

STERLING
ELECTRIC, INC.

SPEED-TROL®

MECHANICAL VARIABLE SPEED DRIVES

INSTALLATION AND MAINTENANCE MANUAL

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WARRANTY

Sterling Electric, Inc. warrants that all of its own manufactured products will be of the kind and quality described in its specifications, and no other warranty, except of title, shall be implied. The conditions of any test shall be mutually agreed upon, and Sterling shall be notified of any and may be represented at all tests that may be made. If any failure to comply with the specifications appear within one year from the date of shipment, the purchaser shall notify Sterling thereof immediately, and Sterling shall thereupon correct the defect, by repair or by replacement, FOB factory, of the defective part or parts. The liability of Sterling arising out of the supplying of said apparatus, or its use, whether on warranties or otherwise, shall not in any case exceed the cost of correcting defects in the apparatus, and upon expiration of said one year, all such liability shall be terminate.

It is understood however, that if any purchaser fails to comply with the stipulation conditions of operation or fails to permit Sterling to inspect defects before repairing, or alters the product in any way, Sterling's responsibility shall terminate.

INSTALLATION CAUTIONS

BE SURE TO CHECK Phase - Voltage - Cycle - Connections - and other nameplate data against operating conditions when installing. Your Variable Speed Drive was designed and manufactured to provide outstanding performance. A few precautions taken at time of installation will help to assure many years of trouble-free service.

STORAGE

Unless special packaging has been specified on the order, all Sterling power drives are prepared for clean, dry, indoor storage. If storage under other conditions is called for, contact the Sterling factory for storage instructions to meet the adverse conditions in the particular case.

GENERAL INFORMATION

This manual describes mechanical variable speed drives. These drives provide infinitely variable speeds over wide speed ranges, with speed variation up to 10:1. The drives are adapted for control by manual, remote manual, semi-automatic or full automatic controls, electric, mechanical or pneumatic.

POSITIVE PULLEY CONTROL

Speed variation is accomplished by means of a special ribbed "V" belt and dual variable pitch pulleys mounted on parallel shafts. The movement of the pulleys in 71 - 74 cases is synchronized by completely new "Spring-Loaded Pulley Control". In the 75 & 76 cases the adjustment of the pulleys is synchronized by a completely new "Positive Pulley Control", which insures against "drift" and backing away under sudden load increases. This "Positive Pulley Control" method also has automatic belt tensioning as a further insurance of performance and longer belt life. Refer to page 7 for belt adjustment instructions.

Safe loading current at reduced speed is based on the rated capacity of the mechanical parts of the drive-belt, gears, etc. Although these drives are stronger than constant torque, a conservative safe load current at a reduced speed is obtained when the calculation is based on constant torque. This safe load current is equal to:

$$\frac{\text{Actual RPM}}{\text{No load Amps} + \text{Max. RPM (Full load amps - No load amps)}}$$

LUBE -FREE CONSTRUCTION

The age-old problem of maintaining proper lubrication has been solved in belt and pulley type variable speed drives by an exclusive LUBE-FREE system.

The LUBE-FREE system utilizes a special, tough, wear-resistant, low-friction material with which shaft or pulley surfaces are impregnated, with durable, strong non-metallic liners for the variable pulley bores. The same resilient non-metallic material is used for the keys, which transmit shaft torque to the pulleys.

The only maintenance usually required with LUBE-FREE system is a periodic inspection of the LUBE-FREE components every 5,000 running hours. Liners or keys, which exhibit undue wear, can be replaced at this time (see page 6). Replacing the belt also affords a convenient time for inspection of the LUBE-FREE components.

LONG SERVICE LIFE

These units retain all the advanced engineering and construction features, which have given variable speed drives their deserved reputation for strength and durability. Properly installed and maintained, they will deliver trouble-free operation over extended periods of time.

TERMINOLOGY & CODING

Transmission Case - Pulley and belt section of the drive.

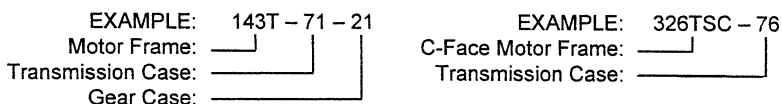
Gear Case - Gear case section of the drive, in geared units.

Motor Frame - Frame size of motor adapted to the particular transmission case.

C-Flow Assembly - Motor and output shaft, or gear case, are on the same side of the unit.

Z-Flow Assembly - Motor and output shaft, or gear case, are on the opposite sides of the unit. (This is the assembly pictured in this manual.)

Coding is explained thus:



INSTALLATION CHECK POINTS

CHECK YOUR SPECIFICATIONS AND BE SURE THE DRIVE IS BEING INSTALLED ACCORDING TO PLAN.

GEARLESS TYPE

Due to its flexibility, this drive can be mounted in any position.

Mount the unit with output shaft in perfect alignment with the drive shaft. Shims may be needed to accomplish this. Should chain and sprocket or belt drive be mounted on the output shaft, caution should be taken to maintain proper tension and alignment.

GEARED TYPE

Variable speed drives with gear units should be mounted on the floor unless specially ordered for mounting in other positions. Geared units may be mounted upright or horizontal, but the factory should be notified at time of purchase, and the original order should state the position in which the unit will be mounted, if any position other than upright floor mounting is planned. The factory will normally make the required modification and place gear-case oil level holes at proper levels for the planned position.

C-FLOW OR Z-FLOW ASSEMBLY

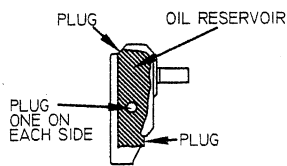
Regardless of position, and in both geared and gearless units, most units can be supplied in either assembly by the factory.

REDUCER LUBRICATION

If a gear is attached to the drive, the nameplate and decal on the reducer case will give lubrication instructions. Complete lubrication information is also described on page 4.

CLASSIC HELICAL GEAR REDUCERS

LUBRICATION INSTRUCTIONS



SINGLE REDUCTION

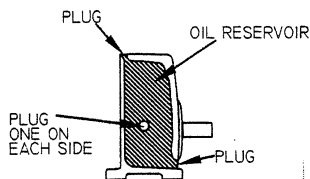
THE GEAR END OF THESE UNITS ARE SHOWN TO THE LEFT. FOUR PLUGS IN THE SINGLE AND DOUBLE REDUCTION AND EIGHT PLUGS IN THE TRIPLE AND QUADRUPLE REDUCTION UNITS PROVIDE A FILL, LEVEL AND DRAIN. MOUNTING CAN BE MADE ON FLOOR, WALL OR CEILING, EITHER HORIZONTAL OR VERTICAL. REGARDLESS OF MOUNTING POSITION, THE PLUG AT THE HIGHEST ELEVATION IS "FILL". THE PLUGS AT THE MIDDLE ELEVATION ARE "LEVEL". THE LOWEST PLUGS ARE FOR DRAINING. CHANGE OIL IN RESERVOIR AFTER 200 HOURS OF OPERATION, THEREAFTER CHANGE OIL EVERY 2000 HOURS.

OIL LEVEL	SINGLE REDUCTION	DOUBLE REDUCTION MAX. OUTPUT SPEED 47 RPM AND HIGHER	MAX. OUTPUT SPEED 47 RPM AND LOWER	TRIPLE & QUADRUPLE REDUCTION	
				1ST STAGE	2ND STAGE
TO "LEVEL" PLUG HOLE ONLY	X	X		X	
* TO WITHIN 1" OF FILL PLUG HOLE			X		X

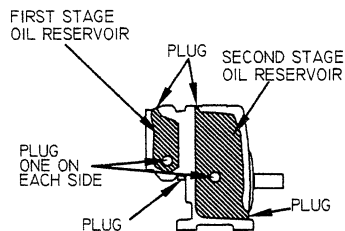
* DO NOT REMOVE "LEVEL" PLUG

LUBRICATION OIL SPECIFICATIONS

HIGH GRADE NON-LEADED GEAR COMPOUND. FOR +40°F. TO 120°F> USE AGMA-8EP VISCOSITY 3000SUS AT 100°F. FOR -20°F. TO +40°F USE AGMA-5EP VISCOSITY 1040SUS AT 100°F. NOTE: FOR TEMPERATURES ABOVE OR BELOW THOSE LISTED, CONSULT THE FACTORY.



DOUBLE REDUCTION



TRIPLE OR QUADRUPLE REDUCTION

SINGLE REDUCTION GEAR CASE		DOUBLE REDUCTION GEAR CASE		TRIPLE REDUCTION GEAR CASE		QUADRUPLE REDUCTION GEAR CASE	
ONE OIL RESERVOIR		ONE OIL RESERVOIR		TWO OIL RESERVOIRS (FILL EA.)		TWO OIL RESERVOIRS (FILL EA.)	
BASIC SIZE		BASIC SIZE		RESERVOIR		RESERVOIR	
				BASIC SIZE	A B	BASIC SIZE	A B
10	1 PINT	21	1 QT	312	5 QTS	413	10 QTS
11	1 PINT	22	1 QT	313	5 PINT	414	4 GALS
12	.5 PINT	23	2.5 QTS	314	.5 PINT	415	6.5 GALS
13	1 QT	24	5 QTS	323	1 PINT	416	13.5 GALS
14	1.5 QTS	25	8 QTS	324	1 PINT	424	4 GALS
15	2 QTS	26	13 QTS	325	1 PINT	425	6.5 GALS
16	3 QTS	27	27 QTS	326	1 PINT	426	13.5 GALS
17	5 QTS		10 QTS	334	1 QT	427	5 GALS
				335	1 QT	435	6.5 GALS
				336	1 QT	436	13.5 GALS
				346	1.5 QTS	437	5 GALS
				347	1.5 QTS	447	8 QTS
				357	2 QTS		6 GALS

THE BASIC GEAR CASE SIZE CAN BE FOUND IN THE LAST GROUP OF NUMBERS IN THE FRAME BLOCK ON THE NAMEPLATE.

THE QUANTITIES OF OIL SHOWN ARE APPROXIMATES ONLY. FILL AS DIRECTED

OIL FOR STERLING HELICAL GEAR REDUCERS

MANUFACTURER	FOR OPERATION AT -20°F TO +40°F*	FOR OPERATION AT +40°F TO +120°F**
CHEVRON OIL	NL GEAR GUARD COMPOUND 220	NL GEAR COMPOUND 680
EXXON PETROLEUM	SPARTAN EP220	SPARTAN EP680
MOBIL OIL COMPANY	MOBILGEAR 630	MOBILEGEAR 636
SHELL OIL CORPORATION	OMALA 71	OMALA 81
TEXACO OIL COMPANY	MEROPA 220	MEROPA 680
PHILLIPS PETROLEUM	ALL PURPOSE GEAR OIL SAE 90	ALL PURPOSE GEAR OIL SAE 140

* AGMA #5EP1040SUS AT 100°F

** AGMA #8EP3000SUS AT 100°F

Refer to Replacement List for Part Location

STATOR FRAME REPLACEMENT - 3/4 MOTOR CONSTRUCTION**Remove Stator Frame:**

1. Remove the side covers and loosen the belt tension as follows:
Spring Design Transmission - Pull belt to spread pulleys.
Lever Design Transmission - Loosen belt tension nut (call out # 71, page 16) until belt is slack.
2. The motor shaft and pulleys must be blocked up or supported, prior to the stator removal, to prevent the bearing at Location III from getting damaged.
3. Support the stator frame with a hoist or other suitable means.
4. Remove the outside fan cover and fan (if applicable).
5. Remove the bearing cap bolts (if applicable) at bearing Location I.
6. Remove the motor bracket from the frame.
7. Remove the inside fan (if applicable) by first removing the bearing at Location I.
8. Separate the stator frame from the transmission case or adapter and slide it over the rotor.

Replace Stator Frame:

1. Slide the stator frame over the rotor and mount it to the transmission case or adapter.
2. Re-assemble all other components in reverse order as outlined in the above section.
3. Remove the motor shaft and pulleys support and reset the belt tension as outlined in the belt replacement instructions.
4. Rotate the belt or pulleys by hand to be sure all parts rotate freely with no binding.
5. Replace the side cover(s).

C-FACE MOTOR REPLACEMENT**Remove C-Face Motor:**

1. Remove side covers.
2. Support the motor by a hoist or other suitable means.
3. Determine the type of coupling. The coupling is accessible through the openings on either side of the C-face motor adapter. Nylon and neoprene element couplings are blind assembly type and separate as the motor is removed. Steel gear couplings require removal of the front retaining ring in the steel sleeve. The retaining ring has a bent-out tab end to assist in its removal.
4. Loosen the hex-head screws holding the C-face motor to the adapter. 75 & 76 case screws are accessible from inside the transmission.
5. Slide the C-face motor and coupling parts from the drive.

Replace C-Face Motor:

1. Mount the coupling hub on the motor shaft, if it has been removed or replaced. Be sure to check the position of the hub so there is proper clearance in the coupling parts when the motor is mounted to the drive. Refer to coupling instruction sheet when furnished.
2. The steel gear coupling should be packed with suitable grease and partially assembled on the motor shaft. This includes the hub, geared sleeve, grease seal and the retaining ring.
3. Mount the C-face motor to the transmission and seat the C-face to the adapter.
4. Tighten the hex-head screws. Be sure the coupling parts engage properly as the C-face motor is mounted.
5. On steel gear couplings, mount the other grease seal and retaining ring in the geared sleeve.
5. Rotate the drive by hand to be sure all parts rotate freely with no binding.
6. Replace the side covers.

LUBE-FREE COMPONENTS REPLACEMENT

Refer to Replacement List for Part Location

INSPECTION:

Inspection of the pulley liners and keys and the teflon coated shafts is recommended every 5000 running hours or during belt replacement. The liners will require replacement if the variable pulley face exhibits run-out in excess of allowable values, shown in the table. Run-out is to be measured within 1/2 inch of the pulley O.D. The pulley keys will require replacement if the drive exhibits a momentary hang-up or increase in shifting force when moved throughout the complete range. Either or both the pulley liners and keys will require replacement if the drive exhibits a dull knocking noise originating from the vicinity of the variable pulleys. The shafts will require replacement or re-coating if the shafts, at the wear areas, have a mike diameter equal to or less than shown in the table. Re-coating is performed only at the factory.

