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

- Reducer with Baseplate
- Reducer with Scoop Motor Mount
- Reducer with Slidebase
- Reducer with Top Motor Mount
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The following instructions apply to Jupiter 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 to four points of contact, with a minimum of six to eight 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.

1.3 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 nameplate 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.
Section 2.0  
Installation

2.1 HANDLING OF REDUCER

Disconnect all mounting bolts from the reducer before lifting. Use lifting chains of ample strength, hooked to the eye bolts when lifting the speed reducer; reference Figure 2.1. Reference Table 1 (page 18) for reducer weight. Be sure the reducer is properly secured and balanced to prevent shifting during suspension.

![Figure 2.1—Reducer Handling](image)

2.2 REDUCER MOUNTING

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

Bolts should be of the correct size to fit mounting holes. They should be SAE Grade 5 or equivalent. Fasteners shall be torqued according to Table 2 (page 18). 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.

Section 2.3  
Mounting of Transmission Accessories

2.3.1 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.

**WARNING**

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

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

Correct for angular misalignment in the side view plane.

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

Correct for parallel misalignment in the side view plane.

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

Correct for angular misalignment in the top view plane.

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

Correct for parallel misalignment in the top view plane.

Section 10.0  
Tables: Replacement Seals and Bearings

### TABLE 3  
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>Jupiter (s,d,t,q)</td>
<td>42554 / 42375</td>
<td>42620 / 42687</td>
</tr>
<tr>
<td>Jupiter (quint)</td>
<td>34378 / 34300</td>
<td>42620 / 42687</td>
</tr>
</tbody>
</table>

### TABLE 4  
SEALS FOR STANDARD SPEED REDUCERS

<table>
<thead>
<tr>
<th>REDUCER SERIES</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>
<tr>
<td>Jupiter (s,d,t,q)</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Jupiter (quint)</td>
<td>CR 26220</td>
<td>CR 26209</td>
</tr>
</tbody>
</table>

N = National Seal  
CR = Chicago Rawhide
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 Rexnord® Omega™, refer to the manufacturer's literature for installation instructions. If Planetgear 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 manufacturer's 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 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.

Figure 2.3.3—Planetgear Top Motor Mount

<table>
<thead>
<tr>
<th>TABLE 3</th>
<th>BEARINGS FOR STANDARD SPEED REDUCERS</th>
<th>(All bearings are “Timken” unless noted otherwise)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REDUCER</td>
<td>INPUT BEARINGS</td>
<td>OUTPUT BEARINGS</td>
</tr>
<tr>
<td>Jupiter</td>
<td>REDUCED CUP / CONE</td>
<td>OUTBOARD CUP / CONE</td>
</tr>
<tr>
<td>Jupiter</td>
<td>42584 / 42579</td>
<td>42584 / 42579</td>
</tr>
</tbody>
</table>

Does not include motor weights.
Section 3.0

Lubrication

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

LUBRICATION CHANGES

For normal conditions, change oil every six months or 2,000 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.

OIL

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 No. 2 grease (equivalent to KGF grease). For normal conditions, change grease every six months or 2,000 hours, whichever comes first. 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 maximum 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. Reference Section 3.0 for lubrication.

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

EXCESSIVE TEMPERATURE (more than 200°F (93°C))

POSSIBLE CAUSES: POSSIBLE SOLUTIONS:

OVERLOAD
ï Inspect and replace bearings if necessary. Reference Section 6.0.

IMPROPER ADJUSTMENT
ï Reduce bearing end play. Reference Section 6.0.

LACK OF LUBRICATION, OLD OR CONTAMINATED OIL
ï 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 increased bearing friction.

REMOVAL OF RESTRICTED VENT PLUG
ï Replace damaged bearings as instructed in Section 6.0. Note: Check hub and shaft for potential damage or heat distress.

BEARING NOISE

POSSIBLE CAUSES: POSSIBLE SOLUTIONS:

DEFECTIVE BEARINGS
ï Inspect and replace bearings if necessary. Reference Section 6.0.

