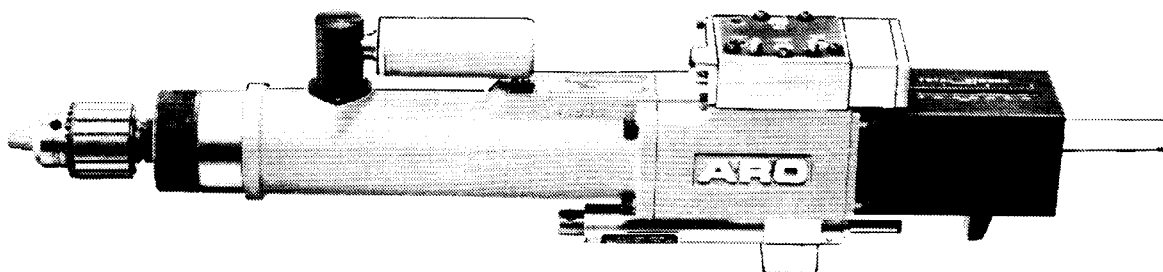


Model 8660-()-3

**FEATURES:**

MODULAR DESIGN FOR EASY MAINTENANCE
OUTER HOUSING OF DUCTILE IRON FOR RIGIDITY
DUPLEX BEARING MOUNTED FRONT SPINDLE TO REDUCE RUN-OUT
DWELL CONTROL – ADJUSTABLE FROM 0 TO 7 SECONDS
TO-DEPTH AND FULL RETRACT SIGNAL PORTS
REMOTE START AND RETRACT SIGNAL PORTS
MANUAL START AND RETRACT VALVES
EXTERNAL FEED RATE ADJUSTING VALVES – FORWARD AND RETRACT
DIRECT READING STROKE SCALE ON REAR COVER
ADJUSTABLE TRIP BRACKET
HYDRAULIC CHECK WITH 3-POSITION MOUNTING
1/2"–20 THREADED SPINDLE FOR CHUCK MOUNTING

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

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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
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INGERSOLL-RAND®
PROFESSIONAL TOOLS

MODEL IDENTIFICATION

MODEL NUMBER	R.P.M.	RATIO	STROKE LENGTH	GEARING OR SPINDLE ASSEMBLY		PISTON ROD	CHUCK NUMBER
				INTERMEDIATE	FINAL DRIVE		
8660-4-3()	450	36.0:1	3"	44934	44931	44928-2	30018
8660-7-3()	750	21.0:1	3"	44930	44931	44928-2	30018
8660-13-3()	1,300	12.3:1	3"	44930	44935	44928-2	30018
8660-27-3()	2,700	6.0:1	3"	44939	44931	44928-2	30018
8660-45-3()	4,500	3.5:1	3"	44939	44935	44928-2	30018
8660-115-3()	11,500	1.38:1	3"	44943	44942	44928-2	30018
8660-160-3()	16,000	1.0:1	3"		44942	44928-2	30018

MODELS WITH -EU SUFFIX ARE "EC" COMPLIANT MODELS.

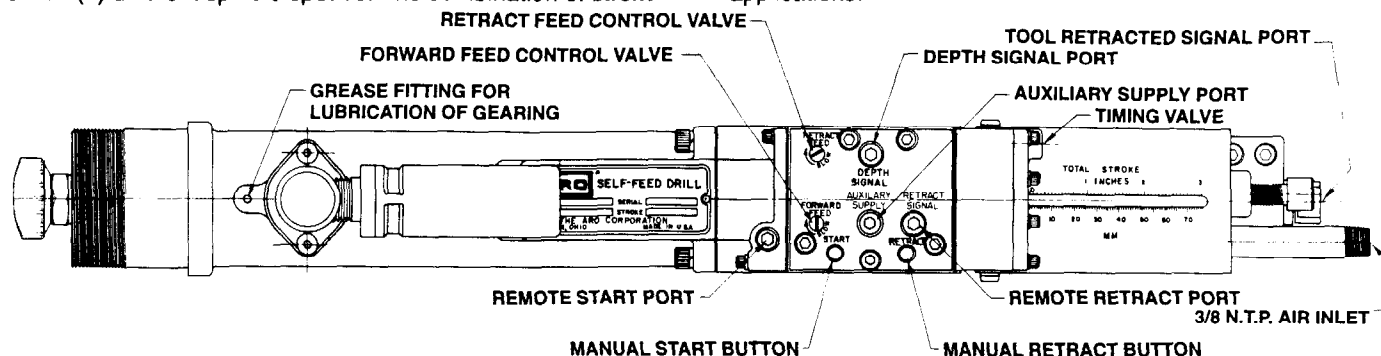
GENERAL DESCRIPTION AND OPERATION

The ARO® model 8660-() self-feed drill is designed to automatically feed to a pre-set depth, trip and return.

The models 8660-() are available with a 3" stroke length and in seven (7) different spindle speeds. The combination of stroke

lengths and free speeds appear as models above.

The models 8660-() may be used in single unit or multiple unit applications.



The three basic sections of the model 8660-() are arranged for efficient maintenance. The following is a brief description of the sections and their functions.

VALVE SECTION

The valve section is composed of a spool valve, timing valve, reversing valve, manual start and manual retract valves, retract feed regulating valve and also houses remote start and remote retract ports, a depth signal and an auxiliary supply port.

The function of the 4-way spool valve is to port air to the piston for the forward and retract strokes.

The function of the timing valve is to regulate the time lapse between the end of the drilling stroke and the retract stroke. The timing valve can be adjusted so the unit retracts immediately upon completion of the drilling stroke or it can be adjusted to delay the retract stroke anywhere in the range from 0 to approximately seven (7) seconds.

The function of the reversing valve is to port air to the spool valve, causing it to shift to the retract stroke position at the completion of the timing cycle.

The drilling stroke is started by manually actuating the start valve, located at top of valve housing. The unit will advance the drill to a pre-set depth and automatically retract to the initial position, whereupon the unit will stop with all air to the unit shut off.

The unit may be shifted to the retract stroke at any time during the drilling cycle by manually depressing the retract valve, located at top of valve housing. The unit will immediately retract to the initial

position, whereupon the unit will stop with all air to the unit shut off.

The needle type retract feed control valve regulates the flow of air from the piston, thus regulating the rate of retraction of the unit. The model 8660-() is furnished with a hydraulic check to control the rate of forward feed of the unit – see page 12 for set-up procedure.

SPECIAL NOTE: There are two needle valves (34617) contained in the valve block. One needle valve is for the retract feed control. The other needle valve [visible only after the removal of the nameplate (45184)] should not be adjusted or removed. If this needle valve should ever be removed, the correct assembled position is – the top of the needle valve flush with the top of the valve block.

The unit may be operated remotely thru the use of the start and retract signal ports located in top of the valve housing, using recommended fittings, tubing and valves – see page 16.

The auxiliary supply port is pressurized whenever air is present at the air inlet of the tool.

The depth signal port is momentarily pressurized at the completion of the forward feed stroke when the retract valve (44981) is actuated and can be used to activate a remote valve for the purpose of starting another tool or an accessory function.

The tool retracted signal port is located in rear of piston rod (44928-2). The port is pressurized when motor starts and remains pressurized during the drilling cycle, until motor shuts off when unit is fully retracted.

The valve section can be easily removed from tool for servicing and replaced with a spare unit, eliminating excessive down-time of tool. See page 4 for removal instructions.

MOTOR AND GEARING SECTION

The motor and gearing section has been designed into a single unit that can be easily removed from tool and replaced with a spare unit while it is being serviced or repaired, eliminating excessive down-time of tool. See page 4 for removal from tool.

HOUSING AND VALVE SECTION

The housing and valve section consists of a main housing, which

houses the piston section and motor and gearing section, and the valve housing, which houses the retract valve that is actuated by the adjustment screw contained in the trip bracket. The retract valve components are accessible by removing striker plate (44987) from rear of valve housing. The piston and components are accessible by separating the main housing from the valve housing. See page 4 for disassembly procedure.

