



Tool Products

# OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

## SERIES 3 ELECTRA-FEED DRILL

Model FE033A-( )A-A

SECTION M107  
MANUAL 10

Released: 1-15-85

Revised: 12-15-95

Form: 2740-2

**IMPORTANT: READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.**

### OPERATING AND SAFETY PRECAUTIONS

- Keep hands and clothing away from rotating end of tool and all moving parts of tool.
- Wear suitable eye protection while operating tool or when near tool when it is being operated.
- Disconnect air and electrical supply from tool before removing/installing bits or performing other maintenance or service procedures.

### ROUTINE LUBRICATION REQUIREMENTS

Lack of or an excessive amount of lubrication will affect the performance and life of this tool. Use only recommended lubricants at below time intervals:

**EVERY 160 HOURS OF TOOL OPERATION** – Inject NLGI #1 "EP" grease (33153), 1 to 2 strokes, thru grease fitting in belt housing. NOTE: Spindle should be in the fully retracted position. This area should contain approximately 1/16 oz. (1.6 g) of grease.

**EVERY 160 HOURS OF TOOL OPERATION** – Inject NLGI #1 "EP" grease (33153), 1 to 2 strokes, thru grease fitting in gear housing. NOTE: Spindle must be extended from outer sleeve sufficiently to expose grease fitting in gear housing. Gearing should contain approximately 1/4 oz. (7 g) of grease.

**EVERY 2000 HOURS OF TOOL OPERATION** – Completely disassemble tool and clean and inspect all possible wear points. Lubricate parts/areas as specified in assembly instructions.

### AIR SUPPLY REQUIREMENTS

For maximum operating efficiency, the following air supply specifications should be maintained to this air tool:

- AIR PRESSURE – 90 PSIG (6 bar)
- AIR FILTRATION – 50 micron
- HOSE SIZE – 5/16" (8 mm) I.D.

Use of an ARO® model C28231-810 air line FILTER/REGULATOR/LUBRICATOR (F.R.L.) is recommended to maintain the above air supply specifications.

### MOUNTING

Three different style mounting bracket assembly options are available:

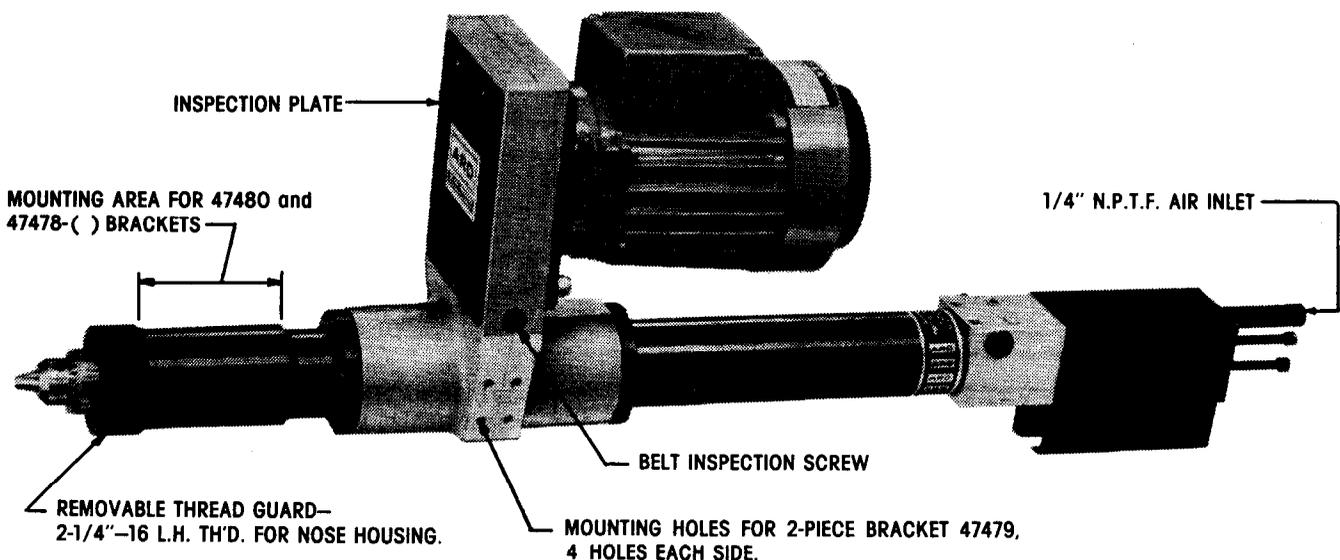
- 47478-( ) Split clamp type for mounting to front sleeve. Three fixed spindle heights available –
  - 47478-1 – 2.467 inches (62.6 mm)
  - 47478-2 – 2.625 inches (66.6 mm)
  - 47478-3 – 2.750 inches (69.8 mm)
- 47479 Two piece bracket for flush type mounting of tool. Brackets bolt to each side of belt drive housing.

A nose housing (47481) is available and recommended when drill bushings are required. The nose housing is not recommended for use as a mount without the additional support of one of the mounting brackets listed above.

### RECOMMENDED LUBRICANTS

After disassembly is complete, all parts, except sealed or shielded bearings, should be washed with solvent. To relubricate parts, or for routine lubrication, use the following recommended lubricants:

Where Used	ARO Part #	Description
Gears and Bearings	33153	5 lb. "EP" – NLGI #1 Grease
"O" Rings, Lip Seals & Air Cylinder	36460	4 oz. Stringy Lubricant



For parts and service information, contact your local ARO distributor, or the Customer Service Dept. of the Ingersoll-Rand Distribution Center, White House, TN at PH: (615) 672-0321, FAX: (615) 672-0801.

### ARO Tool Products

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## INSTALLATION

The ARO model FE033A-( ) is NOT supplied with the required motor starter. The motor starter must conform to local/national regulations governing the use of this type electrical equipment and must provide motor overload protection. The recommended overload setting is given on the wiring diagram. The power supply, motor starter and the motor nameplate ratings must be equivalent.

**MOTOR:** The electric motor develops a minimum of .3 horsepower at 2700/3320 r.p.m. The voltage requirements are shown below in the Electrical Connection Diagram.

**WARNING: BE SURE THE ELECTRICAL POWER SUPPLY IS OFF BEFORE MAKING ANY ELECTRICAL WIRING CONNECTIONS.**

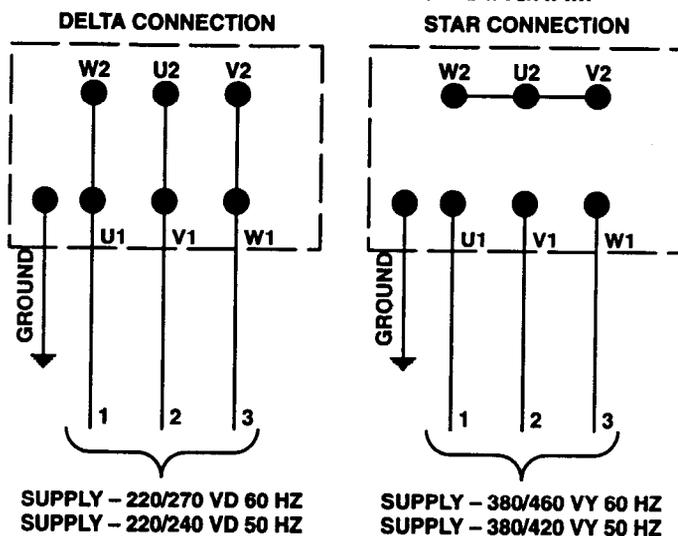
**WARNING: FAILURE TO PROPERLY GROUND THE MOTOR MAY CAUSE SERIOUS INJURY TO PERSONNEL.**

**DO NOT BLOCK THE AIR FLOW TO OR FROM THE MOTOR COOLING FAN. DO NOT DAMAGE THE MOTOR FAN COVER. KEEP SMALL OBJECTS CLEAR OF THE OPENINGS IN THE FAN COVER.**

Connect the motor starter to the motor as shown in the wiring diagram. The minimum wire size should be AWG no. 14, or equivalent, (4107 circular mil). The insulation used on the wire must be compatible with the work station environment.

