Mercury / Mars
Owner’s Manual

Inline
Planetgear™ Reducers
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Section 1.0
Introduction

The following instructions apply to Mercury and Mars Planetgear™ Speed Reducers. To assure long life and performance of the Planetgear speed reducers, the following practices should be followed.

1.1 BASIC OPERATION AND DESIGN
The Planetgear unit is a concentric shaft speed reducer that uses a simple planetary design, which utilizes a sun gear as the input, a ring gear as the fixed element, and a planetary carrier as the output. Power is transmitted from the reducer input shaft, through a splined connection to the input gear (sun gear) of the first reduction. The input gear drives the planet gears, which in turn drive the planetary carrier assembly. This carrier assembly is then connected to the next reduction sun gear or to the output shaft through a splined connection. Each carrier represents a single reduction. The reducer output shaft rotates in the same direction as the input shaft, regardless of the number of reductions. Reference Figure 1.2 for a detailed representation.

All gearing has been made of a high grade alloy steel and case hardened for maximum life. Three points of contact, with a minimum of six gear teeth engaged allow for a smooth transmission of power during normal operation and under extreme spike loads. Self contained input and output shaft assemblies use a double row of tapered roller bearings mounted to a steel alloy shaft to provide high overhung and thrust load capacity. This feature also keeps all external shaft forces isolated from the gearing. Included in both shaft assemblies are two seals with a grease purgeable cavity between them. This design prevents contamination from entering the gear reducer under extreme conditions. The input shaft assembly also has the ability to add a backstop option to eliminate reducer counter rotation when the input driver is shut off.

1.2 SECTIONAL VIEW AND COMPONENT IDENTIFICATION
Reference Figure 1.2.

1.3 NAMEPLATE INFORMATION
Note location of serial number and model number on nameplate. When contacting the factory, have the serial number available, as this unique number fully describes the reducer and allows for the most efficient and accurate exchange of information. Reference Figure 1.3 for name plate illustration.

Operation of the reducer shall not differ from the application data warranted on the nameplate. Any deviations from this data requires submittal of new application information along with all nameplate data to the factory or service center for approval. All data changes require a revised nameplate.

Figure 1.2 Sectional View of a Planetgear Speed Reducer

Figure 1.3 Reducer Nameplate
Section 2.0
Installation

2.1 HANDLING OF REDUCER
Disconnect all mounting bolts from the reducer before lifting. Use a double rope sling of ample strength, wrapped around the input and the output shafts when lifting the speed reducer; reference Figure 2.1. Reference Table 1 (page 20) for reducer weights. Be sure the reducer is properly secured and balanced to prevent shifting during suspension.

⚠️ WARNING
To avoid personal injury or product damage, never attempt to lift the reducer with an eyebolt threaded into the top of the reducer maincase.

![Reduction Handling Diagram](image)

Figure 2.1  Reducer Handling

2.2 REDUCER MOUNTING
It is essential that the speed reducer be securely bolted to a solid, level, and vibration free foundation.

If the reducer mounting surface is not horizontal, refer to Table 3 (page 20) for Maximum Allowable Tilts for Standard Reducers.

**NOTE:** If the reducer is tilted, the oil requirements may change.

Bolts should be of the correct size to fit mounting holes. They should be SAE Grade 5 or equivalent (Grade 8.8 or better for metric applications). Fasteners shall be torqued according to Table 2 (page 20). The use of a rigid structural steel baseplate is strongly recommended as a foundation. If a concrete foundation is used, grout structural steel mounting pads into the concrete rather than grouting the reducer directly into the concrete. Allow the concrete to cure before torquing the reducer mounting bolts down.

Align the reducer with driven equipment by placing broad flat shims underneath all mounting pads of the reducer. Start at the low speed end and level across the length and width of the reducer. **Check with a feeler gauge to make certain there is no clearance and that all pads are supported to prevent distortion of housing when reducer is bolted down.** After the reducer has been aligned with the driven equipment and bolted down, align prime mover to the reducer input shaft. If the reducer is received coupled to a motor, it has been aligned properly at the factory. However, because alignment may have been disturbed during shipment, it is best to check alignment and then realign if necessary. The reliability and long life of the reducer requires careful installation of accessories and accurate alignment of the connecting shafts. Check final alignment of motor shaft, coupling, and reducer shaft after reducer is in final working position.

2.3 MOUNTING OF TRANSMISSION ACCESSORIES

⚠️ WARNING
When the Planetgear speed reducer is connected to a motor or driven equipment through the use of couplings, sprockets, gears or belt drives, all rotating parts must be properly guarded with guarding that conforms to OSHA requirements to prevent personal injury or property damage.

2.3.1a MOTORS (STANDARD UNITS)
When direct coupling motors to the Planetgear reducer, follow the four step process shown below to achieve proper motor to reducer alignment. Refer to coupling manufacture specifications to determine required alignment accuracy. **Note:** Steps 1 to 4 may have to be repeated several times to achieve manufacturers required accuracies.

**STEP #1 (side view plane)**

<table>
<thead>
<tr>
<th>(PROBLEM)</th>
<th>(SOLUTION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR NEAR FEET LOW</td>
<td>SHIM REAR FEET UP</td>
</tr>
</tbody>
</table>

Correct for **angular** misalignment in the **side view plane**.

**STEP #2 (side view plane)**

<table>
<thead>
<tr>
<th>(PROBLEM)</th>
<th>(SOLUTION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR FRONT FEET LOW</td>
<td>SHIM FRONT FEET UP</td>
</tr>
</tbody>
</table>

Correct for **parallel** misalignment in the **side view plane**.

**STEP #3 (top view plane)**

<table>
<thead>
<tr>
<th>(PROBLEM)</th>
<th>(SOLUTION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTIRE MOTOR LOW</td>
<td>RISE MOTOR UP</td>
</tr>
</tbody>
</table>

Correct for **angular** misalignment in the **top view plane**.

**STEP #4 (top view plane)**

<table>
<thead>
<tr>
<th>(PROBLEM)</th>
<th>(SOLUTION)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR ANGLED LEFT</td>
<td>SHIFT NEAR OP MOTOR RIGHT</td>
</tr>
</tbody>
</table>

Correct for **parallel** misalignment in the **top view plane**.
2.3.1b MOTORS (C-FACE & IEC MOTOR FLANGE UNITS)

1. Mount the reducer C-face coupling or IEC motor flange coupling onto the motor shaft with the appropriate size key. The motor shaft to coupling fit should be snug and may require light tapping (Note: Warming up the coupling and applying an Anti-seize compound to the motor shaft is helpful). Note: A loose fit coupling should be avoided and a heavy fit could damage motor bearings if the coupling is pressed onto the motor shaft with extreme force.

⚠️ CAUTION
Never turn down the motor shaft diameter to allow for easy coupling installation, as this will cause coupling movement and wear during operation.

2. a. C-FACE: Locate the C-Face coupling 0.688 to 0.750" from the motor face (Hint: Standard keystock is helpful for this purpose). Refer to the illustration in Figure 2.3.1b.

2. b. IEC MOTOR FLANGE COUPLING: Locate the coupling 13.0 to 14.0mm from the motor face. Refer to the illustration in Figure 2.3.1c.

