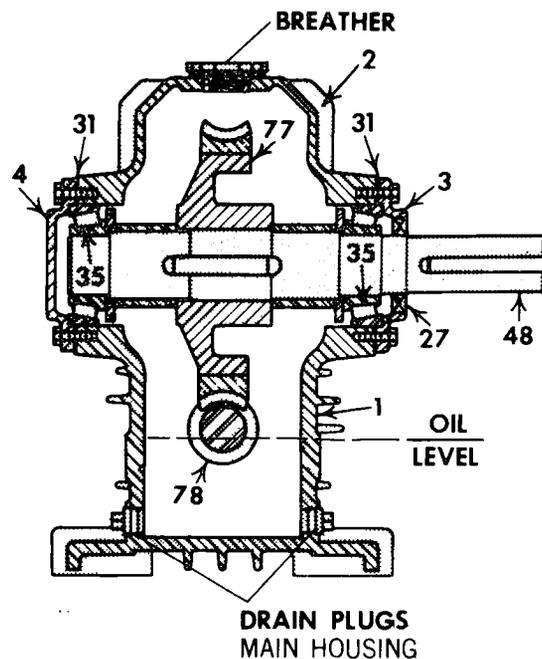
Locator	Description	Quantity per reducer	
		1200	1400
1	Housing base (furnished with cover, Locator 2)	1	
2	Housing cover (furnished with base, Locator 1)	1	
3	Bearing retainer	◆	
4	Bearing retainer	◆	
5	Bearing retainer	—	
6	Bearing retainer	1	
17	Lubrication fitting	2	
18	Pressure relief fitting	2	
26	Oil seal	2	
27	Oil seal	◆	
28A	Gasket	1	
31	Shim	1	
32	Shim	—	
33	Shim	1	
33A	Shim	1	
34	Shim	1	
35	Bearing	2	
36	Bearing	1	
37	Bearing	2	
38	Bearing	2	
48	Low speed shaft	1	
59	Locknut	1	
60	Lockwasher	1	
61	Spacer	1	
72	Primary housing	1	
73	Primary housing cover	1	
74	Bearing retainer	2	
75	Primary worm gear	1	
76	Primary worm shaft	1	
77	Secondary worm gear	1	
78	Secondary worm shaft	1	

◆ Quantity per reducer				
Locator	Assembly number			
	1	2	3	4
3	1	1	2	2
4	1	1	None	None
27	1	1	2	2

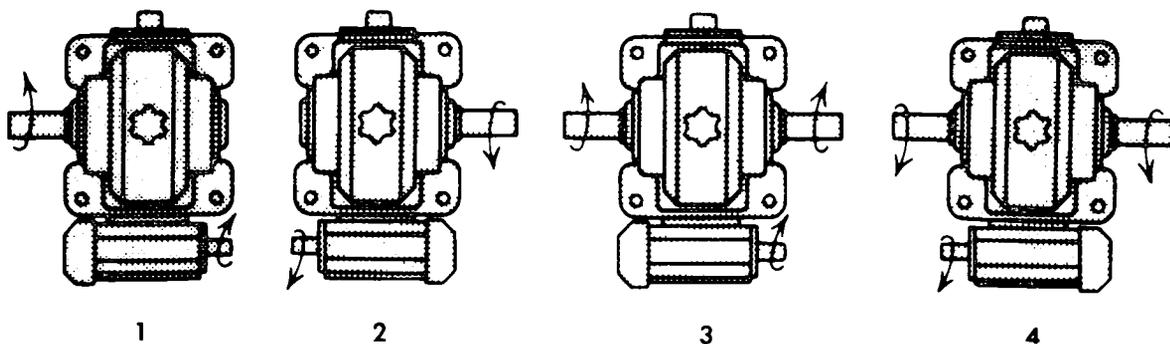
# Parts Drawings

## Type DWB

Sizes 1200 and 1400



### ASSEMBLIES



## Double Worm — Type DWV

### Removing internal parts

The method of parts removal is dependent upon location of the part to be replaced. Drain all oil from housing 1 and primary housing 72. Refer to parts drawings, page 33, and parts list on this page. Three examples follow:

