

ATTENTION: *

VERY IMPORTANT

Before unloading and unpacking the machine, carefully read section 5 of this manual for unpacking instructions.

Failure to do so will result in forfeiture of the warranty.

ORION PACKAGING INC.

NOTICE

In order to acquire more information about custom make features of the machine; and to provide quicker service, the following information is required when making an inquiry for a machine:

- 1) Serial Number
- 2) Model Number
- 3) Subassembly-Part Location

ORION MODEL M-77

Spiral Semi-Automatic Medium Duty Wall Mount Rotary Tower

| | |
|----------------------|--|
| Maximum Load Size | 48"W x 48"L x 76"H (Recommended) 52"W x 52"L x 80"H (Theoretical)* |
| Weight Capacity | Unlimited (Floor Loaded) |
| Utilities | 115/1/60 20 Amp Electrical Service |
| Rotary Tower | All Structural Steel Easy Access to All Components Steel Tube Matrix Design |
| Tower Drive | #50 Chain Tower Drive Heavy Center Shaft Tower Support Rugged Dual Flange Bearings 0-12 RPM Variable Tower Speed 1/2 HP DC/SCR Drive Electronic Soft Start |
| Control Features | Safety Stop Photocell Electronic Film Force Control High/Low Brake Force Selection Separate Top and Bottom Wrap Selectors Variable Speed Film Carriage Control Film Carriage Raise/Lower Switch Tower Jog Pushbutton Power On/Off Switch Current Overload Protection NEMA 12 Electrical Enclosure |
| Film Delivery | 20" Orion EconoStretch Film Carriage Film Roll Diameter Compensation Electronic Film Tension Control Electromechanical Film Braking 16" roll dia. capacity (for netting) |
| Film Carriage Drive | #50 Roller Chain Carriage Lift 1/4 HP Elevator Drive Motor Variable Speed SCR Control Precision Cam Follower Tracking |
| Structural Features | Wall or Beam Mounting Design All Structural Steel Construction |
| Est. Shipping Weight | 400 lbs. |

*Theoretical may increase operator difficulty in proper load placement, and reflects maximum film web height attainable

NOTE: 12" mast extension

5. MACHINE INSPECTION AND INSTALLATION

5.1 Inspection Upon Arrival

Before unloading the Mongoose Stretchwrapper the shipping bracket must be unbolted from the trailer bed. The shipping bracket is an angle mounted on the lower mount of the perch.

Before inspection of the machine may begin, all the packaging and restraining blocks must be removed. That is, the mounting bracket, the stretchwrap material, and the restraining block under the end of the tower must be removed.

CAUTION: When cutting the stretchwrap material covering the machine, care must be taken not to cut any electrical lines or damage the surface finish of the machine.

A visual inspection of all the electrical connections should be performed after unpacking the machine to check for loosened joints or broken connections. Any suspected shipping damage must be reported immediately to the freight carrier.

Items that are vulnerable to damage and must be inspected are,

- motor and transmission housings and connections on the perch, at the base of the tower, and on the carriage.
- the photoswitch mounted on the rotor and its connections.
- the proximity switch mounted on the perch and its connections.

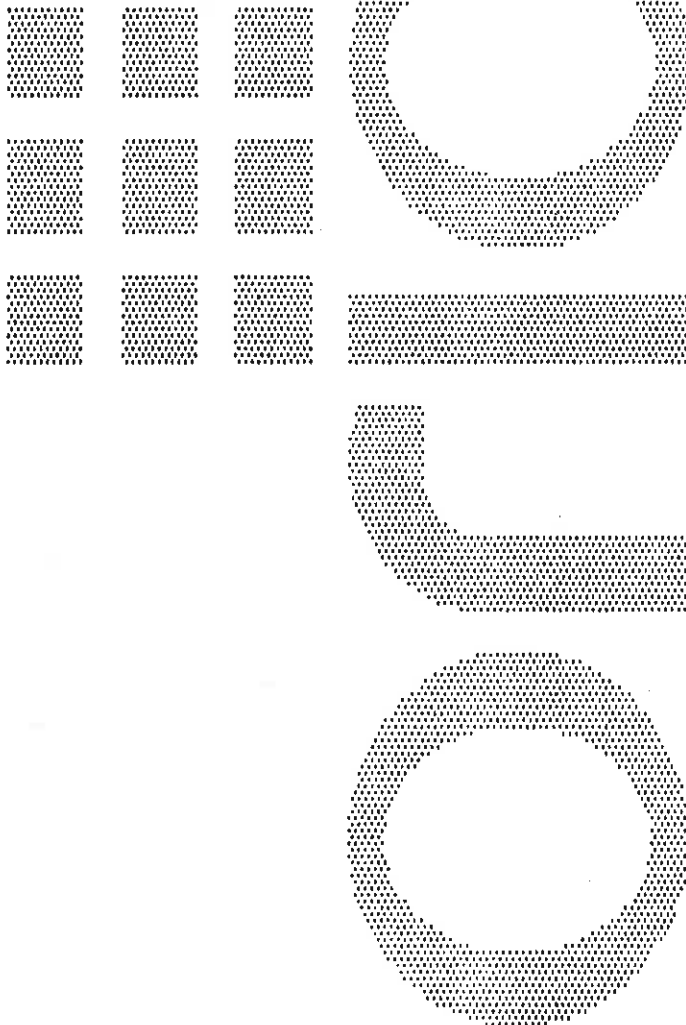
5.2 Machine Installation

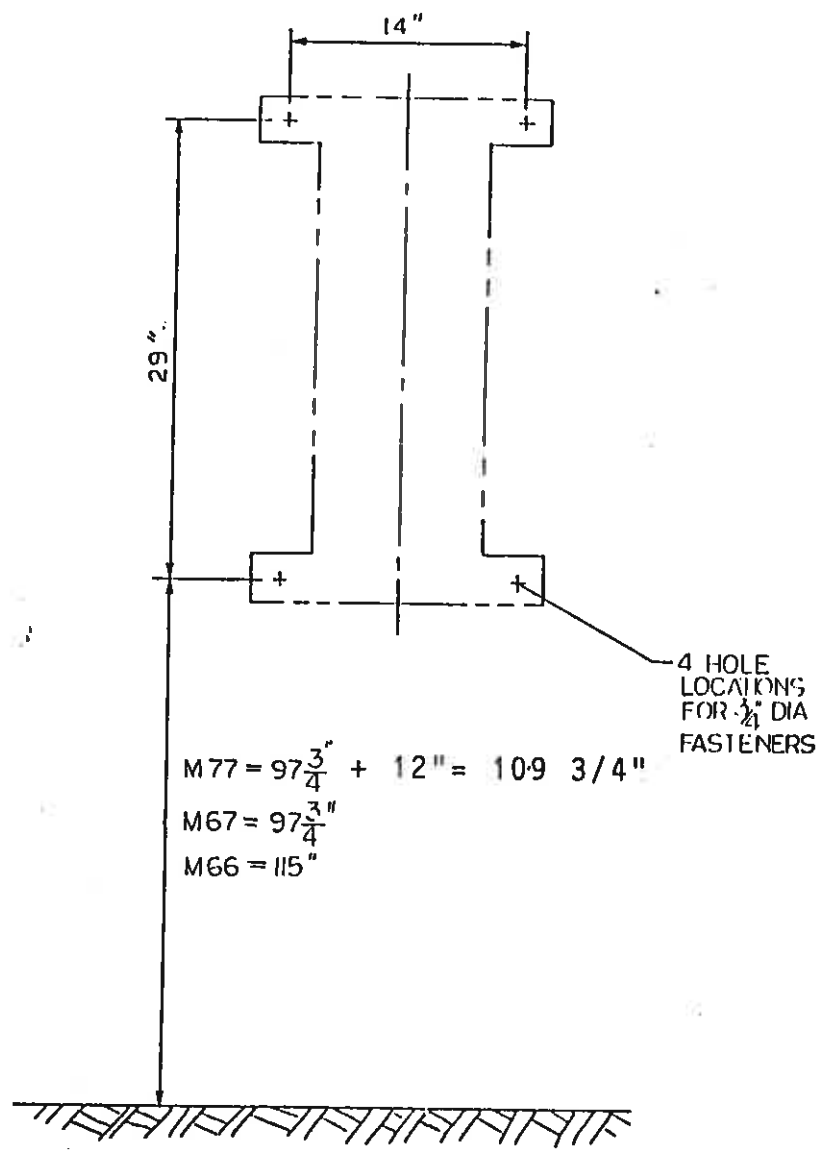
After the visual inspection has been performed, the customer is required to provide the electrical power

requirements as outlined in the specifications (sections 1, 2, and 3 of this manual).

The mounting position and location of the Mongoose stretchwrapper can be determined by the position of the mounting holes as shown in the appendix. Once the stretchwrapper is mounted, the lower limit switch on the tower must be adjusted so as to have the carriage clear the floor when the carriage is at its lowest position.

For the electrical connections, an electrical diagram is provided in the panel box and in the appendix of this manual. Also, a copy of the PLC's instruction manual is included in the appendix for PLC controlled stretchwrappers. Only a qualified electrical technician or an Orion representative should make the connections or effect any repairs on the machines.





| MODEL | ASSUMED FIXING MOMENT | ASSUMED FIXING FORCE |
|-------|---|----------------------|
| M 66 | 7300 lbs-ft 87600 lbs-in 986 kg-m | 3000 lbs 1400 kg |
| M 67 | 4000 lbs-ft 48000 lbs-in 554 kg-m | 1600 lbs 730 kg |
| M 77 | 4000 lbs-ft 48000 lbs-in 986 kg-m | 1600 lbs 730 kg |

MOUNTING DIAGRAM

ORION PACKAGING INC.
TOWER SUBASSEMBLY PARTS LIST

MODEL M77
JOB #1031

| ITEM | DESCRIPTION | QTY |
|------|--|-----|
| 1 | TOWER #220-062C | 1 |
| 2 | CHAIN COVER #220-062C | 1 |
| 3 | RIGHT BEAM HOLDER #220-107B | 1 |
| 4 | LEFT BEAM HOLDER #220-106B | 1 |
| 5 | MOTOR, ELECTRICAL (1/4 HP, 90 VDC, 1750 RPM) | 1 |
| 6 | REDUCER, SPEED (BQ 175, 50:1, ASSY 2) | 1 |
| 7 | CHAIN #50 | 1 |
| 8 | SPROCKET, DRIVER (50B11, 7/8" BORE) | 1 |
| 9 | SPROCKET, IDLER (50B11, 7/8" BORE) | 1 |
| 10 | LIMIT SWITCH ACTUATOR #220-104A | 1 |
| 11 | CHAIN TENSIONER #220-105A | 1 |
| 12 | CHANNEL | 1 |
| 13 | CHANNEL GUIDE | 2 |
| 14 | KNOB | 2 |
| 15 | LIMIT SWITCH (XCKL115) | 2 |
| 16 | LIMIT SWITCH BRACKET | 2 |
| 17 | SQUARE KEY 3/16" | 2 |
| 18 | CHAIN LINK PIN | 2 |
| 19 | COLLAR 1" | 2 |
| 20 | CHAIN TENSIONING SCREW | 2 |
| 21 | MIRROR BRACKET #220-852A | 1 |
| 22 | SAFETY PHOTOCELL BRACKET #200-848D | 1 |
| 23 | REFLECTOR (E51KR84) | 1 |
| 24 | HOLDING ANGLE #220-111A | 2 |

