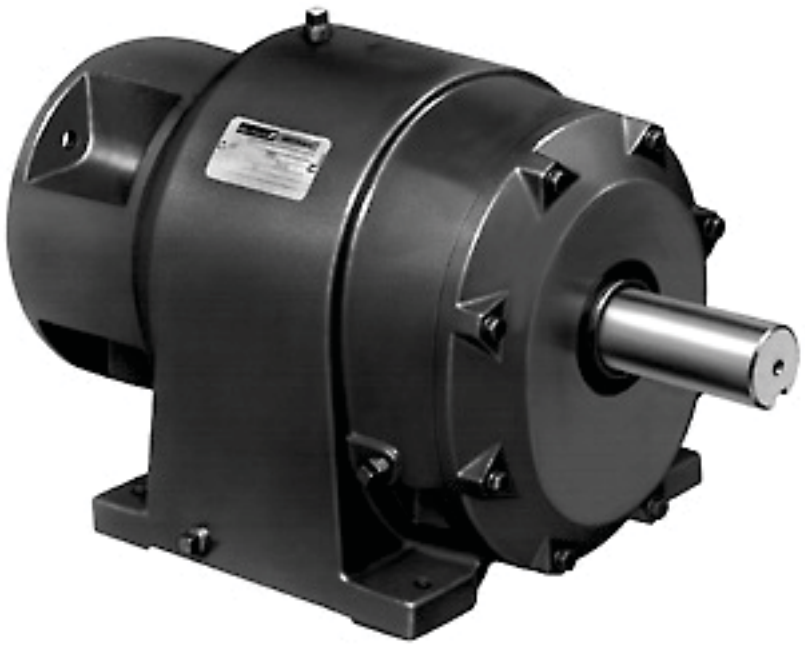
MASTER XL® PARALLEL GEARMOTORS AND C-FACE REDUCERS

SERVICE AND REPAIR FOR SIZES 16, 21, 28



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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GENERAL

The MASTER Parallel Gear line is composed of one basic reducer. This reducer is used to make up two types of motor and gear reduction packages.

1. THE GEARMOTOR — is a compact integral power package. Partial motor is directly connected to the reducer input shaft by means of a semi-rigid coupling.

2. THE C-FACE REDUCER — is also a compact power package utilizing a standard "C" Face motor, adapter, and flexible coupling connecting to the reducer.

The MASTER Parallel gearing is Helical design with ball bearings on input shaft and taper roller bearings on intermediate and output shafts.

ROTATION

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 insure that proper polarity of series fields is retained.

GEARCASE MOUNTING

This gearcase has been lubricated at the factory for only one mounting position. Before starting, check the following mounting position diagrams 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. When the unit is to be mounted in a position other than those shown in the diagrams, consult factory.

OPERATING TEMPERATURES

Heating is a natural characteristic of high speed gears and 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 lubricants.

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, together with flat washers, should be used to mount the gear unit to its base.

MAINTENANCE

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

Whenever a partial motor is assembled to the gearcase of a gearmotor-type unit, the spline on the reducer input shaft must be lubricated with a molydisulfide type lubricant, preferably Mobiltemp No. 78 grease.

Whenever a C-face motor is assembled to a C-face-type reducer, care must be taken to ensure that the flexible coupling hub on the motor shaft is spaced properly from the end of the motor shaft. See diagram on page 8 of this manual.

SERVICE CLASSES OR SERVICE FACTORS

Load conditions must be in accordance with service class or service factor as listed on the name plate. Parallel gearmotors have service classes, while parallel reducers have service factors. Refer to the Reliance Electric catalog or AGMA published ratings for definition of service conditions.

LUBRICATION INFORMATION

Lubrication is extremely important for satisfactory operation. Proper oil level must be maintained in the gearcase at all times. The correct level is indicated by the red pipe plug. Frequent inspections with the unit not running, (preferably when warm), should be made by removing this 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 gear motors 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 drained periodically. When first put into operation, the lubricant in a new gearcase becomes contaminated with grit and metal particles unavoidably left in the unit as a result of machining and from tooth surfaces during run-in periods.

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 thereafter, whichever occurs first. (Normal operation is running 16 hours per day in 80°F. ambient.) More frequent oil changes may be required when running continuously at high temperatures. Use only recommended lubricants as listed in the following table.

All bearings above the the operating oil level that are provided with a pipe plug should be lubricated with a good grade of ball bearing grease when changing gear lubricant. (Replace the pipe plug with a zerk fitting at this time.) Do not overlubricate grease packed bearings.

Master XL parallel gear units are factory filled to the proper oil level for position 1 mounting and an ambient condition of +60°F. to +110°F. and 13.5 to 500 RPM output speed (SAE 40 oil).

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 lubricants depending on the ambient (surrounding air) temperature at the time of operation. Use lubricants of the proper group as outlined in the following table.

APPROVED LUBRICANTS VS. AMBIENT CONDITIONS:

Ambient Temperature	Lubricant Viscosity Grade vs. Outputshaft Speed			
	13.5 to 500 RPM	501 to 1000 RPM	1001 to 3000 RPM	Over 3000 RPM
-65°F. to -20°F.	Note (C)			
*-30°F. to +10°F.	Note (B)	Note (C)		
*-10°F. to +20°F.	SAE 10W	Note (B)		
*+10°F. to +40°F.	SAE 20W	SAE 10W	SAE 10W	
*+35°F. to +70°F.	SAE 30	SAE 20W	SAE 10W	SAE 10W
*+60°F. to +110°F.	SAE 40	SAE 30	SAE 20W	SAE 10W
*+110°F. to +165°F.	SAE 50 (A)	SAE 40	SAE 30	SAE 20W

*Mobil SHC 629 is suitable for all speeds in these temperatures.

Note (A) Use automotive heavy duty oil, SAE 50 grade with oxidation inhibitor.
Note (B) Use Gulf Paramount No. 22 which is a naphenic base oil with a low pour point and viscosities of 109.8 SUS at 100°F. or 39.1 SUS at 210°F. Any other oil meeting these specifications would be a suitable substitute.
Note (C) Use Mobil Oil Corp. Avrex 904 oil.

Use only the best grades of automotive engine lubricants unless otherwise specified. When gear units are used out-of-doors, seasonal changes may be necessary.

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.

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

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. If Chevron FM Lubricating Oil 460X is installed in the field by draining a gearcase which contains our standard non food grade lubricant, the gearcase must be flushed thoroughly with mineral spirits before installing the new lubricant.

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

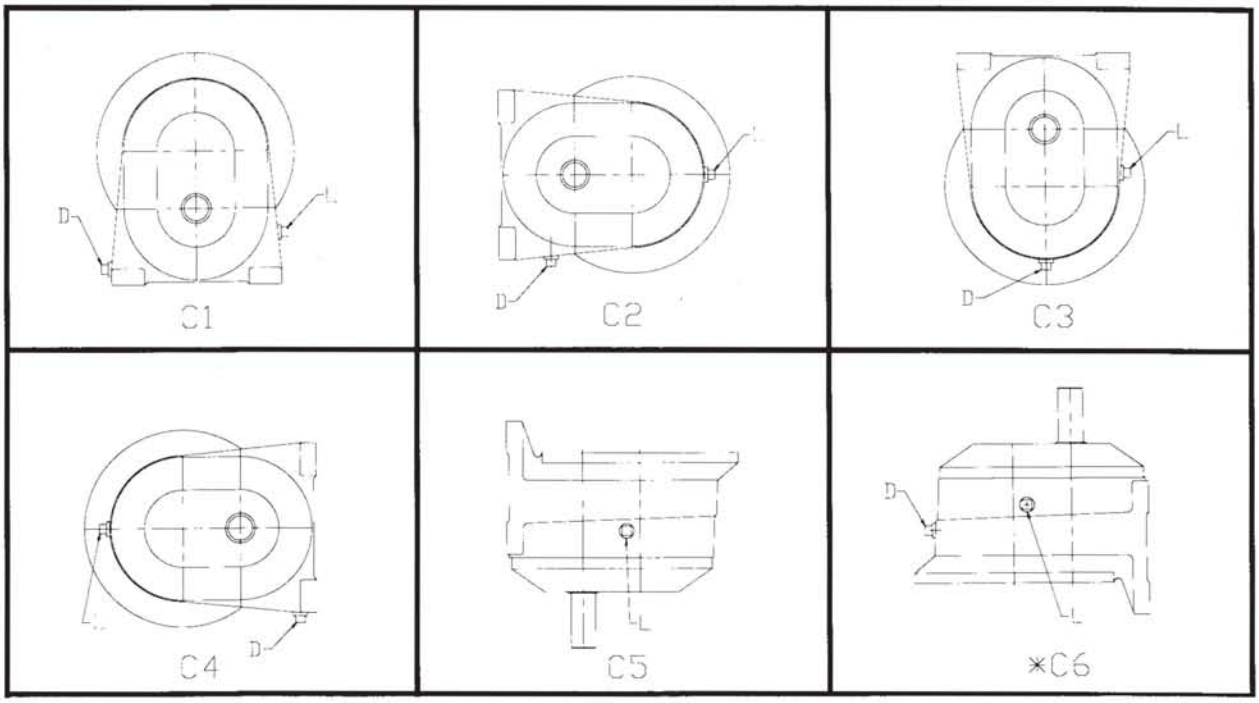
CAUTION: SERVICE AND REPAIR UNDER WARRANTY SHOULD BE PERFORMED ONLY BY A DODGE AUTHORIZED SERVICE SHOP. CALL WARRANTY ADMINISTRATION AT 812-376-1100 FOR THE NEAREST LOCATION.