Once the motor is connected, turn on the power supply. If the drill spindle fails to rotate or rotates in the wrong direction, then de-energize the motor starter immediately. Turn off the power supply and recheck the wiring. To reverse the direction of the rotation, interchange any two supply leads.

### ELECTRICAL CONNECTION DIAGRAM



### RECOMMENDED OVERLOAD SETTING

1.5 – 1.7 amp. ASEA motor.	0.9 – 1.0 amp. ASEA motor.
1.3 – 1.5 amp. LEROY SOMER motor.	0.8 – 0.9 amp. LEROY SOMER motor.

## MANUAL OPERATION

- Install button bleed valve (25) in either the "F" port located at the top of valve housing or the "F" port located at the rear of valve housing. NOTE: Unused port must be plugged with pipe plug (24).
- Depress button bleed valve (25) marked "F" on valve housing. The unit will start in the forward (advancing) mode and continue to feed forward until the adjusting screw "B" has depressed bleed valve (25) marked "R" to retract the unit. See set-up procedure.
- A manual emergency retract button bleed valve (25) can be installed in the "R" port at top of valve housing, if desired. This valve can be used to immediately retract the unit in case of

misaligned part or other emergency. Valve not furnished.

## SET-UP PROCEDURE

**Warning:** Keep clear of rotating end of unit with hands and/or clothing. Keep fingers/hands from being pinched between housing or valves and adjustment screws and/or trip bracket.

- Loosen two screws (29) and remove cover (1).
- Allow a minimum distance of 1/4" between the drill point of the unit and the workpiece (this is necessary for the motor to start and reach free speed before the drill point touches the workpiece).
- Determine the "Total Stroke Length" the drill must travel to perform drilling operation – see illustration, page 3.
- Loosen jam nut (8) and turn adjustment screw "A" so the distance between the end of the screw and the stud (26) equals the "Total Stroke Length".
- Tighten jam nut (8).
- Turn adjustment screw "B" so the distance between the end of the screw and the button bleed valve (25) is slightly GREATER than the distance set for adjustment screw "A".
- Start and let the unit advance until the adjustment screw "A" makes contact with the stud (26).
- Carefully, and be aware that the unit is going to retract, turn the adjustment screw "B" until it depresses the button bleed valve (25) enough to cause the unit to retract.
- See "Feed Rate Control Valves".

## FEED RATE CONTROL VALVES

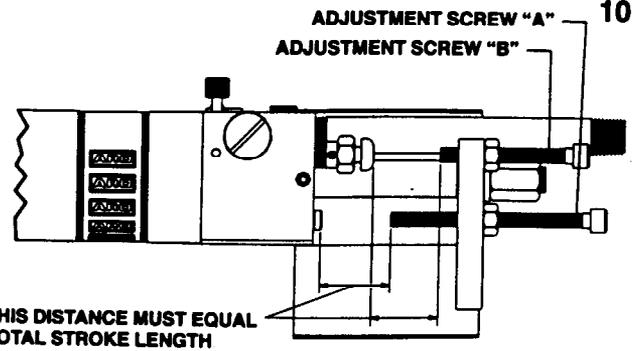
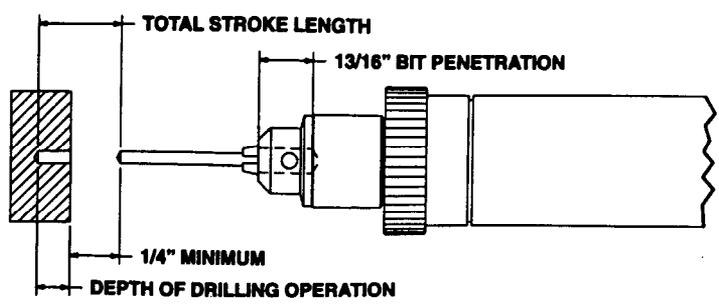
**CAUTION:** The feed rate of this tool is a selectable variable using the needle valves and/or hydraulic check. Faster feed rates require more power and higher amperage to the motor. The amperage to the motor should be closely monitored during set up and initial production to insure the amperage rating on the motor nameplates is not exceeded. Exceeding the amperage rating may cause permanent damage to the motor.

- Turn valve (23), marked "R" on top of housing, approximately 1-1/2 turns counterclockwise (open).
- Turn the other valve (23), marked "F" on top of housing, clockwise until closed (do not tighten too snugly).
- Start the unit and slowly turn valve (23) marked "F" counterclockwise (open) until the desired forward rate of feed is reached.
- A final adjustment of the rate of return (retract) can be made with the valve (23) marked "R" on housing.

## REMOTE OPERATION

- Install a pressure bleed valve – ARO part number 9600 – in valve port marked "F" at either the top or rear of valve housing.
- Connect pressure bleed valve – using 1/8" i.d. tubing – to a remote operated valve which, when actuated, feeds air pressure to the pressure bleed valve. Pressure bleed valve will bleed the air from "F" port of valve housing, causing spool valve in housing to shift to the forward feed position, thus starting the forward stroke of the unit.
- Install a pressure bleed valve – ARO part number 9600 – in valve port marked "R" at the top of the valve housing and connect – using 1/8" i.d. tubing – to a remote MANUALLY operated valve. This valve is used as an emergency retract in case of a part misalignment or such only as the unit, when properly set-up and applied, will automatically retract and return to the start position. See "Set-up Procedure". Refer to page 11 for plumbing and schematic diagrams.

**SPECIAL NOTE:** The air inlet and remote ports of valve housing have tapered pipe threads and should not require the use of thread sealants, such as sealant tape or pipe joint compounds. Thread sealants, when used improperly, can contaminate air passages and cause valve or unit to malfunction.



