



OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

SECTION M40
MANUAL 51
Released: 4/73
Revised: 6-6-97
Form: 278-2

"44" SERIES POWER MOTORS AND MILLING MOTORS

Models: 82() ()-A and 82() ()-4A



⚠ WARNING

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

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

Pneumatic tools should always be installed and used in accordance with A.N.S.I. B186.1 "Safety Code For Portable Air Tools."

⚠ WARNING

- Operate this tool at 90 p.s.i.g. (6.2 bar) maximum air pressure at the air inlet of the tool.
- Disconnect air supply from tool before removing/installing bit, socket or device attached to tool or performing maintenance procedures.
- Keep hands, clothing and long hair away from rotating end of tool.
- Anticipate and be alert for sudden changes in motion during start up and operation of any power tool.
- Never exceed rated r.p.m. of tool.
- Wear suitable eye and hearing protection while operating tool.
- Tool shaft can continue to rotate briefly after throttle is released.

- Do not lubricate tools with flammable or volatile liquids such as kerosene, diesel or jet fuel.
- Do not remove any labels. Replace any damaged label.
- Use only accessories recommended by ARO.

NOTICE

- The use of other than genuine ARO replacement parts may result in safety hazards, decreased tool performance and increased maintenance and may invalidate all warranties.
- ARO is not responsible for customer modification of tools for applications on which ARO was not consulted.
- Tool maintenance and repair should be performed by authorized, trained, competent personnel. Consult your nearest ARO authorized servicer.
- It is the responsibility of the employer to place the information in this manual into the hands of the operator.

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.

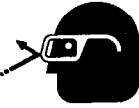
ARO Tool Products

Ingersoll-Rand Company
1725 U.S. No. 1 North • P.O. Box 8000 • Southern Pines, NC 28388-8000
©1997 THE ARO CORPORATION • PRINTED IN U.S.A.

INGERSOLL-RAND®
PROFESSIONAL TOOLS

FAILURE TO OBSERVE THE FOLLOWING WARNINGS COULD RESULT IN INJURY.

⚠ WARNING



Wear eye protection when operating or performing maintenance on this tool.

⚠ WARNING




Wear hearing protection when operating this tool.

⚠ WARNING




Turn off air supply and disconnect air supply hose before installing, removing or adjusting any accessory on this tool, or before performing any maintenance on this tool.

⚠ WARNING



Do not use damaged, frayed or deteriorated air hoses and fittings.

⚠ WARNING



Operate at 90 p.s.i.g. (6.2 bar/620 kPa) maximum air pressure.

WARNING = Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.

CAUTION = Hazards or unsafe practices which could result in minor personal injury or product or property damage.

NOTICE = Important installation, operation or maintenance information.

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 8 HOURS OF TOOL OPERATION – Fill lubricator reservoir of recommended F.R.L. with spindle oil (29665).

EVERY 40 HOURS OF TOOL OPERATION – Flush tool with a solution of three parts cleaning solvent and one part light oil. After flushing, apply a small amount of spindle oil in air inlet and run free for one minute to insure proper lubrication.

EVERY 160 HOURS OF TOOL OPERATION – Lubricate gearing. Inject 2 or 3 strokes of grease thru grease fitting in housing. Pack bearings, coat shafts and lubricate gears with NLGI #1 "EP" grease (33153). Gearing should contain approximately 1/2 oz. (14 g) of grease per reduction.

AIR SUPPLY REQUIREMENTS

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

- AIR PRESSURE – 90 p.s.i.g. (6.2 bar)
- AIR FILTRATION – 50 micron
- LUBRICATED AIR SUPPLY
- HOSE SIZE – 3/8" (10 mm) I.D.

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

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
Air Motor	29665	1 qt. Spindle Oil
"O" Rings & Lip Seals	36460	4 oz. Stringy Lubricant
Gears and Bearings	33153	5 lb. "EP" – NLGI #1 Grease

INSPECTION, MAINTENANCE AND INSTALLATION

Disconnect air supply from the tool or shut off air supply and exhaust (drain) line of compressed air before performing maintenance or service to the tool.

It is important that the tools be serviced and inspected at regular intervals for maintaining safe, trouble-free operation of the tool.

Be sure the tool is receiving adequate lubrication, as failure to lubricate can create hazardous operating conditions resulting from excessive wear.

Be sure that the air supply lines and connectors are of proper size to provide a sufficient quantity of air to the tool.

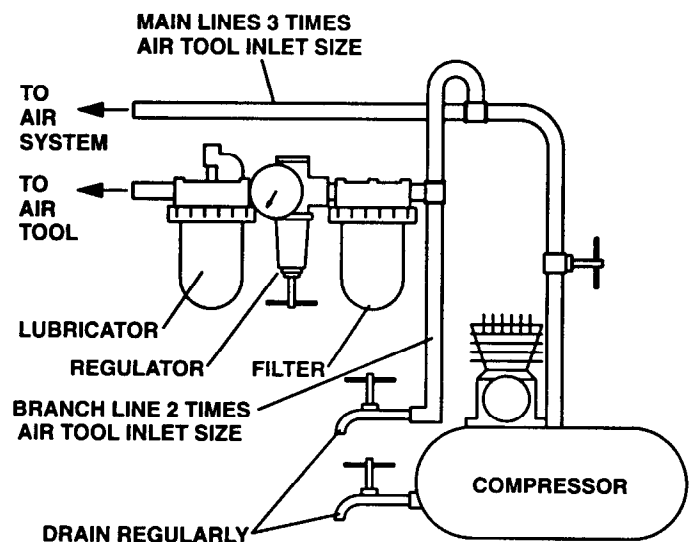
Tool maintenance and repair shall be performed by authorized, trained, competent personnel. Tools, hose and fittings shall be replaced if unsuitable for safe operation and responsibility should be assigned to be sure that all tools requiring guards or other safety devices shall be kept in legible condition. Maintenance and repair records should be maintained on all tools. Frequency of repair and the nature of the repairs can reveal unsafe application. Scheduled maintenance by competent authorized personnel should detect any mistreatment or abuse of the tool and worn parts. Corrective action should be taken before returning the tool for use.