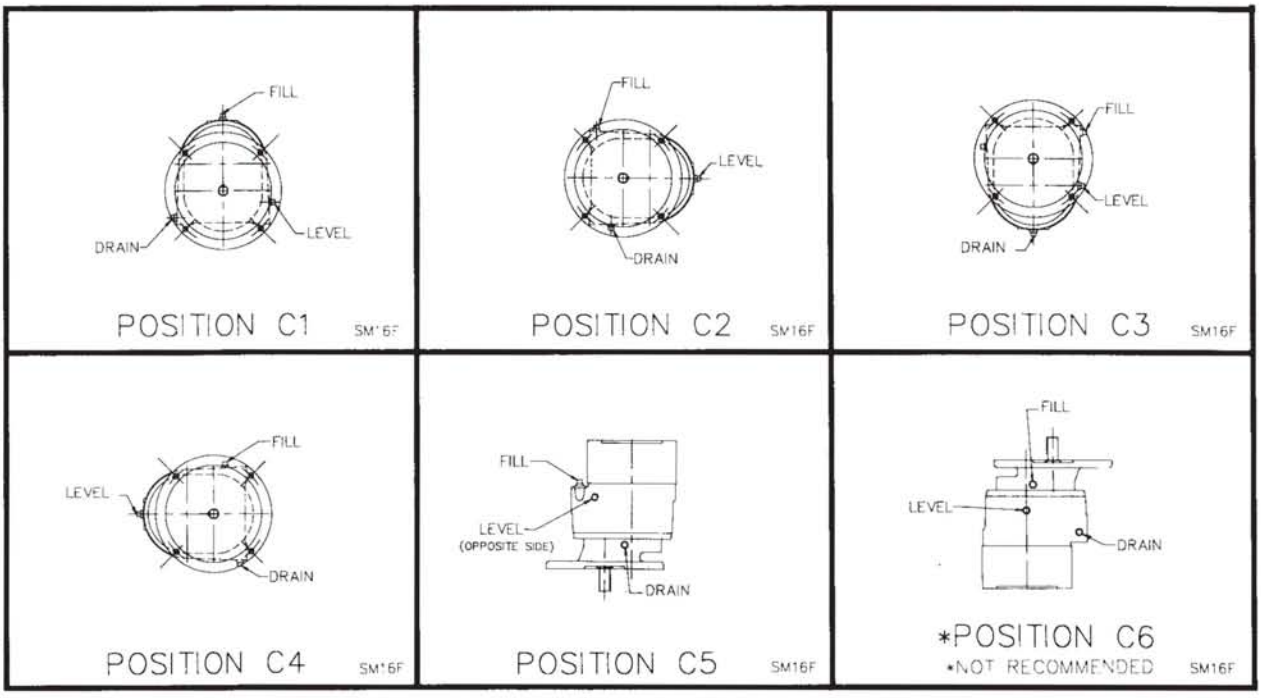
MASTER XL gear units are warranted under the DODGE "Standard Conditions for Sale."

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.

MOUNTING POSITIONS
SINGLE PARALLEL

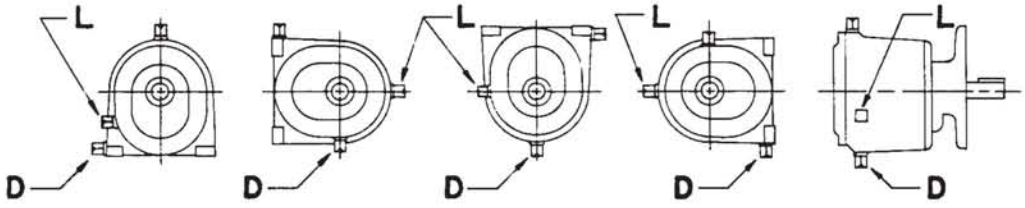




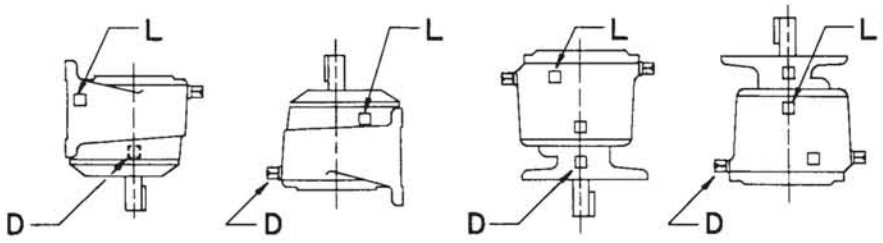
L = Oil Level Plug D = Drain Plug

*Mounting position not recommended. Use in this position voids the time-in-use warranty.

MOUNTING POSITIONS
DOUBLE PARALLEL

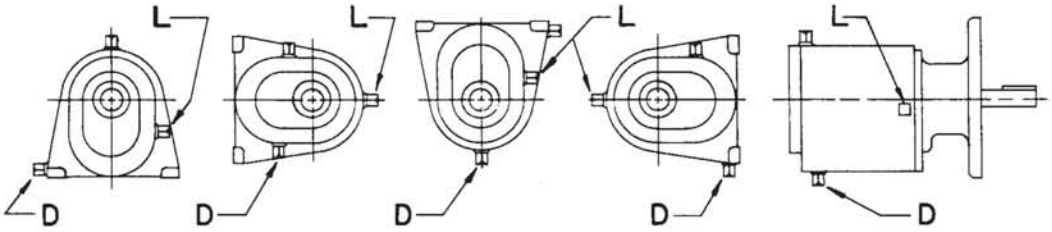


A1 A2 A3 A4 A1-FLG.

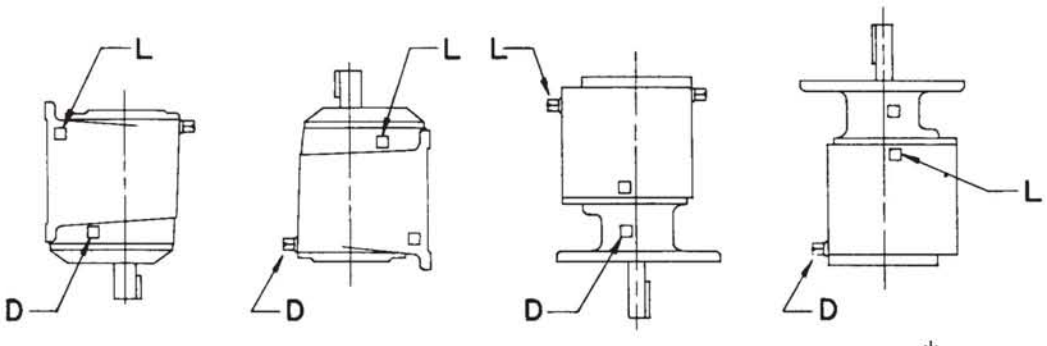


A5 A6 A7 A8 *

TRIPLE PARALLEL



A1 A2 A3 A4 A1-FLG.



A5 A6 A7 A8 *

L = Oil Level Plug D = Drain Plug

*Mounting position not recommended. Use in this position voids the time-in-use warranty.

REMOVAL OF INTEGRAL MOTOR

WARNING

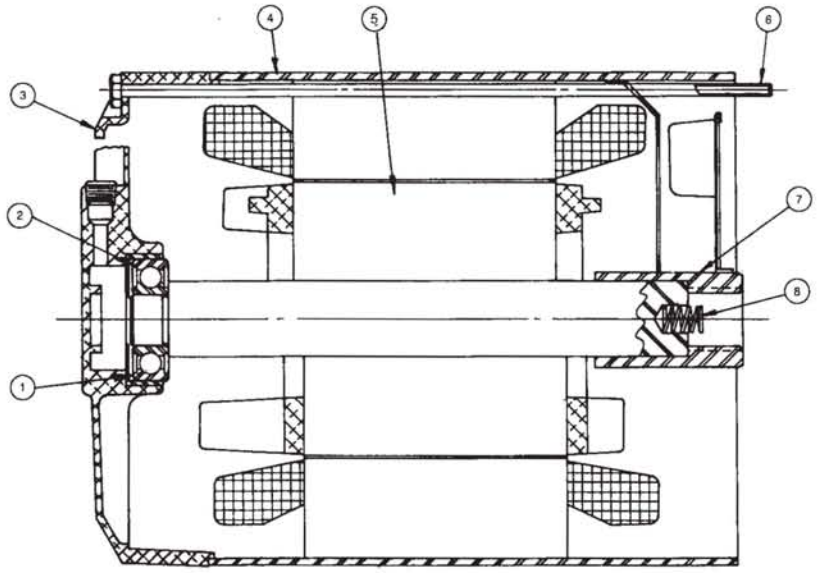
To ensure that drive is not unexpectedly started, turn off and lock out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

For the Gearmotor Configuration:

1. Disconnect all electrical wire and conduit.
2. Remove four motor bolts (6).
3. Tap the side of the end shield (3) to loosen and remove.
4. Remove stator and frame assembly (4).
5. Rotor and shaft assembly (5) will now slide off of the splined input shaft. Be careful not to lose the coupling spring (8) which is in the coupling bore.
6. After other repairs are made to the reducer the motor can be assembled in reverse order.
7. The semi-rigid coupling in gearmotors requires a small amount of Mobiltemp 78 lubricant added to the splines.