### To replace secondary worm gear and supporting bearings.

1. Match-mark housing 1 and housing cover 2 at joint to facilitate correct reassembly.
2. Remove cap screws and eyebolts which fasten housing cover 2 to housing 1 and remove cap screws which fasten bearing retainer 3 (output shaft up) or 4 (output shaft down) to housing cover 2.
3. Remove bearing retainer.
4. Remove housing cover 2. For safety, use a properly secured sling and hoist capable of handling the load. **Overloading may result in personal injury and damage to reducer.**
5. Lift low speed assembly with bearings from housing as a unit, using rope sling if necessary. When a chain is used, be sure to pad it with protective material, such as burlap, to prevent damage to shaft 48, bearings 35, and teeth of worm gear 77.
6. Remove bearings 35 from low speed shaft 48 with a wheel puller.
7. Remove grease retainer and spacer from each side of worm gear 77 and press low speed shaft 48 through worm gear.
8. Remove cap screws which fasten lower bearing retainer to housing 1 and remove bearing retainer.

### To replace primary worm gear set and supporting bearings.

1. Remove fan housing. Remove locking screw and set screw from fan hub and remove fan.
2. Remove cap screws which fasten cover 73 to housing 72. Remove cover 73.
3. Remove cap screws which fasten bearing retainers 74 to housing 72. Remove bearing retainers.
4. Tap on keyseated end of worm shaft 76 until outer race of bearing 38 is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through the housing bore.
5. Remove bearings 38 from worm shaft 76 with a wheel puller.
6. Remove screw and washer assembly from worm shaft 78 and remove worm gear 75.

### To replace secondary worm shaft and supporting bearings

1. Remove secondary worm gear and supporting bearings in accordance with instructions above.
2. Remove primary worm gear set and supporting bearings in accordance with instructions above.
3. Remove cap screws and lockwashers which fasten housing 72 to housing 1. Remove housing 72.
4. Remove cap screws which fasten bearing retainer to housing 1. Remove bearing retainer.
5. Tap on keyseated end of worm shaft 78 until outer race of bearing is free of housing. Support worm shaft so it will not be damaged and pull worm shaft assembly through housing bore.
6. Remove bearings from worm shaft 78 with a wheel puller.

### Reassembly

To reassemble, follow above steps in reverse order and general instructions on page 9.

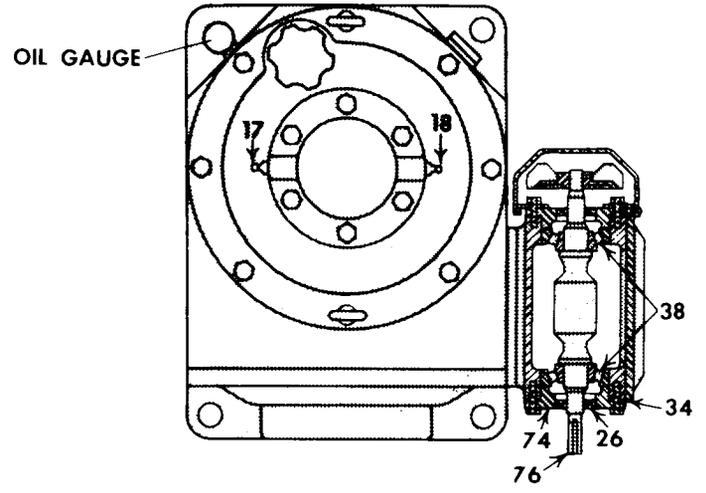
Parts List

Locator	Description	Quantity per reducer
		1200 1400
1	Housing	1
2	Housing cover	1
3	Bearing retainer	1
4	Bearing retainer	1
5	Bearing retainer	—
6	Bearing retainer	1
17	Lubrication fitting	2
18	Pressure relief fitting	2
26	Oil seal	2
27	Oil Seal	1
28A	Gasket	1
31	Shim	1
32	Shim	—
33	Shim	1
33A	Shim	1
34	Shim	1
35	Bearing	2
36	Bearing	1
37	Bearing	2
38	Bearing	2
48	Low speed shaft	1
59	Locknut	1
60	Lockwasher	1
61	Spacer	1
72	Primary housing	1
73	Primary housing cover	1
74	Bearing retainer	2
75	Primary worm gear	1
76	Primary worm shaft	1
77	Secondary worm gear	1
78	Secondary worm shaft	1