Disassembly should be done on a clean work bench with a clean cloth spread to prevent the loss of small parts. After disassembly is completed, all parts should be thoroughly washed in a clean solvent, blown dry with air and inspected for wear levels, abuse and contamination. Double sealed or shielded bearings should never be placed in solvent unless a good method of re-lubricating the bearing is available. Open bearings may be washed but should not be allowed to spin while being blown dry.

Upon reassembling, lubricate parts where required. Use 33153 grease, or equivalent, in bearings. Use 36460 lubricant for "O" ring assembly. When assembling "O" rings or parts adjacent "O" rings, care must be exercised to prevent damage to the rubber sealing surfaces. A small amount of grease will usually hold steel balls and other small parts in place while assembling.

When replacement parts are necessary, consult drawing containing the part for identification.

Always use clean, dry air. Dust, corrosive fumes and/or excessive moisture can damage the motor of an air tool. An air line filter can greatly increase the life of an air tool. The filter removes rust, scale, moisture and other debris from the air lines. Low air pressure (less than 90 p.s.i.g.) reduces the speed of the air tool. High air pressure (more than 90 p.s.i.g.) raises performance beyond the rated capacity of the tool and could cause injury. Shown below is a typical piping arrangement.



MODEL IDENTIFICATION POWER MOTORS

MODEL NUMBER	ROTATION	R.P.M.	GEARING SECTION		MOTOR ASSEMBLY	HEAD SECTION	GEARING RED.
			AUXILIARY	DRIVE			
8200-A	FORWARD	275	36164	36163	36188-1	36175	49:1
8201-A	FORWARD	500	36164	36162	36188-1	36175	28:1
8202-A	FORWARD	900	36165	36162	36188-1	36175	16:1
8203-A	FORWARD	2,000		36163	36188-1	36175	7:1
8204-A	FORWARD	3,500		36162	36188-1	36175	4:1
8205-A	FORWARD	14,000		36161	36188-1	36175	1:1
8206-A	REVERSIBLE	275	36164	36163	36184	36174	49:1
8207-A	REVERSIBLE	500	36164	36162	36184	36174	28:1
8208-A	REVERSIBLE	900	36165	36162	36184	36174	16:1
8209-A	REVERSIBLE	2,000		36163	36184	36174	7:1
8210-A	REVERSIBLE	3,500		36162	36184	36174	4:1
8211-A	REVERSIBLE	14,000		36161	36184	36174	1:1

CANCELLED MODELS

MILLING MOTORS

MODEL NUMBER	ROTATION	R.P.M.	GEARING SECTION		MOTOR ASSEMBLY	HEAD SECTION	GEARING RED.
			AUXILIARY	DRIVE			
8200-4A-()	FORWARD	275	36164	39884	36188-1	36175	49:1
8201-4A-()	FORWARD	500	36164	39883	36188-1	36175	28:1
8202-4A-()	FORWARD	900	36165	39883	36188-1	36175	16:1
8203-4A-()	FORWARD	2,000		39884	36188-1	36175	7:1
8204-4A-()	FORWARD	3,500		39883	36188-1	36175	4:1
8205-4A-()	FORWARD	14,000		39882	36188-1	36175	1:1

COLLETS

COLLET OPTION	COLLET NUMBER	SIZE	CAPACITY	
			MINIMUM	MAXIMUM
820()-4A-A	35264-1	1/4"	.2187 (5.556 mm)	.2500 (6.350 mm)
820()-4A-B	35264-2	9/32"	.2500 (6.350 mm)	.2812 (7.144 mm)
820()-4A-C	35264-3	5/16"	.2812 (7.144 mm)	.3125 (7.938 mm)
820()-4A-D	35264-4	11/32"	.3125 (7.938 mm)	.3437 (8.731 mm)
820()-4A-E	35264-5	3/8"	.3437 (8.731 mm)	.3750 (9.525 mm)
820()-4A-F	35264-6	13/32"	.3750 (9.525 mm)	.4062 (10.319 mm)
820()-4A-G	35264-7	7/16"	.4062 (10.319 mm)	.4375 (11.112 mm)
820()-4A-H	35264-8	15/32"	.4375 (11.112 mm)	.4687 (11.906 mm)
820()-4A-J	35264-9	1/2"	.4687 (11.906 mm)	.5000 (12.700 mm)
820()-4A-K	35264-10	17/32"	.5000 (12.700 mm)	.5312 (13.494 mm)
820()-4A-L	35264-11	9/16"	.5312 (13.494 mm)	.5625 (14.288 mm)
820()-4A-M	35264-12	19/32"	.5625 (14.288 mm)	.5937 (15.081 mm)
820()-4A-N	35264-13	5/8"	.5937 (15.081 mm)	.6250 (15.875 mm)
820()-4A-P	35264-14	21/32"	.6250 (15.875 mm)	.6562 (16.669 mm)
820()-4A-Q	35264-15	11/16"	.6562 (16.669 mm)	.6875 (17.462 mm)
820()-4A-R	35264-16	23/32"	.6875 (17.462 mm)	.7187 (18.256 mm)
820()-4A-S	35264-17	3/4"	.7187 (18.256 mm)	.7500 (19.050 mm)

DISASSEMBLY AND REASSEMBLY OF TOOLS

M40
51

Before starting to disassemble or reassemble this tool (any part or completely), be sure to read "INSPECTION, MAINTENANCE AND INSTALLATION". To minimize the possibility of parts damage and for convenience, the steps for disassembly or reassembly listed on the following pages are recommended.

(Y14-416). Pull gearing from tool. On models with both drive and auxiliary gearing, remove drive gearing as outlined and remove nuts (Y109-428) and cap screws (Y157-43-C). Pull auxiliary gearing from motor.

The basic sections and instructions for removing them from the tool are as follows:

MOTOR SECTION

To remove motor assembly, remove gearing and grasp splined end of rotor and pull motor from housing.

With the tool disconnected from air service -

GEARING SECTION

To remove drive gearing, remove nuts (Y109-428) and cap screws (Y157-42-C) or cap screws (Y157-43-C) and washers

HEAD SECTION

To remove motor housing from head, place head of tool in a suitable holding device and, using a strap wrench, unthread and remove motor housing.