ORION PACKAGING INC.
ROTARY ARM AND PERCH SUBASSEMBLY PARTS LIST

MODEL M77
JOB #1031

| ITEM | DESCRIPTION | QTY |
|------|--|-----|
| 1 | PERCH #220-639D | 1 |
| 2 | TRANSPORTING SUPPORT #220-635B | 1 |
| 3 | ROTARY ARM #220-454C | 1 |
| 4 | HINGE #220-117A | 1 |
| 5 | SPROCKET (50A80, 2" BORE AND #220-455A) | 1 |
| 6 | SPROCKET, DRIVER (50B11, 7/8" BORE) | 1 |
| 7 | MOTOR, ELECTRICAL (1/2 HP, 90 VDC, 1750 RPM) | 1 |
| 8 | REDUCER, SPEED (BQ175, 20:1, ASSY 2) | 1 |
| 9 | SLIP RING ASSY | 1 |
| 10 | SQUARE KEY 3/16" | 1 |
| 11 | CLAMPING COLLAR (#25C200) | 1 |
| 12 | TAPER BUSHING (#R-1, 2" BORE) | 1 |
| 13 | SQUARE FLANGE BEARING (RCJY-2) | 2 |
| 14 | SHAFT 2" DIA. #220-634A | 1 |
| 15 | HOLDING PLATE (FOR TRANSPORTING) #220-458A | 2 |
| 16 | REDUCER MOUNTING PLATE | 1 |
| 17 | PHOTOEYE (FOR REFLECTOR - E3D2-R3M4) | 1 |
| 18 | PROXIMITY SWITCH (923H26Q-A7T-L) | 1 |
| 19 | CHAIN #50 | |

ORION PACKAGING INC.
CARRIAGE SUBASSEMBLY PARTS LIST

MODEL M77
JOB #1031

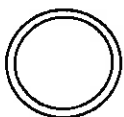
| ITEM | DESCRIPTION | QTY |
|------|---|-----|
| 1 | CARRIAGE FRAME #220-827C | 1 |
| 2 | BRAKE ASSY (B20) | 1 |
| 3 | BRAKE PAD 1/4" THK | 2 |
| 4 | BOTTOM FILM MANDREL ASSY #210-528A | 1 |
| 5 | TOP FILM MANDREL ASSY #210-531A | 1 |
| 6 | FILM MANDREL SHAFT | 1 |
| 7 | COLLAR 1" | 3 |
| 8 | SRING 1 1/4" I.D. | 1 |
| 9 | WASHER (SAE 1" BOLT SIZE) | 1 |
| 10 | ROLLER SHAFT (FOR ROLLER NEAR NET) #220-108A | 1 |
| 11 | STD ROLLER (FOR 20" FILM) | 2 |
| 12 | TOP BRACKET #220-101A | 1 |
| 13 | BUSHING #220-110A | 1 |
| 14 | ROLLER SHAFT #220-109A | 1 |
| 15 | COVER #220-116B | 1 |
| 16 | BEARING ("NSK" UBLF2045J-12) | 2 |
| 17 | RUBBER ROLLER #210-518 | 1 |
| 18 | TOP MOUNTING FLATE #220-100B | 1 |
| 19 | CHANNEL GUIDE | 1 |
| 20 | KNOB | 2 |
| 21 | CHANNEL | 1 |
| 22 | PHOTOSWITCH (MPD2, MPT11, AND MPA1) | 1 |
| 23 | PHOTOSWITCH BRACKET | 1 |
| 24 | SLIP CHANNEL (TIVAR BAR-3/4" X 3/4" X 11" LG) | 2 |

ORION PACKAGING INC.
PANEL SUBASSEMBLY PARTS LIST

MODEL M77
JOB #1031

| ITEM | ORION P/N | DESCRIPTION | QTY |
|------|-----------|-----------------------------|-----|
| 1 | 10532 | BOARD, COUNTER 155-3A | 1 |
| 2 | 10534 | BOARD, CARRIAGE SPEED 168-1 | 1 |
| 3 | 10537 | BOARD, ROTOR SPEED 850C | 1 |
| 4 | 10102 | CONTACTOR | 2 |
| 5 | 10103 | CONTACTOR | 1 |
| 6 | 10546 | RELAY | 7 |
| 7 | 10792 | RELAY SOCKET | 7 |
| 8 | 10542 | FUSE 1 AMP | 1 |
| 9 | 10543 | FUSE 6 1/4 AMP | 3 |
| 10 | 10793 | TRANSFORMER | 1 |
| 11 | 10679 | RESISTOR | 1 |
| 12 | 10690 | FUSE HOLDER | 4 |
| 13 | 10625 | CONTACT BLOCK BODY | 3 |
| 14 | 10634 | CONTACT BLOCK BODY | 1 |
| 15 | 10626 | CONTACT BLOCK BODY | 2 |
| 16 | 10631 | SEL. SWITCH (2 POS., MAIN.) | 2 |
| 17 | 10632 | SEL. SWITCH (3 POS., S.C.) | 1 |
| 18 | 10627 | FLUSH HEAD, BLACK | 1 |
| 19 | 10628 | FLUSH HEAD, GREEN | 1 |
| 20 | 10629 | MUSHROOM, RED, D1A. 40 MM | 1 |
| 21 | 10110 | POTENTIOMETER KNOB 0-10 | 4 |
| 22 | 10791 | BRIDGE RECTIFIER | 1 |
| 23 | 10794 | RHEOSTAT | 1 |

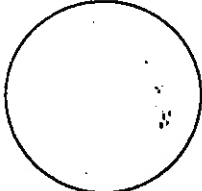
START



FILM TENSION



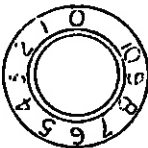
STOP



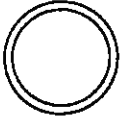
FILM TENSION
LOW HIGH



TOP WRAPS



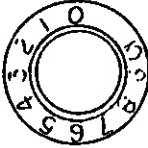
TOWER JOG



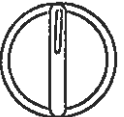
PHOTOCELL
OFF ON



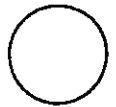
BOTTOM WRAPS



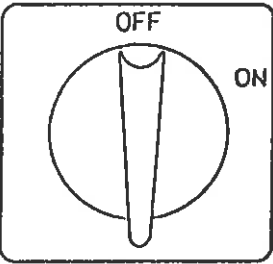
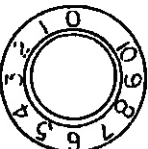
CARRIAGE
RAISE LOWER



POWER



CARRIAGE SP.LLD



6.1 Power Switch

The Power Switch has two settings,

ON - Connects a 110 VAC power source to the machine,

OFF - Disconnects the power source.

When turned ON, the POWER light will also turn on.

6.2 Start And Stop Switches

The Start switch is used to start the cycle once the load is positioned under the mongoose. The cycle may be stopped at any time by pressing the Stop button.

NOTE: If the Stop button is pressed or if the safety photoswitch is tripped in the middle of the cycle, the carriage and rotor may be returned to their home positions by using the jog buttons before restarting the cycle.

6.3 Spiral Wrap Switch

The Spiral Wrap switch has two positions,

UP - In the UP position the cycle will end after completing the specified number of top wraps, therefore, the machine will only wrap the load once, going up.

UP/DOWN - In the UP/DOWN position the cycle is complete after the load is wrapped in both the up and down directions.

6.4 Carriage Control Switch

The Carriage Control switch is a monostable three position switch with the following settings,

RAISE - Raises the carriage until the top limit switch on the tower is activated or, if the photocell switch is on, until the photo switch senses that the top of the load has been reached.

LOWER - Lowers the carriage until the bottom limit switch on the tower is activated.

The switch is normally in the middle position where the carriage remains stationary. Turning the switch to the RAISE or LOWER position will activate the carriage to move in these respective directions.

6.5 Photocell Switch

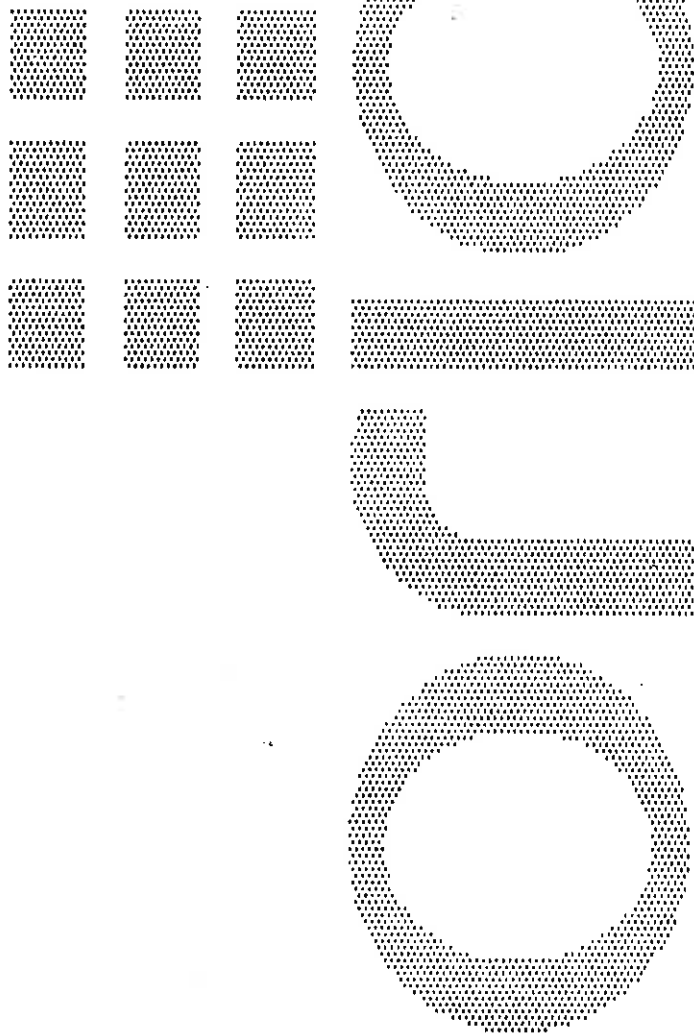
The Photocell switch has two settings,

ON - When turned ON, the photocell senses whether or not the carriage has reached the top of the load. The carriage will stop and begin the top wraps sequence once the top of the load is reached. The carriage will always stop at the top of the load regardless of its height.

OFF - When turned OFF, the photocell is inoperative and the carriage will stop only once the top limit switch has been activated.

6.6 Rotor Jog Switch

The Rotor Jog switch is a monostable pushbutton switch that turns the mongoose arm clockwise (as viewed from below) when held depressed. The rotor jog switch is inoperative during the cycle.



