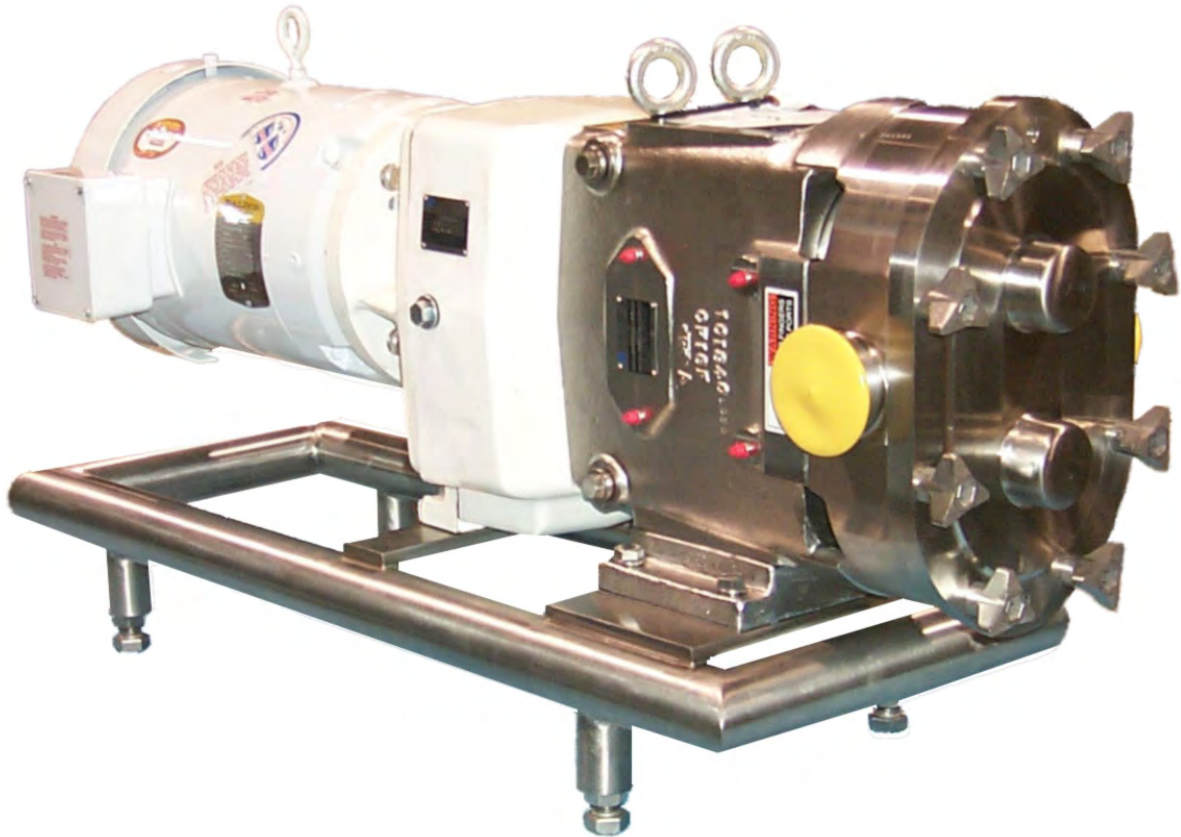


# Waukesha ISR

INTEGRAL SPEED REDUCER SERIES

FORM NO.: 95-03010 REVISION: 08/1997

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.





# SAFETY

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Warnings, cautions and notes are contained in this manual. To avoid serious injury and/or possible damage to equipment, pay attention to these messages.

## LEVELS OF HAZARDS

- WARNING** Hazards or unsafe practices which COULD result in severe personal injury or death and how to avoid it.
- CAUTION** Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.
- NOTE** Important information pertaining directly to the subject.  
(Information to be aware of when completing the task.)

### WARNING

To avoid electrocution, ALL electrical should be done by a registered Electrician, following Industry Safety Standards.  
All power must be OFF and LOCKED OUT during installation.

### WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE REDUCER UNLESS ALL POWER IS OFF AND LOCKED OUT.

### CAUTION

CHANGING GEAR RATIOS MAY AFFECT YOUR PUMP PERFORMANCE AND MOTOR REQUIREMENTS.

### WARNING

All necessary precautions should be taken prior to working on an in-service pump.

1. Shut off and close all product to pump lines.
2. Shut off pump power and lock out at the control box to avoid any unexpected start-up.
3. Remove pump drive system

### CAUTION

To prevent over hung load damage to the pinion shaft bearing, the motor must be supported by a chain hoist or jack until the motor is seated and bolted to the rear case C flange.

Read and understand this manual prior to installing, operating or maintaining this reducer.

Effective Date of this Manual:  
8-13-1997

## **WARRANTY**

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### **WAUKESHA CHERRY-BURRELL WARRANTY**

Seller warrants its products to be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. This warranty shall not apply to products which require repair or replacement due to normal wear and tear or to products which are subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer. Products manufactured by others but furnished by Seller are exempted from this warranty and are limited to the original manufacturer's warranty.

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense.

Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Seller's entire and exclusive liability, and Buyer's exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorneys' fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

## **GENERAL INFORMATION**

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### **MANUAL FORMAT**

This manual is laid out in sections. Each section addresses specific subjects. Familiarize yourself with the subjects by scanning through the manual. Whether installing, operating, troubleshooting, maintaining or ordering parts, read through that section and follow instructions.

### **ORDERING/RETURNING PARTS**

See page 28 for complete information on ordering and returning parts. Record EQUIPMENT and DISTRIBUTOR INFORMATION immediately.

### **SHIPPING DAMAGE**

Inspect your shipment immediately. If damage is found, note it on the driver's copy (packing slip) and request the driver to ask the Inspector to call. You are responsible for initiating shipping damage claims.

### **HIDDEN DAMAGE OR WARRANTY CLAIM**

If during installation, you discover apparent shipping damage, contact the Shipper immediately and ask for an Inspector to call. Notify your Distributor of the problem. In warranty claims you must have a returned goods authorization from the manufacturer before any returns will be accepted. Your Distributor will help you with a warranty problem. Please read the Warranty statement.

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**Read and understand this manual prior to installing, operating or maintaining this reducer.**

# INTRODUCTION

# WAUKESHA INTEGRAL SPEED REDUCER

The Waukesha Integral Speed Reducer is built for extremely durable service. It creates an in-line link between the drive motor and the pump. Three models (sizes) are available: **49, 79** and **239**.

The cast iron casing houses quality reduction gearing, presenting eight speed reduction capabilities using two standard motor RPM inputs on the 49 and 79 units, 10 speeds on the 239 unit. Speed ratios are changeable in the field.

All fittings, bushings, keys and fasteners are supplied to fit the Reducer to C-face motors with frames from 145TC through 286TC.

The Waukesha ISR design will drive Waukesha Universal Pump Models as listed in SPECIFICATIONS and can be retrofitted to these models in the field.

This Manual addresses:   Installation of the Integral Speed Reducer  
  Maintenance of Integral Speed Reducer

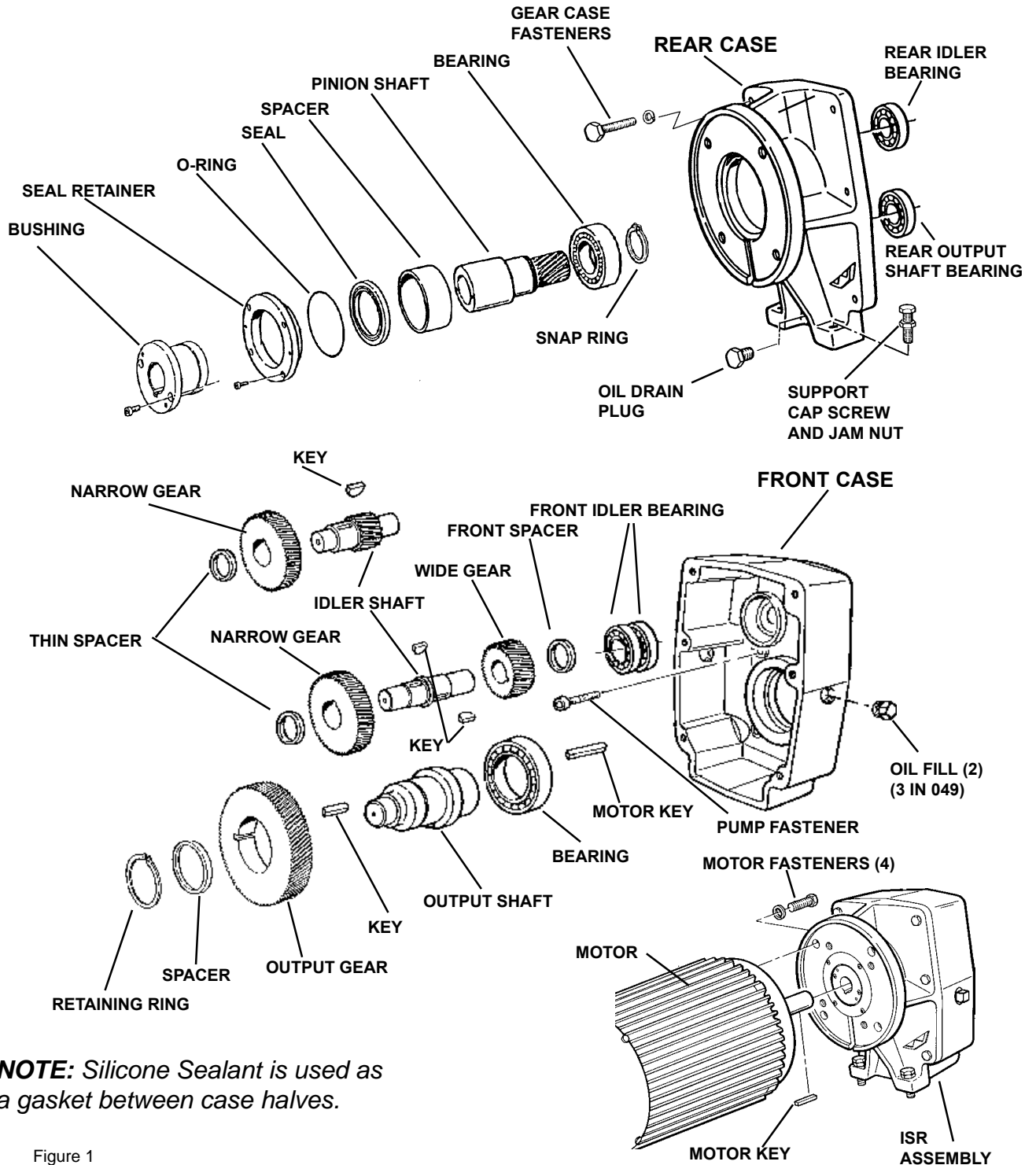
**NOTE** *A separate Integral Speed Reducer is shipped without lubricating oil as disassembly of the ISR is required to mount it to a pump in the field.*

PUMP SPEEDS ATTAINABLE	
<b>Model 49</b>	120 rpm to 287 rpm
<b>Model 79</b>	98 rpm to 390 rpm
<b>Model 239</b>	100 rpm to 320 rpm

See PARTS LISTING beginning on page 22 for:  
Reducer Parts  
Motor Attachment Parts  
Gear Ratio Components

# INTRODUCTION

## INTEGRAL SPEED REDUCER COMPONENTS



**NOTE:** Silicone Sealant is used as a gasket between case halves.

Figure 1

## SPECIFICATIONS

ISR SIZE	USE ON WAUKESHA PUMP
Model 49	Models 30, 32, 34, 33A, 5040
Model 79	Models 60, 62, 64, 130, 134, 132, 133A, 5050, 5060
Model 239	Models 220, 222, 224, 223A, 5070

### STANDARD CONSTRUCTION:

Housing: Cast Iron  
 Steel Shafts  
 Ball Bearings  
 Bushings  
 Paint: 2-part epoxy, TNE MEC 104, Sky Blue #104-BB-42

### PERFORMANCE CHARACTERISTICS

PUMP SPEEDS								
MODEL 49 1-1/2 TO 7-1/2 HP			MODEL 79 3 to 10 HP			MODEL 239 7-1/2 to 30 HP		
PUMP RPM	MOTOR RPM	GEAR RATIO	PUMP RPM	MOTOR RPM	GEAR RATIO	PUMP RPM	MOTOR RPM	GEAR RATIO
119	1125	9.48:1	97	1125	11.57:1	100	1125	11.22:1
155	1125	7.25:1	151	1125	7.47:1	125	1125	9.01:1
184	1745	9.48:1	151	1745	11.57:1	146	1125	7.70:1
187	1125	6.01:1	177	1125	6.35:1	156	1745	11.22:1
241	1745	7.25:1	234	1745	7.47:1	169	1125	6.65:1
262	1125	4.30:1	254	1125	4.43:1	194	1745	9.01:1
291	1745	6.01:1	275	1745	6.35:1	210	1125	5.35:1
406	1745	4.30:1	394	1745	4.43:1	226	1745	7.70:1
						262	1745	6.65:1
						326	1745	5.35:1

### CAUTION

CHANGING GEAR RATIOS MAY AFFECT YOUR PUMP PERFORMANCE AND MOTOR REQUIREMENTS.