TYPICAL CROSS SECTION OF TOOL

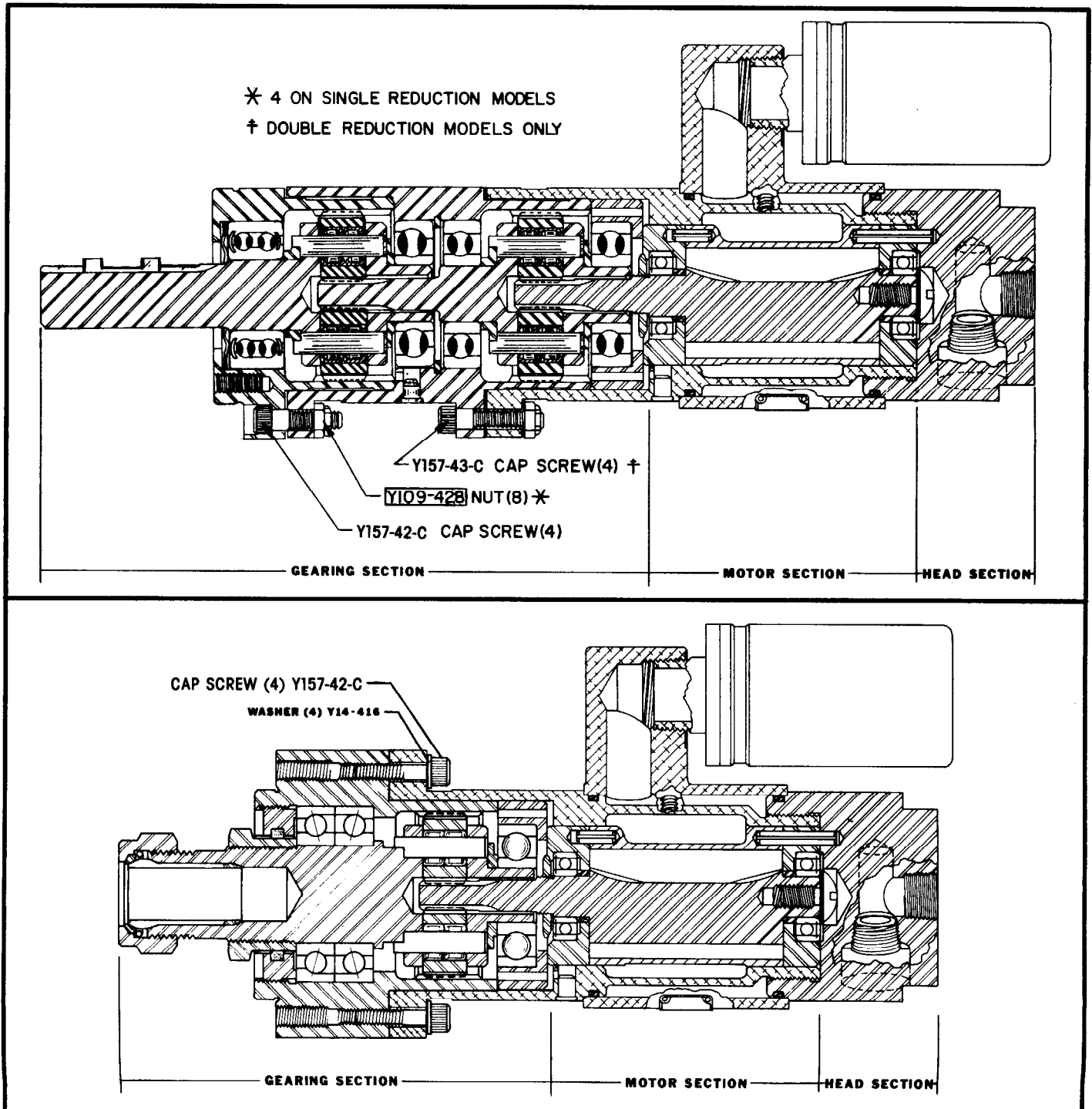


FIGURE 1

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

DRIVE GEARING

DISASSEMBLY

- Grasp housing (ring gear) in one hand and tap drive end of spindle with a soft face hammer; spindle and components will loosen from housing.
- Gearing should not be disassembled further unless it is necessary to replace a part, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, remove bearing and spacer from drive end of spindle.
- Remove shafts, releasing gears.
- To remove bearing from opposite end of spindle, insert shafts

in spindle and alternately tap ends of shafts, loosening bearing.

ASSEMBLY

- Assemble spacer and bearing to drive end of spindle.
- Lubricate gears liberally with ARO 33153 grease and assemble to spindle, securing with shafts. Align notch in shafts with spacer.
- Assemble spacer and bearing to opposite end of spindle and assemble, with washer (33563), to housing. See "Routine Lubrication Requirements", page 3.