3. Tighten the coupling set screws; one located over the key and the other located at 90° (degrees). After tightening the set screws, the gap between the motor face and the coupling should be measured again to insure that the tolerance has been maintained. If the tolerance is not within the specification, loosen the set screws and repeat steps 2 and 3.

4. Mount the motor with coupling to the reducer. Align the internal spline end of the coupling with the external spline end of the reducer input gear.

⚠️ CAUTION
Be careful not to roll the seal when installing or removing the coupling and motor. This could result in oil leakage during operation.

5. Align the mounting holes of the motor with the mounting holes of the reducer, and fasten, reference Table 2 (page 20) for recommended bolt torques.

Figure 2.3.1c IEC Cross Section

2.3.2 COUPLINGS
Mount the reducer coupling hub on the input shaft and the motor coupling hub on the motor shaft as instructed in the manual shipped with the coupling. If the coupling is not a Rex® Omega®, refer to the manufacturers literature for installation instructions. If Rexnord does not mount the motor, the couplings are mounted for shipment only. Coupling bolts and coupling instructions are packed inside the coupling elements. Note: Prior to the installation of the element, check both coupling hubs for the required parallel and angular alignment; Reference Figure 2.3.2.

Figure 2.3.2 Parallel and Angular Misalignment

2.3.3 SPROCKETS OR SHEAVES
Prior to installing sprockets or sheaves, review the manufacturers requirements for chain or belt tension and required alignment. When mounting the sprocket or sheave to the shaft, locate it as close as possible to the reducer. This will minimize the overhung load and prolong bearing life.

When using a Planetgear top motor mount accessory, the belt tension can be changed by varying the height of the motor mount plate. This can be done by adjusting the four threaded support bolts. Reference Figure 2.3.3.

NOTE: Mount sheaves and belts as close to the reducer as possible to avoid undue overhung loading on the bearings.
Section 3.0
Lubrication

IMPORTANT
Read and carry out all instructions on nameplate and review all warning tags and caution tags.

LUBRICATION CHANGES

OIL
For normal conditions, change oil every six months or 2,500 hours, whichever comes first. If operating under abnormal conditions such as high temperature, severe duty, moisture or particle contamination, oil may need to be changed more frequently. Reference Section 5.0 for maintenance.

NOTE: Most lubricant suppliers can test oil from the unit periodically and recommend economical oil change schedules. Oil samples should be taken from the oil level hole, not the drain hole.

GREASE
All reducers are furnished with grease purgeable seals, thus minimizing entry of water or abrasive dust into the reducer. The reducers are shipped with the grease cavity filled with NLGI No. 2 grease (equivalent to K2K grease). Under extreme conditions, grease may need to be changed more frequently. Reference Section 5.0 for maintenance.

OPERATING TEMPERATURE
Determine the minimum and maximum ambient temperatures that the Planetgear reducer will be subject to during operation. If the speed reducer operates in an environment where the temperature fluctuations are predictable, choose an oil viscosity that is recommended for that given temperature. I.E. for cold weather operation, use an oil that will circulate freely at all times. The pour point of the oil should be 9°F (5°C) less than the minimum external temperature during reducer operation. During hot weather, use a higher viscosity oil that will not thin out and lose its lubricating qualities.

If the speed reducer operates under extreme conditions or is exposed to large temperature fluctuations, the use of a synthetic oil is recommended. Contact lubrication supplier for recommendations.

NOTE: The synthetic lubricant should conform to the requirements of ANSI /AGMA 9005-D94.

CAUTION
Special measures should be taken to protect drives operating in direct sunlight at ambient temperatures over 100°F (38°C). This protection can consist of a canopy over the drive or reflective paint on the drive. If neither is possible, a heat exchanger or other cooling device may be required to prevent the reducer sump temperature from exceeding the allowable maximum oil temperature of 200°F (93°C). Temperatures in excess of 120°F (49°C) feel hot to the human hand. Planetgear reducers can be operated with reducer sump oil temperatures of up to 200°F (93°C).

LUBRICATION GRADE SELECTION
After the determination of the ambient temperature is made, reference the nameplate or the Ambient Temperature Table (next column) to determine the proper AGMA or ISO grade lubricant for those temperature conditions, and select an appropriate oil. SAE oils apply to gear lubricants only. Automotive oils are not recommended. All reducers are splash lubricated by gear rotation with even distribution to all gear meshes and bearings.

<table>
<thead>
<tr>
<th>Ambient Temp.</th>
<th>Viscosity @ 40°C Centistokes</th>
<th>AGMA Grade #</th>
<th>ISO Grade #</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10°C to 15°C</td>
<td>15°F to 60°F</td>
<td>90 - 110</td>
<td>3</td>
</tr>
<tr>
<td>10°C to 50°C</td>
<td>50°F to 125°F</td>
<td>135 - 165</td>
<td>4</td>
</tr>
</tbody>
</table>

Comparative Viscosity Classifications

<table>
<thead>
<tr>
<th>Petroleum Based R&amp;O Gear Oils</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum operating temperature of lubricants: 200°F (93°C)</td>
</tr>
<tr>
<td>AGMA 3: 15°F - 60°F  AGMA 4: 50°F - 125°F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>AGMA Viscosity Grade 3</th>
<th>AGMA Viscosity Grade 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lubricant</td>
<td>Lubricant</td>
</tr>
<tr>
<td>Areco Oil Co.</td>
<td>American Ind. Oil #100</td>
<td>American Ind. Oil #150</td>
</tr>
<tr>
<td>Chevron U.S.A. Inc.</td>
<td>AW Machine Oil 100</td>
<td>AW Machine Oil 150</td>
</tr>
<tr>
<td>Cities Service Co.</td>
<td>Cligo Pacemaker 100</td>
<td>Cligo Pacemaker 150</td>
</tr>
<tr>
<td>Conco Inc.</td>
<td>Decal R&amp;O Oil 100</td>
<td>Decal R&amp;O Oil 150</td>
</tr>
<tr>
<td>Exxon Company, U.S.A.</td>
<td>Teresito 100</td>
<td>Teresito 150</td>
</tr>
<tr>
<td>Gulf Oil Corp.</td>
<td>Harmony 100</td>
<td>Harmony 150</td>
</tr>
<tr>
<td>Gulf Canada Limited</td>
<td>Harmony 66</td>
<td>Harmony 77</td>
</tr>
<tr>
<td>Imperial Oil Ltd.</td>
<td>Teresso 100</td>
<td>Teresso 150</td>
</tr>
<tr>
<td>Mobil Oil Corp.</td>
<td>DTE Heavy</td>
<td>DTE Extra Heavy</td>
</tr>
<tr>
<td>Phillips Petroleum Co.</td>
<td>Magnus Oil 100</td>
<td>Magnus Oil 150</td>
</tr>
<tr>
<td>Shell Oil Co.</td>
<td>Motina 100</td>
<td>Motina 150</td>
</tr>
<tr>
<td>Shell Canada Limited</td>
<td>Tellus 100</td>
<td>Tellus 150</td>
</tr>
<tr>
<td>Standard Oil Co. (Ohio)</td>
<td>Industor 66</td>
<td>Industor 80</td>
</tr>
<tr>
<td>Texaco Inc.</td>
<td>Regal R&amp;O 100</td>
<td>Regal R&amp;O 150</td>
</tr>
<tr>
<td>Texas Canada Inc.</td>
<td>Regal R&amp;O 100</td>
<td>Regal R&amp;O 150</td>
</tr>
<tr>
<td>Union Oil Co. Calif.</td>
<td>Unix R&amp;O 100</td>
<td>Unix R&amp;O 150</td>
</tr>
<tr>
<td>Union Oil Co. Calif.</td>
<td>Turbine Oil 100</td>
<td>Turbine Oil 150</td>
</tr>
</tbody>
</table>

LUBRICATION QUANTITY
From the nameplate or the oil capacity chart below, determine the quantity of oil needed to operate the reducer.