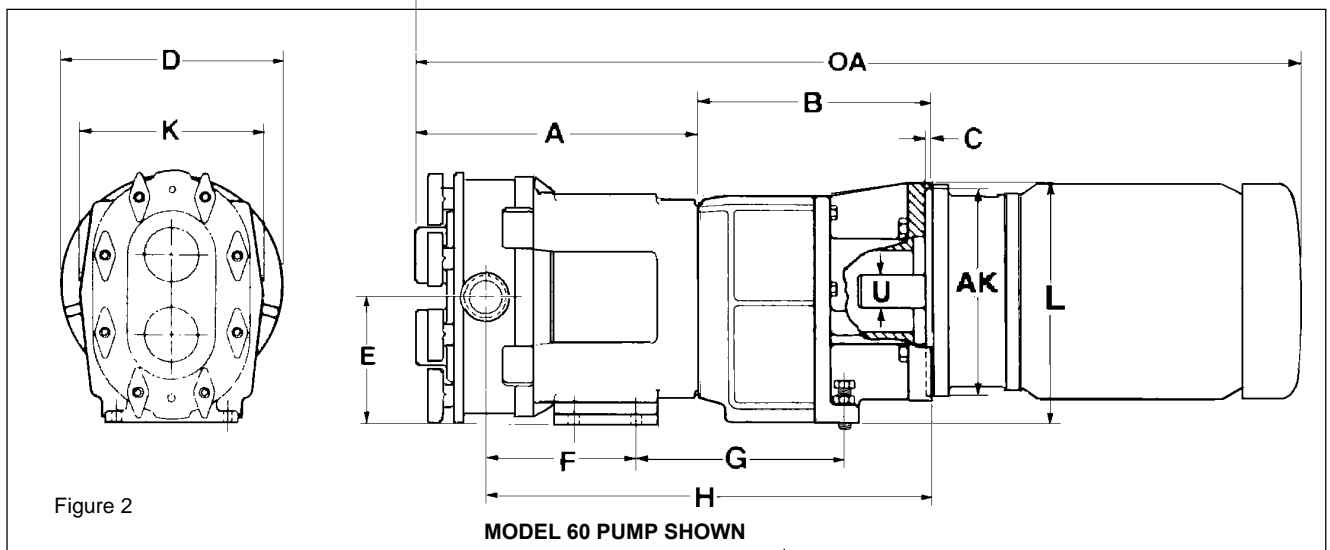
### WARNING

TO AVOID SERIOUS INJURY, DO NOT INSTALL OR SERVICE REDUCER UNLESS ALL POWER IS OFF AND LOCKED OUT.



# INSTALLATION

# ISR TO PUMP DIMENSIONS



UNIVERSAL PUMP MODEL	ISR MODEL	MOTOR FRAME	"U"		OA	UNIVERSAL PUMP SERIES														
						30	60	130	220											
30 SERIES  30, 32, 34, 33A, 5040	49	145TC	.875	4.5	31.75	A	11.71	15.91	16.85	20.13										
		184C			35.0															
		182TCH	1.125	8.5	35.0						B	9.33	9.35	9.35	12.13					
		184TCH			35.0															
		182TC	1.125	8.5	33.25											C	.218	.218	.218	.218
		184TC			34.25															
213C	1.375	8.5	35.25	D	9.13	9.13	9.13	11.12												
215C			37.0																	
213TC	1.375	8.5	36.40						E	5.22	7.31	7.31	9.38							
215TC			38.0																	
60 SERIES  60, 62, 64	79	182TC	1.125											8.5	37.5	F	6.3	9.13	9.77	11.68
		184TC													38.5					
		213C	1.375	8.5	39.5	G	8.5	9.4						9.4	11.9					
		215C			41.0															
		213TC	1.375	8.5	40.6				H	18.18	21.75	22.38	27.38							
		215TC			42.2															
130 SERIES  130, 132, 134, 133A, 5050, 5060	79	182TC	1.125	8.5	38.5											K	7.63	9.5	9.5	13.75
		184TC			39.5															
		213C	1.375	8.5	41.4	L	10.6	13.0						13.0	17.0					
		215C			43.0															
		213TC	1.375	8.5	41.5				All Dimensions in inches											
		215TC			43.0															
220 SERIES  220, 222, 224, 223A, 5070	239	213TC	1.375	8.5	47.6															
		215TC			49.2															
		254TC	1.625	10.5	51.4															
		256TC			53.0															
		284TC	1.875	10.5	54.0															
		286TC			55.5															

All Dimensions in inches

# INSTALLATION

# PREPARING ISR FOR PUMP INSTALLATION

An ISR received as a separate unit will be attached to an existing pump.

- NOTES:** 1. There is NO OIL IN ISR!  
2. Pump fasteners are supplied in a separate bag.

(On previously installed units, see in-service pump preparation on page 11.)

- ① Remove two 1/2-13 hex-head cap screws and jam nuts from support foot of rear case. (Figure 3)

**NOTE:** On Model 239 support foot screws are 1/2-13 x 2 hex-head machine screws.

- ② Remove six hex-head cap screws and lockwashers from gear case assembly.

**NOTE:** On Model 239 there are eight hex-head cap screws.

- ③ Separate rear case assembly from front case assembly. (Figure 3)

**NOTE:** Use a brass or aluminum pry bar to separate cases if necessary.

- ④ Remove old silicone sealant from case halves. (Figure 3)

- ⑤ Remove the thin spacer from idler shaft.

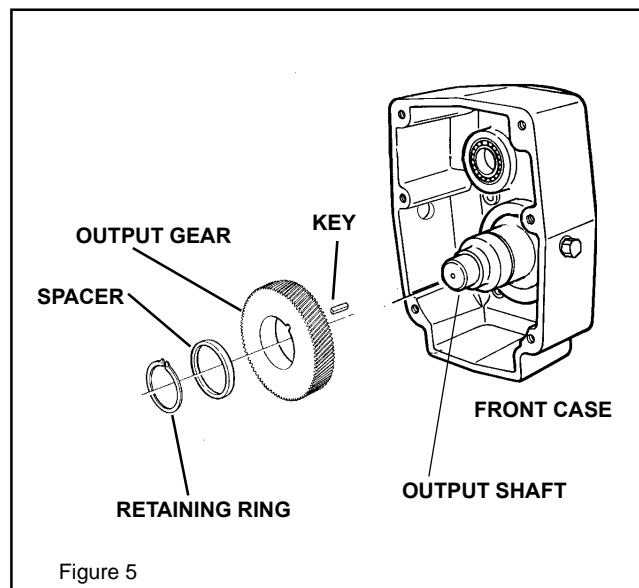
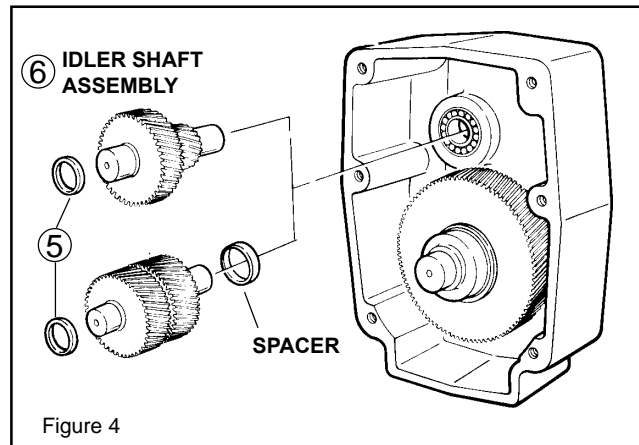
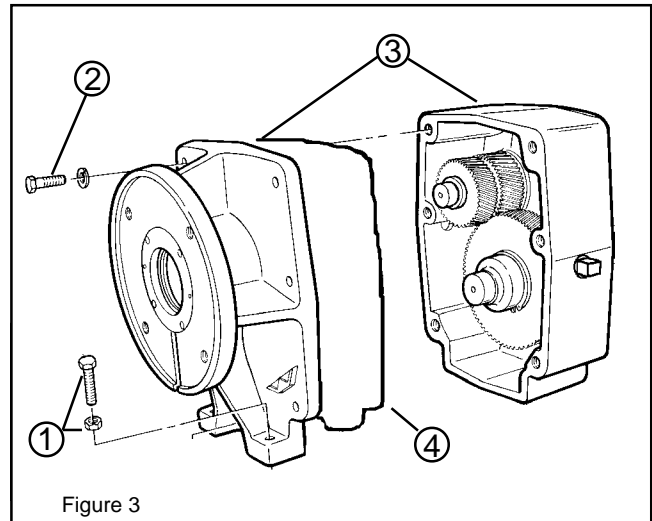
- ⑥ Pull the idler shaft and the spacer from the front case assembly. There are two different idler shaft assemblies used depending on ratio of ISR. (Figure 4)

**NOTE:** It may be necessary to use a brass or aluminum pry bar to remove the idler shaft.

7. Remove the retaining ring from the output gear shaft. Slide the spacer off the shaft. (Spacer not used on Model 49 ISR.) (Figure 5)

8. Slide the output gear and key off the shaft.

9. The front case is now ready to install on the pump.



# INSTALLATION

# MOUNTING FRONT CASE TO PUMP

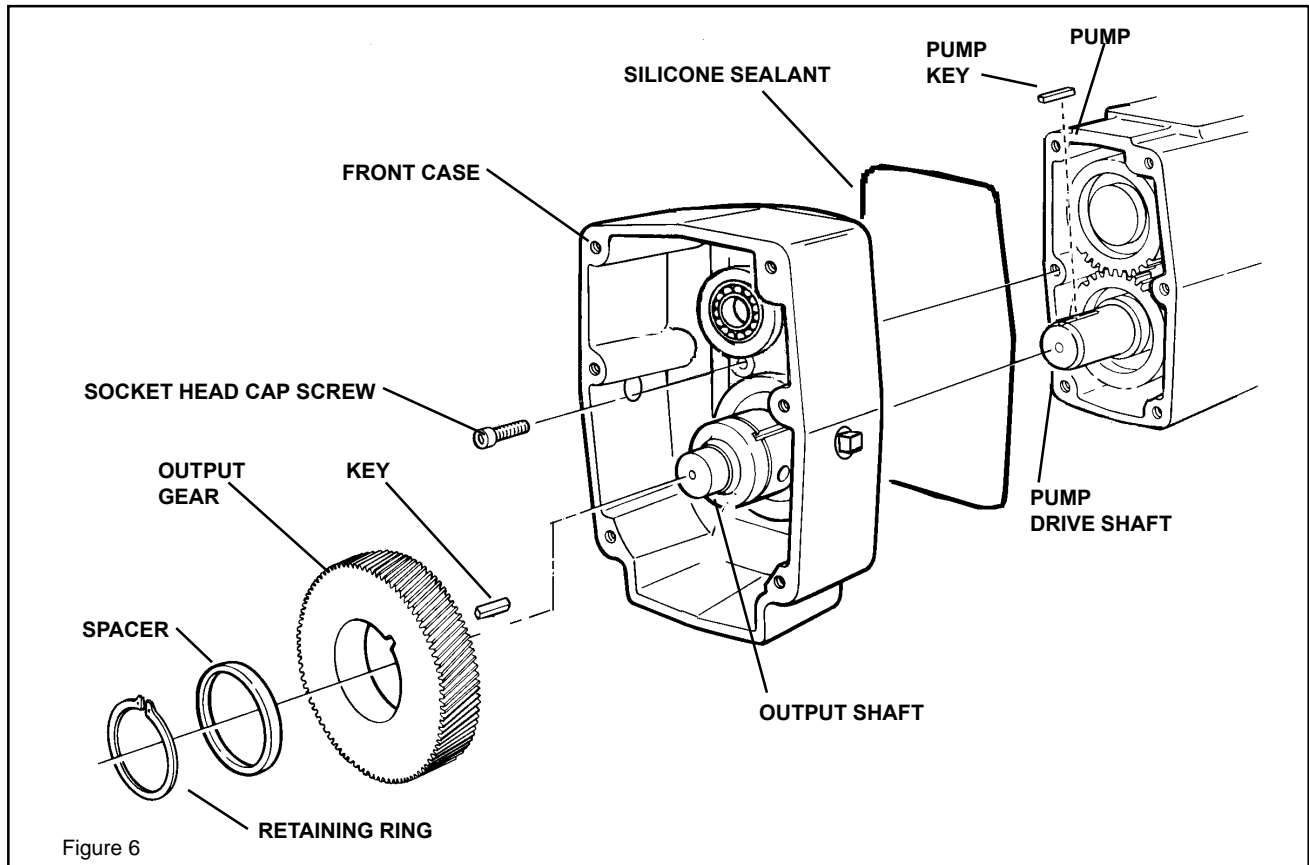


Figure 6

(Figure 6)  
(The speed reducer can only be assembled to a lower drive shaft mounted pump.)