IMPROPER ADJUSTMENT
ï Reduce bearing end play. Reference Section 6.0.

WRONG OR INSUFFICIENT LUBRICATION
ï Replace damaged bearings as instructed in Section 6.0. Note: Check hub and shaft for potential damage or heat distress.

DAMAGE TO WORKS OR SCREWS
ï Replace seals. Reference Section 6.0.

BEARINGS OUT OF ADJUSTMENT
ï Adjust bearing end play. Reference Section 6.0.

EXCESSIVE TEMPERATURE, CAUSING BEARING SEAL CAPSULE
ï Inspect and replace bearings if necessary. Reference Section 6.0.

ABRASIVE OR CORROSION
ï Inspect and replace bearings if necessary. Reference Section 6.0.

EXCESSIVE VENT PLUG
ï Replace damaged bearings as instructed in Section 6.0. Note: Check hub and shaft for potential damage or heat distress.

SPUT-LINE LEAKAGE
ï Replace damaged bearings as instructed in Section 6.0. Note: Check hub and shaft for potential damage or heat distress.

DAMAGE OF FASTENERS

POSSIBLE CAUSES: POSSIBLE SOLUTIONS:

IMPROPER ADJUSTMENT
ï Replace damaged bearings as instructed in Section 6.0. Note: Check hub and shaft for potential damage or heat distress.

FAILURES OF FASTENERS
ï Make sure fasteners are torqued correctly. Reference Table 2.

FASTENER LOOSENING
ï Make sure fasteners are torqued correctly. Reference Table 2.
Section 7.0
Storage Procedures

7.1 SPARE PARTS STORAGE
1. On receipt of spare parts, unpack and spray or dip the parts in a rust preventative such as Mobilama 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 this 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.

7.2 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 insure 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 7.2-A.

7.3 LONG TERM STORAGE
Reducer can be ordered from the factory for long term storage. Field preparation for long term storage is described Section 7.2-A.

Section 4.0
Start-up

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 18)?
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. Does the motor shaft rotate in the proper direction?
8. 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 17) for assistance.

4.2.4 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.

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January 1998

Section 9.0
Troubleshooting
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 ENSURE SAFETY DURING MAINTENANCE, ACTIVATE ALL ELECTRICAL AND/OR MECHANICAL LOCKOUTS.

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 (vent plug) and one of the two oil level plugs; reference Figure 5.1.  
4. Fill reducer at oil fill port.  
5. Reducer oil capacity is reached when oil starts to pour out of the bottom of the 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.

5.2 DRAINING OIL

1. Clean external surfaces to avoid contaminants from entering unit when plugs are removed.  
2. Remove oil fill plug (vent plug) for ventilation; reference Figure 5.1.  

CAUTION  
Care should be taken when removing the vent plug. If vent has been clogged, the possibility of pressurized air inside the reducer may exist. Once threads are free to hand rotate, place a heavy cloth over the vent plug and rotate counter-clockwise until removed.

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

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

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.

6.7.3 REMOTE GREASE LINE INSTALLATION

Per preceding drawing, install grease fitting hardware (items 1 & 2) at seal carrier (if not already installed) and fill grease tube (item 5). Note, fill grease tube prior to installation.

Assemble grease fitting hardware (items 1, 3, & 4) into predrilled 7/16 (11 mm) diameter hole in fan shroud (if not already installed).

The grease line (item 5) will be inserted into the grease fitting hardware in the fan shroud when the shroud is assembled to the speed reducer.

6.7.4 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 and the remote grease line (RGL).

Insert RGL grease tube into shroud grease fitting hardware.

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.
Double Reduction disassembly—Remove input assembly (1), input gear (2), maincase (3), ring gear (4), first stage carrier (5), last stage sun gear (6), ring gear (7), last stage carrier (8), and output assembly (9).

Triple Reduction disassembly—Remove input assembly (1), input gear (2), maincase (3), first stage carrier (4), ring gear (5), sun gear (6), second stage carrier (7), last stage sun gear (8), ring gear (9), last stage carrier (10), and output assembly (11).