7

CYCLE ADJUSTMENT CONTROLS

7.1 Film Tension

The film tension may be adjusted through the film tension control potentiometer. The pot has a range of tension from 0 to 10, 10 being the highest tension rating. This pot may be adjusted at any time.

CAUTION: Light loads may require lower tension settings than heavier loads.

7.2 Carriage Speed

The carriage speed control can be used to control the amount of overlap the film will have on itself during a wrap.

The control potentiometer has settings from 0 to 10, the higher settings being the fastest. High settings will mean LESS film overlap because of faster carriage speed, and low settings will mean MORE film overlap because of lower carriage speeds.

7.3 Top And Bottom Wraps

There are two multi-position switches which control the number of wraps that may be put at the top and bottom of the load. Each switch has positions going from 1 to 10 corresponding to the number of wraps which may be applied at the top or bottom of the load.

The top and bottom wrap switches may be set before the cycle begins.

8. MACHINE MAINTENANCE

8.1 Speed Reducer Maintenance

On the reducing transmission, after the first week all external cap screws and plugs should be checked for tightness. It is recommended to change the oil every six months or every 2500 hours of operation, whichever comes first. When adding oil the transmission should never be filled above the oil level mark indicated because leakage and overheating may occur. Below is a list of the type of lubricant that should be used.

| Manufacturer | Lubricant |
|------------------------|-----------------------------|
| American Oil Co. | American Cyl. Oil No. 196-L |
| Cities Service Oil Co. | Citgo Cyl. Oil 180-5 |
| Gulf Oil Corp. | Gulf Senate 155 |
| Mobile Oil Corp. | Mobil 600 W Super Cyl. Oil |
| Phillips Oil Co. | Andes S 180 |
| Texaco Inc. | 624-650T Cyl. Oil |
| Shell Oil Co. | Velvata Oil J82 |
| Union Oil Of Cal. | Red Line Worm Gear Lube 140 |

Reducing transmissions are found on the carriage, and on the perch next to the ring gear.

8.2 Motor Maintenance

An occasional inspection of the brushes should be made in order to establish a wear rate. Replace-

ment brushes should be installed before old brushes wear to 9/16" long, measured on the long side. After replacing brushes run the motor near rated speed for at least 1/2 hour with no load to seat the new brushes. Failure to properly seat the new brushes may cause commutator damage and rapid wear of the new brushes. If the commutator becomes rough, scored, or out of round, a competent motor shop should disassemble the motor and resurface the commutator. With every third brush change, have a competent motor shop resurface the commutator and blow the carbon dust out of the motor.

8.3 Chain Maintenance

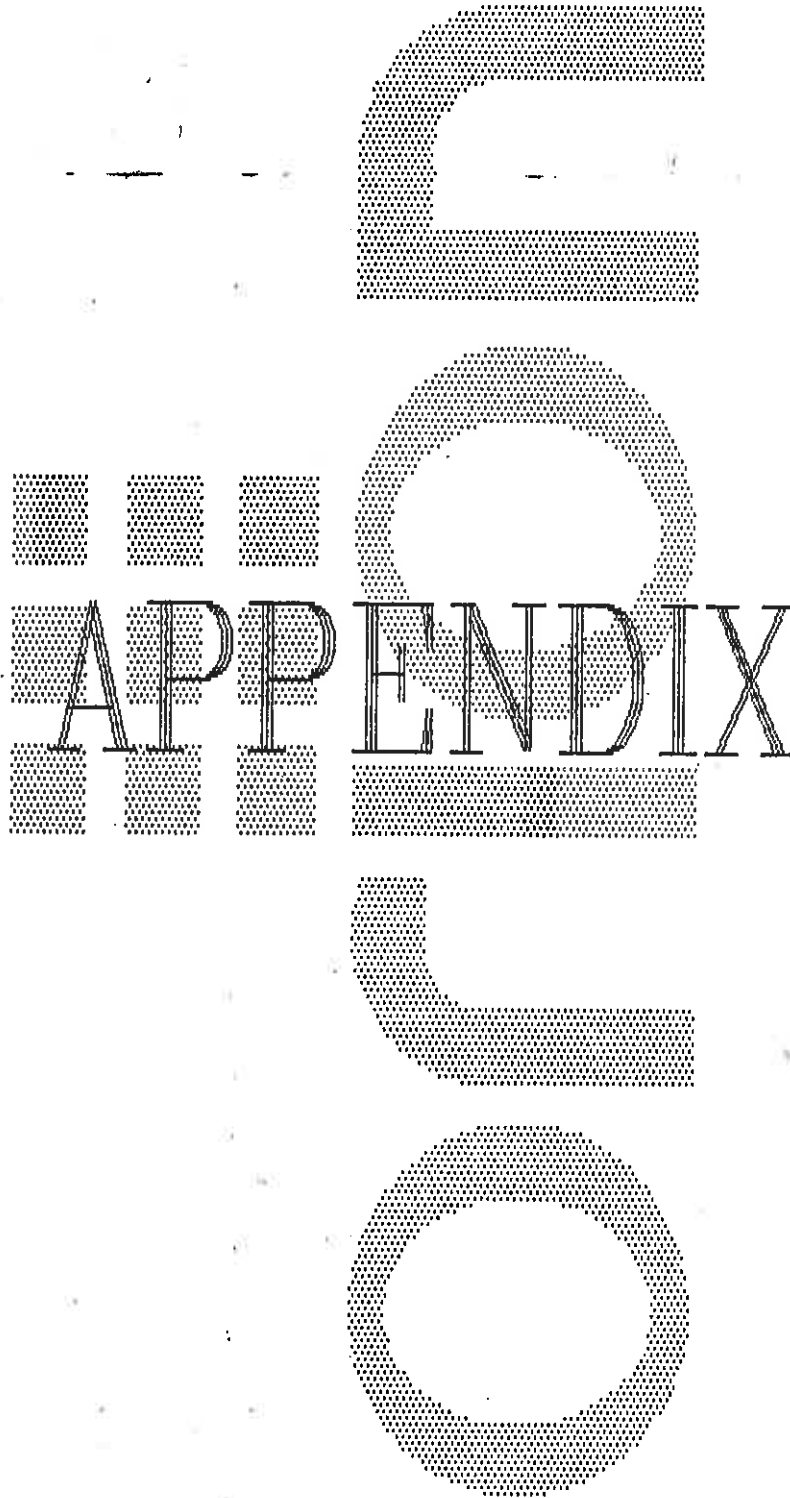
To clean and relubricate the chain, wipe it with an oily cloth every month. If the environment is very dusty or damp, it may be necessary to clean and relubricate the chain more often.

With time the chain will tend to stretch. A loose elevator chain should be tightened at the chain tensioner as shown on drawing number 200-192.

8.4 Cam Follower Maintenance

The cam followers behind the carriage have deep grease pockets and need not frequent relubrication.

The portion of the tower on which the cam followers roll should be cleaned and regreased every 300 hours of operation. If the machine operates in a dusty or corrosive environment the tower should be relubricated more often.



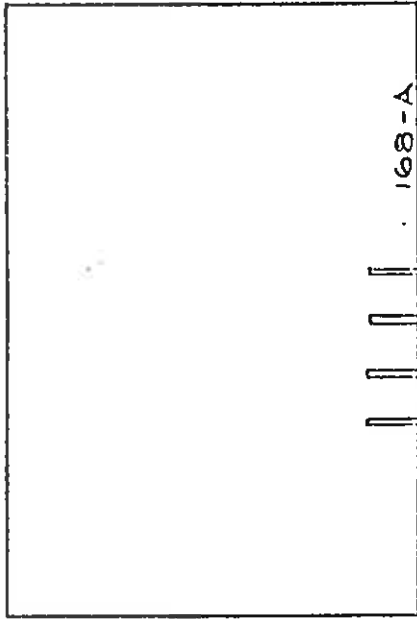
ORION PACKAGING INC.









NOTICE

The manual covers standard features of the machine. Certain machine options may not be covered fully by this manual due to their unique application.

Electrical Boards' Chart for ORION Stretchwrappers

| | 168-4 | 168-A | 236 | 336 | 750+ | 750H-240A | 850M | 850C | 155-3A |
|------------------|-------|-------|-----|-----|------|-----------|------|------|--------|
| MLH 44 Processor | X | | X | | X | | | | |
| MLH 44 | X | | X | | X | | | | X |
| MLH 55 | | X | | X | | | X | | X |
| MLH 66 | | X | | X | | | X | | X |
| MLH 77 | | X | | | | | | | X |
| PA 33 | X | | | X | X | | | | |
| FA 33 | X | | | X | | X | | X | |
| MA 33 | X | | | X | | X | | X | |
| MA 44 | X | | | X | X | | | X | |
| MA 55 | X | | | X | | | X | X | |



 AC AC + -
 120V DC

168-A

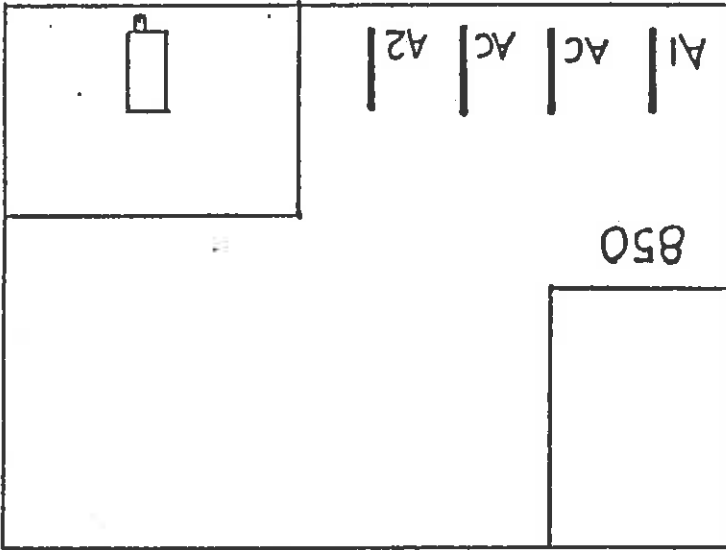
ORION PACKAGING INC

| | | |
|---------------------------|-------------------------------|-------------------------------------|
| ECHELLE: N.T.S. SCALE: | APPROUVE PAR: APPROVED BY: | DESSINE PAR: VALENTINI DRAWN BY: |
| DATE: 16-9-87 | REVISE PAR: REVISED BY: | |

168 - A

| | |
|------------------------------------|-----------|
| NUMERO DE DESSIN DRAWING NUMBER | 200 891 A |
|------------------------------------|-----------|

CONVEYOR SPEED



850

A1
AC
A2

ORION PACKAGING INC.