MOUNTING

The nose end of tool housing is provided with 2-3/8"-16 l.h. threads and a 2.374" x 2" long pilot diameter for fixture mounting. A foot type mounting bracket and nose housing are available

as accessory items for tool mounting (see accessories section). The tool can be mounted in any position desired without impairing the function of the tool (see set-up procedure).

SET-UP PROCEDURE

At the time the model 8660-() self-feed drill is set up for operation, a minimum distance of 1/4" must be maintained between the work piece and the point of the drill bit, with the drilling unit in the fully retracted position. This will allow the air motor to start and reach free speed before the drill reaches the work piece.

STROKE ADJUSTMENT

Determine the total stroke length the drill must travel to perform the drilling operation (see figure 1). Adjust the length of the stroke by loosening the two cap screws (Y99-42) which secure the trip bracket to the piston rod. Position the trip bracket on the piston rod so the distance between the trip bracket and the striker plate is somewhat greater than the desired stroke length and tighten the two screws (Y99-42), securing trip bracket on piston rod. Next, rotate adjustment screw (Y157-64) so the distance between the leading edge of the screw and the striker plate equals the desired total stroke length. A final adjustment of the adjustment screw can be made while testing the drilling operation on a few scrap work pieces to insure desired drilling depth is obtained.

FEED CONTROL VALVES

The models 8660-() are shipped from the factory with the forward and retract feed regulating valves set at a fairly slow rate of feed. Turn valve(s) counterclockwise to increase rate of feed. Turn valve(s) clockwise to decrease rate of feed.

TIMING VALVE (59231 METERING NEEDLE)

The timing valve (59231 metering needle), located at the rear of the valve section, is used to regulate the time lapse between the time the drill bit has reached the pre-set drilling depth and the time the unit retracts. The timing valve can be adjusted so the unit will retract immediately, up thru a range of approximately seven seconds (0 - 7 seconds). Turn the timing valve clockwise (in) to increase the time delay. Turn the valve counterclockwise (out) to decrease the time delay.

NOTE: A final adjustment of the adjusting screw (Y157-64) may be necessary after adjusting the timing valve to insure precise depth of drilling operation.

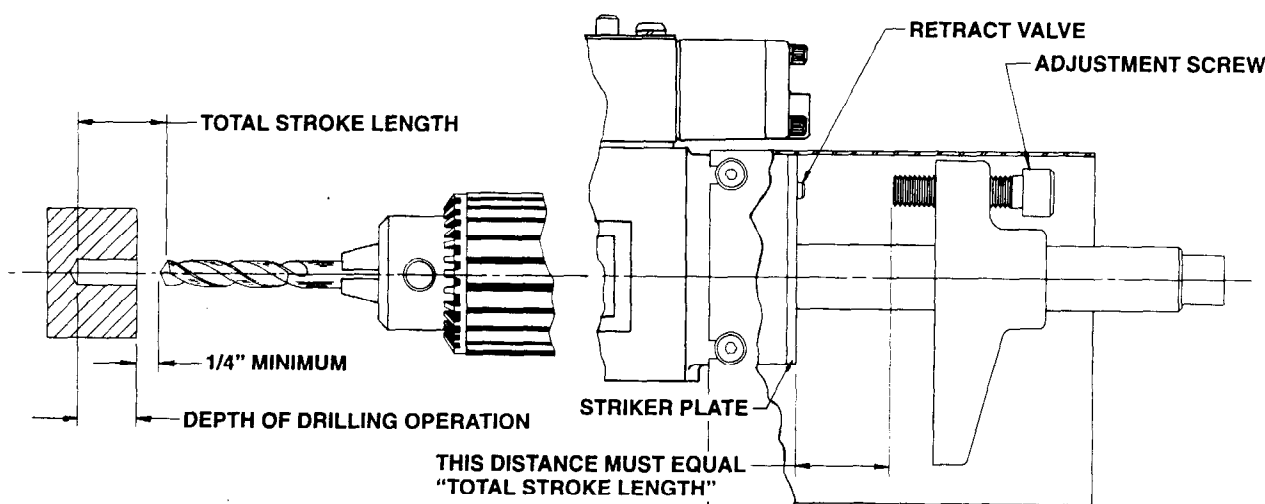


FIGURE 1

AIR AND LUBE REQUIREMENTS

Air pressure of 90 p.s.i.g. (6.2 bar) at the air inlet of the tool is required for maximum motor efficiency. If necessary, an air regulator should be installed to maintain this pressure when tool is in operation.

Filtered and oiled air will allow the tool to operate more efficiently and yield a longer life to operating parts and mechanisms. A line filter capable of filtering particles larger than 50 microns should be used with a line oiler.

Filter-Regulator-Lubricator (F-R-L) assembly model C28231-810 is recommended for use with this air tool. The capacity of the individual filter-lubricator is adequate to provide clean (40 micron) oiled and regulated air for the tool.

Inject 33153 grease (2 to 3 strokes) thru grease fitting located at top of main housing after each 160 hours of operation, or as experience indicates, for lubrication of gearing and spindle bearings. NOTE: Be sure tool is in the fully retracted position when injecting grease thru fitting. CAUTION: An excessive amount of lubricant in a tool will affect the speed and power.

RECOMMENDED HOSE SIZE: 3/8" (10 mm) nominal inside diameter.

RECOMMENDED LUBRICANTS: Spindle oil 29665, 1 qt. (.9 liter) container for oiler and air inlet; Grease 33153, 5 lb. (2.3 kg) can for gears and bearings; "O" ring lubricant 36460, 4 oz. (113 g) tube for lubrication and installation of "O" rings.

MAINTENANCE

Air tools are made of precision parts and should be handled with reasonable care when servicing. Excessive pressure exerted by a holding device may cause distortion of a part. Apply pressure evenly when disassembling (or assembling) parts which have a press fit. When removing or installing bearings, apply pressure to the bearing race that will be press fit to the mating part; if this is not practiced, Brinelling of the bearing races will occur, making replacement necessary. It is important that the correct tools and fixtures are used when servicing this air tool.

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 relubricating the bearing is available. Open bearings may be washed but should not be allowed to spin while being blown dry. When replacement parts are necessary, consult drawing containing the part for identification.

Before reassembling, lubricate parts where required. Use 33153 grease, or equivalent, in bearings. Use 36460 lubricant for "O" ring assembly. When assembling "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 ordering parts, be sure to list part number, part name, model number and serial number of tool. Use only genuine ARO® replacement parts.

DISASSEMBLY AND ASSEMBLY OF TOOLS

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

Before starting to disassemble or assemble this tool (any part or completely), be sure to read "Maintenance" section.

To minimize the possibility of parts damage and for convenience, the steps for disassembly or assembly listed on the following pages are recommended.

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

VALVE SECTION

First, disconnect tubing from ports if any is being used. Remove five screws (Y211-109), with washers (Y14-10), and lift valve section (45174) off valve housing (44919). For disassembly of valve section, see page 8.