Quadruple Reduction disassembly—Remove input assembly (1), input gear (2), maincase (3), first stage carrier (4), ring gear (5), sun gear (6), second stage carrier (7), ring gear (8), sun gear (9), third stage carrier (10), last stage sun gear (11), ring gear (12), last stage carrier (13), and output assembly (14).

#### 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 sub-assembly be installed first, then the gear train and finally the input sub-assembly. 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 sub-assembly / maincase in the following locations and install shroud clips; reference Figure 6.7.1A.

Align shroud clip with center of reducer; reference Figure 6.7.1B, and tighten bolts to torque requirements of Table 2, (page 18).

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.

![Figure 6.7.2—Location of Fan](image)

With key in place, 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 18) for torque requirements.

![Figure 6.7.2—Location of Fan](image)

Section 6.0 Disassembly and Assembly Instructions

The following instructions are for the Jupiter speed reducer. This is a guide for disassembly, parts replacement, and reassembly. Note: the drawings used are not to scale 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 Planetgear representative. All bearings and seals used on standard Planetgear speed reducers are listed in Table 3 and Table 4 (page 19).

**REQUIRED EQUIPMENT**

Standard mechanics tools: arbor press or hydraulic press, 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.

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

1. Clean shaft extension.
2. Drain oil from reducer before removing seal carrier; reference Section 5.2.
3. Remove bolts attaching seal carrier to input or output housing (Note location of grease fitting for reinstallation).
4. Using a flat blade and a hammer, break the seal between the seal carrier assembly and the input or output housing; reference Figure 6.2.1.

5. Remove seal carrier.
6. After seal carrier is removed, protect the input or output bearings from contamination by wrapping a clean cloth (or equivalent) around the exposed area.

**CAUTION**

When removing seal carrier, care should be taken not to damage or contaminate the bearings. Damaged bearings may reduce bearing life.

6.2.2 REMOVING SEALS FROM SEAL CARRIER

1. Remove seal carrier from the input or output housing; reference Section 6.2.1 Removing Seal Carrier.
2. With a set of blocks or equivalent, support the seal carrier up so the seals can be pushed out; reference Figure 6.2.2, next page.
3. With an arbor press or a hydraulic press, carefully push seals out of seal carrier using a metal tube or a circular disc.

**NOTE:** Take care not to scratch or gouge the inside diameter of the seal carrier or the surface that mates to the input or output housing. Damage to these areas may result in oil leakage during operation.

6.2 REPLACING SEALS

6.2.1 REMOVING SEAL CARRIER

**NOTE:** If only replacing seals, the reducer need not be pulled from service.

1. Disconnect all attached equipment.

**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.

2. Remove all reducer mounting bolts.
3. Lift reducer as 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 Installing New Seals

1. Remove seal carrier from the input or output housing; reference Section 6.2.1
2. Remove seals from seal carrier; reference Section 6.2.2
3. Clean all machined surfaces on the seal carrier and the machined surface that the seal carrier seats to on the input or output housing.
4. Place seal carrier outboard side face down on a flat surface. Set the double lipped seal on the seal carrier so that the opening (garter spring side) faces the outboard side; reference Figure 6.2.3.2A.
5. With an arbor press or a hydraulic press, carefully push seal into seal carrier until the seal seats flush to the outboard face of the seal carrier; reference Figure 6.2.3.1B.
6. Place seal carrier inboard side face down on a flat surface. Set the single lipped seal on the seal carrier so that the opening (garter spring side) faces the outboard side; reference Figure 6.2.3.2A.

6.3 Adjusting for Too Much Axial Bearing Clearance

1. Support housing to allow the shaft to rotate freely; reference Figure 6.4.1.
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.
5. Follow procedures in Section 6.4.1 to determine new axial bearing clearance.

6.4 Measuring Axial Clearance on Input and Output Assemblies

NOTE: Axial clearance should be checked while seal carrier is removed. The dial indicator should then be placed on the inboard end of the shaft while pressing upwards on the outboard end of the shaft.