For the C-Face Configuration:

1. Disconnect all electrical wire and conduit.
2. Remove four motor mounting bolts (76).
3. Pull motor from C-face adaptor.
4. Refer to applicable motor instruction manual if further disassembly is required.

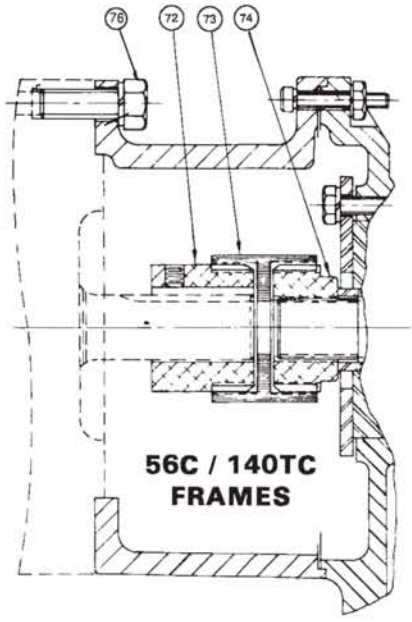


PARTIAL MOTOR USED ON GEARMOTORS

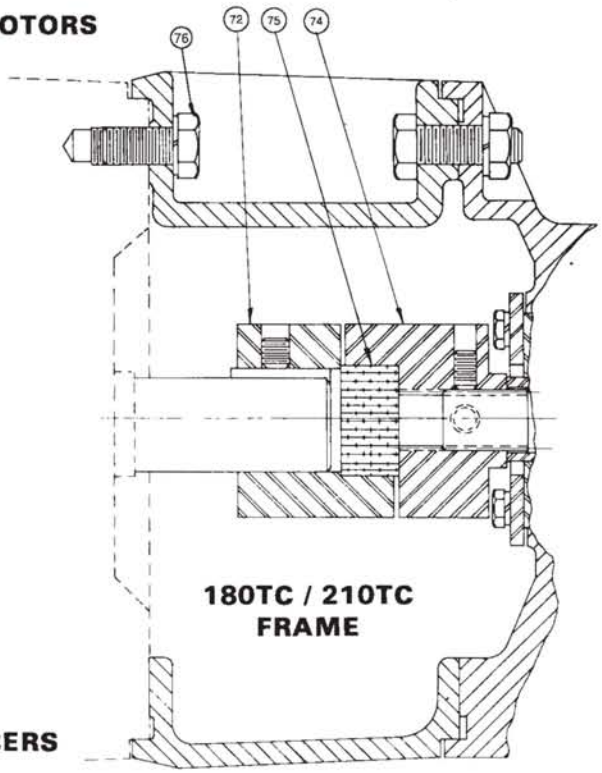
MOTOR PARTS IDENTIFICATION

1. Thrust Spring
2. Ball Bearing
3. F.E. Shield
4. Stator and Frame
5. Rotor
6. Motor Bolts
7. Motor Shaft and Semi-Rigid Coupling Assembly
8. Spring (Coupling)

72. Half Coupling for Motor Shaft
73. & 75. Coupling Sleeve or Spider
74. Half Coupling for Reducer Input Shaft
76. Motor Mounting Bolts



56C / 140TC FRAMES



180TC / 210TC FRAME

MOTOR ADAPTER USED ON C-FACE REDUCERS

INSTALLATION OF MOTOR FOR THE C-FACE CONFIGURATION

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.

When the C-face MASTER SPEED REDUCER is received 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:

MOTOR FRAMES 48Y, 56C AND 140TC

Shown in Figure 1 below is the C-FACE ASSEMBLY for mounting Nema C-face motor frames 48Y, 56C, and 140TC.

1. Locate motor coupling hub A on the motor shaft as shown in figure 2 below. Once located, tighten coupling hub set screw.
2. Slip reducer coupling hub C on the reducer input shaft until it shoulders on the reducer seal sleeve as shown in figure 1.
3. Slip coupling sleeve B over reducer coupling hub C until shouldered.
4. Guide motor shaft coupling hub A into the coupling sleeve as shown in figure 1.
5. Rotate motor to line up C-face tapped holes with bolt holes on the adapter; insert bolts, and tighten securely.

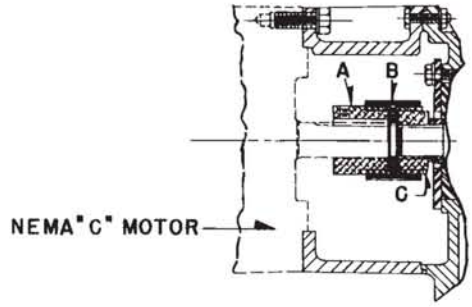


FIGURE 1

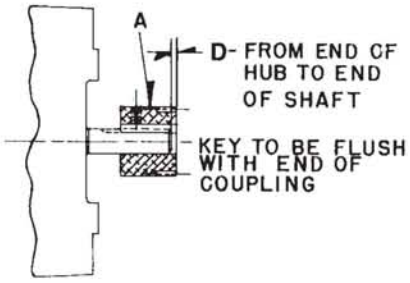
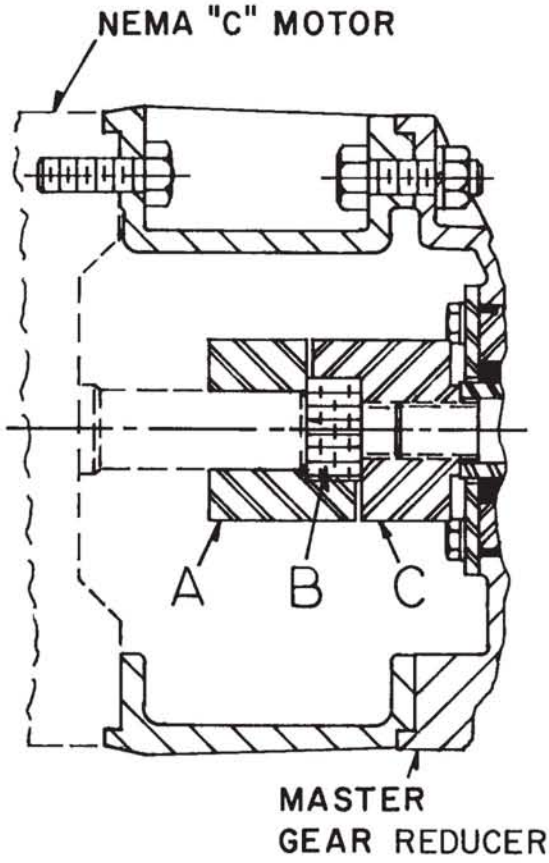


FIGURE 2

MOTOR FRAMES 180TC - 210TC

Shown in the figure below is the C-FACE ASSEMBLY for mounting Nema C-face motor frames 180TC and 210TC.

1. Slip reducer coupling hub C on the reducer input shaft until it shoulders on the reducer seal sleeve. Once located, tighten set screws.
2. Slip motor coupling hub A on motor shaft until the end of the motor shaft is flush with the inner face of the coupling hub. Once located, tighten set screws.
3. Slip coupling spider onto reducing coupling hub C.
4. Guide motor shaft with coupling hub A into spider as shown below.
5. Rotate motor to line up C-face tapped holes with bolt holes on adapter, insert bolts, and tighten securely.



LUBRICATION AND MAINTENANCE

The C-face MASTER SPEED REDUCER flexible coupling is lubrication free and requires no maintenance.

"C" FACE FRAME	D
56 FR. OR 48 FR. WITH 56 FR. "C" FACE	1/8
140TC	1/8

INSTRUCTIONS FOR DISASSEMBLY AND REASSEMBLY OF SINGLE PARALLEL GEARMOTORS AND REDUCERS (Refer to Pages 12 & 13)

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. Remove motor if complete disassembly is to be made.

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

3. Remove the screws holding the bearing housing (8) in place and tap housing with a mallet to separate at the gasket joint. Remove the bearing housing from the gearcase (6) making sure that the gear is not hit or damaged in any way. Remove the output shaft (17) and driven gear-assembly (10) from the gearcase.

4. To remove the input shaft, remove the seal clamp screws and seal clamp (3). Tap the opposite end of the input shaft with a mallet in order to force out the shaft seal (4) and bearing (5a) from the gearcase. On gearmotors where a lockring is used to secure the bearing and seal in the gearcase, Tru-arc pliers can be used to remove this lockring. If bearings and gears are to be replaced, a suitable set of bearing pullers or an arbor press should be utilized to remove them.