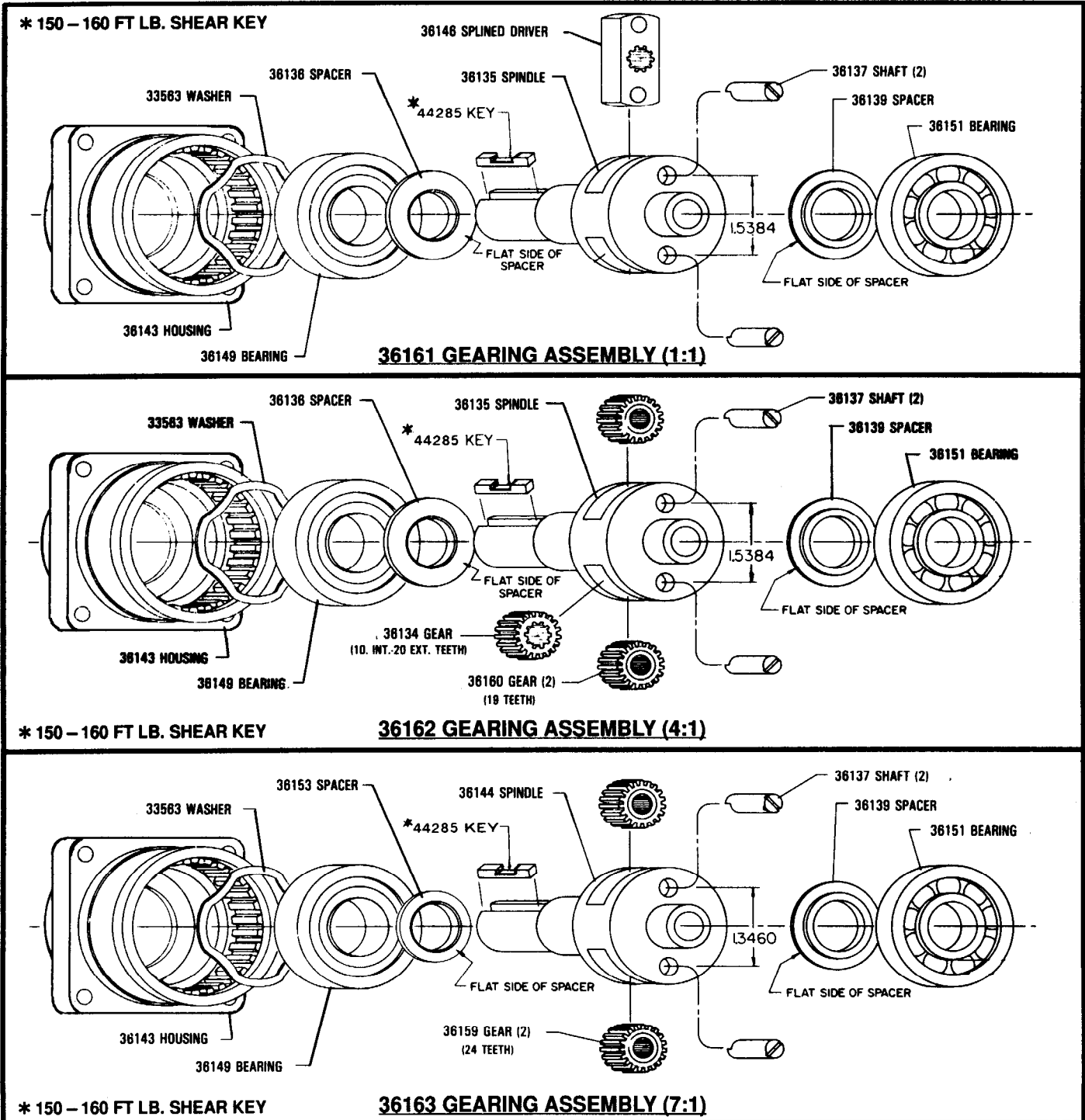


FIGURE 2

DRIVE GEARING

DISASSEMBLY

- Remove collet nut (39877) and lock nut (39878).
- Tap drive end of spindle with a soft face hammer to remove from housing.
- Remove bearing (36151), spacer (36139) and shafts (36137) to remove gears or driver from spindle.

ASSEMBLY

- Lubricate gears or driver liberally with ARO 33153 grease and assemble to spindle, securing with shafts (36137).
- Assemble spacer (36139) and bearing (36151) to spindle and assemble to housing.

