MagnaGear Speed Reducers
Size G525, Size G700, Size G920
Instruction Manual

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see **dodgeindustrial.com** for updated instruction manuals.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

WARNING: All products over 25 kg (55 lbs) are noted on the shipping package. Proper lifting practices are required for these products.

GENERAL INFORMATION

The MagnaGear reducer is designed in accordance with the standards of the American Gear Manufacturers Association to give years of trouble-free operation. Unauthorized modifications are not allowed. In order to obtain good performance, there are precautions and procedures that must be observed when installing and servicing the reducer. This instruction manual contains installation, operating, and maintenance information for your reducer and its accessories. Additional information can be obtained by contacting your local Dodge sales office, distributor or authorized service center.

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by Dodge® nor are the responsibility of Dodge. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

INSTALLATION

NOTE: This reducer is compatible with the Dodge Ability Smart Sensor, that can be installed in the adapter plug labeled "smart sensor". The plug and sensor can be moved to different locations as required by mounting position.

INITIAL RECEIVING INSPECTION

Carefully inspect the drive units for obvious outside damage. If any form of damage is present, notify the carrier and take photos for future use. Great care was taken to insure that the cargo was very well protected. Accessories such as heat exchangers, guards, and couplings may be packaged separately.

Reducer Lifting Instructions

If the reducer is not mounted on a base plate or swing base, the reducer may be lifted utilizing the four bolt holes located on top of the reducer at four corners. Use proper lifting equipment and safe lifting practices when lifting the reducer. The use of eye bolts and nylon straps are suggested to avoid damage to sheet metal or any painted surfaces. Metal lifting straps or cables can be used in place of nylon straps if needed.

Foundation

- A foundation for mounting the reducer must be of sufficient size and rigidity to prevent movement when the MagnaGear unit is installed and operated, and to maintain the alignment between the driven equipment, the MagnaGear, and the drive motor. The foundation surface be flat and level to within 1/16" (1.5 mm) to prevent distortion of the base plate or reducer when hold down bolts are tightened. A well laid concrete slab is the most effective way of ensuring a sound foundation. Steel sub bases can be used under the drive base.
- An elevated foundation will make oil drainage easier.
- The foundation must also have adequate strength and rigidity to withstand the operating forces resulting from the starting torque of the motor multiplied by the gear reduction ratio. Starting motor torque values can be three to even four times higher than nominal motor torque ratings.
- When the geardrive is directly attached to another component, i.e. shaft mounted on a pulley or an outboard bearing on the end of the reducer output shaft, one supporting structure shall be used to mount both components.

- Drive bases must be thermally stress relieved after fabrication for long term dimensional stability. It is preferred to have both the top and bottom surfaces machined flat to facilitate shimming. However, it is acceptable to have only the top mounting surfaces machined.

Steel Foundations

- When mounting a reducer on structural steel, an engineered rigid baseplate is recommended. Fabricated pedestals or baseplates must be carefully designed to assure that they are sufficiently rigid to withstand operating conditions. MagnaGear motor baseplates are fabricated from heavy steel to achieve the necessary rigidity. Bolt the reducer and baseplate securely to the steel supports with proper shimming to ensure a flat and level surface.

CAUTION: The reducer must be mounted on a flat base with proper shimming. Failure to observe this precaution could result in damage to or destruction of the equipment.

Concrete Foundations

If the reducer is to be mounted on a concrete foundation, grout steel mounting pads into the concrete base rather than grouting the reducer directly onto the concrete.

If the reducer is mounted on a baseplate which will be installed on a concrete foundation, use the following instructions:

- The top of the foundation slab or steel sub base should be left 1" to 1.5" (25 to 38 mm) lower than will finally be required to allow for grouting. When installing, the foundation should be roughened, cleaned, and dampened before placing the drive base in position. When installing the drive base on a steel sub base use epoxy type grout. When installing the drive base on a concrete foundation either epoxy type grout or non-shrinking Portland cement type of grout can be used.

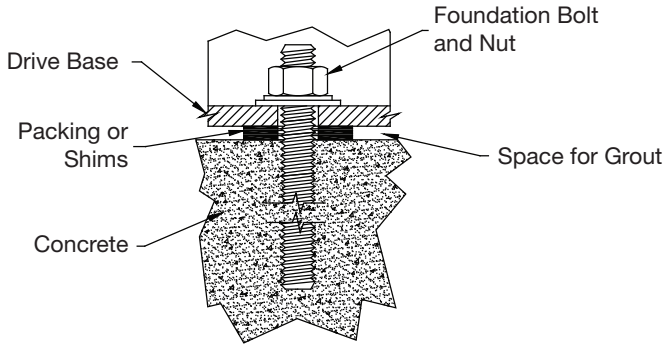


Figure 1 - Foundation Bolts in Conrete

- Foundation bolts should be secured in the concrete as shown in Fig. 1. Allow adequate length for the bolts. Foundation bolts can be placed in the concrete at the time the concrete is poured.
- Packing shims are placed between the top of the foundation and the baseplate until the unit is 1" to 1.5" (25 to 38 mm) clear of the foundation. Adjust the packing or shims until a level placed on the baseplate indicates the base is level.
- After a preliminary alignment between the MagnaGear input and output couplings, the space between the top of the concrete surface and the bottom of the drive baseframe must be filled with grout. The grout should be thoroughly worked under the baseplate and be allowed to completely set (at least 72 hours). After the grout has set, the holding bolts should be tightened evenly. Final alignment of the MagnaGear should be checked after the grout has set and the hold down bolts have been tightened.

CAUTION: To move or lift a MagnaGear gearbox alone, use all 4 lifting holes in the corners of the upper housing. DO NOT use these holes to lift an entire drive motor-gearbox assembly. Use the lifting holes provided on the drive bases for lifting the drive assembly.

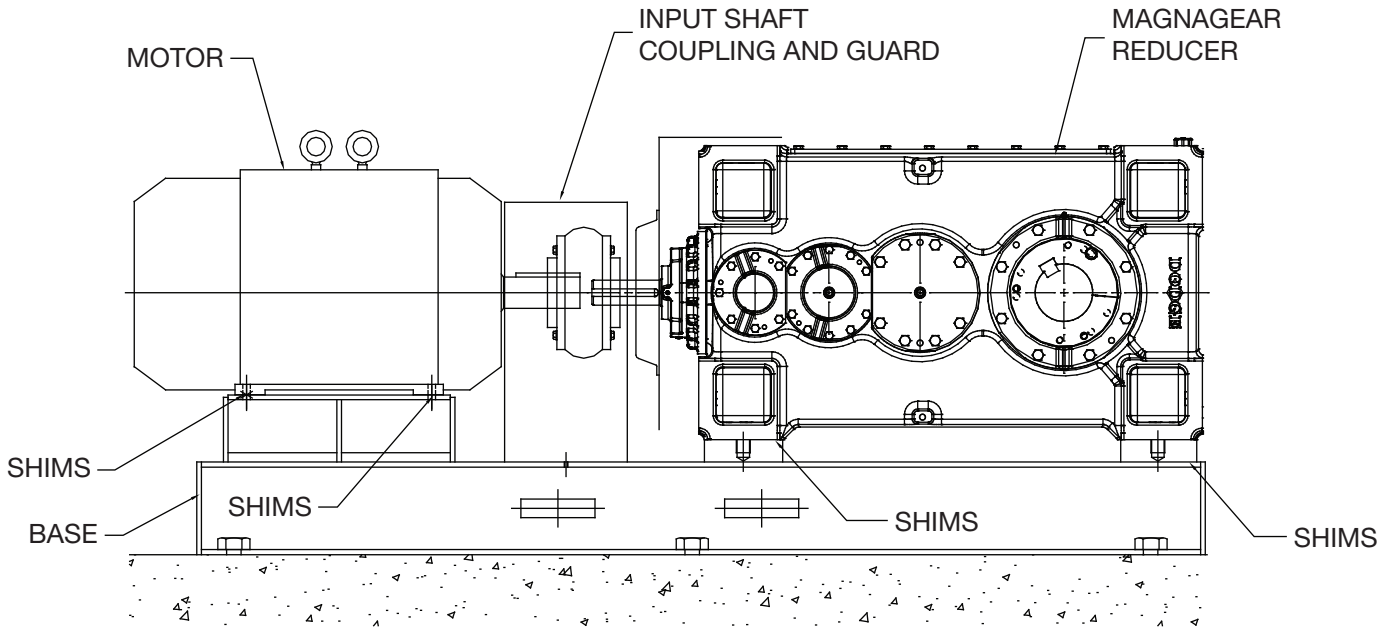


Figure 2 - Typical HD Base Mounting

ALIGNMENT AND LEVELING

If the reducer was received mounted on a baseplate or swing base, the alignment must be checked prior to operation. The possibility of misalignment in transit may occur. Recheck alignment to determine if misalignment has occurred. Remove fan covers if necessary to provide access to foundation bolts. Replace cover after tightening bolts.

Align the MagnaGear output shaft with the driven equipment shaft. The MagnaGear housing feet has tapped holes for leveling jackscrews. Start at the low speed end and work to the input side when leveling.

If shims are used to level or align the unit or baseplate, they must be distributed uniformly around the base to support the entire mounting surface. The supported load must be equalized to avoid any distortion or localized stress on the lower housing. It is preferred to shim under the drive base for height adjustment.

Use feeler gauges to determine the correct shim thickness needed to support each pad. All pads must be evenly supported when the reducer is secured.

Use shims large enough to provide adequate support. If shims are not installed properly, they may get dislodged from their location which will cause severe misalignment in the system resulting in severe damage to all the components in the system.

- When low speed shaft alignment is complete, bolt down the reducer and tighten mounting fasteners to the torque values appropriate for the bolt sizes per Table 1.
- Align the motor coupling hub with the reducer input shaft hub

CAUTION: The life of the MagnaGear reducer bearings is adversely affected by coupling misalignment.

- After both the high speed and low speed couplings have been aligned, tighten the motor hold down bolts to the torque values appropriate for the bolt sizes per Table 1. Re-check alignment.
- After alignment is completed, lubricate the couplings, if required, following the manufacturer's recommendations.
- Install high speed and low speed coupling guards in conformity with applicable safety standards for the location.

Shaft Mounted Units

Shaft mounted units require a torque arm. The connection between the gear unit and support must be flexible. The torque arm should be vertical and perpendicular to the gear drive or swingbase. Failure to follow these guidelines may result in damage to the gearbox or driven equipment. It may be beneficial to disengage the backstop when installing a shaft mounted gearbox by taking out the backstop attaching bolts. It is not necessary to remove the backstop. If the backstop is removed note the direction of the rotation arrow on the backstop, and reinstall the backstop with the proper freewheeling rotation after attaching the torque arm.

SWING BASE LIFTING INSTRUCTIONS

Lift the reducer assembly with nylon straps as shown. The use of wire rope or chain is not recommended due to the potential of damage. The nylon straps should not contact the motor housing or coupling guards due to potential sheet metal or paint damage. Note the alternate lifting point for lifting reducers with the optional electric fan kit installed. Metal lifting hooks can be used where nylon straps would be unsuitable.

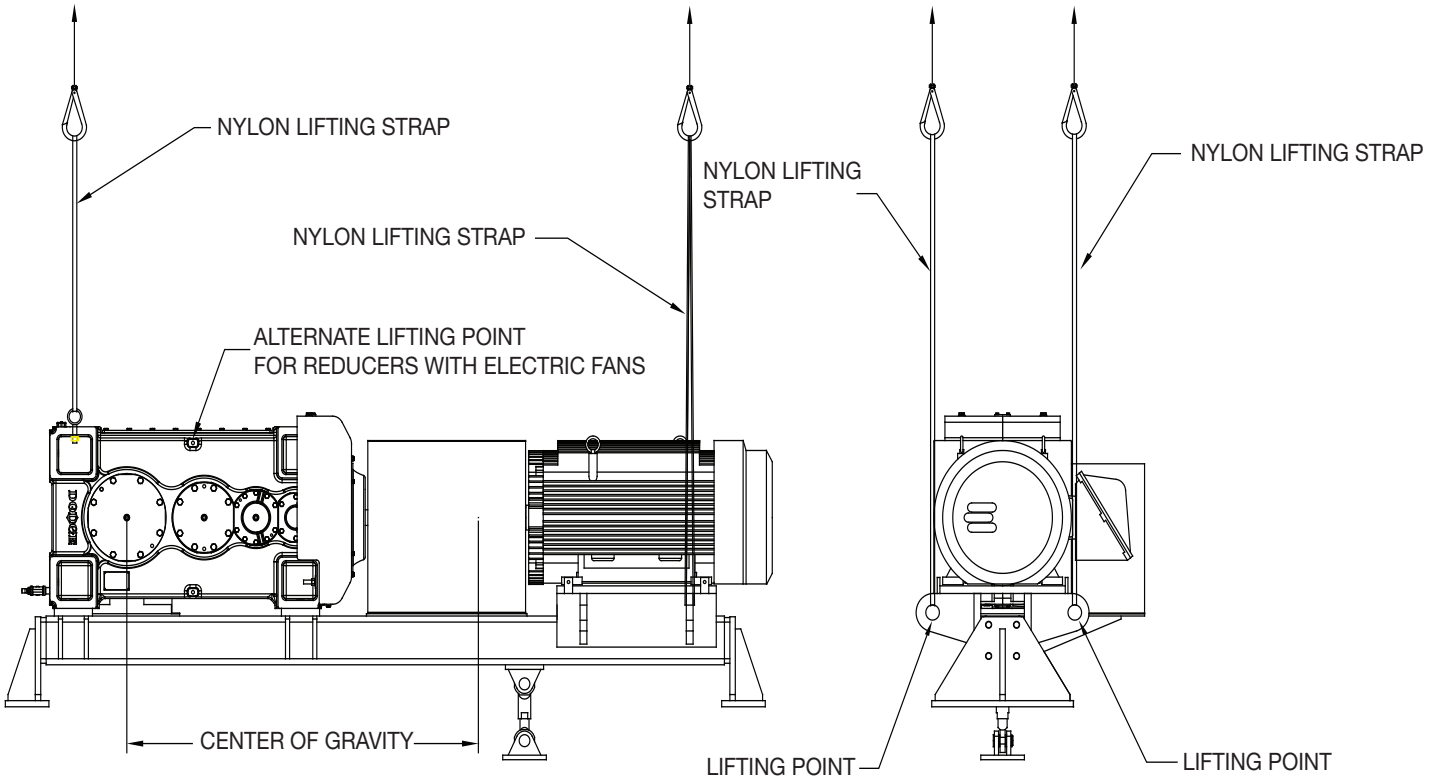


Figure 3 - MagnaGear Lifting Points

SWING BASE INSTALLATION

The swing base consists of a welded and machined steel structure which supports the reducer and motor assembly. There may be optional accessories mounted on the reducer such as a cooling fan, backstop, couplings, or heat exchanger. See Figure 4 for a typical swing base arrangement.

To install the swing base to the driven equipment, use appropriate lifting equipment properly designed to safely lift the swing base into position.

Attach and align the coupling mounted on the reducer/swing base assembly to the driven equipment coupling. Follow all recommendation of the coupling manufacturer and torque all bolts to the recommended specifications.

Once the swing base is attached to the driven equipment, level the swing base so that it is horizontal. Attach the swing base rod assembly to the mounting position provided for on the swing base. Making sure that the rod assembly is perpendicular to the swing base, mount the mounting bracket to the appropriate surrounding structure. Make sure that the mounting structure is sufficient to support the reaction forces of the driven machine.