<table>
<thead>
<tr>
<th>Reducer Series</th>
<th>Reduction Type</th>
<th>S/DT gallons</th>
<th>S/DT liters</th>
<th>Quad gallons</th>
<th>Quad liters</th>
</tr>
</thead>
<tbody>
<tr>
<td>S= single</td>
<td></td>
<td>0.25 (0.50)</td>
<td>0.95 (1.90)</td>
<td>0.38 (0.61)</td>
<td>1.45 (2.30)</td>
</tr>
<tr>
<td>D= double</td>
<td></td>
<td>0.25 (0.50)</td>
<td>0.95 (1.90)</td>
<td>0.38 (0.61)</td>
<td>1.45 (2.30)</td>
</tr>
<tr>
<td>T= triple</td>
<td></td>
<td>0.25 (0.50)</td>
<td>0.95 (1.90)</td>
<td>0.38 (0.61)</td>
<td>1.45 (2.30)</td>
</tr>
<tr>
<td>Quad= quadruple</td>
<td></td>
<td>0.25 (0.50)</td>
<td>0.95 (1.90)</td>
<td>0.38 (0.61)</td>
<td>1.45 (2.30)</td>
</tr>
</tbody>
</table>
**Section 4.0**

**Start-up**

⚠️ **WARNING**

Never operate the speed reducer at speeds and/or loads that exceed the limits specified on the nameplate. Exceeding these limits may result in personal injury or machinery damage. Check to ensure that all rotating equipment is properly guarded according to OSHA standards.

⚠️ **CAUTION**

All speed reducers are shipped without oil. Be sure to fill the unit to the proper level prior to start-up.

⚠️ **CAUTION**

When starting up new equipment, proceed cautiously.

### 4.1 Pre-Start-Up Checklist

1. Has the reducer been filled with the proper oil type and to the correct oil level?
2. Are all mounting bolts high strength ANSI B18.2.1 Grade 5 or ISO 898/1 Grade 8.8 and tightened according to torque specifications in Table 2 (page 20)?
3. Are all input and output shaft couplings, sprockets, pinions, etc. mounted with full engagement and keys in place?
4. Have couplings and reducer seals been properly greased?
5. Are coupling connections properly aligned and fastened?
6. Have all pipe plugs (oil fill, oil level, and oil drain) been inserted and properly tightened?
7. Have all electrical connections been made?
8. Does the motor shaft rotate in the proper direction?
9. Are all guards in place and properly secured?

### 4.2 Initial Start-Up

It is recommended that all Planetgear speed reducers be run-in for a period of time before introduction to full service. This will allow the gearing to mate properly prior to being exposed to any high load conditions. The following procedure is recommended for initial start-up.

### 4.2.1 Prime Mover

The prime mover should be set up to maximize the amount of time necessary to get to the rated speed. This will avoid any instantaneous gear loads that could exceed the rating of the speed reducer or other components.

### 4.2.2 Reducer Rotation

If the reducer is equipped with an internal backstop, an arrow located on the top of the maincase will indicate the direction of rotation during operation. Make sure the motor shaft will rotate in that direction. If necessary, reverse the leads on the motor so that the proper motor direction is attained.

### 4.2.3 Start-Up

Start the reducer under as light a load as possible. As the unit is brought up to normal operating speed, check for unusual noises, excessive vibration, or excessive heat and oil leakage. If any of these conditions exist, shut down the unit immediately and determine the cause of the problem. Refer to Section 9.0 Troubleshooting (page 19) for assistance.

### 4.3 Post-Start-Up Checklist

1. After approximately forty hours of use, check all foundation and mounting bolts and tighten as required. Note: Always recheck alignment after tightening.
2. The oil used in the initial start-up of a new reducer should be completely drained and replaced after 500 hours of use. A thorough cleaning of the gear case using a flushing oil should be performed to remove any foreign matter during the first oil change.

**Section 5.0**

**Maintenance**

⚠️ **WARNING**

DO NOT PERFORM ANY MAINTENANCE PROCEDURES WHILE REDUCER IS IN OPERATION. DOING SO MAY RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE. TO INSURE SAFETY DURING MAINTENANCE, ACTIVATE ALL ELECTRICAL AND/OR MECHANICAL LOCKOUTS.

NOTE: ALL EXTERNAL PLUMBING (PIPE NIPPLE, PIPE PLUGS, FITTINGS) ARE STANDARD NPT (NATIONAL PIPE THREAD) CONNECTIONS.
5.1 FILLING OIL
1. Choose correct oil type (reference Section 3.0).
2. Determine correct oil quantity (reference Nameplate or Section 3.0).

**NOTE:** Special applications may have different oil quantity requirements. Refer to the nameplate for specific oil quantity.

3. Remove oil fill plug and the oil level plug (reference Figure 5.1).

**NOTE:** There are two side plugs. The oil level plug is highest from horizontal of the two.

**NOTE:** Reference Section 7.0 Vertical Service Instructions (page 17).

4. Fill reducer at oil fill port.
5. Reducer oil capacity is reached when oil starts to pour out of the bottom of the oil level port. Allow several minutes for oil to settle, then recheck oil level. Add oil if necessary.

**NOTE:** Oil should be checked or added when reducer is at ambient temperature.

⚠️ **CAUTION**
Underfilling reducer may cause product damage. Overfilling reducer may cause excessive oil temperatures.

6. Replace oil level plug, sealing it in the process using thread sealant.
7. Replace oil fill plug, sealing it in the process using thread sealant.
8. Start up reducer under a no load condition. Run reducer for a few minutes.
9. Stop reducer and recheck oil at the oil level port. If necessary, add oil.

3. With the proper size oil drain pan (reference oil quantity on nameplate) in place, remove the drain plug.

⚠️ **CAUTION**
Care should be taken when removing the oil fill plug. The possibility of pressurized air inside the reducer may exist. Once threads are free to hand rotate, place a heavy cloth over the plug and rotate counterclockwise until removed.

4. After oil is removed, replace oil drain plug, sealing it in the process using thread sealant.
5. Reference Section 5.1 for filling reducer with oil.

5.3 ADDING GREASE TO REDUCER SEALS
1. Clean grease inserts, reference Figure 5.1 for location.
2. Using a high temperature No. 2 grease. Attach grease gun to grease insert and pump grease into seal carrier.
3. Stop greasing when a sufficient amount of grease purges out of seal carrier next to shaft.

