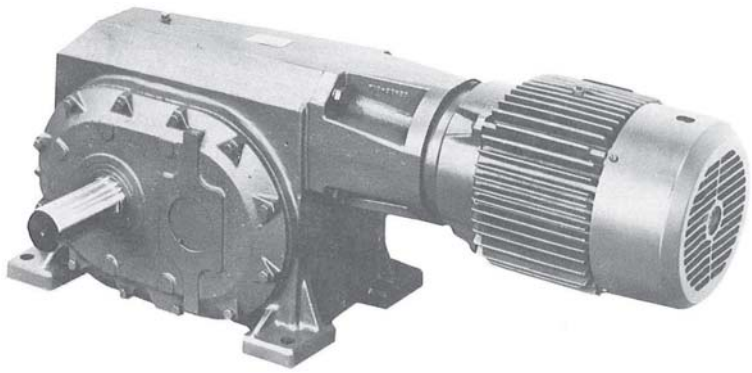
MASTER XL® RIGHT ANGLE REDUCERS

SERVICE AND REPAIR
SIZE 40 C-FACE REDUCER AND GEARMOTOR
AND SIZE H419 C-FACE REDUCER



WARNING: Because of the possible danger to person(s) or property which may result from 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, operation and maintenance 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 Master Power Transmission nor are the responsibility of Master Power Transmission. 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 the equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a failsafe device must be an integral part of the driven equipment beyond the speed reducer output shaft.

MASTER® POWER TRANSMISSION

3300 Tenth St. / Columbus, IN 47201 / (812) 376-1100
www.master-pt.com

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IMPORTANT

It is important that these instructions be studied by personnel servicing the unit. Read thoroughly before repairing. Keep these instructions for future reference.

GENERAL

THE MASTER GEARMOTOR—is a compact power package utilizing a standard "C" face motor, adapter and flexible coupling, connecting to the reducer.

The MASTER XL Right Angle gearmotor and the combination gearmotor and reducer are designed with a steel worm, cut integral on the input shaft, mating with a bronze worm gear as the first stage. The second stage gears are helical, cut from steel, hardened and then honed to close tolerances.

The single reduction and combination gearmotor and reducer are designed with tapered roller bearings on the input, intermediate and final output shafts.

INSTALLATION

The gear unit must be mounted on a sturdy base of sufficient strength to prevent distortion due to applied loads. To prevent the introduction of additional stresses in the gear unit, the base must be flat and any uneveness must be compensated for by the insertion of shims between the base and the feet of the gearcase. Hex head bolts of proper diameter and grade, together with flat washers, should be used to mount the gear unit to its base.

DANGER

THE USER IS RESPONSIBLE FOR CONFORMING WITH THE NATIONAL ELECTRICAL CODE AND ALL OTHER APPLICABLE LOCAL CODES. WIRING PRACTICES, GROUNDING, DISCONNECTS AND OVERCURRENT PROTECTION ARE OF PARTICULAR IMPORTANCE. FAILURE TO OBSERVE THE PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

ROTATION

WARNING

TO ENSURE THAT 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.

To reverse the direction of rotation of a 3-phase A-C gearmotor, interchange any two of the lines going to the motor. If it is a 2-phase gearmotor, interchange the wires of one phase, Four-wire, 2-phase gearmotors have lead marking conforming to NEMA standards.

D-C gearmotors may be reversed by interchanging the armature leads (A1 and A2). In all cases, the connection diagrams furnished with the motors must be consulted to ensure that proper polarity of series fields is retained.

WARRANTY

This equipment is warranted under Reliance's published "Standard Terms and Conditions of Sale of Electrical Apparatus."

Parts, service, and repairs, in or out of warranty may be arranged through any Reliance Authorized Service Shop, Distributor, or District Sales Office.

Damage in shipment, abuse, misuse, applicable maintenance and repair and periodic adjustments, as required, are not part of this warranty.

STANDARD TERMS & CONDITIONS OF SALE

Company expressly warrants the equipment manufactured by it as set forth herein. Company makes no other warranties, either express or implied (including without limitation warranties as to merchantability or fitness for a particular purpose).

WARRANTY

CAUTION: SERVICE AND REPAIR UNDER WARRANTY SHOULD BE PERFORMED ONLY BY A DODGE AUTHORIZED SERVICE SHOP. CALL WARRANTY ADMINISTRATION AT 812-376-1100 FOR THE NEAREST LOCATION.

Master XL gear units are warranted under the DODGE "Standard Conditions for Sale."

Warranty claims on any such apparatus must be submitted to the company within one year from date of installation or within three years from date of manufacture, whichever comes first. The Seller's warranty applies insofar as the equipment is operated within the rating and service conditions for which it was specifically sold. The warranty does not extend to failures induced by misuse, improper storage or handling, abuse or misapplication.

For warranty service, contact the nearest DODGE Sales Office or Authorized Distributor or call Warranty Administration at 812-376-1100.

SERVICE FACTOR

Load conditions must be in accordance with service factor as listed on the nameplate. Refer to the DODGE Gear Catalog or AGMA published ratings for definition of service conditions.

LUBRICATION FITTINGS AND PLUGS

This gearcase has been lubricated at the factory for only one mounting position. Before starting, check the mounting position diagrams on page 6 through 9 to make sure that the oil level plug and oil level are in the correct location for which the unit is to be operated. This is extremely important, as insufficient lubricant will damage gears and bearings in a very short time. If any change is necessary, the vent plug must be relocated above the new oil level. When the unit is to be mounted in a position other than those shown in the diagrams, consult factory.

On some mounting positions zerk fittings are provided for grease lubricating bearings located above the operating oil level. Lubricate with a good grade of roller bearing grease when changing gear lubricant at the recommended change interval. Texaco Marfak No. 3 is a suitable grease. Do not overlubricate grease packed bearings.

The input roller bearings are lubricated at the factory with standard ball bearing grease, not roller bearing grease. On W40 and C40 gear units zerk fitting are provided for regreasing these bearings. At the bearing nearest the motor there are two pipe tapped holes (one on each side of the case). One contains a zerk fitting, the other a hex head pipe plug. At the normal oil change interval as listed below, remove the hex head pipe plug and lubricate the bearing through the zerk. When clean grease comes out the pipe tapped hole, replace the plug. A zerk is also located at the bearing opposite the motor, but no hex head pipe plug is provided. The grease discharges into the gearcase. Lubricate this bearing through the zerk the same amount that the first bearing was lubricated. Shell Alvania No. 2 or Chevron SRI-2 are suitable greases. Input bearings on H419 gear units need not be relubricated.

Single reduction worm gear units for output shaft down mounting have one pipe tapped hole in the center of the closed bearing housing. Combination units for output shaft down mounting have two pipe tapped holes in line, one in the center of the output shaft, and one in the center of the second stage pinion shaft. Units are shipped from the factory with throwaway plugs in these tapped holes (a throwaway plug can be recognized by the cross drilled hole in the head of the plug). Before putting units into operation remove and discard the throwaway plugs and install the zerk fittings.

Flanged units for the flange/output shaft up mounting have one pipe tapped hole in the side of the flanged bearing housing. Its location can be recognized by the throwaway plug. Remove and discard the throwaway plug and install the zerk fitting.

CAUTION

PROPER OPERATION OF THIS UNIT REQUIRES VENTING. REPLACE THE THROWAWAY PLUG WITH THE VENT PROVIDED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN DAMAGE TO, OR DESTRUCTION OF, THE EQUIPMENT.

Vent plug locations can be recognized by a throwaway plug. The vent plug is wired to the throwaway plug to avoid mistaking it for a zerk location. The vent plug is designed to prevent dirt and water from entering the gearcase and also to release air pressure caused by heat generated in the case. Without proper air venting the increase in pressure may force lubricant through the oil seals and result in oil leakage and damage to the unit. Do not restrict the operation of the vent with paint or other obstructions.

OPERATING TEMPERATURES

Heating is a natural characteristic of right angle gear units with a worm gear set. A maximum gearcase sump temperature approaching 200° F. is not uncommon for units operating in normal ambient temperatures. When operated at rated capacity, no damage will result from this temperature, as this was taken into consideration in the design of the gearcase and the selection of the lubricant. The proper lubricant must be selected for the operating ambient temperature range, with seasonal changes in lubricant viscosity grade whenever necessary. Output speeds above 300 RPM may require a lighter viscosity grade of lubricant. Select the lubricant from the proper column on page 4. Lubricants other than those listed should not be used without specific factory approval as performance or gear life amy be adversely affected.

MAINTENANCE

Gearmotors and reducers are accurately adjusted and tested at the factory. Care must be taken when the gearcase is disassembled and reassembled. This should be done according to this manual or by an authorized service station as damage to internal parts may result if done improperly.

On W40 and C40 gear units when the C-face motor is assembled to the gearcase, care must be taked to ensure that the flexible coupling hubs are spaced properly from the ends of both the motor shaft and the reducer input shaft. See diagram on page 12 of this manual. On H419 gear units when the C-face motor is assembled to the

gearcase, the input shaft bore must be lubricated with a molydisulfide-type lubricant, preferably Mobiltemp No. 78 grease.

Lubrication is extremely important for satisfactory operation. The proper oil level must be maintained in the gearcase at all times. The correct level is indicated by the red head pipe plug. Frequent inspections with the unit not running (preferably when warm), should be made by removing the plug to see that the level is being maintained. If low, (without replacing oil level plug), add lubricant through one of the upper holes until it comes out the oil level hole. Replace the oil level plug securely.