If reducer was received mounted on a swing base, it was aligned at the factory. The possibility of misalignment in transit may occur and must be checked when mounting is complete. Recheck alignment to determine if misalignment has occured.

COUPLING ALIGNMENT

Follow the installation instructions provided by the coupling manufacturer. Some general guidelines are provided that will aid in coupling installation. If the reducer is supplied with a backstop, do not connect couplings until the motor shaft direction of rotation is verified and is correct for the freewheeling rotation of the geardrive.

- Accurately measure the hub bore and shaft diameter to verify that each coupling hub and its shaft have an interference fit and that the amount of interference is adequate.
- Check the dimensions of the key on the shaft and on the coupling bore. Make sure the key is going to fit in the shaft and coupling keyways.
- Check the fit of the key in both the hub and shaft. The key should fit snuggly against the sides of the keyway. A slight clearance should be present from top to bottom when the hub is on the shaft. Insert key flush with the end of the shaft.
- Check shaft, hub bore, and keys for nicks and burrs and remove as necessary.
- Use an oil bath to heat the coupling hubs to 245 °F (118 °C). Remove flexible elements before heating. Any kind of oil such as gear oil can be used as long as the flash temperature of the oil is high enough to avoid a fire hazard. Check the temperature of the coupling hub frequently with a Tempil-stick to avoid overheating.
- Alternatively mark the hub with a 275 °F (135 °C) temperature sensitive crayon (melts at prescribed temperatures) in several places on the hub. Remove flexible elements before heating. Use an oxy-acetylene or a blow torch to heat the hub. When using an oxy-acetylene torch use an excess acetylene mixture. Direct the flame toward the hub bore and keep it in motion while heating. Avoid over heating an area.

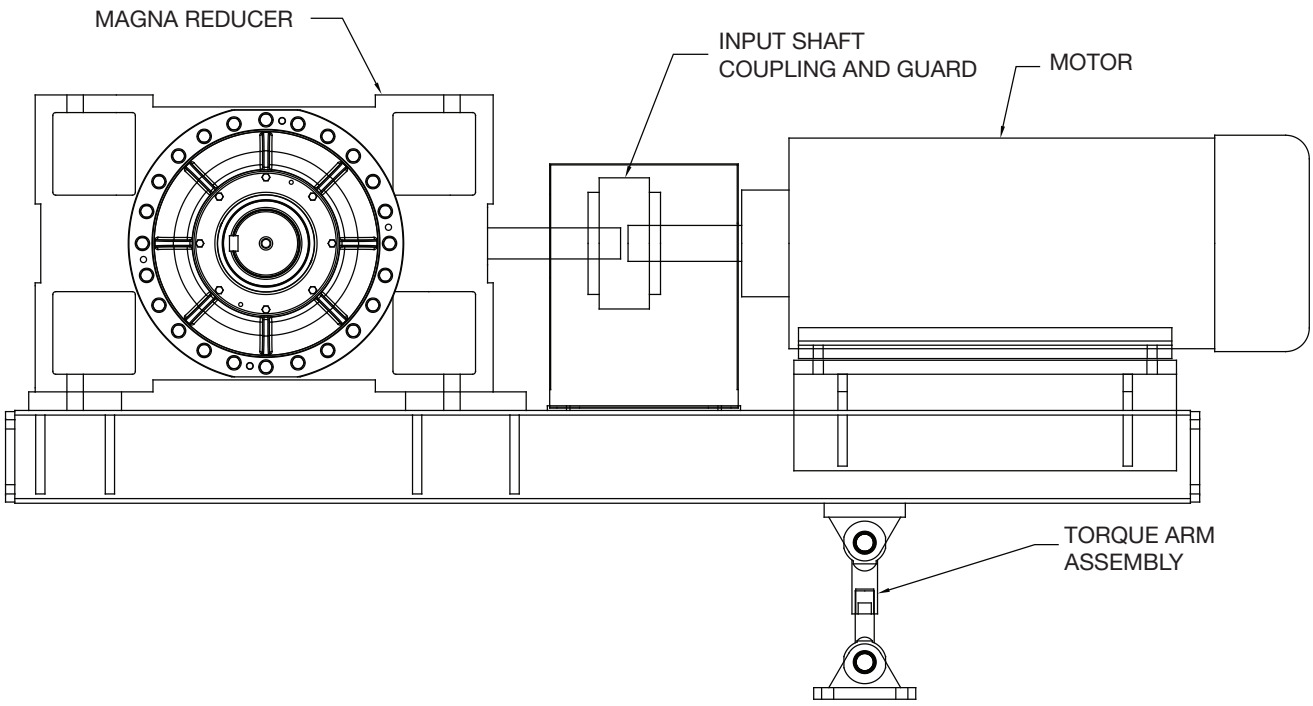


Figure 4 - Typical Swing Base Mounting

WARNING: Do not use an open flame in a combustible atmosphere or near combustible materials.

- Mount the hub on the shaft as quickly as possible to avoid heat loss. Carefully line up bore and keyway with shaft and keyway and slide hub onto shaft until the shaft is at the right location relative to the shaft end. If it is necessary to drive hub into position, lightly tap with a soft brass or lead hammer. DO NOT USE excessive pounding which can cause damage to the bearings or gears.
- Allow coupling hub and shaft assembly to cool.

Sheaves and Sprockets

Mount sheaves and sprockets as close to the reducer as possible. Overtightening may cause damage to the reducer, belts or chain or driven equipment. Adjust chains to manufacturer's recommendations.

Table 1 - Mounting Fastener Tightening Torques (coarse thread series): lb-ft

Inch Fasteners		Metric Fasteners	
Nominal Diameter (in)	Grade SAE 5	Nominal Diameter (mm)	Class 8.8
0.2500	6.5	5	3.5
0.3125	13	6	5.5
0.3750	23	8	14
0.4375	37	10	27
0.5000	57	12	47
0.5625	82	16	120
0.6250	110	20	240
0.7500	200	24	420
0.8750	320	30	840
1.0000	480	36	1450
1.1250	600	42	2350
1.2500	840	48	3500
1.3750	1100	56	5650
1.5000	1450	64	8550
1.6250	2850	72	12400
1.7500	3300		
2.0000	4900		
2.2500	7200		
2.5000	9850		
2.7500	12100		
3.0000	15900		
3.2500	20500		
3.5000	26000		

COUPLING INSTALLATION

Refer to the coupling manufacturer for the maximum recommended misalignment limits.

- Parallel or offset alignment is achieved by adding shims under the reducer and/or the drive base by moving the reducer and/or the drive base laterally as needed. A dial indicator gauge should be attached to the MagnaGear output coupling hub (low speed) and it should be positioned to contact the outside diameter of the pulley shaft or the outside diameter of the pulley coupling hub (Figure 3). While slowly rotating the reducer shaft, the amount of eccentricity can be determined

TIR (Total Indicator Reading) = 2 x P

The difference in readings of the dial indicator gauge between any two locations 180 degrees apart will be double the amount of actual eccentricity.

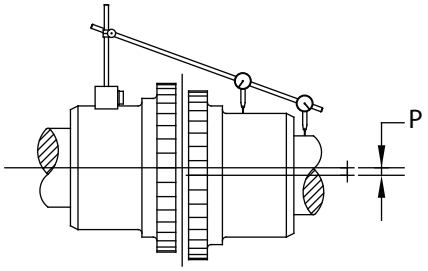


Figure 5

- Angular alignment is achieved by measuring the gap between the ends of the two coupling hubs in both the horizontal and vertical planes (Figure 4).

TIR (Total Indicator Reading) = 2 x (X - Y)

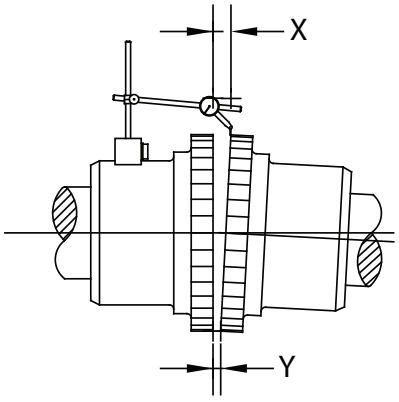


Figure 6

WARNING: To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceedin. Remove all external loads from drive before removing or servicing drive or accessories. Failure to observe these precautions could result in bodily injury.

BACKSTOPS (OPTION)

The backstop is lubricated by the geardrive. There are no serviceable parts in the backstop assembly and no external lubrication is required.

To change the direction of rotation on a geardrive equipped with a backstop, the backstop must be reversed to allow free rotation in the opposite direction. To change the direction of rotation, follow the procedure below.

1. Remove all bolts retaining the backstop outer housing to the geardrive. Remove backstop outer housing. To aid removal, lightly tap the backstop outer housing with a brass or plastic hammer to break the seal between the reducer and the backstop outer housing. Do not use a steel hammer.
2. Clean and remove all RTV from the geardrive and backstop outer housing.
3. The inner race of the backstop is now visible and is held in place on the geardrive shaft by a snap ring. Remove the snap ring. Once the snap ring is removed, the inner race can be removed from the shaft. Do no use force, the inner race should be able to be removed from the shaft easily. Note the direction of the arrow stamped on the inner race. The direction of the arrow indicates the free direction of rotation. Turn the inner race end to end 180 degrees so the arrow is now reversed and slide the inner race back onto the shaft making sure the inner race lines up with the shaft key. Reinstall the snap ring.
4. Add a bead of RTV to the mating surface of the backstop outer housing making sure the RTV is added around each fastener hole. Do not apply excessive amounts of RTV to the backstop outer housing.
5. Before installing the backstop outer housing, the inner race sprags will need to be reset. To reset the sprags, a stiff two to three inch rubber band will be required. Stretch the rubber band around the sprags on the inner race. Once the backstop outer housing is piloted onto the inner race, cut and remove the rubber band. With a slight turning motion, slide the backstop outer housing into position. Do not force the backstop outer housing into position, if the outer housing is piloted correctly, it will slide easily into position.
6. Align the fastener holes in the backstop outer housing with the holes in the geardrive. Reinstall the previously removed bolts and tighten to the correct torque values given in Table 1.

Installation of Electric Cooling Fan (Option)

Mount and align gearbox before installing electric fan kit. Remove the fan assembly and corresponding parts from the packing material. Verify and identify all of the components and fasteners shown on the graphic above. Sandwich the tabs located inside the fan shroud (qty. 1) with the hex nuts (qty. 4) and flat washers (qty. 4) as shown in the graphic below.

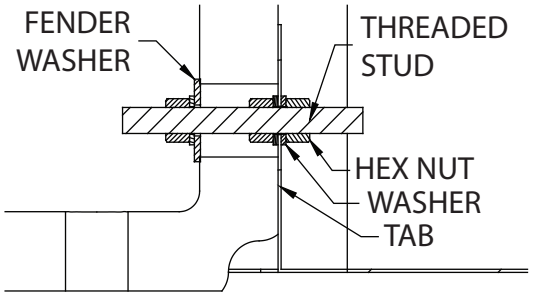


Figure 8 - Fan Kit

Center the electric fan (qty. 1) with the clearance holes on the fan shroud (qty. 1) mounting face using the flat washers (qty. 8), hex bolts (qty. 4), and hex nuts (qty. 4). Lay the spacers (qty. 2) over the two drilled and tapped mounting holes on the top surface of the gearbox. Bring the electric fan shroud with assembled electric fan and rest it on the spacers. Use the flat washers (qty. 2) and hex nuts (qty. 2) to the foot side of the threaded studs.

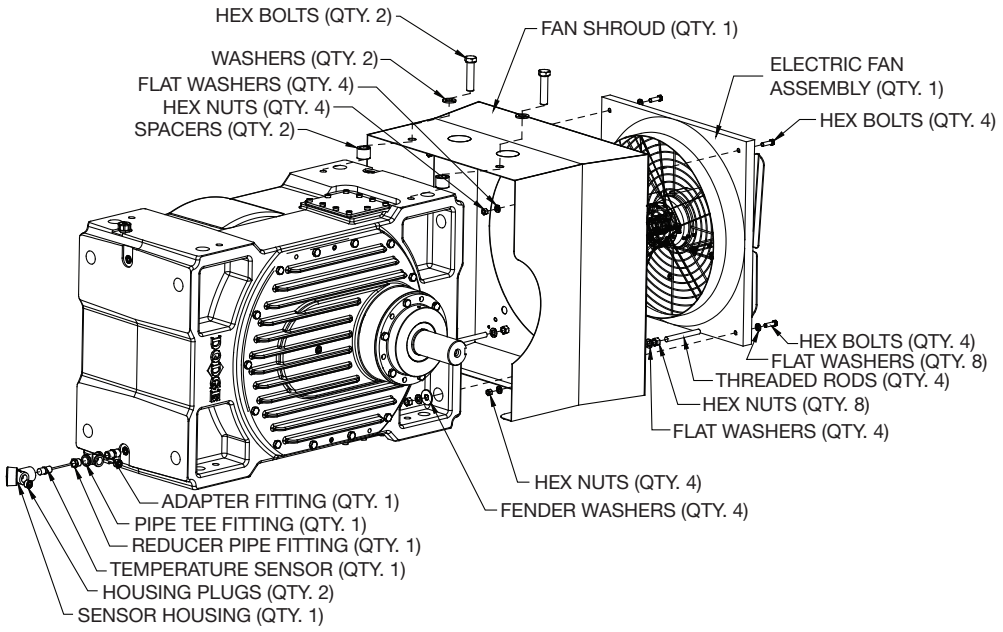


Figure 7 - Electric Cooling Fan Kit

Installation of (RTD) Temperature Sensor (Option)

Verify that all of the fittings shown above have been supplied. Before adding lubrication to the gearbox remove the drain plug on the opposite side of the fan shroud. Assemble the adapter fitting (qty. 1), pipe tee fitting (qty. 1), reducer pipe fitting (qty.1) temperature sensor (qty. 1) housing plugs (qty. 2), and sensor housing (qty. 1) sealing each fitting with pipe sealant. Install the assembled components into the sump drain hole. Connect the RTD lead wires to the PLC. This is the device that signals the electric fan turning it off and on. The electric fan should operate when the sump temperature of the gearbox reaches 150 °F. The resistance of the RTD at 150 °F is 125.3729 Ω.

WARNING: The user is responsible for conforming to the National Electrical Code and all other applicable local codes. Wiring practices, grounding disconnects and overcurrent protection are of particular importance. Failure to observe these precautions could result in severe bodily injury or loss of life.

Wiring of Electric Fan

Use the attached electrical diagram below for wiring the electric motor.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, and/or service this equipment. Read and understand this manual in its entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

LUBRICATION

Mineral based EP oils are the preferred lubricant, suitable for operating temperatures up to 200° F (93° C) as well as for low ambient temperatures down to 25° F (-4° C). For lower temperatures or critical applications, synthetic lubricants which are suitable for operating temperatures up to 212° F (100° C) as well as for low ambient temperatures down to -15° F (-26° C).

Fill to the level indicated by the dipstick or sight glass. External oil lines, pumps and heat exchangers will require additional quantities of oil. Run the gearmotor for 3 minutes to fill the heat exchanger and lube passages. Recheck the oil level and add oil as required.