SCALE: N.T.S. APPROVE PAR:
APPROVED BY:

DESIGN PAR: JAL/DTM
DRAWN BY:

DATE: 24-12-87

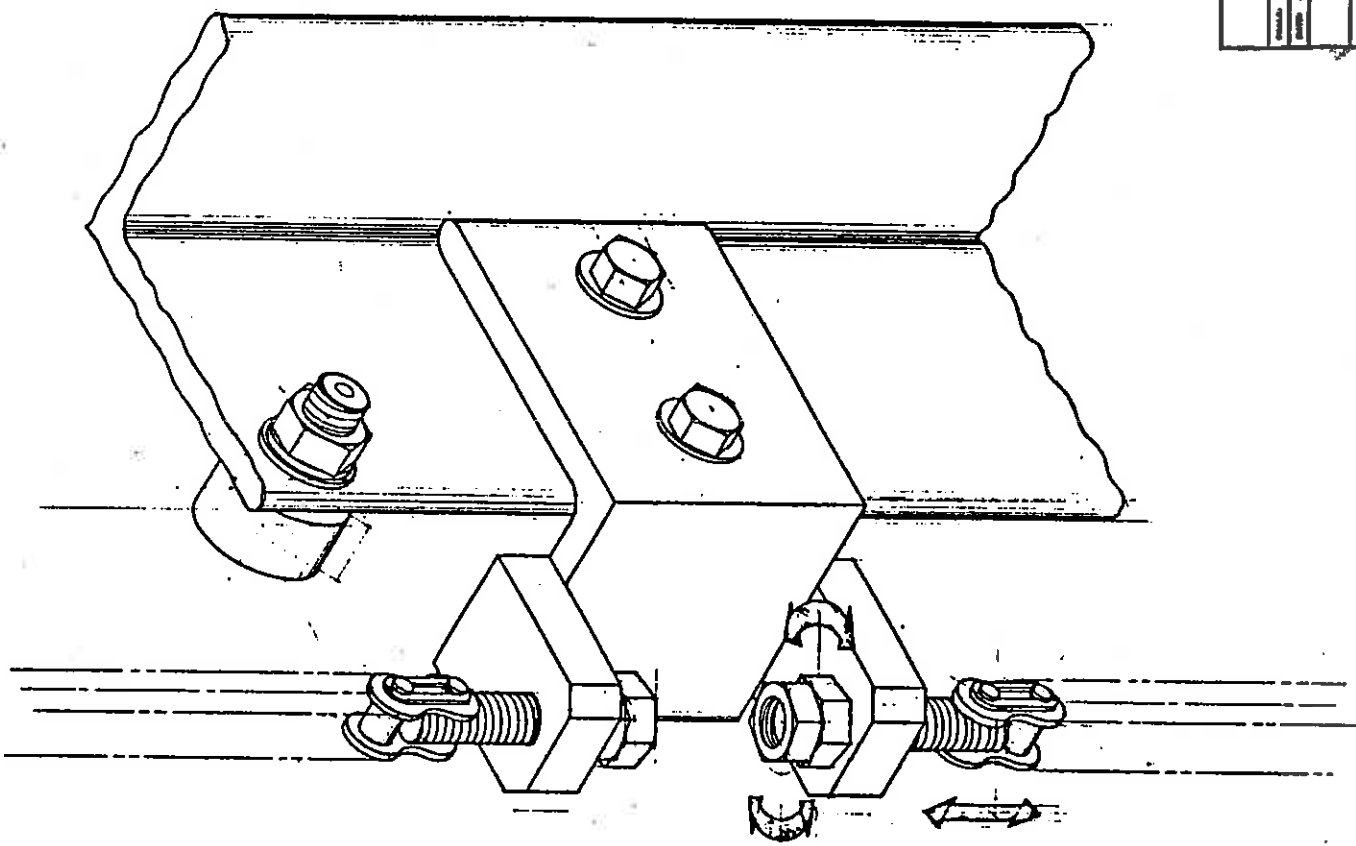
REVISE PAR:
REVISED BY:

850 C

FA 33 MASS MA44 MASS

UNPROCESSED
DRAWING NUMBER

ZIC 142A

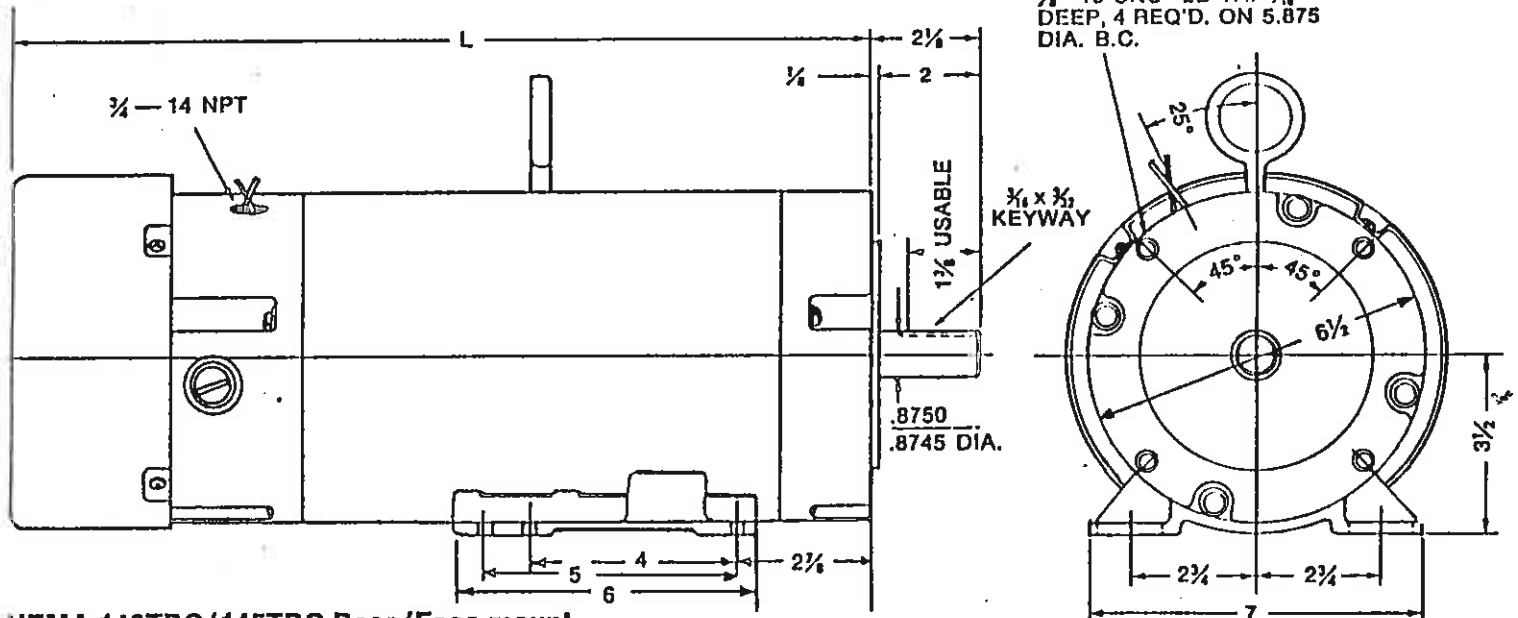


CHAIN TENSION
ADJUSTMENT

| | |
|-----------------------|-----------------------|
| ORION PACKAGING | |
| Model: M.P. 200 | Quantity: 200 |
| Date: 09-7-86 | Drawn by: [Signature] |
| CHAIN TENSIONER ASS'Y | |
| 200-192 | |

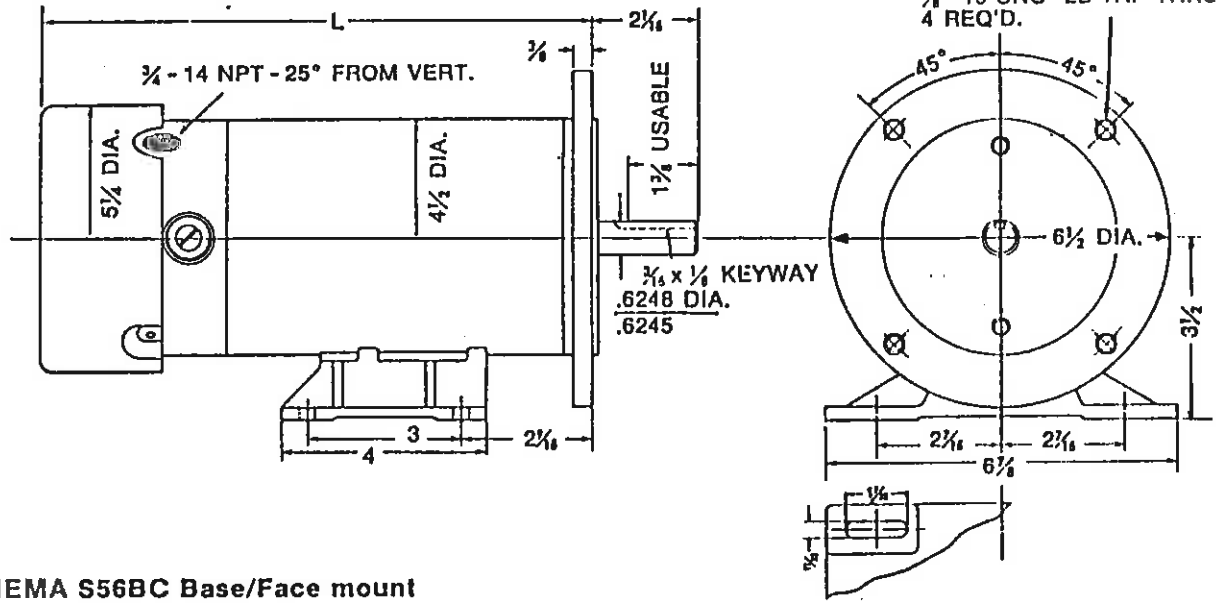
Motor dimensions

TEFC P/M motor



NEMA 143TBC/145TBC Base/Face mount

| H.P. | RPM | VOLTS | AMPS | L | DUTY |
|------|------|-------|------|------------------|-------|
| 1.5 | 1800 | 180 | 8.2 | 15 $\frac{1}{2}$ | CONT. |
| 2 | 1800 | 180 | 11.6 | 16 $\frac{1}{2}$ | CONT. |



NEMA S56BC Base/Face mount

180 V.

| H.P. | RPM | VOLTS | AMPS | L | DUTY |
|---------------|------|-------|------|------------------|-------|
| $\frac{1}{2}$ | 1725 | 180 | 2.8 | 10 $\frac{3}{4}$ | CONT. |
| $\frac{3}{4}$ | 1725 | 180 | 3.5 | 12 $\frac{3}{4}$ | CONT. |
| 1 | 1725 | 180 | 5.35 | 14 $\frac{3}{4}$ | CONT. |

90 V.

| H.P. | RPM | VOLTS | AMPS | L | DUTY |
|---------------|------|-------|------|------------------|-------|
| $\frac{1}{2}$ | 1725 | 90 | 5.35 | 10 $\frac{3}{4}$ | CONT. |
| $\frac{3}{4}$ | 1725 | 90 | 8.1 | 12 $\frac{3}{4}$ | CONT. |
| 1 | 1725 | 90 | 10.6 | 14 $\frac{3}{4}$ | CONT. |

Lubrication

REDUCERS MAY BE FILLED TO THE PROPER LEVEL AT THE FACTORY WITH AGMA No. 8 compounded oil. AFTER INSTALLATION OF THE BREATHER PLUG, UNIT IS READY FOR USE. Before installing breather plug, refer to instruction tag and determine proper position according to reducer mounting.