The satisfactory performance of gears and bearings in gearmotors and reducers depends on clean lubricant, free from dust, grit, sludge, and moisture. Depending on operating conditions, the lubricant will eventually become contaminated and should be replaced periodically. When first put into operation, the lubricant in new gearcases becomes contaminated with grit and metal particles from the run-in period.

Lubricant should be drained, the gearcase flushed with mineral spirits and refilled after the first 250 hours of operation; then every 1500 hours or six months there after, whichever occurs first. (Normal operation is running 16 hours per day in 80° F. ambient.) More frequent oil changes may be necessary when running continuously at high temperatures. Use only recommended lubricants as listed in the table on page 5.

RECOMMENDED LUBRICANTS

It is impossible to select one gear lubricant of petroleum origin which is usable over a wide range of temperatures, such as minus (-)65°F. to plus (+) 165°F., as is required for some installations. When such conditions are encountered it is necessary to change the lubricant depending on the ambient (surrounding air) temperature at the time of operation. Use lubricants of the proper viscosity group as outlined on the following page.

Note 1: Lubricants shipped in the gearcase from the factory are viscosity group 318.62 oils for standard ambient conditions and continuous duty.

Note 2: If a USDA-H1 food grade lubricant is desired, Chevron FM Lubricating Oil 460X may be used in ambient temperatures of +15°F. to +110°F. Chevron FM Lubricating Oil is available as a factory fill, but if it becomes necessary to install this oil in the field by draining a gearcase which contains our standard non-food grade lubricant the gearcase must be flushed thoroughly before installing the new oil.

Do not operate gear unit in ambient temperatures below -65°F. nor above +165°F. For temperatures below +10°F. special oil seals are required and bearings in the gearcase must be packed with Aeroshell 7 grease instead of Marfak No.3.

All group 318.63 lubricants, except Mobil SHC-634 must be changed after 300 hours of high temperature operation. Mobil SHC-634 must be changed after 1500 hours of high temperature operation.

When changing oil from one viscosity group to another, flush the gearcase with mineral spirits before installing the new oil.

FOR INTERMITTENT DUTY IN A WIDE TEMPERATURE RANGE

(Defined as not over 50% duty nor more than 30-minute operation continuously.)

AMBIENT TEMPERATURE	VISCOSITY GROUP
-65°F. TO +10°F.	318.59
-20°F. TO +50°F.	318.60
+15°F. TO +110°F.	318.62
+80°F. TO +165°F.	318.63

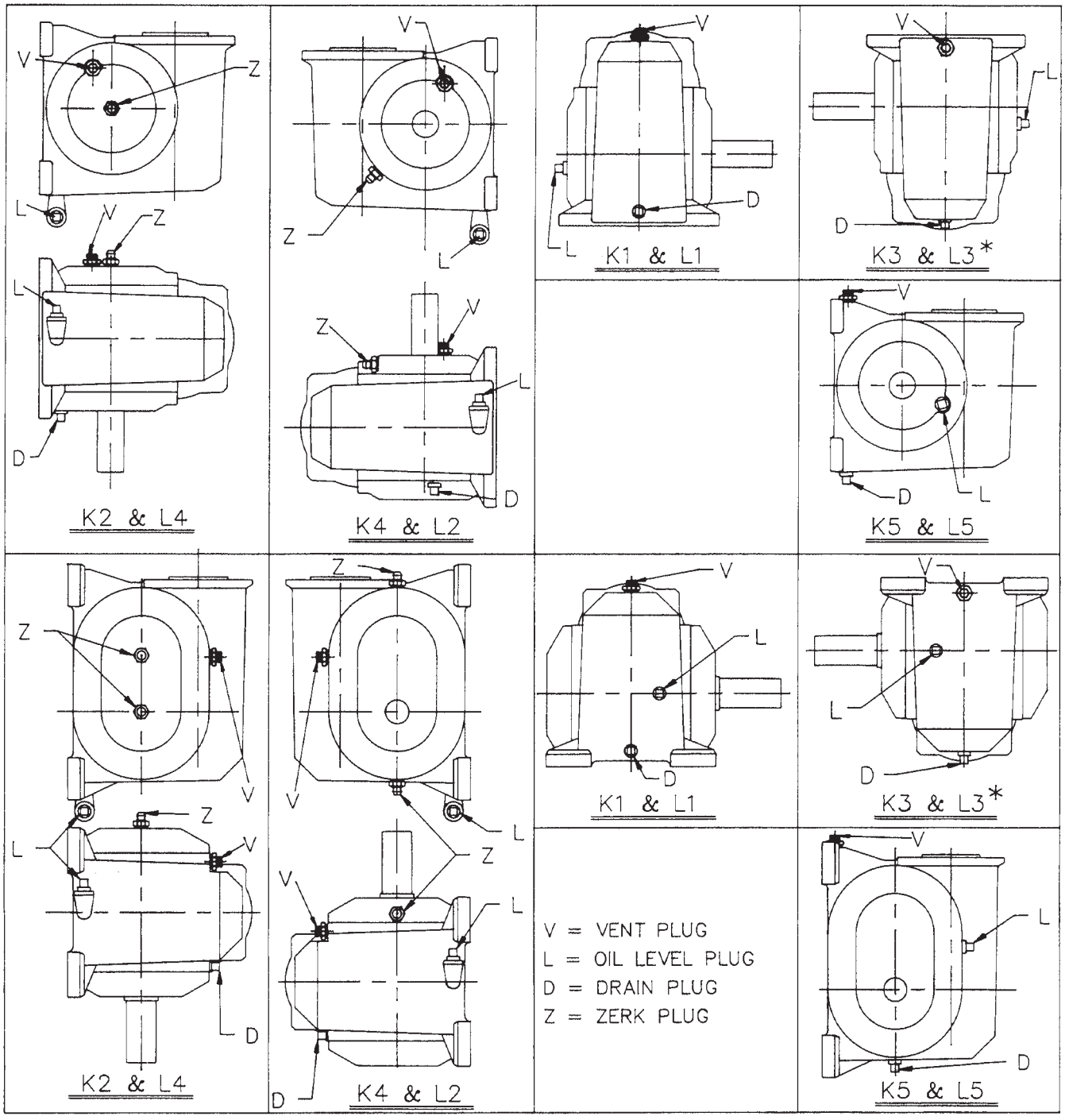
APPROVED LUBRICANTS VS. AMBIENT CONDITIONS

AMBIENT TEMPERATURE	LUBRICANT VISCOSITY GROUP VS. OUTPUT SHAFT SPEED				
	UP TO 300 RPM			OVER 300 RPM	
-65°F. TO 0°F.	318.59				
-45°F. TO +20°F.	318.60			318.59	
-5°F. TO +55°F.	318.61			318.60	
+15°F. TO +110°F.	318.62			318.62	
+100°F. TO +165°F.	318.63			318.63	
VISCOSITY GROUP	**318.59**	**318.60**	**318.61**	**318.62**	**318.63**
AMOCO OIL COMPANY AMOCO PERMAGEAR AMOCO				EP460 WORM GEAR OIL	
ATLANTIC RICHFIELD ARCO MINERAL GEAR OIL S.A.E.			90	140	
CARR OIL COMPANY LUB 733				EP140	
DARMEX INDUSTRIAL CORPORATION GEAR BOX OIL				DX-9140	
DUBOIS CHEMICAL CO. E.G.O.			EP90	EP140	
FISKE BROTHERS LUBRIPLATE APG			90	140	
GULF OIL COMPANY TRANSGEAR LUBE			EP90	EP140	
E.F.HOUGHTON CO. MP GEAR OIL			90	140	
KEYSTONE LUBE CO.				WG-A	
MOBIL OIL CORP. AVREX MOBILEFLUID CYLINDER OIL EXTRA HECLA	904	423		600W	SCH-634* SUPER CYLINDER
PHILLIPS PETROLEUM PHILUBE			90	140	
SHELL OIL CO. AEROSHELL FLUID	4	5-L			
TEXACO VANGUARD				460	
ULTRACHEM, INC. CHEMLUBE				140*	
ISO OR A.G.M.A. VISCOSITY GRADE	ISO 15	ISO 46 AGMA 1	ISO 320 AGMA 5	ISO 460 AGMA 7	ISO 680 AGMA 8

* Viscosity of these oils is actually less than the listed ISO or A.G.M.A. grade.