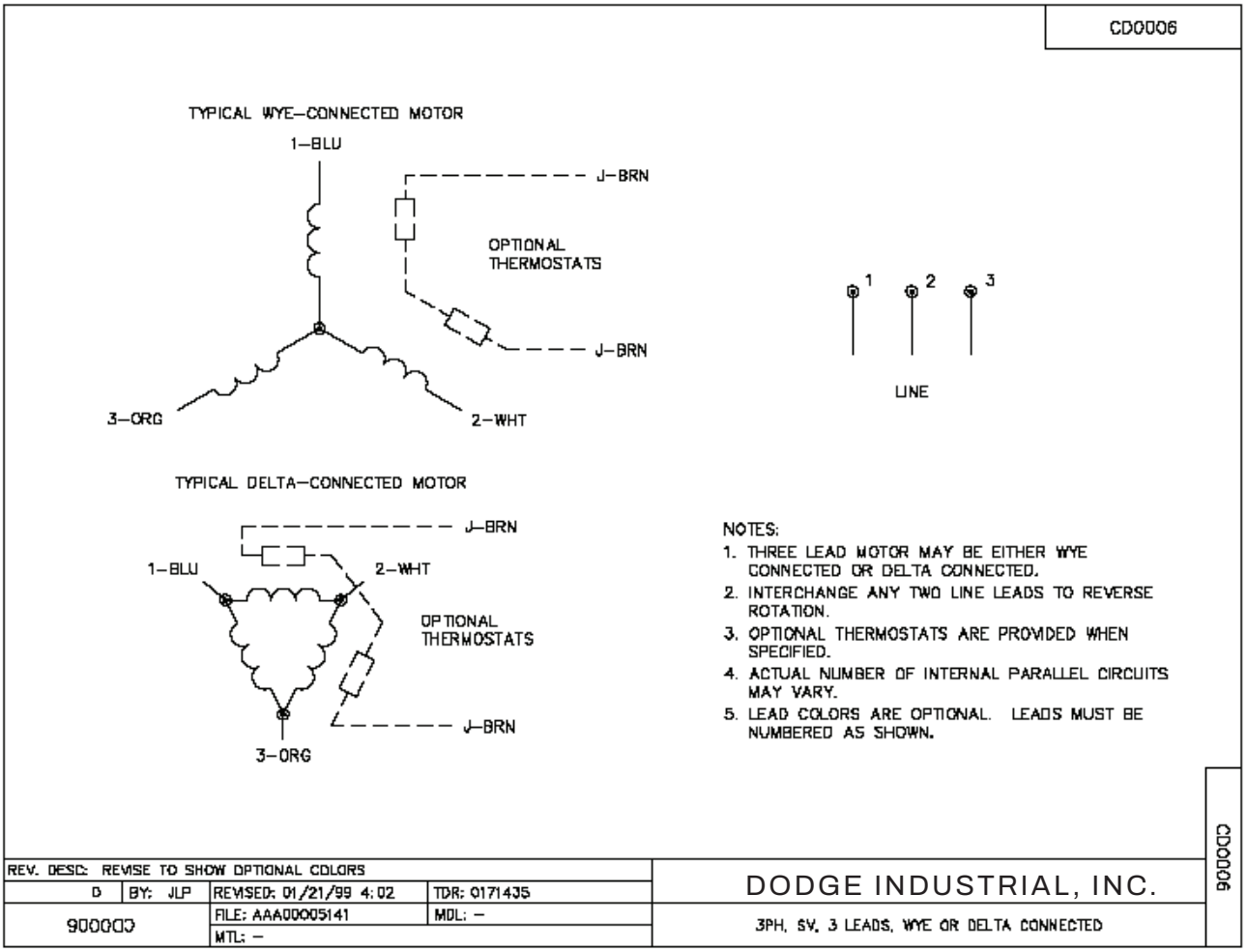
Approximate Oil Volume:

Magna G525	18.8 gallons
Magna G700	26.4 gallons
Magna G920	35.8 gallons

Refer to the reducer nameplate and use the dipstick to determine exact quantity of oil.

A 25 micron filter is recommended to filter oil before it enters the gearbox.

IMPORTANT: Because reducer is shipped without oil, it is necessary to add the proper amount of oil before operating reducer. Follow instructions on reducer warning tags and in the installation manual.



Under average industrial operating conditions, the lubricant should be changed every 2500 hours of operation or every 6 months, whichever occurs first. Drain reducer and flush with kerosene, clean magnetic drain plugs and refill to proper level with new lubricant.

CAUTION: Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly. Failure to observe this precaution could result in bodily injury.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200°F, the oil should be changed every 1 to 3 months, depending on severity of conditions.

The performance of the new oil will be higher if a better job done in removing old oil from the reducer. A small amount of residual oil is usually not detrimental to performance. Never mix gear oils from different manufacturers or type. If changing oil brands or type, flush the geardrive by pouring a charge of the new oil into the gearbox and allow it to drain.

Table 3 - Oil Recommendations - ISO Grades

	Output RPM	
Temperature Range	Up to 100	Over 100
15 °F to 60 °F 50 °F to 125 °F	220EP 320EP	220EP 220EP

NOTES

1. Assumes auxiliary cooling where recommended in the catalog.
2. Pour point of lubricant selected should be at least 10 °F lower than expected minimum ambient starting temperature.
3. When properly selected for specific applications, MagnaGear backstops are suitable for use with EP lubricants.
4. Special lubricants may be required for food and drug industry applications where contact with the product being manufactured may occur. Consult a lubrication manufacturer's representative for his recommendations.
5. For reducers operating in ambient temperatures between -22 °F (-30 °C) and 20 °F (-6.6 °C) use a synthetic hydrocarbon lubricant, 100 ISO grade or AGMA 3 grade (for example, Mobil SHC627). Above 125 °F (51 °C), consult Dodge Gear Application Engineering (864) 288-9050 for lubrication recommendation.
6. Mobil SHC630 Series oil is recommended for high ambient temperatures.

GREASED SHAFT SEALS

Grease packed shaft seals must be re-greased depending on the contamination of the seal area. Under normal operating conditions re-grease the seals at every oil change. To re-grease the seals, remove the solid grease plug from the seal carrier and add fresh grease thru the zerk fitting provided while slowly rotating the reducer input shaft. Add enough grease to the seal carrier. Re-install the solid grease plug in the seal carrier. Under extreme operating conditions, the seals should be re-greased every 1 to 3 months depending on the severity of the operating conditions.

DRAINING THE OIL

Shut down the geardrive and follow lock out tag out procedures to prevent accidental startup. Refer to the figure 5 for the oil drain location. Completely drain or pump the oil into a suitable container. If it is suspected that the oil is contaminated, the geardrive should be flushed by pouring a charge of oil equal to the fill amount and allow the oil to drain into a container. Thoroughly clean the magnetic drain plugs.

Oil Sampling

Change the oil per schedule in Preventive Maintenance Section. It is a good idea to have the lubricant supplier perform an oil analysis at the time of the oil change. Consider setting up an oil sampling plan to determine the optimal time to change the lubricant based on its condition.

CAUTION: If your environment is especially high in moisture, dust and dirt, check the oil condition frequently. Take samples and check for condensation and sediment. Check the oil any time unusual ambient conditions might cause excessive condensation inside the gear case.

CAUTION: If environmental conditions become severe with excessive amounts of dirt, dust or moisture, contact Dodge Product Support to determine whether other devices may be needed to protect your reducer.

START UP

General

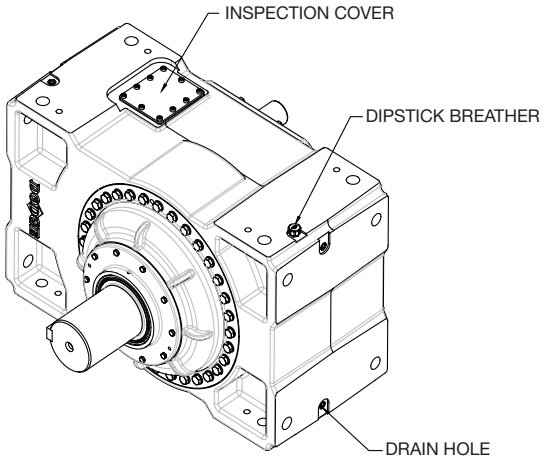
After the installation of the MagnaGear drive unit is completed, check the following to ensure safe operation of each MagnaGear drive.

1. Check the couplings connecting drive motor to MagnaGear for proper alignment. Check that the couplings are filled with the correct grade of grease as recommended by the coupling manufacture.
2. Check all mounting bolts, nuts and screws to be sure they are tight.
3. Check that oil is up to the correct level on the dipstick or in the oil level sight gauge.
4. Check direction of rotation of all components.
5. Ensure that the breather, access covers and coupling guards are in place and secured. Please note that breathers are shipped in a bag which is attached to the breather connection port. Remove the breather from the bag and screw it into the breather port.

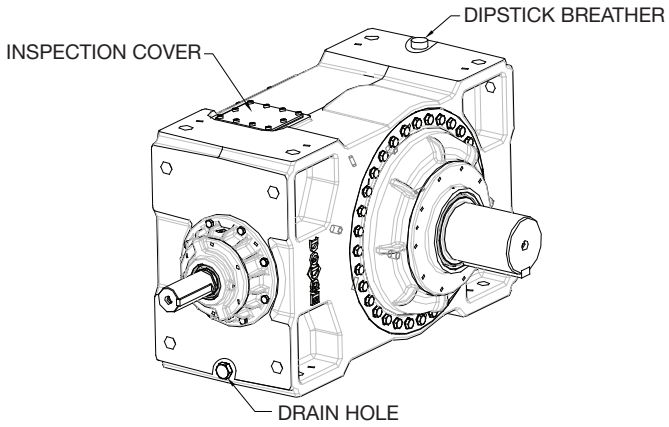
CAUTION: Do not operate unit with caps, covers or guards missing.

6. If equipped, operate the MagnaGear cooling pump to circulate lubricating/cooling oil through the system. Purge air from the pump housing volute by loosening plug at top portion of the volute. Check the oil level again to be sure oil is at the correct level with the pump running.
7. If the MagnaGear has an external backstop, check that the direction of rotation of the backstop and output drive shaft are the same.

IMPORTANT: Lubricant level checks should be done with the cooling pump running, if equipped.



Offset Parallel Reducer



Right Angle Reducer

Figure 9 - Oil drain and dipstick/breather locations

PREVENTATIVE MAINTENANCE

General

All maintenance and repair work should be carried out by trained personnel. Perform the following maintenance at the recommended intervals.

First day of operation

- Check oil temperature – Sump temperature will vary based on operating conditions and cooling method. The gearbox is designed for a maximum oil sump temperature of 200°F (93°C). For water cooled heat exchangers, water flow rate can be adjusted to obtain the desired temperature. Flow rates in the higher range will reduce the oil sump temperature. Check with the cooler manufacturer to determine the allowable flow rates through the cooler.
- Check for change in noise level
- Check for oil leaks

After first month or 600 hours of operation

- Check oil for water content
- Change oil
- Check mounting hardware for tightness
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Re-grease seals

Periodically

- Check oil level
- Check for leakage
- Check oil temperature for changes
- Check for change in noise level
- Change oil filter

Every 6 months or 2500 hours of operation

- Check oil for water content
- Change oil (Synthetic oil every 18 months or 8000 hours)
- Change oil filter with oil change
- Check mounting hardware for tightness
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Check the cooling system
- Re-grease seals

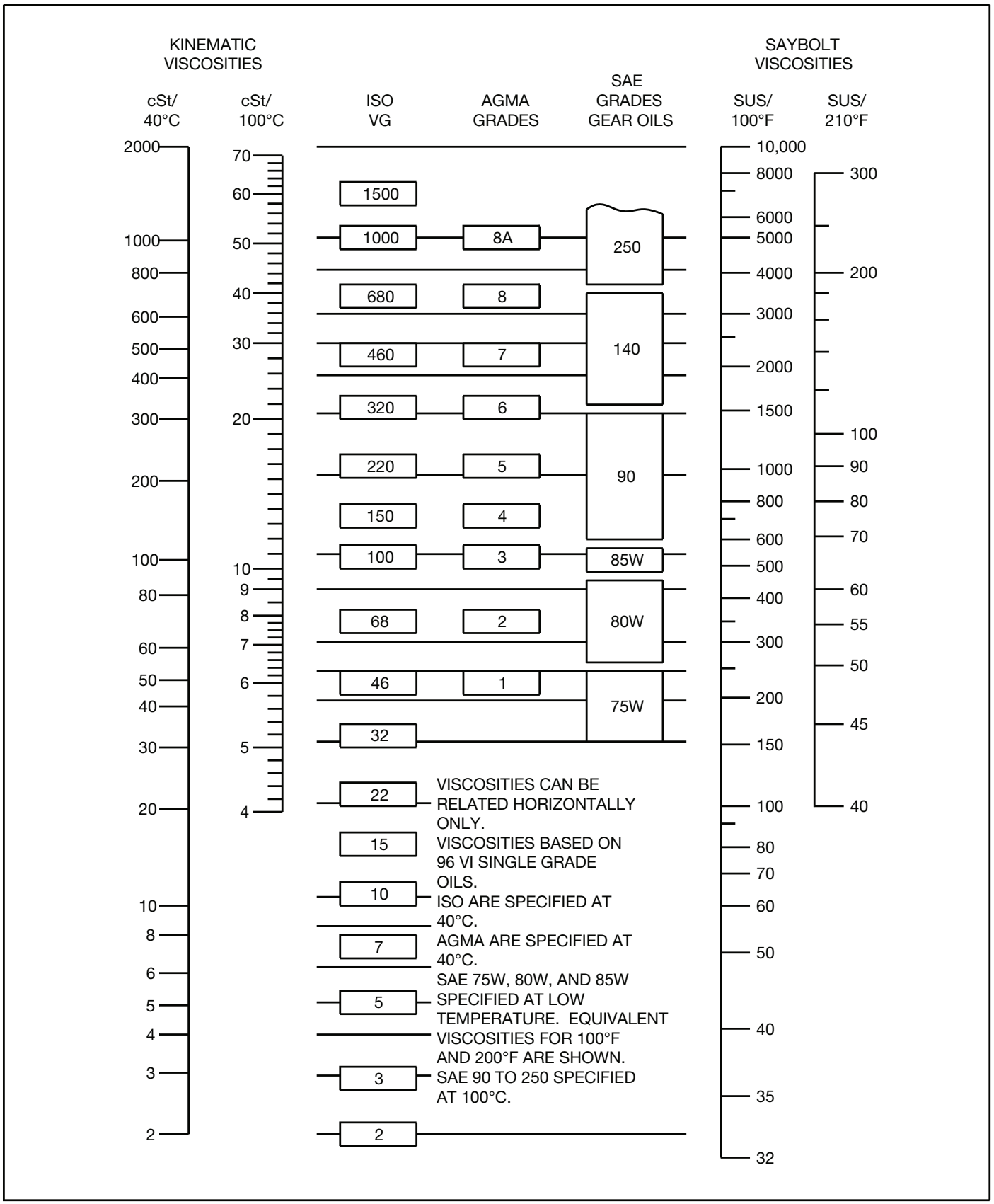
Every 18 months or 8000 hours of operation for synthetic lubricant

- Check oil for water content
- Change oil
- Change oil filter
- Check mounting hardware for tightness
- Check for oil leaks
- Clean and reinstall the magnetic drain plugs
- Check the cooling system

Oil Analysis Program

Oil change intervals can be extended provided an oil analysis programs is in effect. Increased contaminate values would indicate internal component wear is beginning to occur. The reducer should be monitored more frequently and may need to be removed from service for repair.

OIL VISCOSITY EQUIVALENCY CHART



GUIDELINES FOR MAGNAGEAR REDUCER LONG-TERM STORAGE LESS THAN 6 MONTHS

During periods of long storage, or when waiting for delivery or installation of other equipment, special care should be taken to protect a gear reducer to have it ready to be in the best condition when placed into service.