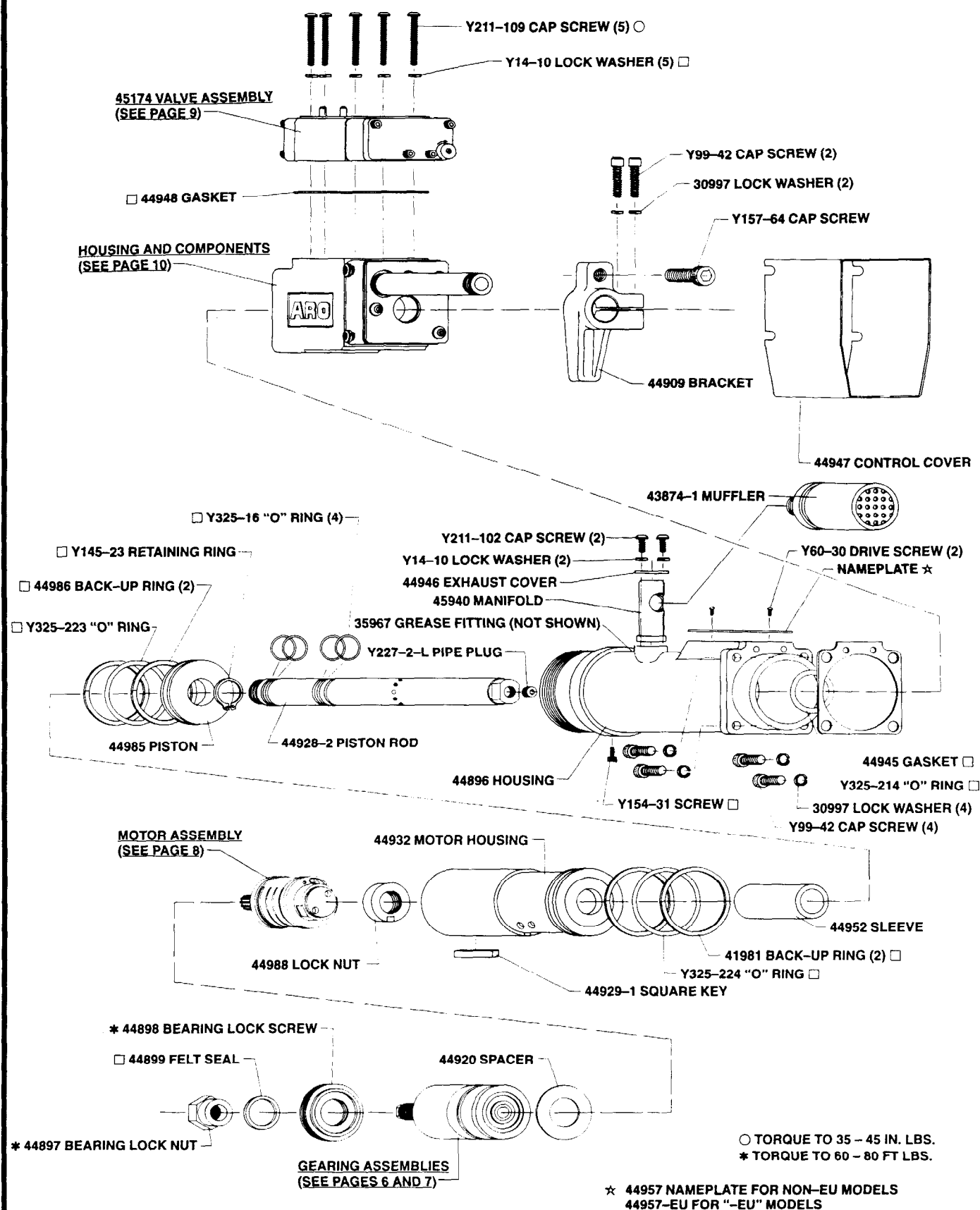
MOTOR AND GEARING SECTION

Loosen four screws (Y211-102) and remove control cover (44947) off rear of tool. Using a wrench on flats at end of piston rod

(44928-2), unthread piston rod from nut (44988) which secures piston rod to motor and gearing section. Do not attempt to remove piston rod from housing at this time. The main housing and valve housing must be separated for removal of rod (see "Housing and Valve" section). Next, remove screw (Y154-31) and remove motor and gearing section from main housing and key (44929-1). For disassembly of gearing, see pages 6 and 7. For disassembly of motor, see page 8.

HOUSING AND VALVE SECTION

To remove piston rod (44928-2) and to gain access to piston (44985), loosen four screws (Y211-102) and remove control cover (44947). Loosen two screws (Y99-42) and slip trip bracket (44909) off end of piston rod. Unthread piston rod (44928-2) from nut (44988) using a wrench on flats at rear end of rod. Main housing and valve housing must be separated before rod can be removed. Remove four screws (Y99-42), with washers (30997), and separate valve housing (44919) from main housing (44896). Use reasonable care when removing valve housing off piston rod so as not to damage rod or components in valve housing. The retract valve (44981) and components are accessible after removing control cover, trip bracket, three screws (Y211-102) and washers (Y14-10) and striker plate (44987). See page 10 for complete disassembly.



PARTS MARKED THUS □ ARE INCLUDED IN SERVICE KIT NUMBER 45831, SEE PAGE 20.

GEARING SECTION

DISASSEMBLY

- a. Secure motor housing (44932) in a suitable holding device and remove chuck, bearing lock nut (44897) and bearing lock screw (44898). Grasp end of spindle and pull gearing assembly from housing.

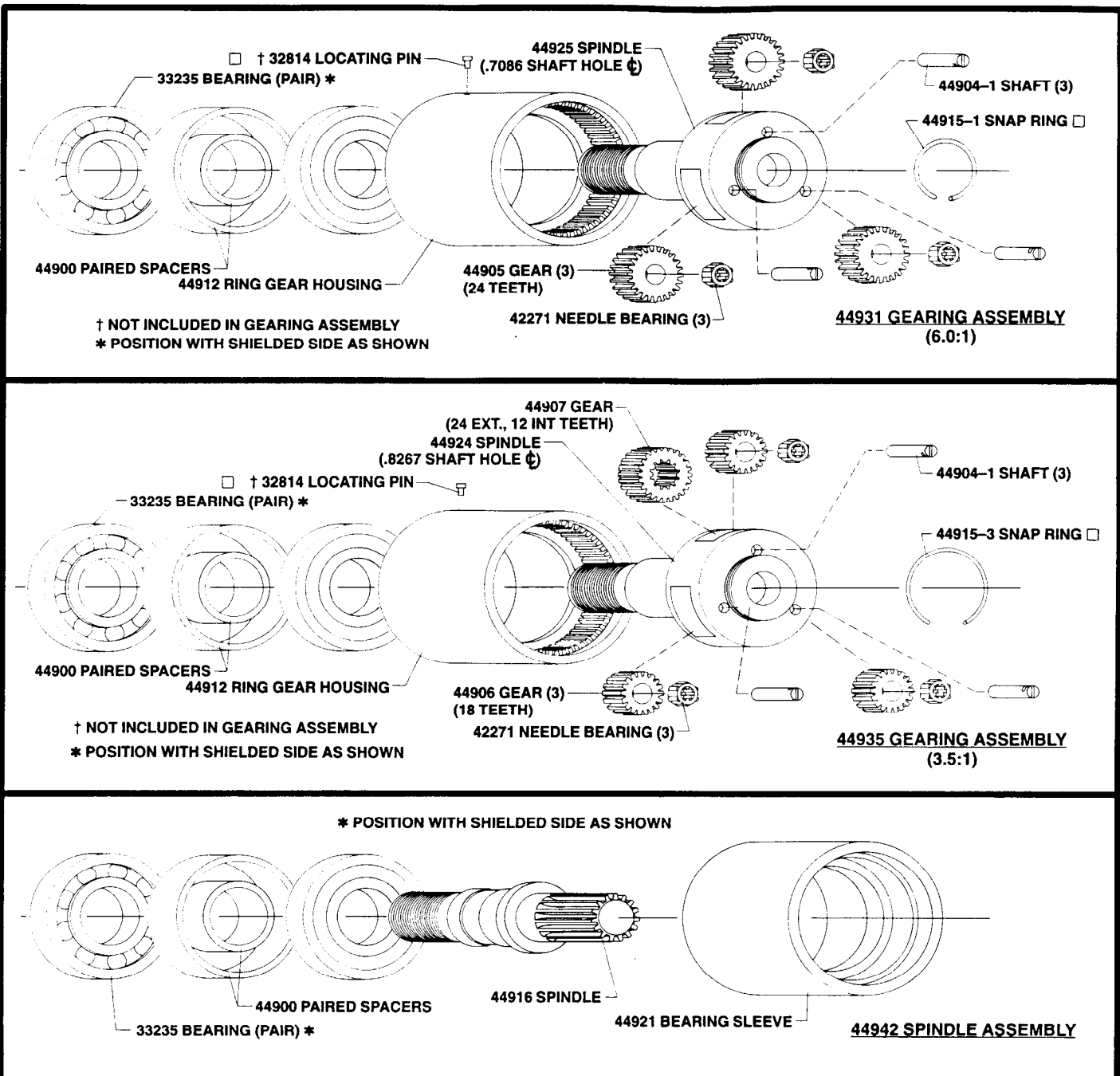
NOTE: If gearing or motor assemblies do not slip freely from housing, a rod or similar tool can be inserted thru rear of motor housing and motor and gearing assemblies pushed out thru front end of housing. Reasonable caution should be exercised in doing this so as not to cause damage to nut (33694) or threads of nut (44988). Push on rod, do not hammer. Motor housing and head end of housing are pinned together at assembly – do not remove.