5. To remove the driven gear (10) from the output shaft (17), place the assembly in a press with the shaft down resting on the gear. Press the shaft out of the gear (10), spacer collar (13), and bearing (31a). On S-16 reducers, a lockring (43) serves as a shoulder and care should be taken not to try and press against it. Reverse shaft in the press and press other bearing (31b) off of shaft. All parts and castings should now be washed and inspected for replacements.

6. Re-assemble in reverse order. If bearings or gears have been removed from the shafts, they should now be replaced with new ones.

7. Install spacer (44). Press the driven gear (10) on the output shaft (17) install spacer (13) and bearing (31a).

8. Install bearing (31b), grease retainer (34)* onto the shaft.

   *Grease Retainer (34) used only in vertical output shaft up mounting position.

9. Install the bearings (5a-5b) on the input shaft (1). Also press on the seal sleeve (2) applying a small amount of sealer under the sleeve.

   NOTE: In S-28 reducers, some ratios have a shell pinion (37) on the input shaft. There are spacers (36 & 38) and a lockring (42) on the input shaft..

10. The input shaft (1) should be installed in the gearcase before the output shaft (17).

11. Apply a small amount of lubricant to the input shaft seal (4) O-Ring and seal sleeve (2). This will allow the seal to slide into the gearcase bore more freely. Install the seal clamp (3) and screws and tighten.

12. If the unit is a gearmotor with a lockring, add ball bearing shims as required between the lockring and the seal housing to limit the endplay of the input shaft to the internal clearance of the ball bearing.

13. The taper roller bearing cups (31a-31b) should be placed in the bearing bore of gearcase (6) and bearing housing (8). Shim to .001 - .003 endplay. Shimming of the roller bearings is done by means of bearing shims (14) of various thicknesses. These shims are placed under the bearing cup in the bearing housing (8).

14. Place the output shaft with gear in gearcase carefully. Install the bearing housing gasket with sealer, bearing housing and secure with several bolts. When shimmed properly, there should be no side movement in the bearings or final output shaft, and the bearings should not be preloaded.

15. The output shaft seal (15) should be the last part installed in the bearing housing (8). A small amount of sealer should be placed on the outside diameter of the seal. Start the seal into the bore and tap into place, using a tube of the correct diameter so as to be able to tap the seal into place flush with the face of the bearing housing. Fill the gearcase with the proper lubricant to the correct oil level for test.

16. Reinstall motor.

INSTRUCTIONS FOR DISASSEMBLY AND REASSEMBLY OF DOUBLE PARALLEL GEARMOTORS AND REDUCERS (Refer to pages 14 & 15)

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. Remove motor.

2. Remove the drain plug and drain the lubricant from the gearcase. We suggest that the disassembly of a gearmotor or a reducer begin at the input shaft of the unit.

3. The input shaft seal (4) and bearing (5a) were locked in the coverplate (7) by a lockring in earlier designs. The present design input shaft seal and bearing are locked with a clamp (3) and screws.

4. Remove the bolts holding the coverplate and tap the cover to loosen at the gasket fit. The coverplate (7) and input shaft (1) can be removed as an assembly, being careful not to hit or damage the gear teeth. Remove the clamp (3) and pull or tap the input shaft (1), seal (4), and bearing (5a) from the coverplate.

5. Remove the screw (11) and washer (12) holding the first stage driven gear (10) on the second stage pinion shaft (19). This gear should come off freely.

6. Stand gearcase on end with the output shaft vertically up. Remove the bolts holding the bearing housing (8). Tap the side of the housing to loosen at the gasket fit. Lift off the bearing housing.

7. The final output shaft (17) assembly can now be removed. The second stage pinion shaft (19) can now also be removed.

8. All parts and castings should now be washed and inspected for possible replacements. If parts are replaced, reshim bearings for proper fit up.

9. Reassemble in reverse order. It is a good idea to shim the shafts separately, in that installing each shaft and checking for preloading gives the best results. Install the final output shaft assembly (17) in the gearcase. The bearing shims are placed under the bearing cup in the bearing housing (8). Shim to .001 - .003 endplay. Install the gasket and bearing housing (8), and secure with several screws. Check this shaft for proper shimming to be sure that there is no side motion and that the shaft turns freely.

10. Remove bearing housing (8) and the final output shaft assembly (17).

11. Install the second stage pinion shaft (19). Shims (18) are placed under the bearing cup (9b) in the bearing housing (8). Place the bearing housing on the gearcase with a gasket and several screws. Check the shaft from the inside of the gearcase making sure that the shaft turns freely and that there is no side motion in the bearings (9a-9b). Shim to .001 - .003 endplay.

12. Remove the bearing housing (8) and place the final output shaft (17) back into the gearcase again. Place some sealer on the gasket surface and reinstall the bearing housing using all screws. At this time install the counter shaft oil seal (15) in the bearing housing.

13. Place the gearcase on its feet again and install the first stage driven gear (10) on the second stage pinion shaft (19). Lock in place with washer (12) and screw (11).

14. If new ball bearings (5a-5b) have been installed on the input shaft (1), a new seal sleeve (2) should also be installed. Apply some sealer to the shaft at the seal sleeve location.

    NOTE: On D-16 and D-21 size reducers, the pinion is cut on the input shaft. In D-28 reducers, some ratios have a shell pinion (37) on the input shaft. There are spacers (36 & 38) and a lockring (39) on this input shaft.

    *Grease retainer (34) used only in vertical output shaft up mounting position.

15. The input shaft (1) is placed in the coverplate (7). A bit of lubricant applied to the seal sleeve (2) will make installation easier.

16. Place the oil seal assembly (4) in the coverplate (7). A bit of lubricant applied to the seal sleeve (2) and the O-Ring of the seal will make installation easier. Install the bearing clamp and screws.

17. Fill the reducer with the proper lubricant to the correct oil level for test. Reinstall motor.

INSTRUCTIONS FOR DISASSEMBLY AND REASSEMBLY OF TRIPLE PARALLEL GEARMOTORS AND REDUCERS (Refer to Pages 16, 17 & 18)

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. Remove motor.
2. Remove the drain plug and drain the lubricant from the gearcase. It is suggested that disassembly begin at the input shaft end of the reducer.
3. Remove the bolts holding the coverplate and tap cover so as to loosen it at the gasket joint. The coverplate and the input shaft assembly can be removed as a unit. Be careful not to hit or damage the gear teeth. Remove the clamp (3) and tap or pull the pinion shaft (1) bearing (5a) and seal (4) from the coverplate (7).
4. Remove the screw (11) and washer (12) holding the first stage driven gear (10) on the second stage pinion shaft (19). This gear and spacer (13) should slip off freely.
5. Remove the screw (24) and washer (25) holding the second stage driven gear (20). This gear will not normally come off of the shaft until output shaft (17) and bearing housing (8) are removed.
6. Remove the three bolts (21) holding the bearing clamp (22) on the second stage pinion shaft. By moving gear (20) on the third stage pinion shaft, the second stage pinion shaft (19) can now be removed. This shaft assembly should now be pulled out, at the same time one bearing cup and shims will also come out.
7. Loosen all screws on bearing housing (8) and remove all except one on each side to keep output shaft in place. With bearing housing loose you can now reach into the gearcase from opposite end and slip off second stage driven gear (20) and spacer (26) from third stage pinion shaft (29).
8. Stand gearcase on end with output shaft vertical. Remove remaining screws and lift off bearing housing. Lift out output shaft assembly (17) also the third stage pinion shaft (29).
9. All parts and castings should be washed and inspected for possible replacement. It is our suggestion that the shimming of bearings be done to one shaft at a time, this allows for better freedom and less possibility of too much preloading or looseness of bearings.
10. If new seals and bearings are being installed, it is a good idea to press on the new seal sleeve. Apply some sealer to the shaft at sleeve location.
11. Install the third stage pinion shaft (29) in the gearcase. Place the shims (28) under the bearing cup (27B) in the bearing housing (8). Install the bearing housing with several bearing housing screws. Check the shaft from the inside of the gearcase for proper shimming of the roller bearings (27A-B). Shim to .000-.003 endplay. The shaft (29) should be free to turn with no side motion in the bearings.
12. Remove the bearing housing screws, bearing housing and lift out the third stage pinion shaft.

*NOTE: Grease retainer (34) used only in vertical output shaft up mounting only.

13. Place the final output shaft (17) into the gearcase. The bearing shims should be placed under the bearing cup (31B) in the bearing housing (8). Shim to .001 - .003 endplay. Install the bearing housing and secure with several screws. Check the output shaft to be sure that the shaft turns freely and there is no side motion in the bearings.
14. Remove the bearing housing (8) again and re-install the third stage pinion shaft (29).