By taking special precautions, problems such as seal leakage and reducer failure due to lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage:

Preparation

1. Drain oil from the unit. Add a vapor phase corrosion inhibiting oil (VCI-105 oil by Daubert Chemical Co.) in accordance with Table 4.
2. Seal the unit airtight. Replace the vent plug with a standard pipe plug and wire the vent to the unit.
3. Cover all unpainted exterior parts with a waxy rust preventative compound that will keep oxygen away from the bare metal. (Non-Rust X-110 by Daubert Chemical Co. or equivalent)
4. The instruction manuals and lubrication tags are paper and must be kept dry. Either remove these documents and store them inside, or cover the unit with a durable waterproof cover which can keep moisture away.
5. Protect reducer from dust, moisture, and other contaminants by storing the unit in a dry area.
6. In damp environments, the reducer should be packed inside a moisture-proof container or an envelope of polyethylene containing a desiccant material. If the reducer is to be stored outdoors, cover the entire exterior with a rust preventative.

When placing the reducer into service:

1. Fill the unit to the proper oil level using a recommended lubricant. The VCI oil will not affect the new lubricant.
2. Clean the shaft extensions with petroleum solvents.
3. Assemble the vent plug into the proper hole.
4. Follow the installation instructions provided in this manual.

Table 4 – Quantities of VCI #105 Oil (VCI #105 and #10 are interchangeable)

Reducer Size	Quantity (Ounces / Milliliter)
G100	2 / 59
G150	3 / 89
G210	4 / 118
G285	6 / 177
G390	8 / 237
G525	8 / 237
G700	10 / 296
G920	12 / 355

GUIDELINES FOR MAGNAGEAR LONG-TERM STORAGE OVER 6 MONTHS

1. Recommended storage requirements for MagnaGear drives are listed below. Follow these recommendations for drives that will not be placed in service for at least six months from date of shipment.
2. Place MagnaGear drives in a clean, dry, protected warehouse, where control over temperature, dust, dew point, shock and vibration are reasonably maintained.
3. The storage area is to be free from any shock or vibration of 2 mils max. at 60 hertz, to prevent bearings from brinelling. Exceeding the above limits will require vibration damping materials under units.
4. The storage area temperatures should not be below 50 °F or over 120 °F and relative humidity should be a maximum of 60 percent.
5. The MagnaGear drive should be protected by a covering, but not sealed to allow air circulation.
6. Fill the MagnaGear completely to the top with the same oil that will be used in operation. This will protect all the internal parts from corroding. Another advantage gained is to minimize the volume of air in the MagnaGear as well as minimizing the in and out breathing of air as temperatures change. This will minimize the amount of moisture that can accumulate due to in and out breathing of air. Remove the oil breather and plug the opening
7. Coat exposed shafts with a thick layer of grease. Additional weather-proofing may be required for some installations. If there are any other exposed steel surfaces, on the MagnaGear gearcase, or any other component, they should be coated with grease or other suitable rust inhibitors as well.
8. For the protection of bearings from brinelling, turn the MagnaGear input shaft once a month. If a coupling is installed on the input shaft, the shaft can be turned by hand. Otherwise, use a chain wrench to turn the shaft. To protect the shaft from damage, wrap a soft cloth rag on the shaft and clamp the chain over the rag.
9. The input shaft should be turned by a sufficient number of times to allow the output shaft to turn by at least one turn plus 1/8 of a turn. After rotation, the output shaft should come to rest in a different angular orientation than before rotation, approximately 45 degrees away from the previous position. The number of turns of the input shaft should be equal to the gearbox ratio plus one eight of the ratio. For example if the nameplate on the gearcase shows the gear ratio as 24, then turn the input shaft by 24 plus 1/8 of 24.

   No input shaft turns = ratio + (ratio /8) Example: 24 + (24 / 8) = 24 + 3 = 27 turns

If either the input or output shafts are braced to support the weight of their respective couplings, or flywheels, remove the brace before turning the shafts. After rotating the shafts, reinstall the braces. Make sure the brace adequately supports the coupling, or the flywheel, to take the weight off the bearings.

Replacement of Parts

IMPORTANT: Using tools normally found in a maintenance department, a MagnaGear speed reducer can be disassembled and reassembled by careful attention to the instructions following.

Cleanliness is very important to prevent the introduction of dirt into the bearings and other parts of the reducer. A tank of clean solvent, an arbor press, and equipment for heating bearings and gears (for shrinking these parts on shafts) should be available.

Our factory is prepared to repair reducers for customers who do not have proper facilities or who, for any reason, desire factory service. The oil seals are contact lip seals. Considerable care should be used during disassembly and reassembly to avoid damage to the surface on which the seals rub.

The keyseat in the input shaft, as well as any sharp edges on the output hub should be covered with tape or paper before disassembly or reassembly. Also, be careful to remove any burrs or nicks on surfaces of the input shaft or output hub before disassembly or reassembly.

Ordering Parts

When ordering parts for reducer, specify reducer size number, reducer model number, part name, part number, and quantity.

It is strongly recommended that, when a pinion or gear is replaced, the mating pinion or gear is replaced also.

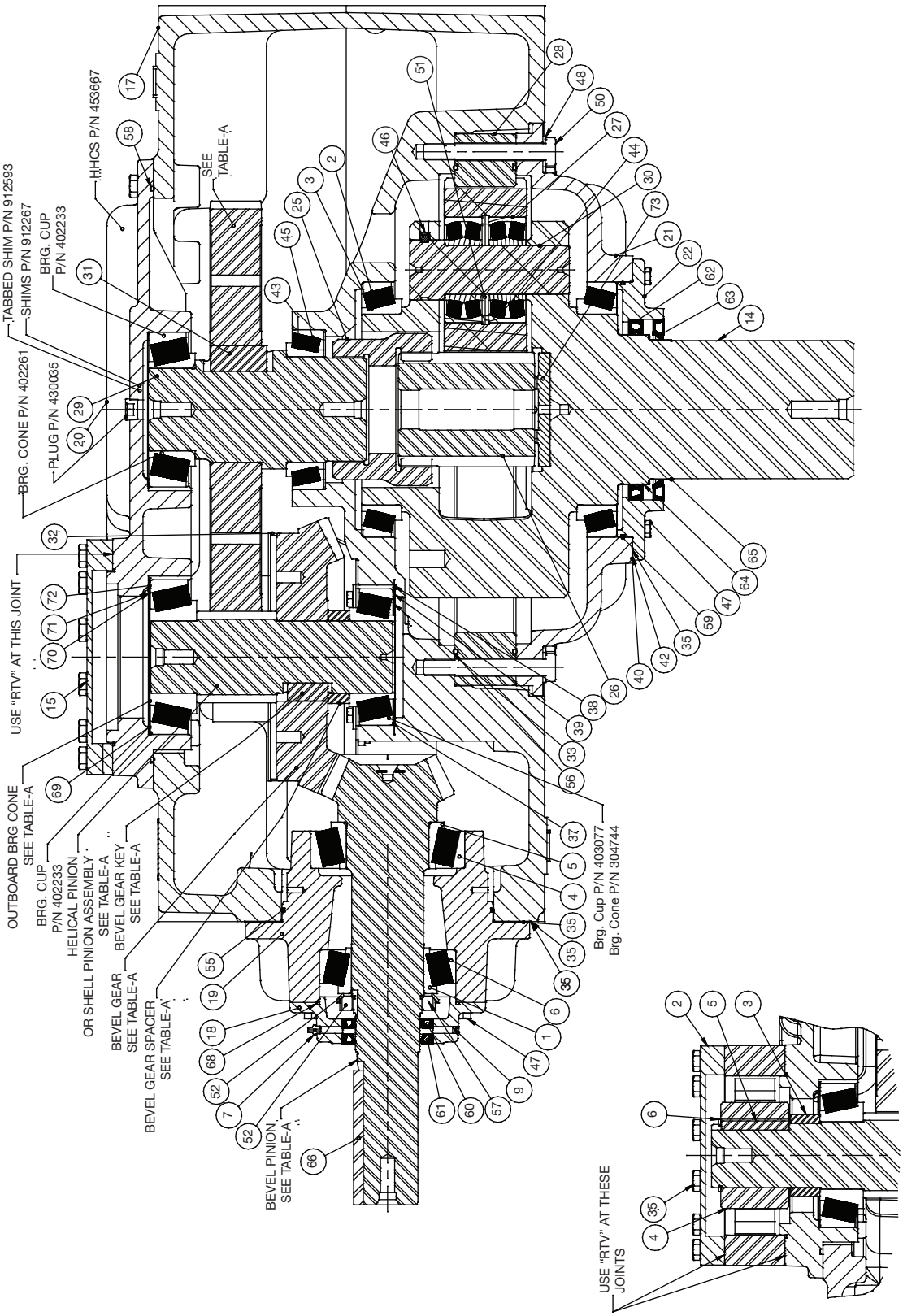
If the large gear on the output shaft must be replaced, it is recommended that an output shaft assembly consisting of a gear assembled on a shaft be ordered to ensure undamaged surfaces on the output shaft where the output seals rub. However, if it is desired to use the old output shaft, press the gear and bearing off and examine the rubbing surface under the oil seal carefully for possible scratching or other damage resulting from the pressing operation. To prevent oil leakage at the shaft oil seals, the smooth surface of the output shaft must not be damaged.

If any parts must be pressed from a shaft or from the output hub, this should be done before ordering parts to make sure that none of the bearings or other parts are damaged in removal. Do not press against the rollers or cage of any bearing.

Because old shaft oil seals may be damaged in disassembly, it is advisable to order replacements for these parts.

	ACTUAL RATIO					
Nominal Ratio	**G525 Right Angle Reducer**	**G525 Offset Parallel Reducer**	**G700 Right Angle Reducer**	**G700 Offset Parallel Reducer**	**G920 Right Angle Reducer**	**G920 Offset Parallel Reducer**
8.00	N/A	8.182	N/A	8.083	N/A	8.155
9.00	N/A	9.133	N/A	9.048	N/A	9.039
10.00	N/A	10.227	N/A	10.161	N/A	10.172
11.2	N/A	11.499	N/A	11.460	N/A	11.340
12.5	12.565	12.727	12.412	12.764	12.524	12.776
14.0	14.026	14.126	13.895	14.370	13.882	14.211
16.0	15.706	15.758	15.605	15.777	15.621	16.046
18.0	17.659	17.686	17.600	17.492	17.415	17.888
20.0	19.545	19.818	19.603	19.576	19.620	20.297
22.4	21.693	22.013	22.068	22.076	21.823	22.200
25.0	25.369	24.873	25.910	25.132	24.642	24.624
28.0	28.775	27.510	28.859	27.577	28.884	27.235
31.5	31.937	N/A	32.488	N/A	32.128	N/A
35.5	35.626	N/A	35.669	N/A	36.277	N/A
40.0	39.986	N/A	39.547	N/A	40.441	N/A
45.0	44.806	N/A	44.258	N/A	45.888	N/A
50.0	49.768	N/A	49.911	N/A	50.191	N/A
56.0	56.234	N/A	56.821	N/A	55.672	N/A
63.0	62.196	N/A	62.348	N/A	61.574	N/A

