

Maintenance Instructions

These general maintenance instructions cover Series 130 through Series 80 Worm Gear Reducers. Your reducer may be slightly different than the reducers shown in the figures below, and to the right, but these general instructions will still apply.

It is advisable to periodically inspect your Speed Reducer for any signs of impending service. Spare or replacement parts can often be ordered and obtained before disassembly is necessary, thus minimizing machine down-time. The following symptoms can be inspected visually without disassembly and may, in some cases, indicate extensive maintenance procedures.

OIL LEAKING FROM SEALS—indicates that shaft and/or seals are worn and need replacing. Keep dirt and foreign particles off shafts in the area of the seals to minimize wear.

OIL LEAKING FROM INPUT OR OUTPUT CAPS, CAP SCREWS OR PIPE PLUGS—might be corrected by retightening or removal and recoating with Loctite® or pipe sealant as required before tightening. If this does not correct the leaking condition, disassembly will be necessary to replace o-rings.

EXCESSIVE END PLAY OF SHAFTS—if there is noticeable shaft movement when couplings are removed and shaft is moved back and forth, it may be an indication of bearing wear. Replacement may be required.

EXCESSIVE BACKLASH—would indicate worm gears which might have to be replaced.

HIGH INTERNAL OPERATING TEMPS (ABOVE 200°F OR 95°C)—if a unit exhibits high internal operating temperatures, one or a combination of the following may be the cause.

1. Unit is overloaded, application may require replacement with higher capacity unit.
2. Damaged bearings, components or improper bearing setting.
3. Improper oil level, lubricant type or lubricant contamination.
4. High ambient temperature.
5. High speed operation in excess of rated values.

IMPORTANT

In the initial factory assembly, Loctite® is used on the threads of all capscrews. If any screws are removed, a new application of Loctite® is required. NOTE: Screw threads and the threaded hole must be degreased before application of Loctite®.



For safe operation and to continue the unit warranty, when installing,

reinstalling, or replacing a factory installed fastener for servicing purposes, or to accommodate the mounting of guards, shields or other light load imposing devices, or for mounting the unit, it becomes the responsibility of the customer or user to properly determine the quality, grade of fastener, thread engagement, load carrying capacity, tightening torque, and the means of torque retention.