**NOTE:** Grease should purge from outboard seal onto shaft, if this does not occur, refer to Section 6.2 to check for proper seal installation.

4. Clean purged grease from reducer.

5.4 REPLACING SEALS IN SERVICE
Reference Section 6.2 for procedure.

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**Section 6.0**
**Disassembly and Assembly Instructions**

The following instructions are for the Mercury and Mars speed reducers. This is a guide for disassembly, parts replacement, and reassembly. Note, one drawing is used to represent the entire line of reducers and therefore may not agree in every detail. To expedite service, when ordering parts or requesting information, supply the following information: model number, reducer size, ratio, serial number, HP, motor RPM, and the build date from the reducer nameplate. No ratio change should be made without first consulting a Rexnord representative. All bearings and seals used on standard Planetogear speed reducers are listed in Table 4 and Table 5 (page 21).

**REQUIRED EQUIPMENT**
Standard mechanic's tools: arbor press (hydraulic press optional), torque wrench, dial indicator with magnetic base, and hoist.

⚠️ **CAUTION**
Always take the necessary safety precautions when working with an arbor press, hydraulic press or with any hand tools.
6.1 TAKING REDUCER OUT OF SERVICE

WARNING
DO NOT PERFORM ANY MAINTENANCE PROCEDURES WHILE REDUCER IS IN OPERATION. DOING SO MAY RESULT IN PERSONAL INJURY OR PROPERTY DAMAGE. TO INSURE SAFETY DURING MAINTENANCE, ACTIVATE ALL ELECTRICAL AND/OR MECHANICAL LOCKOUTS.

1. Disconnect all attached equipment.
2. Remove all reducer mounting bolts.
3. Lift reducer using the double rope sling method explained in Section 2.1.
4. Drain oil from reducer, reference Section 5.2 for procedure.

NOTE: Care should be taken to protect the shafts from damage. Damaged shaft may cause problems when reinstalling couplings, sprockets, or sheaves.

6.2 REPLACING SEALS

6.2.1 REMOVING SEALS (Input/Output Sub-Assembly)

NOTE: If unit is equipped with a fan and shroud, remove fan and shroud.

1. Take reducer out of service. Reference Section 6.1 for procedure.
2. Clean shaft extensions.
3. Position reducer vertically. Reference Figure 6.2.1.1.
4. With a hammer and punch carefully pierce the outboard seal flange. Reference Figure 6.2.1.1.

CAUTION
Do not damage the seal surface on the hub. A damaged seal surface may result in leakage during reducer operation.

Figure 6.2.1.1 Piercing of Outboard Seal with Punch

5. From the pierced hole use the punch to pry the seal out of the housing. Reference Figure 6.2.1.2.

Figure 6.2.1.2 Removal of Outboard Seal

6. With a hammer and punch carefully pierce the inboard seal flange. Reference Figure 6.2.1.3.

CAUTION
Do not damage the seal surface on the hub. A damaged seal surface may result in leakage during reducer operation.

Figure 6.2.1.3 Piercing of Inboard Seal with Punch

7. From the pierced hole use the punch to pry the seal out of the housing. Reference Figure 6.2.1.4.

CAUTION
Do not allow loose particles to fall into bearings. Contamination in bearings may cause premature damage to the bearings. If contamination falls into the bearings, remove assembly and flush out bearings.

Figure 6.2.1.4 Removal of Inboard Seal

8. Clean seal surfaces to prepare for installation of new seals.

6.2.2 INSTALLING NEW SEALS (OUTPUT ASSEMBLY)

RECOMMENDED TOOLING:

RING 2.75" I.D. x 4.00" O.D. x 3/8" THICK
(70 mm I.D. x 100 mm O.D. x 9 mm THICK)

TUBE 2.75" I.D. x 3.50" O.D. x 5" MINIMUM LENGTH
(70 mm I.D. x 90 mm O.D. x 130mm MIN. LENGTH)

PLATE 4.50" O.D. x 3/8" THICK
(115 mm O.D. x 9 mm thick)

1. Remove seals from assembly. Reference Section 6.2.1.
2. With the reducer mounted vertically, carefully place the double lipped inboard seal over the shaft with garter spring side down. Reference Figure 6.2.2.1 (next page).
3. Place the ring on the seal. Reference Figure 6.2.2.2.
4. Place the tube on the ring. Reference Figure 6.2.2.2.
5. Place the plate on the tube. Reference Figure 6.2.2.2.

6. With an arbor press, push the seal into the hub. Stop pressing when the ring seats on the hub.
7. Remove the tools.
8. Place the tube directly on the seal and the plate on the tube. Reference Figure 6.2.2.3.

9. With an arbor press, push seal into the hub. Stop pressing when seal seats fully inside the hub. Reference Figure 6.2.2.4 (next column).

10. Carefully place the outboard seal over the shaft with garter spring side up. Reference Figure 6.2.2.5.

11. Place the ring on the seal. Reference Figure 6.2.2.6.
12. Place the tube on the ring. Reference Figure 6.2.2.6.
13. Place the plate on the tube. Reference Figure 6.2.2.6.

14. With an arbor press, push the seal into the hub. Stop pressing when the ring seats on the hub.
15. Remove the tools.
6.2.3 INSTALLING NEW SEALS (INPUT ASSEMBLY)

RECOMMENDED TOOLING:

RING 2.13" I.D. x 3.00" O.D. x 3/8" THICK  
(55 mm O.D. X 75 mm I.D. x 9 mm THICK)

TUBE 2.13" I.D. x 2.97" O.D. x 5" MINIMUM LENGTH  
(55 mm O.D. X 75 mm I.D. x 130 mm MIN. LENGTH)

PLATE 3.50" O.D. x 3/8" THICK  
(90 mm O.D. X 9 mm THICK)

1. Remove seals from assembly. Reference Section 6.2.1.
2. With the reducer mounted vertically, carefully place the inboard seal over the shaft, garter spring side down. Reference Figure 6.2.3.1.

⚠️ CAUTION

Extreme care must be taken to not roll the lip of the seal or cut the seal on the keyway.

Figure 6.2.3.1 Orientation of Inboard Seal for Installation

3. Place the ring on the seal. Reference Figure 6.2.3.2.
4. Place the tube on the ring. Reference Figure 6.2.3.2.
5. Place the plate on the tube. Reference Figure 6.2.3.2.

6. With an arbor press, push the seal into the hub. Stop pressing when the ring seats on the hub.
7. Remove the tools.
8. Place the tube directly on the seal and the plate on the tube. Reference Figure 6.2.3.3 (next column).

9. With an arbor press, push seal into the hub. Stop pressing when seal seats fully inside the hub. Reference Figure 6.2.3.4.

Figure 6.2.3.4 Final Installation of Inboard Seal

10. Carefully place the outboard seal over the shaft, garter spring side up. Reference Figure 6.2.3.5.

⚠️ CAUTION

Extreme care must be taken to not roll the lip of the seal or cut the seal on the keyway.