FOOT MOUNTED UNITS

SINGLE REDUCTION WORM UNITS



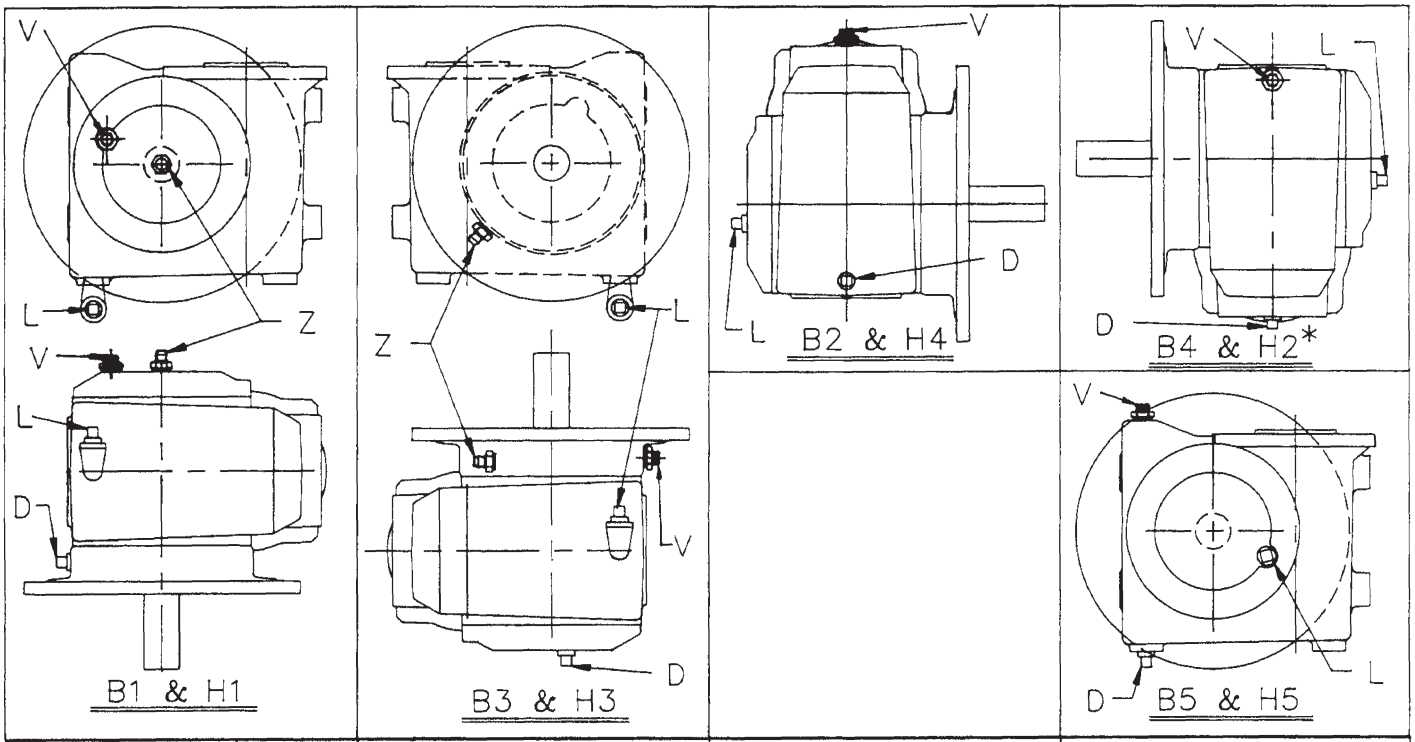
COMBINATION UNITS

V = VENT PLUG
L = OIL LEVEL PLUG
D = DRAIN PLUG
Z = ZERK PLUG

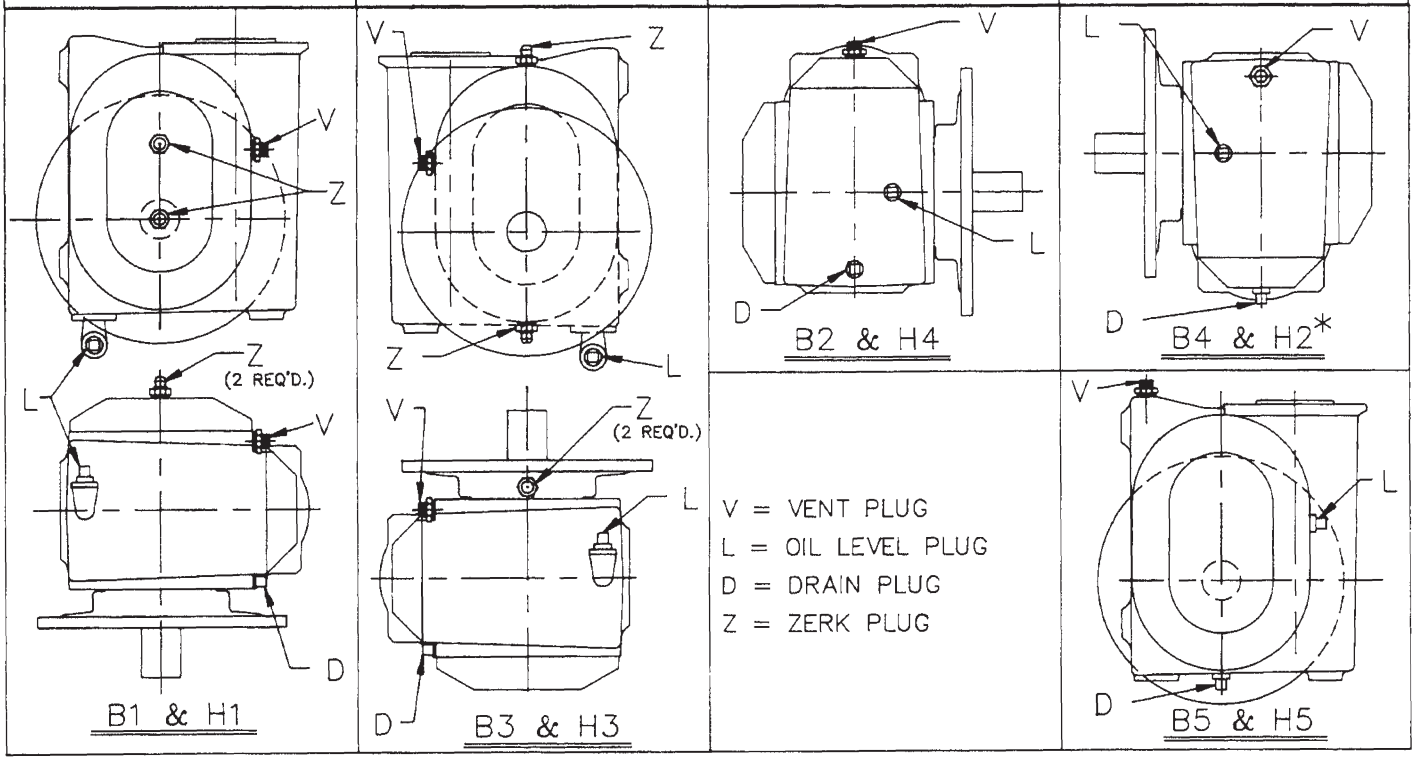
* MOUNTING POSITIONS NOT RECOMMENDED

FLANGED MOUNTED UNITS

SINGLE REDUCTION WORM UNITS



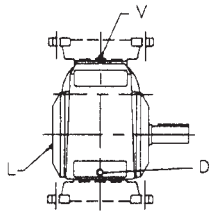
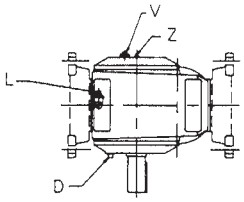
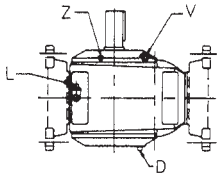
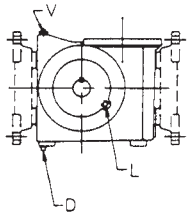
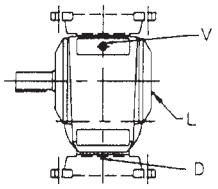
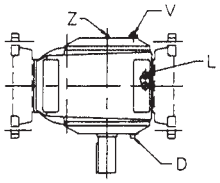
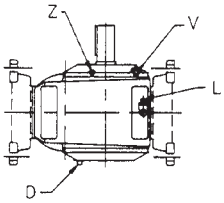
COMBINATION UNITS



* MOUNTING POSITIONS NOT RECOMMENDED

MULTI-MOUNT UNITS

SINGLE REDUCTION WORM UNITS

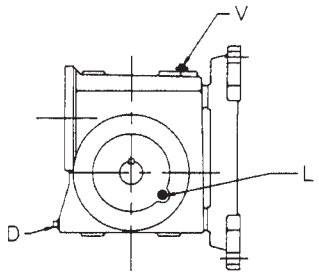
 POSITIONS K1, L1, A3, E3	 POSITIONS K2 & E4	 POSITIONS A4 & L2	 POSITION #5
 POSITIONS K3, L3, A1, E1*	 POSITIONS L4 & A2	 POSITIONS K4 & E2	NOT AVAILABLE POSITION #6

* MOUNTING POSITIONS NOT RECOMMENDED

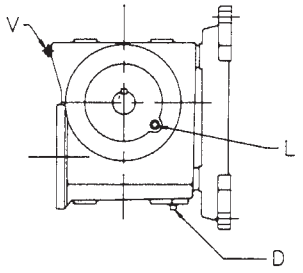
V = VENT PLUG D = DRAIN PLUG
L = OIL LEVEL PLUG Z = ZERK FITTING