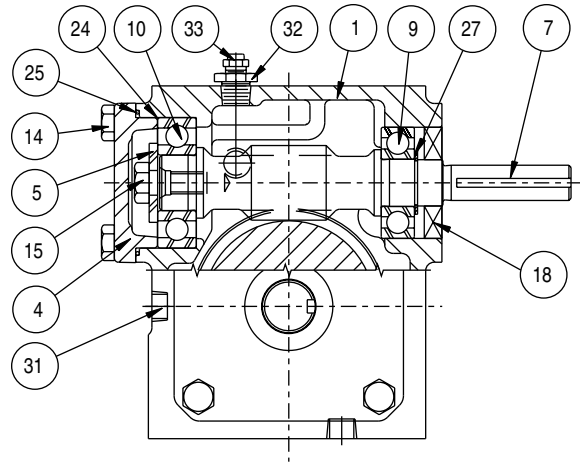


Figure 2 — Ball Bearing Input Shaft Assembly

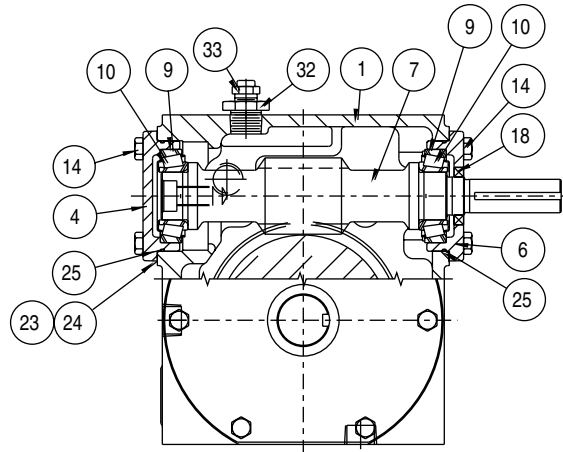


Figure 3 — Tapered Bearing Input Shaft Assembly

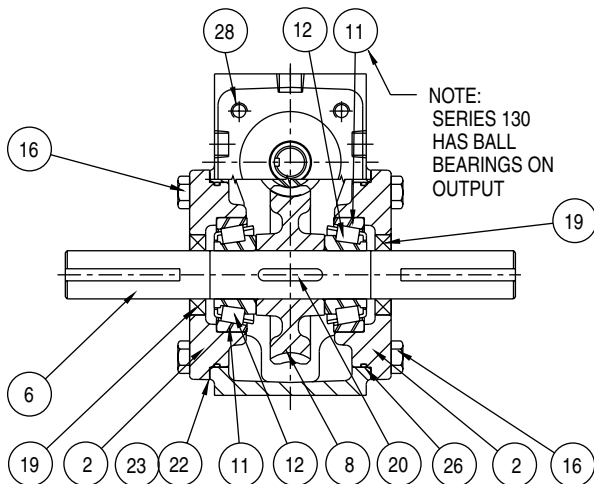


Figure 1 — Typical Output Shaft Assembly

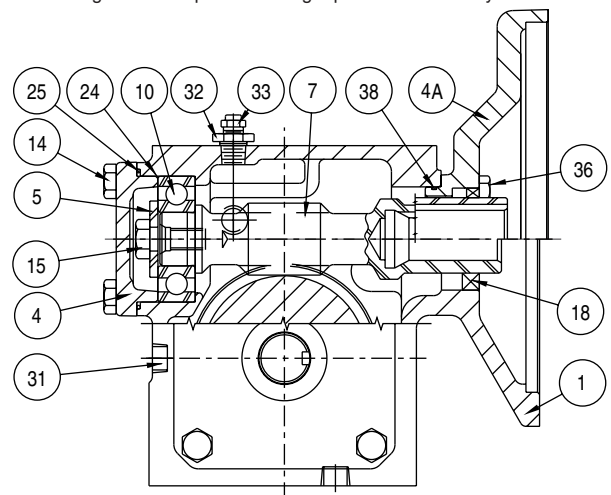


Figure 4 — Motorized Input Assembly

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The figures on page B-128 represent a general design configuration for Hub City Century Series Worm Gear Speed Reducers. There are design differences from model to model, and a general outline of the basic construction is offered here for clarification and future reference:

INPUT SHAFT ASSEMBLY STYLES

Motorized Versions

Series 130-380 Single ball bearing construction opposite motor end as shown in Figure 4.

Series 450-520 Double tapered bearing arrangement opposite motor end, not shown

Series 60-80 N/A

Shaft Input Versions

Series 130-260 Ball bearing construction as shown in Figure 2. No open input cap.

Series 320-70 Direct mounted tapered bearings, straddle mounted on worm, and open input cap used as shown in Figure 3.

Series 80 Double tapered bearing arrangement opposite shaft extension, with single spherical roller bearing on shaft extension side. (Not shown)

Housing Construction

Series 130-260 Have 56C/143TC flange cast integral with housing. All other input flanges and all other models utilize bolt-on connection.

Series 130 Utilizes an expansion plug instead of high speed cover (Ref. #4)

OUTPUT SHAFT ASSEMBLY STYLES

All series, with the exception of the Series 130, use a straddle mounted tapered bearing design as shown in Figure 1 on both shaft and hollow bore outputs. Series 130 uses ball bearings.

Series 450, 520, 60, and 70 hollow shaft units have flanged output sleeves.

Series 60, 70, and 80 have shouldered solid output shafts.