6.4.1 Setting Proper Axial Bearing Clearances on Input or Output Shaft Assemblies

1. Support housing to allow the shaft to rotate freely; reference Figure 6.4.1.
2. Mark the position of the clampnut.
3. Rotate clampnut 1/16" to 1/8" (1.5 to 3.1 mm) in the clockwise direction from mark to tighten clampnut.
4. Loosen socket head cap screw on clampnut.
5. Repeat first steps if axial bearing clearance is found to be still too little.
6. Repeat first steps if axial bearing clearance is found to be too much.

6.4.2 Adjusting for Too Much Axial Bearing Clearance

NOTE: If axial bearing clearance is too excessive, it might be necessary to remove the clampnut and other hardware, and press the bearing again. Reference Section 6.3.5 - steps 11 to 20, or Section 6.3.6 - steps 12 to 21.

6.4.3 Adjusting for Too Little Axial Bearing Clearance

NOTE: The measurement given is an estimate.

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: All the gearing is stabilized at the output assembly. Removing output assembly first may result in a difficult time reassembling reducer. It is recommended that the input assembly be removed first, then the gear train, and finally the output assembly.
NOTE: Any gap between shaft and bearing cone can result 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.

NOTE: It is helpful to use a crane to lift hub onto shaft; reference Figure 6.3.4.4.

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 6.3.4.5.

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 6.3.4.2.

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 bind in the cup.

12. INPUT ONLY - Clean and place the backstop or backstop spacer onto the shaft.

NOTE: The desired rotation of the reducer is determined by viewing thru the output shaft side. Reference Figure 6.3.4.6 for orientation of the backstop after being assembled onto the input shaft.

13. Clean and place the torqued washer onto the shaft.

14. Clean clampnut. Place it with the grooved side down (or groove towards bearings) and thread on clampnut until it is unable to rotate.

15. Mark the location of the clampnut.

16. Loosen clampnut approximately 3/4” (19 mm) from original mark.

17. Tighten socket head cap screw on clampnut; reference Table 2.

18. OUTPUT ONLY - Install external retaining ring.

19. Support hub and affix to work table with the shaft not touching the table; reference Figure 6.4.1.

20. With an arbor press or a hydraulic press, push on the inboard end of the shaft to relieve the bearings.

NOTE: A popping noise will sound when bearings are relieved. If the noise does not occur, an alternative way to determine if the bearings have been relieved is if the housing rotates freely on the bearings.

21. Reference Axial Bearing Clearance, Section 6.4 for proper bearing endplay.

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

4. When the seal carrier is piloted on the shaft pilot, seal the seal carrier by slowly pressing down on the flange; reference Figure 6.2.4.

6.2.4 INSTALLING SEAL CARRIER - INPUT/OUTPUT SHAFT ASSEMBLY

1. Clean the machined surfaces where the seal carrier and the input or output housing mate.

NOTE: Scraping of surfaces with a putty knife may be required.

2. Apply a bead of sealant around the inboard lip of the seal carrier and/or around the face of the input or output housing inside the bolt hole circle.

NOTE: Use Locitite 515 gasket eliminator, or equivalent as a sealant.

3. Slip the seal carrier over the shaft.

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.

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

NOTE: For better results, mount reducer in the vertical position; reference Steps A, B, and C.
5. Remove the bolts that attach the assembly to the maincase.
6. With a 1/2" bolt, drive the bolt into one of the four 1/2-13 UNC threaded holes. This will break the seal between the housing and the maincase allowing the removal of the assembly.
7. Remove assembly by lifting, it straight up away from the maincase. An eye bolt can be used in the threaded end of the shaft to lift the assembly. Reference Figure 6.3.1. Do not lift entire reducer by the threaded hole on either shaft.

**CAUTION**
Do not lift input or output shaft assembly by hand. The assemblies are heavy and lifting by hand can cause serious injury.