Figure 6.2.3.5 Orientation of Outboard Seal for Installation

11. Place the ring on the seal. Reference Figure 6.2.3.6 (next page).
12. Place the tube on the ring. Reference Figure 6.2.3.6 (next page).
13. Place the plate on the tube. Reference Figure 6.2.3.6 (next page).
14. With an arbor press, push the seal into the hub. Stop pressing when the ring seats on the hub.
15. Remove the tools.
16. If unit was equipped with a fan and shroud, replace fan and shroud (reference Section 6.7, page 16).

6.3 REPLACING BEARINGS - INPUT/OUTPUT SHAFT ASSEMBLIES

6.3.1 REMOVING INPUT OR OUTPUT SHAFT ASSEMBLIES TO REPLACE BEARINGS
1. Take reducer out of service (reference Section 6.1).
2. Clean all external surfaces to prevent contaminants from entering unit when disassembled.
3. Drain oil from unit (reference Section 5.2).

NOTE: For better results, mount reducer in the vertical position with the assembly to be removed facing up.

4. Remove the bolts that attach assembly to the maincase.
5. With a wedge or blade, break the seal between the housing and the maincase to allow for removal of the assembly.

NOTE: It is recommended that the input assembly be removed first, then the gear train, and finally the output assembly (reference Section 6.5 for additional information).

6. Remove assembly by lifting it straight up away from the maincase.

CAUTION

If removing assembly by hand, care should be taken when gripping the keyway of the shaft. The keyway is very sharp and can cause serious injury.

NOTE: Place all removed parts on a clean dry surface to avoid contact with contaminants.

6.3.2 DISASSEMBLING INPUT SHAFT ASSEMBLY TO REPLACE BEARINGS
1. Remove endbell from reducer. Reference Section 6.3.1.
2. Support hub to expose the inboard side of the endbell. Reference Figure 6.3.2.1 (next column).

Figure 6.2.3.6 Placement of Tooling for Installation of Outboard Seal

Figure 6.3.2.1 Input Endbell

NOTE: Allow space between the shaft extension and the working surface.

3. Loosen set screw on locknut.
4. Remove locknut from shaft. Store in clean spot.
5. Remove bearing spacer from shaft. Store in clean spot.
6. With an arbor press or a hydraulic press, press the inboard end of the shaft through the inboard bearing cone.
7. At this time, the shaft will be free and can be separated from the housing. The inboard bearing cone will be free to remove and discard.
8. To remove the outboard bearing from the shaft, one of two procedures can be used. 1.) Support the shaft by the bearing cone with the inboard end of the shaft facing up. With an arbor press or hydraulic press, press down on the inboard end of the shaft (reference Figure 6.3.2.2). 2.) With a hammer and punch, carefully strike the bearing cone towards the inboard end of the shaft (reference Figure 6.3.2.3, next page).

NOTE: Take care not to damage the shaft bearing surface or seal surface.

Figure 6.3.2.2 Removal of Outboard Bearing Cone (Option #1)
9. With a hammer and punch, tap out the inboard and outboard bearing cups from the housing.

*NOTE:* Take care not to damage the bearing surface of the housing.

6.3.3 DISASSEMBLING OUTPUT SHAFT ASSEMBLY TO REPLACE BEARINGS

1. Remove endbell from reducer. Reference Section 6.3.1.
2. Support hub to expose the inboard side of the endbell. Reference Figure 6.3.3.1.

*NOTE:* Allow space between the shaft extension and the working surface.

8. With a hammer and punch, tap out the inboard and outboard bearing cups from the housing.

*NOTE:* Take care not to damage the bearing surface of the housing.

6.3.4 INSTALLING BEARING CUPS INTO INPUT OR OUTPUT HOUSINGS

1. Clean machined surfaces on housing where bearing cups are located.

*NOTE:* If high spots or burrs occurs after disassembly, use discretion to remove them. Bearing cup has to be seated perfectly to insure proper bearing alignment.

2. Place bearing cup squarely on the bearing bore. With an arbor press or a hydraulic press and flat disc push bearing cup into housing until seated.

*NOTE:* This procedure applies to both inboard and outboard bearing cup. Be sure to push cups in evenly. Any misalignment may result in a damaged housing or bearing cup.
NOTE: Take care not to scratch or gauge bearing surface. Any damage done may result in premature damage of the bearings.

3. With a 0.001" or 0.040 mm feeler gage, make sure that there is no gap between the housing and the bearing cups to insure proper cup seating. Reference Figure 6.3.4a and Figure 6.3.4b.

![Figure 6.3.4a Installation of Bearing Cups in Input Housing](image)

![Figure 6.3.4b Installation of Bearing Cups in Output Housing](image)

NOTE: Any gap between hub and bearing cups can result in excessive axial bearing clearance or bearing misalignment and ultimately result in premature bearing damage.

5. With an arbor press or a hydraulic press carefully push bearing cone until it bottoms on shaft shoulder.

NOTE: DO NOT push on bearing rollers or bearing cage. Reference Figure 6.3.5.2 for location.

![Figure 6.3.5.2 Location of Bearing Components](image)

6. With a 0.001" or 0.040 mm feeler gage, make sure that there is no gap between the shaft shoulder and the bearing cone to insure proper cone seating. (reference Figure 6.3.5.3).

![Figure 6.3.5.3 Checking for Zero Clearance with Feeler Gauge](image)

6.3.5 ASSEMBLING INPUT SHAFT ASSEMBLIES

1. Clean bearing surface on shaft. With a thread chase (18 threads per inch) chase thread where set screw was located.

2. Make sure bearing cups are clean and installed properly in housing. Reference Section 6.3.4.

3. Set shaft on end with the spline end of the shaft facing up.

⚠️ CAUTION
Pilot assembly so that it will not fall over.

4. Place the outboard bearing cone squarely on the inboard end of the shaft with the smaller diameter of the bearing facing inboard. Reference Figure 6.3.5.1 (next column).

7. Carefully set the housing, outboard side face down, onto the outboard bearings.

8. While rotating the housing on bearings, apply clean oil to the bearings.

9. Place the inboard bearing cone squarely on the inboard end of the shaft with the smaller diameter of the bearing facing the outboard. Reference Figure 6.3.5.4 (next page).
6.3.6 ASSEMBLING OUTPUT SHAFT ASSEMBLY

1. Clean bearing surface on shaft.
2. Make sure bearing cups are clean and installed properly in housing. Reference Section 6.3.4.
3. Set shaft on end with the spline end of the shaft facing up.

⚠️ CAUTION
Pilot assembly so that it will not fall over.

4. Place the outboard bearing cone squarely on the inboard end of the shaft with the smaller diameter of the bearing facing inboard. Reference Figure 6.3.6.1.

5. With an arbor press or hydraulic press carefully push bearing cone until it bottoms on shaft shoulder.

NOTE: DO NOT push on bearing rollers or bearing cage. Reference Figure 6.3.6.2 for location.

6. With a 0.001” or 0.040 mm feeler gage, make sure that there is no gap between the shaft shoulder and the bearing cone to ensure proper cone seating. Reference Figure 6.3.6.3.

10. With an arbor press or a hydraulic press carefully push bearing cone. When bearings begin to approach the bearing cup, apply clean oil to inboard bearings.