- b. Grasp ring gear housing in one hand and tap threaded end of spindle with a soft face hammer; spindle and components will loosen from ring gear housing.

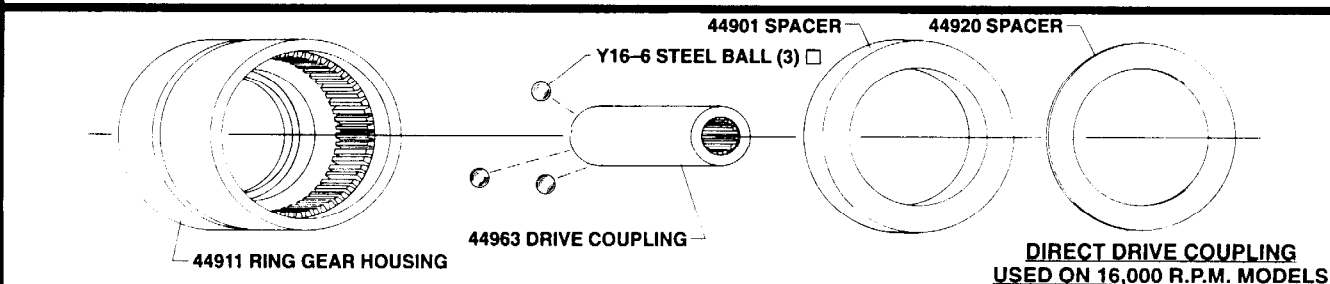
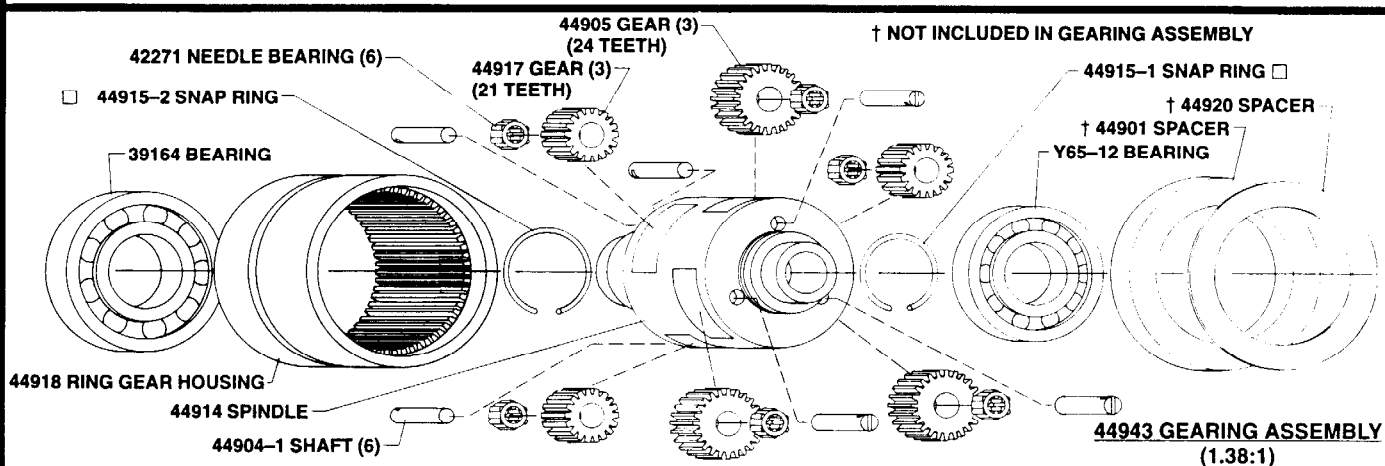
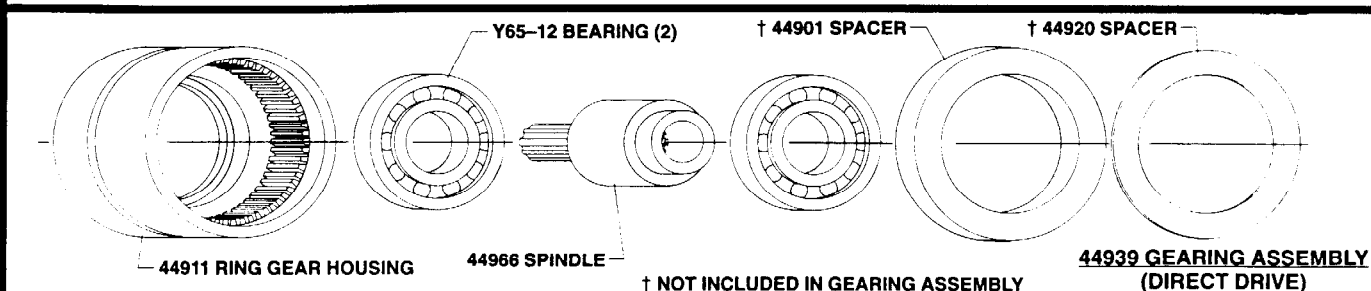
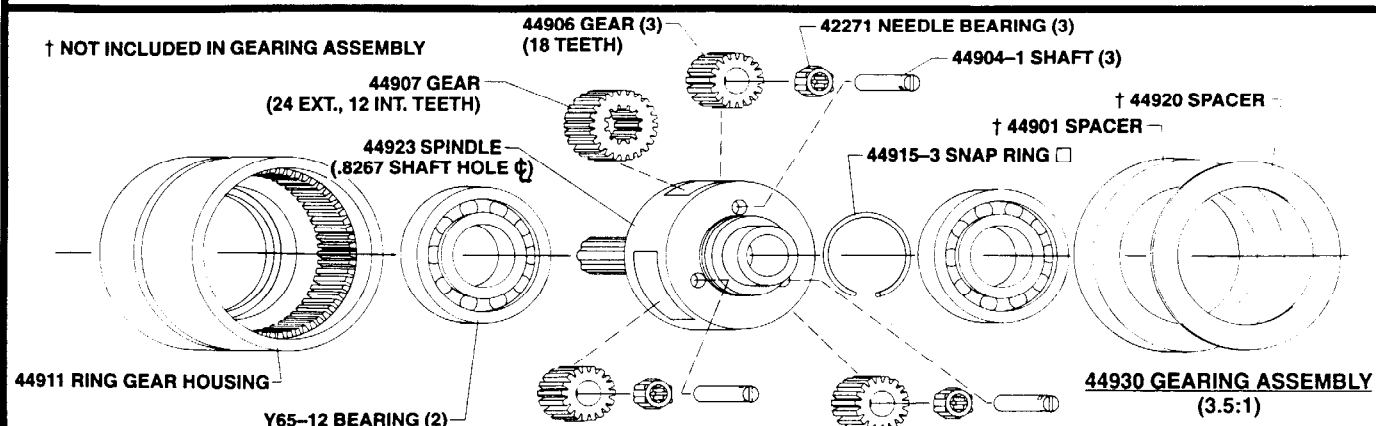
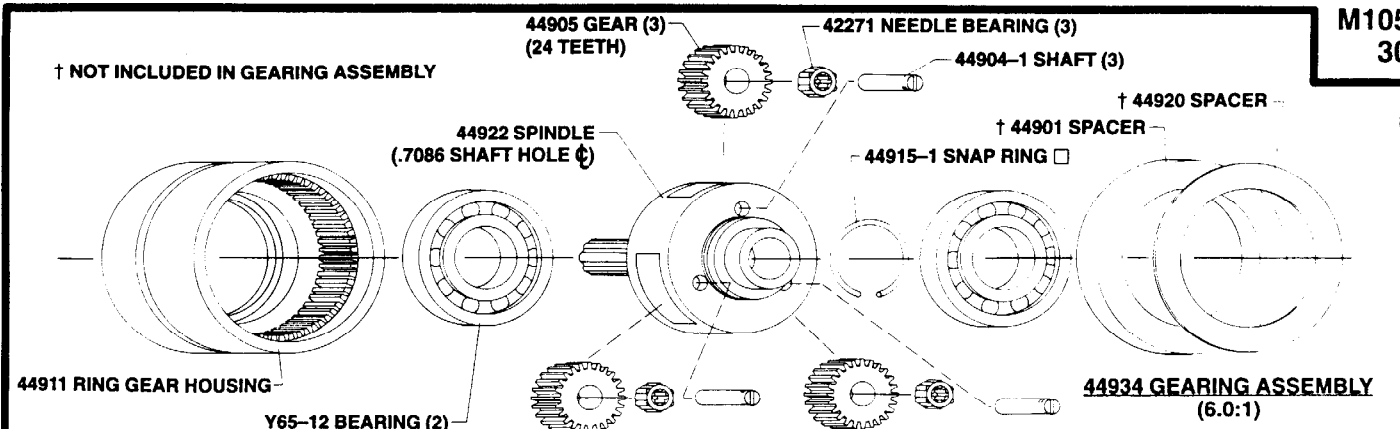
- c. To remove gears from spindle; rotate snap ring so open portion of ring aligns with one shaft. Remove shaft, releasing gear. Repeat for removal of opposite shaft and gear.