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

Figure 6.3.1—Proper Lifting of Input or Output Shaft Assemblies

6.3.2.1A—Positioning of Hub

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

4. OUTPUT ONLY - Remove external retaining ring. Store in clean spot.
5. Loosen socket head cap screw on clampnut.
6. Remove clampnut from shaft. Store in clean spot.

NOTE: A wedge can be used to spread the clampnut in order to ease removal.

7. Remove tongued washer from shaft. Store in clean spot.
8. INPUT ONLY - Remove backstop or backstop spacer from shaft. Store in clean spot.
9. With an arbor press or a hydraulic press, press on the inboard end of the shaft to break free the inboard bearing cone.
10. 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.

**CAUTION**
The input and output shafts are heavy.

Figure 6.3.2—Removal of Outboard Bearing Cone (Option #1)

NOTE: Do not push on bearing rollers or bearing cage; reference Figure 6.3.3.2. An eye bolt can be used in the threaded end of the shaft to lift the assembly. Reference Figure 6.3.1. Do not lift entire reducer by the threaded hole on either shaft.

NOTE: For output assembly, the use of Neverseize around the shaft is allowed to ease assembly. Do NOT put Neverseize on threaded part of shaft.

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 6.3.3.

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.

6.3.4 ASSEMBLING INPUT OR OUTPUT SHAFT ASSEMBLIES
1. Clean bearing surface on shaft.

**CAUTION**
Assembly may become too heavy. Pilot assembly so that it will not fall over.

2. Make sure bearing cups are clean and installed properly in housing; reference Section 6.3.3.
3. Set shaft on end with the spline end of the shaft facing up.
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 6.3.4.1 for location.

Figure 6.3.4.1—Location of Bearing Caps and Roller Bearing

Figure 6.3.4.2—Location of Bearing Cage and Roller Bearing

NOTE: DO NOT push on bearing rollers or bearing cage; reference Figure 6.3.4.2 for location.

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

NOTE: DO NOT push on bearing rollers or bearing cage; reference Figure 6.3.4.2 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 insure proper cone seating; reference Figure 6.3.4.3.
6.3.2 DISASSEMBLING INPUT OR OUTPUT SHAFT ASSEMBLIES TO REPLACE BEARINGS

1. Remove endbell from reducer; reference Section 6.3.1.
2. Remove seal carrier from endbell; reference Section 6.3.1.
3. Support hub to expose the inboard side of the endbell.

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

6.3.3 INSTALLING BEARING CUPS INTO INPUT OR OUTPUT HOUSINGS

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

NOTE: DO NOT push on bearing rollers or bearing cage; reference Figure 6.3.4.2 for location.

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 cups. Be sure to push cups in evenly. Any misalignment may result in a damaged housing or bearing cup.

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 6.3.3.

NOTE: For output assembly, the use of Neverseize around the shaft is allowed to ease assembly. DO NOT put Neverseize on threaded part of shaft.

4. With an arbor press or a hydraulic press carefully push bearing cone towards the inboard end of the shaft; reference Figure 6.3.2.3, next column.

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. Clean bearing surface on shaft.

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

6.3.4 ASSEMBLING INPUT OR OUTPUT SHAFT ASSEMBLIES

1. Clean bearing surface on shaft.

NOTE: For output assembly, the use of Neverseize around the shaft is allowed to ease assembly. DO NOT put Neverseize on threaded part of shaft.

2. 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.

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

CAUTION: Assembly may become top heavy. 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 6.3.4.1.

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 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 6.3.4.3.
NOTE: Any gap between shaft and bearing cone can result excessive axial bearing clearance or bearing misalignment and ultimately result in premature bearing damage.

Tighten socket head cap screw on clampnut; reference Table 2.

NOTE: The desired rotation of the reducer is determined by viewing thru the output shaft side; Reference Figure 6.4.6 for orientation of the backstop after being assembled onto the input shaft.

NOTE: Scraping of surfaces with a putty knife may be required.

NOTE: A popping noise will sound when bearings are relieved. If the noise does not occur , an alternative way to determine if the bearings have been relieved is if the housing rotates freely on the shaft.