## WARNING

All necessary precautions should be taken prior to working on an in-service pump.

1. Shut off and close all product to pump lines.
2. Shut off pump power and lock out at the control box to avoid any unexpected start-up.
3. Remove pump drive system

## PREPARATION OF PUMP

1. Drain oil from pump gear case and remove pump gear case cover and sealant.
2. Clean sealant from gear case surface.
3. Apply a bead of silicone sealant to the pump case. Rotate pump drive shaft and install drive

key. Apply a film of Micro Plate 140 gear oil to pump drive shaft.

4. Align keyway in speed reducer output shaft with key in pump drive shaft and slide output shaft over pump drive shaft.
5. Seat front case to pump.

## 6. Fasteners

**Model 49:** Install six 5/16-18 x 1-1/4" socket-head cap screws. Torque to 17 ft. lbs.

**Model 79:** Install six 3/8-16 x 1-1/4" socket-head cap screws. Torque to 30 ft. lbs.

**Model 239:** Install eight 3/8-16 x 2" socket-head cap screws. Torque to 30 ft. lbs.

7. Install key in output shaft.
8. Align output gear with key and slide onto output shaft.
9. Slide on spacer and secure with retaining ring.

**NOTE:** Model 49 does not use a spacer between the retaining ring and the output gear.

# INSTALLATION

# CASE ASSEMBLY

## ISR ASSEMBLY - REAR CASE TO FRONT CASE

Lubricate all shaft surfaces with Micro Plate 140 gear oil prior to installing.

1. Place the front spacer on the long end of the idler shaft. Install the idler shaft assembly in the front case assembly. *There are two different idler shaft assemblies used depending on ratio of ISR.* (Figure 7)

**NOTE:** A front spacer is used on all idler shafts, except 79 and 49 gear idler shafts. Shaft is a light press fit. Use a soft hammer to seat the shaft or press it in.

2. Install thin spacer onto idler shaft.  
 49 thickness = .060/.062 inch  
 79 thickness = .060/.062 inch  
 239 thickness = .133/.138 inch

### INSTALL REAR CASE ASSEMBLY

4. Place a bead of silicone sealant on the rear case edge.

Lubricate front and rear case bearings and gears with Micro Plate 140 gear oil.

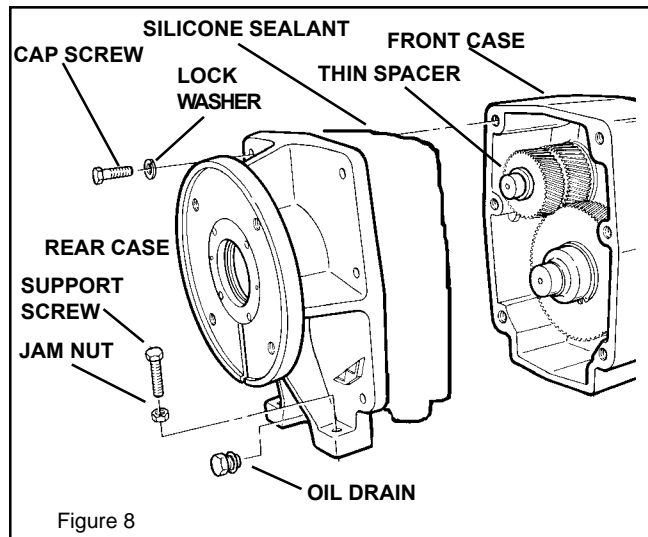
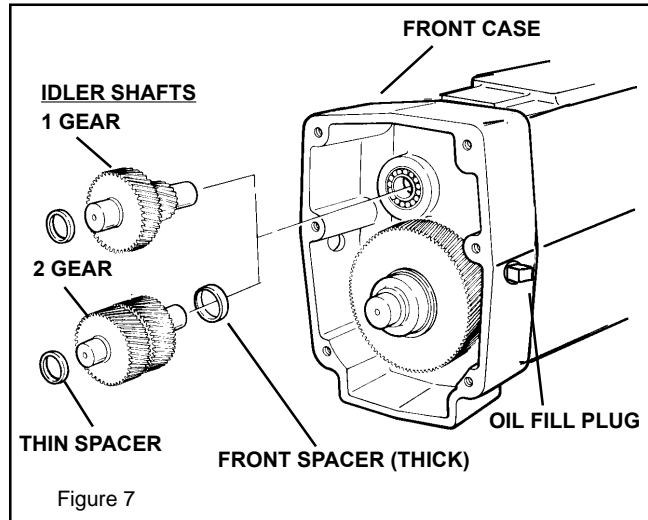
5. Seat rear case to front case. (Figure 7)

**NOTE:** Idler and output shafts may be a light press fit in rear case bearings. The rear case should be completely assembled, without the motor coupling installed.

6. Attach with cap screws and lock washers. Torque to 30 foot lbs.

7. Install the two hex-head cap screws with jam nuts into support foot of rear case. After screws are engaged in the base plate, lock them in position with the jam nuts.

Install oil drain plug (1/2-20 cap screw with fiber washer). (Figure 8)



Fill unit with Microplate 140 gear oil. (Use reducer fill hole located on either side). Figure 7

MICROPLATE 140 LUBE OIL CAPACITY	
MODEL 49	1-1/4 PINTS
MODEL 79	3 PINTS
MODEL 239	6-1/2 PINTS

**NOTE:** Pump and reducer form a common oil reservoir.

# INSTALLATION

# MOTOR TO SPEED REDUCER

**NOTE:** See *Bushing and Key Selection Chart* for specific parts for each model. (Page 14)

1. Apply a generous coating of good quality anti-seize compound to O.D. of pinion shaft bushing. Figure 9
2. Align two counter-bored holes in pinion shaft bushing with two tapped holes in pinion shaft and install bushing into pinion shaft bore.
3. Install two #10-32 x 1/2 socket-head cap screws. Torque screws to 5 ft. lbs.
4. Remove cover from pump.

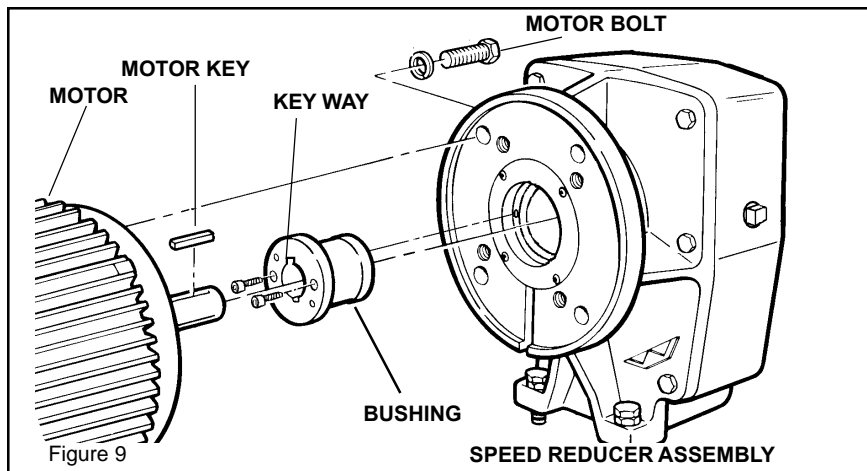
5. Using a rotor nut wrench, rotate the pump shaft so that the keyway in the pinion shaft bushing is facing up.
6. Rotate the motor shaft so that the keyway is facing up and install key.
7. Apply a generous coat of good quality anti-seize compound to motor shaft and bore of pinion shaft bushing.
8. While supporting weight of motor, align key in motor shaft with keyway in pinion shaft bushing and insert motor shaft into pinion shaft bushing. Seat motor into rear case flange and install four hex-head cap screws with lockwashers. Torque screws per chart below.

**CAUTION**

To prevent over hung load damage to the pinion shaft bearing, the motor must be supported by a chain hoist or jack until the motor is seated and bolted to the rear case C flange.

### MOTOR FASTENER REFERENCE

FRAME	HEX HEAD CAPSCREW	WASHER
145 TC	3/8-16 X 1-1/4"	3/8"
182 TC	1/2-13 X 1-1/2"	1/2"
184 TC	1/2-13 X 1-1/2"	1/2"
213 TC	1/2-13 X 1-1/2"	1/2"
215 TC	1/2-13 X 1-1/2"	1/2"
254 TC	1/2-13 X 1-3/4"	1/2"
256 TC	1/2-13 X 1-3/4"	1/2"
284 TC	1/2-13 X 2"	1/2"
286 TC	1/2-13 X 2"	1/2"



MOTOR BOLT TORQUE TABLE	
SIZE	TORQUE
1/2 - 13	30 ft. lbs.
3/8 - 16	10 ft. lbs.

# MAINTENANCE

# MOTOR REPLACEMENT

## INSPECTION

Inspect speed reducer for excessive noise and oil leaks during monthly inspections. Check oil level at fill plug location. (Figure 10) Excessive oil use would require replacement of oil seals, while excessive noise would indicate bearing and/or gear problems.

## MOTOR REPLACEMENT

The motor must be removed to service the speed reducer.

### CAUTION

To prevent overhung load damage to the pinion shaft bearing, support the motor with a chain hoist or jack until it is completely removed.

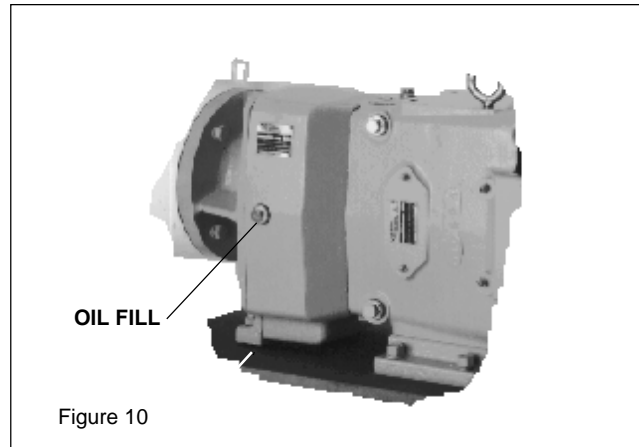


Figure 10

## ALL MODELS

**NOTE:** C-flanges have tapped pushoff holes located inboard of the motor mounting holes.

After mounting screws have been removed, install push-off screws into inboard push-off holes. (Figure 11 ).

Thread push-off screws in alternately until motor is forced out of speed reducer.