Case Size	Allowable Pulley Face Runout (in.)		Min Shaft Dia. Mike Reading (in.)
	Motor Pulley	Driven Pulley	
71	.020	.020	.873
72	.020	.020	.998 (Motor)
			1.3098 (Driven)
73	.020	.020	1.436
74	.020	.020	1.6245
75	.020	.020	1.9977
76	.020	.020	1.9977

IMPORTANT: When new lube-free components are installed, be sure pulleys and shafts are wiped clean.

BELT REPLACEMENT:

Refer to page 26

MOTOR SHAFT LINERS AND KEYS REPLACEMENT - 3/4 MOTOR CONSTRUCTION:

Remove Liners and Keys:

1. Remove the bearing from the end of the motor shaft (Location III).
2. Remove the variable motor pulley from the motor shaft.
3. Remove the pulley liners from the variable motor pulley. **Note:** The liners are held in place by a positioning ring.
4. The pulley keys are held in position by the set screws in the fixed motor pulley. Remove the set screws (two per key) and carefully slide the fixed motor pulley over the motor shaft and keys.
5. Remove the keys from the motor shaft. The 75 & 76 case motor pulley keys are held in position by the variable motor pulley and can be removed after the variable motor pulley is removed.

Install Liners and Keys:

1. Install the new keys in the motor shaft.
2. Re-mount the fixed motor pulley on the motor shaft and install the set screws (two per key).
3. Install and align the new pulley liners in the variable motor pulley and slide the pulley on the motor shaft. **Note:** It may be necessary to re-mount the pulley 180° from the original position and/or re-mount one or both liner sections (end for end) for optimum pulley fit.
4. Re-mount the bearing on the motor shaft.

MOTOR SHAFT LINERS AND KEYS REPLACEMENT- C-FACE MOTOR CONSTRUCTION:

Remove Liners and Keys:

1. Remove the C-face motor from the transmission. See instruction for C-face motor removal on page 5.
2. Remove the coupling hub from the transmission stub shaft if the coupling hub will not pass through the C-face adapter.
3. Remove the stub shaft with the fixed and variable motor pulleys.
4. Remove the bearing from the end of the stub shaft (Location III).
5. Remove the variable motor pulley from the stub shaft.
6. Remove the pulley liners from the variable motor pulley.
7. The keys are held in position by set screws in the fixed motor pulley. Remove the set screws (two per key).
8. Carefully pry up the free ends of the keys and remove them from the stub shaft and fixed motor pulley with a pair of pliers.

Install Liners and Keys:

1. Align and seat the keys in the stub shaft and under the fixed motor pulley with a soft hammer.
2. Re-install the set screws to the fixed motor pulley (two per key).
3. Install and align the new pulley liners in the variable motor pulley.
4. Re-mount the variable motor pulley on the stub shaft. See note in step 2 (3/4 motor liners) for pulley fit.
5. Re-mount the bearing on the end of the stub shaft
6. Install the complete stub shaft assembly with pulleys in the drive and C-face motor adapter.
7. Replace coupling hub if removed.
8. Replace the C-face motor per instructions on page 5.

LUBE FREE COMPONENTS (Cont.)

DRIVEN SHAFT LINER AND KEYS - Z-FLOW ASSEMBLY:

Remove Liners & Keys:

- 1.Remove the bearing from the end of the driven shaft (Location IV).
- 2.Remove the variable driven pulley from the shaft. **Note:** On the 71 Transmissions, the spring, spring retainer and snap ring must first be removed from the driven shaft before removing the variable driven pulley.
- 3.Remove the pulley liners from the variable driven pulley.
- 4.The pulley keys are held in position by the set screws in the fixed driven pulley. Remove the set screws (two per key) and carefully slide the fixed driven pulley over the shaft and keys.
- 5.Remove the pulley keys.

Install Liners & Keys:

- 1.Install the new keys in the driven shaft.
- 2.Re-mount the fixed driven pulley on the shaft and install the set screws.
- 3.Install and align the new pulley liners in the variable driven pulley.
- 4.Re-mount the variable driven pulley on the driven shaft. See note in step 2 (3/4 motor liners) for pulley fit. **Note:** On the 71 Transmissions, re-mount the spring, spring retainer and snap ring on the driven shaft.
- 5.Re-mount the bearing on the end of the driven shaft.

DRIVEN SHAFT LINER AND KEYS - C-FLOW ASSEMBLY:

Remove Liners & Keys:

- 1.Remove the bearing from the end of the driven shaft (Location VI).
- 2.Loosen the set screws in the fixed driven pulley (two per key).
- 3.Remove the snap ring and fixed driven pulley from the driven shaft.
- 4.Remove the variable driven pulley from the driven shaft.
- 5.Remove the liners from the variable driven pulley and the keys from the driven shaft.

Install Liners & Keys:

- 1.Install the new keys in the driven shaft and liners in the variable driven pulley.
- 2.Re-mount the variable driven pulley on the driven shaft. See note in step 2 (3/4 motor liners) for pulley fit.
- 3.Re-mount the fixed driven pulley on the driven shaft and re-install the snap ring.
- 4.Re-install the set screws, two per key, except 70 Case. Re-install bearing.

After the new lube free components have been installed, replace the control levers, and follow the belt replacement instruction steps to install the belt, the bracket, and the side covers.

BELT ADJUSTMENT

Sterling has two basic types of Variable Speed Drives available. Standard construction for 71 through 74 cases is spring design. This provides a self-adjusting feature and eliminates the need for re-tensioning the belt after the initial break-in period.

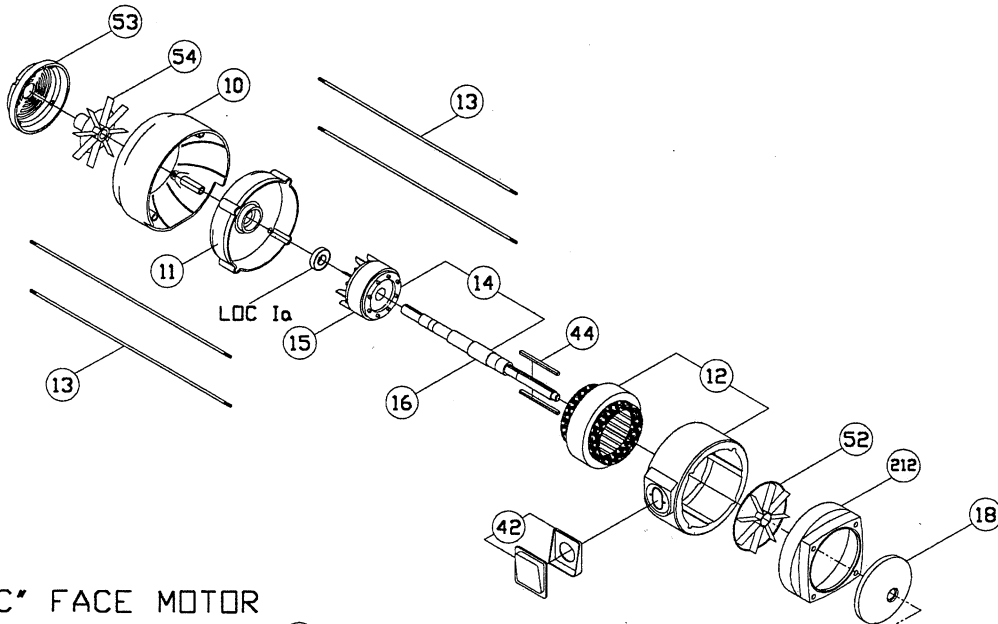
Construction of the 75 and 76 case is a lever design that mechanically ties together the adjustment positioning of both the motor variable and driven variable pulleys. Adjustment is required after a break-in period of approximately 50 hours to re-tension the belt. This adjustment should last for the life of the belt. The need for adjustment becomes obvious when the drive begins to chatter during starting due to intermittent slippage.

To adjust the belt tension of a lever designed unit, the drive should be stopped with the belt in a 1:1 ratio position (belt positioned at approximately half way down the pulley). Adjustment can be made turning the belt tension nut connecting both sets of levers. It is important that the pulleys be rotated by hand as the belt tension is increased to prevent the belt being wedged between the pulleys. Loosen the jam nut before making adjustment and lock it back in place after adjustments are complete. The proper belt tension deflection is 1/16 to 7/16 inches. Belt deflection is in inches when 15 lb. pull is exerted at the center of the belt.

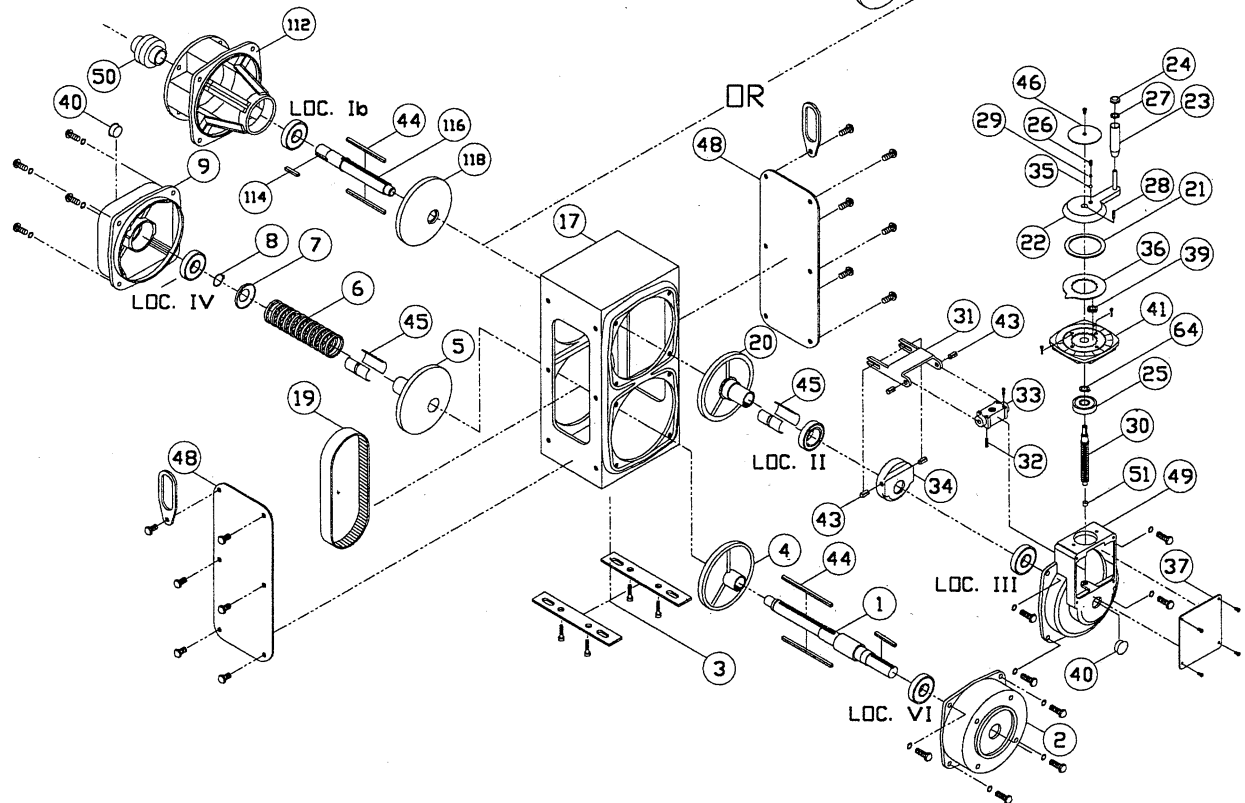
Frame (Case)	Belt No.	Belt Defl.*	Frame (Case)	Belt No.	Belt Defl.*
71	40800689	--	73	40800484	5/16-7/16
E71	40800344	--	74	40800735	--
72	40800271	5/16-3/8	75	40800719	5/16-7/16
E72	40800336	5/16-3/8	76	40800697	5/16-7/16

* Applies only to drives of lever design and deflection is in inches at center of belt with 15 lbs. pull.

71 CASE (Spring Design) MOTOR & TRANSMISSION



TO "C" FACE MOTOR



71 CASE (Spring Design)
**MOTOR & TRANSMISSION
PARTS LIST**

Call Out No.	Description
1	Driven Shaft
2	Bracket, Pulley End
3	Feet
4	Driven Pulley, Fixed
5	Driven Pulley, Variable
6	Spring
7	Spring Retainer
8	Snap Ring
9	Bracket, Short End
11	Motor Bracket, Short End
12	Wound Stator (cartridge with motor frame)
13	Thru Bolt (4 each)
14	Rotor Assembly (includes 15 & 16)
15	Rotor Core
16	Motor Shaft
17	Transmission Case
18	Motor Pulley, Fixed
19	Belt - Part # 40800689 - 71 Case Size Part # 40800344 - E71 Case Size
20	Motor Pulley, Variable (with bearing)
22A	Handwheel Assembly Kit - Part # 71-72HWAK
*	21 Felt Gasket
*	22 Handwheel with Post
*	23 Handle
*	24 Plug Button
*	26 Compression Spring
*	27 Snap Ring
*	28 Key
*	29 Rivet
*	35 Nylon Ball
*	36 Pointer Gear
*	39 Pinion
*	41 Indicator Housing
*	46 Caution Plate

Call Out No.	Description
30A	Control Shaft & Bearing Kit - Part # 71-CSBKIT
*	25 6203 Double Shield Ball Bearing
*	30 Control Shaft
33A	Travel Nut Assembly Kit - Part # 71-TNAKIT
*	31 Shifting Link
*	32 Stop Nut (2 each)
*	33 Travel Nut
*	43 Roll Pin (2 each for travel nut)
34	Bearing Housing
40	Shaft Hole Plug (2 each)
42	Terminal Box & Cover
43	Roll Pin (2 each for bearing housing)
45A	Liner & Key Kit - Part # LK71KIT
*	44 Key, Plastic (4 each)
*	45 Liner, Plastic (4 each)
48	Side Cover (2 each)
49A	Control Bracket Assembly Kit - Part # 71-CBAKIT
*	30A 71-CSBKIT
*	33A 71-TNAKIT
*	37 Inspection Cover
*	40 Shaft Hole Plug
*	49 Control Bracket
*	51 Bronze Bearing
50	Coupling (1 sleeve & 2 hubs)
52	Inside Fan (U-frame & ODP)
61	Fan Grill (U-frame)
62	Outside Fan
63	Fan Guard
112	C-face Motor Adapter
114	Key, Input Shaft
116	Input Shaft
118	Motor Pulley, Fixed (with bearing)
212	Integral Motor Adapter