**NOTE:** DO NOT push on bearing rollers or bearing cage. Reference Figure 6.3.5.2.

11. Press inboard bearing until it touches the surface of the bearing cup.

**NOTE:** Do not over push bearings into cup. This might cause the bearings to Brinell the cup.

**NOTE:** An indication when the inboard bearing is fully seated is when the hub will not rotate on the shaft freely.

12. Clean and place the bearing spacer onto the shaft.
13. Clean locknut. Place it with the grooved side down (or groove towards bearings) and thread on locknut until it is unable to rotate.
14. Mark the location of the locknut.
15. Loosen locknut approximately 5/16” (8 mm) from original mark.
16. Tighten set screw on locknut.
17. Hold housing on its' side, and with a blunt instrument, rap on the inboard side of shaft. Reference Figure 6.3.5.5.

**NOTE:** Shaft should be able to rotate freely at this time. Replace seals after bearing clearance has been established.

18. Reference Axial Bearing Clearance, Section 6.4 for proper bearing endplay.
NOTE: Any gap between shaft and bearing cone can result in excessive axial bearing clearance or bearing misalignment and ultimately result in premature bearing damage.

7. Carefully set the housing, outboard side face down, onto the outboard bearings.
8. While rotating the housing on bearings, apply clean oil to the bearings.
9. Place the inboard bearing cone squarely on the inboard end of the shaft with the smaller diameter of the bearing facing the outboard. Reference Figure 6.3.6.4.

![Figure 6.3.6.4 Placing Inboard Bearing Cone onto Shaft](image)

10. With an arbor press or a hydraulic press carefully push bearing cone. When bearings begin to approach the bearing cup, apply clean oil to inboard bearings.

NOTE: DO NOT push on bearing rollers or bearing cage. Reference Figure 6.3.6.2.

11. Press inboard bearing until it touches the surface of the bearing cup.

NOTE: Do not over push bearings into cup. This might cause the bearings to Brinell the cup.

NOTE: An indication when the inboard bearing is fully seated is when the hub will not rotate on the shaft freely.

12. Clean and place the bearing spacer onto the shaft.
13. Clean and attach external retaining ring on output shaft. If retaining ring was destroyed after disassembly replace with an Eaton 1065-R retaining ring external.
14. Hold housing on its' side and with a blunt instrument, rap on the inboard side of shaft. Reference Figure 6.3.6.5 (next column).

![Figure 6.3.6.5 Final Assembly of Output Shaft Housing](image)

NOTE: Shaft should be able to rotate freely at this time. Replace seals after bearing clearance has been established. No axial bearing clearance measurements need to be taken.

6.4 SETTING PROPER AXIAL BEARING CLEARANCES ON INPUT SHAFT ASSEMBLIES

6.4.1 MEASURING AXIAL CLEARANCE ON INPUT ASSEMBLY

1. Support housing to allow the shaft to rotate freely (reference Figure 6.4.1).

NOTE: Axial clearance should be checked while seals are removed.

![Figure 6.4.1 Setting Axial Bearing Clearance](image)

2. Affix the hub to the support table with C-Clamps or bolting to table (reference Figure 6.4.1).
3. While exerting downward force by hand on the end of the shaft, rotate shaft 6 to 10 times to align the bearing rollers.
4. Use a dial indicator with a magnetic base to take measurements.
NOTE: Use a dial indicator that has a balanced dial with 0.0001" or 0.01mm graduations.

5. Affix the magnetic base of the dial indicator to a flat area of the housing (reference Figure 6.4.1).
6. Place the stem of the dial indicator perpendicular to the end of the shaft.

NOTE: Place stem of dial indicator as close to the center of the shaft as possible.

7. Record the reading of the dial indicator when the indicator has engaged the shaft.
8. With a pry bar, push the inboard end of the shaft up (reference Figure 6.4.1).

NOTE: Use a constant swift force when pushing on the pry bar. Excessive force not required. DO NOT rotate shaft while pushing on shaft. The object is to lift the shaft only.

9. Record reading of the dial indicator. Take the difference between the two readings. The difference is the axial bearing clearance.

NOTE: 0.001" to 0.004" (0.03 to 0.10 mm) axial bearing clearance is recommended. Do steps 3 thru 9 several times to insure an accurate measurement has been made.

10. See Sections 6.4.2 and 6.4.3 for adjusting for too much or too little axial bearing clearance.

6.5 GEAR TRAIN DISASSEMBLY

Place gears in a clean dry place in the order of disassembly. Exploded view drawings of a specific gear train may be requested from the factory by specifying the reducer serial number, model number, size, ratio, and rating. To order replacement components, please give the previously stated information about the reducer and the items needed. Reference the following sketches for general exploded view drawings.

NOTE: It is recommended that the input assembly be removed first, then the gear train, and finally the output assembly.

- **Single Reduction disassembly** - Remove input assembly (1) from maincase (4). Remove input gear (2), and last stage carrier (3). Remove output assembly (5) from maincase.

![Single Reduction Diagram]

- **Double Reduction disassembly** - Remove input assembly (1) from maincase (6). Remove input gear (2), first stage carrier (3), last stage sun gear (4), and last stage carrier (5). Remove output assembly (7) from maincase.

![Double Reduction Diagram]

- **Triple Reduction disassembly** - Remove input assembly (1) from maincase (8). Remove input gear (2), first stage carrier (3), second stage sun gear (4), second stage carrier (5), last stage sun gear (6), and last stage carrier (7). Remove output assembly (9) from maincase.

![Triple Reduction Diagram]

- **Quadruple Reduction disassembly** - Remove input assembly (1) from maincase (10). Remove input gear (2), first stage carrier (3), second stage sun gear (4), second stage carrier (5), third stage sun gear (6), third stage carrier (7), last stage sun gear (8), and last stage carrier (9). Remove output assembly (11) from maincase.

![Quadruple Reduction Diagram]
6.6 GEAR TRAIN ASSEMBLY
The gear train can be assembled in the reverse order of disassembly. Reference Section 6.5.

**NOTE:** It is recommended that the output subassembly be installed first, then the gear train and finally the input subassembly. Unit should be assembled in the vertical position, with input shaft up.

6.7 FAN AND SHROUD INSTALLATION

6.7.1 SHROUD CLIP INSTALLATION
- Remove mounting bolts from input subassembly / maincase in the following locations and install shroud clips (reference Figure 6.7.1a).

![Image of shroud clip locations](image)

**Figure 6.7.1a Location of Shroud Clips**

- Align shroud clip with center of reducer (reference Figure 6.7.1b) and tighten bolts to torque requirements of Table 2, page 20.

![Image of bolt and shroud clip](image)

**Figure 6.7.1b Location of Shroud Clips**

6.7.2 FAN INSTALLATION
- From Figure 6.7.2, determine the distance from the end of the input shaft to the front edge of the fan.

![Image of fan dimensions](image)

**Figure 6.7.2 Dimensions for Location of Fan**

- Position the fan on the input shaft to the determined "NA" distance.
- Locate the set screw which is 90° from the keyway to the spotting hole on the shaft.
- Tighten set screws (2). Reference Table 2, page 20 for torque requirements.
- Install key.