Parts Reference for Magna G525 Right Angle Reducer Parts

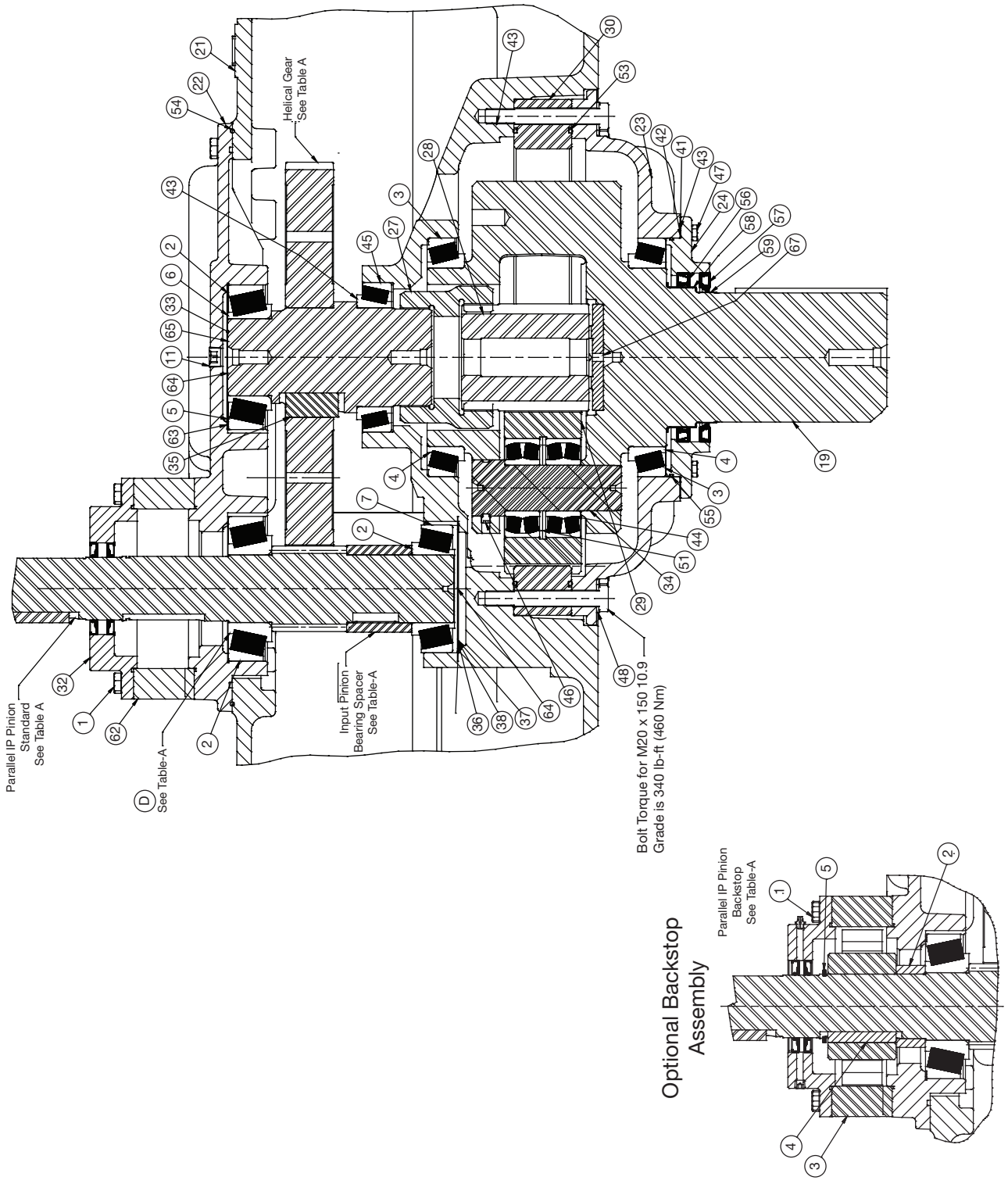


Magna G525 Right Angle Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	304744	850 Cone	–	2
2	402229	LM545810 Cup	–	2
3	402230	LM545849 Cone	–	2
4	402233	HH221410 Cup	–	3
5	402261	HH221449 Cone	–	2
6	403077	832 Cup	–	2
7	405015	1/8 x 27 Grease Fitting	–	2
8	415006	#4 x 3/16” Rivet	–	4
9	430023	1/8 SOC HD (Hex) Pipe Plug	–	2
10	430029	1/4 SOC HD Pipe Plug Dry-Seal	–	2
11	430035	3/4 NPT Socket HD Pipe Plug Dryseal	Steel Per Ansi B2.1	5
11	966907	Smart Sensor Adaptor		1
12	453300	Dipstick / Breather Combination	3/4 NPT ELESA 954222-L	1
13	453301	MagnaGear Nameplate Blank	Reducer Sizes 1-12	1
14	453398	Planet Carrier	1 Piece Design from Casting	1
15	453497	525K Helical Pinion	Cover Plate	1
16	453499	Low Head Shcs Grade 8.8, Din 6912, Plain	M12-1.75 x 20 Long	20
17	453502	Housing - Monoblock	Machining	1
18	453504	Input Seal Carrier	Machining	1
19	453506	Input Housing	–	1
20	435508	Bearing Carrier Cover Plate	Machining Right Angle	1
21	453512	Ouput Cover	Machining	1
22	453514	Ouput Seal Carrier	Machining	1
23	453521	Inspection Cover	–	2
24	453522	Gasket	–	2
25	453581	Spline Coupling	LSS- Sun Pinion	1
26	453582	Sun Pinion		1
27	453583	Planet Gear		3
28	453585	Ring Gear	Large HP Planetary Reducer	1
29	453591	Helical Gear Shaft		1
30	453592	Planet Spindle		3
31	453603	Helical Key		1
32	453605	Oil Pan Assembly	(Bevel Gear)	1
33	453613	Tabbed Shim	For Bearing Cup 832	2
34	453615	Input Bearing Carrier	Shims	2
35	453616	Input Bearing Carrier	Shims	2
36	453617	Input Bearing Carrier	Shims	2
37	453627	Shims	For Bearing Cub 832	3
38	453628	Shims	For Bearing Cup 832	3
39	453629	Shims	For Bearing Cup 832	3
40	453632	Output Bearing Cover Shims		2
41	453633	Output Bearing Cover Shims		2
42	453634	Output Bearing Cover Shims		2
43	453646	67389 Cone	–	1
44	453648	Spherical Roller Bearing	22312 El	6
45	453656	67322 Cup		1
46	453657	M12 x 12 Din. 915/ISO 4028 Dogpoint Set Screw	(Steel, Min Hardness 45 HRC)	3
47	453661	HHCS Grade 8.8 Din 933, Plain	M12-1.75 x 35 Long	14
48	453664_	Hardened Washer Din 6916	(21 x 37 x 4 295-350 HV)	24
49	453667	HHCS Grade 808 Din 933, Plain	M16 - 2 x 45 Long	32
50	453668	HHCS Grade 10.9 DIN 931, Plain	M20-2.5 x 150 Long	24

Magna G525 Right Angle Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
51	453671	Retaining Ring spring Steel DIN 472	Anderton Int. Circlip D1300 - 130 - A	6
52	453672	Bearing Lock-Nut	Tan -17	1
53	453673	Bearing Lock-Washer	TW 117 (For AN-17 Locknut)	1
54	453677	Dowel Pins Allow Steel	.625 Diam x 1.75 Og Per ANSI B18.8.2	8
55	453682	O-Ring	Parker #2-273 Buna N or Equivalent	1
56	453683	O-Ring	Parker #2-392 Buna N or Equivalent	2
57	453684	O-Ring	Parker #2-208 Buna N or Equivalent	2
58	453686	O-Ring Cord Stock, Buna N or Equivalent	Parker 3/16 (.210) Thick 92.50" LGT	1
59	453687	O-Ring	Parker #2-278 Buna N or Equivalent	1
60	453688	Lip Seal, Input Shaft	Dual Lip HNBR	1
61	453689	Lip Seal, Input Shaft	Single Lip HNBR	1
62	453690	Lip Seal, Output Shaft	Dual Lip Seal HNBR	1
63	453691	Lip Seal, Output Shaft	Single Lip Seal HNBR	1
64	453692	Speedi Sleeve	CR #99725	1
65	453693	Speedi Sleeve	CR #99675	1
66	453903	Right Angle	Input Shaft Extension Key	1
67	453904	Output Shaft Extension Key		1
68	453948	O-Ring	Parker #2-260 Viton or Equivalent	1
69	912267	107 TA Input	Bearing Shims	2
70	912268	Shim Int Pinion	0.007" Thick (Quantities as needed)	2
71	912269	Shim Int Pinion	0.015" Thick (Quantities as needed)	2
72	912593	Tabbed Shim	For Bearing Cup HH221410	2
73	70781501	Thrust Washer	–	1

Table A for Magna G525 Right Angle Reducer Parts - Overall Gear Box Gear Ratios and Part Numbers								
Overall Gearbox Ratio	**Parallel IP Pinion Shaft P/N**	**Helical Gear P/N**	**Helical Shell Pinion P/N**	**Parallel IP Shell Pinion SFT P/N**	**Shell Pinion Key P/N**	**Shell Pinion SPCR P/N**	**Input Pinion Bearing Spacer**	**Outboard Bearing Cone**
8.11:1	N/A	453542	453539	453409	453410	453411	N/A	402261
9.09:1	453538	453544	N/A	N/A	N/A	N/A	N/A	402261
10.23:1	453537	453546	N/A	N/A	N/A	N/A	N/A	402261
11.50:1	453536	453548	N/A	N/A	N/A	N/A	N/A	402261
12.73:1	453535	453550	N/A	N/A	N/A	N/A	N/A	402261
14.13:1	453530	453552	N/A	N/A	N/A	N/A	N/A	402261
16.52:1	453528	453554	N/A	N/A	N/A	N/A	N/A	912253
17.69:1	453527	453562	N/A	N/A	N/A	N/A	453911	912253
19.82:1	453526	453564	N/A	N/A	N/A	N/A	453911	912253
22.01:1	453525	453566	N/A	N/A	N/A	N/A	453911	912253
24.65:1	453524	453568	N/A	N/A	N/A	N/A	453911	912253
27.51:1	453523	453570	N/A	N/A	N/A	N/A	453911	912253

Additional Backstop Parts for Magna G525 Right Angle Reducer			
Item	**Part #**	**Description_I**	**Quantity**
1	304559	HHCS Grade 8.8 DIN 933, Plain	12
2	453497	525 Helical Pinion	1
3	453598	Backstop Spacer	1
4	453599	Backstop	1
5	453600	Shaft Key Backstop	1
6	453912	Retaining Ring Anderton	1


Helical Gear
See Table A
Parallel IP Pinion
Standard
See Table A
See Table-A
Input Pinion
Bearing Spacer
See Table-A
Bolt Torque for M20 x 150 10.9
Grade is 340 lb-ft (460 Nm)
Optional Backstop
Assembly
Parallel IP Pinion
Backstop
See Table-A

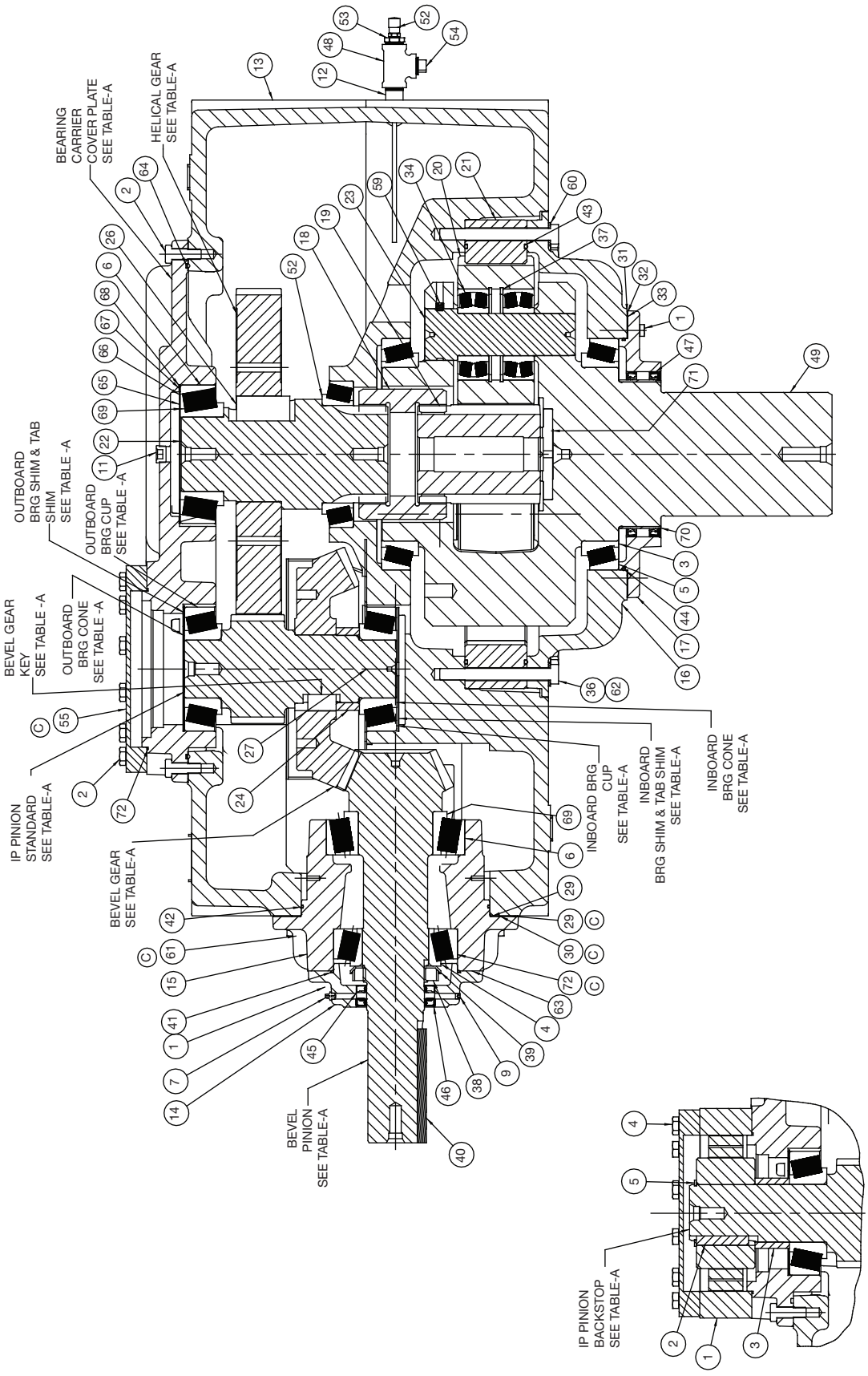
Parts Reference for Magna G525 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	304559	HHCS Grade 8.8 Din 933, Plain	MN16-2 x 120 Long	12
2	304744	850 Cone	–	1
3	402229	LM545810 Cup	–	2
4	402230	LM545849 Cone	–	2
5	402233	HH221410 Cup	–	2
6	402261	HH221449 Cone	–	1
7	403077	832 Cup	–	1
8	405015	1/8 x 27 Grease Fitting	–	2
9	415006	#4 x 3/16” Rivet	–	4
10	430026	1/8 Soc HD (HEX) Pipe Lug	–	2
11	430035	3/4 NPT Socket HD Pipe Plug Dryseal	Steel Per ANSI B2.1	5
11	966907	Smart Sensor Adaptor		1
12	430078	3/4 NPT X 2” Nipple	Per ASTM A197	1
13	452096	3/4 NPT Tee Fitting	Per ASTM A197	1
14	453300	Dipstick / Breather Combination	3/4 NPT ELESA 954222-L	1
15	453301	MagnaGear Nameplate Blank	Reducer Sizes 1 - 12	1
16	453303	Pitot Tube	Lubrigard #B14NT12	1
17	453304	3/4 - 1/4 NPT Hex Bushing Adapter		1
18	453305	3/4 NPT Square HD Pipe Plug	Per ASTM A 197	1
19	453398	Planet Carrier	1 Piece Design from Casting	1
20	453449	Low Head SHCS Grade 8.8, Din 6912, Plain	M12 - 1.75 x 20 Long	20
21	453502	Housing - Monoblock	Machining	1
22	453508	Bearing Carrier Cover Plate	Machining Right Angle	1
23	453512	Output Cover	Machining	1
24	453514	Output Seal Carrier	Machining	1
25	453521	Inspection Cover	–	2
26	453522	Gasket	–	2
27	453581	Spline Coupling	LSS - Sun Pinion	1
28	453582	Sun Pinion	–	1
29	453583	Planet Gear	–	3
30	453585	Ring Gear	Large HP Planetary Reducer	1
31	453588	Input Cover	Parallel Shaft Configuration	1
32	453590	Bearing End Cap	Helical Pinion Shaft	1
33	453591	Helical Gear Shaft	–	1
34	453592	Planet Spindle	–	3
35	453603	Helical Key		1
36	453613	Tabbed Shim	For Bearing Cup 832	1
37	453627	Shims	For Bearing Cup 832	2
38	453628	Shims	For Bearing Cup 832	2
39	453629	Shims	For Bearing Cup 832	2
40	453632	Output Bearing Cover Shims		2
41	453633	Output Bearing Cover Shims		2
42	453634	Output Bearing Cover Shims		2
43	453646	67389 Cone		1
44	453648	Spherical Roller Bearing	22312 EI	6
45	453656	67322 Cup		1
46	453657	M12 x 12 Din. 915 / ISO 4028 Dogpoint Set Screw	[Steel, Min Hardness 45 HRC]	3

Parts Reference for Magna G525 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
47	453661	HHCS Grade 8.8 DIN 933, Plain	M12-1.75 x 35 Long	8
48	453664_	Hardened Washer DIN 6916	[21 x 37 x 4 295-350 HV]	24
49	453667	HHCS Grade 8.8 DIN 933, Plain	M16 -2 45 Long	20
50	453668	HHCS Grade 10.9 DIN 931,	M20 -2.5 x 150 Long	24
51	453671	Retaining Ring Spring Steel DIN 472	Anderton Int. Circlip D1300-130A	6
52	453677	Dowel Pins Alloy Steel	.625 Diameter x 1.75 Lg Per ANSI B18.8.2	6
53	453683	O-Ring		2
54	453686	O-Ring Cord Stock, Buna - N or Equivalent		1
55	453687	O-Ring		1
56	453690	Lip Seal, Output Shaft	Dual Lip Seal Hnbr	1
57	453691	Lip Seal, Output Shaft	Single Lip Seal Hnbr	1
58	453692	Speedi Sleeve		1
59	453693	Speedi Sleeve		1
60	453904	Output Shaft Extension Key		1
61	453901	Parallel	Input Shaft Extension Key	1
62	453920	Spacer Ring	Parallel IP Shaft Seal Carrier	1
63	912267	107 TA Input	Bearing Shims	1
64	912268	Shim Int Pinion	0.007” Thick (Quantity as needed)	3
65	912269	Shim Int Pinion	0.015” Thick (Quantity as needed)	3
66	912593	Tabbed Shim	For Bearing Cup HH224140	2
67	70781501	Thrust Washer	–	1