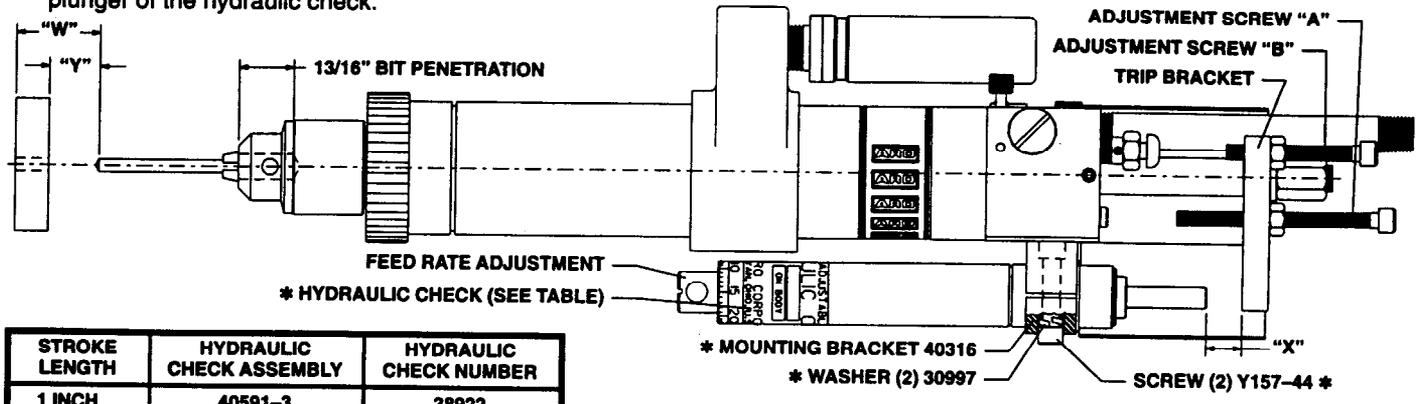
**SET-UP PROCEDURE WITH OPTIONAL HYDRAULIC CHECK**

- Assemble hydraulic check to mounting bracket and assemble mounting bracket to tool, using washers (30997) and cap screws (Y157-44).
- Measure the distance from the drill point to the workpiece - distance "Y".
- Distance "X" between the hydraulic check plunger and the trip bracket must be less than the distance "Y" to prevent damage to the drill point when it approaches the workpiece.
- Loosen the cap screws (Y157-44) and position the hydraulic check to obtain the correct setting for distance "X".
- Tighten cap screws (Y157-44) securely before operating the unit.
- Increase the air flow thru the feed control valve marked "F" by opening two full turns from the closed position. This will allow the drill to advance rapidly until the trip bracket contacts the plunger of the hydraulic check.

- The hydraulic feed rate adjustment is located at the nameplate end of the hydraulic check. Rotate the extended spindle until the slot on the spindle is located midway between the highest and the lowest settings.
- Start the drill unit and the drill will advance at a rapid rate until the trip bracket contacts the plunger of the hydraulic check.
- Slowly rotate the hydraulic feed rate counterclockwise for faster feed rate or clockwise for slower feed rate.

**TO CONTROL BREAKTHROUGH**

- Position the hydraulic check so the distance between the plunger and the trip bracket (distance "X") is less than the distance from the drill point to the opposite side of the workpiece (distance "W").
- Set-up of the self-feed drill unit will be the same as explained in "Set-up Procedure", page 2.



STROKE LENGTH	HYDRAULIC CHECK ASSEMBLY	HYDRAULIC CHECK NUMBER
1 INCH	40591-3	38922
2 INCH	40591-4	38922-1
3 INCH	40591-5	38922-2

\* MOUNTING BRACKET 40316  
\* WASHER (2) 30997  
SCREW (2) Y157-44 \*

PARTS INDICATED BY ASTERISK (\*) ARE INCLUDED IN 40591-( ) HYDRAULIC CHECK ASSEMBLY.

# DISASSEMBLY/ASSEMBLY INSTRUCTIONS

- Disconnect air and electrical supply BEFORE performing maintenance or service to tool.
- Never apply excessive pressure by a holding device which may cause distortion of a part.
- Apply pressure evenly to parts which have a press fit.
- Apply even pressure to the bearing race that will be press fitted to the mating part.
- Use correct tools and fixtures when servicing this tool.
- Don't damage "O" rings when servicing this tool.
- Use only genuine ARO replacement parts for this tool. When ordering, specify part number, description, tool model number and serial number.
- Secure tool in a suitable holding device, clamping on the valve housing. CAUTION: Do not clamp on the outer sleeve of the piston section, as it may cause distortion of the piston air cylinder, impairing the function of the tool.

## BELT AND PULLEY SECTION DISASSEMBLY

- Thread jack screw (90) all the way into jack screw support (89) – R.H. THREAD.
- Remove eight screws (79) and inspection plate (80).
- Loosen four nuts (81). Motor will slip down on belt housing, allowing sufficient slack in drive belt (99) for belt to be removed from drive pulley (98).
- Remove four nuts (81), washers (82), cap screws (83) and motor from belt housing.
- Thread adjustment screws (6 and 7) all the way back in trip bracket (5) and push the piston rod (46) forward the full stroke length.
- Remove five cap screws (40) from the rear belt housing (rear sleeve) and slip the retaining collar back on the sleeve.
- Remove two split ring halves (43) from sleeve.
- Pull rear sleeve (42) from belt housing far enough to expose bearing locknut (51).
- Using spanner wrench 47477-23 furnished with the tool, loosen locknut (51) – R.H. THREAD – completely. This will allow the drive shaft and bearings to be pulled from the rear bearing carrier (48).
- Pull the rear sleeve (42) back completely, disconnecting the rear sleeve and valve housing section from the belt housing.
- Insert a 3/16" dia. (4.7 mm) rod thru the cross hole in the drive shaft and remove screw (49). NOTE: Extra force may be required to remove screw due to the use of thread adhesive during assembly – R.H. THREAD.
- Using proper bearing removal tool, remove bearing (50).
- The gearing section with front gearing carrier (57) and drive shaft (61) can be pulled from front sleeve (54) at this point.
- To remove front sleeve, remove five screws (40) and slide retaining collar (41) back on front sleeve (54).
- Remove two split ring halves (43) from sleeve.
- Pull front sleeve from belt housing.
- Remove spacer washer (53) and grease ring (52) from belt housing.
- Remove belt inspection screw (92).
- Remove five screws (85) and shoulder screw (86).
- Separate the belt housing (78), allowing access to the drive belt (99) and the driven pulley assembly (91).

## BELT AND PULLEY SECTION ASSEMBLY

- Insure "O" rings (39) are properly seated in belt housing halves.
- Position one bearing of the driven pulley (91) in one of the belt housing halves, using care that "O" ring (39) remains properly seated in housing.
- Assemble drive belt (99) to driven pulley (91) and housing.
- Align other belt housing half with bearing of driven pulley and to first belt housing, using care that "O" ring remains properly seated in housing.
- Secure belt housing with shoulder screw (86) and five cap screws (85).
- Assemble spacer washer (53) into gearing end of belt housing.

- Assemble front sleeve (54) to belt housing and secure with split ring halves (43), retaining collar (41) and five button head screws (40).
- Lubricate "O" ring (58) and o.d. of front gearing carrier (57) adjacent to "O" ring (58), liberally with ARO 36460 "O" ring lube.
- Apply a liberal amount of ARO 33153 grease to internal splines of driven pulley (91), splines of drive shaft (61) and torque pin groove of gearing carrier (57).
- Assemble gearing section (gearing, gearing carrier, drive shaft, etc.) to front sleeve (54), aligning groove of gearing carrier and torque pin (55).
- Assemble grease ring (52) over drive shaft and into belt housing.
- Slip locknut (51) over drive shaft.
- Assemble bearings (50) to drive shaft with the unshielded side of bearings facing each other (shielded side of bearings facing out).
- Secure bearings (50) to drive shaft with screw (49). NOTE: Use a good grade thread adhesive on threads of screw (49) and, using a 3/16" dia. (4.7 mm) rod inserted thru cross hole of drive shaft, torque screw to 16.5 ft lbs.
- Assemble rear sleeve and valve section and rear bearing carrier (48) over bearings (50) and secure with locknut (51) in reverse manner of disassembly. Tighten locknut securely – R.H. THREADS.
- Assemble rear sleeve into belt housing and secure with split ring halves (43), retaining collar (41) and button head screws (40).
- Assemble motor to belt housing and belt, leaving the four nuts (81) loose enough to adjust belt tension.