DISASSEMBLY PROCEDURE



The exterior threaded holes on this drive are for mounting the drive or drive accessories (couplings, sprockets, etc.). They are not to be used for lifting the drive or any driver/driven equipment.



Make certain that the power supply is disconnected before attempting to service or install the unit, or remove any components. Lock out the power supply, and tag it to prevent unexpected application of power.

Refer to the figures on page B-128 for the discussion on assembly and disassembly procedures.

1. Disconnect reducer from drive motor, couplings, or driven shafts to guard against personal injury. Remove all sprockets or sheaves from reducer shafts with a puller tool to prevent accidental damage to shafts.

2. Remove Pipe Plug from bottom of Gear Case and drain all lubricant from unit.



Oil, housings, and other components can reach high temperatures during operation, and can cause severe burns. Use extreme care when removing lubrication plugs and vents while servicing the unit.



Wear protective clothing and eye shields when installing or maintaining unit and machine.

3. If old seals are to be salvaged, cover keyways with cellophane tape, plastic shim stock, or paper before sliding seals over keyway. Remove cap screws from Output Shaft Caps (2) and CAREFULLY remove output shaft assembly. Be careful to keep bearings clean and not to damage Worm Gear (8) teeth.

4. Remove cap screws from closed input cap (4) and open input cap if applicable. Series 60, 70, and 80 may have fan shroud in place of cap. Use same procedure. Series 130 requires removal of expansion plug. The expansion plug is a non salvageable part. CAREFULLY remove input shaft assembly. On motorized units, remove entire quill assembly from the back of the unit. On shaft input units, remove input seal (18) or open cap if applicable and snap ring (27) if used and press worm shaft out through front bearing (9). NOTE: Some series allow removal of input shaft assembly without removal of front seal through closed cap end. On Series 80, remove bearing locknut, lock washer, and flat washer. Press input shaft out of housing and bearings.



FIGURE 5 – Removal of Worm Gear and Bearing Cone

5. Examine Seals (13) for wear or damage and remove from caps or housing only if replacement is necessary. (When servicing units, seals should always be replaced.) When removed from caps or housing, seals should not be reused.

6. Remove Bearing Cups (11) from output caps and input caps when applicable with a puller tool. If driven out, gently tap opposite sides of the bearing cups with a flat punch so they are removed evenly and no damage occurs to caps.

7. To remove Worm Gear (8) and Bearing Cone (12) from Output Shaft (6), rest one side of gear on blocks and press shaft through gear and one bearing cone as shown in Figure 5.



Do not attempt to strip the gear and both bearing cones off the output shaft in one operation. The Key (17) will lodge against Bearing Cone (12) and severe damage will occur.

Series 450, 520, 60 and 70 units have flanged output sleeves on the shaft mount models. To remove the worm gear from these models, the sleeve must be pressed out so gear moves away from the flange. The back side of the flange is recessed to allow a puller to be used to remove the bearing cone from the short end of the output sleeve.

Series 60, 70, and 80 have shouldered output shaft. To remove gear assembly, press on shaft so gear assembly moves away from shoulder.

8. If input shaft bearings are to be reused, use bearing puller tool or proper bearing removal fixture so no damage occurs to bearings.

ASSEMBLY PROCEDURE

1. All parts, including the gear case, should be cleaned thoroughly with an approved, non-flammable, nontoxic solvent. Any accumulation of sludge deposits or corrosion should be removed. Whenever input or output caps are removed, it is recommended that seals and shims be replaced. These and other miscellaneous items are included in each Reducer Repair Kit. Before reassembly, examine input and output shafts for grooving in the shaft seal area. If the shafts are to be reused, polish out any imperfections with a fine grade of emery cloth. The polishing motion should be circumferential, not axial or spiral in direction. Shaft grooving .010 deep or greater cannot be corrected by polishing. These shafts should be replaced or the seal installed in a new axial location to allow contact in non grooved areas. Some units do not allow space for repositioning of the seal.