Table A for Magna G525 Parallel Shaft Reducer Parts - Overall Gear Box Gear Ratios and Part Numbers								
Overall Gearbox Ratio	**Parallel IP Pinion Shaft P/N**	**Helical Gear P/N**	**Helical Shell Pinion P/N**	**Parallel IP Shell Pinion SFT P/N**	**Shell Pinion Key P/N**	**Shell Pinion SPCR P/N**	**Input Pinion Bearing Spacer**	**Outboard Bearing Cone**
8.11 : 1	N/A	453542	453539	453409	453410	453411	N/A	402261
9.09 : 1	453538	453544	N/A	N/A	N/A	N/A	N/A	402261
10.23 : 1	453537	453546	N/A	N/A	N/A	N/A	N/A	402261
11.50 : 1	453536	453548	N/A	N/A	N/A	N/A	N/A	402261
12.73 : 1	453535	453550	N/A	N/A	N/A	N/A	N/A	402261
14:13 : 1	453530	453552	N/A	N/A	N/A	N/A	N/A	402261
16.52 : 1	453528	453554	N/A	N/A	N/A	N/A	N/A	912253
17.69 : 1	453527	453562	N/A	N/A	N/A	N/A	453911	912253
19.82 : 1	453526	453564	N/A	N/A	N/A	N/A	453911	912253
22.01 : 1	453525	453566	N/A	N/A	N/A	N/A	453911	912253
24:65 : 1	453524	453568	N/A	N/A	N/A	N/A	453911	912253
27.51: 1	453523	453570	N/A	N/A	N/A	N/A	453911	912253

Additional Backstop Parts for Magna G525 Parallel Shaft Reducer (Kit Part #453927)			
Item	**Part #**	**Description_I**	**Quantity**
1	304559	HHCS Grade 8.8 DIN 933, Plain	12
2	453598	Backstop Spacer	1
3	453599	Backstop	1
4	453600	Shaft Key Backstop	1
5	453606	Retaining Ring Anderton	1
6	912268	Shim Int Pinion	1
7	912269	Shim Int Pinion	1

Magna G700 Right Angle Reducer Parts



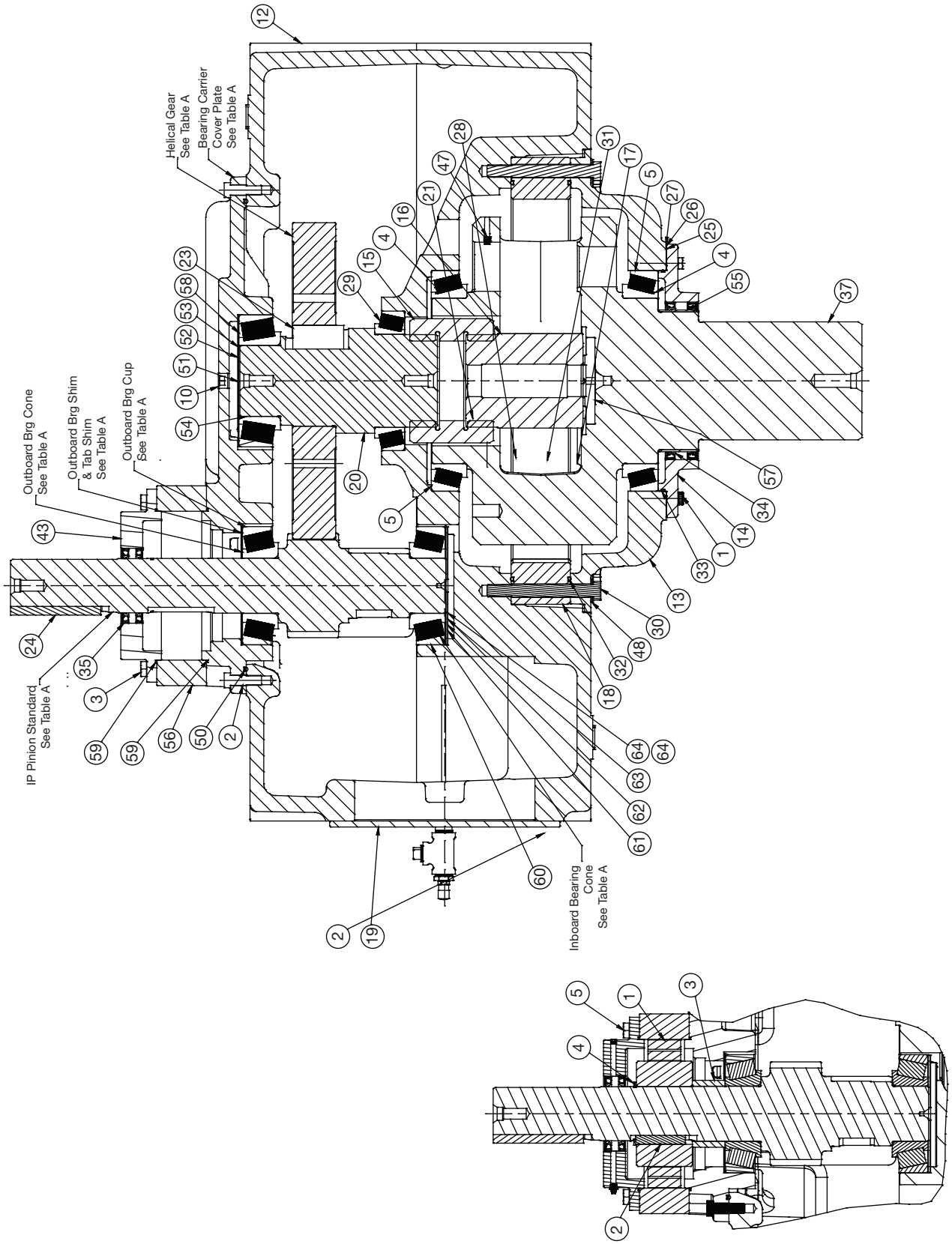
Magna G700 Right Angle Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	304541	HHCS Grade 8.8 DIN 933, Plain	M12-1.75 x 40 Long	16
2	304552	HHCS Grade 8.8 DIN 933, Plain	M16-2 x 50 Long	26
3	402239	LM451349 Cone	–	2
4	402261	HH221449 Cone	–	1
5	403133	LM451310 Cup	–	2
6	403134	HH224310 Cup	–	2
7	405015	1/8 x 27 Grease Fitting	–	2
8	415006	#4 x 3/16” Rivet	–	4
9	430026	1/8 Soc HD (Hex) Pipe Plug		2
10	430029	1/4 Soc HD Pipe Plug Dry-Seal		2
11	430035	3/4 NPT Socket HD Pipe Plug Dry-Seal	Steel Per ANSI B2.1	6
11	966907	Smart Sensor Adaptor		1
12	430078	3/4 NPT x 2” Nipple	Per ASTM A197	1
13	451902	Housing - Monoblock	Machining	1
14	451904	Input Seal Carrier	Machining	1
15	451906	Input Housing		1
16	451912	Output Cover	Machining	1
17	451914	Output Seal Carrier	Machining	1
18	451981	Spline Coupling	LSS - Sun Pinion	1
19	451982	Sun Pinion		1
20	451983	Planet Gear		3
21	451985	Ring Gear	Large HP Planetary Reducer	1
22	451991	Helical Gear Shaft		1
23	451992	Planet Spindle		3
24	451995	Spacer	IST Stage Level	1
25	452000	Output Shaft	Extension Key	1
26	452003	Helical	Key	1
27	452005	Oil Pan Assembly	(Bevel Gear)	1
28	452015	Input Bearing Carrier	Shims	5
29	452016	Input Bearing Carrier	Shims	3
30	452017	Input Bearing Carrier	Shims	2
31	452032	Output Bearing Cover	Shims (0.005” Thick)	2
32	452033	Output Bearing Cover	Shims (0.007” Thick)	2
33	452034	Output Bearing Cover	Shims (0.015” Thick)	2
34	452048	Spherical Roller Bearing	22313 E1	6
35	452056	Bearing Assembly	32030X	1
36	452068	HHSC Grade 10.9 DIN 931, Plain	M20-2.5 x 170 Long	32
37	452071	Retaining Ring Spring Steel DIN 472	Anderton Int. Circlip D1300-1400	6
38	452072	Bearing Lock-Nut	Tan-20	1
39	452073	Bearing Lock-Washer	TW 120 (for Tan-20 Locknut)	1
40	452080	Right Angle	Input Shaft Extension Key	1
41	452081	O-Ring	Parker #2-264 Buna N or Equivalent	1
42	452082	O-Ring	Parker #2-276 Buna N or Equivalent	1
43	452093	O-Ring	Parker #2-393 Buna N or Equivalent	2
44	452087	O-Ring	Parker #2-279 Buna N or Equivalent	1
45	452088	Input Seal 3.500 x 4.756 x 0.438	CRWHA1 Hnbr Dual Lip	1
46	452089	Input Seal 3.500 x 4.756 x 0.438	CRWHA1 Hnbr Single Lip	1
47	452090	Lip Seal, Output Shaft	9.00” x 10.00” x 0.625” Hnbr CRWH1	2

Magna G700 Right Angle Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
48	452096	3/4 NPT Tee Fitting	Per ASTM A197	1
49	452099	Planet Carrier	1 Piece Design	1
50	453300	Dipstick / Breather Combination	3/4 NPT ELESA 954222-L	1
51	453301	MagnaGear Nameplate Blank	Reducer Sizes 1-12	1
52	453303	Pitot Tube	Lubrigard #B14NT12	1
53	453304	3/4 - 1/4 NPT Hex Bushing Adapter		1
54	453305	3/4 NPT Square Head Pipe Plug	Per ASTM A197	1
55	453496	700K & 920K Helical Pinion	Cover Plate	1
56	453499	Low Head SHCS Grade 8.8, DIN 6912, Plain	M12 - 1.75 x 20 Long	20
57	453521	Inspection Cover		2
58	453522	Gasket		2
59	453657	M12 x 20 DIN 915 / ISO 4028 Dogpoint Setscrew	(Steel, Min Hardness 45 HRC)	3
60	453664	Hardened Washer DIN 6916, Plain	(21 x 37 x 4 295-350 HV)	32
61	453667	HHCS Grade 8.8 DIN 933, Plain	M16 - 2 x 45 Long	8
62	453667	Dowel Pins Alloy Steel	.625 Dia x 1.75 Lg Per ANSI B18.8.2	6
63	453684	O-Ring	Parker #2-208 Viton or Equivalent	2
64	453686	O-Ring Cord Stock, Buna N or Equivalent	Parker 3/16 (.210) Thick x 92.5” Lgt.	1
65	453812	Tabbed Shim		1
66	453813	Shims		2
67	453814	Shims		2
68	453815	Shims		2
69	453841	HH224346 Cone		2
70	453892	Seal Wear Sleeve		1
71	70781501_	Thrust Washer		1
72	402233	HH221410 Cup		1
73	453884	O-Ring	Parker #2-176 Viton or Equivalent	1

Table A for Magna G700 Right Angle Reducer Parts - Overall Gear Box Gear Ratios and Part Numbers															
Overall Gearbox Ratio	Bearing Carrier Cover Plate P/N	Bevel Pinion P/N	Bevel Gear P/N	Bevel Gear Key P/N	IP Pinion Backstop P/N	IP Pinion Standard P/N	Helical Gear P/N	Outboard Bearing Cone P/N	Outboard Bearing Cup P/N	Inboard Bearing Cone P/N	Inboard Bearing Cup P/N	Outboard Bearing Shim P/N	Outboard Bearing Tab Shim P/N	Inboard Bearing Shim P/N	Inboard Bearing Tab Shim P/N
12.41 : 1	453408	451931	451932	452002	452053	451941	451942	453841	403134	402261	402233	453813 453814 453815	453812	912267 912268 912269	912593
13.89 : 1	453408	451931	451932	452002	452018	451943	451944	453841	403134	402261	402233	453813 453814 453815	453812	912267 912268 912269	912593
15.60 : 1	453408	451931	451932	452002	452030	451945	451946	453841	403134	402261	402233	453813 453814 453815	453812	912267 912268 912269	912593
17.60 : 1	453408	451931	451932	452002	452031	451947	451948	453841	403134	402261	402233	453813 453814 453815	453812	912267 912268 912269	912593
19.60 : 1	453408	451931	451932	452002	452035	451949	451950	453841	403134	402261	402233	453813 453814 453815	453812	912267 912268 912269	912593
22.07 : 1	453408	451931	451932	452002	452036	451951	451952	453841	403134	402261	402233	453813 453814 453815	453812	912267 912268 912269	912593
25.91 : 1	451908	451933	451934	452001	452037	451953	451948	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
28.86 : 1	451908	451933	451934	452001	452038	451955	451950	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
32.49 : 1	451908	451933	451934	452001	452039	451957	451952	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
35.67 : 1	451908	451933	451934	452001	452049	451959	451960	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
39.55 : 1	451908	451933	451934	452001	452050	451961	451962	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
44.26 : 1	451908	451933	451934	452001	452058	451963	451964	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
49.91 : 1	451908	451933	451934	452001	452059	451965	451966	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
56.82 : 1	451908	451933	451934	452001	452094	451967	451968	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593
62.35 : 1	451908	451933	451934	452001	452095	451969	415970	912253	402233	912253	402233	912267 912268 912269	912593	912267 912268 912269	912593

Additional Backstop Parts for Magna G700 Right Angle Reducer (Kit 453928)			
Item	**Part #**	**Description**	**Quantity**
1	453399	Backstop	1
2	453400	Key - Backstop	1
3	453402	Spacer Sleeve	1
4	453880	HHCS Grade 8.8 DIN 933, Plain	12
5	453917	Retaining Ring	1