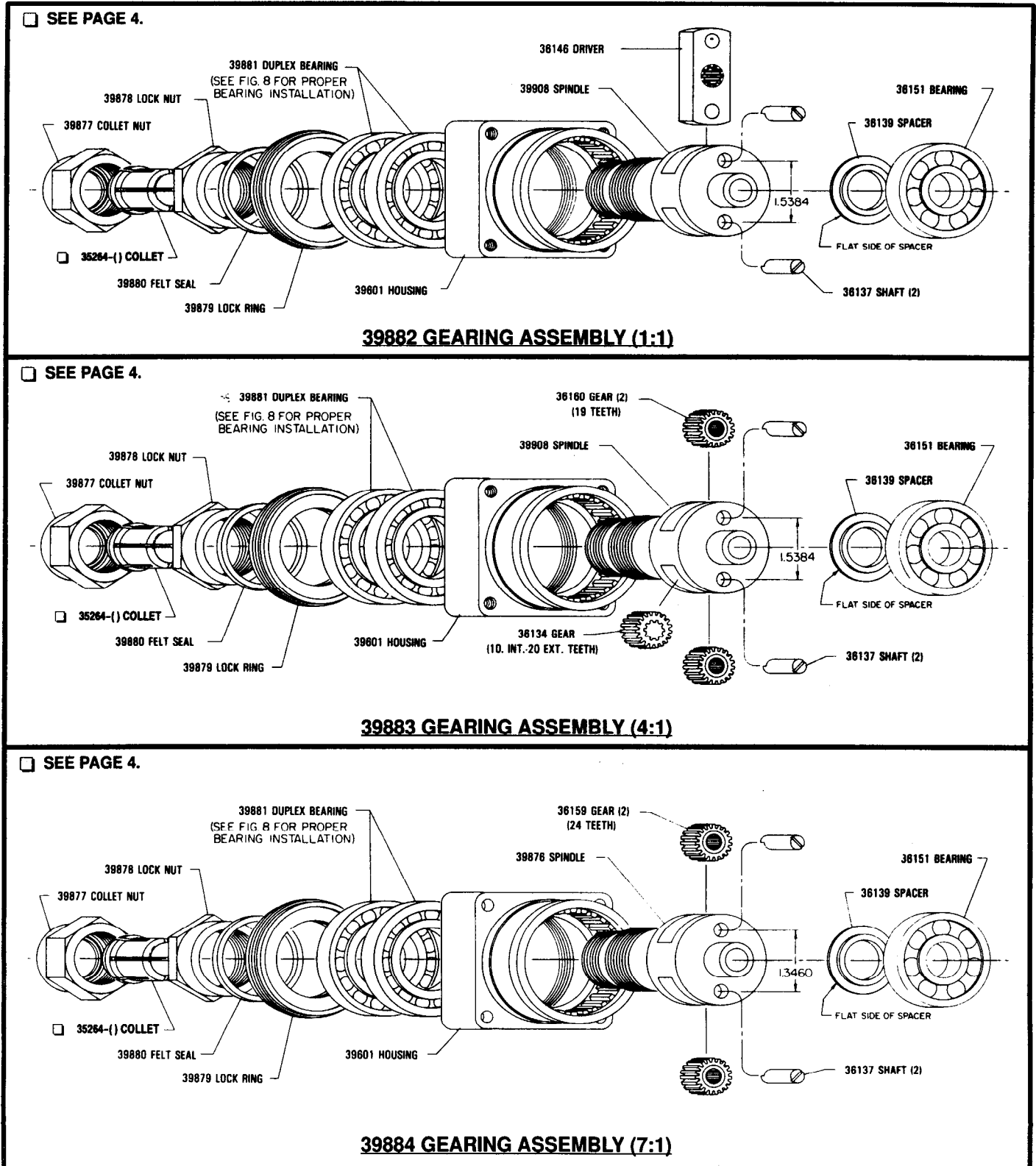


FIGURE 3

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

AUXILIARY GEARING

DISASSEMBLY

- Grasp housing (ring gear) in one hand and tap drive end of spindle with a soft face hammer; spindle and components will loosen from housing.
- Gearing should not be disassembled further unless it is necessary to replace a part, as Brinelling of the bearing races may occur, making replacement necessary.
- To disassemble further, remove bearing and spacer from drive end of spindle.
- Remove shafts, releasing gears.
- To remove bearing from opposite end of spindle, insert shafts into spindle and alternately tap ends of shafts, loosening bearing.

ASSEMBLY

- Assemble spacer and bearing to drive end of spindle.
- Lubricate gears liberally with ARO 33153 grease and assemble to spindle, securing with shafts (36137). Align notch in shaft with spacer.
- Assemble spacer (36139) and bearing (36151) to opposite end of spindle.
- Assemble retaining ring (36152-1) and spindle and components into housing.

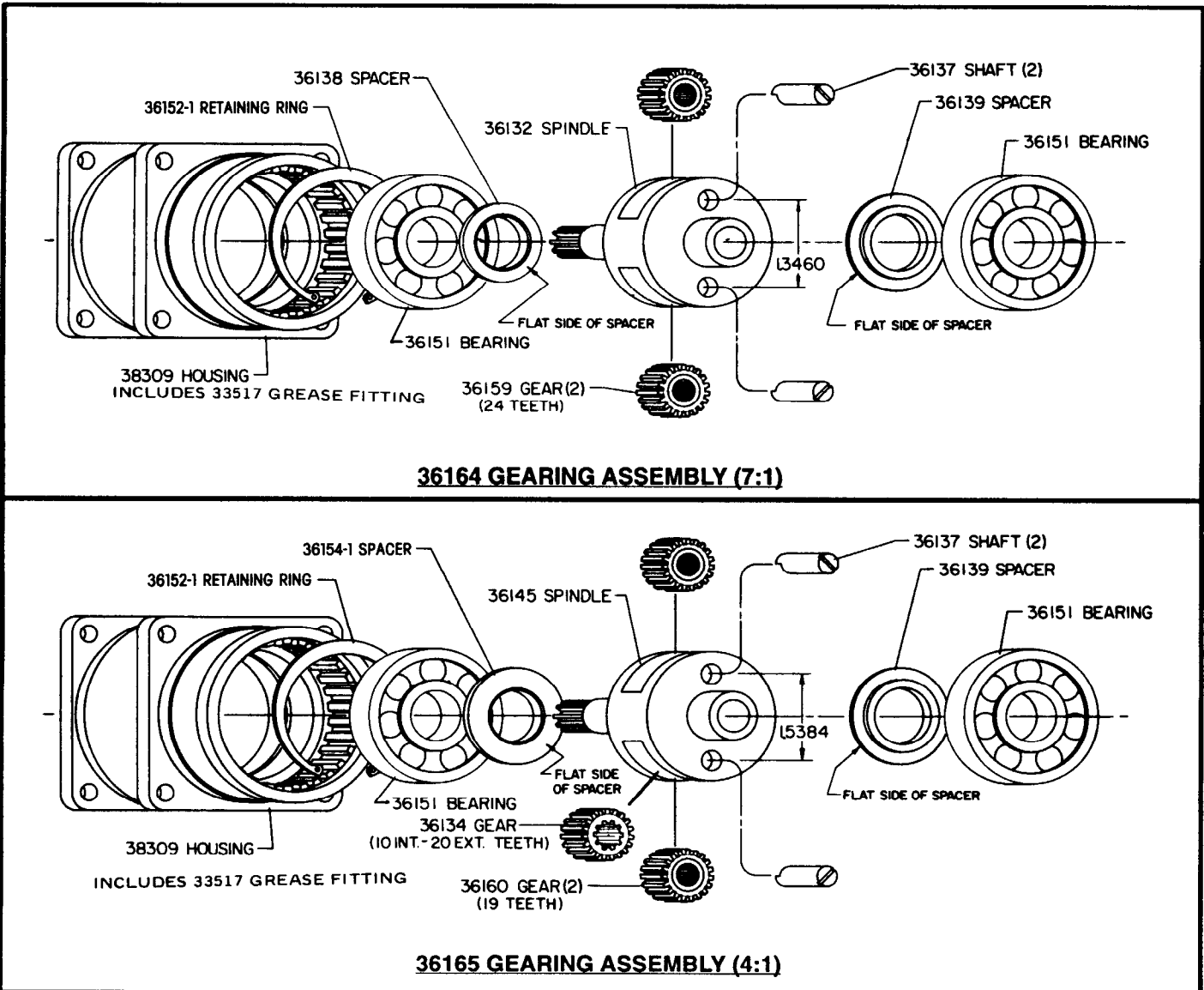


FIGURE 4

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

M40
51

MOTOR SECTION

DISASSEMBLY

- Remove motor assembly from housing and remove sems fastener (36171).
- Remove nut (36140) and washer (Y1-916) from rotor.
- Grasp cylinder in one hand and tap splined end of rotor with a soft face hammer; motor will come apart.
- Remove bearing (36191), spacer (36189) and rear end plate from rotor.