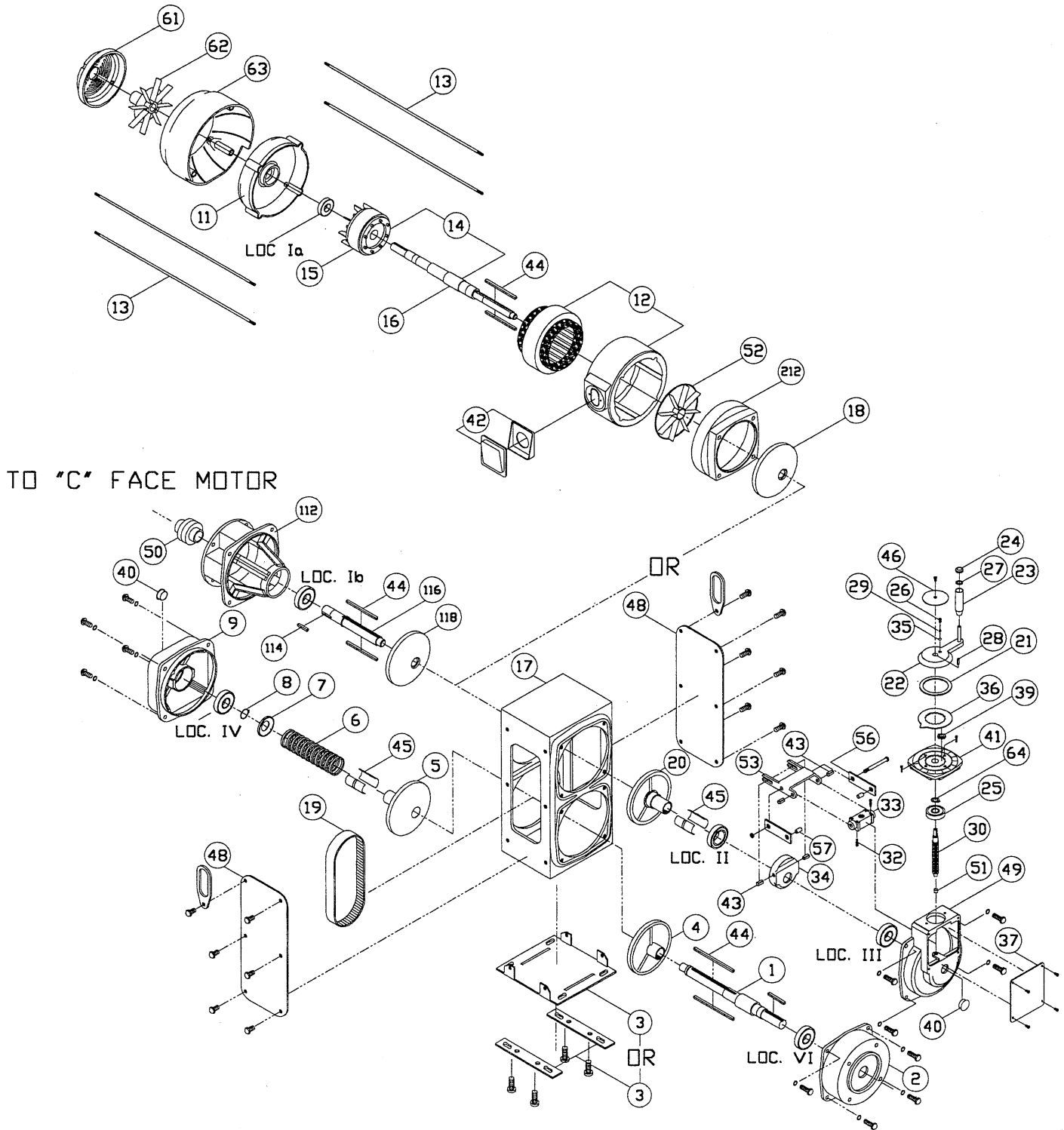
* Included in Assembly Kit

Location	Bearing	Location	Bearing
Ia	6205ZZ	III	6203ZZ
Ib	6207ZZ5C	IV	6203ZZ
II	6007LLC3/5C	VI	6205ZZ

Ia – Integral construction

Ib – C-face motor construction

**72 CASE (Spring Design)
MOTOR & TRANSMISSION
PARTS LIST**



**72 CASE (Spring Design)
MOTOR & TRANSMISSION
PARTS LIST**

Call Out No.	Description
1	Driven Shaft
2	Bracket, Pulley End
3	Feet
4	Driven Pulley, Fixed
5	Driven Pulley, Variable
6	Spring
7	Spring Retainer
8	Snap Ring
9	Bracket, Short End
11	Motor Bracket, Short End
12	Wound Stator (cartridge with motor frame)
13	Thru Bolt (4 each)
14	Rotor Assembly (includes 15 & 16)
15	Rotor Core
16	Motor Shaft
17	Transmission Case
18	Motor Pulley, Fixed
19	Belt - Part # 40800271 - 72 Case Size Part # 40800336 - E72 Case Size
20	Motor Pulley, Variable (with bearing)
22A	Handwheel Assembly Kit - Part # 71-72HWAK
*	21 Felt Gasket
*	22 Handwheel with Post
*	23 Handle
*	24 Plug Button
*	26 Compression Spring
*	27 Snap Ring
*	28 Key
*	29 Rivet
*	35 Nylon Ball
*	36 Pointer Gear
*	39 Pinion
*	41 Indicator Housing
*	46 Caution Plate

Call Out No.	Description
30A	Control Shaft & Bearing Kit - Part # 72-CSBKIT
*	25 6203 Double Shield Ball Bearing
*	30 Control Shaft
*	64 Snap Ring
33A	Travel Nut Assembly Kit - Part # 72-TNAKIT
*	32 Stop Nut (2 each)
*	33 Travel Nut
*	34 Bearing Housing
*	43 Roll Pin (4 each)
*	53 Shifting Link
*	56 Fulcrum Link (2 each)
40	Shaft Hole Plug (2 each)
42	Terminal Box & Cover
45A	Liner & Key Kit - Part # LK72KIT
*	44 Key, Plastic (4 each)
*	45 Liner, Plastic (4 each)
48	Side Cover (2 each)
49A	Control Bracket Assembly Kit - Part # 72-CBAKIT
*	30A 72-CSBKIT
*	33A 72-TNAKIT
*	37 Inspection Cover
*	40 Shaft Hole Plug
*	49 Control Bracket
*	51 Bronze Bearing
*	57 Dowel Pin (2 each)
50	Coupling (1 sleeve & 2 hubs)
52	Inside Fan (U-frame & ODP)
61	Fan Grill (U-frame)
62	Outside Fan
63	Fan Guard
112	C-face Motor Adapter
114	Key, Input Shaft
116	Input Shaft
118	Motor Pulley, Fixed (with bearing)
212	Integral Motor Adapter

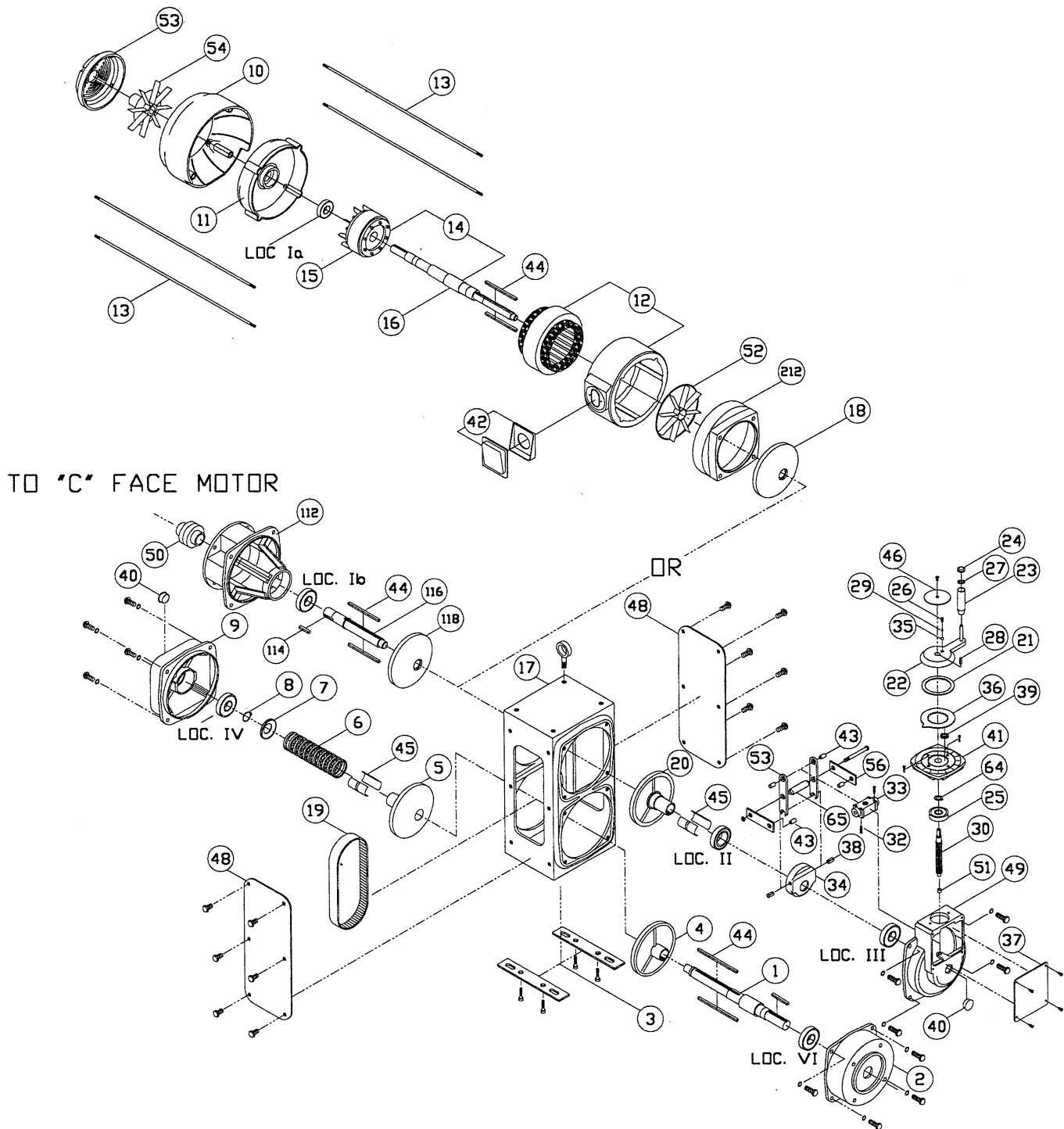
* Included in Assembly Kit

Location	Bearing	Location	Bearing
Ia (Fr. 184)	6205ZZ	II	6208LLC3/5C
Ia (Fr. 213)	6306ZZ	III	6304ZZ
Ia (Fr. 215)	6306ZZ	IV	6206ZZ
Ib	6208LL5C	VI	6306ZZ

Ia – Integral construction

Ib – C-face motor construction

**73 & 74 CASE (Spring Design)
MOTOR & TRANSMISSION
PARTS LIST**



**73 & 74 CASE (Spring Design)
MOTOR & TRANSMISSION
PARTS LIST**

Call Out No.	Description
1	Driven Shaft
2	Bracket, Pulley End
3	Feet
4	Driven Pulley, Fixed
5	Driven Pulley, Variable
6	Spring
7	Spring Retainer
8	Snap Ring
9	Bracket, Short End
11	Motor Bracket, Short End
12	Wound Stator (cartridge with motor frame)
13	Thru Bolt (4 each)
14	Rotor Assembly (includes 15 & 16)
15	Rotor Core
16	Motor Shaft
17	Transmission Case
18	Motor Pulley, Fixed
19	Belt - Part # 40800484 - 73 Case Size Part # 40800735 - 74 Case Size
20	Motor Pulley, Variable (with bearing)
22A	Handwheel Assembly Kit - Part # 73-74HWAK
*	21 Felt Gasket
*	22 Handwheel with Post
*	23 Handle
*	24 Plug Button
*	26 Compression Spring
*	27 Snap Ring
*	28 Key
*	29 Rivet
*	35 Nylon Ball
*	36 Pointer Gear
*	39 Pinion
*	41 Indicator Housing
*	46 Caution Plate

* Included in Assembly Kit

Call Out No.	Description
30A	Control Shaft & Bearing Kit - Part # 73-CSBKIT or 74-CSBKIT
*	25 6203 Double Shield Ball Bearing
*	30 Control Shaft
*	64 Snap Ring
33A	Travel Nut Assembly Kit - Part # 73-TNAKIT or 74-TNAKIT
*	32 Stop Nut (2 each)
*	33 Travel Nut
*	34 Bearing Housing
*	38 Roll Pin (2 each)
*	43 Roll Pin (4 each)
*	53 Control Link (2 each)
*	56 Fulcrum Link (2 each)
*	65 Spacer Link
40	Shaft Hole Plug (2 each)
42	Terminal Box & Cover
45A	Liner & Key Kit - Part # LK73KIT or LK74KIT
*	44 Key, Plastic (4 each)
*	45 Liner, Plastic (4 each)
48	Side Cover (2 each)
49A	Control Bracket Assembly Kit - Part # 73-CBAKIT or 74-CBAKIT
*	30A 73-CSBKIT or 74-CSBKIT
*	33A 73-TNAKIT or 74-TNAKIT
*	37 Inspection Cover
*	40 Shaft Hole Plug
*	43 Roll Pin (2 each)
*	49 Control Bracket
*	51 Bronze Bearing
50	Coupling (1 sleeve & 2 hubs)
52	Inside Fan (U-frame & ODP)
61	Fan Grill (U-frame)
62	Outside Fan
63	Fan Guard
112	C-face Motor Adapter
114	Key, Input Shaft
116	Input Shaft
118	Motor Pulley, Fixed (with bearing)
212	Integral Motor Adapter