We recommend an initial oil change after 250 hours of operation, then every six months or every 2500 hours of service under Class 1 Service. If fluctuating temperatures, humid, dirty or corrosive environment, oil changes should be made more frequently. Frequency can be established by oil sample analysis.

KEEP YOUR OIL CLEAN



Doerr Electric replacement oil

To order oil, request:

Doerr part no. 00019001 — synthetic AGMA #7EP
(- 40°F to 150°F)

Doerr part no. 00019101 — AGMA #8 (50°F to 125°F)

Oil is packed 12 one quart bottles per carton, minimum ship one carton.

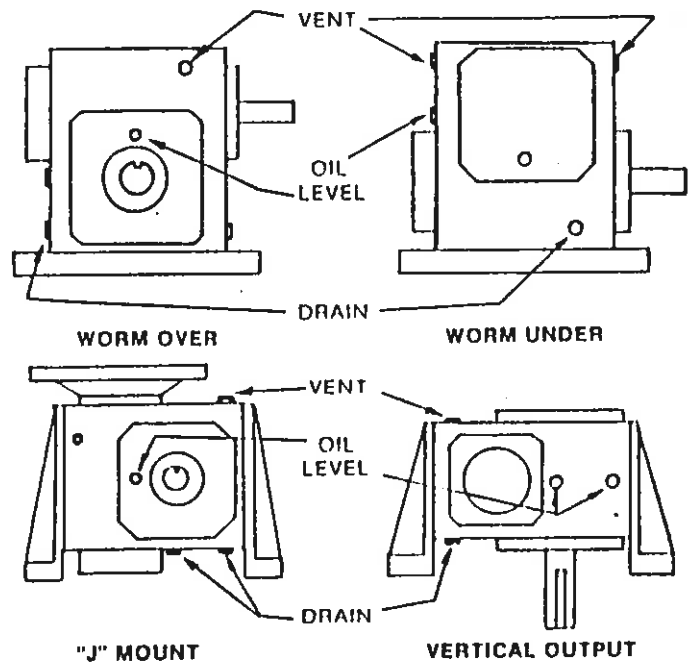
Contact DEC Service Dept. for order information.

OIL CAPACITIES*

| UNIT TYPE | UNIT SERIES | | | | |
|-----------------|-------------|-----|-----|-----|-----|
| | 133 | 175 | 200 | 262 | 323 |
| Worm Over | 14 | 20 | 27 | 49 | 84 |
| Worm Under | 17 | 22 | 28 | 49 | 73 |
| Vertical Output | 10 | 15 | 20 | 37 | 63 |
| "J" Mount | 13 | 18 | 23 | 38 | 63 |

*Capacities in approximate ounces. On double reduction units determine capacity of both primary and secondary reducers.

OIL LEVELS*



*On double reduction units fill and vent each unit to levels shown.



MAINTENANCE INSTRUCTIONS

STANDARD REDUCERS SERIES 133, 175, 206, 262, 325

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MAINTENANCE INSTRUCTIONS FOR STANDARD REDUCERS

Series 133, 175, 206, 262 and 325

INTRODUCTION

The following instructions apply to standard Worm Gear Reducers. When ordering parts or requesting information specify all information stamped on the reducer nameplate. The nameplate will also identify the type of lubricant to be used.

EQUIPMENT REQUIRED

In addition to standard mechanic's tools, the following equipment is required: arbor press, wheel puller, torque wrench, dial indicator, seal driver, bluing, Permatex No. 2 and Permatex No. 3, snap ring pliers for internal and external rings.

GENERAL INSTRUCTIONS

Housings — Clean external surfaces of reducer before removing seal cages and end covers to prevent dirt from falling into the unit. Record mounting dimensions of accessories for reference when reassembling. If it is necessary to remove the reducer from its operating area, disconnect all connected equipment and lift reducer from its foundation.

Seals — Replacement of all seals is recommended when a unit is disassembled. However, if seals are not to be replaced, protect seal life by wrapping shaft with thin, strong paper coated with oil or grease before removing or replacing seal case assembly. Clean the shaft but do not use any abrasive material on the shaft surface polished by the seal.

CAUTION

If the reducer is painted, extreme care should be taken to mask the shaft extensions and rubber surface of the seals. Paint on the shaft adjacent to the seal or on the seal lip will cause oil leakage.

TO CHANGE OUTPUT SHAFT DIRECTION

To change the hand of a unit from left hand to right hand, or vice versa, the following instructions apply:

1. Remove drain plug and drain oil from unit.
2. Remove end cover and seal cage cap screws; then while supporting output shaft remove end cover and shims from the unit.
3. Remove output shaft and seal cage together from extension side.

NOTE: Keep shims with their respective seal cage and end cover.

4. Insert seal cage, shims and sub-assembly into the housing from the side opposite from which they were removed. Insert seal cage cap screws and tighten with light pressure.
5. Assemble end cover and shims. Insert end cover cap screws and tighten with light pressure.
6. Turn high speed shaft in both directions to see that gear train is running freely.
7. Cross tighten seal cage and end cover cap screws to torques listed in Table 1.

TABLE 1. CAPSCREW TIGHTENING TORQUE

| Capscrew Diameter | 1/4 - 20 UNC | 5/16 - 18 UNC | 3/8 - 16 UNC |
|-----------------------|--------------|---------------|--------------|
| Torque (in. lbs.) Dry | 96 | 204 | 360 |

UNIT DISASSEMBLY, PARTS SERVICE, AND ASSEMBLY

Disassembly:

1. Remove drain plug and drain oil from unit.
2. Low speed shaft (gear shaft) removal:
 - A. Remove end cover and seal cage cap screws.
 - B. With a firm hold on the output extension remove end cover and shims.
 - C. Carefully slide output shaft assembly and seal cage out extension side.
 - D. Slide seal cage off low speed shaft using caution to prevent damage to seal lips.
 - E. Wire or tie the shims to their mating end cover and seal cages. They will be available for reference when assembling the unit.
3. High speed shaft (worm shaft) removal:
 - A. Position unit with input shaft down. With a small chisel make a groove in the stamped steel cover opposite the shaft extension. Pry cover off.

- B. Remove internal snap ring from housing bore.
- C. Reposition the housing with the worm shaft horizontal. Using a plastic hammer gently tap on the end of the shaft extension to feed worm shaft assembly through housing and out.

its Service:

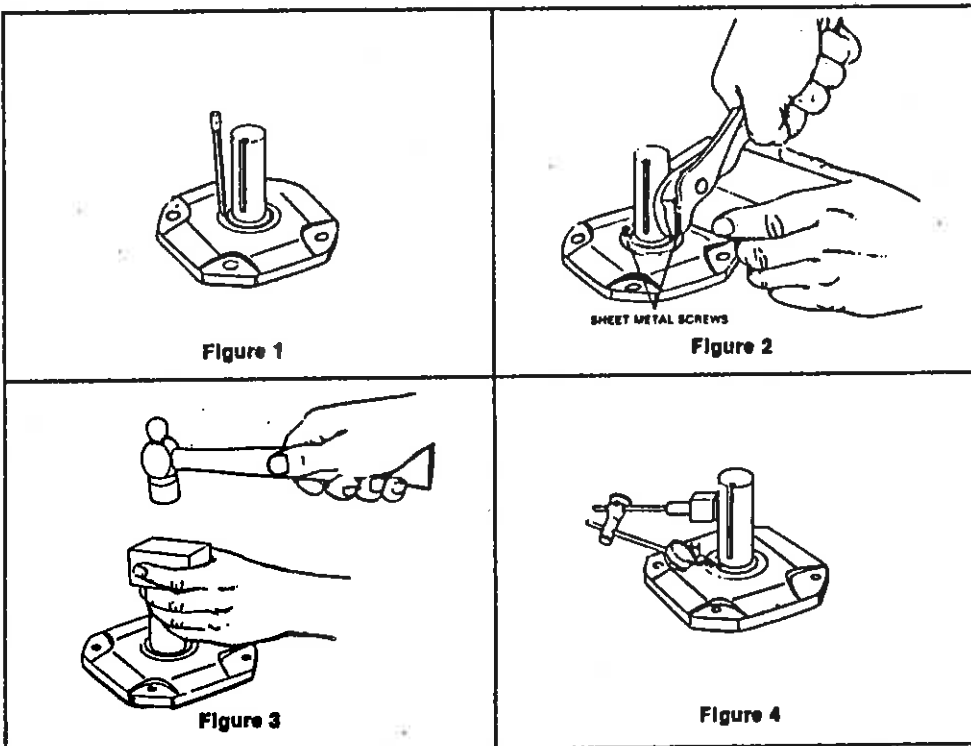
- 1. **Housing** — Clean inside of housing with kerosene or solvent and then dry.
- 2. **Seal cages and end cover** — Remove dirt from joint faces, wipe clean and dry.
- 3. **Air vent** — Wash in kerosene, blow clean and dry.
- 4. **Seals** — To replace seals without dismantling reducer refer to steps C through F below. To replace seals when the entire reducer is dismantled and coupling hubs, sprockets, pulleys, pinions, keys, etc. have been removed the following instructions apply:

NOTE: Replacement of all seals is recommended when a unit is disassembled.

Caution

New seals will leak if the seal lips or if seal's rubbing surface on the shaft has been altered. Protect seal lips at all times. Clean the shaft but do not use any abrasive material on the shaft surface polished by the seal.

- A. Block up seal cages and press or drive out seal.
- B. Remove old sealing compound from seal seat in cage if it is present. If a seal with rubber coating on the outside diameter is used, no Permatex is necessary. If no rubber coating is on seal outside diameter, coat seal cage bore with Permatex No. 3 or equivalent immediately before assembly. To prevent possible damage to seal lips, do not reassemble seals until high speed and low speed shafts have been reassembled to the housing. Then see steps E and F below.
- C. See Figures 1 through 4—To replace seals without dismantling reducer, proceed as follows:



Caution

Do not damage shaft; new seals will leak if seal contacting surface is marred. Use punch and place two or more holes in steel casing of seal, Figure 1. (The steel casing may be rubber coated) Insert sheet metal screws, leaving the heads sufficiently exposed so they can be pried up or grasped with pliers, Figure 2. Do not drill holes because chips may get into the unit.

- D. Work seal loose. Be careful to keep all metal or dirt particles from entering unit. Remove old sealing compound from seal seat if it is present. Also remove burrs and sharp edges from shaft. Clean with rag moistened with solvent. Do not use abrasive material on shaft seal contacting surface.

Caution

E. Protect seal lips when handling; seal leakage will result if these are damaged. If a seal with rubber coating on the outside diameter (O.D.) is used, no Permatex is necessary. If no rubber coating is on seal O.D., coat seal cage bore with Permatex No. 3 or equivalent. Coat seal lips with oil and carefully work seal into position. Before sliding seal into position, protect seal lips from shaft keyway edges by wrapping shaft with thin, strong paper coated with oil. Position garter spring toward the inside of the unit. Place a square faced pipe or tube against the seal O.D. and drive or press seal until fully seated as shown in Figure 3. Do not strike seal directly.