J-MOUNT UNITS

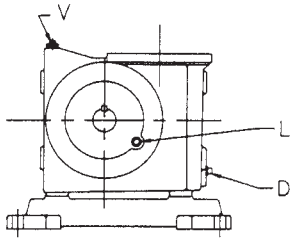
SINGLE REDUCTION WORM UNITS



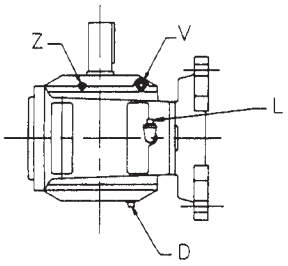
POSITIONS
JK1, JL1



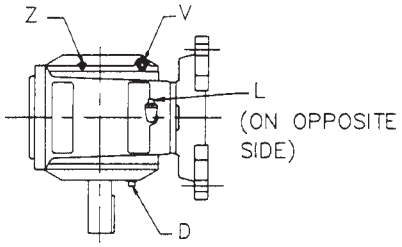
POSITIONS
JK3, JL3*



POSITIONS
JK5, JL5



POSITIONS
JK4, JL2



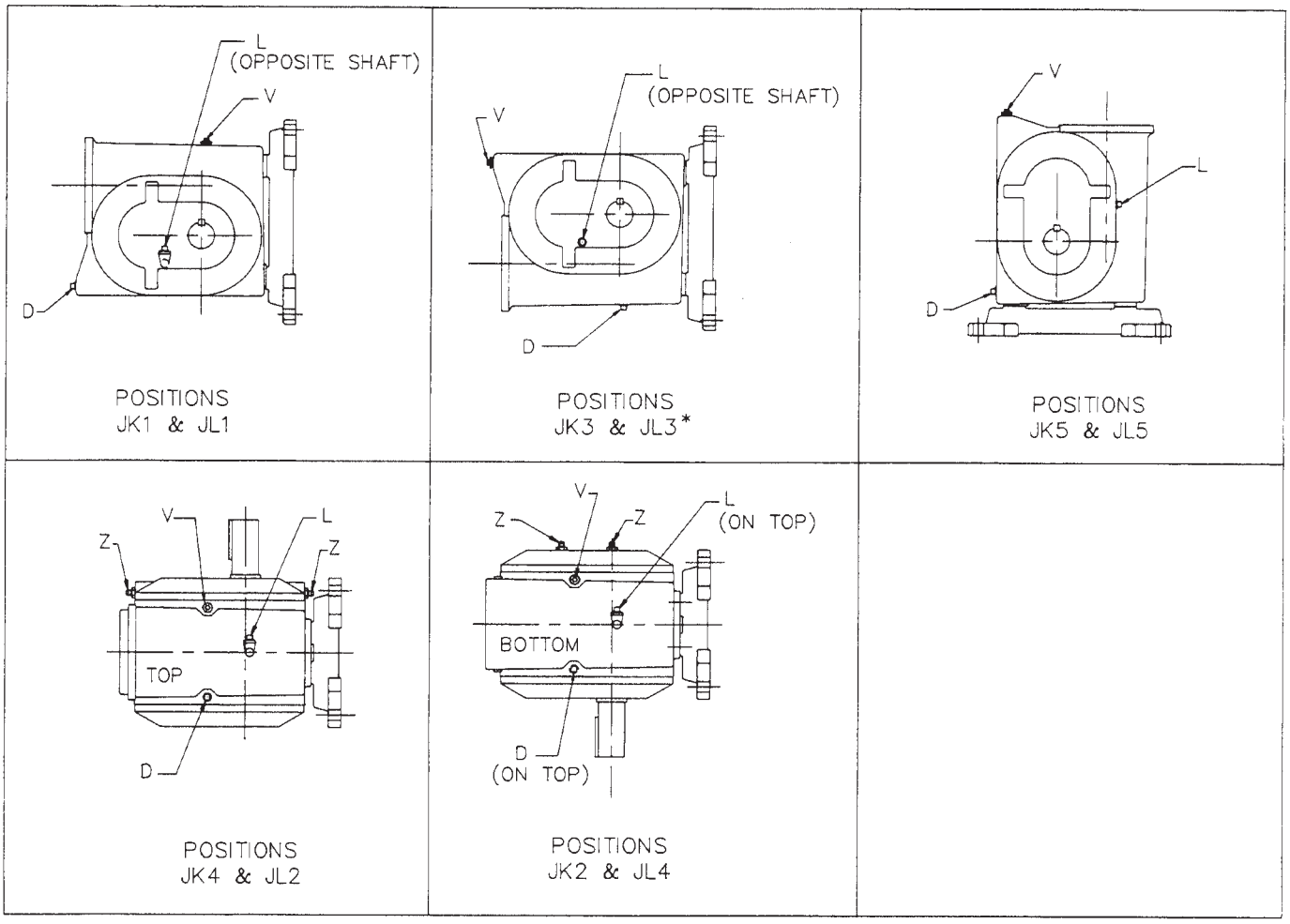
POSITIONS
JK2, JL4

* MOUNTING POSITIONS NOT RECOMMENDED

V = VENT PLUG D = DRAIN PLUG
L = OIL LEVEL PLUG Z = ZERK FITTING

J-MOUNT UNITS

COMBINATION UNITS



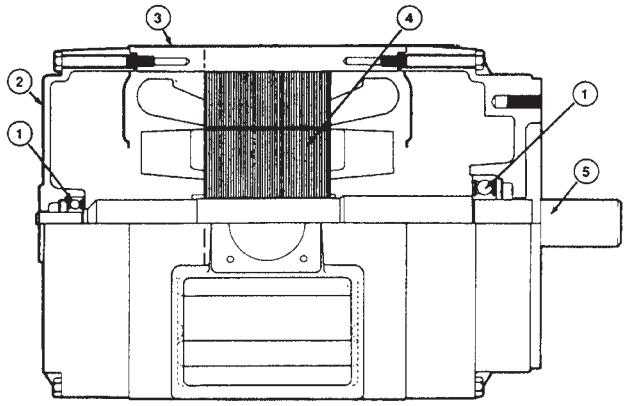
* MOUNTING POSITIONS NOT RECOMMENDED

V = VENT PLUG D = DRAIN PLUG
O = OIL LEVEL PLUG Z = ZERK FITTING

DISASSEMBLY OF MOTOR

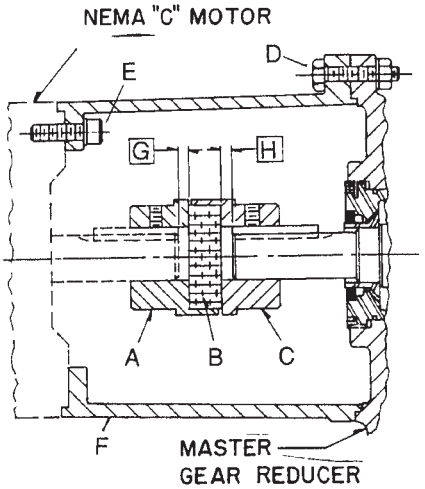
> WARNING
>
> TO ENSURE THAT DRIVE IS NOT UNEXPECTEDLY STARTED, TURN OFF AND LOCK OUT OR TAG POWER SOURCE BEFORE PROCEEDING. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

1. Disconnect all electrical wire and conduit.
2. Remove the gearcase mounting bolts 'D' and pull the motor from the gearcase.
3. If motor bearings require replacing, remove the half coupling 'A' from the motor shaft.
4. Remove four adapter mounting screws 'E' and tap adapter loose from the back end bracket.
5. Remove screws from front end bearing clamp-screws. Cap if motor is so equipped.
6. Remove front end bracket bolts.
7. Pull bracket.
8. Remove back end bracket in same manner.
9. Remove rotor and shaft assembly.
10. To reassemble follow the reverse procedure as above, having marked the brackets in the original position, replace as marked.



MOTOR PART IDENTIFICATION

1. Ball bearing
2. F.E. shield
3. Stator and frame
4. Rotor
5. Motor shaft



C-FACE COUPLING

A. Coupling half for motorshaft
B. Coupling spider
C. Coupling half for reducer input shaft
D. Gearcase mounting screws
E. Adapter mounting screws
F. C-face adapter

For G and H Dimensions
See picture on page 12.

C-FACE MASTER SPEED REDUCER
RIGHT ANGLE SINGLE REDUCTION
RIGHT ANGLE COMBINATION

INSTALLATION

When the C-face MASTER Speed Reducer is recieved the adapter is bolted to the gearcase. The flexible coupling assembly and bolts for attaching the motor to the adapter are packaged separately. To assemble the C-face motor to the C-face reducer proceed as follows:

Shown in the figure on the right is the C-face assembly for mounting NEMA C-face motors:

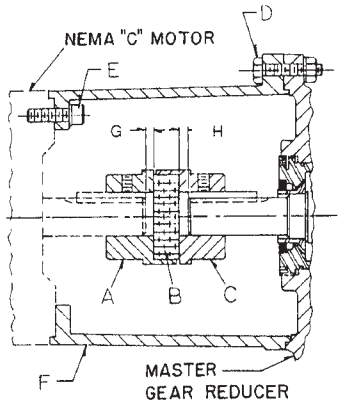
1. Locate motor coupling hub A on motor shaft per the chart at right. Once located, tighten coupling hub set screw.

2. Locate reducer coupling hub on the reducer input shaft per the chart at right. Once located, tighten coupling hub set screw.

3. Slip coupling spider into reducer coupling hub C.

4. Guide motor shaft with coupling hub A into spider as shown at right.

5. Rotate motor to line up C-face tapped holes with bolt holes on the adapter; insert bolts, and tighten securely.



CASE SIZE	"C" FACE MOTOR FRAME	G	H
WM40	180TC	5/8	5/8
	210TC	3/8	3/8
CM40	250TC	1/8	0
	280TSC	0	0

LUBRICATION AND MAINTENANCE

The C-face MASTER Speed Reducer flexible coupling is lubrication free and requires no maintenance.

INSTRUCTIONS FOR THE DISASSEMBLY AND REASSEMBLY OF SIZE 40 XL SINGLE REDUCTION GEARMOTORS AND C-FACE REDUCERS (Refer to Figures 1 & 2)

> WARNING
>
> TO ENSURE THAT 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.

DISASSEMBLY:

1. Remove motor if complete disassembly is to be made.

2. Remove the drain plug and drain oil from gearcase.

3. Remove screws holding the bearing housing (8), tap housing to loosen at the gasketed joint, then remove from the gearcase (6).

4. Lift out the output shaft (17) which includes the bronze worm gear.

5. To remove input shaft assembly (46) loosen the bearing cap locking screw (60) (Fig. 1), install face type spanner tool in the two pin holes in the face of the oil seal bearing cap assembly (56) and unscrew counterclockwise and remove. Pull input shaft assembly including bearings (5C) and grease retainer (34B) with 'O' ring (61) from gearcase.