    NOTE: It is now necessary to place the second stage driven gear (20) and spacer (26) onto the third stage pinion shaft (29) from the input end of the gearcase. Use screw (24) and washer (25) finger tight in order to keep the gear on splined shaft while completing assembly of output shaft end. Apply silicone rubber adhesive to gasket surface and re-install bearing housing with all screws. You should now be able to turn the third stage pinion shaft freely from inside the gearcase.
15. From the input end you can now place the second stage pinion shaft (19) into the bearing bores. You will need to loosen the screw (24) which was finger tight and slide gear (20) on spline in order for bearing on pinion shaft (19) to clear gear and go into bearing bore. To secure these shaft bearings (9A-B) the shims (18) are placed under the bearing clamp (22). Shim to .000-.003 endplay. Again shim so there is no side motion in the bearings and shaft turns freely.
16. Secure the second stage driven gear (20) onto the third stage pinion shaft (29) with screw (24) and washer (25).
17. The first stage driven gear (10) and spacer (13) can now be placed on the second stage pinion shaft (19). Lock this gear on the shaft with screw (11) and washer (12).
18. If new bearings (5A-B) have been installed on the input shaft (1), a new seal sleeve (2) should also be installed. Apply some sealer to the shaft at the seal sleeve location and press the sleeve in place. The input shaft assembly should be placed in the coverplate (7).

    NOTE: In T-28 reducers, some ratios have a shell pinion (37) on the input shaft. There are additional spacers (36-38) and lockring (39) on this input shaft.
19. Apply silicone rubber adhesive to the gasket area. Take input shaft (1) and coverplate assembly and install on gearcase making sure that pinion meshes with driven gear and outboard bearing (5B) slides into the bearing bore properly. Install coverplate screws and secure them.
20. The oil seal assembly (4) can now be placed in the coverplate (7). A bit of lubricant should be applied to the seal sleeves and to the O-Ring. This will allow the seal to slide into place much easier. Install the seal clamp (3) and secure with clamp screws.
21. If the output shaft oil seal has not as yet been installed, it should now be placed in the bearing housing and a tube of proper dimensions used to tap the seal flush with the casting surface.
22. Fill the reducer with the proper lubricant to the correct oil levels for test. Reinstall motor.

MASTER X-L GEARMOTORS
AND
C-FACE SPEED REDUCERS
SINGLE PARALLEL
SIZES SG16, SM16, SG21, SM21, SG28, SM28

REF. NO.	DESCRIPTION	QTY. EACH	RATIO	PART NUMBER**		
				S16	S21	S28
1	Input Shaft (Pinion)	1		SEE GEAR CHART BELOW		
2	Oil Seal Sleeve	1*	ALL	411621-07A	411621-20A	411621-20C
3	Lock Ring or Clamp	1	ALL	411625-13A	411625-04A	411637-01A
4	Oil Seal Assembly	1*	ALL	411620-21A	411620-11B	411620-13C
5a	Bearing	1*	ALL	79147-02P	79147-02AD	79147-02AL
5b	Bearing	1*	ALL	79147-02B	79147-02F	79147-02P
6	Gearcase	1	ALL	86868-04A	86856-02A	86860-04A
8	Bearing Housing	1	ALL	79070-02A	79039-02A	79045-02A
10	Driven Gear	1		SEE GEAR CHART BELOW		
13	Spacer	1	ALL	411622-08H	411622-07C	411622-11A
14	Shims — As Required	—	ALL	411623-01E	411623-01Y	411623-02A
15	Oil Seal	1*	ALL	411627-01AL	411627-01AM	411627-01A
16	Oil Seal Sleeve	1*	ALL	411621-08B	411621-10A	411621-15B
17	Output Shaft	—	ALL	602088-01N	602050-01A	602066-01R
31a	Bearing	1*	ALL	411626-01B	411626-01A	411626-01R
31b	Bearing	1*	ALL	411626-01D	411626-01W	411626-01AR
34	Grease Retainer— When Required	1	ALL	411624-01B	411624-01E	411624-01R
36	Spacer (For Shell Pinion)	1	ALL	—	—	411622-09B
38	Spacer (For Shell Pinion)	1	ALL	—	—	411622-08C
41	Spacer (S21 & S28 Only)	1	ALL	—	411622-02D	411622-07C
42	Lock Ring (S28 Only)	1	ALL	—	—	056509
43	Lock Ring (S16 Only)	—	—	411637-02C	—	—
44	Spacer	1	ALL	411622-08AG	411622-09A	411622-12C
50	Gasket-Brg. Hsg. (Not Shown)	1*	ALL	602028-14A	602028-05A	602028-09A

* Recommended Spares
** NOTE: These part numbers apply to standard catalogued units only.

GEARING CHART

RATIO	SIZE	PINION-DRIVER REF #1	DRIVEN GEAR REF #10
2.25	S16	602082-16	602083-16
2.25	S21	602044-16	602045-16
2.25	S28	602060-16	602061-16
2.75	S16	602082-13	602083-13
2.75	S21	602044-14	602045-14
2.75	S28	602060-14	602061-14
3.37	S16	602082-10	602083-10
3.37	S21	602044-10	602045-10
3.37	S28	602060-11	602061-11
4.13	S16	602082-07	602083-07
4.13	S21	602044-07	602045-07
4.13	S28	602060-08	602061-08
5.06	S16	602082-04	602083-04
5.06	S21	602044-05	602045-05
5.06	S28	602060-05	602061-05
6.20	S16	602082-02	602083-02
6.20	S21	602044-02	602045-02
6.20	S28	602060-02	602061-02

REPAIR KITS

SEAL & GASKET KIT	SIZE
079019-38AS	S16
079019-38AT	S21
079019-38AV	S28

INCLUDES INPUT & OUTPUT SEALS, SLEEVES AND GASKETS.

BEARING KIT	SIZE
411642-45M	S16
411642-45N	S21
411642-45P	S28

INCLUDES ALL REDUCER BEARINGS.

SIZES S16-S21-S28

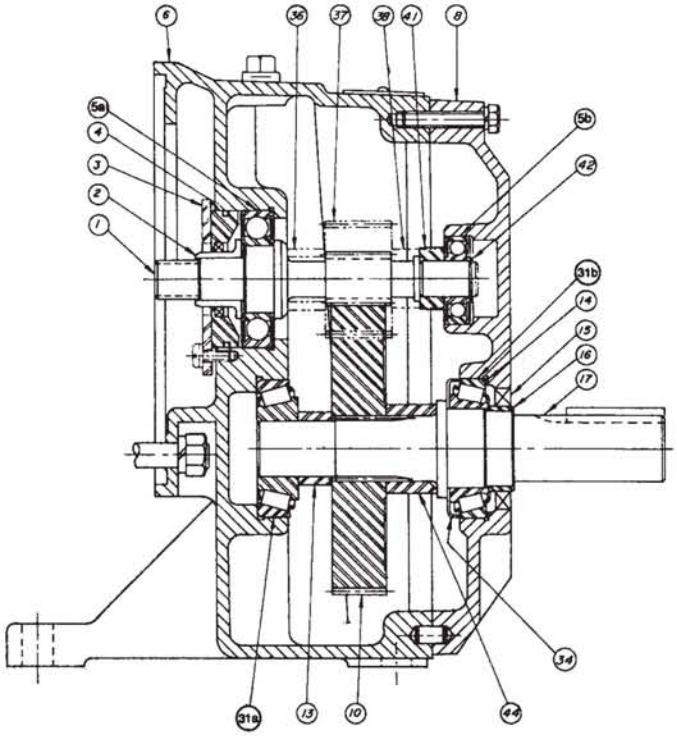
1. Input Shaft (driver gear)
2. Seal Sleeve
3. Lock Ring or Clamp
4. Oil Seal

5a. Ball Bearing
5b. Ball Bearing (input shaft)

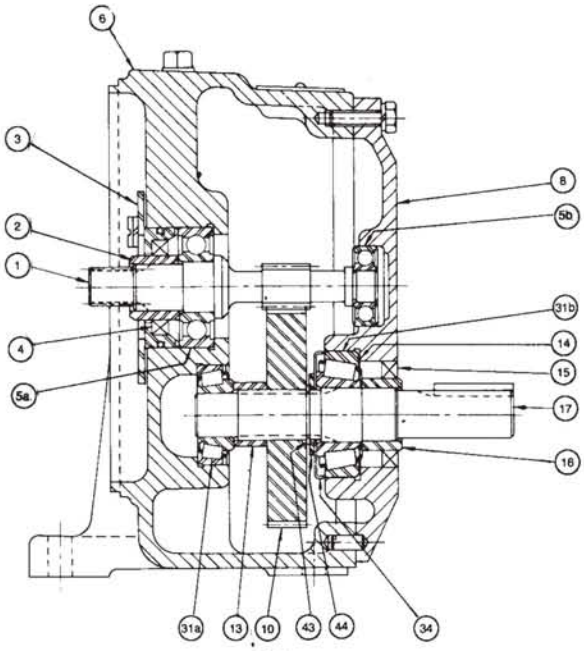
6. Gearcase
8. Bearing Housing
10. 1st Stage Driven Gear
13. Spacer (gear)
14. Shims
15. Seal (output)
16. Seal Sleeve (output)
17. Output Shaft

31a. Roller Bearing
31b. Roller Bearing (output shaft)