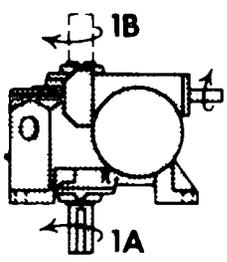
# Parts Drawings

## Type DWV

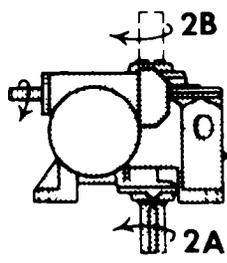
Sizes 1200 and 1400



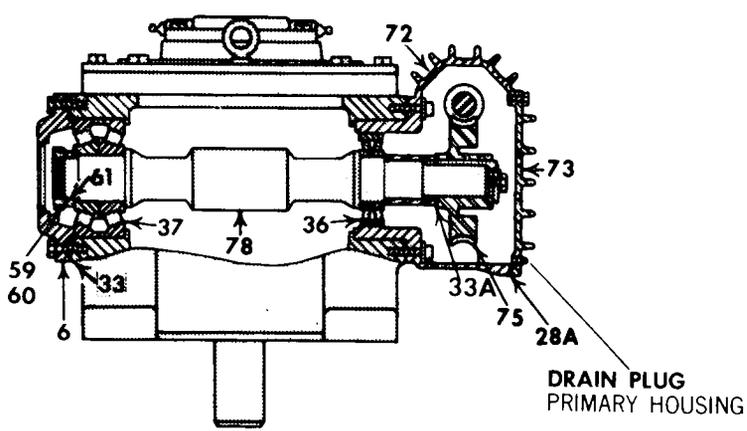
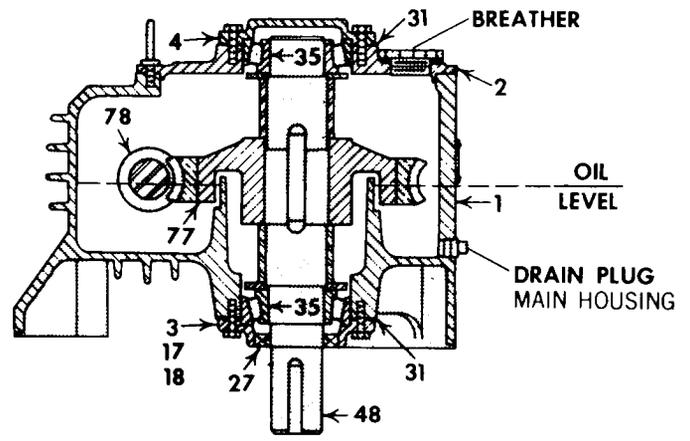
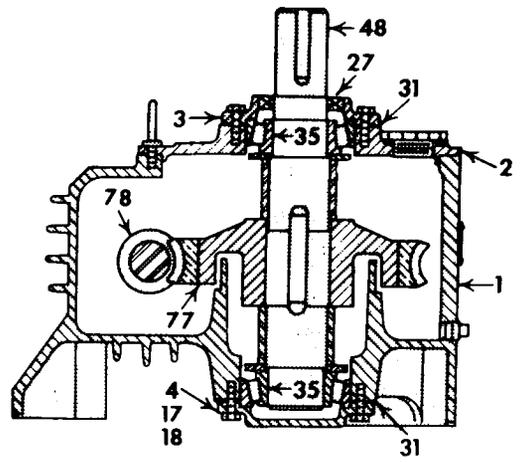
### ASSEMBLIES



1A OR 1B



2A OR 2B



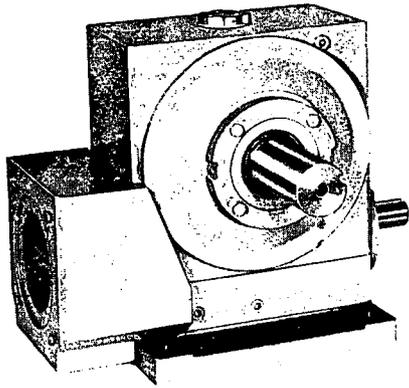
**Table 7 • Trouble shooting and repair**