## ADJUSTING BELT TENSION

- Thread jack screw out (counterclockwise) to increase (tighten) the belt tension.
- Gradually increase the belt tension until the belt deflection is 5/64" (2.0 mm) when a .5 to 1.0 lb force is applied to side of belt (see diagram, page 11).
- Tighten motor mounting nuts (81) completely and install inspection plate (80) and inspection screw (92).

## GEARING SECTION DISASSEMBLY

- Using a wrench on flats of spacer (72 or 109), place chuck key on chuck and strike key a sharp blow to loosen chuck from spindle – R.H. THREADS.
- Remove chuck and spacer (72 or 109).
- Follow disassembly instructions for disassembly of "Belt and Pulley Section" and remove gearing section from the belt and pulley section.
- Using wrenches on flats of gear housing and front bearing carrier, unthread and remove gearing assembly from bearing carrier – R.H. THREADS.
- Grasp ring gear (69) in one hand and tap threaded end of spindle (64) with a soft face hammer; spindle and components will loosen from ring gear.
- Further disassembly of gearing should only be done if it is necessary to replace a part, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble completely, remove bearing (67).
- Rotate snap ring on spindle so the open portion of the ring will allow the removal of one shaft (63).
- Remove one shaft (63) and gear and rotate open portion of snap ring, allowing removal of other shaft (63) and gear.
- To remove bearing (62), insert shafts (63) into spindle and alternately tap ends of shafts, loosening bearing from spindle.

## GEARING SECTION ASSEMBLY

- Pack bearings and lubricate gears and shafts liberally with ARO 33153 grease during assembly. Gearing should contain approximately 1/4 oz. (7 g) of grease.
- Assemble snap ring (66) to spindle (64), aligning open portion of ring with one shaft hole.

- Assemble one gear and shaft to spindle and rotate snap ring, aligning notch in shaft to snap ring.
- Assemble other gear and shaft to spindle and rotate open portion of snap ring 90° from either shaft, locking shafts in place.
- Assemble bearings (67 and 62) to spindle.
- Assemble washer (105), wave washer(s) (104) and spindle to ring gear.
- Assemble drive shaft (61), spacer (100) and gearing assembly to front gearing carrier (57) and tighten securely, using wrenches on flats of ring gear and front gearing carrier.
- Assemble seal (70) to nose housing (71) and assemble to ring gear. Tighten securely.
- On models using direct drive (1:1) gearing, check side play of spindle with tool retracted. If side play exceeds .010 T.I.R., add sufficient number of wavy washers (104) to reduce side play to less than .010 T.I.R. Do not use less than one or more than three wavy washers.
- Assemble spacer (72 or 109) and chuck to spindle.
- Follow instructions for assembly of the "Belt and Pulley Section" for completing the balance of the tool assembly.

## PISTON/REAR BEARING CARRIER SECTION DISASSEMBLY

- Loosen two screws (29) and remove cover (1) from valve housing.
- Remove adapter (3), washer (4) and trip bracket (5) from piston rod (46).
- Follow disassembly instructions of "Belt and Pulley Section" and remove the rear sleeve and valve housing section from the belt housing.
- Place valve housing in a suitable holding device with the rear sleeve (42) in an upright position.
- Using a strap type wrench on rear sleeve (42), unthread and remove rear sleeve from valve housing - L.H. THREADS. CAUTION: Remove rear sleeve (42) with care. Pull sleeve straight up and away from valve housing so as not to bend the air cylinder (35), damaging the inside diameter.
- If cylinder (35) remains inside the rear sleeve (42), push the piston rod (46) forward then pull it rearward. CAUTION: Handle the air cylinder carefully to prevent damaging or distorting the inside diameter.
- Remove "O" ring (31) and retaining ring (32) from piston rod (46).
- Push the piston rod (46) forward, exposing rear bearing carrier (48) and remove carrier and piston rod from rear sleeve. NOTE: Piston rod and rear bearing carrier are assembled using a hard drying thread adhesive. If it should become necessary to disassemble these parts, heat the threaded area lightly with a heat gun to soften the adhesive and facilitate removal - R.H. THREADS.
- Remove piston (33) from rear sleeve (42).
- Using a suitable rod inserted thru belt housing end of rear sleeve, push the cylinder stop (38) out thru the valve housing end of rear sleeve (42).

## PISTON/REAR BEARING CARRIER SECTION ASSEMBLY

- NOTE: Whenever a part containing "O" rings has been removed from the tool, it is recommended new "O" rings be used when reassembling the part to the tool. Lubricate all "O" rings with ARO 36460 "O" ring lube when assembling.
- Assemble retaining ring (36) and "O" rings (39 and 37) to air cylinder stop (38).
- Insert air cylinder stop (38) into rear sleeve (42) with the "O" ring (39) inserted into sleeve (42) first.
- Push cylinder stop (38) into sleeve (42) until it bottoms against offset in i.d. of sleeve.
- Assemble "O" ring (47) to groove of piston rod (46).
- Lubricate key groove of rear bearing carrier (48) and key (45)

- liberally with ARO 33153 grease and coat large o.d. of piston rod with ARO 36460 "O" ring lube.
- Insert piston rod (46) thru belt housing end of rear sleeve (42) and thru air cylinder stop (38), aligning groove of rear bearing carrier and key (45). Use care inserting piston rod thru cylinder stop so the "O" ring (37) is not damaged.
- Assemble seals (34) to piston (33), with lips of seals facing out (away from each other).
- Assemble piston (33) on piston rod and push down onto rod until piston seats against step on rod.
- Secure piston to piston rod with retaining ring (32).
- Lubricate "O" ring (31) and assemble over piston rod and push it down to step on piston rod.
- Secure valve housing in a suitable holding device, with the sleeve end upright.
- Assuming "O" rings (27 and 28) are assembled to valve housing; coat i.d. of cylinder (35) with ARO 36460 "O" ring lube and place air cylinder on valve housing over "O" ring (28).
- Coat o.d. of piston rod (46) with ARO 36460 "O" ring lube and insert rod thru valve housing, using care to maintain proper alignment of parts so "O" rings in valve housing are not damaged and to insure air cylinder is not bent or distorted when assembling rear sleeve (42) over air cylinder.
- Thread rear sleeve (42) to valve housing - L.H. THREADS - and tighten securely using a strap type wrench.
- Assemble rear sleeve and rear bearing carrier to drive shaft (61) and to belt housing section by following instructions for assembly of "Belt and Pulley Section".
- Assemble trip bracket (5), washer (4) and adapter (3) to piston rod.
- Assemble cover (1) to valve housing and secure with screws (29).