- on inner race of bearing. Secure with sems fastener (36171).
- Coat five rotor blades (36190) with ARO 29665 spindle oil and assemble to rotor slots — straight side out.
- Coat i.d. of cylinder with ARO 29665 spindle oil and assemble over rotor to end plate, aligning roll pin with hole in end plate.
- Assemble spacer (36189) and front end plate to rotor, pressing on inner race of bearing. Secure with washer (Y1-916) and nut (36140).

ASSEMBLY

- Pack bearings with ARO 33153 grease and assemble into end plates, pressing on outer race of bearings. NOTE: Bearings are paired bearings and must be assembled into end plates with the identification markings facing out.
- Assemble spacer (36189) and rear end plate to rotor, pressing

NOTE: When assembling motor to tool, remove head from motor housing. Place head of tool in a suitable holding device with the "motor end" in an upright position. Place motor assembly on head, with roll pin (Y178-78) protruding from end plate aligned with hole in head (largest hole). Slip motor housing, with manifold, over motor and secure to head. Assemble spacer (36141) and gearing to tool.

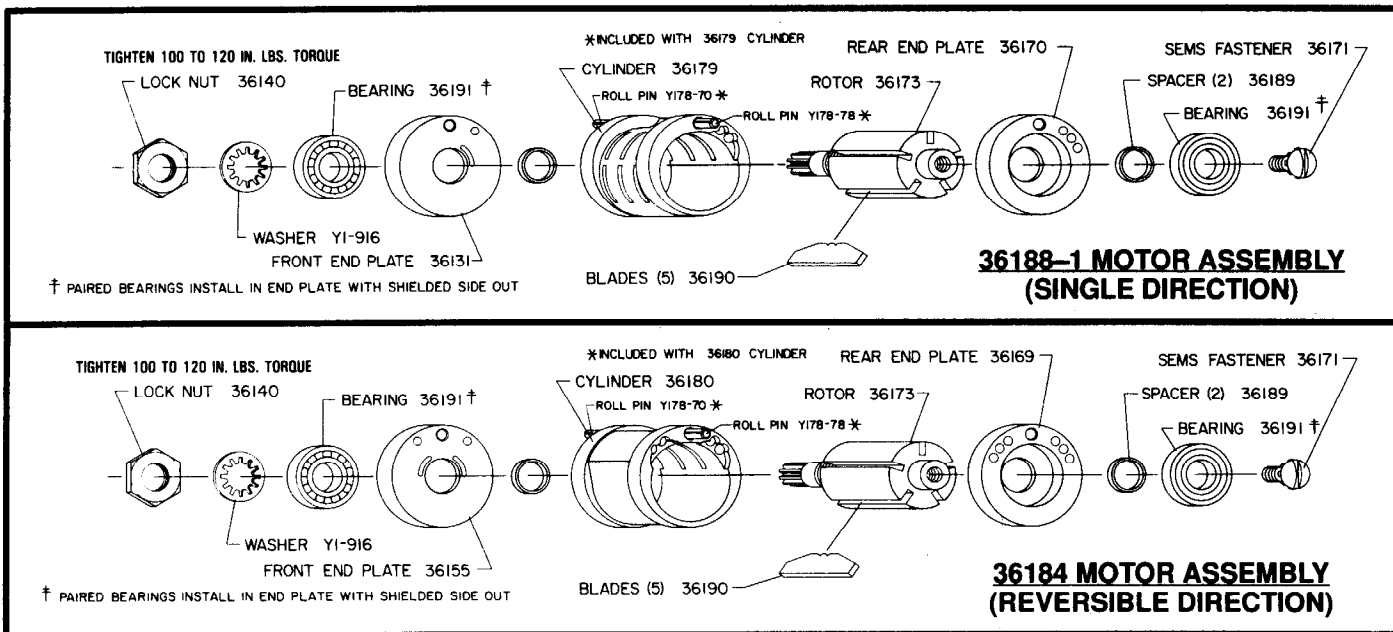


FIGURE 5

MOTOR HOUSING AND EXHAUST MANIFOLD

DISASSEMBLY

- To remove manifold from motor housing, remove head, loosen set screw and slip manifold off housing.

ASSEMBLY

- Assemble "O" ring (Y325-147) to housing. Slide manifold over housing and tighten set screw (Y29-44).