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

Figure 6.3.4.6—Backstop on Input Assembly

Figure 6.2.4.—Placement of Seal Carrier Assembly onto Shaft

NOTE: Orientate the seal carrier grease fitting to the position best suited to your application. Reducers built by Planetgear are assembled with the grease fitting oriented in-line with an oil port in the input or output shaft housings and are normally in the 12 o’clock position.

NOTE: PLACE BEARINGS

1. Clean the machined surfaces where the seal carrier and the input or output housing mate.

NOTE: Scraping of surfaces with a putty knife may be required.

2. Apply a bead of sealant around the inboard lip of the seal carrier and/or around the face of the input or output housing inside the bolt hole circle.

NOTE: Use Locite 515 gasket eliminator, or equivalent as a sealant.

3. Slip the seal carrier over the shaft.

4. When the seal carrier is piloted on the shaft pilot, seat the seal carrier by slowly pressing down on the flange; reference Figure 6.2.4.

NOTE: Special care should be taken when removing the output assembly. All gearing is stabilized at the output assembly. Removing output assembly first may result in difficulties during reducer reassembly. 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.

Figure 6.3.4.5—Placing Inboard Bearing Cone onto Shaft

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.

NOTE: For better results, mount reducer in the vertical position; reference Steps A, B, and C.

2. Clean all external surfaces to prevent contaminants from entering unit when disassembled.

3. Drain oil from unit; reference Section 5.2.

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

Figure 6.2.4—Placement of Seal Carrier Assembly onto Shaft

Step A— Carefully lift reducer by using the two eyebolts located on the input shaft end of reducer. Do not allow output shaft to be damaged.

Step B— Carefully lift reducer to vertical position by both the two eyebolts and the two festoon mounting holes on the input shaft end.

Step C— Carefully place reducer in vertical position on support blocks.
6.2.3 INSTALLING NEW SEALS

1. Remove seal carrier from the input or output housing; reference Section 6.2.1.
2. Remove seals from seal carrier; reference Section 6.2.2.
3. Clean all machined surfaces on the seal carrier and the machined surface that the seal carrier seats to on the input or output housing.
4. Place seal carrier outboard side face down on a flat surface. Set the single lipped seal on the seal carrier so that the opening (garter spring side) faces the outboard side; reference Figure 6.2.3.2A.

5. With an arbor press or a hydraulic press, carefully push seal into seal carrier until the seal seats flush to the outboard face of the seal carrier; reference Figure 6.2.3.1A.

6. Place seal carrier inboard side face down on a flat surface. Set the single lipped seal on the seal carrier so that the opening (garter spring side) faces the inboard side; reference Figure 6.2.3.1B.

7. With an arbor press or a hydraulic press, carefully push seal into seal carrier until the seal seats flush to the outboard face of the seal carrier; reference Figure 6.2.3.2B.

NOTE: Be sure to push seal in squarely. Any misalignment might damage seal and result in oil leakage.

6.4 SETTING PROPER AXIAL BEARING CLEARANCES ON INPUT OR OUTPUT SHAFT ASSEMBLIES

6.4.1 MEASURING AXIAL CLEARANCE ON INPUT AND OUTPUT ASSEMBLIES

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

NOTE: If necessary, the axial bearing clearance can be measured by orientating the larger assemblies outboard side down. The dial indicator should then be placed on the inboard end of the shaft while prying upwards on the outboard end of the shaft.

NOTE: Axial clearance should be checked while seal carrier is removed.

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 0.016 mm graduations.

5. Mark the position of the clampnut.

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 is 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" (0.025 to 0.102 mm) axial bearing clearance is recommended. Do steps 3 thru 8 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.

6.4.2 ADJUSTING FOR TOO MUCH AXIAL BEARING CLEARANCE

NOTE: If axial bearing clearance is too excessive, it might be necessary to remove the clampnut and other hardware, and press the bearing again. Reference Section 6.3.6 - steps 11 to 20, or Section 6.3.6 - steps 12 to 21.