6. All parts and castings should now be cleaned and inspected for possible replacement. If bearings or gears are to be replaced, a suitable set of bearing pullers or an arbor press must be utilized.

7. Tapered roller bearing clearance and centering of the worm gear on the output shaft is accomplished by adjusting the threaded bearing caps and shifting the output shaft as required. The same applies to setting tapered roller bearing clearance on the output shaft.

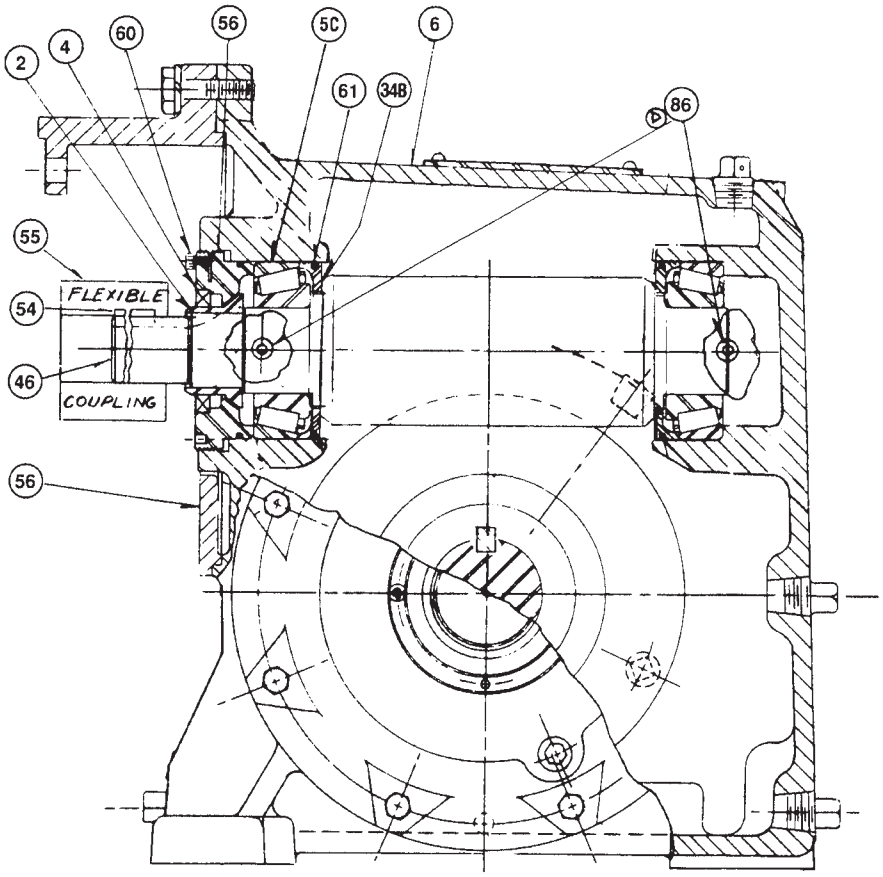


Figure 1

NOTE 1: If bearings, gears or output shaft have not been changed, then a readjustment of the bearing caps should not be necessary.

NOTE 2: The bearing caps are sealed around the OD by 'O' rings. If a leak is detected around the OD of the output shaft bearing caps, remove the bearing housing (45) or (8) and screw the cap clockwise and remove from the *inside* of the bearing housing. Inspect the 'O' rings for nicks or cuts and replace. Coat the new 'O' ring with light grease to prevent cutting the 'O' ring when reinstalling. Reassemble bearing housing and readjust bearings. (See item 7.)

REASSEMBLY

1. Press a new seal sleeve (2) on the input shaft. Some sealer should first be applied to the shaft at the sleeve location. Do not use so much that it gets on the sleeve OD or lip seal as this will result in seal leakage.

2. Before installing the input shaft, remove the grease pipe plugs (86) and pack the roller bearings and bearing bore with standard ball bearing grease, such as Shell Alvania #2 or equivalent. Install input shaft (46) into the gearcase, then pack the front bearing with standard grease as above, then screw the oil seal bearing cap assembly (56) in place and adjust for proper end play. Reinstall grease plugs.

NOTE: *To adjust the input shaft bearings* for proper clearance screw the cap clockwise until bearings have zero clearance. Draw a pencil line in vertical position across the face of the cap and the gearcase; then back off the cap counterclockwise and measure between the mark; turn cap 1 1/2 to 1 5/8 inches counterclockwise; (.003" to .005" end play) and retighten bearing cap lock screw (60) (Fig. 1) to 75 inch lbs.

3. Press a new seal sleeve on the output shaft (17). However, first apply some sealer to the sleeve location.

4. Reassemble by installing the closed bearing housing (45) with gasket, then insert the output shaft assembly (17) into the gearcase. Install open bearing housing (8) with gasket.

NOTE 1: Pack output bearings with Marfak #3 grease.

NOTE 2: Apply sealant to bearing housing gaskets, screws and plugs to protect against possible leakage.

5. Recentering gears may be necessary if gears and bearings have been replaced. This is accomplished by shifting the output shaft in either direction by turning the bearing caps until proper centering is obtained. *Correct centering* is accomplished when the total rotational back and forth movement of the input shaft is maximum with the output shaft held stationary.

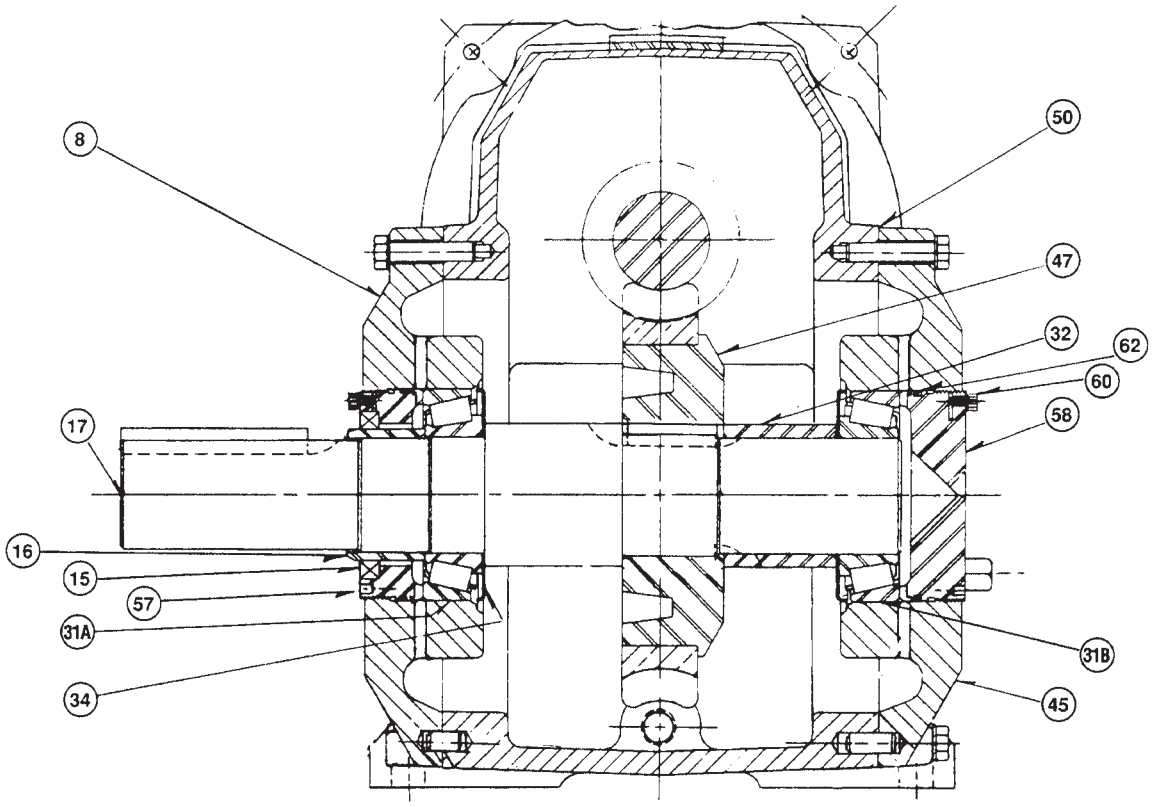


Figure 2

NOTE: *To adjust the output shaft bearings* turn the bearing caps clockwise to zero clearance and mark the cap and gearcase; then back off one of the caps in a counterclockwise rotation 1/4" (.001" to .003" end play) and retighten the bearing cap lock screw (60) (Fig. 2) to 75 inch lbs.

6. An alternate method to *visually* check gear centering is to "blue" the gear and check tooth contact in both directions. Apply Prussian Blue lightly but evenly to six teeth of the bronze gear (47). Install the output shaft assembly into the gearcase so that the gears do not mesh on the teeth coated with Prussian Blue. Install the bearing housing (45) and gasket and then secure with several screws.

   Rotate the input shaft in both directions through the "blued area." This will provide contact marks on both sides of the worm gear teeth (47).

   If the tooth contact pattern is in an off centered position, it means that the output shaft assembly should be moved in the direction where contact shows heaviest. Repeat until properly centered.

7. Install new input and output shaft lip seals into the oil seal bearing cap (57) and output bearing housing, after the OD is coated with sealer. Take a tube or sleeve which has a good square face of proper dimensions so as to be able to tap the lip seal squarely into place in the bearing cap. DO NOT cock or bend.

8. Install vent plug in correct location. Fill the gearcase with the proper lubricant to the correct oil level and test for leaks.