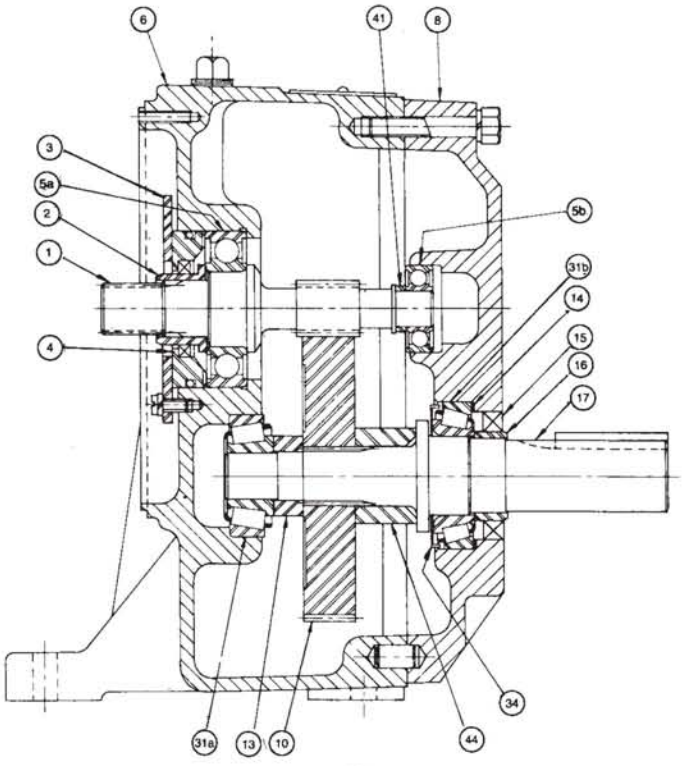
34. Grease Retainer (shaft up mounting only)
36. Spacer (gear) } Shell Pinion
37. Shell Pinion } in some S-28
38. Spacer (gear) } Ratios
41. Spacer (bearing)
42. Lock Ring
43. Lock Ring (S-16)
44. Spacer (gear)



S28



S16



S21

MASTER X-L GEARMOTORS
AND
C-FACE SPEED REDUCERS
DOUBLE PARALLEL
SIZES DG16, DM16, DG21, DM21, DG28, DM28

REF. NO.	DESCRIPTION	QTY. EACH	RATIO	PART NUMBER**		
				D16	D21	D28
1	Input Shaft — 1st stg. Pinion	1		SEE GEAR CHART BELOW		
2	Oil Seal Sleeve	1*	ALL	411621-07A	411621-20A	411621-20C
3	Clamp	1	ALL	411625-13A	411625-04A	411625-04A
4	Oil Seal Assembly	1*	ALL	411620-21A	411620-11B	411620-13C
5a	Bearing (Input Shaft)	1*	ALL	79147-02P	79147-02AD	79147-02AL
5b	Bearing (Input Shaft)	1*	ALL	79147-02B	79147-02F	79147-02P
6	Gearcase	1	ALL	86870-02A	86858-02A	86862-02A
7	Cover Plate — Input 56/140 Frame	1	ALL	79073-04A	79041-02A	79047-02A
7	Cover Plate — Input 180/210 Frame	1	ALL	—	79041-02B	79047-04D
8	Bearing Housing — Output	1	ALL	79074-02A	79042-02A	79048-02A
9a	Bearing	1	ALL	411626-01B	411626-01BE	411626-01AE
9b	Bearing	1	ALL	411626-01D	411626-01AD	411626-01AW
10	Gear — 1st stg. Driven	1	ALL	SEE GEAR CHART BELOW		
14	Shims — As Required	—	ALL	411623-01Y	411623-02AD	411623-03A
15	Oil Seal	1*	ALL	411627-01AM	411627-01A	411627-01D
16	Oil Seal Sleeve	1*	ALL	411621-10C	411621-13A	411621-18B
17	Output Shaft	1	ALL	602088-02A	602050-02A	602066-02A
18	Shims — As Required	—	ALL	411623-01A	411623-02D	411623-03E
19	Pinion Shaft — 2nd stg. Driver	1		SEE GEAR CHART BELOW		
20	Gear — 2nd stg. Driven	1		SEE GEAR CHART BELOW		
31a	Bearing (Output Shaft)	1	ALL	411626-01W	411626-01X	411626-01AY
31b	Bearing (Output Shaft)	1	ALL	411626-01A	411626-01AA	411626-01AB
33	Key — Gear			050992	057500	050768
34	Grease Retainer— When Required	1	ALL	411624-01E	411624-01F	411624-01X
36	Spacer (For Shell Pinion Only)	1	—	—	—	411622-09B
37	Shell Pinion — Shell Pinion in Some T-28 Ratios	—	—	—	—	—
38	Spacer (For Shell Pinion)	1	—	—	—	411622-08B
50	Gasket-Brg. Hsg. (Not Shown)	2*	ALL	602028-08C	602028-06A	602028-10A

* Recommended Spares

** NOTE: These part numbers apply to standard catalogued units only.

GEARING CHART

RATIO	SIZE	REF. #1 1ST PINION	REF. #10 1ST GEAR	REF. #19 2ND PINION	REF. #20 2ND GEAR
5.06	D16	602082-19	602083-19	602084-08	602029-08
5.06	D21	602044-20	602045-20	602046-08	602030-08
5.06	D28	602019-19*	602061-19	602062-04	602039-04
6.20	D16	602082-16	602083-16	602084-08	602029-08
6.20	D21	602044-18	602045-18	602046-08	602030-08
6.20	D28	602060-17*	602061-17	602062-04	602039-04
7.60	D16	602082-19	602083-19	602084-03	602029-02
7.60	D21	602044-18	602045-18	602046-05	602030-02
7.60	D28	602060-18*	602061-18	602062-03	602039-02
9.30	D16	602082-16	602083-16	602084-03	602029-02
9.30	D21	602044-16	602045-16	602046-05	602030-02
9.30	D28	602060-16	602061-16	602062-03	602039-02
11.4	D16	602082-13	602083-13	602084-03	602029-02
11.4	D21	602044-14	602045-14	602046-05	602030-02
11.4	D28	602060-14	602061-14	602062-03	602039-02
14.1	D16	602082-10	602083-10	602084-03	602029-02
14.1	D21	602044-10	602045-10	602046-05	602030-02
14.1	D28	602060-11	602061-11	602062-03	602039-02
17.1	D16	602082-06	602083-06	602084-03	602029-02
17.1	D21	602044-07	602045-07	602046-05	602030-02
17.1	D28	602060-07	602061-07	602062-03	602039-02
20.9	D16	602082-06	602083-06	602084-02	602029-03
20.9	D21	602044-07	602045-07	602046-04	602030-04
20.9	D28	602060-07	602061-07	602062-02	602039-03
25.6	D16	602082-04	602083-04	602084-02	602029-03
25.6	D21	602044-05	602045-05	602046-04	602030-04
25.6	D28	602060-04	602061-04	602062-02	602039-03
31.4	D16	602082-02	602083-02	602084-02	602029-03
31.4	D21	602044-02	602045-02	602046-04	602030-04
31.4	D28	602060-02	602061-02	602062-02	602039-03

*SHELL PINION. If input shaft is required also order part number 602060-37A.

BEARING KIT	SIZE
41164245R	D16
41164245S	D21
41164245T	D28

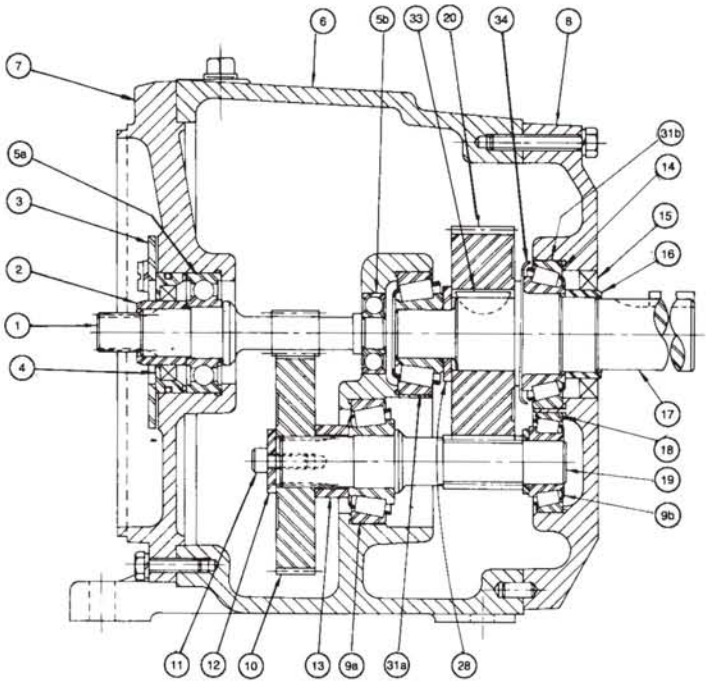
INCLUDES ALL REDUCER BEARINGS.