Condition	Cause		Remedy
Overheating	Overloading	Load exceeds capacity of reducer. Reducer operating in excess of thermal HP rating.	Compare thermal HP rating with actual load. Replace with reducer of sufficient capacity, or reduce load.
	Improper lubrication	Insufficient oil or grease.	Adjust oil level, see page 2. Add grease until it comes out of pressure relief fitting.
		Too much oil in reducer causes churning, and excessive heat is generated by the fluid friction of the churning oil.	Drain oil to correct level.
		Clogged oil passages.	Make sure all oil passages are clear and permit free flow of lubricant.
		Wrong grade of oil or grease.	Flush and refill with correct grade of oil or grease as specified in Tables 1, 2 and 3.
		Forced lubrication and oil cooling systems on high speed reducers may be clogged.	Inspect oil lines, pressure regulators, nozzles, and filters to be sure they are free of obstructions and are in good working order. If foreign material is found, clean and flush reducer thoroughly, and add new oil.
		Obstructed air flow.	Check air supply for proper fan circulation. Avoid high surrounding ambient temperatures
		Incorrect shaft end play.	Check bearing adjustment. Shim to proper recommended fit.
Noise and vibration	Loose foundation bolts	Improper installation.	Check mounting bolts and tighten if necessary. If reducer is mounted on studs, inspect each stud for rigidity. Use lock washers on all bolts or studs.
	Loose parts	Excessive backlash or shaft end play.	Check for worn bearings, gears and proper shimming.
		Excessive shock loads or improper connection with other machinery.	Inspect reducer for broken parts, loose bolts, nuts, and screws. Replace broken lockwire. Check all keys for proper size and fit.
	Failing bearings	Wear, evident from dullness of balls, rollers, and raceways. Wear of bearing is caused by dirt in oil.	Replace worn bearings. Clean and flush reducer and replace oil.
		Spalling or flaking out of metal in raceways usually indicates overloading.	Replace bearings. Check and remedy bearing clearances, coupling alignment, and loading of reducer, including overhung loads.
		Failed separators, caused by overload on bearings.	
Excessively worn gears	Overloading causes pitting of tooth faces.	Check load. Reduce load or replace with reducer of sufficient capacity.	
Insufficient oil	A low oil level reduces the natural muffling effect of the oil.	Oil should be at a level between high and low points on oil gauge.	
Excessively high speeds		Check recommended speed range. Reduce speed or install a unit with sufficient speed range.	
Excessive shaft end play	Worn bearings	Bearing exposure to an abrasive causes wear of the balls, rollers, and raceways.	Worn bearing rollers and raceways have a dull appearance. Replace worn bearings. Clean and flush reducer and replace oil. See End Play Table
Excessive backlash or slack	Worn gears or loose parts	Worn gears and keys, or loose fasteners, such as screws, bolts or nuts cause backlash. Backlash increases with the number of gear sets, consequently, backlash is normally greater in double reduction reducers.	Replace worn gears and keys. Tighten loose screws, bolts, or nuts
Oil leakage		Leakage between housing and cover.	Tighten cover bolts. If this does not remedy the condition, remove housing cover, clean both surfaces, and apply new sealing compound per instructions.
		Too much oil.	Check oil level and drain to proper level.
		Clogged breather	Clean breather and breather hole, being careful to prevent any dirt from falling into reducer.
		Damaged oil seals.	Replace with new seals.