9. Test unit for noise and performance.

INSTRUCTIONS FOR DISASSEMBLY AND REASSEMBLY OF SIZE 40 & XL COMBINATION GEARMOTORS AND C-FACE REDUCERS (Refer to Figures 3, 4 & 5)

> WARNING
>
> TO ENSURE THAT 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.

DISASSEMBLY:

1. Remove motor if complete disassembly is to be made.

2. Remove the drain plug and drain oil from gearcase.

3. Remove screws holding the bearing housing (45) opposite output shaft, tap housing to loosen at the gasketed joint, then remove from the gearcase (6).

4. Lift out the output shaft assembly (17) and intermediate shaft assembly (19).

5. To remove input shaft assembly (46) loosen the bearing cap locking screw (60) (Fig. 3), install face type spanner tool in the two pin holes in the face of the oil seal bearing cap assembly (4) and unscrew counterclockwise and remove. Pull input shaft assembly including bearings (5C) and grease retainer (34B) with 'O' ring from gearcase.

6. All parts and castings should now be cleaned and inspected for possible replacement. If bearings or gears are to be replaced, a suitable set of bearing pullers or an arbor press must be utilized.

7. Tapered roller bearing clearance and centering of the worm gear on the intermediate shaft is accomplished by adjusting the threaded bearing caps and shifting the intermediate shaft as required. The same applies to setting tapered roller bearing clearance on the output shaft.

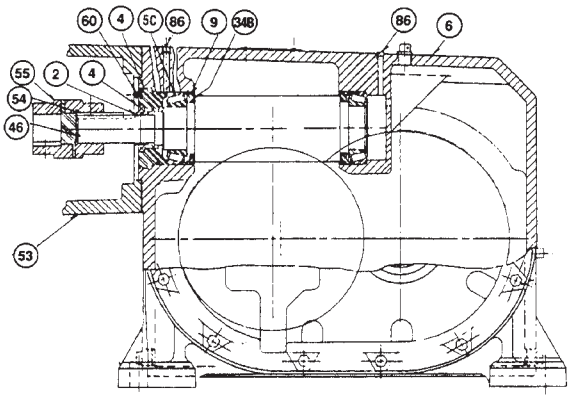


Figure 3

NOTE 1: If bearings, gears or output shaft have not been changed, then a readjustment of the bearing caps should not be necessary.

NOTE 2: The bearing caps are sealed around the OD by 'O' rings. If a leak is detected around the OD of the intermediate or output shaft bearing caps, remove the bearing housing (45) or (8) and screw the bearing cap clockwise and remove from the *inside* of the bearing housing. Inspect the 'O' rings for nicks or cuts and replace. Coat the new 'O' ring with light grease to prevent cutting the 'O' ring when reinstalling. Reassemble bearing housing and readjust bearings. (See item 6.)

REASSEMBLY

1. Press a new seal sleeve (2) on the input shaft. Some sealer should first be applied to the shaft at the sleeve location. Do not use so much that it gets on the sleeve OD or lip seal as this will result in seal leakage.

2. Before installing the input shaft, remove the grease pipe plugs (86) and pack the roller bearings and bearing bore with standard ball bearing grease, such as Shell Alvania #2 or equivalent. Install input shaft (46) into the gearcase, then pack the front bearing with standard grease as above, then screw the oil seal bearing cap assembly (4) in place and adjust for proper end play. Reinstall grease plugs.

NOTE: *To adjust the input shaft bearings* for proper clearance screw the cap clockwise until bearings have zero clearance. Draw a pencil line in vertical position across the face of the cap and the gearcase; then back off the cap counterclockwise and measure between the mark as follows:

Turn cap 1 1/2 to 1 5/8 inches counterclockwise. (.003" to .005" end play.)

Retighten bearing cap lock screw (60) (Fig. 3) to 75 inch lbs.

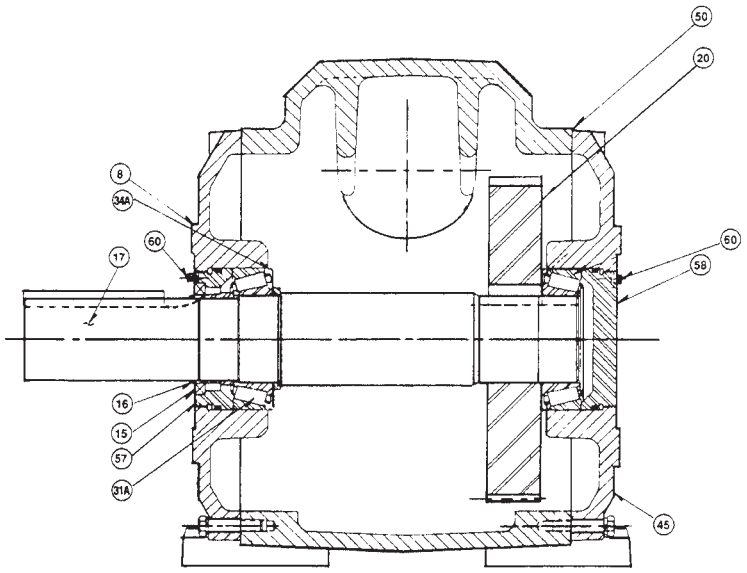


Figure 4

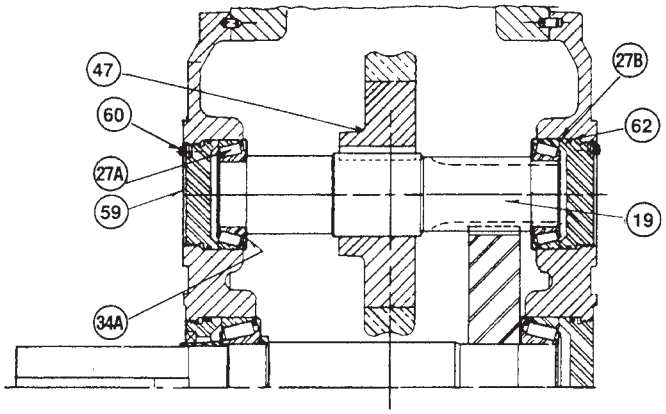


Figure 5

3. Press a new seal sleeve (16) on the output shaft (17). However, first apply some sealer to the sleeve location.

4. Reassemble by installing the open bearing housing (8) with gasket, then insert the intermediate shaft (19) and output shaft assembly (17) into the gearcase. Install closed bearing housing (45) with gasket.

NOTE 1: Pack intermediate and output shaft bearings with Marfak #3 grease.

NOTE 2: Apply sealant to bearing housing gaskets, screws and plugs to protect against possible leakage.

5. Recentering of the worm gear may be necessary if gears and gearings have been replaced. This is accomplished by shifting the intermediate shaft in either direction by turning the bearing caps until proper worm gear centering is obtained. *Correct centering* is accomplished when the total rotational back and forth movement of the input shaft is maximum with the output shaft held stationary.

NOTE 1: *To adjust the intermediate and output shaft bearings,* turn the bearing caps clockwise to zero clearance and mark the cap and gearcase; then back off one of the intermediate and final co-shaft bearing caps in a counterclockwise rotation 1/4" (.001" to .003" end play) and retighten the bearing cap lock screw (60) (Fig. 4-5) to 75 inch lbs.

NOTE 2: The final co-shaft gears do not require centering since they are helical, however, to be sure gears are properly meshed adjust the face of the output bearing cap opposite the final co-shaft extension flush with the bearing housing; then back off the opposite cap counterclockwise 1/4" as above (.001" to .003" end play).

6. An alternate method to *visually* check gear centering is to "blue" the worm gear and check tooth contact in both directions. Apply Prussian Blue lightly but evenly to six teeth of the bronze gear (20). Install the intermediate shaft assembly into the gearcase so that the gears do not mesh on the teeth coated with Prussian Blue. Install the bearing housing (45) and gasket and then secure with several screws.

   Rotate the input shaft in both directions through the "blued area." This will provide contact marks on both sides of the worm gear teeth (47).

   If the tooth contact pattern is in an off centered position, it means that the intermediate shaft assembly should be moved in the direction where contact shows heaviest. Repeat until properly centered.

7. Install new input and output shaft lip seals into the oil seal bearing cap (4) and output bearing cap (57), after the OD is coated with sealer. Take a tube or sleeve which has a good square face of proper dimensions so as to be able to tap the lip seal squarely into place in the bearing cap. DO NOT cock or bend.

8. Install vent plug in correct location. Fill the gearcase with the proper lubricant to the correct oil level and test for leaks.

9. Test unit for noise and performance.

RIGHT ANGLE SINGLE REDUCTION
SIZES WG40, WM40

Ref. No.	Parts Description	Qty. Unit	Part Numbers ■
* 2	Oil Seal Sleeve	1	79020-12B
* 4	Oil Seal	1	411627-01A
* 5C	Bearing	1	411626-01CC
* 5D	Bearing	1	411626-01CC
6	Gear Case	1	86884-02A
8	Bearing Housing	1	79086-04A
*15	Oil Seal	1	411627-01D
*16	Oil Seal Sleeve	1	411621-18H
17	Output Shaft	1	602225-01A
*31A	Bearing	1	411626-01AB
*31B	Bearing	1	411626-01AB
32	Spacer	1	411622-18C
34	Grease Retainer	2	411624-05A
34B	Grease Retainer	2	411624-01X
45	Bearing Housing—Opposite Ext.	1	79086-02A
*46	Worm Shaft	1	—
*47	Worm Gear	1	—
48	Grease Plug	2	052152
*50	Gasket	2	602028-12B
54	Key	1	055613
55	Coupling	1	—
56	Bearing Cap Assembly — Input	1	411620-26A
57	Bearing Cap Assembly — Open	1	411620-27A
58	Bearing Cap Assembly — Closed	1	411620-27B

* Recommended Spare Part

■ NOTE: These Part Numbers Apply to Standard Units Only.
For Part Numbers not found contact RELIANCE Renewal Parts (803) 297-4160.