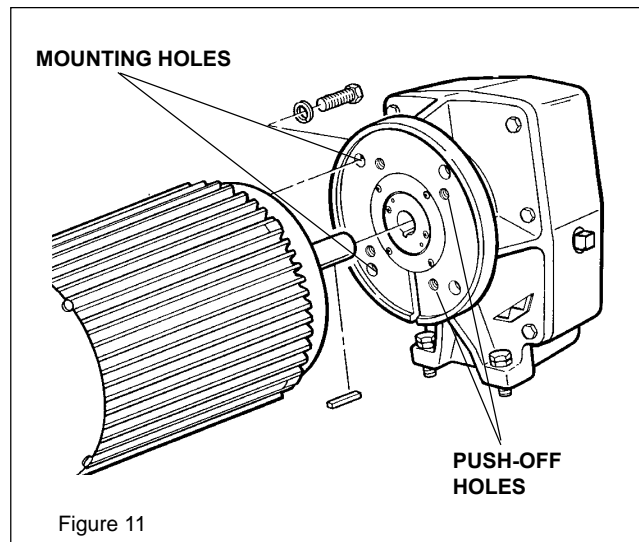


Figure 11

## MOTOR, BUSHING, KEY INFORMATION

FRAME SIZE	SHAFT SIZE	FACE DIA.	ISR MODEL NO.			BUSHING NO.	KEY NO.	KEY SIZE
			49	79	239			
145 TC	.875	4.5	•			049 116 000	000 037 001	3/16 x 3/16 x 1
182 TC	1.125	8.5	•	•		079 116 001	000 037 015	1/4 x 1/4 x 1
184 TC			•	•		079 116 001	000 037 015	1/4 x 1/4 x 1
213 TC	1.375	8.5	•	•		079 116 002	000 037 010	5/16 x 5/16 x 1-1/8
215 TC			•	•		079 116 002	000 037 010	5/16 x 5/16 x 1-1/8
213 TC	1.375	8.5		•	•	239 116 002	000 037 012	5/16 x 5/16 x 1-1/4
215 TC				•	•	239 116 002	000 037 012	5/16 x 5/16 x 1-1/4
254 TC	1.625	8.5			•	239 116 003	000 037 013	3/8 x 3/8 x 1-3/8
256 TC					•	239 116 003	000 037 013	3/8 x 3/8 x 1-3/8
284 TC	1.875	10.5			•	239 116 004	000 037 014	1/2 x 1/2 x 1-3/8
286 TC					•	239 116 004	000 037 014	1/2 x 1/2 x 1-3/8

## MAINTENANCE

## ISR DISASSEMBLY

### ISR DISASSEMBLY (Figure 12)

1. Remove two 1/2-13 hex-head cap screws and jam nuts from support foot of rear case.

**NOTE:** On Model 239 support foot screws are 1/2-13 x 2 hex-head machine screws.

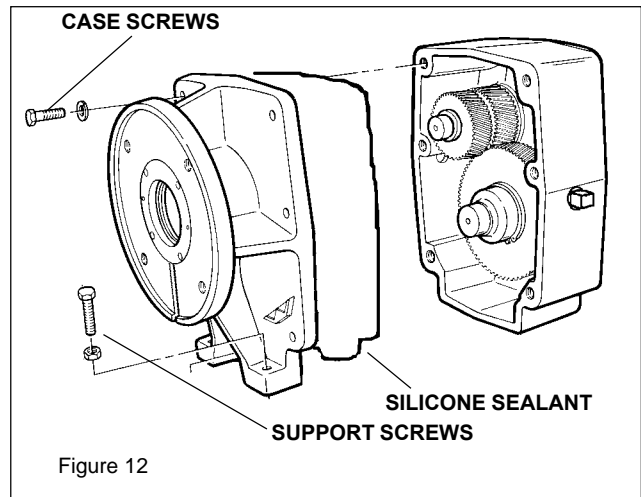
2. Remove six hex-head cap screws and lock washers from gear case assembly.

**NOTE:** On Model 239 there are eight hex-head cap screws.

3. Separate rear case assembly from front case assembly.

**NOTE:** Use a brass or aluminum pry bar to separate cases if necessary.

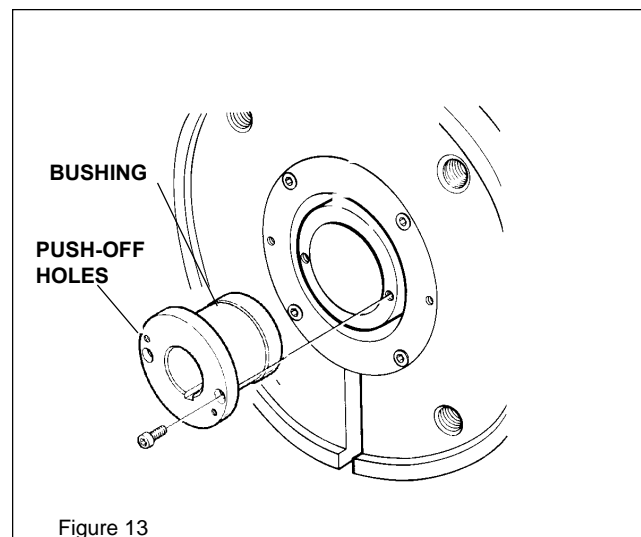
4. Remove old silicone sealant.



### REAR CASE DISASSEMBLY

1. Remove two 10-32 x 1/2 socket-head cap screws from pinion bushing.

**NOTE:** Push-off holes are provided in the bushing to facilitate removal.

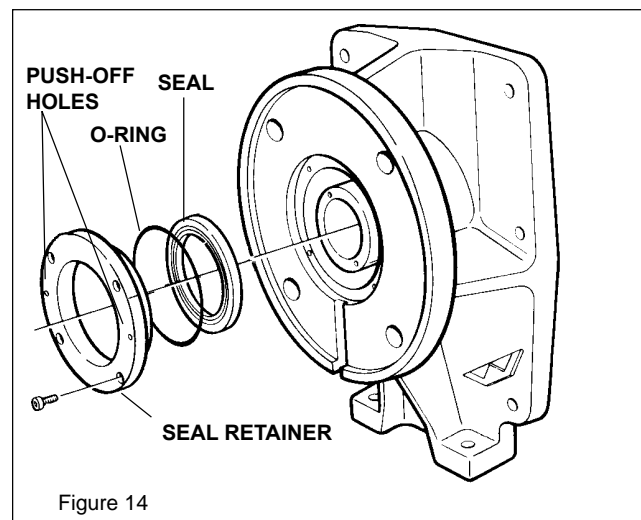


2. Thread the socket-head cap screws removed from bushing into the push-off holes provided and turn alternately to force bushing from pinion shaft. (Figure 13)

3. Remove the four 10-32 x 1/2 socket-head cap screws from the seal retainer. (Figure 14)

4. Using two of the screws removed, thread into push-off holes and turn alternately to force seal retainer out of rear case.

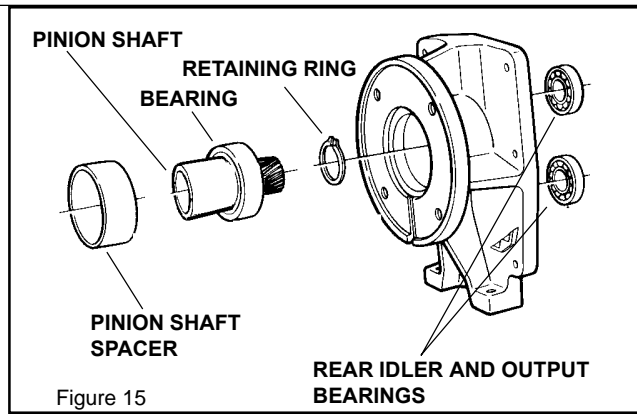
5. Remove O-ring from outside diameter of retainer and press seal out of retainer bore.



## MAINTENANCE

## ISR DISASSEMBLY

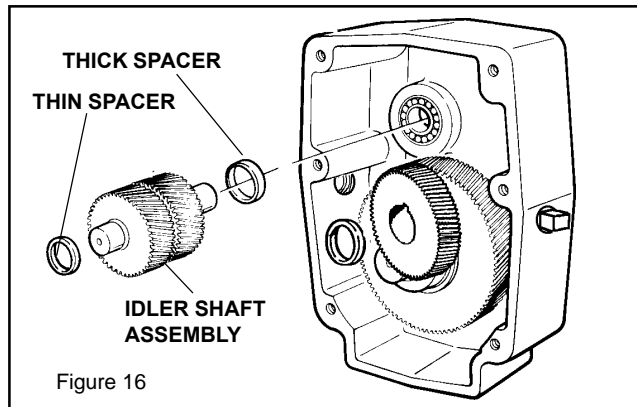
6. Remove pinion shaft spacer from rear case pinion shaft bore. (Figure 15)
7. Press pinion shaft and bearing out of rear case pinion shaft bore.
8. Remove retaining ring from pinion shaft and press shaft out of bearing.
9. Using an inside race puller, remove rear idler bearings and output shaft bearings.



### IDLER SHAFT FROM FRONT CASE DISASSEMBLY (Figure 16)

1. Remove thin rear spacer from idler shaft.
2. Pull idler shaft out of front case assembly.

**NOTE:** It may be necessary to use a brass or aluminum pry bar to remove the idler shaft.

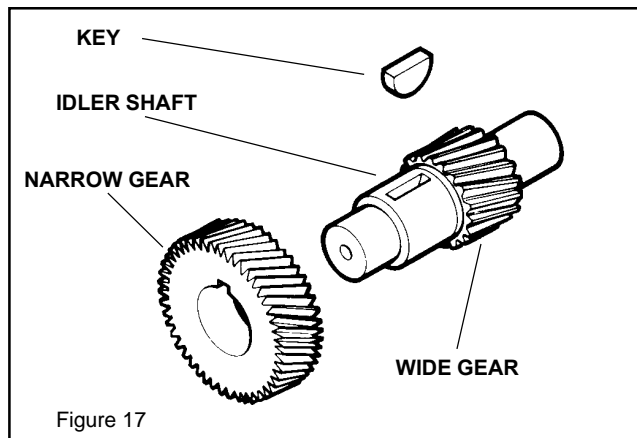


3. Remove thick front spacer, (if used) from idler shaft.

### IDLER SHAFT DISASSEMBLY WITH ONE PRESSED-ON GEAR (Figure 17)

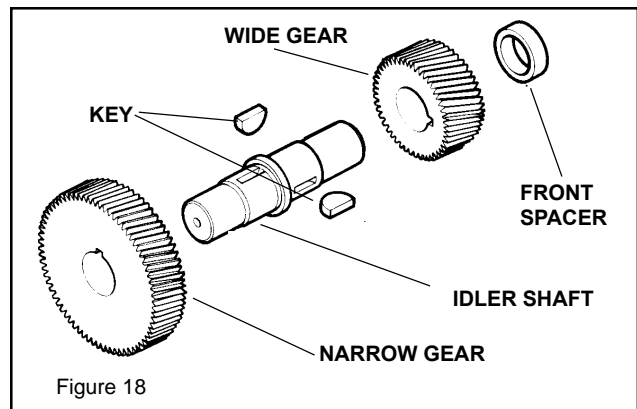
**NOTE:** Wide gear is integral with shaft.

1. Press narrow gear off of shaft and remove woodruff key.



### IDLER SHAFT DISASSEMBLY WITH TWO PRESSED-ON GEARS (Figure 18)

1. Press narrow gear off.
2. Press wide gear off.
3. Remove two woodruff keys.





# MAINTENANCE

## FRONT CASE TO PUMP DISASSEMBLY

1. Remove retaining ring and spacer from output shaft. (Figure 19)

**NOTE:** *Spacer is not required on Model 49.*

2. Slide output gear off output shaft and remove key.

3. Remove the six socket-head cap screws securing the front case to the pump.

**NOTE:** *On Model 239 there are eight socket-head cap screws.*

4. Using a soft mallet, tap on case to separate case from pump.

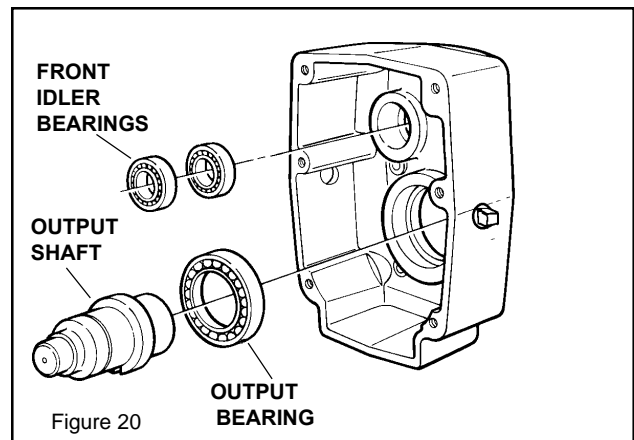
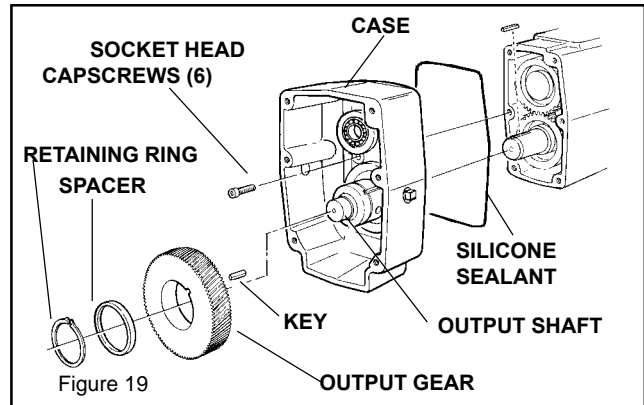
5. Remove silicone sealant and key.