1. Loosen socket head cap screw on clampnut.
2. Mark the position of the clampnut.
3. Rotate clampnut 1/16" to 1/8" (1.5 to 3.1 mm) in the clockwise direction from mark to tighten clampnut.

NOTE: The measurement given is an estimate.

4. Tighten socket head cap screw on clampnut.
5. Follow procedures in Section 6.4.1 to determine new axial bearing clearance.
6. Repeat first 5 steps if axial bearing clearance is found to be still too much.

6.4.3 ADJUSTING FOR TOO LITTLE AXIAL BEARING CLEARANCE

NOTE: The measurement given is an estimate.

4. Tighten socket head cap screw on clampnut.
5. With a hydraulic press, push on the clampnut end of shaft to increase the bearing axial clearance.
6. Follow procedures in Section 6.4.1 to determine new axial bearing clearance.
7. Repeat first 6 steps if axial bearing clearance is found to be still too little.

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 ratings. 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: All the gearing is stabilized at the output assembly. Removing output assembly first may result in a difficult time reassembling reducer. It is recommended that the input assembly be removed first, then the gear train, and finally the output assembly.
6.7 FAN AND SHROUD INSTALLATION

6.7.1 SHROUD CLIP INSTALLATION
Remove mounting bolts from input sub-assembly / maincase in the following locations and install shroud clips; reference Figure 6.7.1A.

Align shroud clip with center of reducer; reference Figure 6.7.1B, and tighten bolts to torque requirements of Table 2, (page 18).

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.

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 sub-assembly be installed first, then the gear train and finally the input sub-assembly. Unit should be assembled in the vertical position, with input shaft up.

6.2 REPLACING SEALS
6.2.1 REMOVING SEAL CARRIER
NOTE: If only replacing seals, the reducer need not be pulled from service. Seals are housed in a seal carrier which can be removed without pulling the reducer out of service. Seals are housed in a seal carrier which can be removed without pulling the reducer out of service.

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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.

5.1 FILLING OIL
1. Chose 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 (vent plug) and one of the two oil level plugs; reference Figure 5.1.
4. Fill reducer at oil fill port.
5. Reducer oil capacity is reached when oil starts to pour out of the bottom of the 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.

5.2 DRAINING OIL
1. Clean external surfaces to avoid contaminants from entering unit when plugs are removed.
2. Remove oil fill plug (vent plug) for ventilation; reference Figure 5.1.
3. With the proper size oil drain pan (reference oil quantity on nameplate) in place, remove one of the drain plugs.

CAUTION
Oil may be hot. Do not drain until oil is at ambient or a safe temperature.
4. After oil is removed, replace oil drain plug, sealing it in the process using thread sealant.

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.
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.

5.7.3 REMOTE GREASE LINE INSTALLATION
Per preceding drawing, install grease fitting hardware (items 1 & 2) at seal carrier (if not already installed) and fill grease tube (item 5). Note, fill grease tube prior to installation.

NOTE: The fan shroud should be predrilled for the shroud clips and the remote grease line (RGL).

6.7.4 FAN SHROUD INSTALLATION
Position the fan shroud so that it fits tight over the shroud clips. Check to ensure 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 and the remote grease line (RGL).

Insert RGL grease tube into shroud grease fitting hardware.

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 Storage Procedures

7.1 SPARE PARTS STORAGE
1. On receipt of spare parts, unpack and spray or dip the parts in a rust preventative such as Mobilama 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 newsprint 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.

7.2 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 assure 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 7.2-A.

7.3 LONG TERM STORAGE
Reducer can be ordered from the factory for long term storage. Field preparation for long term storage is described Section 7.2.

Section 4.0 Start-up

4.1 PRE START-UP CHECKLIST
   ☑ Has the reducer been filled with the proper oil type and to the correct oil level?
   ≤ 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 16)?
   ☑ Are all input and output shaft couplings, sprockets, pinions, etc. mounted with full engagement and keys in place?
   ➤ Have couplings and reducer seals been properly greased?
   ◆ Are coupling connections properly aligned and fastened?
   ± Have all pipe plugs (oil fill, oil level, and oil drain) been inserted and properly tightened?
   ➤ Have all electrical connections been made?
   = Does the motor shaft rotate in the proper direction?
   ◆ 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 order or 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 17) for assistance.