RIGHT ANGLE REDUCTION
SIZES CG40, CM40

Ref. No.	Parts Description	Qty. Unit	Part Numbers ■
* 2	Oil Seal Sleeve	1	79020-12B
* 4	Oil Seal	1	411627-01BU
* 5C	Bearing	1	411626-01CC
* 5D	Bearing	1	411626-01CC
6	Gear Case	1	86885-02A
8	Bearing Housing	1	79087-02A
*15	Oil Seal	1	411627-01R
*16	Oil Seal Sleeve	1	411621-19C
17	Output Shaft	1	602225-02A
*19	Pinion Shaft — 2nd Stage	1	—
*20	Gear, Driven — 2nd Stage	1	—
*27A	Bearing	1	411626-01CC
*27B	Bearing	1	411626-01CC
*31A	Bearing	1	411626-01BK
*31B	Bearing	1	411626-01BK
34	Grease Retainer	2	411624-01G
34A	Grease Retainer	2	411624-01H
34B	Grease Retainer	2	411624-05A
45	Bearing Housing — Opposite Ext.	1	79087-02A
*46	Worm Shaft	1	—
*47	Worm Gear	1	—
48	Grease Plug	2	058101
*50	Gasket	2	602028-17A
53	C-Face Adaptor	1	—
54	Key	1	055437
55	Coupling	1	—
56	Bearing Cap Assembly — Input	1	411620-26A
57	Bearing Cap Assembly — Open	1	411620-27C
58	Bearing Cap Assembly — Closed	1	411620-27D
59	Bearing Cap Assembly — Intermediate	2	411620-27F
60	Lock Screw	5	411631-09B
61	O-Ring — Output Caps	2	411628-09K
62	O-Ring — Input & Inter. Caps	3	411628-09J

* Recommended Spare Parts

■ NOTE: These Part Numbers Apply to Standard Units Only.
For Part Numbers not found contact RELIANCE
Renewal Parts (803) 297-4160

INSTRUCTIONS FOR DISASSEMBLY AND REASSEMBLY OF H419 C-FACE REDUCER

1. Remove drain plug and drain lubricant from the gearcase.
2. Remove screws holding bearing housing (8) on case, tap housing to loosen gasketed joint. Then remove the bearing housing.
3. Lift out the output shaft assembly (17) which includes the bronze worm gear.
4. To remove the input shaft, remove the cap screws holding the C-face adapter (53) to the gearcase. The H419 case utilizes tapered roller bearings on the input shaft. It may also be necessary to tap the worm from the inside of the case (with brass rod) to force the bearings (5A-B) and grease retainer (34B) out of the bearing bores.
5. Clean and inspect all parts and castings for possible wear or damage. If bearings or gear are to be replaced, a suitable set of bearing pullers or an arbor press should be utilized.
6. Begin reassembly by placing the output shaft assembly (17) into the gearcase (6). Install gasket and bearing housing (8) with screws. Also install the open bearing cap (57).
7. Check the output shaft bearing clearance. Adjust output shaft bearing clearance to .001 to .003 end play or side movement. Shims may be added or removed as necessary.
8. Again remove the bearing housing (8), gasket, and output shaft assembly (17).
9. Check the grease retainers and O-rings on the input shaft. Repack the bearings with Shell Alvania #2 lubricant, or equivalent. Add a film of lubricant to the O-rings and the bearing bore of the gearcase for ease of assembly.
10. Install input shaft assembly (46) in the gearcase, being careful not to damage the grease retainer O-rings. Adjust input shaft bearing clearance to .003/.005 looseness.

Note:

The shims (67) are located between the C-face adapter (53) and the gearcase (6).

We suggest that all shims be coated with ball bearing lubricant on final assembly.

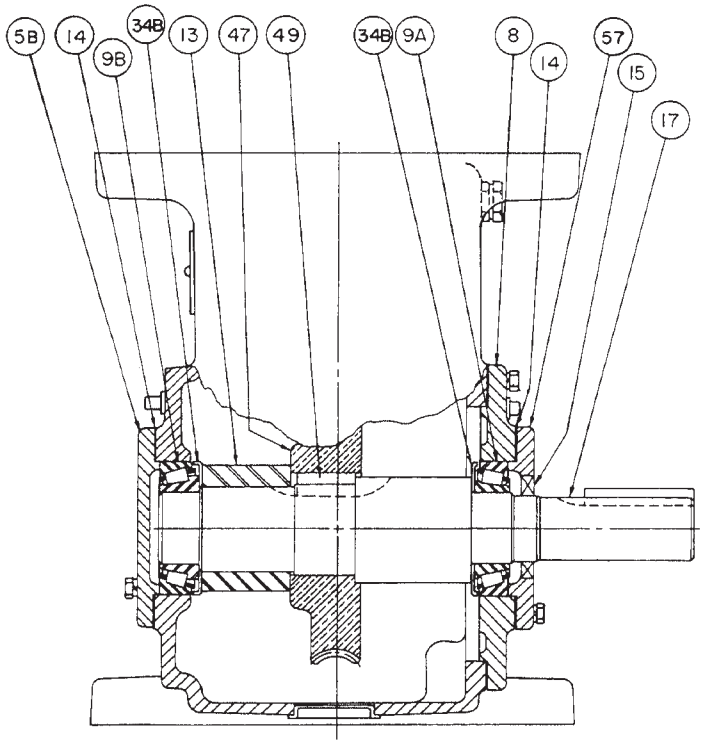
11. Check the grease retainers (34) on each end of the worm shaft for proper location in the bearing bore. A blunt tool or screwdriver can be used to tap the grease retainers and O-rings in the bore for proper running clearance.
12. To check gear centering, apply "Prussian Blue" to five or six adjacent teeth of the bronze gear (47). Install the output shaft assembly (17) in to the gearcase (6) so that the gears mesh with teeth **not** coated with "Prussian Blue." Install gasket, bearing housing (8), and secure with screws.
13. Rotate the input shaft (46) to provide rotation of the worm through the blued gear teeth in one rotation and then in the opposite direction. This will provide marks of contact on both sides of the bronze gear (47) teeth.
14. Remove the bearing housing screws, bearing housing (8) and the gasket. Lift the output shaft assembly from the gearcase and determine if the contact pattern indicates an off-center condition.
15. Alignment is accomplished by removing the required amount of bearing shims from behind the output shaft bearing cap on the side where contact is heaviest and placing them behind the opposite bearing cap.
16. Reassemble and follow steps 12 through 15 until gears are aligned correctly, washing and re-bluing each time.
17. When bearings are adjusted properly and gears are aligned, pack the roller bearings (9A-B) with Marfak #3 or equivalent lubricant, apply sealer to the gasket and reinstall the bearing housing with screws.
18. Install new input and output shaft seals after coating the O.D. with sealer. Use a tube of proper dimension in order to tap or press the seal squarely into place. DO NOT COCK OR BEND.
19. Fill gearcase with proper lubricant to correct oil level. Add sealer to threaded plugs and test.

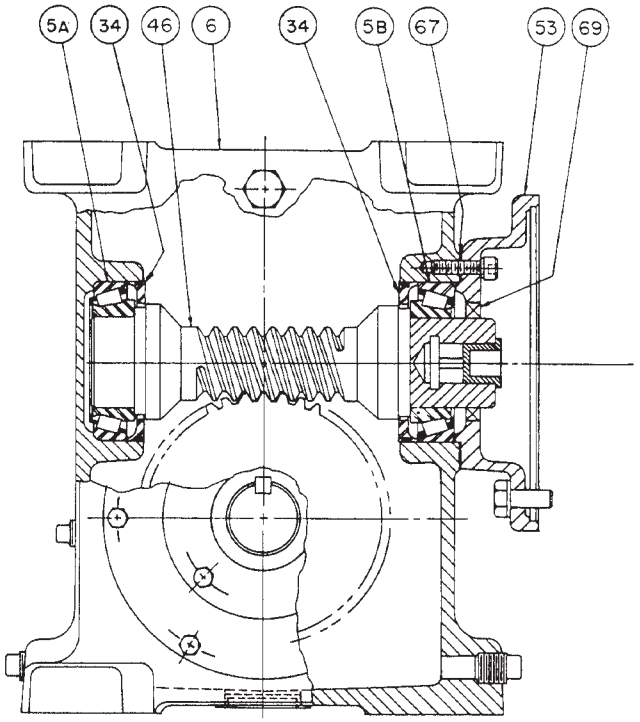
H419 C-Face Reducer

Ref. No.	Parts Description	Qty. Unit	Part Number ■
* 5A	Roller Bearing — Input	1	411626-01-BM
* 5B	Roller Bearing — Input	1	411626-01-BM
6	Gearcase	1	086901-02-A
8	Bearing Housing — Open	1	079143-02-A
* 9A	Roller Bearing — Output	1	411626-01-BM
* 9B	Roller Bearing — Output	1	411626-01-BU
13	Spacer–Gear	1	411622-18-D
14	Shims	As Req'd.	411623-13B,C,D,E
*15	Oil Seal	1	411627-02-AB
17	Output Shaft	1	602398-01-A
* 34	Grease Retainer — Input — When Req'd.	2	411626-07-A
34B	Grease Retainer — Output	2	411624-01-T
46	Worm Shaft — Input	1	—
47	Worm Gear	1	—
49	Key–Worm Gear	1	150420
53	Adaptor—C-Face	1	079144-02-A
57	Bearing Cap — Open	1	602397-02-A
58	Bearing Cap — Closed	1	602397-04-A
67	Shims	As Req'd.	411623-18A,B,C,D
*69	Oil Seal — Input	1	411627-02-C