ASSEMBLY

- a. Assembly of gearing will be the reverse of disassembly procedure. Pack bearings and lubricate gears liberally with ARO 33153 grease, or equivalent, when assembling. After assembling gears and shafts to spindle, rotate open portion of snap ring 60° from either shaft, securing shafts in spindle. Each gearing assembly should contain approximately 1/4 oz. of grease. Spindle assembly (44942) – pack bearings.
- b. See "Motor Assembly" – paragraphs h, i and j.



PARTS MARKED THUS \square ARE INCLUDED IN SERVICE KIT NUMBER 45831, SEE PAGE 20.



PARTS MARKED THUS □ ARE INCLUDED IN SERVICE KIT NUMBER 45831, SEE PAGE 20.

MOTOR SECTION

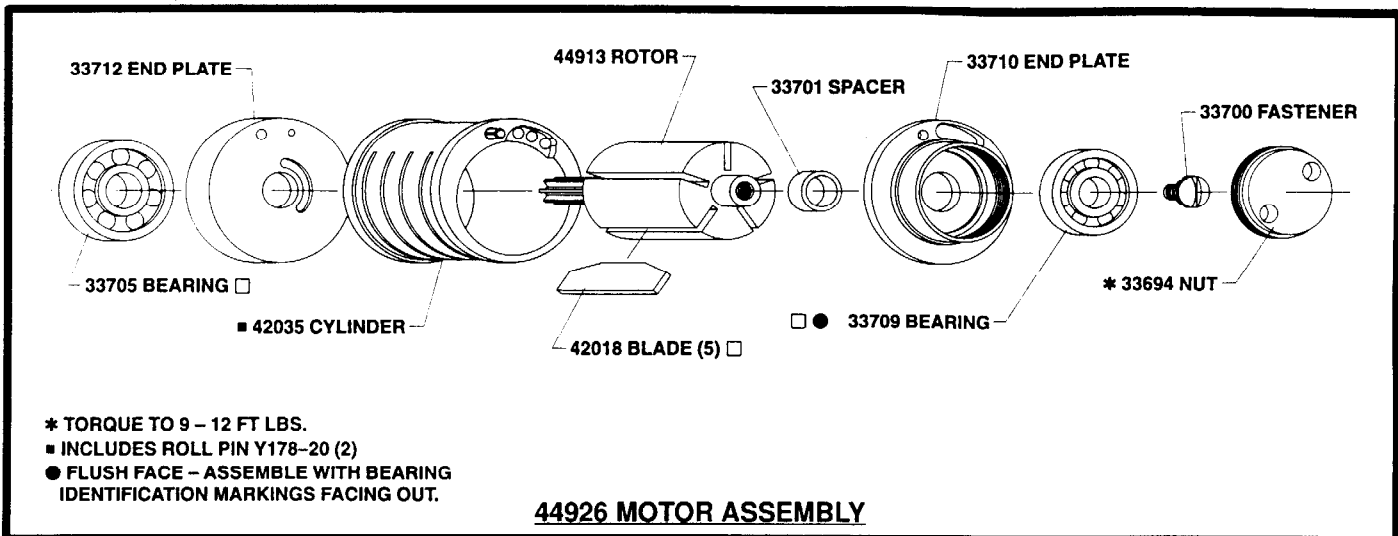
DISASSEMBLY

- Remove motor from tool as outlined on page 4. Remove motor assembly from housing as outlined in paragraph "a" of gearing disassembly.
- Remove retainer nut (33694) and fastener (33700).
- Grasp cylinder in one hand and tap splined end of rotor with a soft face hammer; motor will come apart.

ASSEMBLY

- Pack bearings with ARO 33153 grease, or equivalent, and assemble bearings to end plates, pressing on outer race of bearings. NOTE: Bearing (33709) is a flush face type and must be assembled to end plate with the identification markings on the bearing to the outside.
- Assemble rear end plate (33710), with bearing and spacer (33701), to rotor (44913) and secure with fastener (33700). NOTE: Press on inner race of bearing. Bearing is press fit on rotor.
- Coat i.d. of cylinder with ARO 29665 spindle oil and assemble cylinder over rotor, aligning air inlet and roll pin of cylinder with holes in end plate.
- Assemble blades (42018) into slots in rotor.

- Assemble front end plate (33712) to rotor and cylinder, aligning hole in end plate with roll pin in cylinder. NOTE: Press on inner race of bearing. Bearing is press fit on rotor.
- Assemble retainer nut (33694) to end plate and torque to 9 – 12 ft lbs.
- Be sure rotor does not bind and assemble motor to housing. NOTE: Be certain nut (44988) is properly positioned in housing before assembling motor to housing.
- Assemble spacers (44920 and 44901) and gearing assemblies to housing and secure with bearing lock screw (44898) with seal (44899) and bearing lock nut (44897).
NOTE: When assembling gearing to motor housing, be sure locating pin (32814) is properly positioned in ring gear and aligned with slot in housing.
- Lube "O" ring (Y325-224) attached to rear head of motor housing with ARO 36460 "O" ring lube and assemble motor and gearing section with key (44929-1) to main housing and secure key into housing with screw (Y154-31). NOTE: When assembling key, be sure hole thru key is properly positioned and aligned with hole in housing to accept screw (Y154-31).
- Thread piston rod into nut (44988), securing motor and gearing section into main housing. Using a wrench on flats at rear of piston rod, tighten rod securely but do not overtighten.



PARTS MARKED THUS □ ARE INCLUDED IN SERVICE KIT NUMBER 45831, SEE PAGE 20.