6.7.3 FAN SHROUD INSTALLATION
- Position the fan shroud so that it fits tight over the shroud clips. Check to insure that when the input shaft is rotated, the fan does not interfere with the shroud. Gently bend the shroud clips to position the shroud.

**NOTE:** the fan shroud should be predrilled for the shroud clips.

- Using bolts and washers that were removed originally during disassembly, fasten the shroud to the shroud clips. Once fastened rotate input shaft to insure no interference with fan.

Section 7.0
Vertical Service

**NOTE:** ALL EXTERNAL PLUMBING (PIPE NIPPLE, PIPE PLUGS, FITTINGS) ARE STANDARD NPT (NATIONAL PIPE THREAD) CONNECTIONS.

Vertical service can be either input, or output shaft up. Standard reducers are not designed for vertical applications. Modifications are made at the factory to convert a standard reducer for vertical service.

Planetgear speed reducers used in a vertical orientation or most inclined orientations require an oil reservoir lubrication system. Any mounting orientation other than horizontal must be stated at order placement so Rexnord can determine the requirement for a reservoir kit.

The reservoir kit works by providing an adequate head of oil to lubricate the uppermost bearing while allowing for oil expansion. A plastic tube acts as a purge line to eliminate trapped air below the seals.

⚠️ **CAUTION**
Failure to use a properly installed reservoir kit will cause premature speed reducer damage.

Assemble components as shown in Figure 7.1a & Table 7.1b, and Figure 7.2a & Table 7.2b. It is difficult to determine all potential field installation interference points. If necessary please substitute different pipe fittings as required. In doing so, it is important that the bottom of the reservoir is at or above the uppermost bearing. Holes have been drilled by the factory to facilitate both right hand or left hand oil reservoir mounting. Apply pipe sealant to all threaded connections during assembly.
FILLING OIL

The speed reducer should be completely filled with oil prior to start-up.

NOTE: When replacing oil plug, seal it in the process using thread sealtant.

1. Begin by filling the reducer thru the primary oil fill in the maincase until full. Reference Figure 7.1a.
2. Plug primary oil fill and fill thru secondary oil fill until full if orientation is low speed shaft up.
3. Plug secondary oil fill and fill reservoir until proper oil level is reached.
4. Start reducer under a no-load condition.

NOTE: During start-up and initially after, it is important to monitor the oil level, as any remaining trapped air may need to purge out. Add oil as needed if this occurs.

DRAINING OIL

▲ CAUTION
Oil may be hot. Do not drain oil until oil is at ambient or a safe temperature.

NOTE: When replacing oil plug, seal it in the process using thread sealtant.

1. Begin by draining oil from main oil drain in maincase. Reference Figure 7.1a.
2. Plug main oil drain and begin draining oil from final oil drain if orientation is high speed shaft up.

Section 8.0
Storage Procedures

8.1 SPARE PARTS STORAGE

1. On receipt of spare parts, unpack and spray or dip the parts in a rust preventative such as Mobilarmax 524, or equivalent.
2. Place parts on a wood pallet in a dry place. Cover loosely with plastic, DO NOT wrap or store parts in news print as it is corrosive.
3. Re-spray parts every six months. Spray parts every three months if high humidity exists.
4. If rust develops, remove rust with a medium grit emery cloth and re-spray with rust preventative.
5. When ready to install parts, make sure all parts rotate freely. Clean all grime from the parts before installation.

Filling Oil Diagram

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<th>QTY.</th>
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Draping Oil Table

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</tr>
</tbody>
</table>
8.2 STORED AND INACTIVE REDUCERS

1. Preparation For Storage

   A. If a reducer is to be stored or is inactive after installation, fill the reducer with the correct type and amount of lubricant. Add a rust inhibitor such as Mobil Vaprotec Concentrate to the lubricant. Seal the reducer completely; replace the vent plug with a solid pipe plug to keep rust inhibiting atmosphere sealed inside.

   B. After approximately three months, rotate the input shaft such that the output shaft rotates a full 360°(degrees). This will ensure that all internal parts will remain coated and will also keep the bearings from becoming lacquered. Noncompliance with this procedure may cause bearing damage during start-up.

   C. Every six months inspect the stored or inactive reducer and add rust inhibitor if necessary. Dry, indoor storage is recommended.

2. Preparation For Start-up

   Rotate shafts until the bearings move freely. This is to assure that the bearings have not become lacquered. Reducer may be operated without draining the lubricant described in Section 8.2-A.

8.3 LONG TERM STORAGE

   Reducer can be ordered from the factory prepared for long term storage. Field preparation for long-term storage is described in Section 8.2.
### Section 9.0
#### Troubleshooting
This troubleshooting guide will handle questions encountered in regards to Planetgear speed reducers.

<table>
<thead>
<tr>
<th>POSSIBLE CAUSES</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCESSIVE TEMPERATURE [more than 200°F (93°C)]</td>
<td></td>
</tr>
<tr>
<td>OVERLOAD</td>
<td>• Compare actual reducer load with rated load on the nameplate. If the HP or torque is greater, or the speed is slower than stated on the nameplate, the reducer is probably overloaded. Contact a Rex Planetgear Representative; may require a speed change or a larger unit.</td>
</tr>
<tr>
<td>TIGHT OR DEFECTIVE BEARINGS</td>
<td>• Inspect bearings for excessive wear or discoloration due to heat. If either is present, replace the bearings. Refer to Section 6.0 for replacing bearings.</td>
</tr>
<tr>
<td>EXCESSIVE AMBIENT TEMPERATURE</td>
<td>• Provide ventilation for the reducer.</td>
</tr>
<tr>
<td></td>
<td>• Paint white if reducer is in direct sun light.</td>
</tr>
<tr>
<td></td>
<td>• If conditions are extreme, contact a Rex Planetgear Representative for assistance.</td>
</tr>
<tr>
<td>IMPROPER OIL, OIL LEVEL, OLD OR CONTAMINATED OIL</td>
<td>• Make sure lubricant is correct for reducer. A mistake frequently made is to use automotive oil. This is incorrect and will frequently cause the reducer to overheat.</td>
</tr>
<tr>
<td></td>
<td>• Check the oil level in the reducer. Too much as well as too little oil can cause the reducer to overheat.</td>
</tr>
<tr>
<td></td>
<td>• Check to see that oil has not lost its lubricating property. If oil viscosity is too low, this will result in high oil temperatures.</td>
</tr>
<tr>
<td>PLUGGED SHROUD</td>
<td>• Make sure area immediately in front of fan shroud is clear.</td>
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<tr>
<td>OVERSPEED</td>
<td>• Reduce input speed to reduce oil temperature. If reducer input speed is above the stated value on the nameplate, this would raise oil temperature due to increase in internal windage.</td>
</tr>
<tr>
<td>RESTRICTED VENT PLUG</td>
<td>• Remove and clean vent plug.</td>
</tr>
<tr>
<td></td>
<td>• Replace vent plug.</td>
</tr>
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</table>