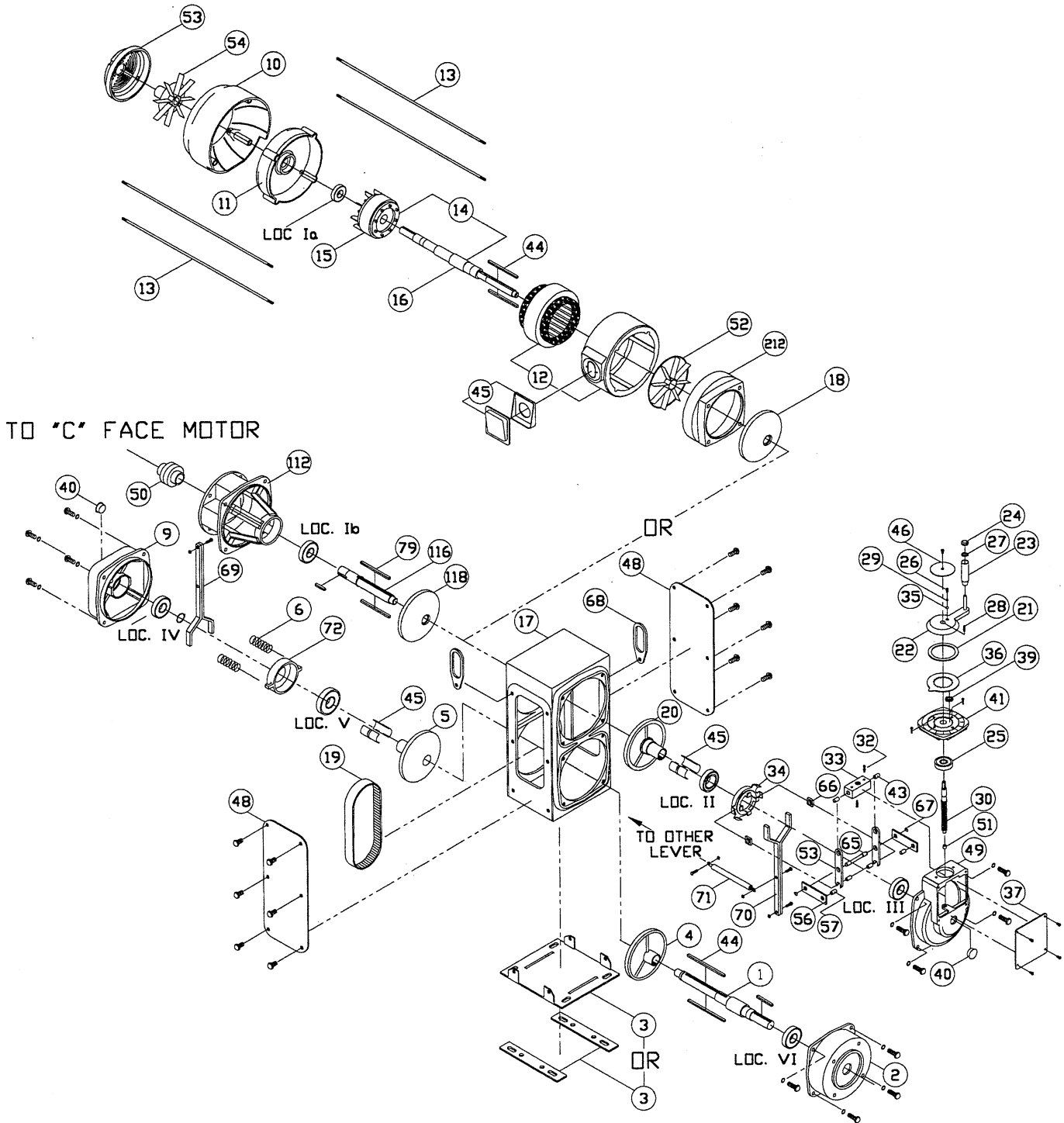
73 CASE

Location	Bearing
I	6208ZZ
Ib	6211LL5C
II	6211LLBC3/5C
III	6306ZZ
IV	6306ZZ
VI	6308ZZ

74 CASE

Location	Bearing
Ib	6212ZZ5C
II	6212LLC3/5C
III	6307ZZ
IV	6307ZZ
VI	6210ZZ

**72 CASE (Lever Design)
MOTOR & TRANSMISSION
PARTS LIST**



**72 CASE (Lever Design)
MOTOR & TRANSMISSION
PARTS LIST**

Call Out No.	Description
1	Driven Shaft
2	Bracket, Pulley End
3	Feet
4	Driven Pulley, Fixed
5	Driven Pulley, Variable (with bearing)
6	Spring (2 each)
9	Bracket, Short End
11	Motor Bracket, Short End
12	Wound Stator (cartridge with motor frame)
13	Thru Bolt (4 each)
14	Rotor Assembly (includes 15 & 16)
15	Rotor Core
16	Motor Shaft
17	Transmission Case
18	Motor Pulley, Fixed
19	Belt - Part # 40800271 - 72 Case Size Part # 40800336 - E72 Case Size
20	Motor Pulley, Variable (with bearing)
22A	Handwheel Assembly Kit - Part # 71-72HWAK
*	21 Felt Gasket
*	22 Handwheel with Post
*	23 Handle
*	24 Plug Button
*	26 Compression Spring
*	27 Snap Ring
*	28 Key
*	29 Rivet
*	35 Nylon Ball
*	36 Pointer Gear
*	39 Pinion
*	41 Indicator Housing
*	46 Caution Plate
30A	Control Shaft & Bearing Kit - Part # 72-CSBKIT
*	25 6203 Double Shield Ball Bearing
*	30 Control Shaft
*	64 Snap Ring

* Included in Assembly Kit

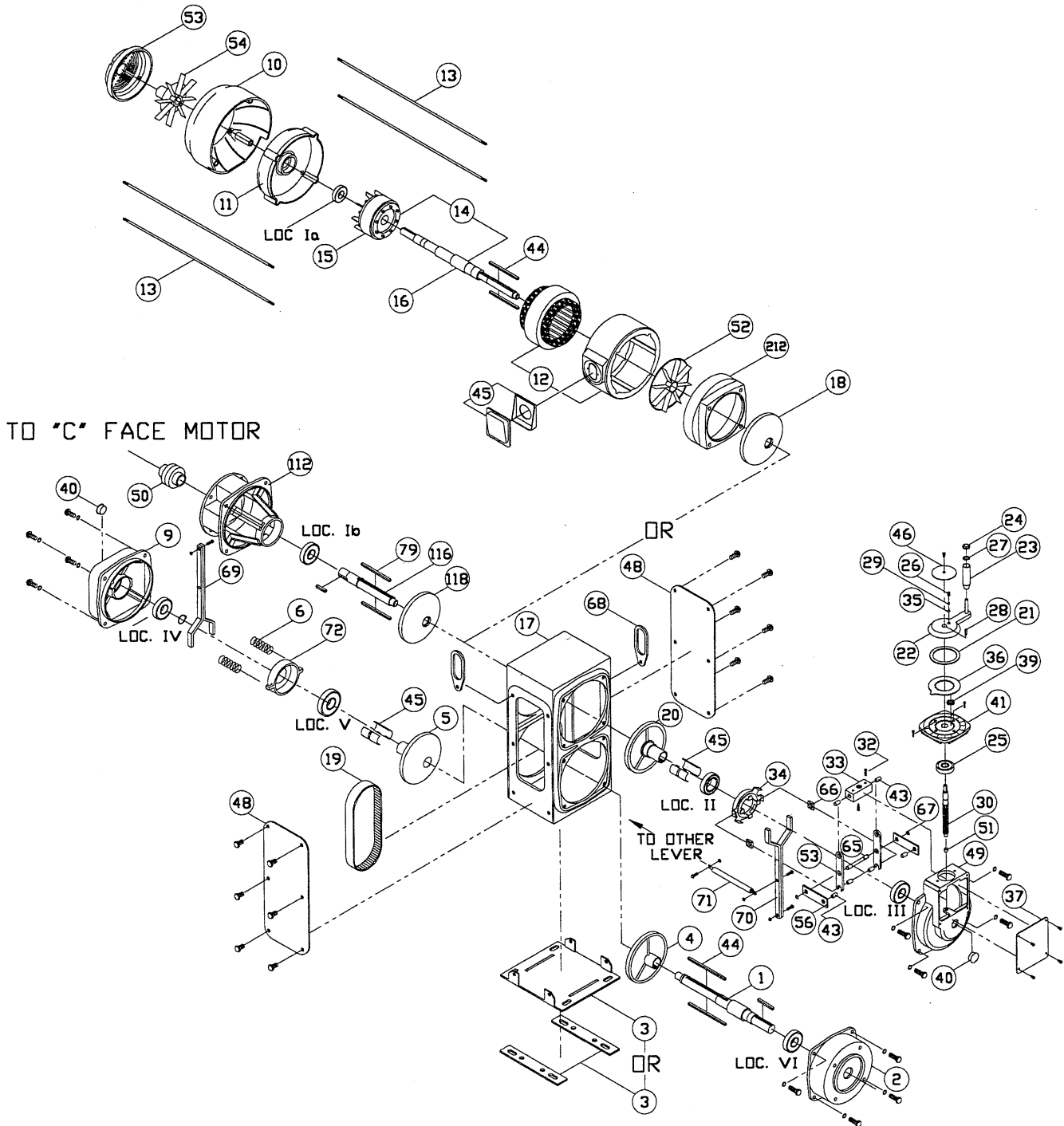
Call Out No.	Description
33A	Travel Nut Assembly Kit - Part # 72-TNLKIT
*	32 Stop Nut (2 each)
*	33 Travel Nut
*	43 Roll Pin (2 each)
*	53 Control Link (2 each)
*	56 Fulcrum Link (2 each)
*	65 Spacer Link
*	66 Pivot Block (2 each)
*	67 Cotter Pin (4 each)
34	Bearing Housing
40	Shaft Hole Plug (2 each)
42	Terminal Box & Cover
45A	Liner & Key Kit - Part # LK72KIT
*	44 Key, Plastic (4 each)
*	45 Liner, Plastic (4 each)
48	Side Cover (2 each)
49A	Control Bracket Assembly Kit - Part # 72-CBAKIT
*	30A 72-CSBKIT
*	33A 72-TNLKIT
*	37 Inspection Cover
*	40 Shaft Hole Plug
*	49 Control Bracket
*	51 Bronze Bearing
*	57 Dowel Pin (2 each)
50	Coupling (1 sleeve & 2 hubs)
52	Inside Fan (U-frame & ODP)
61	Fan Grill (U-frame)
62	Outside Fan
63	Fan Guard
69	Control Lever, Driven (2 each with sph. Brg.)
70	Control Lever, Motor (2 each with sph. Brg.)
71	Belt Tension Nut (with LH & RH thd. sph. Brg.)
72	Bearing Housing, Driven
74	Roll Pin (2 each)
112	C-face Motor Adapter
114	Key, Input Shaft
116	Input Shaft
118	Motor Pulley, Fixed (with bearing)
212	Integral Motor Adapter

Location	Bearing	Location	Bearing
Ia (Fr. 184)	6205ZZ	II	6208LLC3/5C
Ia (Fr. 213)	6306ZZ	III	6304ZZ
Ia (Fr. 215)	6306ZZ	IV	6206ZZ
Ib	6208LL5C	V	6210LL5C
		VI	6306ZZ

Ia – Integral construction

Ib – C-face motor construction

**73 & 74 CASE (Lever Design)
MOTOR & TRANSMISSION
PARTS LIST**



**73 & 74 CASE (Lever Design)
MOTOR & TRANSMISSION
PARTS LIST**

Call Out No.	Description
1	Driven Shaft
2	Bracket, Pulley End
3	Feet
4	Driven Pulley, Fixed
5	Driven Pulley, Variable (with bearing)
6	Spring (2 each)
9	Bracket, Short End
11	Motor Bracket, Short End
12	Wound Stator (cartridge with motor frame)
13	Thru Bolt (4 each)
14	Rotor Assembly (includes 15 & 16)
15	Rotor Core
16	Motor Shaft
17	Transmission Case
18	Motor Pulley, Fixed
19	Belt - Part # 40800484 - 73 Case Size Part # 40800735 - 74 Case Size
20	Motor Pulley, Variable (with bearing)
22A	Handwheel Assembly Kit - Part # 73-74HWAK
*	21 Felt Gasket
*	22 Handwheel with Post
*	23 Handle
*	24 Plug Button
*	26 Compression Spring
*	27 Snap Ring
*	28 Key
*	29 Rivet
*	35 Nylon Ball
*	36 Pointer Gear
*	39 Pinion
*	41 Indicator Housing
*	46 Caution Plate
30A	Control Shaft & Bearing Kit - Part # 73-CSBKIT or 74-CSBKIT
*	25 6203 Double Shield Ball Bearing
*	30 Control Shaft
*	64 Snap Ring

* Included in Assembly Kit

73 CASE

Location	Bearing
I	6208ZZ
Ib	6211LL5C
II	6211LLBC3/5C
III	6306ZZ
IV	6306ZZ
V	6211LLBC3/5C
VI	6308ZZ