VALVE SECTION

DISASSEMBLY

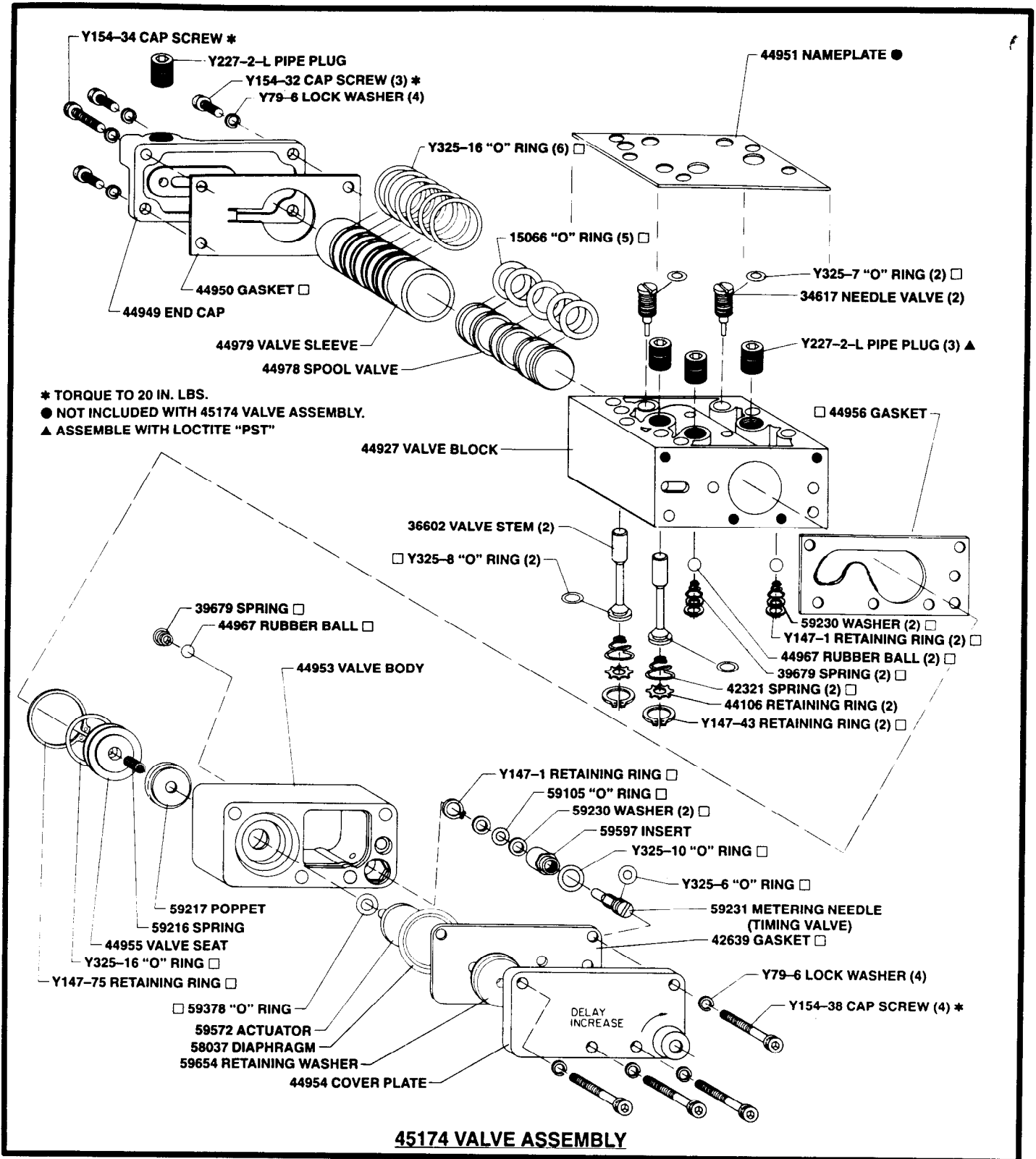
- To gain access to timing valve (metering needle 59231) and/or reversing valve (actuator 59572) and components, remove four screws (Y154-38), with washers (Y79-6), cover plate (44954) and valve body (44953) from valve block (44927). Use reasonable care when removing cover plate (44954) so as not to cause damage to metering needle (59231) or components. After removal of cover plate, insert (59597) and components can be removed from valve body. To disassemble components from insert, remove retaining ring (Y147-1). Unthread metering needle (59231) to remove from insert.
- After removal of cover plate, diaphragm (58037) and valve actuator (59572) can be removed from valve body. To remove valve seat (44955) and components, remove retaining ring (Y147-75).
- Spool valve (44978) can be removed from valve block after removing the end cap (44949) and cover plate (44954) and valve body (44953). To remove end cap, remove three screws (Y154-32) and one screw (Y154-34), with washers (Y79-6). Push spool valve out thru block.
- To remove needle valves (34617), unthread from valve block (44927).

- To remove valve stem (36602), remove retaining ring (Y147-43) and (44106).
- To remove rubber ball(s) (44967), remove retaining ring(s) (Y147-1), washer(s) (59230) and spring(s) (39679).

ASSEMBLY

- Assembly of the valve assembly (45174) will be the reverse of the disassembly procedure. Lubricate all "O" rings with ARO 36460 "O" ring lube, or equivalent, upon assembly. It is recommended that "O" rings be replaced whenever a part containing "O" rings has been disassembled. Be sure gaskets are in good repair and assembled in the proper position.
NOTE: When assembling needle valves (34617), install with top of needle valve flush with top of valve block (44927).
- Assemble valve assembly (45174) to valve housing (44919) with gasket (44948) and nameplate (44951) and secure with five screws (Y211-109) and washers (Y14-10).

NOTE: When replacing gaskets, torque cap screws to 20 in. lbs and re-torque after 24 hours to remove gasket set.



PARTS MARKED THUS □ ARE INCLUDED IN SERVICE KIT NUMBER 45831, SEE PAGE 20.

HOUSING AND VALVE SECTION

DISASSEMBLY

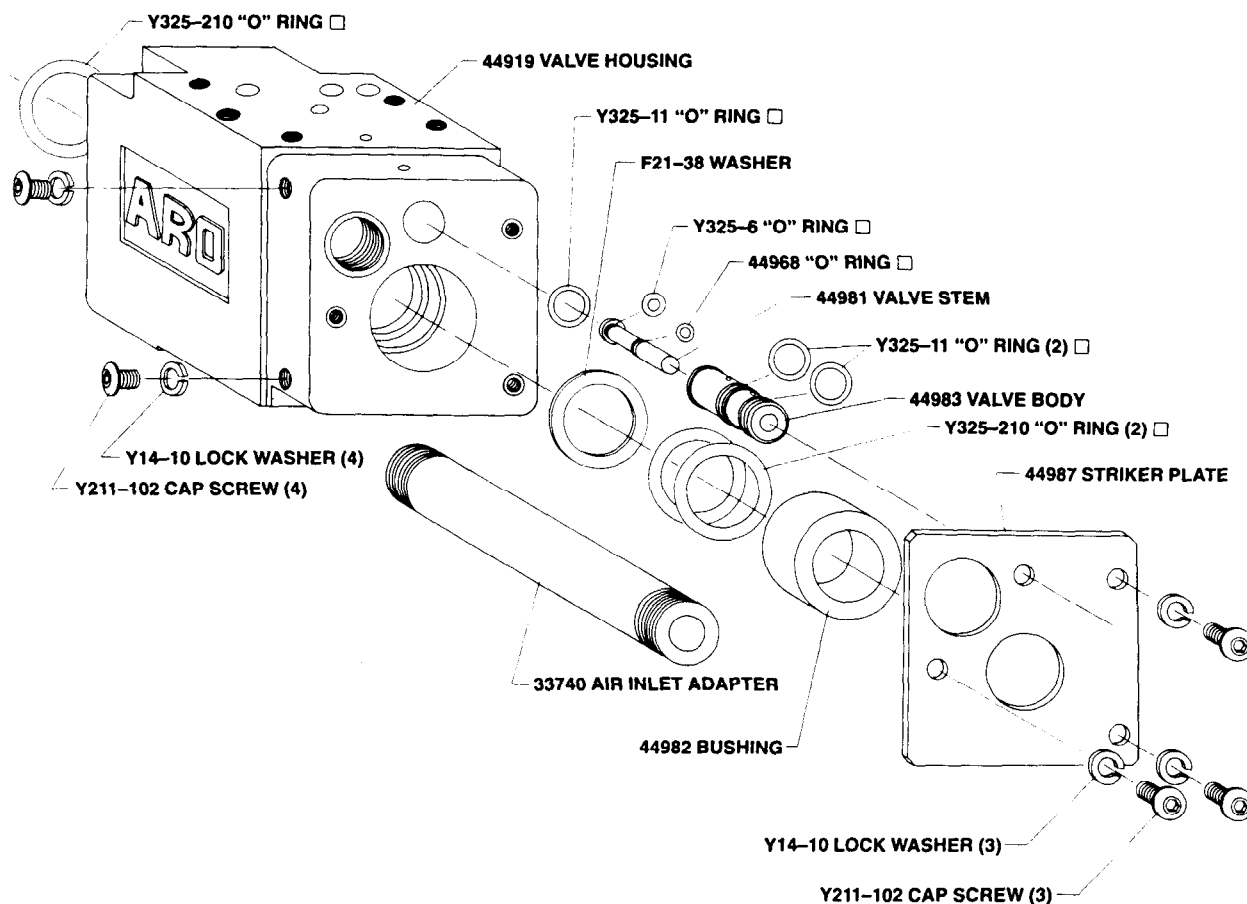
- Remove three cap screws (Y211-102), with lock washers (Y14-10), and remove striker plate (44987).
- Grasp end of valve stem (44981) and pull valve components from housing.
- Remove bushing (44982) from housing for access to two "O" rings (Y325-210) and washer (F21-38). Other "O" ring (Y325-210) is accessible thru front of housing.