- F. For best performance, seat the seal square with shaft within .005" at 180°. Check with dial indicator as shown in Figure 4, Page 2, or with a straight edge and feelers, or square and feelers. To straighten a cocked seal, place tubing over the seal and tap the tube lightly at a point diametrically opposite the low point on the seal. DO NOT strike seal directly.

5. Bearings —

- A. Wash all bearings in clean kerosene and then dry.
B. Inspect bearings carefully and replace those that are worn or questionable.
NOTE: Replacement of all bearings is recommended.
C. Use a wheel puller or press to remove worm shaft bearings. Apply force to inner race only — not to cage or outer race.
D. Use a wheel puller or press to remove output bearing inner races.
E. New seal cages and end covers must be used when replacing output bearings. Output bearing outer races must be pressed in square and seated completely.
F. To replace output bearing inner races and all input bearings, heat bearings in an oil bath or oven to maximum of 290 degrees F (143 degrees C). Slide high speed shaft bearings onto the oiled shaft until seated against the shoulder or snap ring of the shaft. Slide low speed shaft bearings onto the oiled shaft against the gear spacer.
G. Thoroughly coat all bearings with lubricating oil.

6. Worm, gear and shafts

- A. Worm and high speed shaft—since all worms are integral with the high speed shaft, any wear or damage to the worm will necessitate replacing both.
B. Press shaft out of bronze worm gear. To reassemble gear and low speed shaft, freeze shaft or heat gear. Do not exceed 200 degrees F (93 degrees C). Insert key into shaft keyway and press shaft into oiled gear bore. The short hub of the gear must be assembled toward snap ring on the shaft.
NOTE: It is advisable to replace both the worm and worm gear should either of the assemblies require replacement.

Unit Reassembly:

1. Preliminary

- A. Check to see that all worn parts have been replaced, gear and bearings coated with oil and all parts cleaned. Remove all foreign matter from unit feet. The feet must be flat and square with each other.
- B. Before starting to reassemble reducer, add old shims or replace with new shims of equal thickness.

2. High Speed Shaft (Worm Shaft) Assembly

- A. Lubricate bearing bores of housing and insert high speed shaft sub-assembly from opposite extension end into housing until seated against shoulder in bore. Tap the end of the shaft lightly with a plastic hammer to feed bearings through bores.
- B. Lock high speed sub-assembly in housing bore with lock ring.
- C. Coat outside diameter of stamped steel end cover with Permatex No. 2 and press into high speed bore opposite extension end until flush with housing. If steel endcover is rubber coated then no Permatex is necessary.

3. Low Speed Shaft (Gear Shaft) Assembly

- A. Determine output shaft direction.
- B. Assemble low speed shaft assembly, seal cage, and end cover with shims on both seal cage and end cover. Torque cap screws to torques listed in Table 1. Rotate the input shaft to seat output bearings.
- C. Moving the shaft back and forth by hand, check axial float with dial indicator as shown in Figure 5. Axial float must be .0005-.003 with .0005 being the absolute minimum. Do not preload bearings. If the axial float is not as specified add or subtract required shims under end cover.

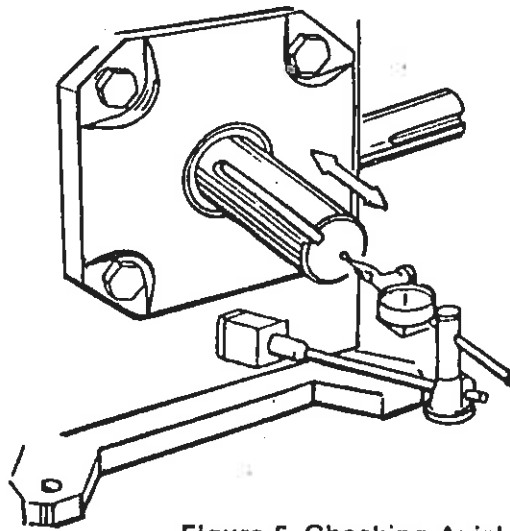


Figure 5 Checking Axial Float

- D. Remove output shaft with seal cage and apply bluing to entire worm thread. Worm thread must be clean of oil. Reassemble output shaft and seal cage with output key facing up.
- E. Use a rag to apply hand pressure to the output shaft and rotate the high speed shaft until output key is down. Return output shaft to original position by reversing rotation. Remove output shaft and seal cage to inspect contact. Compare with Figure 6. If contact is not correct move assembly in the direction shown in Figure 6 by adding shims to the side to which the arrow points after removing them from the opposite side. Repeat steps D and E until contact pattern is correct.
- F. Recheck axial float with dial indicator.
- G. When contact pattern is correct tighten seal cage and end cover cap screws to torques listed in Table 1 page 1.

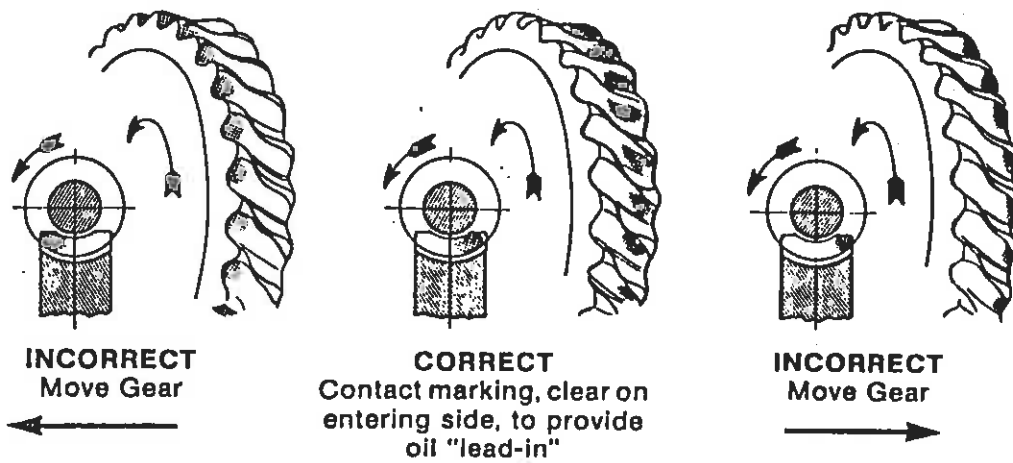


Figure 6 Gear Contact Pattern

4. **Seals** — To reassemble seals to unit, see Parts Service Steps 4E and 4F, page 3.

5. **Motorized Coupling Adaptor**

Certain mounting dimensions should be adhered to when removing motor and coupling assembly for service. When ordering replacement coupling halves (metal gear), specify correct bore diameter. See Table 2 for mounting dimensions and available bore sizes.

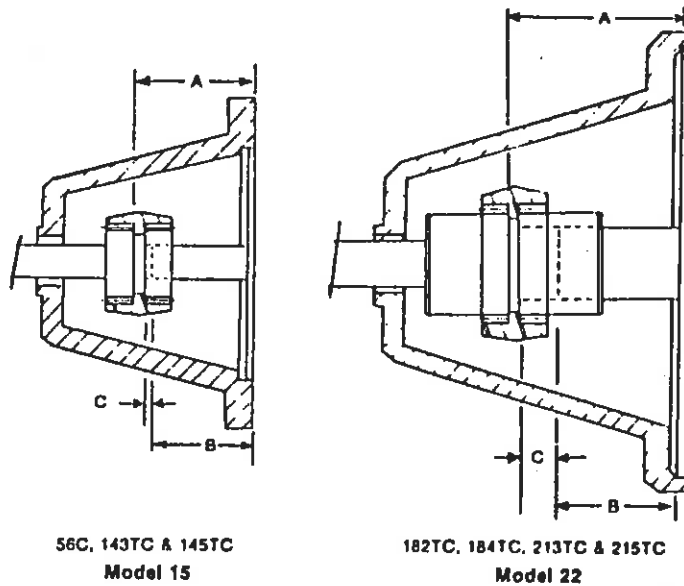


Figure 7 Motorized Coupling Adaptor

TABLE 2. COUPLING ADAPTOR DATA

"C" COUPLING MOUNTING DATA

| N.E.M.A. Frame No. | Mounting Dimensions | | |
|-----------------------|---------------------|-------------------|------|
| | Reducer A ± 1/64 | Motor B ± 1/64 | C |
| 56C | 2 5/16 | 2 1/8 | 1/16 |
| 143TC | 2 5/16 | 2 1/8 | — |
| 145TC | 2 5/16 | 2 1/8 | — |
| 182TC | 3 5/16 | 2 5/8 | 1/2 |
| 184TC | 3 5/16 | 2 5/8 | 1/2 |
| 213TC | 3 5/16 | 3 1/8 | — |
| 215TC | 3 5/16 | 3 1/8 | — |

BORE SIZES AVAILABLE

| MODEL 15 | | MODEL 22 | |
|----------|-------------|----------|-------------|
| Bore | Kwy. | Bore | Kwy. |
| .500 | None | — | — |
| .500 | 1/8 x 1/16 | — | — |
| .625 | 3/16 x 3/32 | .625 | 3/16 x 3/32 |
| .750 | 3/16 x 3/32 | .750 | 3/16 x 3/32 |
| .875 | 3/16 x 3/32 | .875 | 3/16 x 3/32 |
| — | — | 1.125 | 1/4 x 1/8 |
| — | — | 1.375 | 5/16 x 5/32 |

6. Final Inspection

- A. Turn gear train over by hand as a final check.
- B. Re-install reducer and accessories.

CAUTION: Discard motor key. Use only special key provided with reducer. Failure to use special key will make assembly impossible.

- C. Fill reducer with the recommended oil to proper level. See Fig. 8 for standard oil levels. (Type of oil recommended — see nameplate).
- D. Spin test for three minutes and check for noise, leakage, and rapid temperature rise.

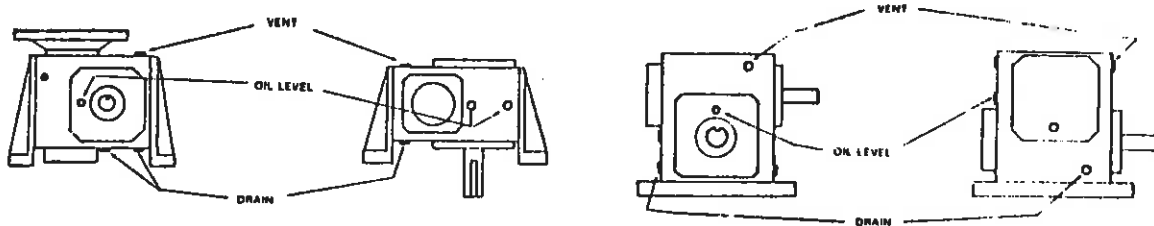


Figure 8 Standard Oil Levels

PREVENTATIVE MAINTENANCE

- A. After first week check all external cap screws and plugs for tightness.
- B. Periodically, check oil level when gears are at rest. Add oil if needed. Do not fill above mark indicated by level because leakage and overheating may occur.
- C. Oil changes — For normal operating conditions, change oil every six months or 2500 hours, whichever occurs first. Also if the unit is operated in an area where temperatures vary with the season, change the oil viscosity to suit the temperature. Most lubricant suppliers can test oil periodically and recommend economical oil change schedules.