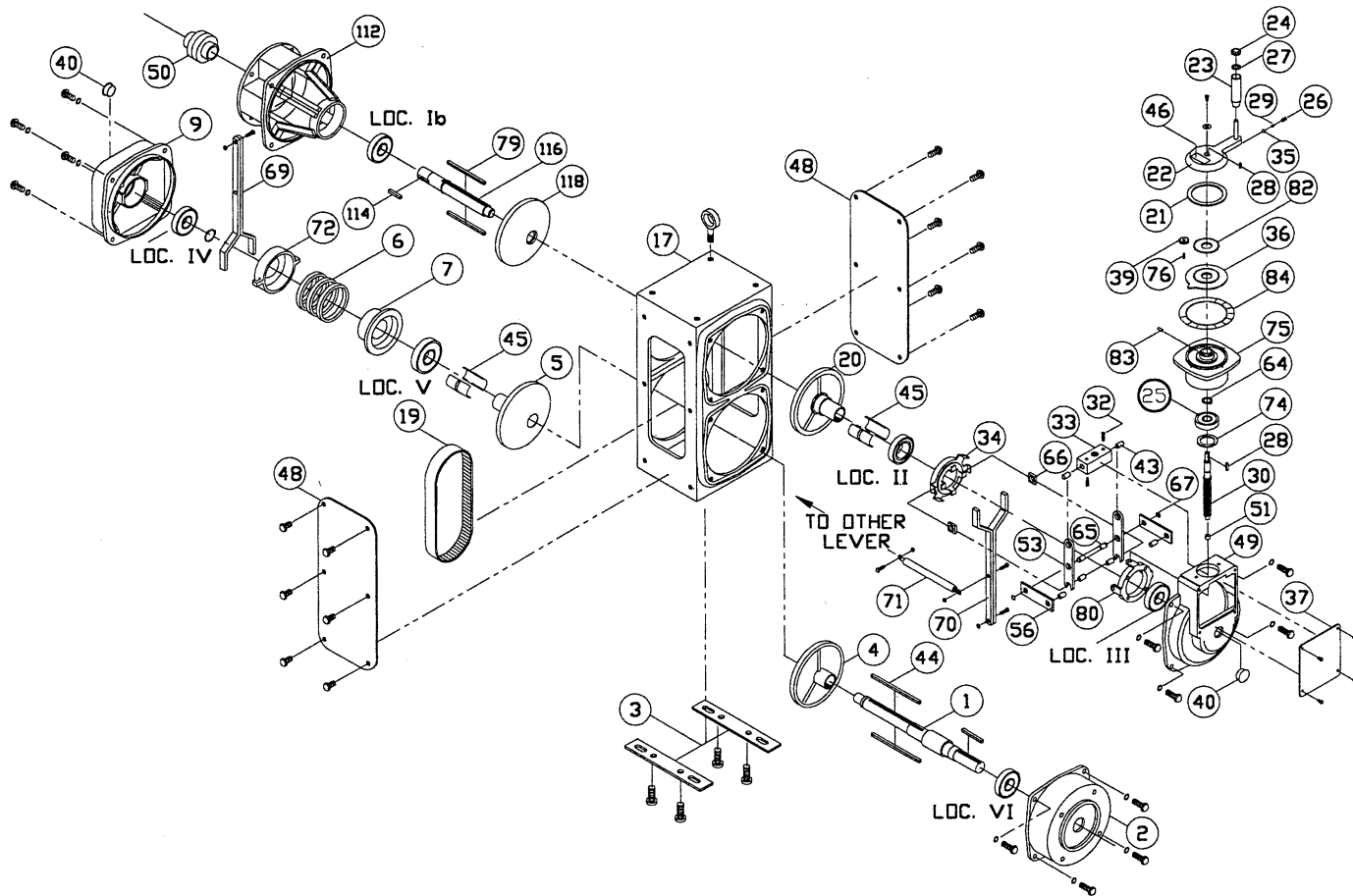
Call Out No.	Description
33A	Travel Nut Assembly Kit - Part # 73-TNLKIT or 74-TNLKIT
*	32 Stop Nut (2 each)
*	33 Travel Nut
*	43 Roll Pin (2 each)
*	53 Control Link (2 each)
*	56 Fulcrum Link (2 each)
*	65 Spacer Link
*	66 Pivot Block (2 each)
*	67 Cotter Pin (4 each)
34	Bearing Housing
40	Shaft Hole Plug (2 each)
42	Terminal Box & Cover
45A	Liner & Key Kit - Part # LK73KIT or LK74KIT
*	44 Key, Plastic (4 each)
*	45 Liner, Plastic (4 each)
48	Side Cover (2 each)
49A	Control Bracket Assembly Kit - Part # 73-CBAKIT or 74-CBAKIT
*	30A 73-CSBKIT or 74-CBAKIT
*	33A 73-TNLKIT or 74-TNLKIT
*	37 Inspection Cover
*	40 Shaft Hole Plug
*	43 Roll Pin (2 each)
*	49 Control Bracket
*	51 Bronze Bearing
50	Coupling (1 sleeve & 2 hubs)
52	Inside Fan (U-frame & ODP)
61	Fan Grill (U-frame)
62	Outside Fan
63	Fan Guard
69	Control Lever, Driven (2 each with sph. Brg.)
70	Control Lever, Motor (2 each with sph. Brg.)
71	Belt Tension Nut (with LH & RH thd. sph. Brg.)
72	Bearing Housing, Driven
74	Roll Pin (2 each)
112	C-face Motor Adapter
114	Key, Input Shaft
116	Input Shaft
118	Motor Pulley, Fixed (with bearing)
212	Integral Motor Adapter

74 CASE

Location	Bearing
Ib	6212ZZ5C
II	6212LLC3/5C
III	6307ZZ
IV	6307ZZ
V	6212LLC3/5C
VI	6210ZZ

PARTS LIST

TO "C" FACE MOTOR



**75 & 76 CASE (Lever Design)
MOTOR & TRANSMISSION
PARTS LIST**

Call Out No.	Description
1	Driven Shaft
2	Bracket, Pulley End
3	Feet
4	Driven Pulley, Fixed
5	Driven Pulley, Variable (with bearing)
6	Spring
7	Spring Retainer
9	Bracket, Short End
17	Transmission Case
19	Belt - Part # 40800719 - 75 Case Size Part # 40800697 - 76 Case Size
20	Motor Pulley, Variable (with bearing)
22A	Handwheel Assembly Kit - Part # 75-76HWAK
*	21 Felt Gasket
*	22 Handwheel with post
*	23 Handle
*	24 Plug Button
*	26 Compression Spring
*	27 Snap Ring
*	28 Key
*	29 Rivet
*	35 Nylon Ball
*	36 Pointer Gear
*	39 Pinion
*	46 Caution Plate
*	74 Snap Ring
*	75 Control Housing
*	76 Pinion Spindle
*	80 Bearing Housing
*	82 Stationary Gear
*	83 Pin, Stationary Gear
*	84 Dial Indicator
25	6204 Double Shield Ball Bearing

Call Out No.	Description
30	Control Shaft
32	Stop Nut (2 each)
33	Travel Nut
34	Bearing Housing
37	Inspection Cover
40	Shaft Hole Plug (3 each)
43	Roll Pin (2 each)
45A	Liner & Key Kit - Part # LKC75KT or LKC76KT
*	44 Key, Plastic (4 each)
*	45 Liner, Plastic (4 each)
48	Side Cover (2 each)
49	Control Bracket
50	Coupling (1 sleeve & 2 hubs)
51	Bronze Bearing
53	Control Link (2 each)
56	Fulcrum Link (2 each)
64	Snap Ring
65	Spacer Link
66	Pivot Block (2 each)
67	Snap Ring (6 each)
69	Control Lever, Driven (2 each with sph. Brg.)
70	Control Lever, Motor (2 each with sph. Brg.)
71	Belt Tension Nut (with LH & RH thd. sph. Brg.)
72	Bearing Housing, Driven
73	Bearing Cap
77	Bearing Cap
78	Key, Woodruff
112	C-face Motor Adapter
113	Bearing Clamp
114	Key, Input Shaft
116	Input Shaft
118	Motor Pulley, Fixed (with bearing)

* Included in Assembly Kit

75 CASE

Location	Bearing
Ib	6216LL
II	6215LLC3/5C
III	6309LL
IV	6309LL
V	6215LLC3/5C
VI	6312LL

76 CASE

Location	Bearing
Ib	6216LL
II	6215LLC3/5C
III	6310LLC3
IV	6310LLC3
V	6215LLC3/5C
VI	6314LL

CLASSIC HELICAL REDUCER PARTS LIST



CLASS/C HELICAL REDUCER PARTS LIST

SINGLE REDUCTION

Call Out No.	Description
1	Gear Case
2	Gear Case Cover
4G	Gear
4P	Pinion
6	Output Shaft
8	Adapter

DOUBLE REDUCTION

Call Out No.	Description
1	Gear Case
2	Gear Case Cover
3	Counter Shaft
4G	First Gear
4P	First Pinion
5G	Second Gear
5P	Second Pinion
6	Output Shaft
8	Adapter

TRIPLE REDUCTION

Call Out No.	Description
1	First Gear Case
1a	Second Gear Case
2	First Gear Case Cover
2a	Second Gear Case Cover
3	Counter Shaft
4G	First Gear
4P	First Pinion
4aG	Second Gear
4aP	Second Pinion
5aG	Third Gear
5aP	Third Pinion
6	Output Shaft
7	Intermediate Shaft
8	Adapter
9	Intermediate Adapter

BEARINGS

Frame	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
11	6205LL			6203	6204				
111	6203LL			6302	6206				
121or 21	6203LL	6302	6302	6302	6306				
12	6204LL			6203	6206				
13	6205LL			6206	6207				
14	6206LL			6206	6208				
15	6306LL			6207	6211				
16	6309LL			6208	6213				
22	6204LL	6202	6204	6304	5207				
23	6205LL	6203	6204	6306	5209				
24	6206LL	6204	6206	6307	5211				
25	6306LL	6206	6208	6308	5212				
26	6309LL	6207	6308	6310	5215				
313	6203LL	6203	6204	6306	5209	6302	6205LL		
314	6203LL	6204	6206	6307	5211	6302	6206LL		
323	6204LL	6203	6204	6306	5209	6203	6205LL		
324	6204LL	6204	6206	6307	5211	6203	6206LL		
325	6204LL	6206	6208	6308	5212	6203	6306LL		
326	6204LL	6207	6308	6310	5215	6203	6309LL		
334	6205LL	6204	6206	6307	5211	6206	6206LL		
335	6205LL	6206	6208	6308	5212	6206	6306LL		
413	6203LL	6204	6206	6306	5209	6302	6205LL	6302	6302
414	6203LL	6204	6206	6307	5211	6302	6206LL	6302	6302
415	6203LL	6206	6208	6308	5212	6302	6306LL	6302	6302
416	6203LL	6207	6308	6310	5215	6302	6309LL	6302	6302
424	6204LL	6204	6206	6307	5211	6304	6206LL	6203	6204
425	6204LL	6206	6208	6308	5212	6304	6306LL	6203	6204
426	6204LL	6207	6308	6310	5215	6304	6309LL	6203	6204
435	6205LL	6206	6208	6308	5212	6306	6306LL	6203	6204
436	6205LL	6207	6308	6310	5215	6306	6309LL	6203	6204

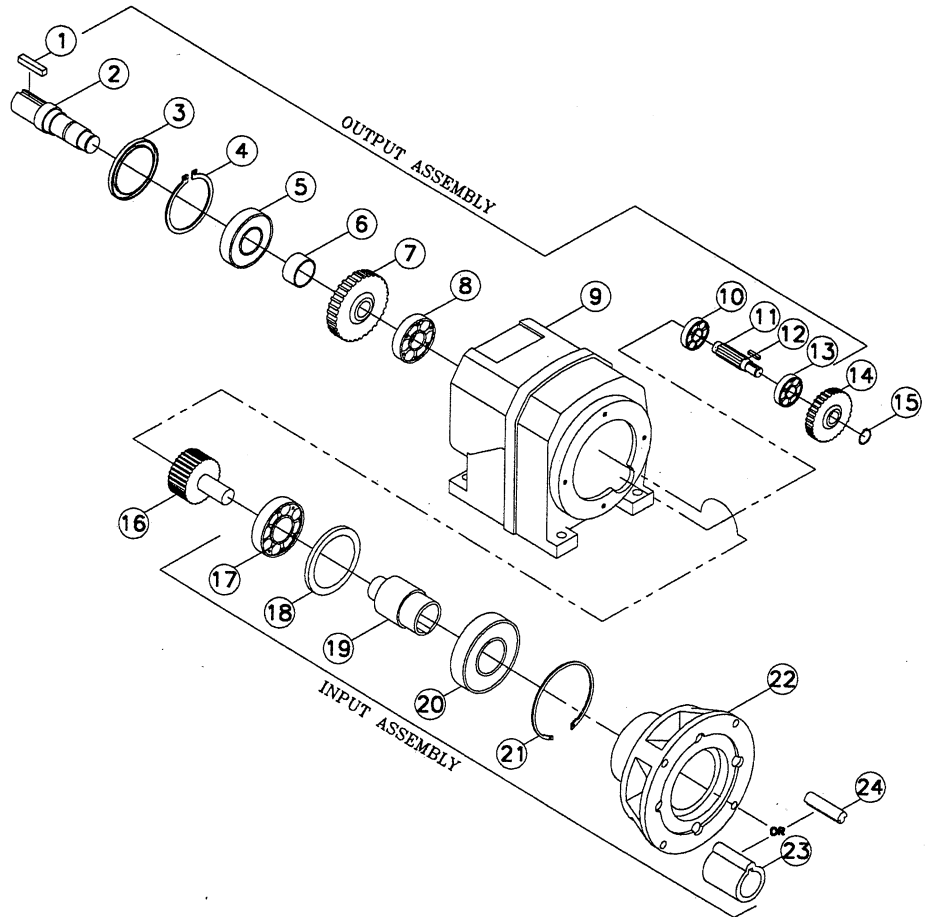
NATIONAL SEALS

Frame	A	B	C	D
11	450009	450032		
111	450009	450184		
121or 21	450009	450160		
12	450027	450160		
13	450208	450169		
14	450948	450262		
15	450948	450312		
16	450352	455655		
22	450027	450169		
23	450208	450291		
24	450948	450314		
25	450948	455321		
26	450352	455153		
313	450208	450291	450009	450136
314	450948	450314	450009	450136
323	450208	450291	450027	450169
324	450948	450314	450027	450169
325	450948	455321	450027	450169
326	450352	455153	450027	450312
334	450948	450314	450208	450312
335	450948	455321	450208	450312
413	450208	450291	450009	450136
414	450948	450314	450009	450136
415	450948	455321	450009	450136
416	450352	455153	450009	450303
424	450948	450314	450027	450067
425	450948	455321	450027	450067
426	450352	455153	450027	450312
435	450948	455321	450208	450291
436	450352	455153	450208	450312