### FRONT CASE DISASSEMBLY (Figure 20)

1. Press output shaft out of case.

2. Press bearing off of output shaft.

3. Use inner race puller to remove two front idler bearings.



# MAINTENANCE

# SPEED REDUCER ASSEMBLY

## MODELS 49, 79, 239

### FRONT CASE ASSEMBLY (Figure 21)

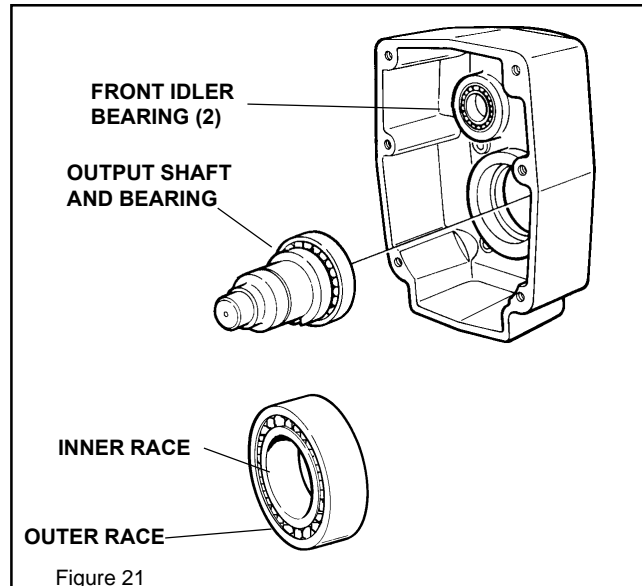
1. Press and seat two front idler bearings into front idler bearing bore.

#### NOTE

To avoid damage to the bearings, press against outer race when installing bearing in case and inner race when installing bearing on shaft.

2. Press and seat front output shaft bearing onto output shaft.

3. Press and seat bearing and output shaft assembly into output shaft bearing bore.



### FRONT CASE TO PUMP ASSEMBLY

**NOTE** The speed reducer can only be assembled to a lower drive shaft mounted pump.

1. Drain oil from pump gear case and remove pump gear case cover and clean silicone sealant from cover and case. (Figure 22)

2. Rotate pump drive shaft so that keyway faces up and install drive key. Apply a film of Micro Plate 140 gear oil to pump drive shaft. (Figure 23)

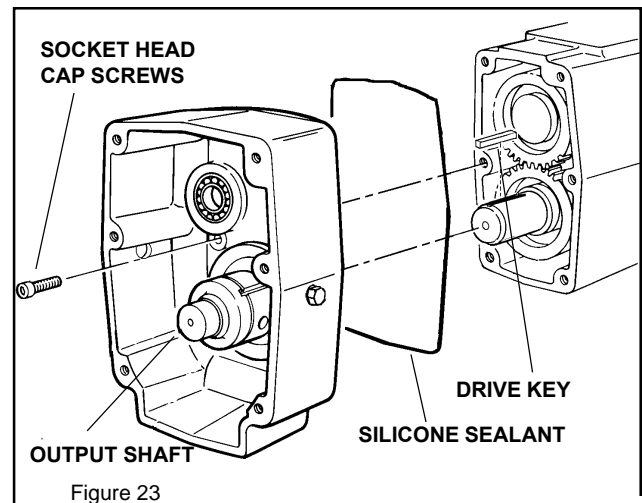
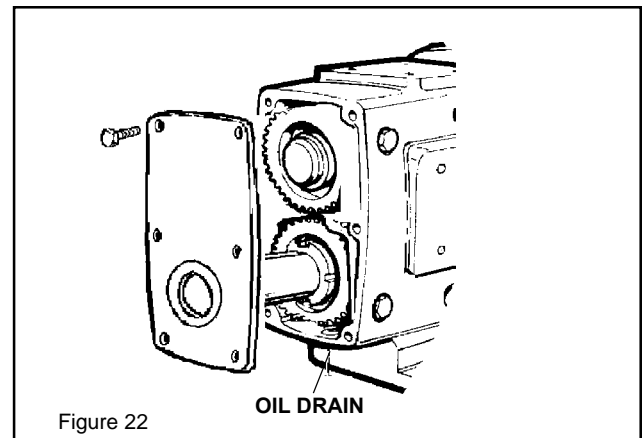
3. Align output shaft key way with key on pump drive shaft and slide output shaft over drive shaft. (Figure 23)

Apply silicone sealant bead on pump gear case.

5. Seat front ISR case to pump.

6. **Model 79:** Install six 3/8-16 x 1-1/4 socket-head cap screws- torque to 30 ft. lbs. For **Model 49:** Install six 5/16-18 x 1-1/4" socket-head cap screws- torque to 17 ft. lbs.

**Model 239:** Install eight 3/8-16 x 2" socket-head cap screws-torque to 30 ft. lbs.



# MAINTENANCE

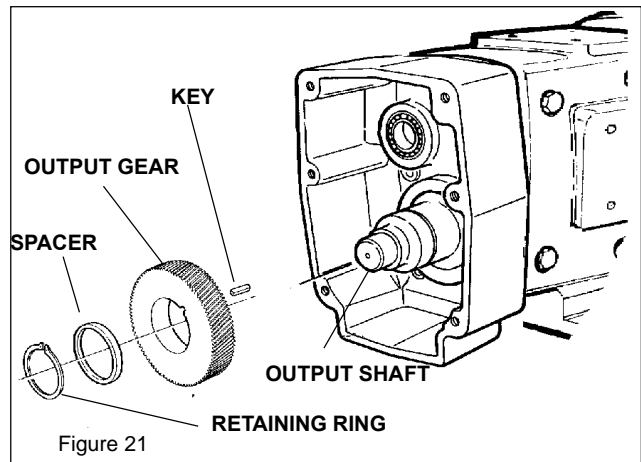
# SPEED REDUCER ASSEMBLY

7. Install key in output shaft. (Figure 21)

8. Align keyway in output gear with key in output shaft and slide output gear onto output shaft.

9. Assemble spacer and retaining ring to output shaft.

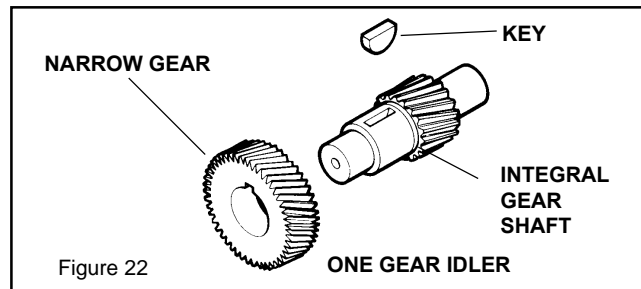
**NOTE:** Model 49 does not use a spacer between the retaining ring and the output gear.



## IDLER SHAFT ASSEMBLY

There are two types of idler shaft assemblies, depending on the gear ratio selected. One type uses two pressed-on gears while the other type uses one pressed-on gear and one 21 tooth gear that is part of the idler shaft.

**NOTE:** For Model 239 there is only one idler shaft assembly and it uses two pressed-on gears. (Figure 23)



## IDLER SHAFT ASSEMBLY WITH ONE PRESSED-ON GEAR (Figure 22)

1. Install woodruff key in shaft, press and seat narrow gear onto shaft.

## CHANGING GEAR RATIO?

The output gear and the wide idler gear can be changed to increase or decrease pump RPM. Also, changing to a different speed motor can effect the final pump speed.

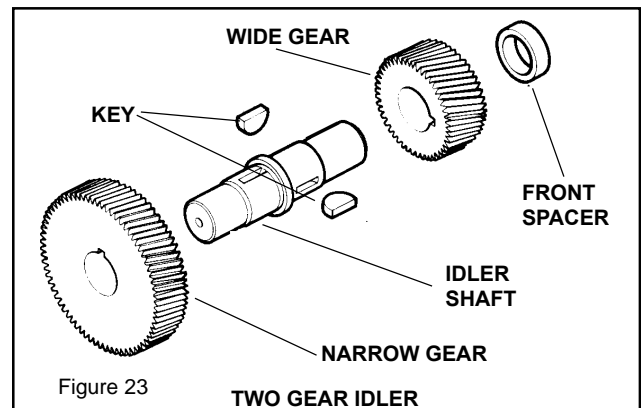
See PARTS LIST pages beginning on page 23, 25, 27 for specific gears required for RPM changes

## IDLER SHAFT ASSEMBLY WITH TWO PRESSED-ON GEARS (Figure 23)

**NOTE:** NARROW gear is assembled to short end of shaft. WIDE gear is assembled to long end of shaft.

1. Install woodruff key in short end of shaft. Press and seat NARROW gear onto shaft.

2. Install woodruff key in long end of shaft, press and seat WIDE gear onto shaft.



# MAINTENANCE

# SPEED REDUCER ASSEMBLY

## IDLER SHAFT TO FRONT CASE ASSEMBLY (Figure 27)

Idler shaft to front idler bearing is a light press fit.

Refer to chart for idler shaft configurations.

1. Install thick front spacer onto long end of idler shaft.
2. Start long end of idler shaft into bearing bore and align teeth on idler gear so they will mesh with teeth on output gear.

3. Remove cover from pump. Using a rotor nut wrench, rotate pump shaft while at the same time tapping on end of idler shaft with a soft mallet to seat idler shaft in bearing bore.

4. Install thin rear spacer.

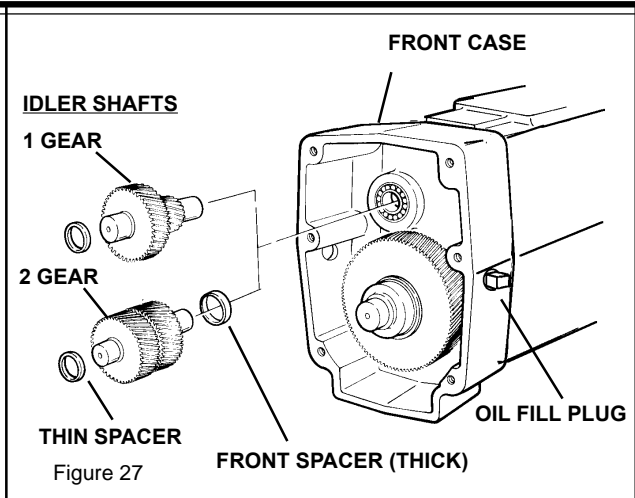
## REAR CASE ASSEMBLY

Refer to REAR CASE BEARING CHART for idler and output shaft bearing configurations.

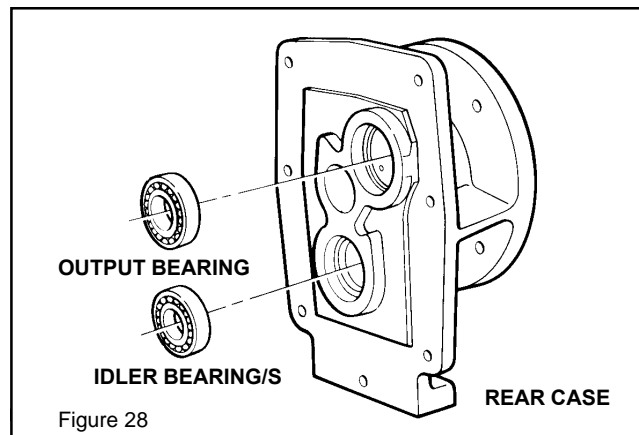
1. Press and seat rear output shaft bearing(s) into output shaft bearing bore. (Figure 28)
2. Press and seat rear idler shaft bearing(s) into idler shaft bearing bore. (Figure 28)

### NOTE

To avoid damage to the bearings, press against the OUTER RACE.