4.3 POST START-UP CHECKLIST
   ☑ After approximately forty-hours of use, check all foundation and mounting bolts and tighten as required. Note: Always recheck alignment after tightening.
   ≤ 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.

Bulletin #88-PG20
January 1998
### Section 3.0 Lubrication

**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 change scheduling. Oil samples should be taken from the oil level hole, not the drain hole.

**GREASE**

All reducers are furnished with grease purgeable seals, thus removing entry of water or abrasive dust into the reducer. The reducers are shipped with the grease cavity filled with No.2 grease (equivalent to K2K grease). For normal conditions, change grease every six months or 2,500 hours, whichever comes first. 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 Planetarygear 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) lower 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. If the speed reducer operates under extreme conditions or is exposed to large temperature fluctuations, the use of a synthetic oil is recommended.

**LUBRICATION QUANTITY**

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

**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 ANSI / AGMA grade for lubricant 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.
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 Rexnord® Omega™, refer to the manufacturers literature for installation instructions. If Planetgear 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 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.

Figure 2.3.3—Planetgear Top Motor Mount

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### TABLE 3

<table>
<thead>
<tr>
<th>BEARINGS FOR STANDARD SPEED REDUCERS (ALL BEARINGS ARE &quot;TIMKEN&quot; UNLESS NOTED OTHERWISE)</th>
<th>INPUT BEARINGS</th>
<th>OUTPUT BEARINGS</th>
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<td>OUTBOARD CUP / CONE</td>
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<td>36304 / 36332</td>
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<tr>
<td>Jupiter (quint)</td>
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Does not include motor weights

### TABLE 2

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### TABLE 2

<table>
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</tr>
<tr>
<td>12.9</td>
</tr>
<tr>
<td>2.5</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, 04/10/79
Section 2.0 Installation

2.1 HANDLING OF REDUCER

Disconnect all mounting bolts from the reducer before lifting. Use lifting chains of ample strength, hooked to the eye bolts when lifting the speed reducer; reference Figure 2.1. Reference Table 1 (page 18) for reducer weight. 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.

2.2 REDUCER MOUNTING

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

Bolts should be of the correct size to fit mounting holes. They should be SAE Grade 5 or equivalent. Fasteners shall be torqued according to Table 2 (page 18). 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.

2.3.1 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 manufacturer 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 )
Correct for angular misalignment in the side view plane.

STEP #2 ( side view plane )
Correct for parallel misalignment in the side view plane.

STEP #3 ( top view plane )
Correct for angular misalignment in the top view plane.

STEP #4 ( top view plane )
Correct for parallel misalignment in the top view plane.

Figure 2.1—Reducer Handling

Section 10.0 Tables: Replacement Seals and Bearings

TABLE 3
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>Jupiter (s,d,t,q)</td>
<td>42584 / 42375</td>
<td>42584 / 42375</td>
</tr>
<tr>
<td>Jupiter (quint)</td>
<td>42620 / 42687</td>
<td>42620 / 42687</td>
</tr>
</tbody>
</table>

TABLE 4
SEALS FOR STANDARD SPEED REDUCERS

<table>
<thead>
<tr>
<th>REDUCER SERIES</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>
<tr>
<td>Jupiter (s,d,t,q)</td>
<td>N- (N)</td>
<td>416556V (N)</td>
</tr>
<tr>
<td>Jupiter (quint)</td>
<td>26220 (CR)</td>
<td>26208 (CR)</td>
</tr>
</tbody>
</table>

N = National Seal
CR = Chicago Rawhide
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 drives 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 to four points of contact, with a minimum of six to eight 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.

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

Reducer with Baseplate

Reducer with Scoop Motor Mount

Reducer with Slidebase

Reducer with Top Motor Mount

Jupiter Owners' Manual