SEAL & GASKET KIT	SIZE
079019-38AW	D16
079019-38AX	D21
079019-38AY	D28

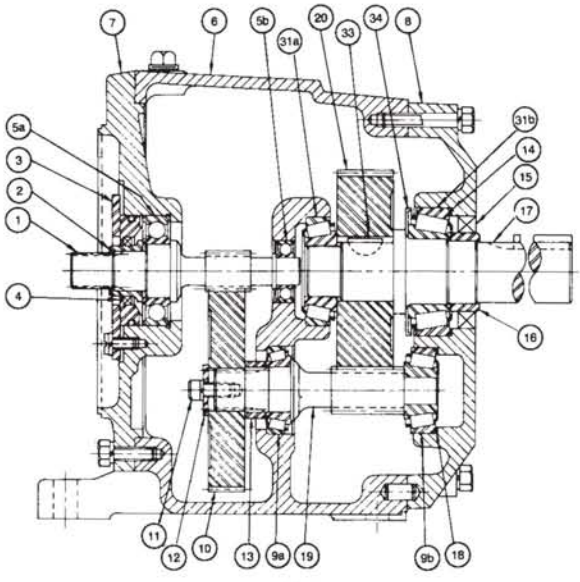
INCLUDES INPUT & OUTPUT SEALS, SLEEVES AND GASKETS.

SIZES D16-D21-D28

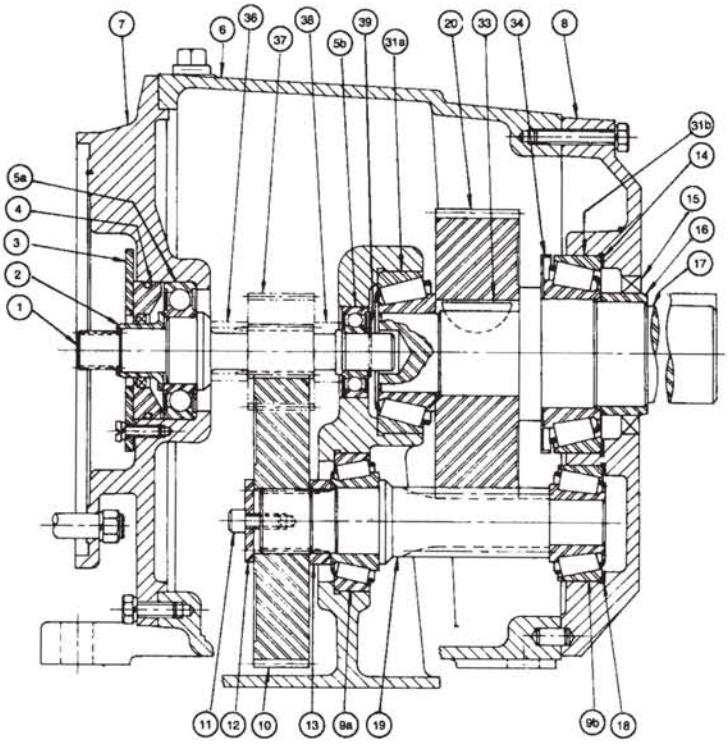
1. Input Shaft (driver gear)
2. Seal Sleeve
3. Clamp
4. Seal (input)
5a. Ball Bearing (input shaft)
5b. Ball Bearing (input shaft)
6. Gearcase
7. Cover Plate
8. Bearing Housing
9a. Roller Bearing
9b. Roller Bearing
10. 1st Stage Driven (gear)
11. Screw
12. Washer
13. Spacer (gear)
14. Shims
15. Seal (output)
16. Seal Sleeve (output)
17. Output Shaft
18. Shims
19. 2nd Stage Driver (gear)
20. 2nd Stage Driven (gear)
27. Key
28. Spacer (gear)
31a. Roller Bearing
31b. Roller Bearing
33. Key
34. Grease Retainer (shaft up mounting only)*
36. Spacer } Shell pinion
38. Spacer } in some D-28
39. Lock Ring ratios



D21



D16



D28

MASTER X-L GEARMOTORS
AND
C-FACE SPEED REDUCERS
TRIPLE PARALLEL
SIZED TG16, TM16, TM21, TG28, TM28

REF. NO.	DESCRIPTION	QTY. EACH	RATIO	PART NUMBERS**		
				T16	T21	T28
1	Input Shaft — 1st stg. Pinion	1		SEE GEARING — PAGE 17		
2	Oil Seal Sleeve	1*	ALL	411621-07A	411621-20A	411621-20C
3	Clamp	1	ALL	411625-13A	411625-04A	411625-04A
4	Oil Seal Assembly	1*	ALL	411620-21A	411620-11B	411620-13C
5a	Bearing	1*	ALL	79147-02P	79147-02AD	79147-02AL
5b	Bearing	1*	ALL	79147-02B	79147-02F	79147-02P
6	Gearcase	1	ALL	86871-02A	86859-02A	86863-02A
7	Cover Plate—Input 56/140 Frame	1	ALL	79073-04A	79041-02A	79047-02A
7	Cover Plate—Input 180/210 Frame	1	ALL	—	79041-04B	79047-04D
8	Bearing Housing — Output	1	ALL	79076-02A	79044-02A	79049-02A
9a	Bearing	1*	ALL	411626-01D	411626-01BE	411626-01AW
9b	Bearing	1*	ALL	411626-01B	411626-01AD	411626-01AE
10	Gear — 1st stg. Driven	1		SEE GEARING — PAGE 17		
11	Screw	1	ALL	411631-01A	411631-01A	411631-01D
12	Washer	1	ALL	411632-01B	411692-01B	411632-01A
13	Spacer	1	AILL	411622-08H	411622-10B	411622-12D
14	Shims — As Required	—	ALL	411623-02A	411623-03A	411623-03AD
15	Oil Seal	1*	ALL	411627-01A	411627-01D	411627-02D
16	Oil Seal Sleeve	1*	ALL	411621-15D	411621-18A	411621-19A
17	Output Shaft	1	ALL	602088-03A	602050-03A	602066-03A
18	Shims — As Required	—	ALL	411623-05A	411623-02A	411623-04E
19	Pinion Shaft — 2nd stg. Driver	1		SEE GEARING — PAGE 17		
20	Gear — 2nd stg. Driven	1		SEE GEARING — PAGE 17		
21	Screw	2	ALL	4119631-02A	411631-02A	411631-02A
22	Clamp	1	ALL	411625-09A	411625-09A	411625-06B
23	Spacer (T16 Only)	1	ALL	411622-05A	—	—
24	Screw	1	ALL	411631-01A	411631-01A	411631-03B
25	Washer	1	ALL	411632-01B	411632-01A	411632-01C
26	Spacer	1	ALL	411622-08G	411622-13A	411622-17C
27a	Bearing	1*	ALL	411626-01B	411626-01AC	411626-01AY
27b	Bearing	1*	ALL	411626-01B	411626-01AA	411626-01BB
28	Shims — As Required	—	ALL	411623-01E	411623-02Y	411623-03Y
29	Pinion Shaft — 3rd stg. Driver	1		SEE GEARING — PAGE 17		
30	Gear — 3rd stg. Driven	1		SEE GEARING — PAGE 17		
31a	Bearing	1*	ALL	411626-01BC	411626-01AB	411626-01BA
31b	Bearing	1*	ALL	411626-01R	411626-01Y	411626-01AX
32	Spacer (T16 & T28 Only)	1	ALL	411622-10E	—	411622-18A
33	Key, Gear	1	ALL	053180	051283	151985
34	Grease Retainer	1	ALL	411624-01R	411624-01X	411624-02A
35	Spacer (T21 & T28 Only)	1	ALL	—	411622-14A	411622-17B
36	Spacer (For Shell Pinion Only)	1	ALL	—	—	411622-09B
38	Spacer (For Shell Pinion Only)	1	ALL	—	—	411622-08B
39	Lock Ring (T28 Only)	1	ALL	—	—	056509
40	Lock Ring (T28 Only)	1	ALL	—	—	058256
50	Gasket—Not Shown—Input Brg. Hsg.	1*	ALL	602028-08C	602028-08C	602028-08B
50	Gasket—Not Shown—Output C. Plate	1*	ALL	602028-15A	602028-07A	602028-11A

* Recommended Spares
** NOTE: These part numbers apply to standard catalogued units only.