SPEED REDUCER MODEL	IDLER SHAFT CONFIGURATIONS	SPACER TYPE & LOCATIONS
79	2 Pressed Gears	Thick Front and Thin Rear Spacer
	Integral Gear	No Front Spacer
49	2 Pressed Gears	Same Thickness Spacer Front and Rear
	Integral Gear	No Front Spacer
239	2 Pressed Gears	Thick Front and Thin Rear Spacer



## REAR CASE BEARING CHART

MODEL	REAR CASE IDLER SHAFT BEARINGS	REAR CASE OUTPUT SHAFT BEARINGS	NOTES
49	ONE	TWO	All three bearings have same I.D. Idler shaft bearing has larger O.D.
79	ONE	ONE	Both bearings have same O.D. Output bearing has larger I.D.
239	TWO	TWO	All four bearings have same I.D. and O.D.

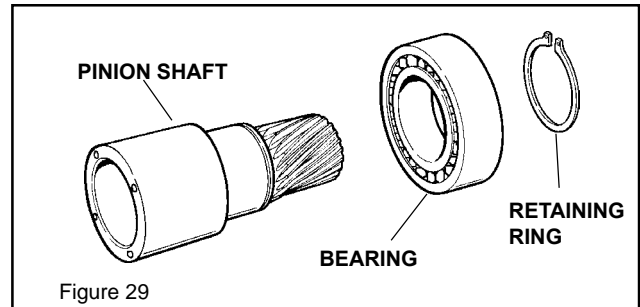
## MAINTENANCE

## SPEED REDUCER ASSEMBLY

3. Press pinion bearing onto shaft and install external retaining ring. (Figure 29)

**NOTE**

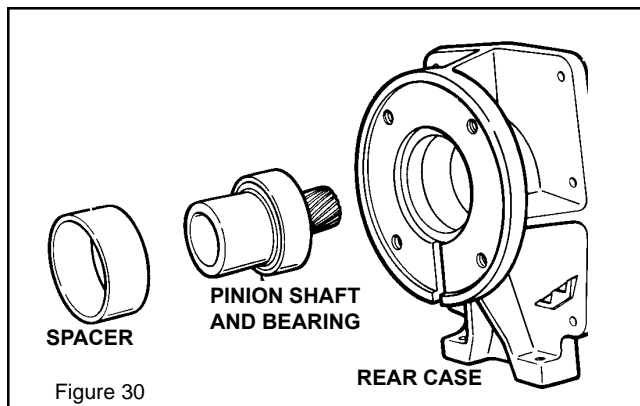
*To avoid damage to the bearing, press against the INNER RACE.*



4. Lubricate pinion bearing with Micro Plate 140 gear oil.

5. Press and seat bearing and pinion shaft assembly into pinion bearing bore. (Figure 30)

**NOTE:** *To avoid damage to the bearing, press against the OUTER RACE.*

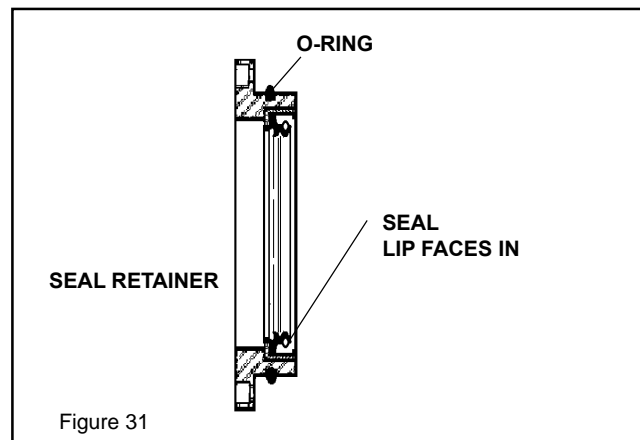


6. Install pinion shaft spacer into pinion bearing bore of rear case.

7. Press and seat seal into seal retainer as shown with lip facing. (Figure 31)

8. Install O-ring onto seal retainer. (Figure 31)

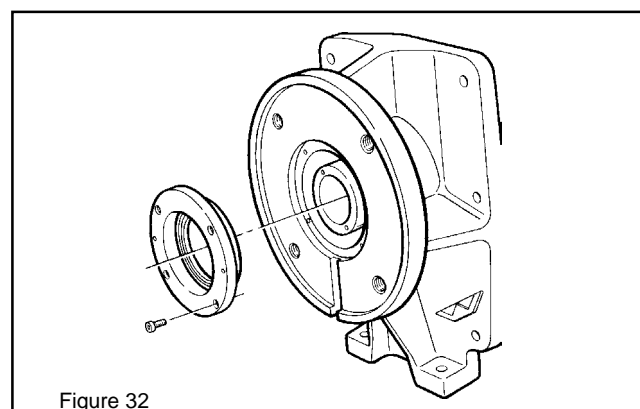
9. Lubricate oil seal and O-ring with Micro Plate 140 gear oil.



10. Align four counter-bored screw holes in seal retainer with four tapped holes in seal retainer bore. Install seal retainer with four 10-32 x 1/2 socket-head cap screws. Torque screws to 5 ft. lbs. (Figure 32)

See page 12 for **INSTALLING REAR CASE to FRONT CASE.**

See page 13 for **INSTALLING MOTOR**



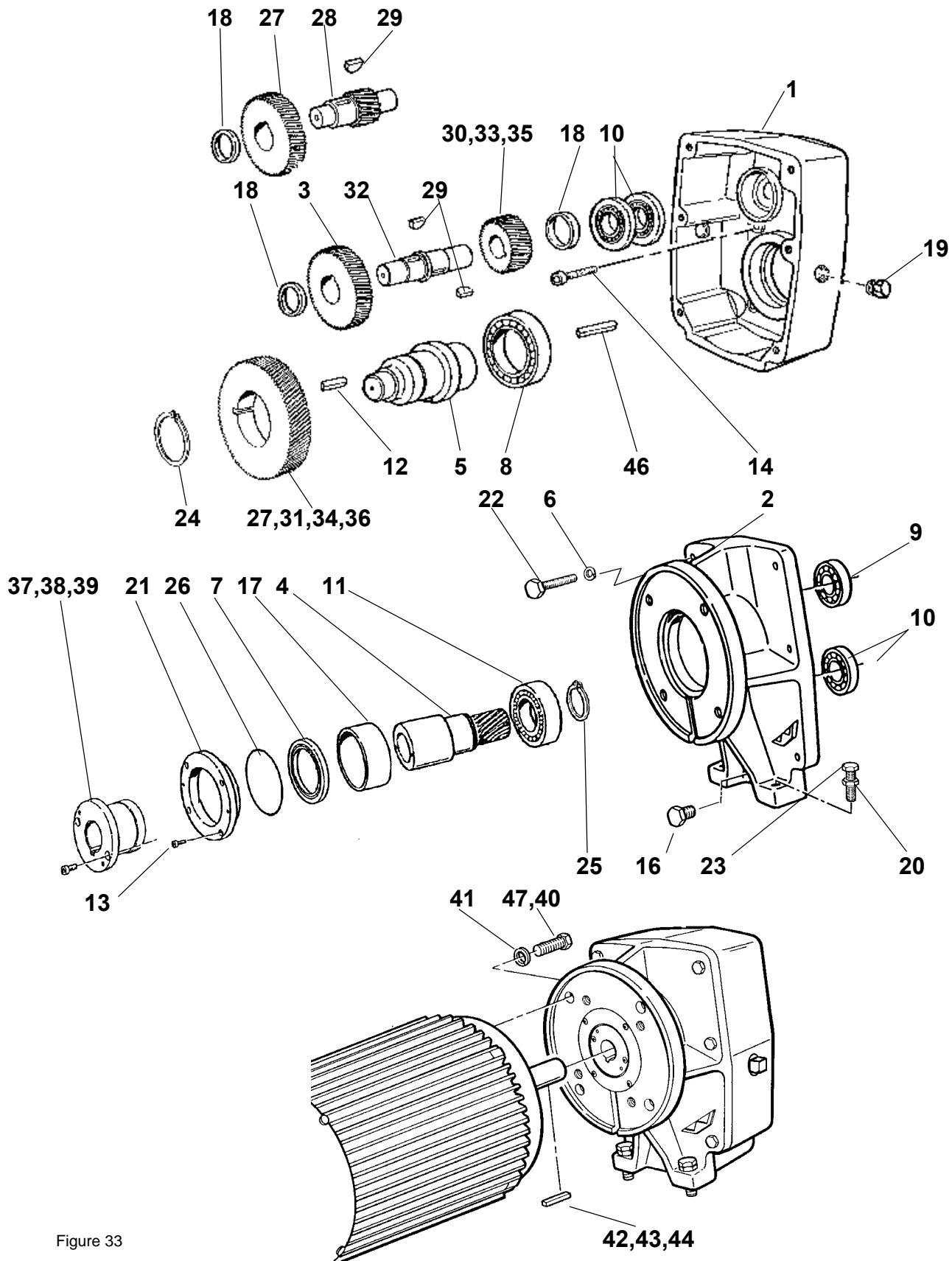


Figure 33

## MODEL 49 COMMON PARTS

ITEM	PART NO.	DESCRIPTION	QTY.
1	049 005 001	Gear Box, Front .....	1
2	049 005 005	Gear Box, Rear .....	1
3	079 007 144	Narrow Gear, 44 Tooth .....	1
4	079 008 000	Shaft, Pinion .....	1
5	049 009 000	Shaft, Output .....	1
6	43-180	Lock Washer, 3/8" .....	6
7	000 030 022	Oil Seal .....	1
8	049 036 002	Bearing, Front Output .....	1
9	079 036 003	Bearing, Rear Idler .....	1
10	079 036 004	Bearing, Front Idler and Rear Output .....	4
11	079 036 005	Bearing, Pinion Shaft .....	1
12	000 037 010	Key, 5/16 x 5/16 x 1-1/8" Lg., Output Shaft .....	1
13	30-276	Socket Head Cap Screw, #10-32 x 1/2" Lg. ....	6
14	30-216	Socket Head Cap Screw, 5/16-18 x 1-1/4" Lg. ....	6
*	000 142 300	Silicone Sealant .....	1
16	000 046 003	Oil Drain Plug .....	1
17	079 055 000	Spacer, Pinion .....	1
19	000 046 004	Drain/Level Cap Screw/Washer 3/4-16 .....	2
20	36-92	Hex Jam Nut, 1/2-13 .....	2
21	079 080 000	Retainer, Seal .....	1
22	30-289	Hex Head Cap Screw, 3/8-16 x 1-1/2" Lg. ....	6
23	30-290	Hex Head Cap Screw, 1/2-13 x 2" Lg. ....	2
24	000 087 006	Snap Ring, Output .....	1
25	000 087 007	Retaining Ring, Pinion .....	1
26	N70043	O-Ring , Nitrile (Buna N) .....	1
*	000 140 000	Oil, Microplate #140 .....	1.250 Pt.
*	000 150 000	Anti-seize (Black Moly Lube) .....	1.5 oz.
*	33-64	Name Plate .....	1
46	000 037 002	Key, 1/4 x 1/4 x 1-3/4" Pump .....	1

\*Not Shown

## MOTOR ATTACHMENT PARTS

FRAME	ITEM	REQ'D	PART NO.	PART NAME
145TC	37	1	049 116 000	Bushing
	42	1	000 037 001	Key, 3/16 x 3/16 x 1"
	47	4	30-351	Hex Head Cap Screw, 3/8-16 x 1-1/4"
	6	4	43-180	Lock Washer, 3/8"
182TC	38	1	079 116 001	Bushing
184TC	43	1	000 037 015	Key, 1/4 x 1/4 x 1"
	40	4	30-291	Hex Head Cap Screw, 1/2-13 x 1-1/2"
	41	4	43-177	Lock Washer, 1/2"
213TC	39	1	079 116 002	Bushing
215TC	44	1	000 037 010	Key, 5/16 x 5/16 x 1 1/8"
	40	4	30-291	Hex Head Cap Screw, 1/2-13 x 1-1/2"
	41	4	43-177	Lock Washer, 1/2"