2000HG HELICAL REDUCER PARTS LIST

PARTS LIST

OUTPUT ASSEMBLY	
ITEM	DESCRIPTION
1	KEY
2	OUTPUT SHAFT
3	OUTPUT SEAL
4	SNAP RING
5	BEARING
6	SPACER
7	FINAL GEAR
8	BEARING
9	GEAR HOUSING
10	BEARING
11	FINAL PINION
12	KEY
13	BEARING
PRIMARY GEAR	
ITEM	DESCRIPTION
14	PRIMARY GEAR
15	SNAP RING
16	PRIMARY PINION
INPUT ASSEMBLY	
ITEM	DESCRIPTION
17	BEARING
18	INPUT SEAL
19	INPUT SHAFT
20	BEARING
21	SNAP RING
22	INPUT HOUSING
23	PLASTIC MUFF
24	PLASTIC MUFF KEY



OUTPUT HOUSING KIT

TRIPLE KIT

Unit	Bearing		Dimensions (mm)	Seal
	Input End	Output End		
H03/04	6005C3	6204ZC3	20 x 32 x 7	CR7918
H0602	6205ZC3	6206C3	24 x 35 x 7	CR9500
H0603	6005C3	6204ZC3	20 x 32 x 7	CR7918
H0702	6206Z	6207C3	30 x 40 x 7	CR11600
H0703	6205ZC3	6206C3	24 x 35 x 7	CR9500

Unit	Motor Frame	Bearing		Dimensions (mm)	Seal
		Input End	Output End		
H03/04	56C-180TC	6006C3	6008ZZC3	45 x 60 x 8	CR17752
H06	56C-140TC	6006C3	6008ZZC3	45 x 60 x 8	CR17752
	180TC-210TC	6208C3	6012ZZ	95 x 120 x 12	CR37041
H07	56C-140TC	6006C3	6008ZZC3	45 x 60 x 8	CR17752
	180TC-250TC	6208C3	6012ZZ	68 x 90 x 10	CR26653

OUTPUT HOUSING KIT

TRIPLE KIT

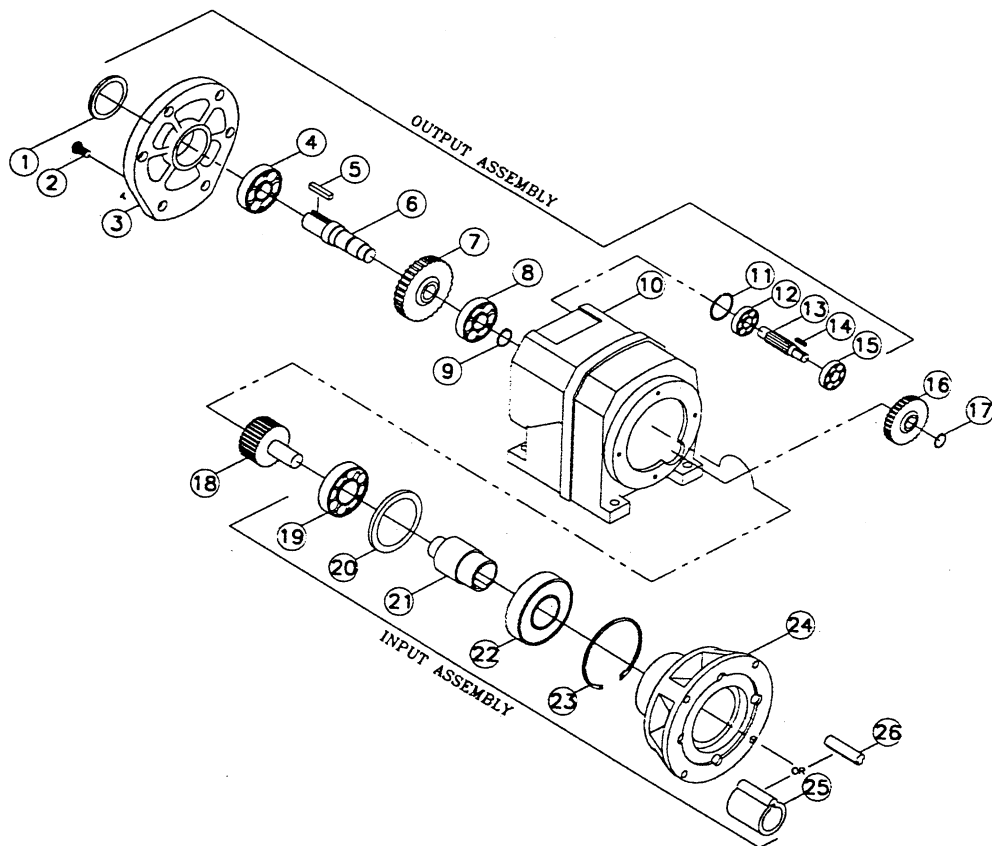
Unit	Pinion Shaft (qty. 2)	Bearing		Dimensions (mm)	Seal
		Input End	Output End		
H03	6201C3	6202C3	6203ZC3	23 x 40 x 6	CR8551
H04	6202C3	6204C3	6205ZC3	30 x 52 x 7	CR11638
H06	6204C3	6206C3	6207ZC3	42 x 72 x 8	CR16558
H07	6305C3	6207C3	6209Z	55 x 85 x 8	CR21661

Unit	Bearing	
	Input End	Output End
H03	6201C3	6302C3
H04	6201C3	6302C3
H06	6203C3	6204C3
H07	6204C3	6305C3

2000HG HELICAL REDUCER PARTS LIST

PARTS LIST

OUTPUT ASSEMBLY	
ITEM	DESCRIPTION
1	OUTPUT SEAL
2	BOLT
3	OUTPUT BRACKET
4	BEARING
5	KEY
6	OUTPUT SHAFT
7	FINAL GEAR
8	BEARING
9	SNAP RING
10	GEAR HOUSING
11	SNAP RING
12	BEARING
13	FINAL PINION
14	KEY
15	BEARING
PRIMARY GEAR	
ITEM	DESCRIPTION
16	PRIMARY GEAR
17	SNAP RING
18	PRIMARY PINION
INPUT ASSEMBLY	
ITEM	DESCRIPTION
19	BEARING
20	INPUT SEAL
21	INPUT SHAFT
22	BEARING
23	SNAP RING
24	INPUT HOUSING
25	PLASTIC MUFF
26	PLASTIC MUFF KEY



SHAFT INPUT HOUSING KIT

Unit	Bearing		Dimensions (mm)	Seal
	Input End	Output End		
H0802	6207ZC3	6208C3	35 x 50 x 7	CR13933
H0803	6206Z	6207C3	30 x 40 x 7	CR11600
H0902	6209Z	6211C3	45 x 60 x 8	CR17740
H0903	6207ZC3	6208C3	35 x 50 x 7	CR13933
H1002	6211Z	6311C3	50 x 65 x 8	CR19600
H1003	6209Z	6211C3	45 x 60 x 8	CR17740

MOTOR INPUT HOUSING KIT

Unit	Motor Frame	Bearing		Dimensions (mm)	Seal
		Input End	Output End		
H08	56C-250TC	6208C3	6012ZZ	68 x 90 x 10	CR26653
H0902	180TC-210TC	6210C3	6012ZZ	78 x 100 x 10	CR30725
	250TC-320TC	6311C3	6017ZZ	85 x 130 x 12	CR33585
H0903	56C-180TC	6208C3	6012ZZ	68 x 90 x 10	CR26653
	180TC-210TC	NJ210ECPC3	6012ZZ	78 x 100 x 10	CR30725
H10	250TC-320TC	6311C3	6017ZZ	85 x 130 x 12	CR33585

OUTPUT HOUSING KIT

Unit	Pinion Shaft (qty. 2)	Bearing		Dimensions (mm)	Seal
		Input End	Output End		
H08	NJ206CN	6211C3	6311ZC3	55 x 70 x 8	CR21612
H09	NJ207E	6213C3	6313Z	63 x 85 x 10	CR24758
H10	NJ2208ECP	6217C3	6316Z	78 x 100 x 10	CR30725

TRIPLE KIT

Unit	Bearing	
	Input End	Output End
H08	6206C3	6206C3
H09	6207C3	6207C3
H10	6208C3	6208C3

2000HG HELICAL REDUCER LUBRICATION

LUBRICANT AND QUANTITY

Sizes H030 and H040 will be, if supplied assembled, filled with a quantity of EP mineral oil (unless otherwise specified). However if, as requested, the unit is supplied without lubricant then the oil quantity required is obtained from Table 1. Recommended lubricants are listed in Table 2. See below for ambient temperature limitations.

MAINTENANCE AND TEMPERATURE LIMITATIONS

Sizes H030 and H040 require an oil change after 15,000 hours of operations. Other sizes require an oil change after 10,000 hours of operation. (Refer to maintenance manual.)

The standard lubricant is suitable for operation in ambient temperatures of 32°F (0°C) to 104°F (40°C), outside of this consult Table 2 or Sterling Electric.

TABLE 1 LUBRICANT QUANTITY (Gallons)

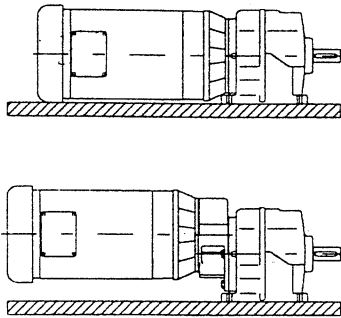
Unit Size	Mounting Position (See Appendix 2)								
	1	2	3	4	5	6	7	8	9
H0302	0.15	0.150	0.210	0.210	0.210	0.260	0.16	0.210	0.260
H0303	0.21	0.210	0.260	0.260	0.440	2.200	0.21	0.440	0.390
H0402	0.15	0.150	0.290	0.290	0.360	4.200	0.16	0.360	0.420
H0403	0.23	0.230	0.340	0.340	0.550	0.550	0.23	0.600	0.550
H0602	0.31	0.310	0.570	0.570	0.750	0.830	0.31	0.750	0.830
H0603	0.47	0.470	0.680	0.680	1.200	1.200	0.47	1.200	1.200
H0702	0.65	0.650	1.200	1.200	1.600	1.800	0.65	1.600	1.800
H0703	0.75	0.960	1.500	1.500	2.300	2.300	0.75	2.600	2.300
H0802	1.17	2.340	2.340	1.300	2.600	2.600	1.04	2.340	2.340
H0803	1.17	2.340	2.340	1.300	2.600	2.860	1.04	2.340	2.600
H0902	1.82	3.640	3.640	2.600	3.640	4.940	1.56	4.160	4.680
H0903	1.82	3.640	3.640	2.860	3.640	5.200	1.56	4.160	5.460
H01002	2.86	5.720	5.720	4.940	8.320	6.760	2.08	5.720	7.280
H01003	2.86	5.980	5.980	5.200	8.320	7.020	2.08	5.720	7.540
H01302	4.42	8.060	8.060	7.280	12.22	9.880	3.64	11.70	11.18
H01303	4.42	8.580	8.580	7.800	12.22	10.40	3.64	11.70	11.44
H01402	6.24	12.74	12.74	10.66	18.72	16.90	5.20	16.90	16.90
H01403	6.24	13.00	13.00	11.18	18.72	17.42	5.20	16.90	17.42

TABLE 2 RECOMMENDED LUBRICANTS

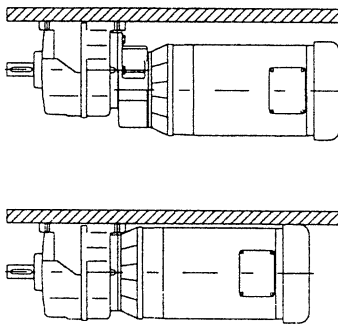
Lubricant Supplier	Lubricant Range Name	ISO Viscosity / AGMA No.		
<u>MINERAL OILS</u>		220 / 5EP	320 / 6EP	460 / 7EP
		Ambient Temperature Range °F		
		23 to 77°F (-5 to 25°C)	32 to 104°F (0 to 40°C)	50 to 122°F (10 to 50°C)
CHEVRON OIL CO.	CHEVRON GEAR COMPOUNDS EP	220	320	460
EXXON PETROLEUM CO.	SPARTAN EP	220	320	460
MOBIL OIL CO. LTD.	MOBIL GEAR 600 SERIES	630	632	634
SHELL LTD.	OMALA	220	320	460
TRIBOL (ICI) LTD.	MOLUB ALLOY GEAR OIL	90	690	140
	TRIBOL 1100	220	320	460
<u>SYNTHETIC OILS</u>		ISO Viscosity / AGMA No.		
		220 / 55	320 / 65	460 / 75
		Ambient Temperature Range °F		
		14 to 88°F (-10 to 30°C)	32 to 113°F (0 to 45°C)	50 to 122°F (10 to 50°C)
CHEVRON OIL CO.	SYNTHETIC DBH	220	320	460
EXXON PETROLEUM CO.	SPARTAN SEP	220	320	460
MOBIL OIL CO. LTD.	MOBIL GEAR SHC	220	320	460
SHELL LTD.	HYPERIA S	220	-	460
TRIBOL (ICI) LTD.	TRIBOL 1510	220	320	460