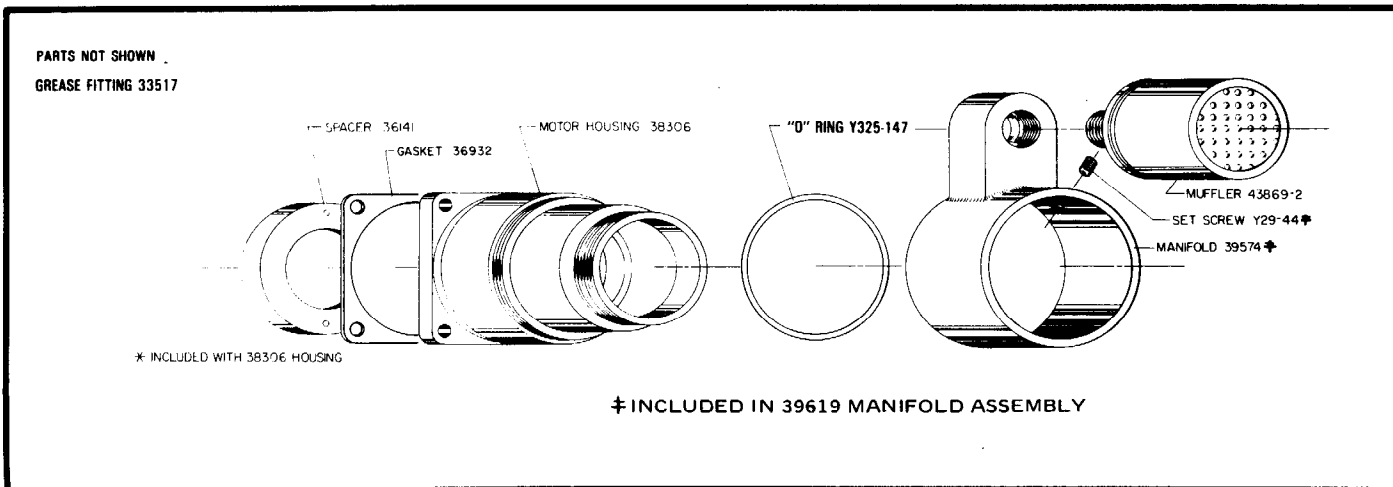


FIGURE 6

DISASSEMBLY/ASSEMBLY INSTRUCTIONS

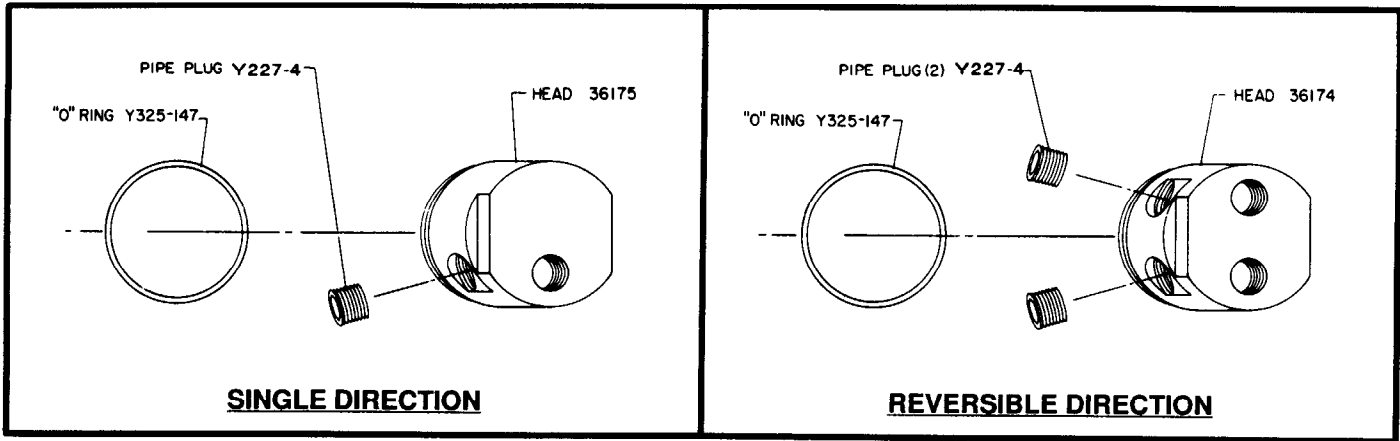
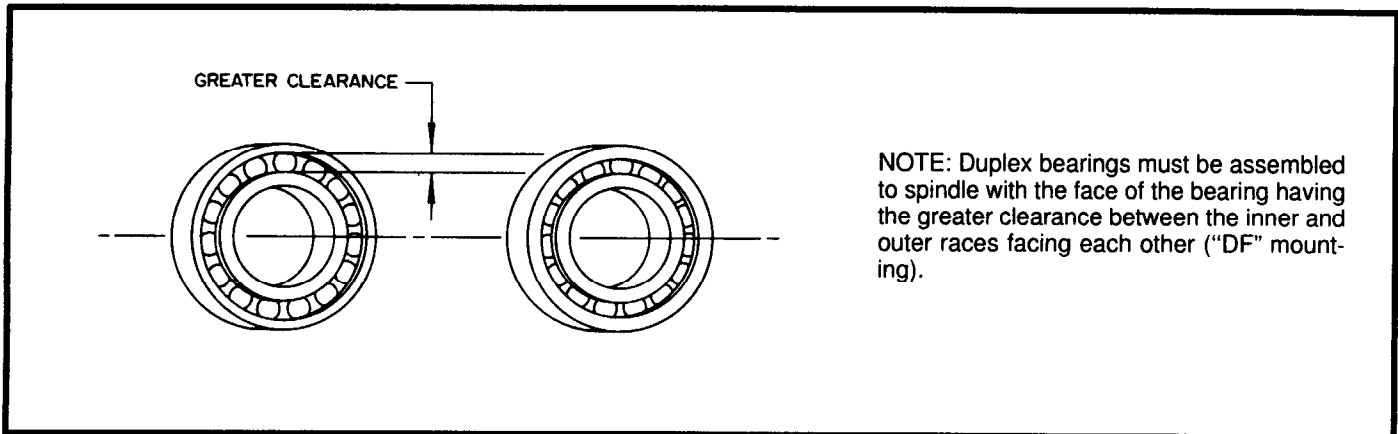


FIGURE 7

NOTE: When assembling head to tool, place head in a suitable holding device with the "motor end" in an upright position. Assemble "O" ring (Y325-147) to head. Place motor assembly on head, with roll pin (Y178-78) protruding from end plate aligned

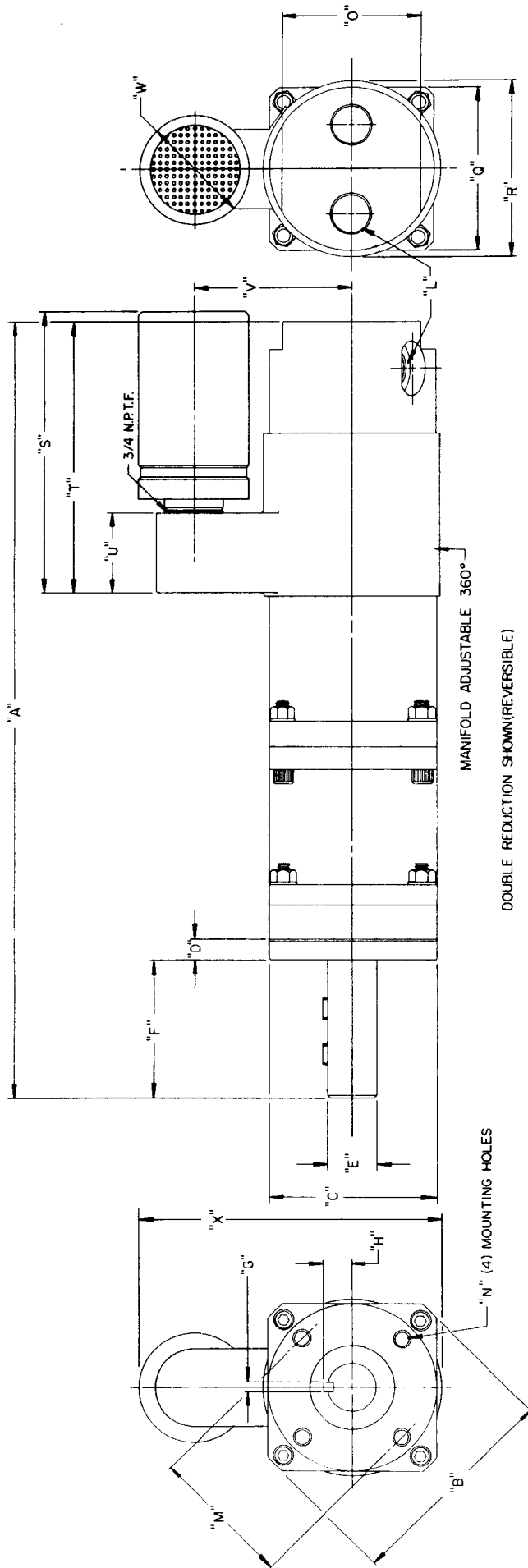
with hole in head (largest hole). Slip motor housing, with manifold, over motor and secure to head. Assemble spacer (36141) and gearing to tool.