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2. Replace Bearing Cups (14) in output caps and input caps when applicable being careful to remove any foreign particles in the counterbore. Bearing cup must seat squarely in counterbore of cap. If cups must be tapped into place, use a rubber hammer or brass driver to protect cup surfaces. Do not insert seals at this time.

3. **PREASSEMBLY OF INPUT AND OUTPUT SHAFTS.**

IMPORTANT: The Models 130-380 motorized style input and Series 130-260 shaft style units use a **National Fine Grade 8** cap screw to secure the rear ball bearing to the shaft. The assembly procedure for the cap screw is critical and **MUST** be followed to assure proper gearbox operation.

- A. Clean the cap screw to be free of dirt and oil.
- B. Clean the threaded hole with a swab or air pressure.
- C. Apply Loctite® Primer N to the threaded hole. Do this before preassembly so the primer is dry when you are ready to install the screw.
- D. Assemble the rear bearing, taking care to press on bearing inner race only.
- E. Slide the flat washer onto the screw.
- F. Apply green Loctite® #640 to the screw and also the threaded hole in the worm.
- G. Tighten the screw to the appropriate torque as listed below.

Series	Cap Screw	Tightening Torque
130	5/16-24 x 3/4	20 ft.-lbs.
180	5/16-24 x 3/4	20 ft.-lbs.
210	5/16-24 x 3/4	20 ft.-lbs.
260	3/8-24 x 1-1/4	37 ft.-lbs.
320	1/2-20 x 1-1/2	90 ft.-lbs.
380	1/2-20 x 1-1/2	90 ft.-lbs.

NOTE: PREASSEMBLY OF BALL BEARING STYLE INPUT SHAFTS. Series 130 and 210 require assembly of the rear ball bearing in the housing after the worm shaft has been inserted. Models 180 and 260 can have both bearings preassembled before final assembly. The procedure for securing the cap screw listed above should be carefully followed for Models 180 and 260 at this time.

When reassembling worm and worm gear assemblies, refer to Figures 1 and 2 so that all parts are included in their proper position. Be sure that parts are pressed tightly against one another and that no foreign material is included between them. If shaft has a shoulder, the appropriate gear, spacer, or bearing must be assembled tightly against it.

Figure 6 shows the recommended method of pressing the Bearing Cone (1) onto the Shaft (3). An Inserting Tool (2) is shown pressing evenly on the bearing inner race. This tool may be machined for this purpose in your shop. A substitute inserting tool may also be made from tubing which would have an I.D. sufficient to accept the shaft and an O.D. **no larger** than the inner bearing race.

CAUTION

Contact on the cage of the bearing, or using the bearing cup to press the bearing on, will damage bearing.

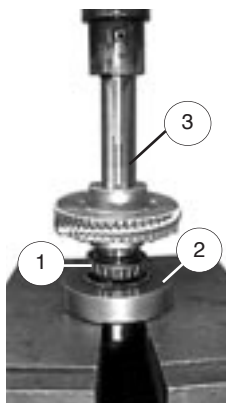


FIGURE 6 – Reassembly of Worm Gear and Bearing Cone

4. Installation of Input Assembly

- A. Shaft input styles using ball bearings, Models 130-260.

Install preassembly into housing. Models 130 and 210 will require installation of rear bearing while input shaft is in the housing. Install washer and cap screw, taking care to follow the procedure outlined in Section 3 on these models at this time. Then install proper amount of shims (24) between bearing outer race and end cap to eliminate any axial movement of bearing outer race. Liberally add grease to o-ring (25), Loctite® cap screws (14) and tighten properly.
- B. Shaft input styles using tapered bearing. Models 320-80

Install preassembly into housing. Preassembly will consist of worm shaft and two bearing cones. Install two (2) each shims 23 & 24 between gear case and input caps. Bearings are adjusted by adding or

removing shim until bearings bind, then adding one .002 shim at a time until shaft rotates freely with .001-.003 endplay. Liberally add grease to o-ring, Loctite® cap screws and tighten properly.