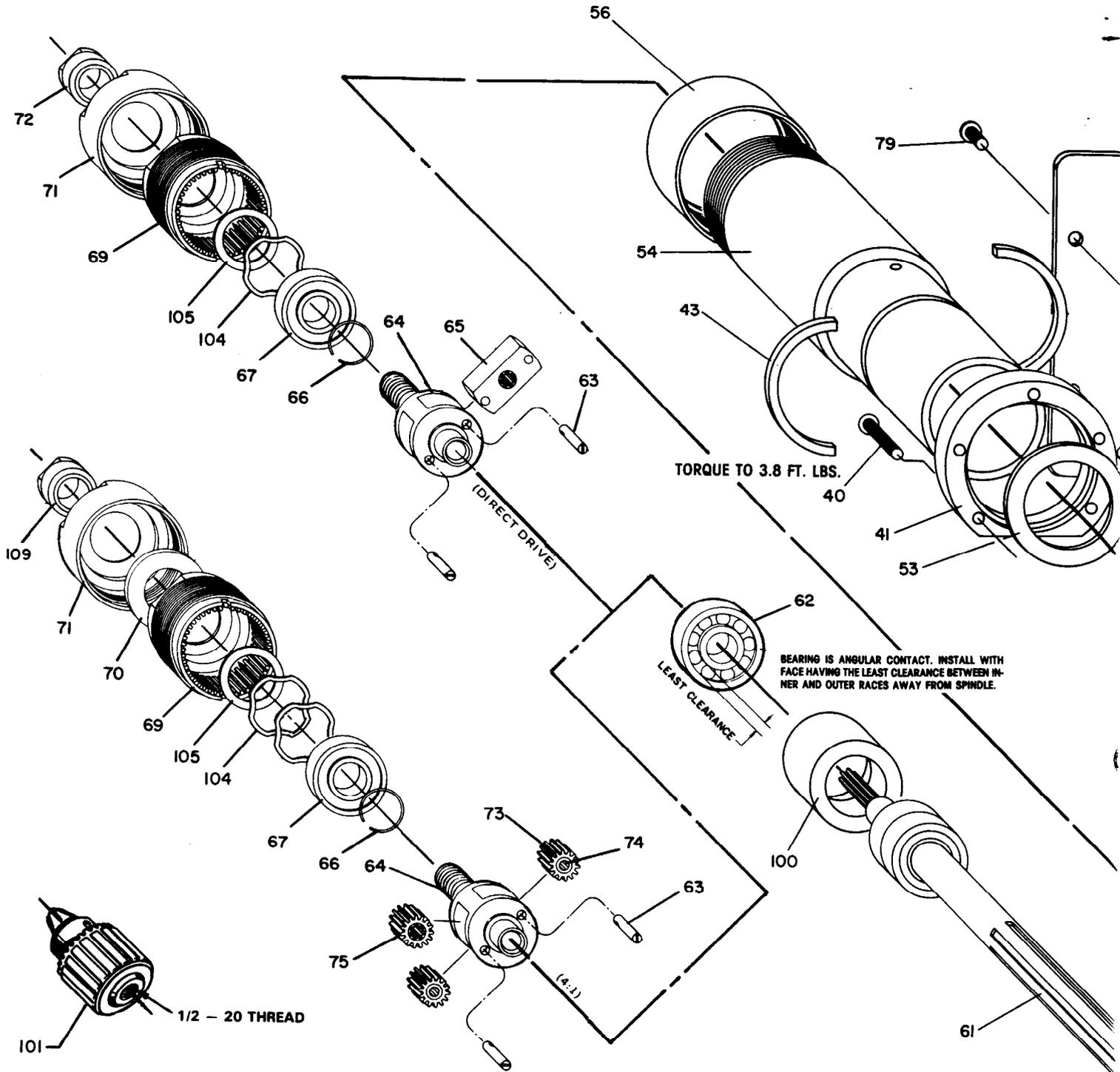
## VALVE HOUSING SECTION DISASSEMBLY

- The spool valve (14), needle valves (23) and button bleed valves (25) can be serviced without removing the valve housing from the piston/rear bearing carrier section. If the check valves (17) and/or components need to be serviced, follow instructions for disassembly of piston/rear bearing carrier section and remove rear sleeve (42) from valve housing.
- Loosen two screws (29) and remove cover (1) from valve housing.
- Remove two caps (12) and "O" rings (13) and push spool valve out thru housing.
- Feed control valves (23) and button bleed valves can be unthreaded and removed if necessary - R.H. THREADS.