NOTE: Duplex bearings must be assembled to spindle with the face of the bearing having the greater clearance between the inner and outer races facing each other ("DF" mounting).

FIGURE 8

DIMENSIONAL DATA



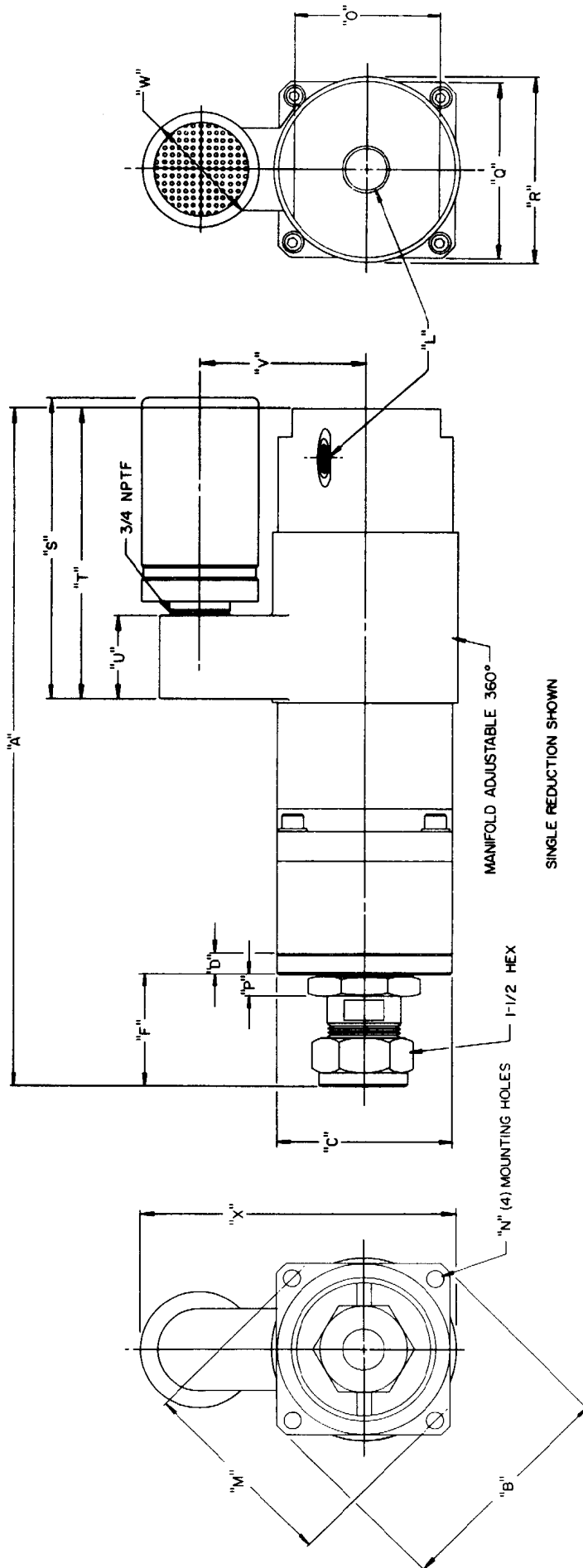
MANIFOLD ADJUSTABLE 360°
DOUBLE REDUCTION SHOWN(REVERSIBLE)

MODELS	GEAR REDUCTION	A
8203-A, 8204-A, 8205-A	SINGLE	11-17/64
8209-A, 8210-A, 8211-A	SINGLE	286 MM
8200-A, 8201-A, 8202-A	DOUBLE	14-1/16
8206-A, 8207-A, 8208-A	DOUBLE	373 MM

	B	C	D	E	F	G	H	L	M	N	O	Q	R	S	T	U	V	W	X
INCHES	4.090	2.996	.369	.8743	2.483	.1872	.528	3/8	2.495	5/16-24	2-1/2	3	3-3/16	5-3/16	5	1-7/16	2-27/32	2	5-7/16
MM	103.886	76.098	9.372	22.207	63.068	4.7548	13.411	AIR INLET NPTF	63.373 63.627	UNF-2B TH'D.	63	76	81	132	127	36	72	51	138

FIGURE 9

DIMENSIONAL DATA



SINGLE REDUCTION SHOWN

MODELS	GEAR REDUCTION	A
8203-4A, 8204-4A, 8205-4A	SINGLE	11-11/16 297 MM
8200-4A, 8201-4A, 8202-4A	DOUBLE	14-1/2 368 MM

	B	C	D	F	L	M	N	O	P	Q	R	S	T	U	V	W	X
INCHES	4.090 4.110	2.996 2.998	.302 .322	1-15/16 (APPROX.)	3/8 AIR INLET NPTF	3.498 3.502	5/16-24 UNF-28 TH'D.	2-1/2	.335 .364	3	3-3/16	5-3/16	5	1-7/16	2-27/32	2	5-7/16
MM	103.886 104.394	76.098 76.149	7.670 8.178	49 (APPROX.)		86.563 88.950		63	8.509 9.245	76	81	132	127	36	72	51	138