On Series 80, install only Roller Bearing Inner Race on input shaft. Install shaft in housing, install Inner Bearing Cup, then press both bearing cones onto shaft. Install Outer Bearing Cup, flat washer, lock washer, and locknut. Tighten locknut fully and bend tang of lock washer into slot on locknut. Install roller bearing into housing and install open cap. No bearing adjustment is required at open cap. Adjust tapered roller bearings with gaskets at closed cap.

- C. Motorized style assemblies using a single ball bearing. Models 130-380.

Install preassembly in housing. All units should have bearing installed on shaft and cap screw assembled by following procedure listed earlier at this time. Install proper amount of shims (24) between bearing outer race and end cap to eliminate any movement of bearing outer race. Liberally add grease to o-ring (25), Loctite® cap screws (14) and tighten properly.

5. Installation of the output assembly. **IMPORTANT:** The Worm must be centered on the Worm Gear for maximum gear life. Follow the procedure below to achieve proper bearing adjustment and gear position.

- A. Insert output assembly carefully into gear case so that worm is meshed with worm gear. Install one each .002 and .005 shims (22) (23) on each Output Cap (2, Figures 1 and 2) and install caps over shaft. Fasten caps and shims to gear case by torquing down cap screws evenly.
 - B. Adjust bearings by removing or adding shims until bearings bind. Then add one shim at a time until shaft rotates freely, with no endplay. **NOTE:** the position of the gear will be closer to center if the total shim pack thickness on each cap does not vary by more than .005. After adjusting bearings, but before permanently bolting output caps or installing o-rings, coat worm gear teeth with blueing compound.
 - C. Turn Worm Shaft (7) by hand while putting a slight load on output shaft so that worm marks contact points in blueing on gear.
 - D. Sight through pipe plug holes with an inspection light and determine if the contact of the worm is centered on both sides of the gear. If worm is not centered, the gear position must be shifted by moving shims from one side to the other. This will maintain proper bearing adjustment. See Figure 7.
 - E. Liberally apply grease to o-ring and Loctite® cap screws and tighten properly.
6. Oil Seals (13, Figures 1 and 2) can now be installed in input and output caps. Before installing seal, coat O.D. of seal with Permatex and apply grease to seal lips. Force should be applied evenly, with a driver, near the outer edge of the seal until seals are flush with outer surface of caps. If seals must be installed without a seal driver, a rubber hammer or brass driver should be used to protect the seal.

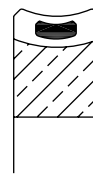


FIGURE 7 – Gear Pattern

CAUTION

Damage to seals can be avoided by covering the shaft keyways with cellophane tape, plastic shim stock, or paper before sliding seals onto the shaft. The spring loaded lip of the seal must face toward the inside of reducer to operate properly.

7. Apply sealant to drain plug and replace in the bottom of the gear case. Remove fill and breather plugs and fill gear case with recommended lubricant, following all the procedures detailed in the Lubrication and Installation Instructions which are included with Speed Reducer.

CAUTION

Do not operate the unit without making sure it contains the correct amount of oil. Do not overfill or underfill with oil, or injury to personnel, unit, or other equipment may result.

CAUTION

Do not mix nonsynthetic and synthetic oil in the unit.

WARNING

Make certain that all tools and other items are clear from rotating parts before starting machine. Stand clear, and start machine slowly to be sure all components are secure, and operating properly.

For further information that may be helpful, see the Lubrication, Installation and Illustrated Replacement Parts sheets for your Speed Reducer. Should a particular problem arise or additional information be required, contact the nearest HUB CITY Sale Office or Industrial Power Transmission Distributor which are listed in the Yellow Pages, or contact HUB CITY, Aberdeen, SD.