ASSEMBLY

- Lubricate all "O" rings with ARO 36460 "O" ring lube, or equivalent, upon assembly.

NOTE: It is recommended that "O" rings be replaced whenever a part containing "O" rings has been disassembled.

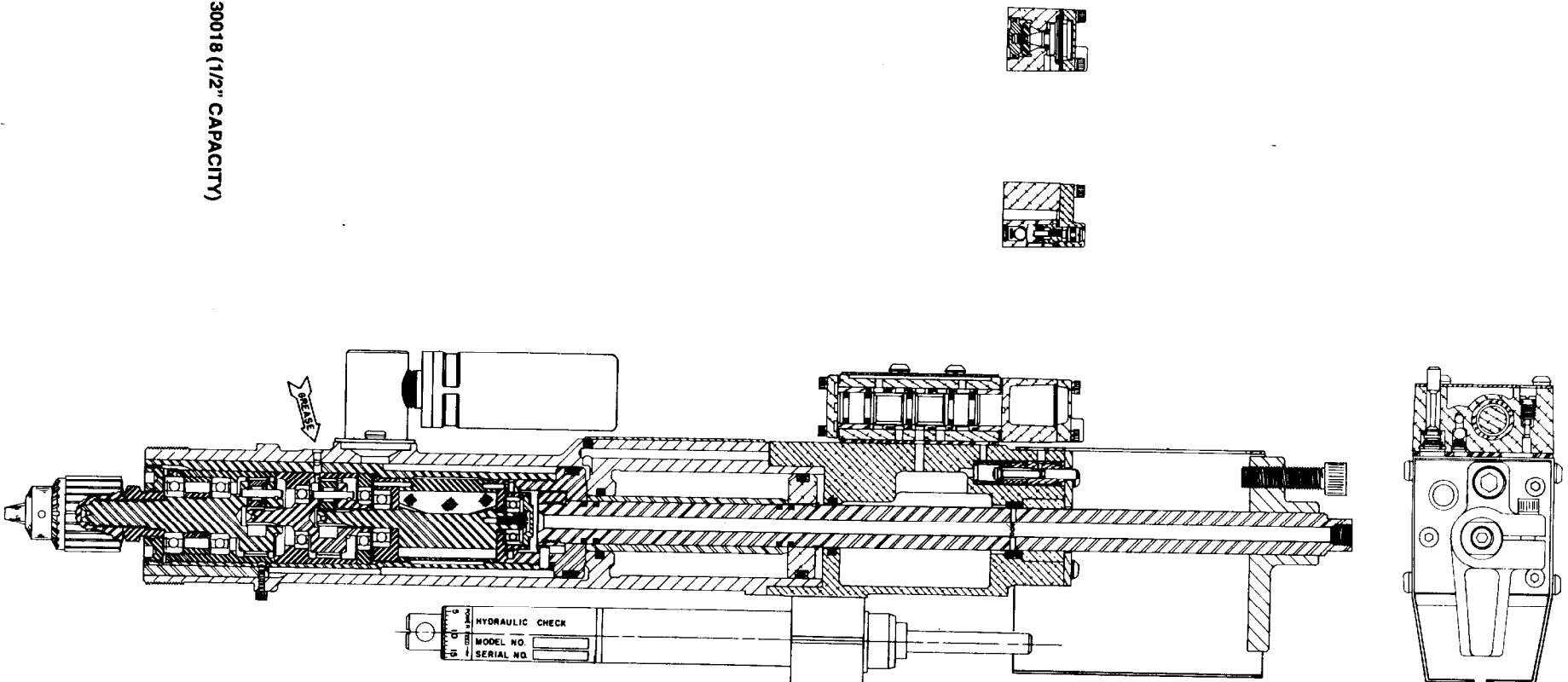
- Assemble one "O" ring (Y325-210) into "O" ring groove thru front of housing. Assemble washer (F21-38), two "O" rings (Y325-210) and bushing (44982) into position at rear of housing.
- Assemble one "O" ring (Y325-11) into bottom of hole in housing provided for valve body and assemble two "O" rings (Y325-11) to valve body. Assemble "O" rings (Y325-6) and (44968) to valve stem and assemble valve stem to valve body. Assemble valve body into housing and secure with striker plate (44987), washers (Y14-10) and cap screws (Y211-102).



PARTS MARKED THUS □ ARE INCLUDED IN SERVICE KIT NUMBER 45831, SEE PAGE 20.

TYPICAL CROSS SECTION OF TOOL

M105
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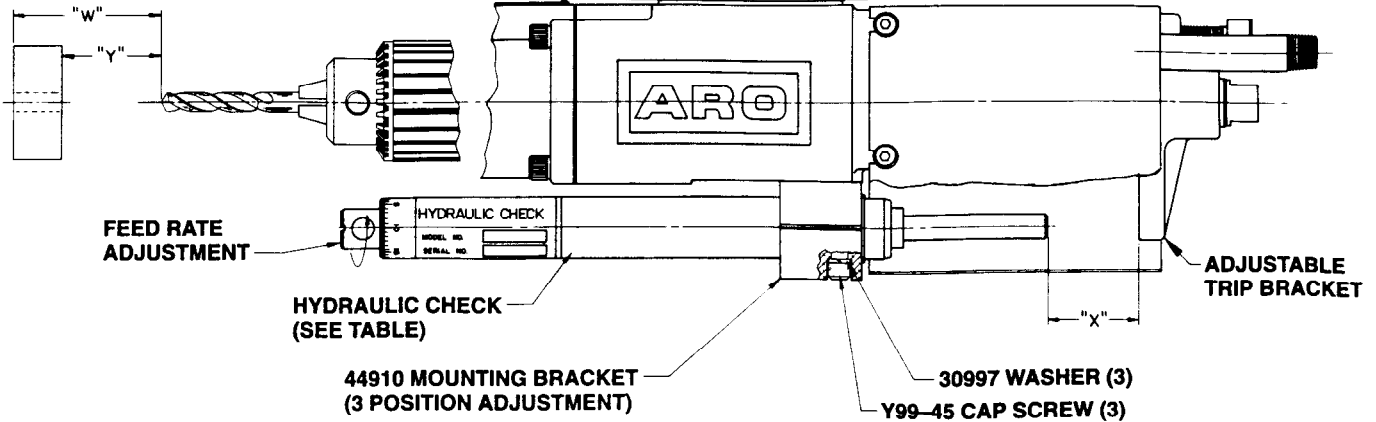


CHUCK 30018 (1 1/2" CAPACITY)

ACCESSORIES

HYDRAULIC CHECK

STROKE LENGTH	HYDRAULIC CHECK ASS'Y	HYDRAULIC CHECK NO.
1 INCH	44969-1	38922
2 INCH	44969-2	38922-1



NOTE: Hydraulic check assembly 44969-2 is furnished with models 8660-()-3.

HYDRAULIC CHECK: The hydraulic check assembly is a hermetically sealed unit with a frictionless diaphragm. The hydraulic fluid need not be replenished. The hydraulic check is available in 1" and 2" stroke length.

MOUNTING INSTRUCTIONS

Assemble mounting bracket (44910), with hydraulic check (38922-), to the valve housing with three screws (Y99-45) and washers (30997).