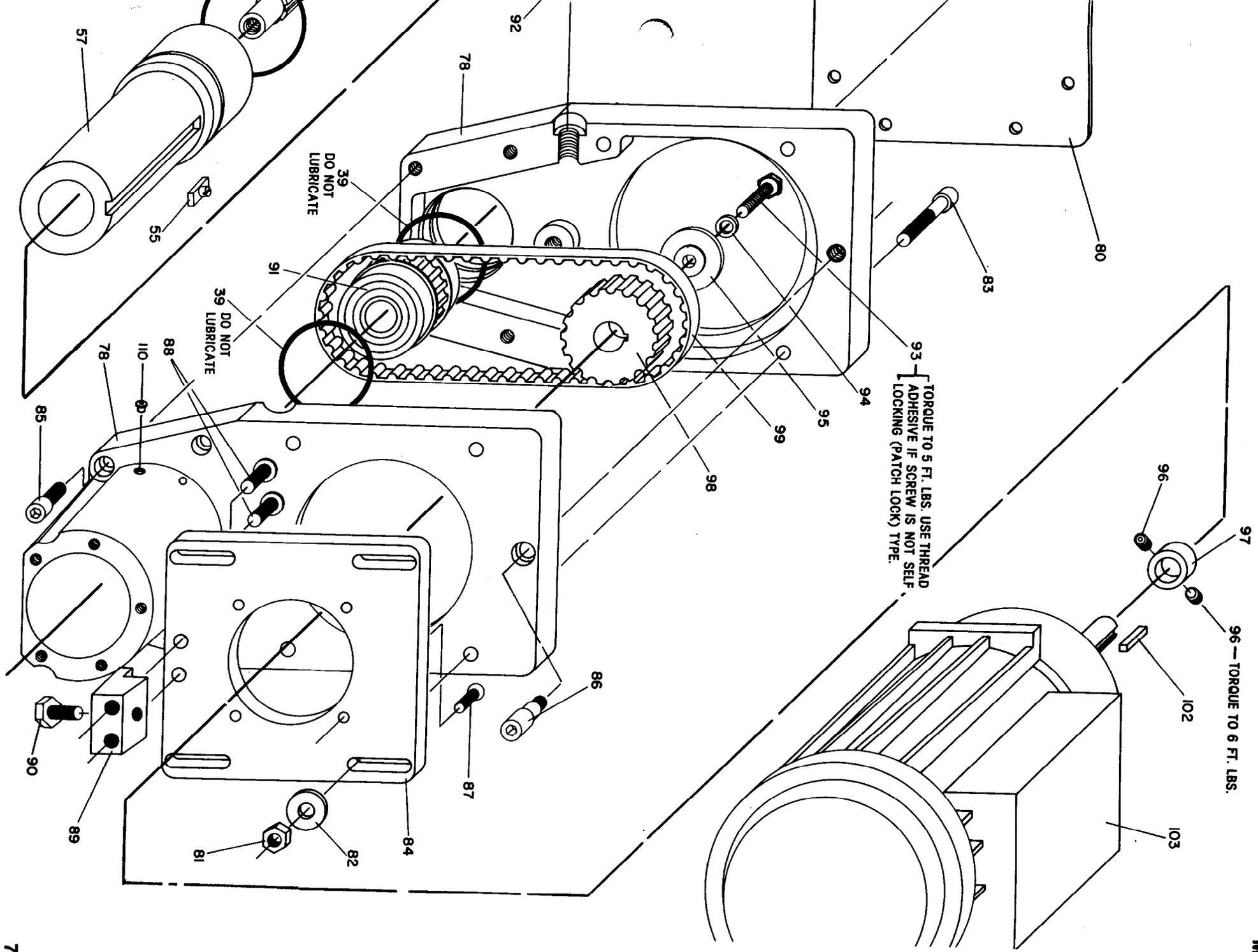
## VALVE HOUSING SECTION ASSEMBLY

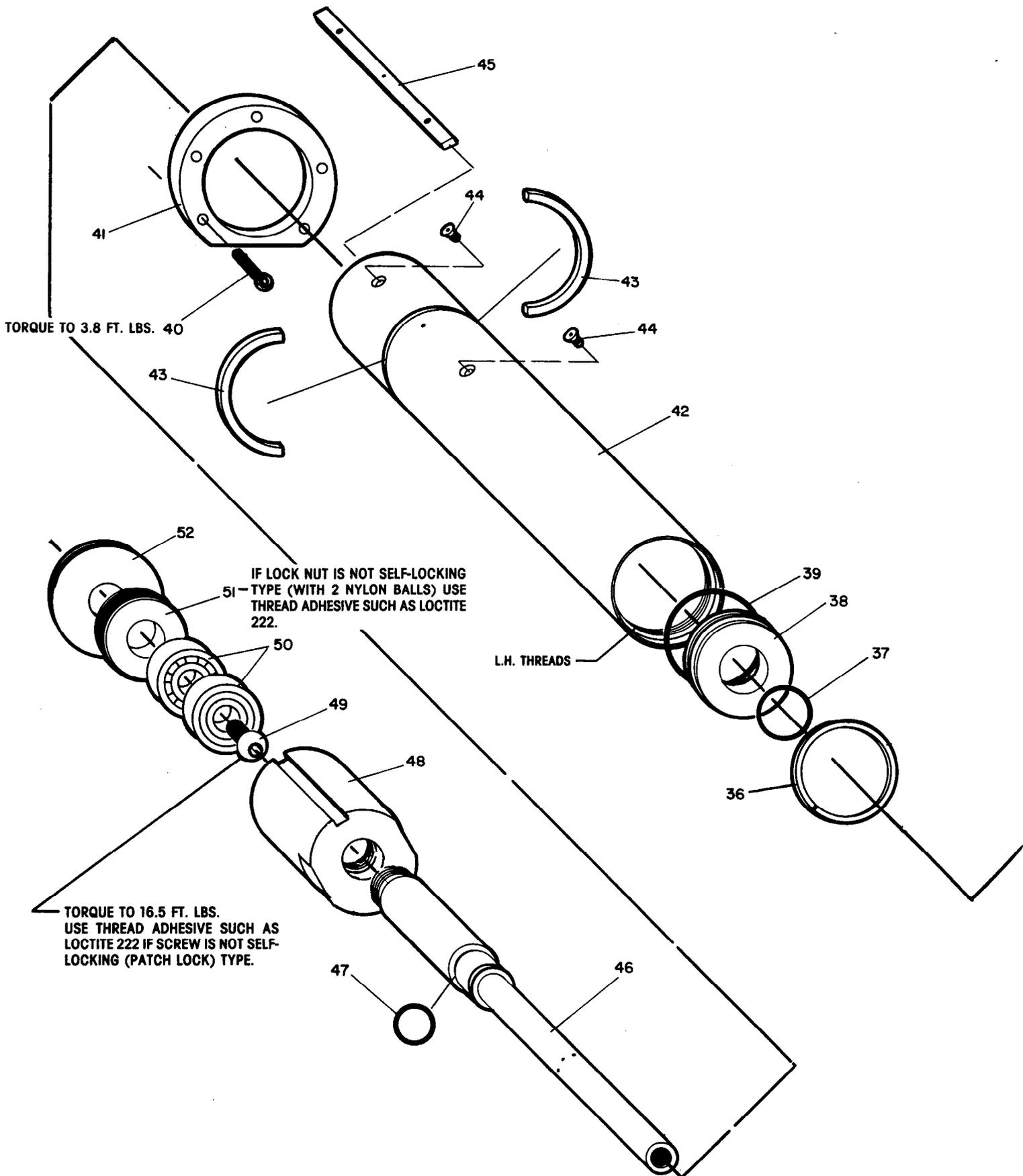
- All parts removed from valve housing that contain "O" rings, use new "O" rings with these parts when assembling.
- Lubricate all "O" rings with ARO 36460 "O" ring lube during assembly.
- Assemble "O" rings (22) to needle valves (23) and assemble needle valves to housing.
- Assemble plate (106) to housing, securing with screws (107).
- Assemble five "O" rings (15) to spool valve (14) and assemble spool valve into housing.
- Assemble "O" rings (13) to caps (12) and assemble to housing.
- Assemble "O" rings (16) to check valves (17) and assemble to housing, with springs (18).
- Assemble screw plug (19) to valve housing as shown in illustration.
- Assemble screw plug (21) to valve housing as shown in illustration.
- Assemble "O" rings (27 and 28) to valve housing.
- Follow instructions for assembly of "Piston/Rear Bearing Carrier Section" to assemble valve housing section to air cylinder (35) and rear sleeve (42).