2000HG HELICAL REDUCER ASSEMBLY POSITIONS

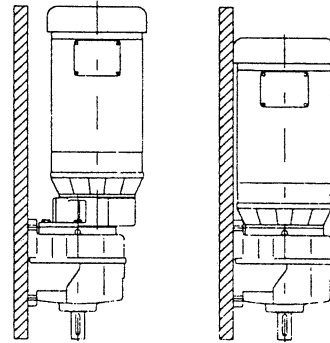
MOUNTING 1 3-F-1



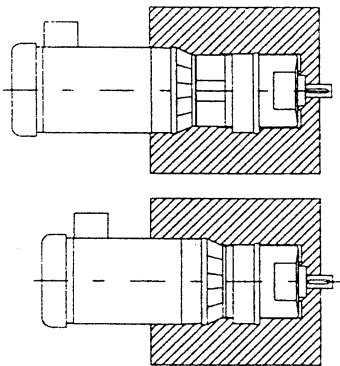
MOUNTING 4 3-C-1



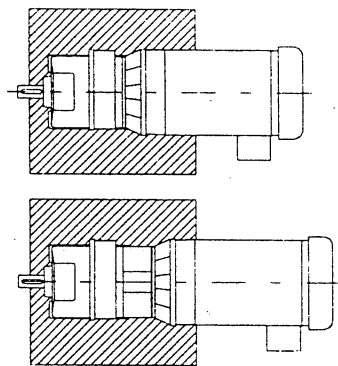
MOUNTING 5 3D-W-1



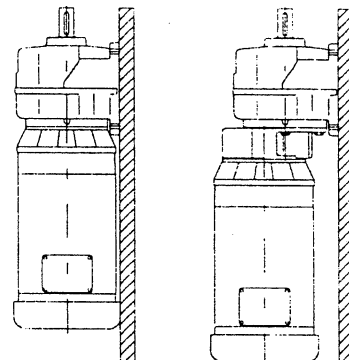
MOUNTING 3 3-RW-2



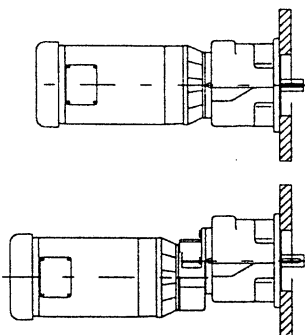
MOUNTING 2 3-LW-2



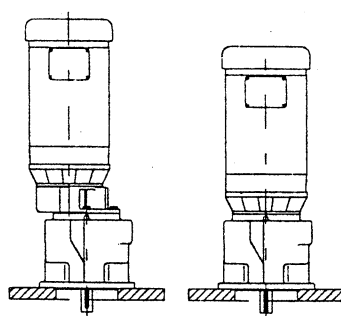
MOUNTING 6 3U-W-1



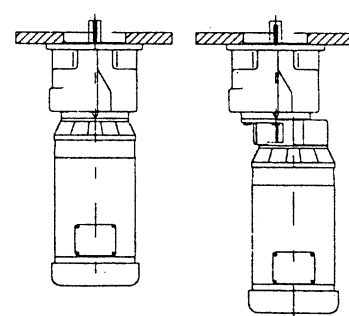
MOUNTING 7 3-FW-1



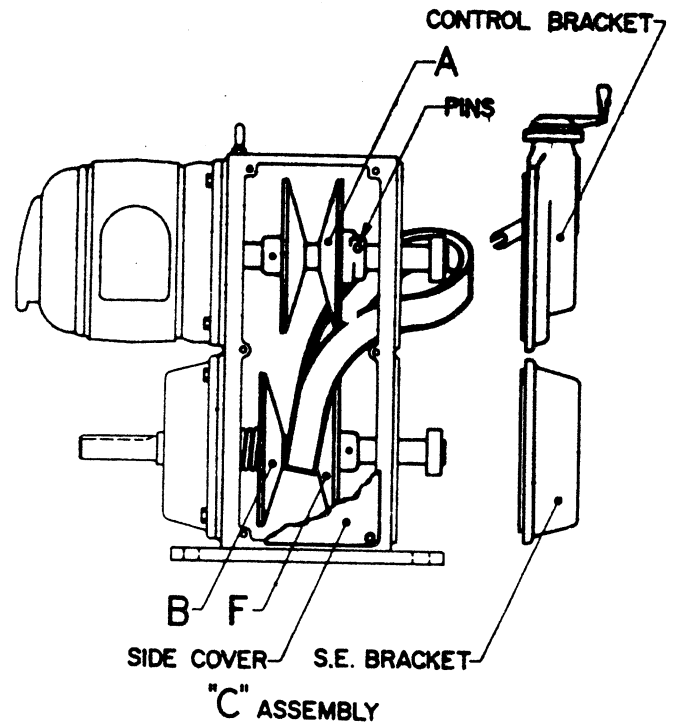
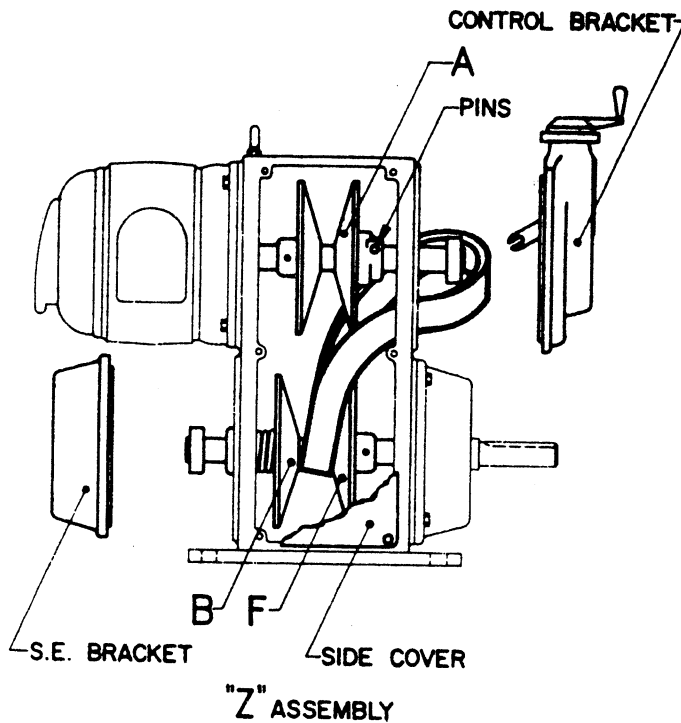
MOUNTING 8 3-FD-1



MOUNTING 9 3-FU-1



BELT REPLACEMENT 71 THROUGH 74 CASE



BELT REMOVAL

1. Turn unit off, remove side cover(s) and pull belt to separate pulleys.
2. Remove bracket with control wheel (control bracket) and bracket opposite drive output shaft (S.E. bracket).
3. Slip edge of belt over Pulley "A" over end of shaft and back into center of case.

FOR "Z" ASSEMBLY DRIVES - (This drive is with output shaft on opposite side of motor. See drawing above).

4. Slip belt under Pulley "B" and withdraw belt from case through S.E. bracket opening.

FOR "C" ASSEMBLY DRIVES - (This drive is with output shaft on same side as motor. See drawing above).

5. Slip belt under Pulley "F" and withdraw belt from case through S.E. bracket opening.

INSTALLING NEW BELT

6. Insert new belt into case through S.E. bracket opening and around Pulleys "B" and "F".
7. Replace the bracket opposite the output shaft and pull belt to spread Pulleys "B" and "F".
8. Slip belt through control bracket opening, over end of shaft and then over Pulley "A".
9. Turn control wheel to low on control bracket, then install bracket on drive. Be sure shifting yoke engages pins on bearing housing of Pulley "A".
9. Rotate pulleys and belt by hand to take up belt slack and to check for proper function. Replace side cover(s).

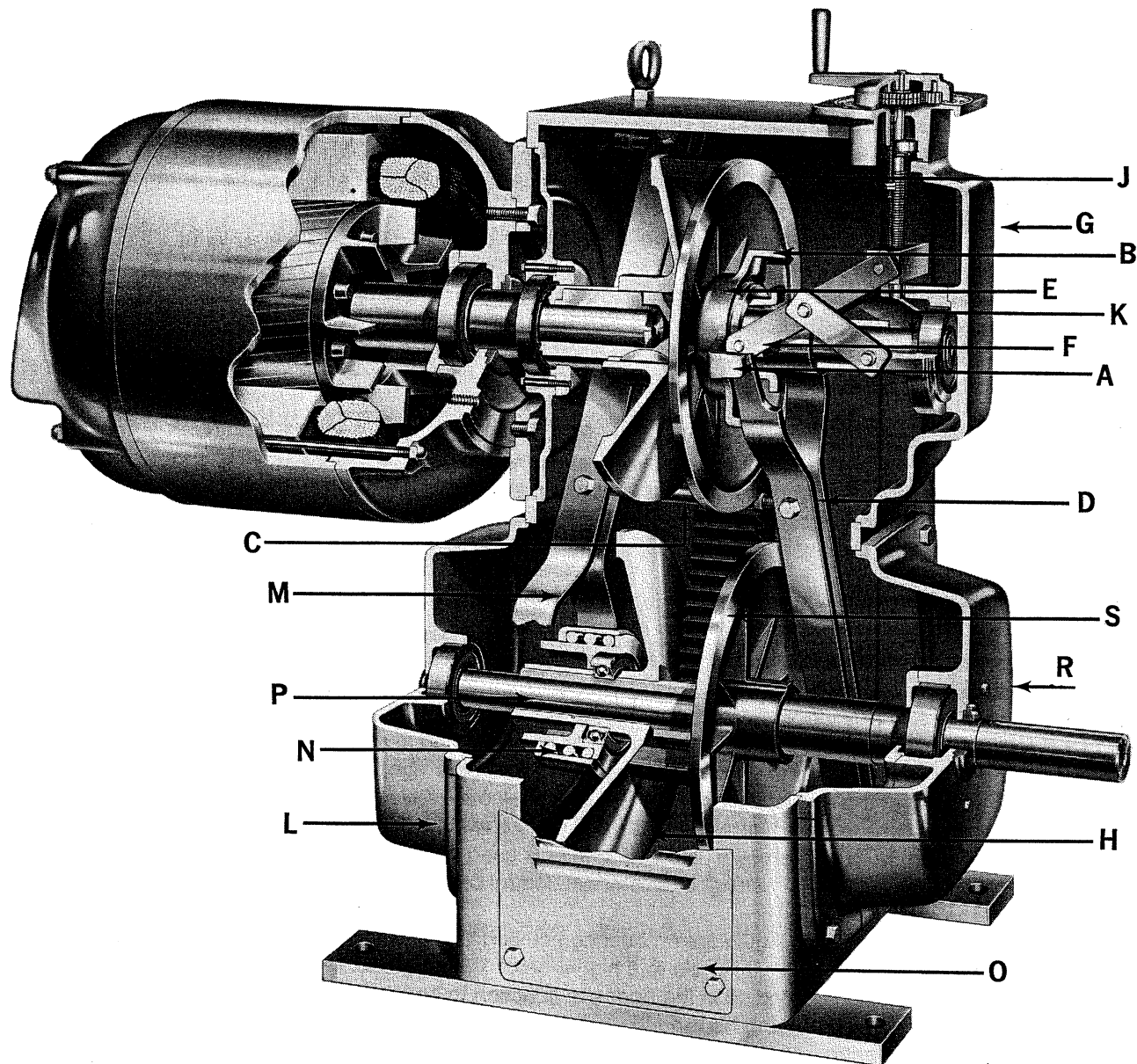
1. With drive stopped, remove side cover "O".
2. Loosen belt tension nut 'C' (Figure 1), and remove. Note: Count the number of turns necessary to remove the nut, and make a note of the number. It will be necessary to give the nut the same number of turns, in the opposite direction, when replacing it, in order to restore the same belt tension setting. Also note that the nut may not be threaded the same number of turns on both the spherical bearing shanks between the arms of the control levers. **IMPORTANT:** Do not loosen the jam nuts on the spherical bearing shanks (right hand threaded). These have been factory positioned for proper belt setting - 5/16" to 3/8" deflection at the center of the belt, with a 15- pound pull, when the drive is at the 1:1 ratio.
3. Disengage control lever 'D' from the pulley bearing housing 'E' (Figure 2). Note the bosses on the pulley bearing housing 'E', which engage the control lever. These bosses are marked "A" and "B", in raised letters on the edge. The control lever must engage the same bosses in the same position when reassembling.
- 3a. On "C" assembly drives, remove the control lever 'D' by first removing the hex head bolt (accessible from front of case- Figure 3), which holds the lever pivot spherical bearing, and then withdrawing lever through the side opening of the case (Figure 4.). This may be done now, or after Step # 5, removal of bracket, as illustrated.
4. Rotate pulley bearing housing 'E' 45 in either direction (figure 5). This will disengage the control actuating links from the lugs on the housing (Figure 5A).
5. Remove control bracket 'G' from the case. The actuating link assembly comes away with it.
6. Spread the lower (driven) variable pulley apart to provide belt slack (Figure 6). Note: On the 75 case it will be necessary to rotate bearing housing 'N' 90 to allow the fork lever 'M' to slip over the housing for additional pulley movement. Then work belt off the upper (motor) pulley by starting one edge of belt over the pulley (Figure 70), and working it towards the opening left by removal of the control bracket 'G'.
7. Slip edge of belt between the shaft 'K' and one back through the other fork of the control lever (Figure 9). Upper end of belt is now free.
8. Remove bracket 'L' and disengage control lever 'M' from the bearing housing 'N' of the driven pulley 'H'.
9. Pull belt down, slip it over the edge of the pulley 'H', and thread it through the forks of the control lever, as in step #7. It may now be removed through the opening left by the removal of bracket 'L' (Figure 10).
- 9a. On "C" assembly drives, do not remove bracket 'L'. Remove bracket 'R', work belt over the fixed pulley half 'S', over the shaft end and out the opening on that side.

INSTALLING NEW BELT

1. Start by reversing Step #7. Work end of belt through side opening left by removal of cover 'O', then through opening of bracket 'L'.
2. Slip belt edge over end of shaft 'P', through the fork of control lever 'M', and over the variable pulley 'H'.
- 2a. On "C" assembly drives, work belt through bracket 'R' opening, and over fixed pulley half 'S'.
4. Draw free end of belt up and out the control bracket opening, upper right. Slip edge of belt through the fork of control lever 'D', and over the end of pulley shaft 'K'. Work belt over driver shaft variable pulley 'J'.
- 4a. On "C" assembly drives, install control lever 'D', and secure with hex head bolt on lever pivot spherical bearing. This is reversal of Step 3a in belt removal. Note: If spacer is used on spherical bearing, be sure to install same.
5. Turn control handle to lowest dial setting, and remount control bracket 'G'. Be Sure the actuating links do not jam or force any internal parts!!
6. Engage control actuating links 'F' with lugs on bearing housing 'E'. Bearing housing should be rotated 45 from normal position at start; turning control handle to a higher setting will align actuating links and lugs for engagement. When aligned, rotate bearing housing 45 in the opposite direction to engage links and bring "A" and "B" into position.
7. Engage control lever 'D' with bearing housing 'E'.
8. Close lower pulley, and engage control lever 'M' with bearing housing 'N' on lower, or driven, pulley.
9. Replace belt tension nut 'C', taking the same number of turns as when removing it. Turn pulleys and belt by hand as tension nut is being tightened until nut jams and locks against jam nuts.
10. Check belt tension. Check all levers, linkages and pivot blocks for proper engagement and easy working.
11. Replace side cover 'O'- unit is ready for operation.