CAUTION

See nameplate for type of lubricant to be used.

STORED AND INACTIVE UNITS

1. Each unit is shipped with oil that will protect parts against rust for a period of 4 months in an outdoor shelter or 12 months in a dry building after shipment from the factory. Indoor dry storage is recommended.
2. If a unit is to be stored or is to be inactive after installation beyond the above periods, fill the unit completely with oil.

CAUTION

Before starting a stored unit or re-starting an inactive unit, the oil level should be returned to the proper value as indicated by the oil level.

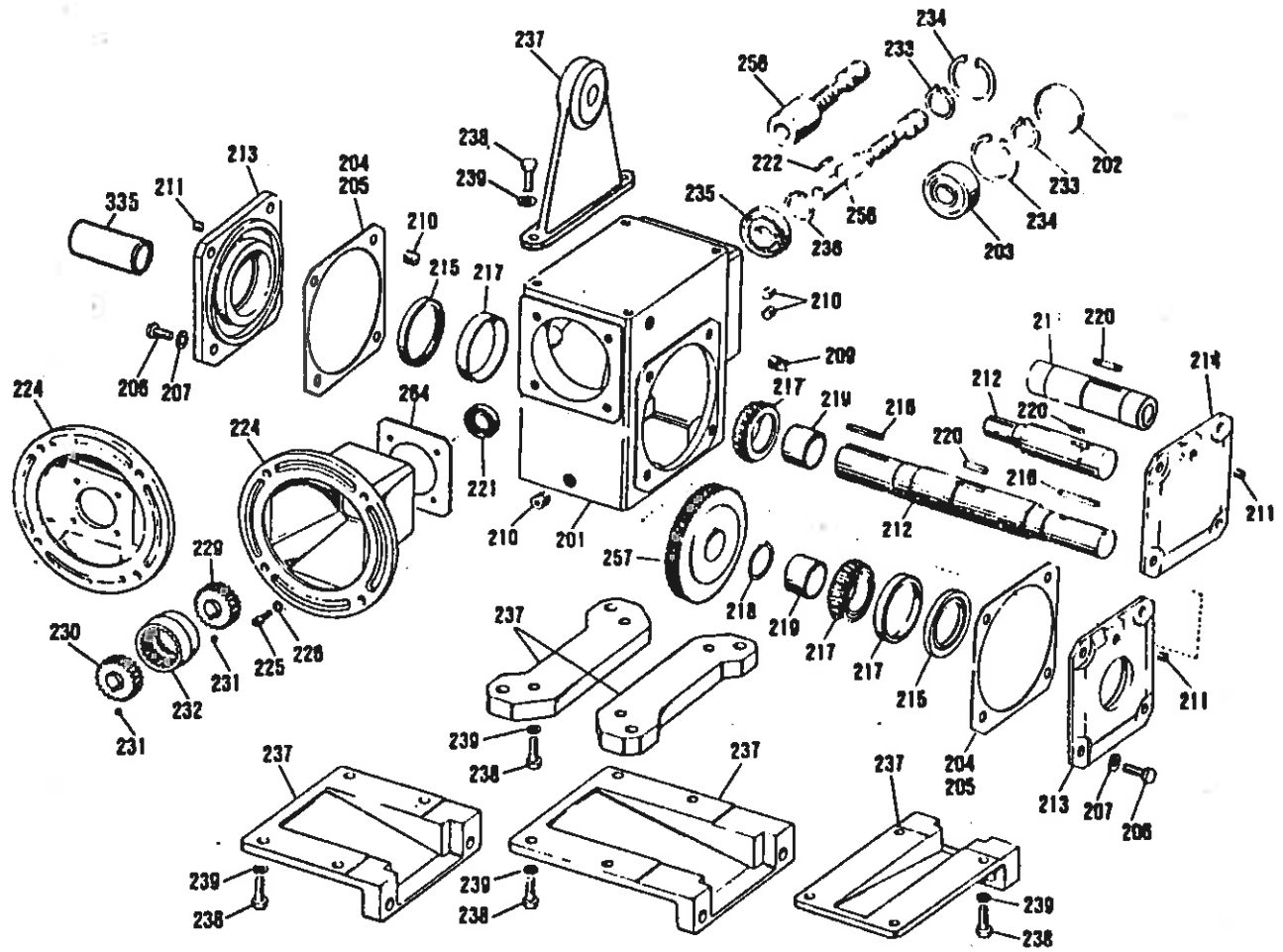
PARTS ORDERING INSTRUCTIONS

When ordering replacement parts first locate the exploded view that corresponds to your Doerr Electric gear reducer. Then determine which parts must be ordered. To order the parts, please provide the following:

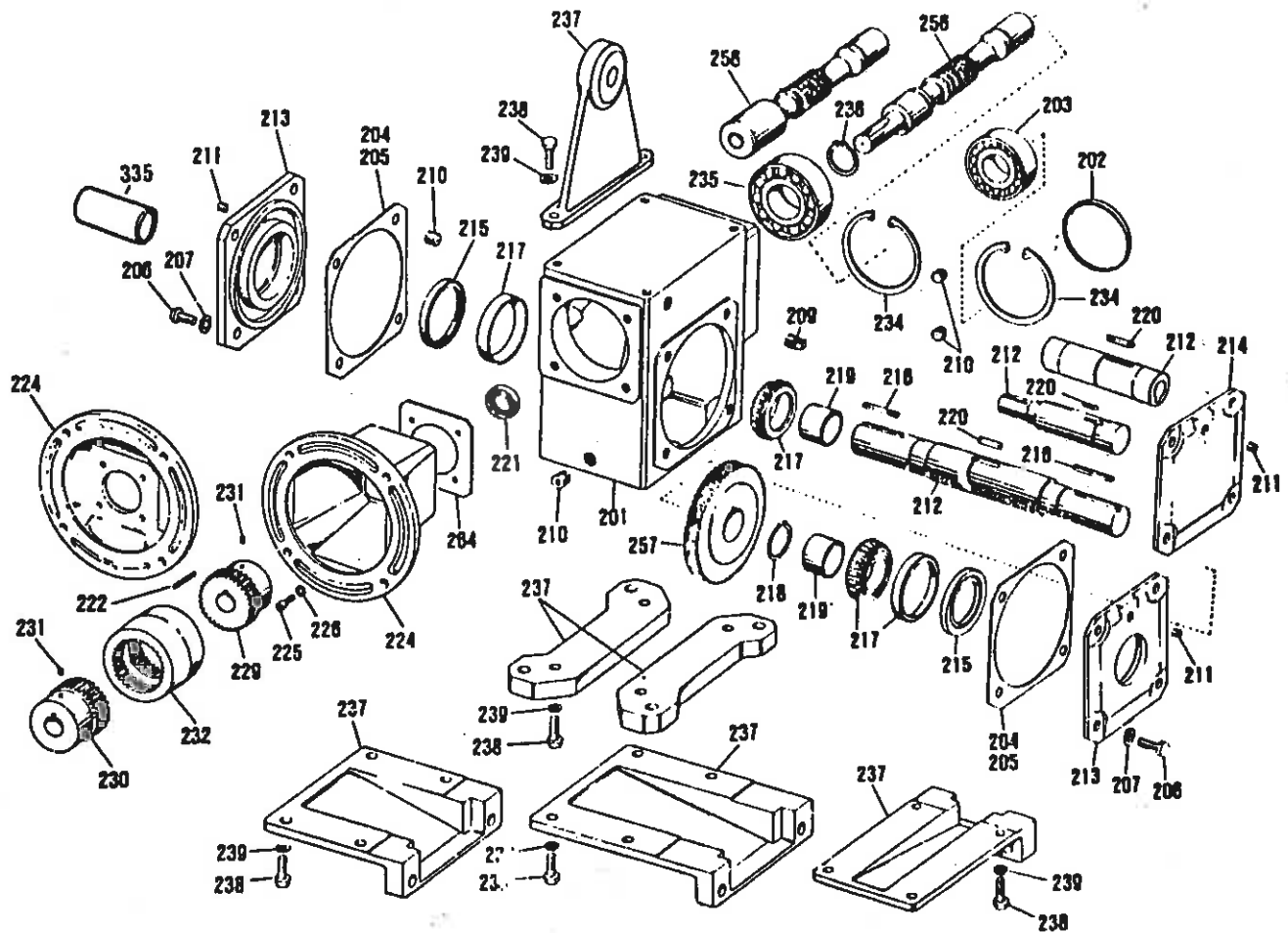
1. Complete Model Number (Nameplate)
2. Item Number (Exploded view and parts list)
3. Part Description (Parts list)

Note that one parts list covers all five exploded views. Although a single item number may refer to the same part on all five exploded views, it is incorrect to assume that these parts are interchangeable. They are not. Therefore, it is imperative that items 1 through 3 above be provided when ordering your parts.

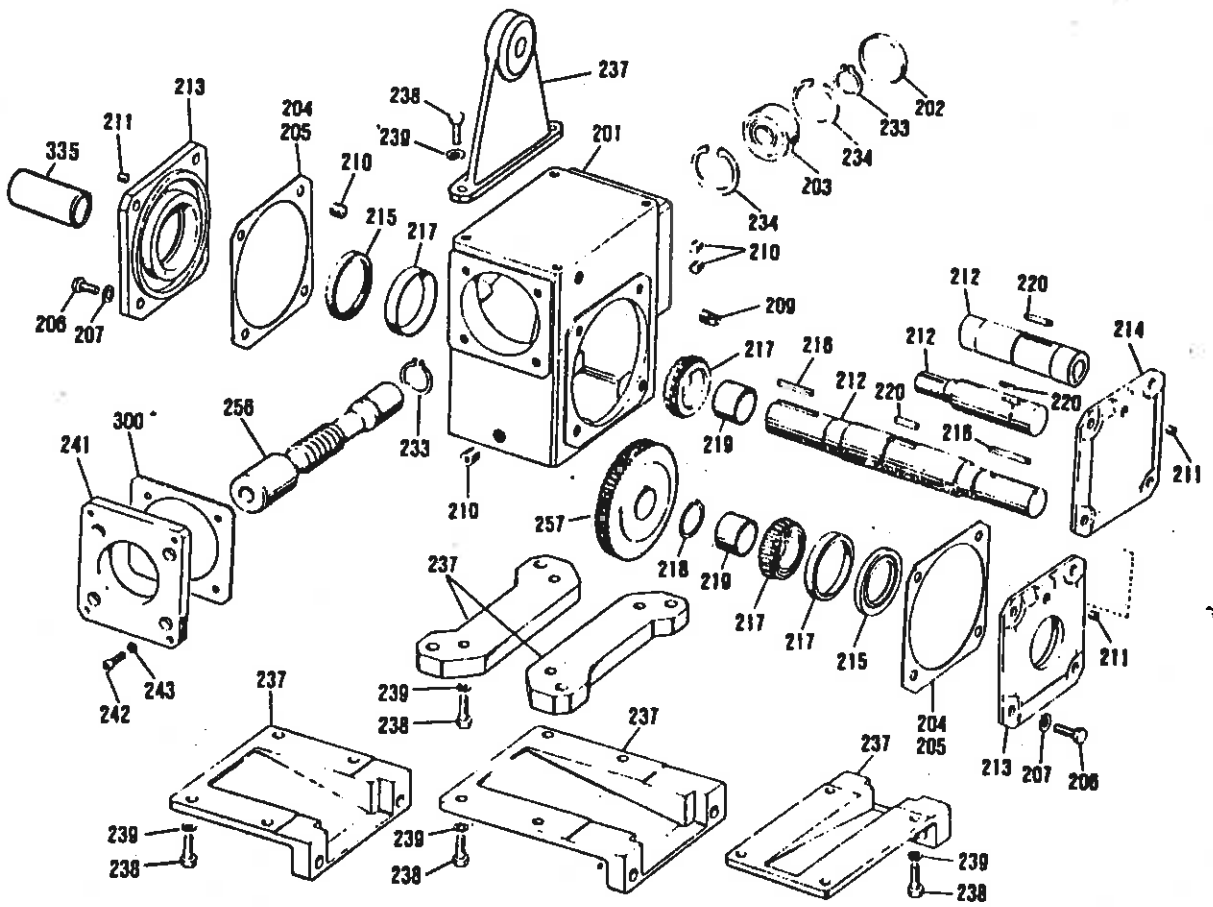
Failure to provide this information will only slow or prevent the processing of your order.