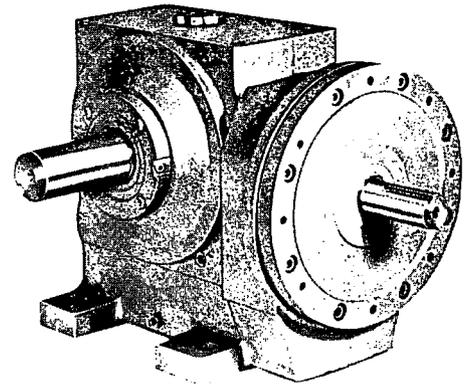
# Link-Belt® Worm Gear Speed Reducers

## Range of Sizes

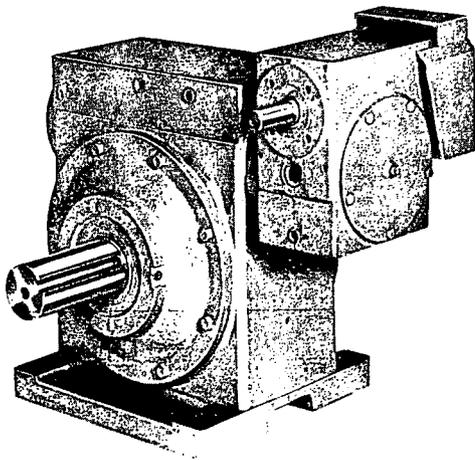
	Single Worm S		Helical Worm H		Double Worm D		Extended Bearing E
	Model MW	Large Worms Sizes 1200-1400	Model MW	Large Worms Sizes 1200-1400	Model MW	Large Worms Sizes 1200-1400	Type H Only Model MW
Size Range	120mm thru 250mm	12 in. & 14 in.	85mm thru 250mm	12 in. & 14 in.	120mm thru 250mm	12 in. & 14 in.	120mm thru 250mm
Max. Output Torque	92,000 lb.-in.	244,000 lb.-in.	95,000 lb.-in.	204,000 lb.-in.	100,000 lb.-in.	233,000 lb.-in.	95,000 lb.-in.
Ratio Ranges	7½:1 to 70:1	5:1 to 70:1	14:1 to 460:1	15:1 to 350:1	75:1 to 4900:1	75:1 to 4900:1	14:1 to 460:1



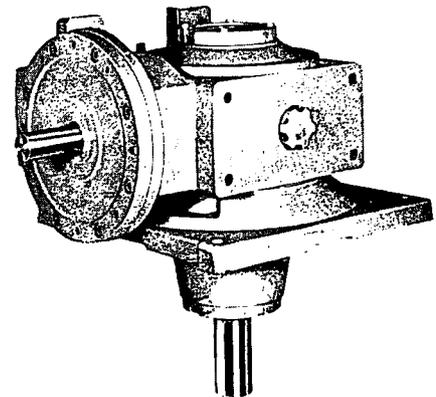
Single Worm Type S



Helical Worm Type H



Double Worm Type D



Extended Bearing Type E

## Maintenance Service Record

The following maintenance record form is for your convenience and should be kept up to date and made part of your permanent maintenance records.

### Maintenance Record

Reducer Type & Size \_\_\_\_\_ Model No. \_\_\_\_\_

Serial No. \_\_\_\_\_ Ratio \_\_\_\_\_

Date	Maintenance to be Performed	Hours of Operation	Remarks
	Fill with proper grade oil and check for correct oil level	Start up	See pages 2 through 5 
	Initial oil change	150	
	First periodic oil change	2,500	
	Second periodic oil change	5,000	
	Third periodic oil change	7,500	
	Fourth periodic oil change	10,000	
	Fifth periodic oil change	12,500	
	Sixth periodic oil change	15,000	
	Seventh periodic oil change	17,500	

## Authorized Service Shops for Link-Belt Drive Products

1. **James McGraw, Inc.**  
Richmond VA 23234  
(804) 233-3071
2. **Bearings Inc.**  
Cleveland OH 44103  
(216) 881-2838
3. **Ohio Transmission  
& Pump Co.**  
Columbus OH 43006  
(614) 444-2172  
Monroe OH 45050  
(513) 539-9411
4. **Kentucky Bearings  
Service, Inc.**  
Louisville KY 40201  
(502) 636-2571
5. **Cameron & Barkley Company**  
Orlando FL 32804  
(407) 298-6250
6. **Vacherie Machine Works**  
Vacherie LA 70090  
(504) 265-4372
7. **Carlson-Dimond & Wright, Inc.**  
Warren MI 48091  
(313) 758-6611
8. **Hewitt Transmission Co.**  
Neenah WI 54956  
(414) 722-2851
9. **Bearing Headquarters Co.**  
Broadview IL 60155  
(312) 681-4400
10. **I.B.T.**  
Shawnee Mission KS 66201  
(913) 677-3151
11. **King Bearing Inc.**  
Corona CA 92631  
(714) 956-8070
12. **Logan Corporation**  
Huntington WV 25719  
(304) 529-3231



Rexnord Corp.  
Link-Belt Drive Division  
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(215) 225-6000