See Page 28 & 29 For Figures

BELT REPLACEMENT 75 & 76 CASE



BELT REPLACEMENT 75 & 76 CASE

Fig. 1

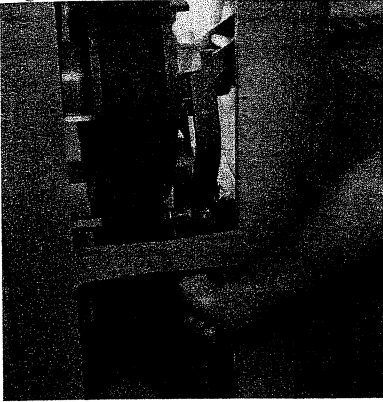


Fig. 2

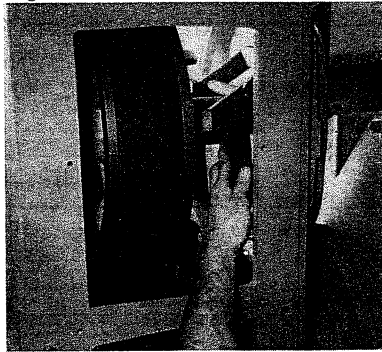


Fig. 3

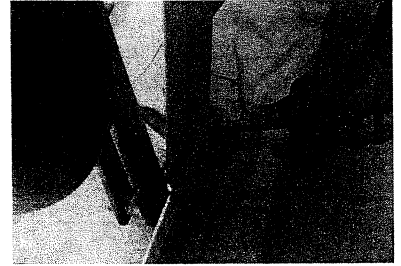


Fig. 4



Fig. 5

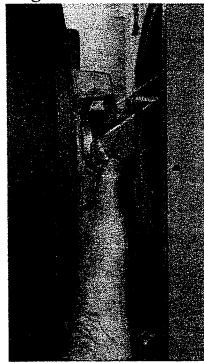


Fig. 5A

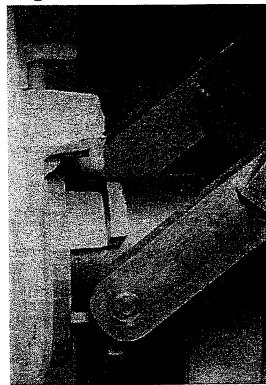


Fig. 6

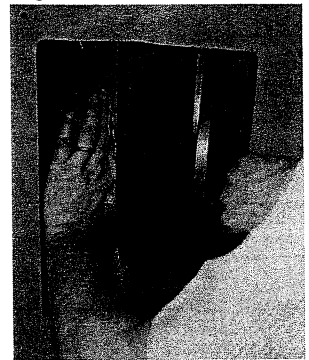


Fig. 7

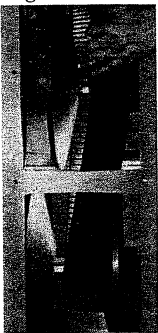


Fig. 8



Fig. 9

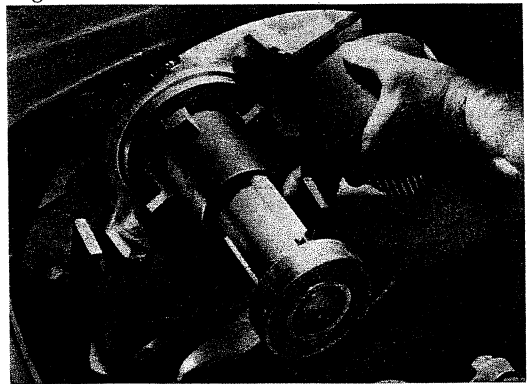
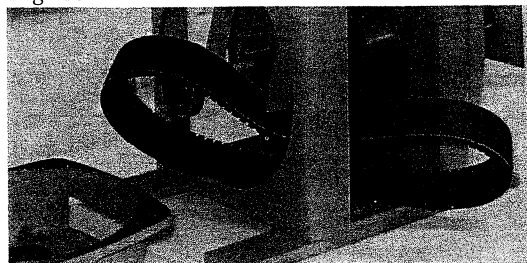


Fig. 10



TROUBLE SHOOTER'S GUIDE VARIABLE SPEED DRIVES

These variable speed drives are designed to deliver specified rated horsepower at maximum speed setting. When operating at less than maximum output RPM it is possible to overload the belt and other mechanical parts without overloading the motor. The following formula may be used as a guide in determining safe loading at reduced speed.

$$\text{For Safe Loading the maximum amps permissible} = \frac{\text{No Load Amps}}{\text{Maximum RPM}} + \frac{\text{Actual RPM}}{\text{Maximum RPM}} \left(\frac{\text{Full Load Amps}}{\text{Maximum RPM}} - \frac{\text{No Load Amps}}{\text{Maximum RPM}} \right)$$

Should an application require transmitting more horsepower at reduced speed than that for which the specific transmission is designed, refer to factory.

ELECTRICAL MALFUNCTION

SYMPTOM	CAUSE	RESULT	REMEDY
1. Motor does not start	a-Incorrectly connected	Burnout	Connect correctly per diagram on motor
	b-Incorrect power supply	Burnout	Use only with correct rated power supply
	c-Fuse out, loose or open connection	Burnout	Correct open circuit condition
	d-Rotating parts of motor may be jammed mechanically	Burnout	Check and correct: Bent housing Broken housing Damaged bearing Foreign material in motor
	e-Driven machine may be jammed	Burnout	Correct jammed condition
	f-No Power supply	None	Check for voltage at motor and work back to power supply
2. Motor starts but does not come up to speed	a-Same as 1-a,b,c	Burnout	Same as 1-a,b,c
	b-Overload	Burnout	Reduce load to bring current to rated limit. Use proper fuses and overload protection
3. Motor noisy electrically	a-Same as 1-a,b,c	Burnout	Same as 1-a,b,c
4. Motor runs hot and exceeds rating	a-Same as 1-a,b,c	Burnout	Same as 1-a,b,c
	b- Overload	Burnout	Reduce Load
	c-Impaired ventilation	Burnout	Remove obstruction
	d-Frequent start or stop	Burnout	Reduce number of reversals secure proper motor for this duty
	e-Misalignment between rotor and stator laminations	Burnout	Realign

MECHANICAL MALFUNCTION

SYMPTOM	CAUSE	RESULT	REMEDY
5. Noisy Mechanically	a-Misalign of coupling or sprocket	Bearing failure, broken shaft, stator burnout due to motor drag	Correct misalignment
	b-Mechanical unbalance of rotating Parts	Same as 5-a	Find unbalanced part, then balance
	c-Lack of or improper lubrication in gear case	Gear failure and / or Bearing failure	Use correct lubricant, replace parts as necessary
	d-Foreign material in lubricant	Same as 5-c	Clean out and replace bearings and/or gears
	e-Overload	Same as 5-c	Remove overload condition, replace damaged parts
	f-Shock loading	Same as 5-c	Correct cause and replace necessary parts
	g-Pulley rattle on Speed-Trol motor	Failure of pulleys, shafts, bearings and belts	Replace necessary parts
	h-Incorrect belt tension	Same as 5-g	Adjust to proper tension per instructions
	i-Mounting acts as amplifier of normal Noise	Annoying	Isolate motor from base
	j-Rotor dragging due to worn bearings, shaft or bracket	Burnout	Replace bearings, shaft or bracket as needed
6. Bearing failure	a-Same as 5-a thru h	Burnout, damaged shaft, damaged housing, gear failure	Replace bearing, follow 5-a through h
	b-Entry of water or foreign material into bearing housing	Same as 6-a	Replace bearings and shield against entry of foreign material (water, dust, etc.) – use proper motor

TROUBLE SHOOTER'S GUIDE MECHANICAL MALFUNCTION

SYMPTOM	CAUSE	RESULT	REMEDY
7. Gear failure	a-Same as 5-c thru f	Machine stoppage	Same as 5-c thru f
8. Oil leak	a-Improper lubricant	Seal damage	Use specified lubricant
	b-Too much lubricant	Gear failure, bearing failure, burnout if oil level gets to low	Fill only to level plug
	c-Worn oil seals or shaft	Same as 8-b	Replace necessary parts
	d-Loose gear case cover	Same as 8-b	Tighten bolts, replace gasket if necessary
	e-Loose level or drain plugs	Same as 8-b	Tighten and seal plugs
	f-Misalign sprocket or couplings	Same as 8-b	Correct misalignment
	g-Overload	Same as 8-b	Reduce load
	h-Shock load	Same as 8-b	Remove conditions causing shock
9. Belt slippage	a-Belt too loose	Belt failure	Adjust to proper tension
	b-Overload	Belt or bearing failure	Remove excess load
	c-Grease on pulley faces	Belt failure	Clean pulley faces
	d-Variable pulley stuck indicated by tight control wheel	Belt failure	Check pulley liners and keys Replace or clean up
	e-Shifting through the range too rapidly	Belt wear and annoying noise with belt striking side plate cover	Increase shifting time
10. Belt failure	a-Improper tension	Machine stopped	Replace belt and adjust to proper tension
	b-Overload	Machine stopped	Remove excess load
	c-Slippage	Machine speed varies	Clean pulley faces and adjust belt tension
	d-Variable pulley stuck	Machine speed varies	Check pulley liners and keys Replace or clean up
11. Pulley failure	a-Overload	Bearing failure	Remove overload
	b-Worn pulley bore or hub O.D.	No speed variation	Replace parts as needed
	c-Frozen pulley	Pulley not sliding on shaft surface	Eliminate contaminants (dust or grit) or excess moisture
12. Broken linkage	a-Turning control wheel when motor is not running	Belt or bearing failure	Replace needed parts Do not turn control wheel unless motor is running
	b-Tight pulleys because of contaminants (dust, grit or moisture)	Cannot adjust speed	Eliminate contaminants, clean parts Refer to factory for moisture stable parts

APPEARANCE OF DAMAGED PART

SYMPTOM	CAUSED BY	APPEARANCE
1. Shorted coil	a-Moisture, chemicals, foreign material in motor, damaged winding	Black or burned coil with remainder of winding good
2. 100% Burnout	a-Overload	Burned equally all around winding
	b-Stalled	Burned equally all around winding
	c-Impaired ventilation	Burned equally all around winding
	d-Frequent reversal or starting	Burned equally all around winding
	e-Incorrect power	Burned equally all around winding
3. Single phase conditions	a-Open circuit in one line. The most common causes are loose connections one fuse out, loose contact in switch	If 1800 RPM motor-four equally burned groups at 90° intervals
		If 1200 RPM motor-six equally burned groups at 60° intervals
		If 3600 RPM motor-two equally burned groups at 180° intervals NOTE: If Y connected each burned group will consist of two adjacent phase groups. If Delta connected each burned group will consist of one phase group.
4. Other	a-Improper connection b-Ground	Irregularly burned group or spot burns

After start-up many burnouts occur within a short period of time. This does not necessarily indicate the motor is defective, but rather, one or more of the above mentioned is the cause.

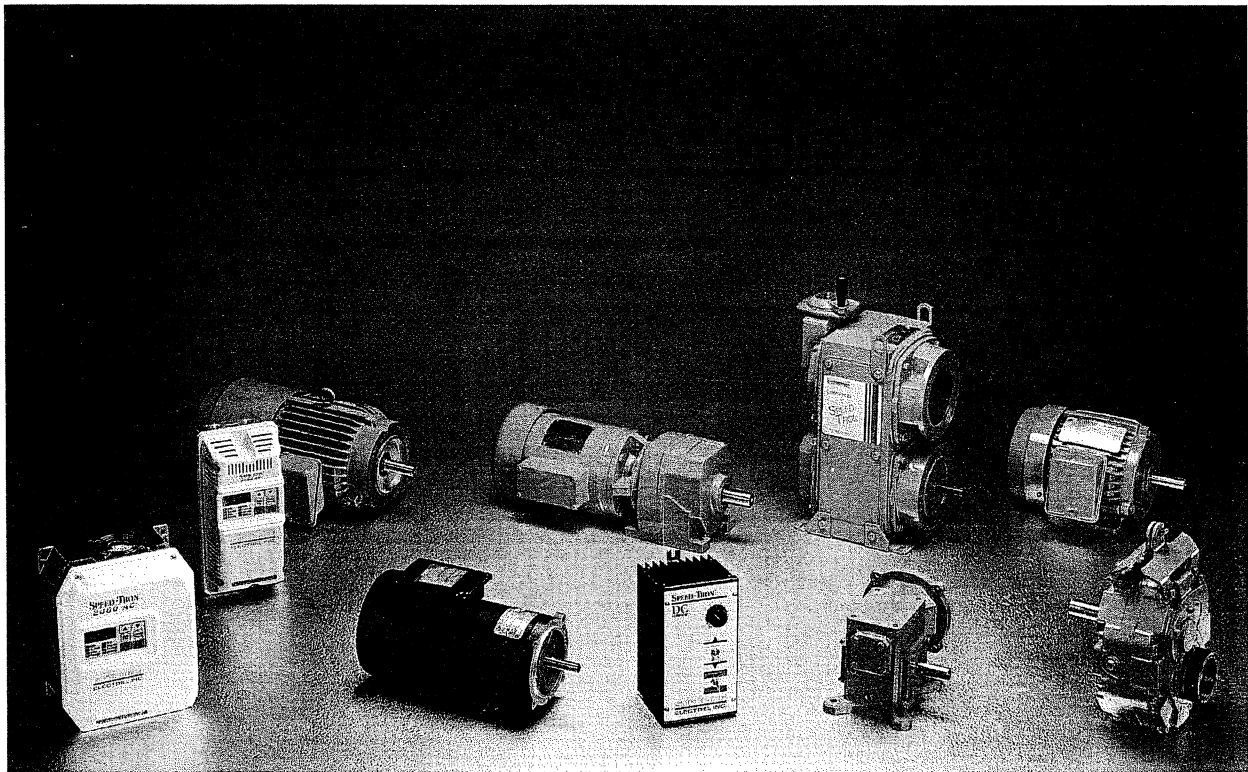
GEAR FAILURE

APPEARANCE	CAUSE
1. Worn evenly around the entire circumference	a-Lack of lubrication at start up or at some later time
	b-Improper lubricant
	c-Foreign material in lubricant
	d-Overload
2. Teeth stripped	a-Shock Load
3. Gear broken	a-Shock Load

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