Parts Reference for G700 Parallel Shaft Reducer Parts



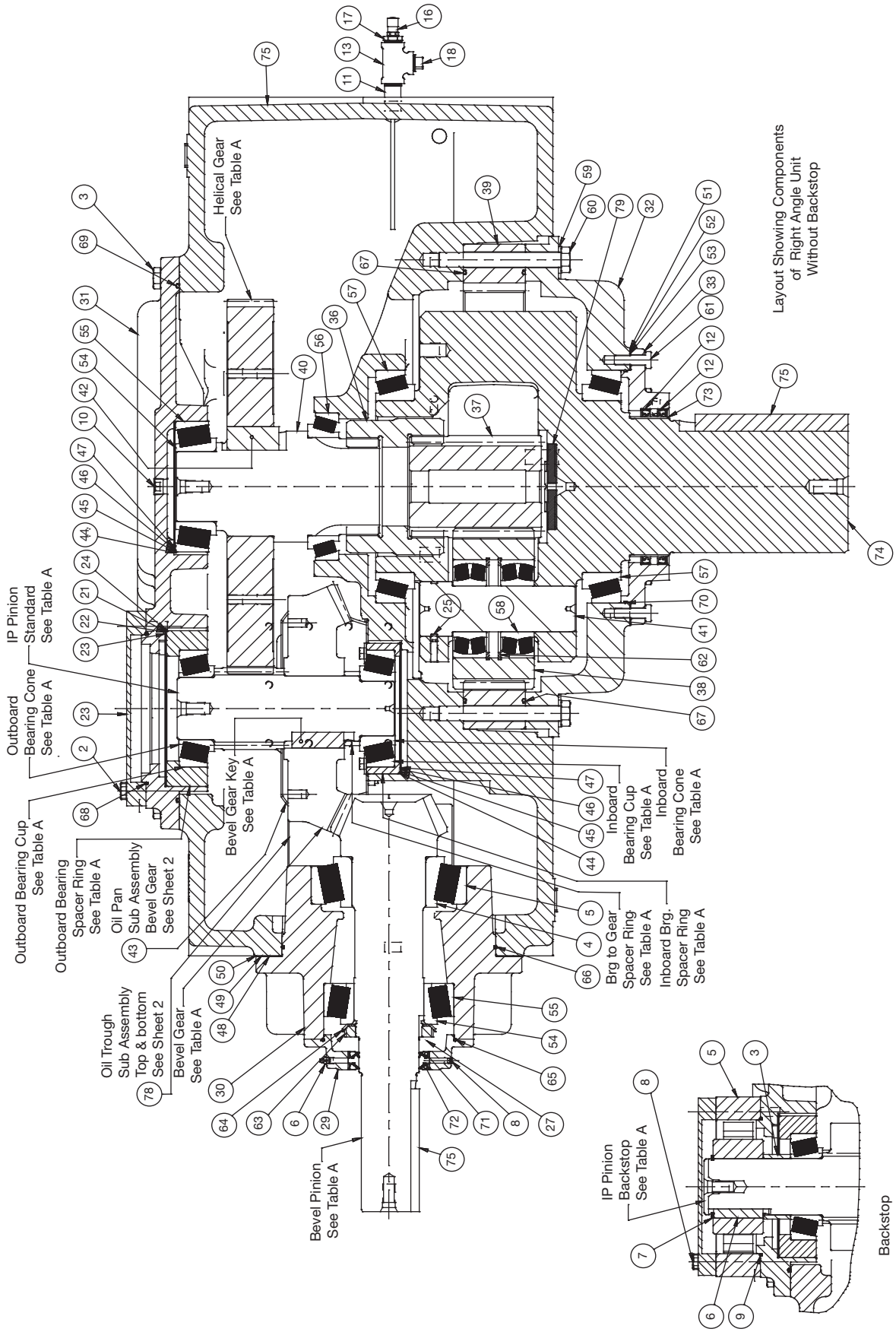
Magna G700 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	304541	HHCS Grade 8.8 DIN 933, Plain	M12-1.75 x 40 Long	20
2	304552	HHCS Grade 8.8 DIN 933, Plain	M1602 x 50 Long	20
3	304559	HHCS Grade 8.8 DIN 933, Plain	M16-2 x 120 Long	12
4	402239	LM451349 Cone	–	2
5	403133	LM451310 Cup	–	2
6	403134	HH224310 Cup	–	1
7	405015	1/8 x 27 Grease Fitting	–	2
8	415006	#4 x 3/16” Rivet	–	4
9	430026	1/8 Soc HD (Hex) Pipe Plug		2
10	430035	3/4 NPT Socket HD Pipe Plug Dryseal	Steel Per ANSI B2.1	5
10	966907	Smart Sensor Adaptor		1
11	430078	3/4 NPT x 2” Nipple	Per ASTM A197	1
12	451902	Housing Monoblock	Machining	1
13	451912	Output Cover	Machining	1
14	451914	Output Seal Carrier	Machining	1
15	451981	Spline Coupling	LSS - Sun Pinion	1
16	451982	Sun Pinion	–	1
17	451983	Planet Gear	–	3
18	451985	Ring Gear	Large HP Planetary Reducer	1
19	451988	Input Cover	Parallel Shaft Configuration	1
20	451991	Helical Gear Shaft	–	1
21	451992	Planet Spindle	–	3
22	452000	Output Shaft	Extension Key	2
23	452003	Helical	Key	1
24	452011	Key	Parallel Input Shaft	1
25	452032	Output Bearing Cover	Shims (0.005” Thick)	2
26	452033	Output Bearing Cover	Shims (0.007” Thick)	2
27	452034	Output Bearing Cover	Shims (0.015” Thick)	2
28	452048	Spherical Roller Bearing	22313 EI	6
29	452056	Bearing Assembly	32030X	1
30	452068	HHCS Grade 10.9 DIN 931, Plain	M20-2.5 x 170 Long	32
31	452071	Retaining Ring Spring Steel DIN 472	Anderton Int. Circlip D1300-1400	6
32	452083	O-Ring	Parker #2-393 Buna N or Equivalent	2
33	452087	O-Ring	Parker #2-279 Buna N or Equivalent	1
34	452090	Lip Seal, Output Shaft	9.00” x 10.00” x 0.625” HNBR CRWHI	2
35	452091	Lip Seal, Output Shaft	CR# 34383 3.438” x 4.761 x 0.438”	2
36	452096	3/4 NPT Tee Fitting	Per ASTM A197	1
37	452099	Planet Carrier	1 Piece Design	1
38	450300	Dipstick / Breather Combination	3/4 NPT ELESA 954222-L	1
39	453301	MagaGear Nameplate Blank	Reducer Sizes 1-12	1
40	453303	Pitot Tube	Lubrigard #B14NT12	1
41	453304	3/4 - 1/4 NPT Hex Bushing Adapter		1
42	453305	3/4 NPT Square HD Pipe Plug	Per ASTM A197	1
43	453404	Parallel IP Seal Carrier	High Ratio	1
44	453499	Low Head SHCS Grade 8.8, DIN 6912, Plain	M12 - 1.75 x 20 Long	20
45	453521	Inspection Cover	–	2
46	453522	Gasket	–	2

Magna G700 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
47	453657	M12 x 12 DIN 915/ISO 4028 Dogpoint Setscrew	(Steel, Min Hardness 45 HRC)	3
48	453664_	Hardened Washers DIN 6916	(21 x 37 x 4 295-350 HV)	32
49	453677	Dowel Pins Alloy Steel	.625 Dia x 1.75 Lg Per ANSI B18.8.2	8
50	453686	O-Ring Cord Stock, Buna N or Equivalent	Parker 3/16 (.210) Thick x 92.50 Lgt.	1
51	453812	Tabbed Shim		1
52	453813	Bearing Shim 0.005 Thick	Quantities as Needed	2
53	453814	Bearing Shim 0.007 Thick	Quantities as Needed	2
54	453841	HH224346 Cone	–	1
55	453892	Seal Wear Sleeve	–	1
56	453919	Spacer Ring	Parallel IP Shaft Seal Carrier	1
57	70781501	Thrust Washer		1
58	453815	Shims		2
59	453884	O-Ring		2
60	402233	Inboard Bearing Cup		1
61	912267	Inboard Bearing Shim	Shims (0.015 Thick)	2
62	912268	Inboard Bearing Shim	Shims (0.005 Thick)	2
63	921169	Inboard Bearing Shim	Shims (0.007 Thick)	2
64	912593	Inboard Bearing Tab Shim	Bearing Spacer	1

Table A for Magna G700 Parallel Shaft Reducer Parts - Overall Gear Box Gear Ratios and Part Numbers								
Overall Gearbox Ratio	Parallel IP Pinion Backstop P/N	Helical Gear P/N	Bearing Car. Cover Plate P/N	Outboard Bearing Cone P/N	Outboard Bearing Cup P/N	Inboard Bearing Cone P/N	Outboard Bearing Shim P/N	Outboard Bearing Tab Shim P/N
8.08 : 1	451919	451942	453408	453841	403134	402261	453813 453814 453815	453812
9.05 : 1	451937	491944	453408	453841	403134	402261	453813 453814 453815	453812
10.16 : 1	451938	451946	453408	453841	403134	402261	453813 453814 453815	453812
11.46 : 1	451923	451948	453408	453841	403134	402261	453813 453814 453815	453812
12.76 : 1	451924	451950	453408	453841	403134	402261	453813 453814 453815	453812
14.37 : 1	451925	451952	453408	453841	403134	402261	453813 453814 453815	453812
15.78 : 1	451926	491960	451908	912253	402233	912253	912267 912268 912269	912593
17.49 : 1	451927	451962	451908	912253	402233	912253	912267 912268 912269	912593
19.58 : 1	451928	451964	451908	912253	402233	912253	912267 912268 912269	912593
22.08 : 1	451929	451966	451908	912253	402233	912253	912267 912268 912269	912593
25.13 : 1	451930	451968	451908	912253	402233	912253	912267 912268 912269	912593
27.58 : 1	451935	451970	451908	912253	402233	912253	912267 912268 912269	912593

Additional Backstop Parts for Magna G700 Parallel Shaft Reducer			
Item	Part #	Description_I	Quantity
1	453399	Backstop	1
2	453400	Key - Backstop	1
3	453402	Spacer Sleeve	1
4	453917	Retaining Ring	1
5	453880	HHCS DIM 933 Grade 8.8	12

Parts Reference for Magna G920 Right Angle Reducer Parts

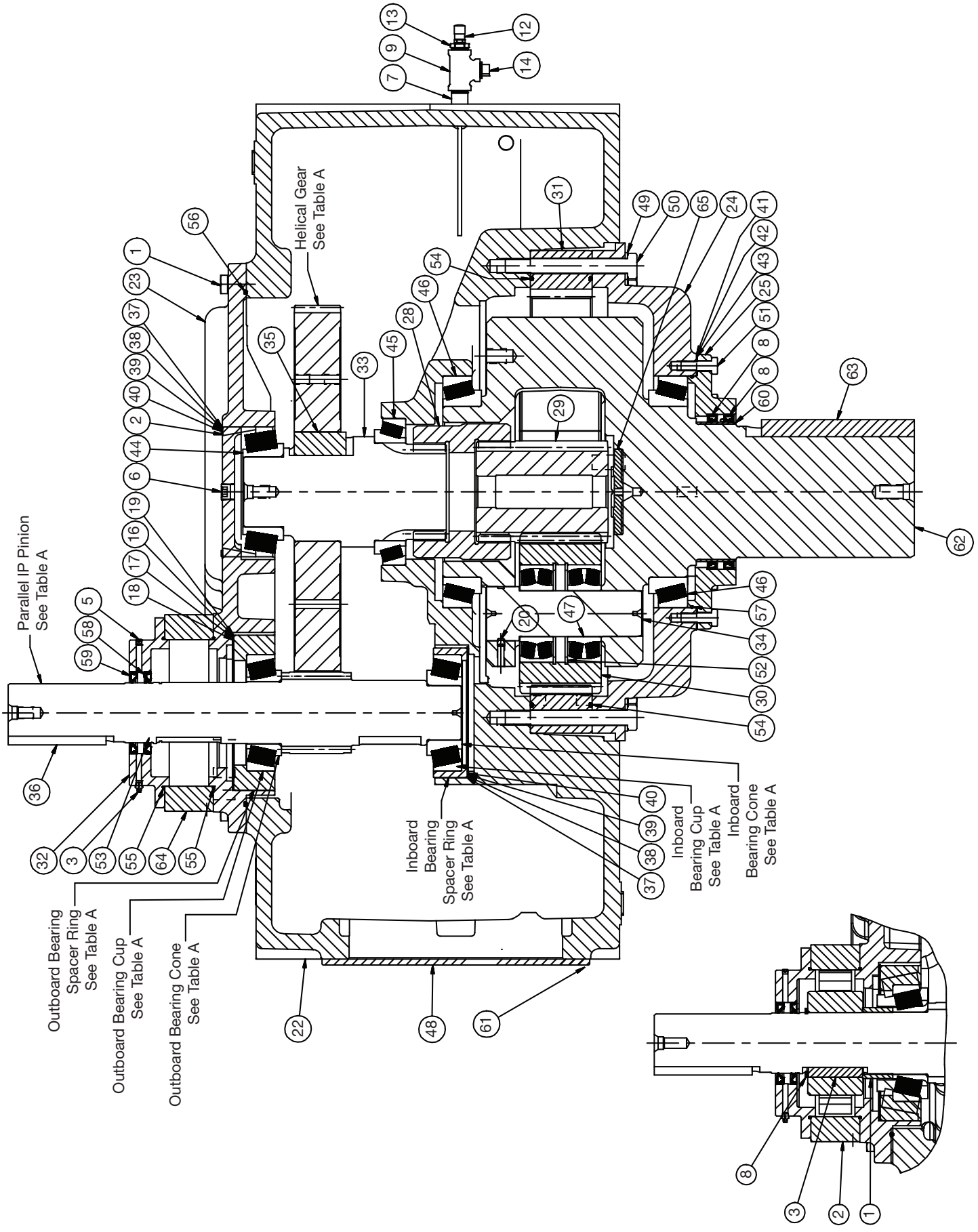


Magna G920 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	304541	HHCS Grade 8.8 DIN 933, Plain	M12-1.75 x 40 Long	6
2	304522	HHCS Grade 8.8 DIN 933, Plain	M16-2 x 50 Long	12
3	304562	HHCS Grade 8.8 DIN 033, Plain	M20-2.50 x 60 Long	24
4	402011	HH228340 Cone	–	1
5	403014	HH228310 Cone	–	1
6	405015	1/8 x 27 Grease Fitting	–	2
7	415006	#4 x 3/16” Rivet	–	4
8	430026	1/8 SOC HD (Hex) Pipe Plug		2
9	430029	1/4 SOC HD Pipe Plug Dryseal		2
10	430035	3/4 NPT Socket HD Pipe Plug Dryseal	Steel per ANSI B2.1	5
10	966907	Smart Sentor Adapter		1
11	430078	3/4 NPT x 2” Nipple	Per ASTM A197	1
12	452090	Lip Seal, Output Shaft	9.00” x 10.00” x 0.625” HNBR CRWHI	2
13	452096	3/4 NPT Tee Fitting	Per ASTM A197	1
14	453300	Dipstick / Breather Combination	34/ NPT ELESA 954222-L	1
15	453301	MagnaGear Nameplate Blank	Reducer Sizes 1-12	1
16	453303	Pitot Tube	Lubrigard #B14NT12	1
17	453304	3/4 - 1/4 NPT Hex Bushing Adapter		1
18	453305	3/4 NPT Square HD Pipe Plug	Per ASTM A197	1
19	453496	700K and 920K Helical Pinion	Cover Plate	1
20	453499	Low Head SHSC Grade 8.8 DIN 6912, Plain	M12-1.75 x 20 Long	20
21	453619	Bearing Shim (For HH228310) 0.005 Thick	Quantity as Needed	2
22	453620	Bearing Shim (For HH228310) 0.007 Thick	Quantity as Needed	2
23	453621	Bearing Shim (For HH228310) 0.015 Thick	Quantity as Needed	2
24	453622	Tabbed Shim	For Bearing Cup HH228310	1
25	453657	M12 x 12 DIN 915 / ISO 4028 Dogpoint Set Screw	(Steel Min Hardness 45 HRC)	3
26	453677	Dowel Pins Alloy Steel	.625 Dia x 1.75 Lg Per ANSI B18.8.2	6
27	453684	O-Ring	Parker #2-208 Viton or Equivalent	2
28	453702	Housing - Monoblock	Machining	1
29	453704	Input Seal Carrier	Machining	1
30	453706	Input Housing	–	1
31	453708	Bearing Carrier Cover Plate	Machining	1
32	453712	Output Cover	Machining	1
33	453714	Output Seal Carrier	Machining	1
34	453721	Inspection Cover	–	2
35	453722	Gasket	–	2
36	453781	Spline Coupling	LSS - Sun Pinion	1
37	453782	Sun Pinion	–	1
38	453783	Planet Gear	–	3
39	453785	Ring Gear	–	1
40	453791	Helical Gear Shaft	–	1
41	453792	Planet Spindle	–	3
42	453803	Helical	Key	1
43	453805	Oil Pan Assembly	(Bevel Gear) see Dwg. 453805 for component breakdown	1
44	453812	Tabbed Shim	For Bearing Cup HH224310	2
45	453813	Bearing Shim 0.005 Thick	Quantity as Needed	4
46	453814	Bearing Shim 0.007 Thick	Quantity as Needed	4