REPAIR KITS

SEAL & GASKET KIT	SIZE
07901938BA	T16
07901938BB	T21
07901938BC	T28

INCLUDES INPUT & OUTPUT SEALS, SLEEVES AND GASKETS

BEARING KIT	SIZE
41164245V	T16
41164245W	T21
41164245X	T28

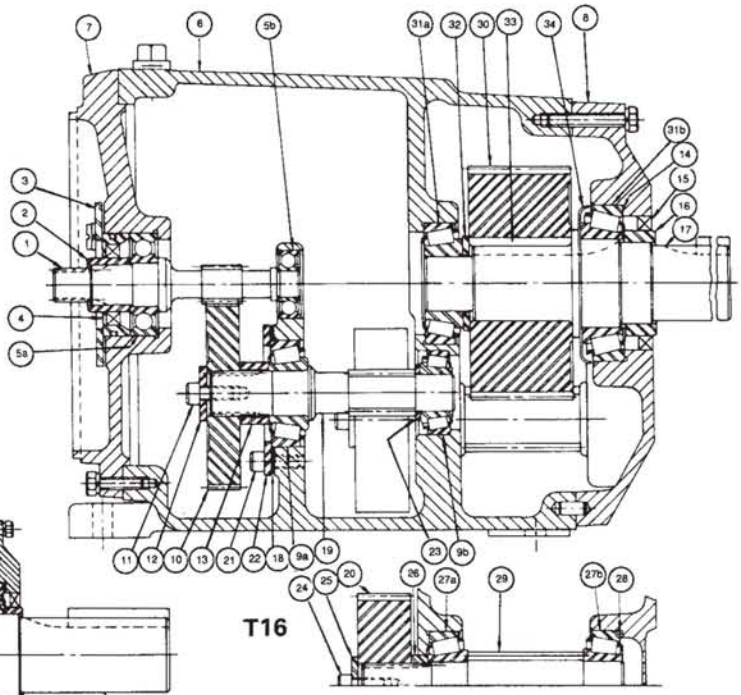
INCLUDES ALL REDUCER BEARINGS.

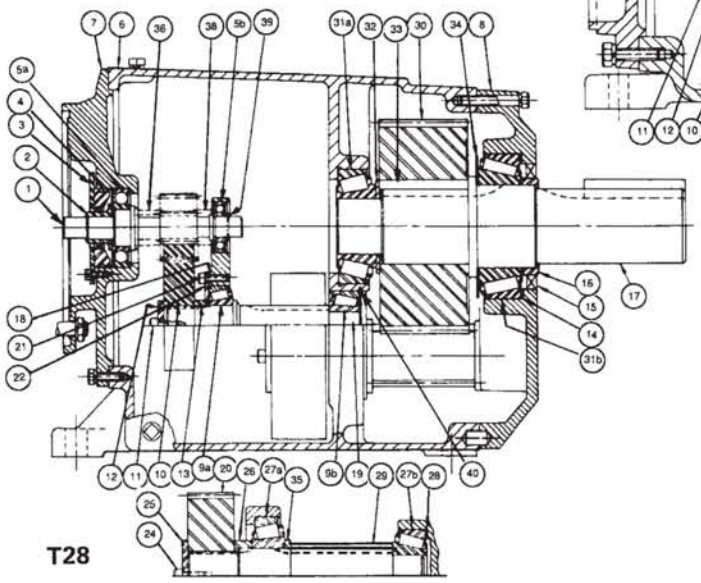
MASTER X-L GEARMOTORS
AND
C-FACE SPEED REDUCERS
TRIPLE PARALLEL
SIZES TG16, TM16, TG21, TM21, TG28, TM28

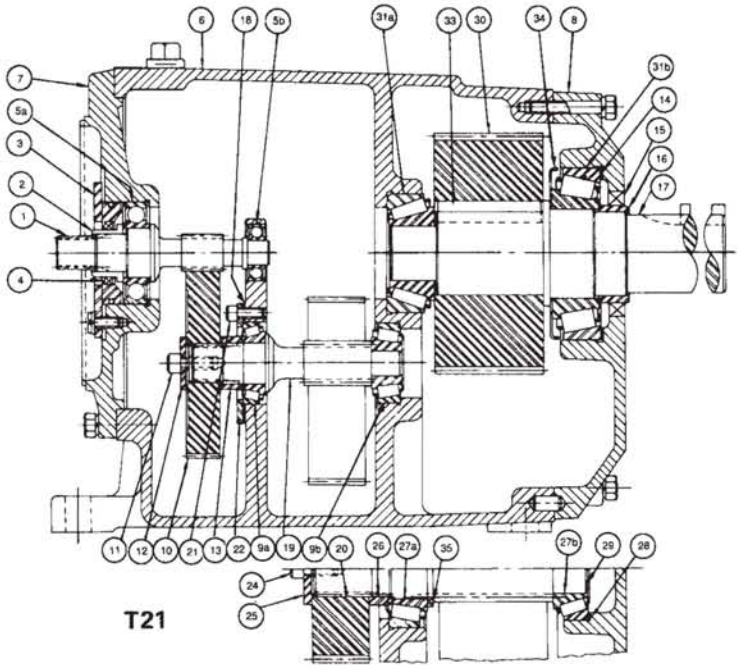
GEARING CHART

RATIO	SIZE	REF. #1 1ST PINION	REF. #10 1ST GEAR	REF. #19 2ND PINION	REF. #20 2ND GEAR	REF. #29 3RD PINION	REF. #30 3RD GEAR
20.9	T16	60208219	60208319	60208408	60208404	60208602	60208702
20.9	T21	60204420	60204520	60204608	60204704	60204802	60204902
20.9	T28	60206019*	60206119	60206204	60206207	60206404	60206502
25.6	T16	60208216	60208316	60208408	60208504	60208602	60208702
25.6	T21	60204418	60204518	60204608	60204704	60204802	60204902
25.6	T28	60206017*	60206117	60206204	60206307	60206404	60206502
31.4	T16	60208213	60208313	60208408	60208504	60208602	60208702
31.4	T21	60204418	60204518	60204605	60204703	60204802	60204902
31.4	T28	60206020	60206120	60206204	60206307	60206404	60206502
38.5	T16	60208215	60208315	60208403	60208503	60208602	60208702
38.5	T21	60204416	60204516	60204605	60204703	60204802	60204902
38.5	T28	60206015	60206115	60206203	60206306	60206404	60206502
47.5	T16	60208213	60208313	60208403	60208503	60208602	60208702
47.5	T21	60204414	60204514	60204605	60204703	60204802	60204902
47.5	T28	60206015	60206115	60206202	60206305	60206404	60206502
57.7	T16	60208209	60208309	60208403	60208503	60208602	60208702
57.7	T21	60204410	60204510	60204605	60204703	60204802	60204902
57.7	T28	60206011	60206111	60206203	60206306	60206404	60206502
70.6	T16	60208207	60208307	60208403	60208503	60208603	60208702
70.6	T21	60204407	60204507	60204605	60204703	60204802	60204902
70.6	T28	60206007	60206107	60206203	60206306	60206404	60206502
86.5	T16	60208204	60208304	60208403	60208503	60208602	60208702
86.5	T21	60204407	60204507	60204604	60204702	60204802	60204902
86.5	T28	60206004	60206104	60206203	60206306	60206404	60206502
105.9	T16	60208204	60208304	60208402	60208502	60208602	60208702
105.9	T21	60204405	60204505	60204604	60204702	60204802	60204902
105.9	T28	60206004	60206104	60206202	60206305	60206404	60206502
129.7	T16	60208202	60208302	60208402	60208502	60208602	60208702
129.7	T21	60204402	60204502	60204604	60204702	60204802	60204902
129.7	T28	60206002	60206102	60206202	60206305	60206404	60206502

*SHELL PINION. IF INPUT SHAFT IS REQUIRED ALSO ORDER PART NUMBER 60206037A







SIZES T16-21-28

1. Input Shaft (1st stage driver)
2. Seal Sleeve
3. Clamp
4. Seal
5a. Ball Bearing (input shaft)
5b. Ball Bearing (input shaft)
6. Gearcase
7. Cover Plate
8. Bearing Housing
9a. Roller Bearing
9b. Roller Bearing
10. Gear (1st stage driven)
11. Screw
12. Washer
13. Spacer (gear)
14. Shims
15. Seal
16. Seal Sleeve (output)
17. Output Shaft
18. Shims
19. Gear (2nd stage driver)
20. Gear (2nd stage driven)
21. Screws (bearing clamp)
22. Clamp
23. Spacer (T-16)
24. Screw
25. Washer
26. Spacer
27a. Roller Bearing
27b. Roller Bearing
28. Shims
29. Gear (3rd stage driver)
30. Gear (3rd stage driven)
31a. Roller Bearings
31b. Roller Bearings
32. Spacer (T-16 & T-28)
33. Key
34. Grease Retainer (shaft up mounting only)*
35. Spacer (T-21 & T-28)
36. Spacer } Shell Pinion
38. Spacer } in some T-28
39. Lock Ring ratios
40. Lock Ring

LONG-TERM STORAGE GUIDELINES FOR GEAR REDUCERS:

Care must be taken to ensure that gear reducers are placed in service in the best possible condition. 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. Preparation:

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. 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.
4. 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.
5. 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.
6. 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.
7. Apply a thick coating of chassis-type grease to all exposed shaft seals.
8. If the unit must be stored outdoors or in damp or unheated areas indoors, cover the entire exterior with a rust preventative. 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.
9. 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.
10. Instruction manuals and tags are paper and must be kept dry. Remove these documents and store them in a safe, dry place for future reference at 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. Regreasable assemblies and bearings must be purged and filled with new grease.
3. Install the oil level plug in the proper location for the mounting position to be used. Check the motor condensate drain locations to assure 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, briefly 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 the 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 61204-5015
Telephone (309) 788-5631