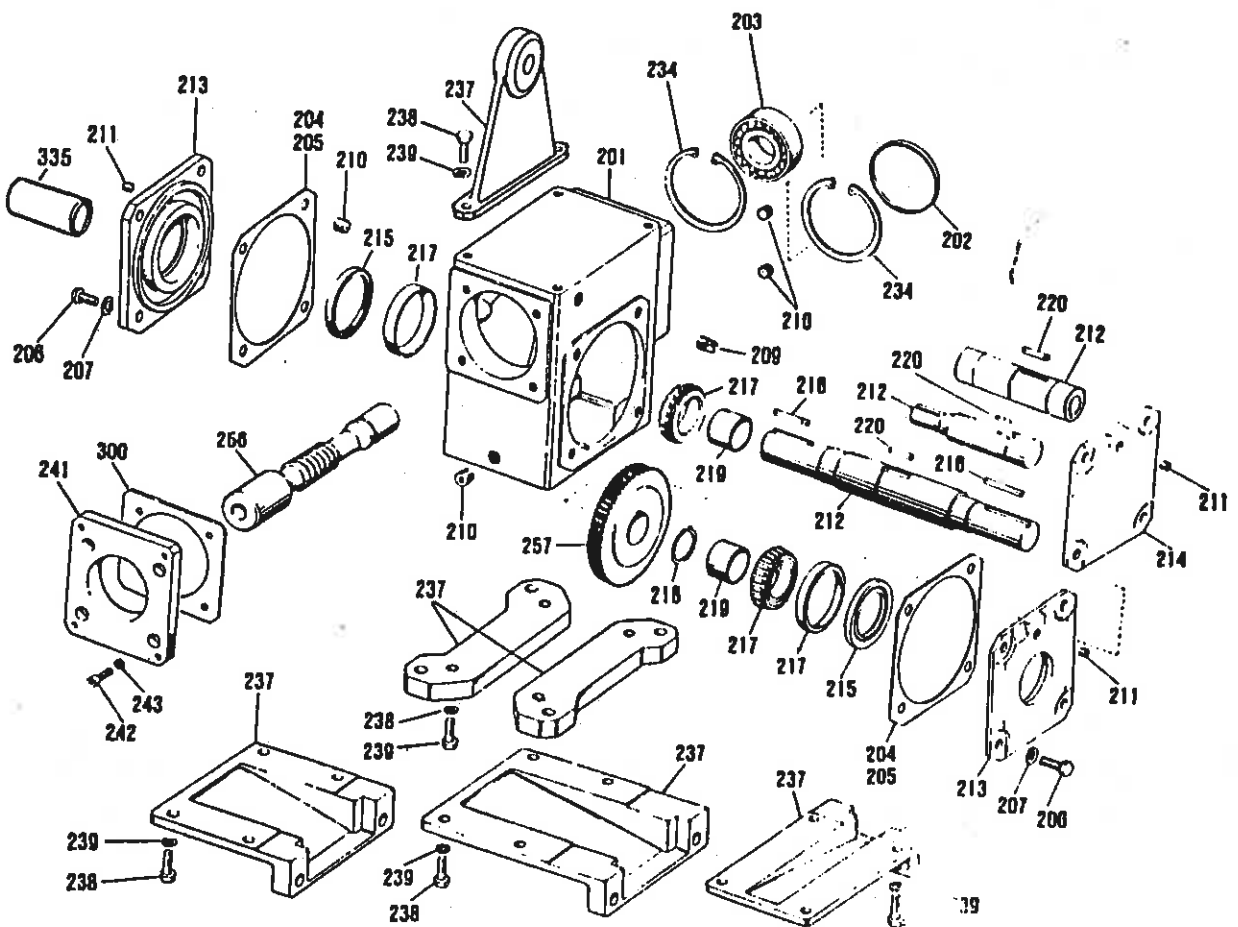
Single Reduction Unit 133, 175, 206 Series



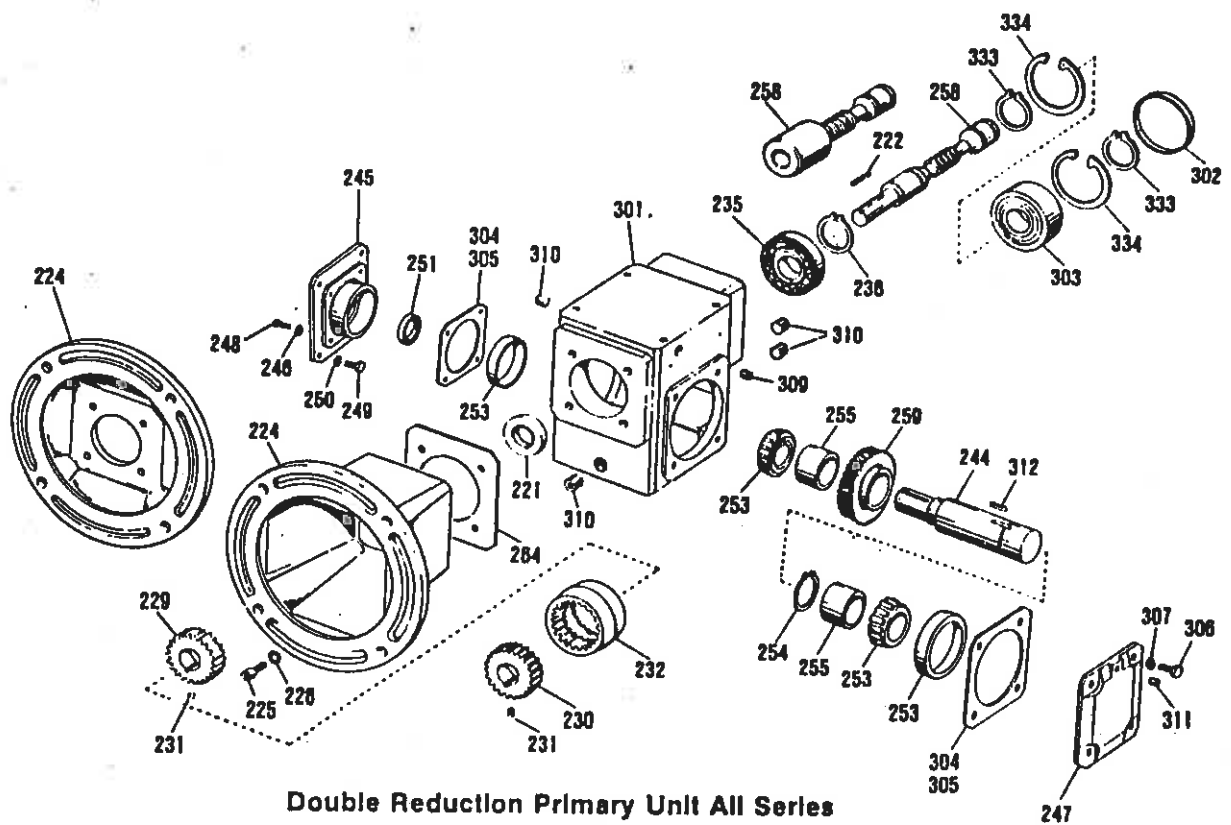
Single Reduction Unit 262, 325 Series



Double Reduction Secondary Unit 133, 175, 206 Series



Double Reduction Secondary Unit 262, 325 Series



Double Reduction Primary Unit All Series

PARTS LIST
(Applies to all exploded views)

| ITEM | DESCRIPTION | ITEM | DESCRIPTION | ITEM | DESCRIPTION |
|------|-------------------|------|----------------------|------|-------------------|
| 201 | Housing | 229 | Coupling Hub (Unit) | 255 | Spacer |
| 202 | End Cover | 230 | Coupling Hub (Motor) | 256 | Worm |
| 203 | Bearing | 231 | Setscrew | 257 | Gear |
| 204 | Shim (.019 Thick) | 232 | Coupling Sleeve | 258 | Worm |
| 205 | Shim (.007 Thick) | 233 | Lock Ring | 259 | Gear |
| 206 | Capscrew | 234 | Lock Ring | 260 | Thrust Plate |
| 207 | Lock Washer | 235 | Bearing | 261 | Capscrew |
| 209 | Vent Plug | 236 | Lock Ring | 264 | Gasket |
| 210 | Pipe Plug | 237 | Base | 300 | Gasket |
| 211 | Pipe Plug | 238 | Capscrew | 301 | Housing |
| 212 | Output Shaft | 239 | Lock Washer | 302 | End Cover |
| 213 | Seal Cage | 241 | Secondary Adaptor | 303 | Bearing |
| 214 | End Cover | 242 | Capscrew | 304 | Shim (.019 Thick) |
| 215 | Oil Seal | 243 | Lock Washer | 305 | Shim (.007 Thick) |
| 216 | Key | 244 | Primary Output Shaft | 306 | Capscrew |
| 217 | Bearing | 245 | Primary Adaptor | 307 | Lock Washer |
| 218 | Lock Ring | 246 | Lock Washer | 309 | Vent Plug |
| 219 | Spacer | 247 | End Cover | 310 | Pipe Plug |
| 220 | Key | 248 | Capscrew | 311 | Pipe Plug |
| 221 | Oil Seal | 249 | Capscrew | 312 | Key |
| 222 | Key | 250 | Lock Washer | 333 | Lock Ring |
| 224 | Motor Flange | 251 | Oil Seal | 334 | Lock Ring |
| 225 | Capscrew | 253 | Bearing | 335 | Shaft Cover |
| 226 | Lock Washer | 254 | Lock Ring | | |

Note: When ordering replacement parts, specify model number, item number, and part description.