Magna G920 Right Angle Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
47	453815	Bearing Shim 0.015 Thick	Quantity as Needed	4
48	453816	Input Bearing Carrier	Shims	5
49	453817	Input Bearing Carrier Shim 0.007 Thick	Quantity as Needed	3
50	453818	Input Bearing Carrier Shim 0.015 Thick	Quantity as Needed	2
51	453832	Shim Output Bearing Cover 0.005 Thick	Quantity as Needed	2
52	453833	Shim Output Bearing Cover 0.007 Thick	Quantity as Needed	2
53	453834	Shim Output Bearing Cover 0.015 Thick	Quantity as Needed	2
54	453841	HH224346 Cone	–	2
55	453842	HH224310 Cup	–	2
56	453843	32032X TS Bearing Assembly	Timken or Equivalent	1
57	453844	32956 TS Bearing Assembly	Taper Roller Bearing Assembly	2
58	453848	Spherical Roller Bearing	22315 EI	6
59	453864	HRDND Washer DIN 6916	(25 x 44 x 4 295-350 HV)	24
60	453868	HHCS Grade 10.9 DIN 933, Plain	MN24-3 x 200 Long	24
61	453869	HHCS Grade 8.9 DIN 933, Plain	M16-2 x 55 Long	8
62	453871	Retaining Ring Spring Steel DIN 472	Anderton Int Circle IP DI300-1600	6
63	453872	Bearing Lock-Nut #TAN-22	–	1
64	453873	Bearing Lock-Washer #TW122	–	1
65	453881	O-Ring	Parker #2-267 Buna N or Equivalent	1
66	453882	O-Ring	Parker #2-279 Buna N or Equivalent	1
67	453883	O-Ring Parker .210 +/- .005 Diameter Cross Section	95” Long Buna N or Equivalent	2
68	453884	O-Ring	Parker 2-271 Buna N or Equivalent	1
69	453886	O-Ring cord Stock, Buna N or Equivalent	Parker 3/16 (.210) Nominal Cross Section, 110” Long	1
70	453887	O-Ring	Parker #2-280 Buna N or Equivalent	1
71	453888	Lip Seal		1
72	453889	Lip Seal		1
73	453907	Right Angle	Input Shaft Extension Key	1
74	453889	Planet Carrier	1 Piece Design	1
75	453907	Right Angle	Input Shaft Extension Key	1
76	453909	Output Shaft	Extension Key	1
77	454034	920K Oil Trough Assembly	(Top) See Dwg 454034 for Component Breakdown	1
78	454040	920K Oil Trough Assembly	(Bottom) See Dwg 454040 for Component Breakdown	1
79	70781501	Thrust Washer	–	1

Table A for Magna G920 Right Angle Reducer Parts (See Note #3 for Bearing Details)													
Overall Gearbox Ratio	Bevel Pinion P/N	Bevel Gear Pin P/N	Bevel Gear Key P/N	IP Pinion Standard P/N	IP Pinion Backstop P/N	Helical Gear P/N	Outboard Bearing Cone P/N	Outboard Bearing Cup P/N	Inboard Bearing Cone P/N	Inboard Bearing Cup P/N	Bearing to Gear Spacer Ring P/N	Outboard Bearing Spacer Ring P/N	Inboard Bearing Spacer Ring P/N
12.524 : 1	453731	453732	453802	453741	453777	453742	402011	403014	453841	453842	453854	N/A	N/A
13.882 : 1	453731	453732	453802	453743	453778	453744	402011	403014	453841	453842	453854	N/A	N/A
15.621 : 1	453731	453732	453802	453745	453830	453745	402011	403014	453841	453842	453854	N/A	N/A
17.415 : 1	453731	453732	453802	453747	453831	453748	402011	403014	453841	453842	453854	N/A	N/A
19.620 : 1	453731	453732	453802	453749	453835	453750	402011	403014	453841	453842	453854	N/A	N/A
21.823 : 1	453731	453732	453802	453751	453836	453752	402011	403014	453841	453842	453854	N/A	N/A
24.624 : 1	453731	453732	453802	453753	453837	453754	402011	403014	453841	453842	453854	N/A	N/A
28.884 : 1	453733	453732	453802	453760	453838	453750	402261	402233	912253	402233	453853	453798	453797
32.128 : 1	453733	453734	453801	453762	453839	453752	402261	402233	912253	402233	453853	453798	453797
36.277 : 1	453733	453734	453801	453764	453851	453754	402261	402233	912253	402233	453853	453798	453797
40.441 : 1	453733	453734	453801	453755	453852	453756	402261	402233	912253	402233	453853	453798	453797
45.888 : 1	453733	453734	453801	453757	453850	453758	402261	402233	912253	402233	453853	453798	453797
50.191 : 1	453733	453734	453801	453765	453859	453766	402261	402233	912253	402233	453853	453798	453797
55.672 : 1	453733	453734	453801	453767	453894	453768	402261	402233	912253	402233	453853	453798	453797
61.574 : 1	453733	453734	453801	453769	453895	453770	402261	402233	912253	402233	453853	453798	453797

Additional Backstop Parts for Magna G920 Right Angle Reducer with Backstop (Kit 953929)			
Item	**Part #**	**Description_I**	**Quantity**
3	453795	Spacer	1
4	453797	Inboard Bearing Spacer Ring	1
5	453799	Backstop	1
6	453800	Backstop	1
7	453806	Retaining Ring	1
8	486880	HHCS Grade 8.8 DIN 933, Plain	12
9	453884	O-Ring	1


Helical Gear
See Table A
Parallel IP Pinion
See Table A
Outboard Bearing
Spacer Ring
See Table A
Outboard Bearing Cup
See Table A
Outboard Bearing Cone
See Table A
Inboard
Bearing
Spacer Ring
See Table A
Inboard
Bearing Cup
See Table A
Inboard
Bearing Cone
See Table A

Magna G920 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
1	304562	HHCS Grade 8.8 DIN 933, Plain	M20-2.50 x 60 Long	16
2	403134	HH224310 Cup	–	1
3	405015	1/8 x 27 Grease Fitting	–	2
4	415006	#4 x 3/16” Rivet	–	4
5	430026	1/8 Soc HD (Hex) Pipe Plug		2
6	430035	3/4 NPT Socket HD Pipe Plug Dryseal	Steel Per ANSI B2.1	5
6	966907	Smart Sensor Adapter		1
7	430078	3/4 NPT x 2” Nipple	Per ASTM A197	1
8	452090	Lip Seal, Output Shaft	9.00” x 10.00” x 0.625” HNBR CRWHI	2
9	452096	3/4 NPT Tee Fitting	Per ASTM A197	1
10	453300	Dipstick / Breather Combination	3/4 NPT ELESA 954222-L	1
11	453301	MagnaGear Nameplate Blank	Reducer Sizes 1-12	1
12	453303	Pitot Tube		1
13	453304	3/4 - 1/4 NPT Hex Bushing Adapter		1
14	453305	3/4 NPT Square HD Pipe Plug	Per ASTM A197	1
15	453499	Low Head SHCS Grade 8.8, DIN 6912, Plain	M12-1.75 x 20 Long	20
16	453619	Bearing Shim (for HH228310) 0.005 Thick	Quantity as Needed	2
17	453620	Bearing Shim (for HH228310) 0.007 Thick	Quantity as Needed	2
18	453621	Bearing Shim (for HH228310) 0.015 Thick	Quantity as Needed	2
19	453622	Tabbed Shim		1
20	453657	M12 x 12 DIN, 915 / ISO 4028 Dogpoint Set Screw	(Steel, MN Hardness 45 HRC)	3
21	453677	Dowel Pins Allow Steel	.625 Dia x 1.75 Lg. Per ANSI B18.8.2	6
22	453702	Housing - Monoblock	Machining	1
23	453708	Bearing Carrier Cover Plate	Machining	1
24	453712	Output Cover	Machining	1
25	453714	Output Seal Cover	Machining	1
26	453721	Inspection Cover	–	2
27	453722	Gasket	–	2
28	453781	Spline Covering	LSS - Sun Pinion	1
29	453782	Sun Pinion	–	1
30	453783	Planet Gear	–	3
31	453785	Ring Gear	–	1
32	435790	Parallel IP Seal Carrier	Low Ratio	1
33	453791	Helical Gear Shaft	–	1
34	453792	Planet Spindle	–	3
35	453803	Helical	Key	1
36	453807	Input Shaft Extension Key		1
37	453812	Tabbed Shim		2
38	453813	Bearing Shim 0.005 Thick	Quantity as Needed	4
39	453814	Bearing Shim 0.007 Thick	Quantity as Needed	4
40	453815	Bearing Shim 0.015 Thick	Quantity as Needed	4
41	453832	Shim Output Bearing Cover 0.005 Thick	Quantity as Needed	2
42	453833	Shim Output Bearing Cover 0.007 Thick	Quantity as Needed	2
43	453834	Shim Output Bearing Cover 0.015 Thick	Quantity as Needed	2
44	453841	HH224346 Cone	–	1
45	453843	32032X TS Bearing Assembly	Timken or Equivalent	1
46	453844	32956 TS Bearing Assembly	Taper Roller Bearing Assembly	2
47	453848	Spherical Roller Bearing	22315 EI	6

Magna G920 Parallel Shaft Reducer Parts				
Item	**Part #**	**Description**		**Quantity**
48	453860	Input Cover	Parallel Shaft Configuration	1
49	453864	HRDND Washer DIN 6916	(25 x 44 x 4 295-350 HV)	24
50	453868	HHCS Grade 10.9 DIN 933, Plain	M24 - 3 x 200 Long	24
51	453869	HHCS Grade 8.8 DIN 933, Plain	M16-2 x 55 Long	24
52	453871	Retaining Ring Spring Steel DIN 472	Anderton INT Circlip D1300-1600	6
53	453880	HHCS Grade 8.8 DIN 933, Plain	M16-2 x 140 Long	12
54	453883	O-Ring Parek .210 +/- .005 Diameter Cross Section	95” Long Buna N or Equivalent	2
55	453884	O-Ring	Parker 2-271 Buna N or Equivalent	2
56	453886	O-Ring Cord Stock, Buna N Or Equivalent	Parker 3/16 (.210) Nominal Cross Section, 110” Long	1
57	453887	O-Ring	Parker #2-280 Buna N or Equivalent	1
58	453888	Lip Seal		1
59	453889	Lip Seal		1
60	453892	Seal Wear Sleeve	–	1
61	453897	HHCS Grade 8.8 DIN 933, Plain	M20-2.50 x 40 Long	8
62	453899	Planet Carrier	1 Piece Design	1
63	453909	Output Shaft	Extension Key	1
64	453919	Spacer Ring	Parallel IP Shaft Seal Carrier	1
65	70781501	Thrust Washer	–	1

Table A for Magna G920 Parallel shaft Reducer Parts (See Note #2 for Bearing Details)								
Overall Gearbox Ratio	Parallel IP Pinion P/N	Helical Gear P/N	Outboard Bearing Cone P/N	Outboard Bearing Cup P/N	Inboard Bearing Cone P/N	Inboard Bearing Cup P/N	Outboard Bearing Spacer Ring P/N	Inboard Bearing Spacer Ring P/N
8.16 : 1	453735	453742	402011	403014	403014	453841	N/A	N/A
9.04 : 1	453736	453744	402011	403014	403014	453841	N/A	N/A
10.17 : 1	453737	453746	402011	403014	403014	453841	N/A	N/A
11.34 : 1	453738	453748	402011	403014	403014	453841	N/A	N/A
12.78 : 1	435739	453750	402011	403014	403014	453841	N/A	N/A
14.21 : 1	453740	453752	402011	403014	403014	453841	N/A	N/A
16.05 : 1	453771	453754	402261	402233	402233	912253	453798	453797
17.89 : 1	453772	453756	402261	402233	402233	912253	453798	453797
20.30 : 1	453773	453758	402261	402233	402233	912253	453798	453797
22.20 : 1	453774	453766	402261	402233	402233	912253	453798	453797
24.62 : 1	453775	453768	402261	402233	402233	912253	453798	453797
27.23 : 1	453776	453770	402261	402233	402233	912253	453798	453797

Additional Backstop Parts for Magna G920 Right Angle Reducer with Backstop (Kit 953929)			
Item	**Part #**	**Description_I**	**Quantity**
1	453795	Spacer	1
2	453799	Backstop	1
3	453800	Backstop	1
4	453806	Retaining Ring	1

Troubleshooting Chart

Trouble	What to Inspect	Action
OVERHEATING	1. Oil cooler (if equipped)	Check coolant and oil flow. If top of the heat exchanger is at a level above the gearbox normal oil level, air can get trapped in the heat exchanger. Loosen piping at the top of the heat exchanger and vent the air out. Oil temperature in the MagnaGear should be about 150 to 165° F (65 to 74°C) when equipped with an oil cooler. Check pipes and cooler/heat exchanger for deposits of sediment.
	2. Oil level	Check dipstick or sight tube for correct oil level.
	3. Bearings	Check bearing end play and radial clearance. All shafts must turn freely when disconnected from load.
	4. Breather	Breather must be open. Replace if plugged.
	5. Type of oil	Oil viscosity higher than recommended for ambient temperature. Refer to oil selection section and fill with proper viscosity selection.
	6. Oil is dirty	Change oil
SHAFT FAILURE	1. Type of coupling	Rigid couplings between rigidly supported shafts can cause shaft failure. Replace with flexible coupling that provides required lateral float.
	2. Coupling alignment	Realign equipment as necessary.
	3. Overhung load	Sprockets or pulleys may be mounted on either the input or output shafts. Ensure proper tension.
	4. Excessive high energy loads	Equip MagnaGear with couplings designed to absorb shock or repetitive shock loads
BEARING FAILURE	1. Overloads	Check nameplate rating and compare with MagnaGear rating chart.
	2. Overhung loads	See "Shaft Failure"--Item 2.3
	3. Bearing adjustment	See "Overheating"--Item 1.3
	4. Bearing lubrication	If equipped, check operation of the lube oil pump. Output pressure at full speed should not be less than 15 psi (1 Bar). Clean or replace filter on pump. Replace worn, cracked or badly heat-discolored bearings.
	5. Rust formation	Seal unit to prevent entrance of moisture and to reduce condensation inside unit. Drain condensation often. Run the unit to full warm frequently during long shutdowns or fill the MagnaGear COMPLETELY with oil.
	6. Storage conditions	Long periods of storage in moist atmospheres will cause destructive rusting of bearings and gears. If this occurs, disassemble the unit, inspect and clean or replace parts.
OIL LEAKAGE	1. Oil level	Add oil or drain excess oil from housing as required. Maintain oil level as indicated by the fill arrow near the sight tube.
	2. Breather	If breather is clogged remove and replace.
	3. Oil seals	Check oil seals and replace if worn.
	4. Plugs, gauges and fittings	Apply thread sealant and tighten.
	5. Housing and caps	Tighten bolts or cap screws. If leak persists, remove housing cover and caps. (NOTE: Drain oil to level below housing cover to avoid spillage). Clean mating surfaces. Apply a 1/8" (3 mm) bead of silicon to the cap around the tenon. Tighten fasteners securely. Refill housing to proper level.
GEAR WEAR	1. Gear tooth wear and failure	Contact factory
	2. Backlash	Nominal range is .014" to .022". Contact factory.
	3. Misalignment	Check contact pattern on gear face. 75% of the total face, is correct.
	4. Overloads	See "Bearing Failure"--Item 3.1
	5. Oil level	See "Overheating"--Item 1.2
	6. Type of oil	See "Overheating'' --Item 1.5
	7. Coupling lateral float	See "Shaft Failure" --Item 2.1
	8. Rust formation	See "Bearing Failure"--Item 3.5
NOISE	1. Unusual or increasing noise	See "Gear Wear" and "Bearings Failure"
	2. Defective Coupling	Contact coupling vendor
	3. Gear unit mounting has loosened	Tighten fasteners to recommended torques. Replace damaged fasteners.

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