* Recommended Spare Parts

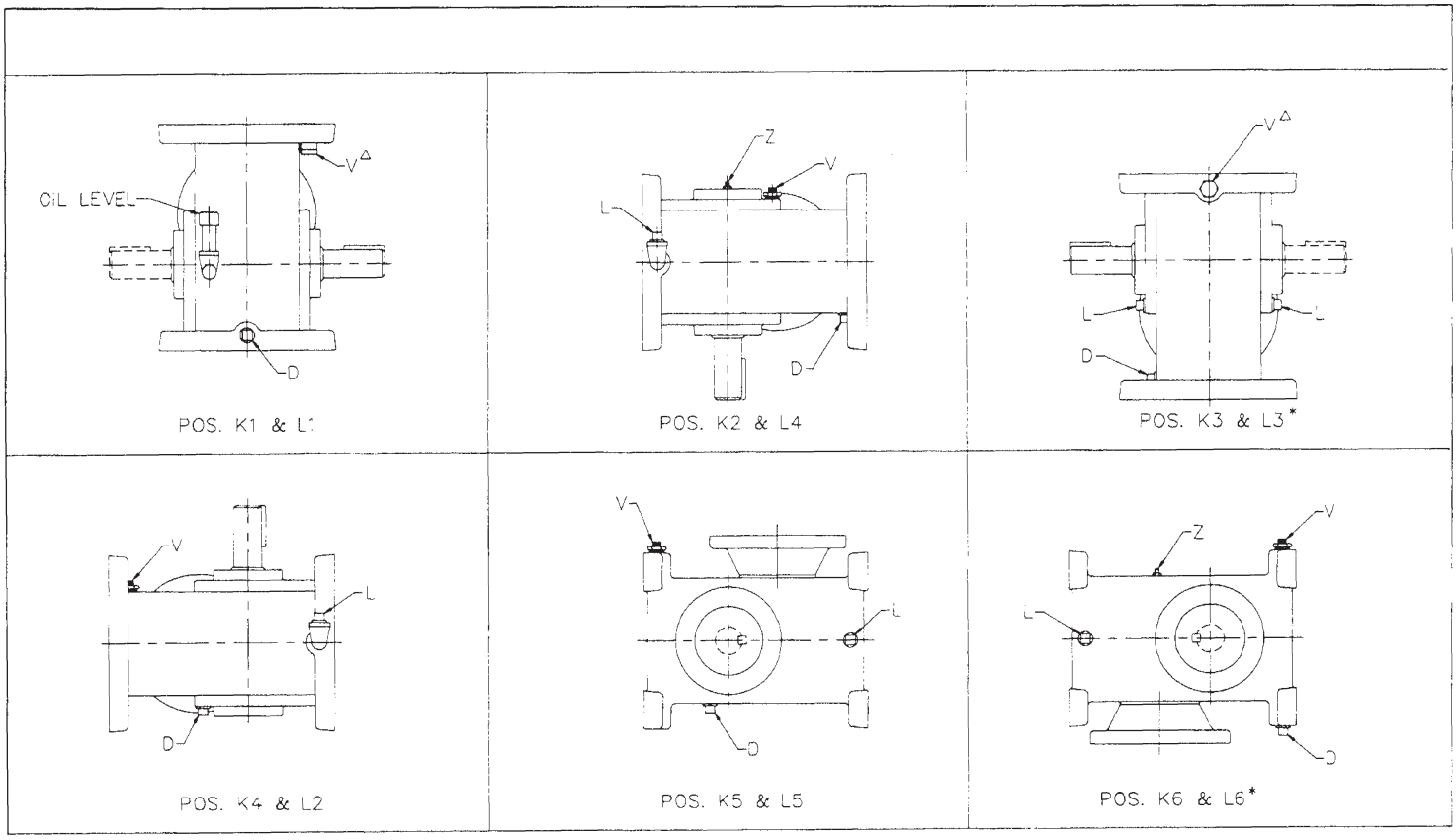
■ NOTE: These Part Numbers Apply to Standard Units Only. For Part Numbers not found Contact RELIANCE Renewal Parts (803) 297-4160.





H 419 CASE

H-419



V = VENT PLUG
L = OIL LEVEL PLUG
D = DRAIN PLUG
Z = ZERK FITTING

△ VENT HOLES MUST FACE UPWARD ON HORIZONTALLY MOUNTED VENT PLUGS

* MOUNTING POSITIONS NOT RECOMMENDED

AUTOCAD FILE NO:
O:\LUB\E3626

LONG-TERM STORAGE GUIDELINES FOR GEAR REDUCERS:

Care must be taken to ensure that gear reducers are placed in service in the best possible conditions. During periods of long storage (six months or longer) special procedures must be followed which will protect the reducer and make certain that it will be in good condition when ready to be put 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 reducers during periods of long-term storage:

A. Preperation:

1. Select a clean, dry, protected storage area free of vibration and temperature extremes. Set the drive level on its feet with no load on either the input or output shafts. Block as needed to keep weight off the motor fan shroud and motor conduit box (if unit has a motor).
2. Fill the gearbox to the highest designated oil level with a recommended lubricant blended with 2% by volume of *Daubert Chemical Co. Nox-Rust VCI-105 oil. Do not fill the gearbox completely full of oil. Expansion space is needed to avoid pressurizing the gearbox during temperature variations. Rotate the input shaft at least 60 revolutions to ensure a full distribution of the lubricant.
3. Replace the gearbox vent plug with a solid pipe plug. Wire or tie the vent plug to the gearbox to prevent losing it.
4. All condensate drains and breathers (on motors so equipped) are to be fully operable to allow breathing through points other than bearing fits. Remove the condensate drain plugs located in the motor end shield. Position the motor so the drain is at the lowest point. Totally enclosed fan cooled XT motors are equipped with automatic drains which should be left in place.
5. All units equipped with heaters must have the heaters connected and operational if the storage conditions are in any way like the anticipated service conditions.
6. Motor windings are to be checked with a megohmeter when the equipment is put into storage. The resistance must be recorded and saved for future reference. See "To Put The Stored Unit Into Service" for the megohmeter check required upon removal from storage.
7. Apply a thick coating of chassis type grease, Cosmoline or equivalent protective coating *(Daubert Chemical Co. Nox-Rust X-110 is a suitable coating) on all unpainted surfaces including threads, bores, keyways and shafts.
8. Apply a thick coating of chassis-type grease to all exposed shaft seals.
9. If the unit must be stored outdoors or in damp or unheated areas indoors, cover the entire exterior with a rust preventive. Seal the unit in a moisture proof container or in an envelope of heavy polyethylene film with a dessicant inside. Shade the enclosure from direct sunlight.
10. Rotate the input shaft at least 60 revolutions once a month to redistribute the lubricant and to prevent brinelling of bearings and drying of seals.
11. Instruction manuals and tags are paper and must be kept dry. Remove these documents and store in a safe, dry place for future reference start up.

B. To Put The Stored Unit Into Service:

1. Remove all protective coatings added for storage.
2. Drain and refill the gearbox with a recommended type and amount of lubricant. Regreaseable assemblies and bearings must be purged and filled with new grease.
3. Install the vent and oil level plugs in the proper locations for the mounting position to be used. Check the motor condensate drain locations to asssure the motors will drain properly when mounted in the proposed position. Rotate the motor on the gearhead or rotate the motor end shields on the motor frame if necessary to get the drains in the proper positions.
4. Check all hardware for proper tightness.
5. If the gear unit has been stored for more than three years or in an area with high ambient temperatures, the oil seals must be replaced before being put into service. See the instruction manual for directions on oil seal replacement.
6. Check the motor stator insulation resistance with a megohmeter. Resistance less than one megohm or less than 50% of the resistance reading taken when the motor was put into storage (whichever is the higher resistance), requires the motor winding to be dried in one of the two ways described below. If drying does not restore the winding insulation resistance to the values listed above, the motor must be repaired or rewound.

A. Remove the motor from the reducer (see instruction manual). Place the motor in a ventilated oven at not more than 90 degrees celsius (194 degrees F.). Check the insulation resistance every 30 minutes. Bake until the resistance becomes constant.

or

B. Lock the motor rotor. Insert a thermocouple in the winding or set up to measure rise by resistance. Apply low voltage. Gradually increase the current through the winding until the winding temperature reaches 90 degrees celsius (194 degrees F.). Do not exceed this temperature. Check the winding insulation resistance with a megohmeter. Repeat if necessary.

After drying, breifly run the motor not connected to any load to further dry the motor and to check the bearings for noise and smooth operation.

7. When stored motors are found to be wet, a more detailed inspection should be made by removing the motor end shields and visually inspecting for water in the grease or rust on bearings. If either is found, replace the bearings, clean the end shields thoroughly and relubricate.

*Note: Daubert Nox-Rust VCI-105 oil and Nox-Rust X-110 protective coating can be procured in bulk quantity from:

Daubert Chemical Company, Inc.
4700 S. Central Ave.
Chicago, Illinois 60638
Telephone (708) 496-7350

or in 5 gallon pails from their distributor:

Rock Island Lubricants and Chemicals
1320 First Street
Rock Island, Illinois 61204-5016
Telephone (309) 788-5631