**NOT SHOWN**  
**30510K CHUCK KEY (INCLUDED WITH ITEM 101)**  
**47477-23 WRENCH**  
**Y106-5 ALLEN WRENCH**

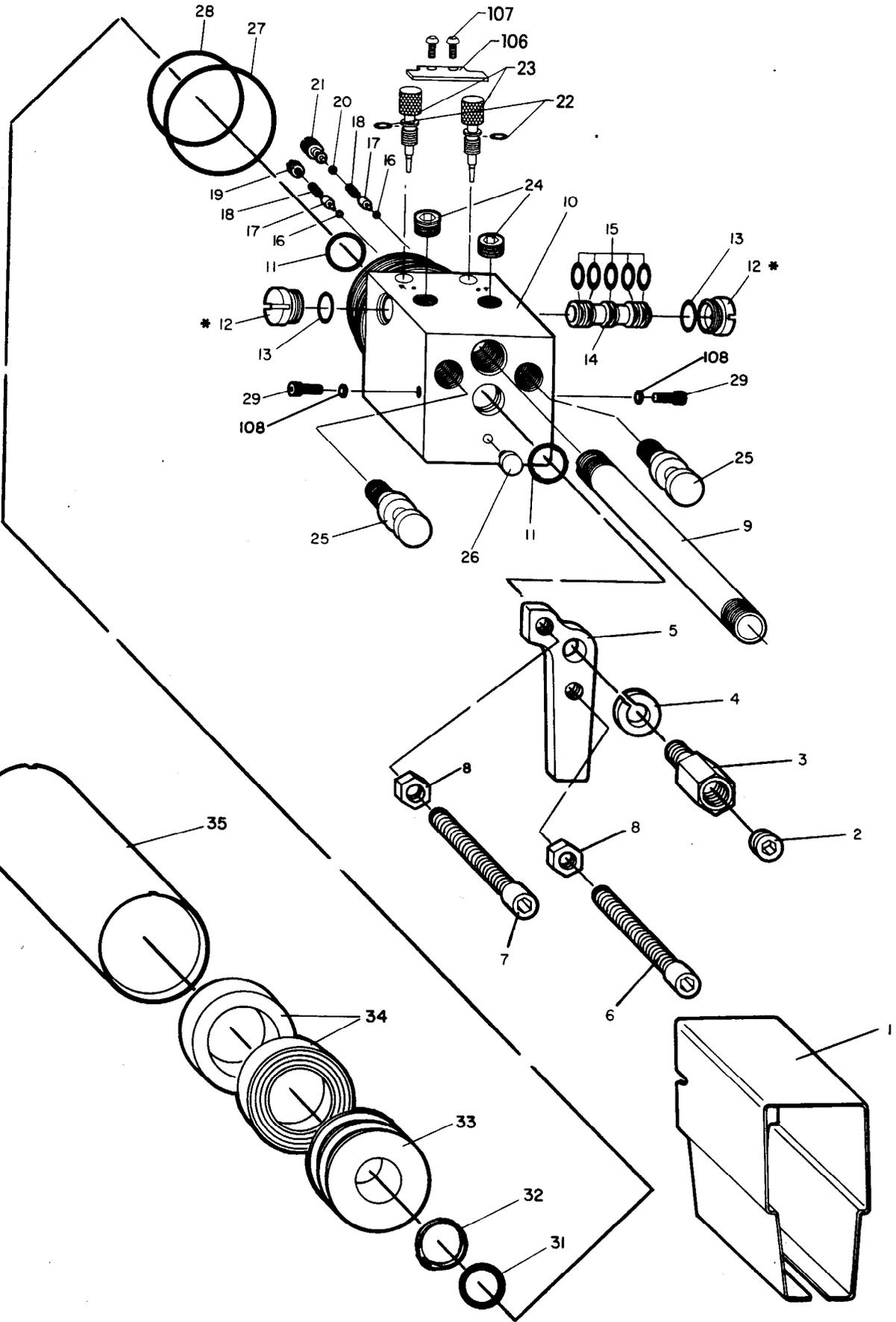


MODELS	R.P.M. @ 60 Hz	R.P.M. @ 50 Hz	DRIVE PULLEY (ITEM 98)	DRIVE BELT (ITEM 99)	DRIVE GEARING	TOTAL RED.
FE033A-85A-A	8500	7400	47477-8-A	47477-9-A	47591	.427:1
FE033A-65A-A	6500	5500	47477-8-B	47477-9-E	47591	.550:1
FE033A-49A-A	4900	4100	47477-8-C	47477-9-B	47591	.733:1
FE033A-36A-A	3600	3000	47477-8-D	47477-9-C	47591	1:1
FE033A-29A-A	2900	2400	47477-8-E	47477-9-D	47591	1.257:1
FE033A-21A-A	2100	1800	47477-8-F	47477-9-D	47591	1.692:1
FE033A-16A-A	1600	1400	47477-8-B	47477-9-E	40819	2.200:1
FE033A-12A-A	1200	1000	47477-8-C	47477-9-B	40819	2.933:1
FE033A-9A-A	900	700	47477-8-D	47477-9-C	40819	4:1
FE033A-5A-A	500	400	47477-8-F	47477-9-D	40819	6.769:1





\* ASSEMBLE WITH THREAD ADHESIVE SUCH AS LOCTITE 242



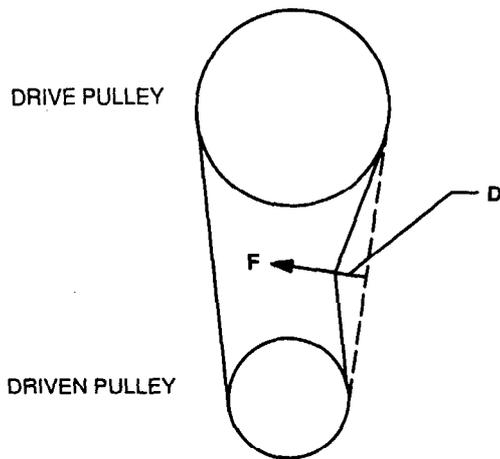
## PART NUMBER FOR ORDERING

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1	Cover	40313-2	62	Bearing	33703
2	Pipe Plug	Y227-2-L	63	Shaft (2 req'd per gearing assembly)	40841
3	Adapter	44883	64	Spindle (1/2" - 20 thread)	40835
4	Lock Washer	Y14-616	65	Splined Driver (direct drive)	34488
5	Trip Bracket	41713-3	66	Snap Ring	40842
6	Adjustment Screw "A"	40292-3	67	Bearing	33706
7	Adjustment Screw "B"	40292-2	69	Ring Gear	34490
8	Nut (2 req'd)	Y11-4-C	70	Seal	37774
9	Pipe Nipple	40857-7-2	71	Nose Housing (includes 35967 grease fitting)	38379
10	Valve Housing	40805	72	Spacer	33697
11	"O" Ring (2 req'd)	Y325-15	73	Gear (2 req'd) 4:1 ratio (14 teeth)	46417
12	Cap (2 req'd)	46697	74	Needle Bearing (4 req'd per gearing ass'y)	42271
13	"O" Ring (2 req'd)	Y325-14	75	Gear (7 internal - 15 external teeth)	34574
14	Valve Body	40307		Gearing Assembly 1:1 ratio (includes items 62 thru 67, 69, 71, 72, 104 and 105)	47591
15	"O" Ring (5 req'd)	41083		Gearing Assembly 4:1 ratio (includes items 62, 63, 64, 66, 67, 69, 70, 73, 74, 75, 104, 105 and 109)	40819
16	"O" Ring (2 req'd)	Y325-2	78	Drive Belt Housings (matched pair)(includes item 86 and two cap screws Y99-458)	47477-34
17	Check Valve (2 req'd)	39587	79	Button Head Cap Screw (8 req'd)	Y211-102
18	Spring (2 req'd)	35733	80	Inspection Plate	47477-7
19	Screw Plug	39652	81	Nut (4 req'd)	Y108-1-Z
20	"O" Ring	Y325-3	82	Washer (4 req'd)	Y13-4-C
21	Screw Plug	38863	83	Cap Screw (4 req'd)	Y99-45
22	"O" Ring (2 req'd)	Y325-7	84	Motor Mounting Flange	47477-2
23	Needle Valve (2 req'd)	48441-1	85	Cap Screw (3 req'd)	Y99-458
24	Pipe Plug (2 req'd)	Y227-2-L	86	Shoulder Screw	47477-25
25	Button Bleed Valve (2 req'd)	24130	87	Flat Head Screw (4 req'd)	47477-22
26	Stud	46558	88	Button Head Cap Screw (2 req'd)	Y211-144
27	"O" Ring	Y325-129	89	Jack Screw Support	47477-29
28	"O" Ring	Y325-29	90	Jack Screw	Y5-43
29	Button Head Cap Screw (2 req'd)	Y154-19	91	Driven Pulley Assembly (includes two bearings and driven pulley) sold as an assembly only	47477-16
	Valve Housing Assembly (includes items 10 thru 29 and 106 thru 108)	40814-3	92	Belt Inspection Screw	Y212-162
31	"O" Ring	41535	93	Hex Head Cap Screw	47477-21
32	Retaining Ring	Y145-23	94	Lock Washer	Y1-10
33	Piston	38867-1	95	Drive Pulley Retainer	47477-6
34	Seal (2 req'd)	38860	96	Set Screw (2 req'd)	47477-77
35	Air Cylinder	38866-2	97	Drive Pulley Spacer	47477-36
36	Retaining Ring	35619	98	Drive Pulley	
37	"O" Ring	Y325-20		models -85A-A	47477-8-A
38	Air Cylinder Stop Tube	47477-35		models -65A-A and -16A-A	47477-8-B
39	"O" Ring (3 req'd)	Y325-30		models -49A-A and -12A-A	47477-8-C
40	Button Head Cap Screw (10 req'd)	Y211-107		models -36A-A and -9A-A	47477-8-D
41	Retaining Collar (2 req'd)	47477-20		models -29A-A	47477-8-E
42	Rear Sleeve	47477-10		models -21A-A and -5A-A	47477-8-F
43	Split Ring Set (2 pair req'd)	47477-28	99	Drive Belt	
44	Flat Head Screw (2 req'd)	47477-42		models -85A-A	47477-9-A
45	Torque Key	47477-14		models -65A-A and -16A-A	47477-9-E
46	Piston Rod	40807-2		models -49A-A and -12A-A	47477-9-B
47	"O" Ring	Y325-16		models -36A-A and -9A-A	47477-9-C
48	Rear Bearing Carrier	47477-12		models -29A-A, -21A-A and -5A-A	47477-9-D
49	Retaining Screw	47477-78	100	Spacer	47477-5
50	Bearing (1 pair)	47477-26	101	Chuck (0" - 3/8" cap.) (includes 30510-K key)	33907
51	Locknut	47477-11	102	Motor Shaft Key	47477-55
52	Grease Ring	47477-45	103	Motor (includes item 102)	47477-1-A
53	Spacer Washer	47477-15	104	Wave Washer (1 or 2 req'd)	47589
54	Front Sleeve	47477-18	105	Washer	47590
55	Torque Pin	40312-1	106	Plate	48440-1
56	Thread Guard	47477-39	107	Screw (2 req'd)	Y211-1
57	Front Gearing Carrier	47477-17	108	Washer (2 req'd)	Y14-4
58	"O" Ring	Y325-32	109	Spacer	33697-1
59	Drive Shaft (included with item 61)		110	Grease Fitting	35967
60	Nut (included with item 61)				
61	Drive Shaft Assembly (includes two bearings, nut and drive shaft) sold as an assembly only	47477-40			