**BEARING DAMAGE**

<table>
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<tr>
<th>POSSIBLE CAUSES</th>
<th>POSSIBLE SOLUTIONS</th>
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<tr>
<td>IMPROPER ADJUSTMENT</td>
<td>• Adjust bearing to proper axial bearing clearance as instructed in Section 6.0.</td>
</tr>
<tr>
<td>LACK OF LUBRICATION, IMPROPER LUBRICATION, OLD OR CONTAMINATED OIL</td>
<td>• Replace damaged bearings as instructed in Section 6.0. Note: Check hub and shaft for potential damage or heat distress.</td>
</tr>
<tr>
<td>EXCESSIVE OVERHUNG LOAD</td>
<td>• Reduce overhung load. Move the sprocket or sheave closer to the bearings or increase the diameter of both the driven and the driver.</td>
</tr>
</tbody>
</table>

**BEARING NOISE**

<table>
<thead>
<tr>
<th>POSSIBLE CAUSES</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEFECTIVE BEARING</td>
<td>• Inspect and replace bearings if necessary. Reference Section 6.0.</td>
</tr>
<tr>
<td>IMPROPER BEARING ADJUSTMENT</td>
<td>• Adjust bearing endplay. Reference Section 6.0.</td>
</tr>
<tr>
<td>WRONG OR INSUFFICIENT LUBRICATION</td>
<td>• Make sure that enough oil of the correct grade is used. Reference Section 3.0.</td>
</tr>
</tbody>
</table>

**LEAKAGE**

<table>
<thead>
<tr>
<th>POSSIBLE CAUSES</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAMAGED OR WORN SEALS</td>
<td>• Replace seals. Reference Section 6.0.</td>
</tr>
<tr>
<td>BEARINGS OUT OF ADJUSTMENT</td>
<td>• Reset bearings. Reference Section 6.0.</td>
</tr>
<tr>
<td>EXCESSIVE TEMPERATURE, CAUSING BRITTLE SEALS</td>
<td>• Isolate reducer from source of extreme temperature.</td>
</tr>
<tr>
<td></td>
<td>• Install high temperature seals.</td>
</tr>
<tr>
<td>ABRASIVE OR CORROSIVE ATMOSPHERE</td>
<td>• Isolate reducer seal area from environment.</td>
</tr>
<tr>
<td></td>
<td>• Re-grease frequently.</td>
</tr>
<tr>
<td>RESTRICTED VENT PLUG</td>
<td>• Remove and clean vent plug.</td>
</tr>
<tr>
<td></td>
<td>• Replace vent plug.</td>
</tr>
<tr>
<td>SPLIT-LINE LEAKAGE</td>
<td>• Make sure fasteners are torqued correctly. Reference Table 2.</td>
</tr>
<tr>
<td></td>
<td>• Remove suspect hub. Visually inspect mating surfaces for rses or dings. File smooth (do not allow file shavings to enter gearing or bearings) apply gasket eliminator and replace hub.</td>
</tr>
</tbody>
</table>

**DAMAGE OF FASTENERS**

<table>
<thead>
<tr>
<th>POSSIBLE CAUSES</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAILURE OF FASTENERS</td>
<td>• Make sure fasteners are torqued correctly. Reference Table 2.</td>
</tr>
<tr>
<td></td>
<td>• Make sure the correct grade of fastener is used. All reducer fasteners should be ANSI B18.2.1 Grade 5 or ISO 898/1 Grade 8.8 or greater.</td>
</tr>
<tr>
<td></td>
<td>• Check length of fastener.</td>
</tr>
<tr>
<td>FASTENER LOOSENING</td>
<td>• Make sure fasteners are torqued correctly. Reference Table 2.</td>
</tr>
<tr>
<td></td>
<td>• For highly vibratory environments, locate fasteners and torque, or use studs and double nut.</td>
</tr>
</tbody>
</table>
Section 10.0
Tables

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>AVERAGE WEIGHTS</th>
<th>lbs (Kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REDUCER</td>
<td>REDUCER ONLY</td>
<td>REDUCER 1</td>
</tr>
<tr>
<td>SERIES</td>
<td></td>
<td>W/ TOP MOTOR</td>
</tr>
<tr>
<td>Mercury</td>
<td>144 (65)</td>
<td>205 (93)</td>
</tr>
<tr>
<td>Mars</td>
<td>150 (68)</td>
<td>211 (96)</td>
</tr>
</tbody>
</table>

*Does not include motor weights

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>TORQUE REQUIREMENTS FOR DRY FASTENERS (INCH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAE</td>
<td>DIA</td>
</tr>
<tr>
<td>GENERAL PURPOSE GRADE 2</td>
<td>TORQUE (ft. lbs.)</td>
</tr>
<tr>
<td>HIGH STRENGTH GRADE 5</td>
<td>TORQUE (ft. lbs.)</td>
</tr>
<tr>
<td>ALLOY STEEL GRADE 8</td>
<td>TORQUE (ft. lbs.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 2</th>
<th>TORQUE REQUIREMENTS FOR DRY FASTENERS (METRIC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE</td>
<td>NOMINAL DIA.</td>
</tr>
<tr>
<td>8.8</td>
<td>TORQUE (Nm)</td>
</tr>
<tr>
<td>10.9</td>
<td>TORQUE (Nm)</td>
</tr>
<tr>
<td>12.9</td>
<td>TORQUE (Nm)</td>
</tr>
</tbody>
</table>

* The torques shown produce a clamp load of 80% of proof load. They assume clean, dry threads with a torque coefficient of 0.2, and a coefficient of friction of 0.14.
* Plated threads need only 3/4 torque shown.
* Well lubricated threads need only 1/2 torque shown.
* Source: Rexnord Engineering Specification: GES8-19, 04/10/99

| TABLE 3 | MAXIMUM ALLOWABLE TILTS FOR STANDARD REDUCERS |

Note: If any reducer application exceeds maximum allowable tilt, consult a Planetgear representative for possible modifications.
### Table 4
Bearings for Standard Speed Reducers
(All bearings are *Timken* unless noted otherwise)

<table>
<thead>
<tr>
<th>Reducer Series</th>
<th>Input Bearings</th>
<th>Output Bearings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INBOARD CUP / CONE</td>
<td>OUTBOARD CUP / CONE</td>
</tr>
<tr>
<td>Mercury</td>
<td>LM501310 / LM501349</td>
<td>LM501310 / LM501349</td>
</tr>
<tr>
<td>Mars</td>
<td>LM501310 / LM501349</td>
<td>LM501310 / LM501349</td>
</tr>
</tbody>
</table>

### Table 5
Seals for Standard Speed Reducers
(All seals are *Chicago Rawhide* unless noted otherwise)

<table>
<thead>
<tr>
<th>Reducer</th>
<th>Input Seals</th>
<th>Output Seals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NITRILE</td>
<td>VITON</td>
</tr>
<tr>
<td></td>
<td>INBOARD</td>
<td>OUTBOARD</td>
</tr>
</tbody>
</table>
Section 11.0
Accessories

Contact a Rexnord sales representative or refer to Planetgear catalog for detailed information on accessories.

Reducer with Top Motor Mount

Reducer with Scoop Motor Mount

Reducer with Slide Base

Reducer with Scoop and Slidebase