## RATIO FACTOR COMPONENTS (AND QUANTITIES)

ITEM	PART NO.	DESCRIPTION	4.30:1	6.01:1	7.25:1	9.48:1
18	049 055 001	Spacer	2	2	2	1
27	049 007 095	Output Gear (95 tooth)	-	-	-	1
28	049 009 003	Idler Shaft (21 Tooth)	-	-	-	1
29	000 037 007	Woodruff Key, #807	2	2	2	1
30	049 007 026	Wide Idler Gear (26 tooth)	-	-	1	-
31	049 007 090	Output Gear (90 Tooth)	-	-	1	-
32	049 009 002	Idler Shaft	1	1	1	-
33	049 007 030	Wide Idler Gear (30 Tooth)	-	1	-	-
34	049 007 086	Output Gear (86 Tooth)	-	1	-	-
35	049 007 038	Wide Idler Gear (38 Tooth)	1	-	-	-
36	049 007 078	Output Gear (78 Tooth)	1	-	-	-

Pump RPM is determined by motor speed. See SPECIFICATIONS

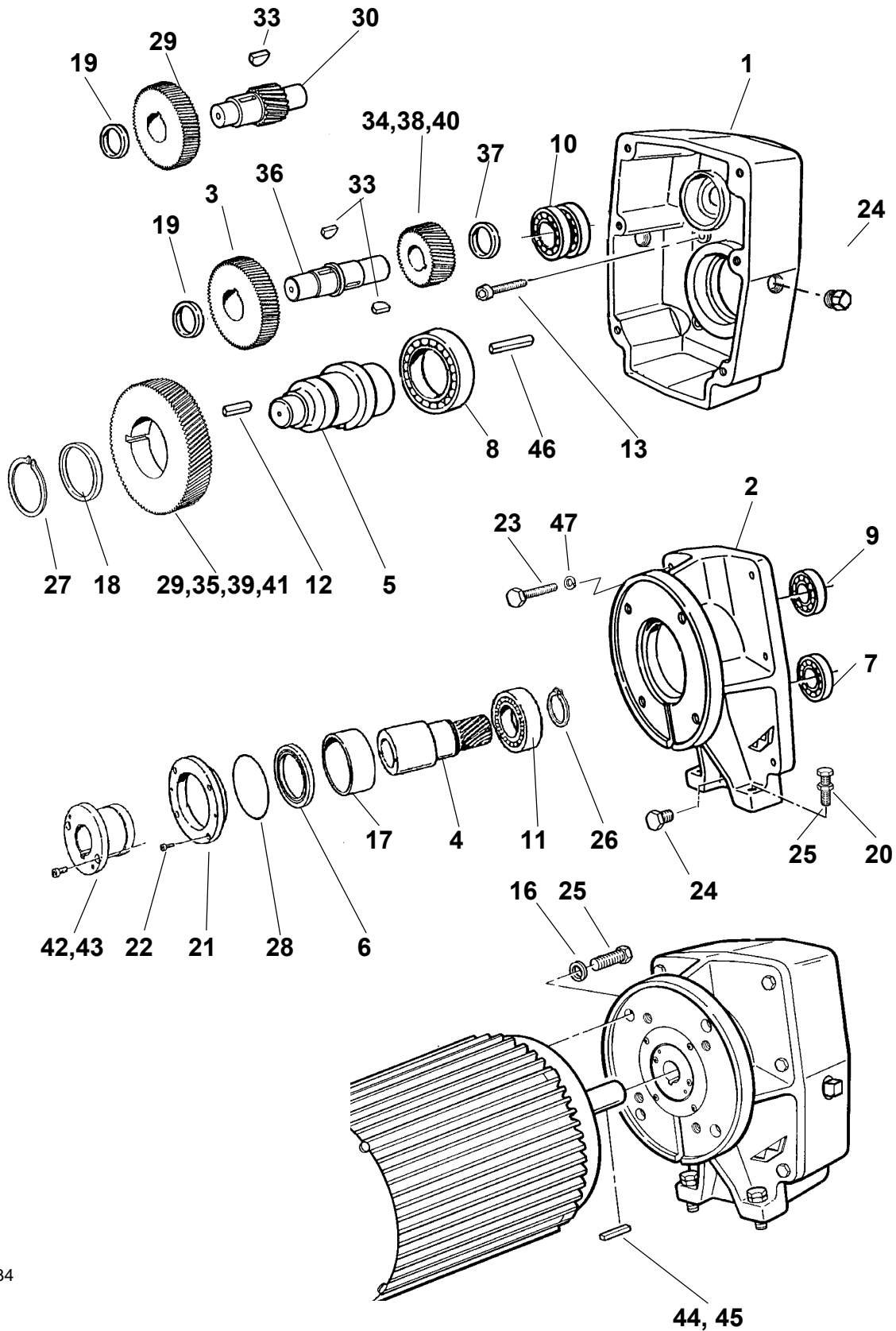


Figure 34



**MODEL 079 COMMON PARTS**

ITEM	PART NO.	DESCRIPTION	QTY.
1	049 005	Gear Box, Front .....	1
2	079 005 005	Gear Box, Rear .....	1
3	079 007 144	Narrow Gear, 44 Tooth .....	1
4	079 008 000	Shaft, Pinion .....	1
5	079 009 000	Shaft, Output .....	1
6	000 030 022	Oil Seal .....	1
7	079 036 001	Bearing, Rear Output .....	1
8	079 036 002	Bearing, Front Output .....	1
9	079 036 003	Bearing, Rear Idler .....	1
10	079 036 004	Bearing, Front Idler .....	2
11	079 036 005	Bearing, Pinion .....	1
12	000 037 009	Key, 3/8 x 3/8 x 1-3/16 Lg., Output Shaft .....	1
13	30-346	Socket Head Cap Screw, 3/8-16 x 1-1/4" Lg. ....	4
*	000 142 300	Silicone Sealant .....	1
15	000 046 003	Oil Drain Plug 1/2-20 .....	1
16	43-177	Lock Washer, 1/2 .....	4
17	079 055 000	Spacer, Pinion Shaft .....	1
19	049 055 001	Spacer, Idler Shaft .....	1
20	36-92	Hex Jam Nut, 1/2-13 .....	2
21	079 080 000	Retainer, Seal .....	1
22	30-276	Socket Head Cap Screw, #10-32 x 1/2" Lg .....	6
23	30-289	Hex Head Cap Screw, 3/8-16 x 1-1/2" Lg .....	6
24	000 046 004	Drain/Level Cap Screw/Washer, 3/4-16 .....	2
25	30-291	Hex Head Cap Screw, 1/2-13 x 1-1/2" Lg .....	6
26	000 087 007	External Retaining Ring, Pinion .....	1
27	000 087 008	External Retaining Ring, Output .....	1
28	N70043	O-Ring , Nitrile (Buna N) .....	1
*	000 140 000	Oil, Microplate #140 .....	3.000 Pt.
*	000 150 000	Anti-seize Black Moly Lub .....	1.5 Oz.
*	33-64	Name Plate .....	1
46	000 037 003	Key, 3/8 x 3/8 x 1-5/8" Lg., Pump .....	1
47	43-180	Lock Washer, 3/8" .....	6

\*Not Shown

**MOTOR ATTACHMENT PARTS**

FRAME	ITEM	REQ'D	PART NO.	PART NAME
182TC	42	1	079-116-001	Bushing
184TC	44	1	000-037-015	Key, 1/4 x 1/4 x 1"
	40	4	30-291	Hex Head Cap Screw, 1/2-13 x 1-1/2"
	41	4	43-177	Lock Washer, 1/2"
213TC	43	1	079-116-002	Bushing
2151C	45	1	000-037-010	Key, 5/16 x 5/16 x 1-1/8" Lg.
	40	4	30-291	Hex Head Cap Screw, 1/2-13 x 1-1/2"
	41	4	43-177	Lock Washer, 1/2"

**RATIO FACTOR COMPONENTS (AND QUANTITIES)**

ITEM	PART NO.	DESCRIPTION	4.43:1	6.35:1	7.47:1	11.57:1
29	079-007-116	Output Gear (116 Tooth)	-	-	-	1
30	079-009-003	Idler Shaft (21 tooth)	-	-	-	1
33	000-037-007	Woodruff Key, #807	2	2	2	1
34	079-007-030	Wide Idler Gear (30 Tooth)	-	-	1	-
35	079-007-107	Output Gear (107 Tooth)	-	-	1	-
36	079-009-002	Idler Shaft	1	1	1	-
37	079-055-002	Spacer	1	1	1	-
38	079-007-034	Wide Idler Gear (34 Tooth)	-	1	-	-
39	079-007-103	Output Gear (103 Tooth)	-	1	-	-
40	079-007-044	Wide Idler Gear (44 tooth)	1	-	-	-
41	079-007-093	Output Gear (93 Tooth)	1	-	-	-