# BELT TENSION DIAGRAM

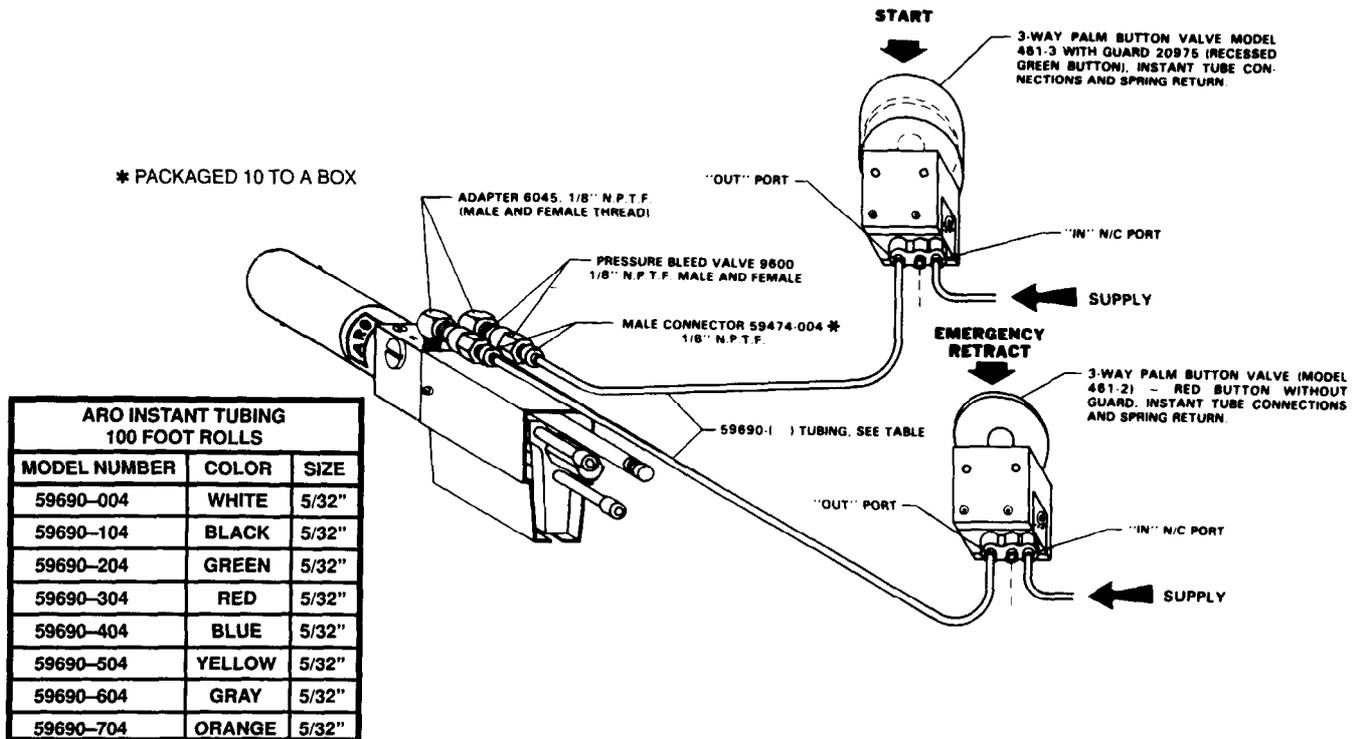
M107  
10



"F" = .50 TO 1.0 LB FORCE (2.3 TO .45 Kg)

"D" = 5/64" (2 mm)

## BASIC REMOTE CONTROL FOR START AND EMERGENCY RETRACT FUNCTIONS



## REMOTE OPERATION

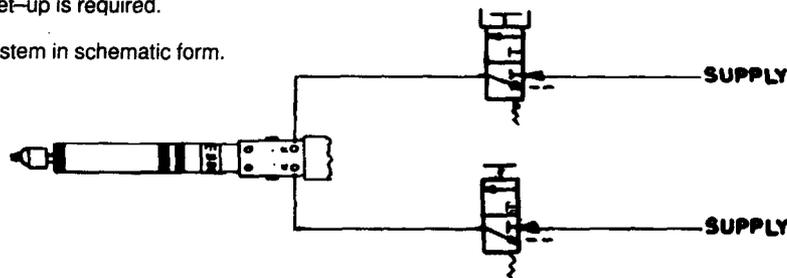
Remote operation of the unit may be achieved by connecting a 3-way valve to the remote start and/or remote retract ports, as shown above.

**TO START**—Depress the remote button momentarily. The unit will advance the drill to a pre-set depth and automatically retract to the initial position whereupon the unit will stop.

**EMERGENCY RETRACT**—Depress the emergency button momentarily. This signal to the unit will shift the built-in pressure operated valve, commanding the unit to retract immediately to the initial position whereupon the unit will stop.

**NOTE: MANUAL START and EMERGENCY RETRACT** buttons on the tool are fully operational even when remote control is used. The manually operated buttons can be used when set-up is required.

Shown below is the same system in schematic form.



# TYPICAL CROSS SECTION OF TOOL