Pump RPM is determined by motor speed. See SPECIFICATIONS

7-29-98

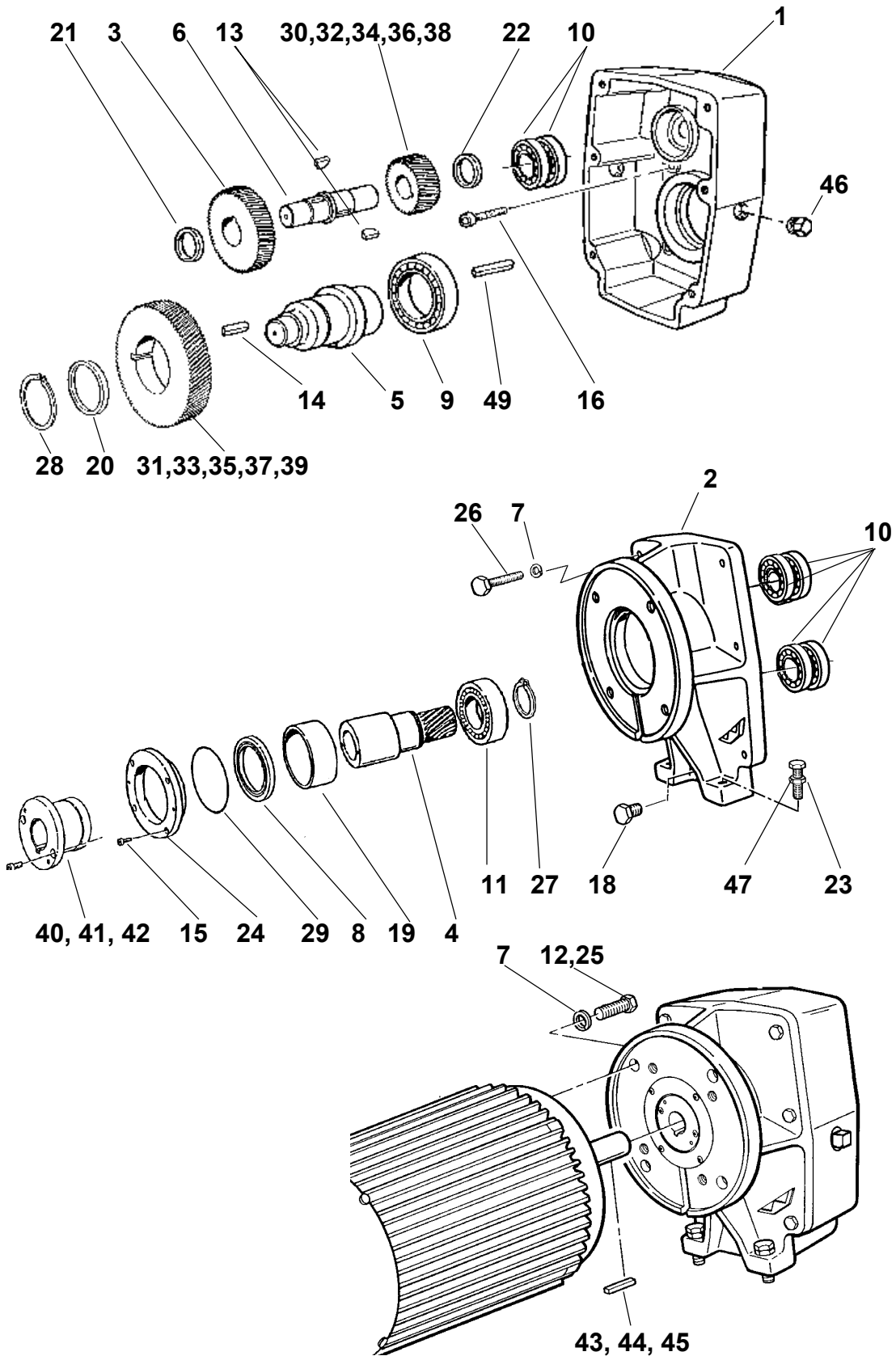


Figure 35

# PARTS LIST

ITEM	PART NO.	DESCRIPTION	. QTY
1	239 005 001	Gear Box, Front .....	1
2	239 005 005	Gear Box, Rear .....	1
3	239 007 082	Narrow Gear, 82 Tooth .....	1
4	239 008 001	Shaft, Pinion .....	1
5	239 009 000	Shaft, Output .....	1
7	43-177	Lock Washer, 1/2" .....	12
8	000 030 023	Oil Seal .....	1
9	239 036 001	Bearing, Front Output .....	1
10	239 036 002	Bearing, Idler, Rear Output .....	6
11	239 036 003	Bearing , Pinion .....	1
14	000 037 011	Key, 1/2 x 1/2 x 1-1/2", Output Shaft .....	1
15	30-276	Socket Head Cap Screw, #10-32 x 1 1/2" .....	6
16	30-316	Socket Head Cap Screw, 3/8-16 x 2" .....	8
*	000 142 300	Silicone Sealant .....	1
18	000 046 003	Oil Drain Plug .....	1
19	239 055 000	Spacer, Pinion .....	1
20	239 055 001	Spacer, Output .....	1
22	239 055 003	Spacer, Front Idler .....	1
23	36-92	Hex Jam Nut, 1/2-13 .....	1
24	239 080 000	Retainer, Seal .....	1
26	30-290	Hex Head Cap Screw, 1/2-13 x 2" .....	8
27	000 087 009	External Retaining Ring, Pinion .....	1
28	000 087 010	External Retaining Ring, Output .....	1
29	N70049	O-Ring , Nitrile (Buna N) .....	1
*	000 140 000	Oil (Microplate #140) .....	6.500 Pt.
*	000 150 000	Anti-seize Black Moly Lub. .....	2 Oz.
46	000 046 004	Drain/Level Cap Screw/Washer, 3/4-16 .....	2
47	30-292	Hex Head Machine Screw, 1/2-13 x 2" Lg. ....	2
*	33-64	Name Plate .....	1
49	000 037 004	Key, 1/2 x 1/2 x 1-7/8" Lg., Pump .....	1

\* Not Shown

## MOTOR ATTACHMENT PARTS

FRAME	ITEM	REQ'D	PART NO.	PART NAME
213TC	40	1	239 116 002	Bushing
215TC	43	1	000 037 012	Key, 3/8 x 3/8 x 1 1/4"
	25	4	30-250	Hex Head Cap Screw, 1/2-13 x 1-3/4"
	41	1	239 116 003	Bushing
254TC	44	1	000 037 013	Key, 3/8 x 3/8 x 1-3/8" Lg.
256TC	25	4	30-250	Hex Hd. Cap Screw, 1/2-13 x 1-3/4"
284TC	42	1	239 116 004	Bushing
286TC	45	1	000 037 014	Key 1/2 x 1/2 x 1-3/8", Lg.
	12	4	30-290	Hex Hd. Cap Screw, 1/2-13 x 2"

## RATIO FACTOR COMPONENTS (AND QUANTITIES)

ITEM	PART NO.	DESCRIPTION	5.35:1	6.65:1	7.70:1	9.01:1	11.22:1
13	000 037 007	Woodruff Key, #807	2	2	2	2	2
30	239 007 050	Wide Idler Gear (50 tooth)	-	-	-	-	1
31	239 007 171	Output Gear (171 tooth)	-	-	-	-	1
32	239 007 059	Wide Idler Gear (59 tooth)	-	-	-	1	-
33	239 007 162	Output Gear (162 Tooth)	-	-	-	1	-
34	239 007 066	Wide Idler Gear (66 Tooth)	-	-	1	-	-
35	239 007 155	Output Gear (155 Tooth)	-	-	1	-	-
6	239 009 002	Idler Shaft	1	1	1	1	1
21	239 055 002	Spacer	1	1	1	1	1
36	239 007 073	Wide Idler Gear (73 Tooth)	-	1	-	-	-
37	239 007 148	Output Gear (148 Tooth)	-	1	-	-	-
38	239 007 084	Wide Idler Gear (84 tooth)	1	-	-	-	-
39	239 007 137	Output Gear (137 Tooth)	1	-	-	-	-

Pump RPM is determined by motor speed. See SPECIFICATIONS

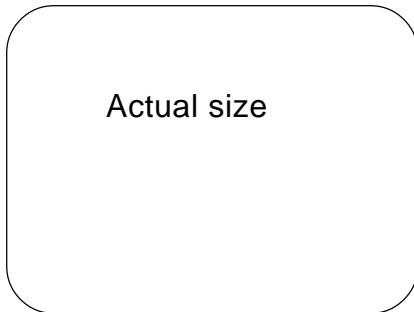
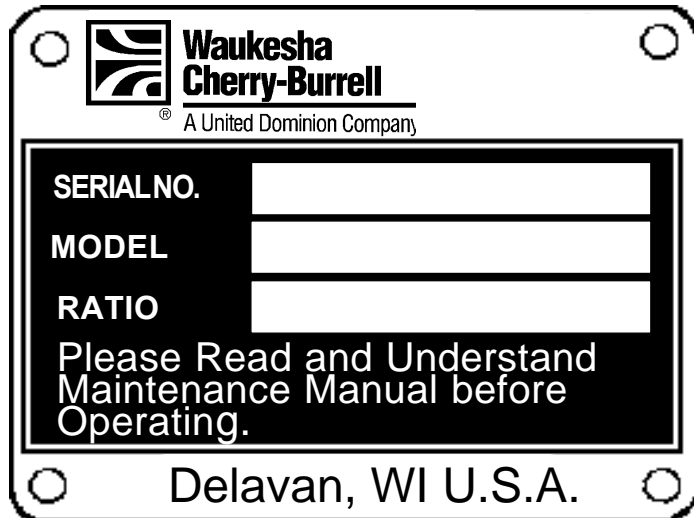
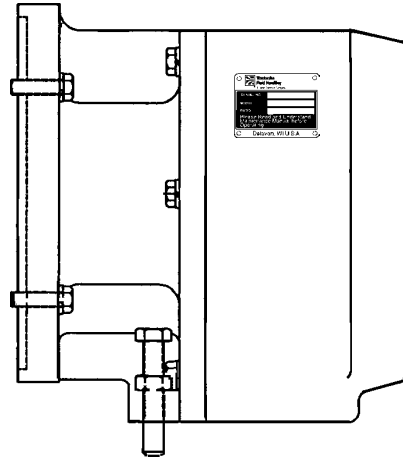
# SPEED REDUCER IDENTIFICATION

The Integral Speed Reducer has one name tag on it. The MODEL designation is displayed and the current gear RATIO of that model.

The SERIAL NUMBER represents the single unattached unit, unless the unit is attached to a pump. Then, the serial number will be that of the pump.

During servicing procedures on the pump or the speed unit, the speed reducer may need to be separated from the pump. Trace the speed reducer (or pump) back to its correct location using the serial numbers.

*The adjoining page contains name plate and warning tag information for the pump.*



# LABEL PLACEMENT

PUMP MODEL	1				2			
	33-62	33-59	33-60	33-61	33-63	33-61	33-60	33-63
6, 12, *14, 15, 18, 22, 24,	•							•
30, 32, 33, *34	•							•
60, 62, 64, 130,	•		•					
132, 133, 134	•		•					
220, 222, 223, 224	•		•					
*320, *323,	•							
*324	•		•					
**5040	•					•		
5050	•					•		
5060	•					•		
5070, 5080	•						•	
420, 520	•		•					

\* Rectangular Flanges or Port Flanges cover label area.

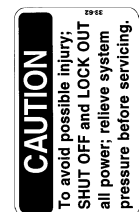
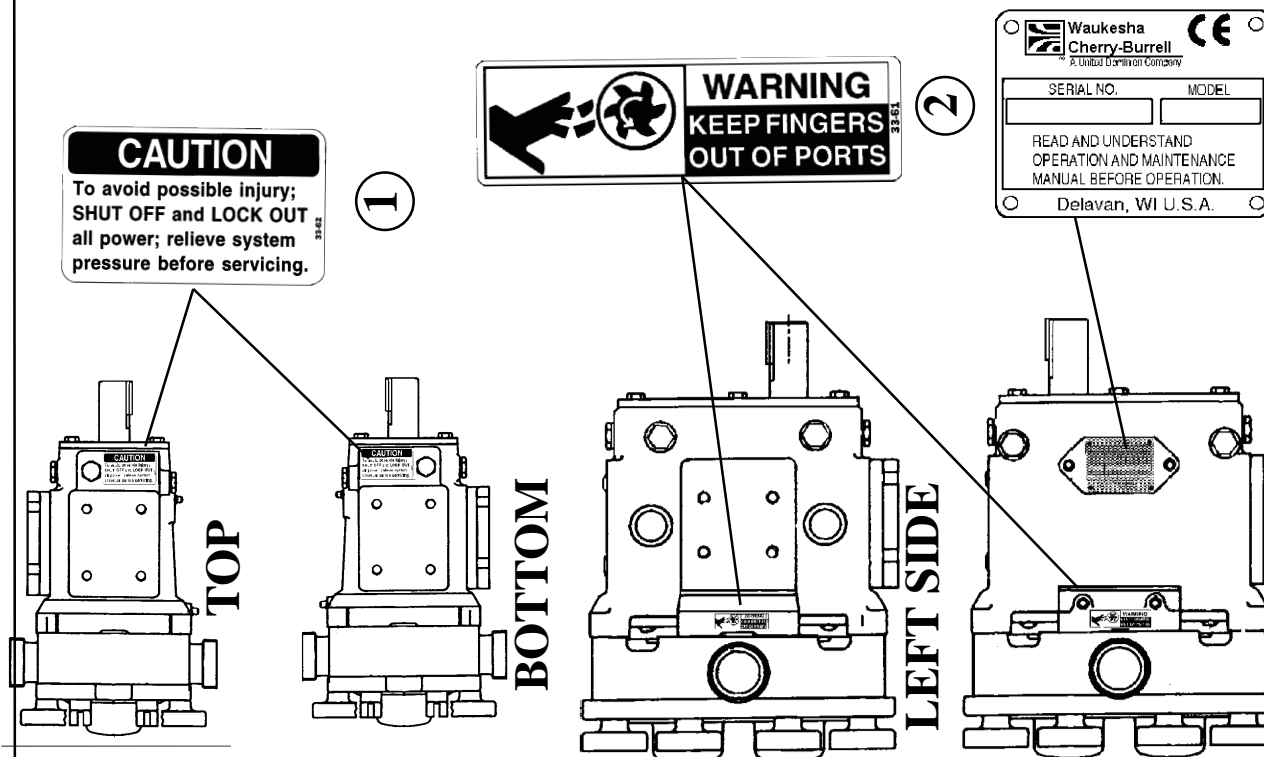
Place label on body behind grease fittings.

\*\* Place label behind grease fittings (on right side).

• = 2 each

## APPLICATION INSTRUCTIONS

Apply to clean, dry surface. Remove backing; position in place, lay cover sheet over and burnish. (*Alternate method; Use soft rubber roller to press label in place.*)  
Apply all labels to be readable from front of pump



33-62

Relative Sizes



33-59

Part Number 001 061 002

Effective Date:  
January 26, 1995

95-01005

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## Waukesha ISR

INTEGRAL SPEED REDUCER SERIES



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