SET-UP PROCEDURES

TO CONTROL RATE OF FEED:

1. Measure distance from drill point to work piece (distance "Y").
2. Distance "X" between the hydraulic check plunger and the trip bracket must be less than distance "Y" to prevent damage to the drill point when it approaches the work piece. This can be adjusted by selecting the most suitable mounting of the 3-position mounting feature when attaching mounting bracket to tool housing and/or positioning of the adjustable trip bracket. Re-tighten screws before operating unit.

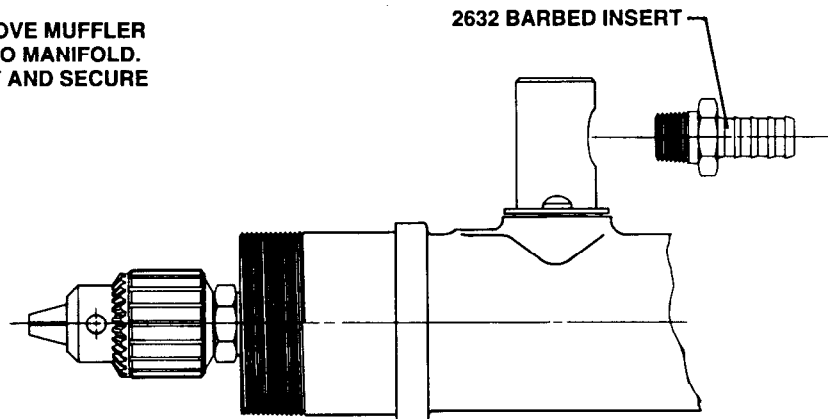
3. Increase the air flow thru the feed control valve by opening five (5) turns from closed. This will allow the drill to advance uncontrolled until the trip bracket contacts the plunger of the hydraulic check.
4. The hydraulic feed rate adjustment is located at the nameplate end of the hydraulic check. Rotate extended spindle until the slot on spindle is located midway between the highest and the lowest settings.
5. Start tool and the drill will advance at a rapid rate, until the trip bracket contacts the plunger of the hydraulic check.
6. Slowly rotate the hydraulic feed rate counterclockwise toward the zero (0) on the nameplate until the drill advances at the desired rate.
Set-up procedure for the tool will be the same as explained in "Set-Up Procedure" on page 3.

TO CONTROL BREAKTHROUGH:

1. When controlled breakthrough is required, the hydraulic check must be set up 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 work piece (distance "W").
2. Set-up procedure for the tool will be the same as explained in "Set-Up Procedure" on page 3.

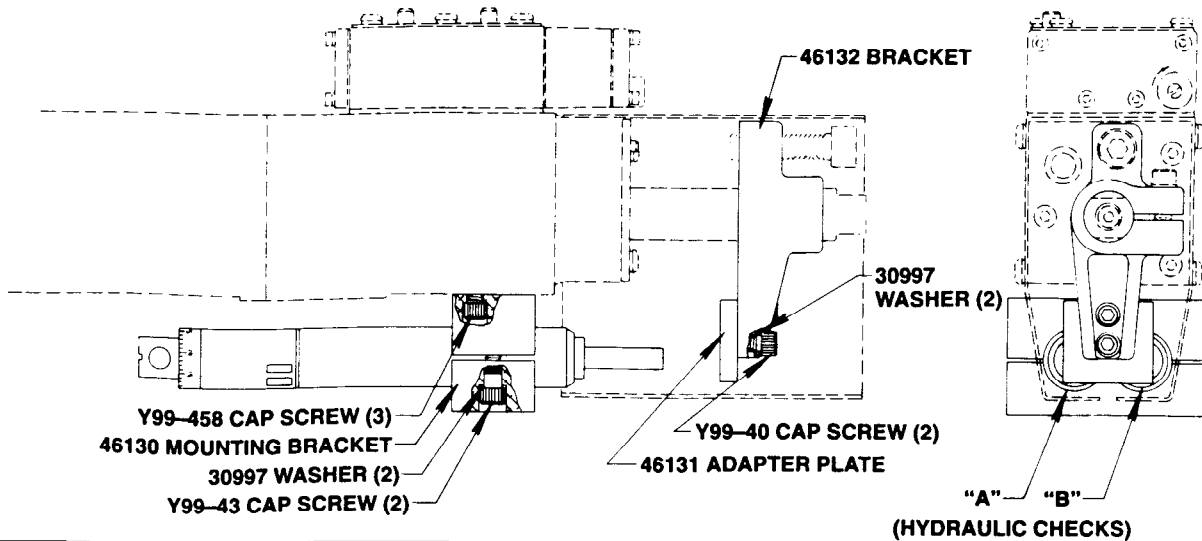
2632 BARBED INSERT FOR PIPED EXHAUST

FOR 1/2" I.D. EXHAUST HOSE, REMOVE MUFFLER AND ASSEMBLE BARBED INSERT TO MANIFOLD. SLIP EXHAUST HOSE OVER INSERT AND SECURE WITH HOSE CLAMP.



DOUBLE HYDRAULIC CHECK ASSEMBLIES 46133-()

M105
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HYDRAULIC CHECK ASSEMBLY NO.	HYDRAULIC CHECK "A"	HYDRAULIC CHECK "B"
46133-11	38922	38922
46133-12	38922	38922-1
46133-13	38922	38922-2
46133-22	38922-1	38922-1
46133-23	38922-1	38922-2
46133-33	38922-2	38922-2

HYDRAULIC CHECK NO. 38922 = 1" STROKE, 38922-1 = 2" STROKE.

HYDRAULIC CHECK ASSEMBLY DASH NO. REPRESENTS STROKE LENGTH OF CHECKS. EXAMPLE: 46133-11 ASSEMBLY CONTAINS TWO 1" STROKE CHECKS.

The dual hydraulic check assembly (46133-) is an accessory item used to replace the standard hydraulic check when additional thrust control during the drilling operation and/or at breakthrough is required.

The dual system can be used when two different thrust control requirements are needed – for example, a 2" stroke length check and a 1" stroke length check. When used together, the 2" stroke length check controls the initial part of the drilling operation and the 1" stroke is set to give additional control at breakthrough.

MOUNTING INSTRUCTIONS

Remove hydraulic check assembly supplied with tool. Determine which of the three mounting positions on housing is best suited for the operation to be performed and assemble mounting bracket (46130) to housing using the three 1/4"-20 x 5/8" long cap screws (Y99-458) and tighten securely. Insert hydraulic checks thru mounting bracket, positioning for desired stroke and secure with the two 1/4"-20 x 1-1/4" long cap screws (Y99-43) and two washers (30997).

Remove trip bracket (44909) from tool and remove the two clamping screws (Y99-42) and washers (30997) and the adjusting

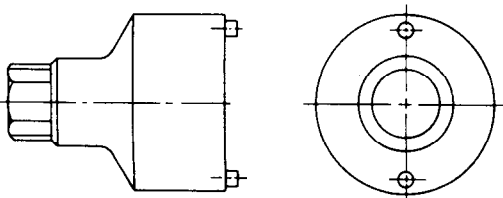
screw (Y157-64) from the trip bracket for use with the new trip bracket (46132).

Assemble adapter plate (46131) to trip bracket (46132) and secure with the two 1/4"-20 x 1/2" long cap screws (Y99-40) and two washers (30997). Assemble the two clamping screws (Y99-42) with washers (30997) and the adjusting screw (Y157-64) to trip bracket and assemble the trip bracket to tool. Position trip bracket on piston rod for desired stroke and tighten the two screws (Y99-42), securing trip bracket on piston rod.

SET-UP PROCEDURE

Basically, the set-up procedure for the dual hydraulic checks is the same as for the single hydraulic check, except you will be doing each step of the set-up twice. After the stroke length set-up is made, synchronize the two checks more or less by rotating the feed rate adjustment of each check to approximately the same number. This is when two checks of the same stroke lengths are being used to control thrust.

When using two checks of different stroke lengths, testing set-up on a few scrap work pieces will be the best way in determining proper rates of feed.

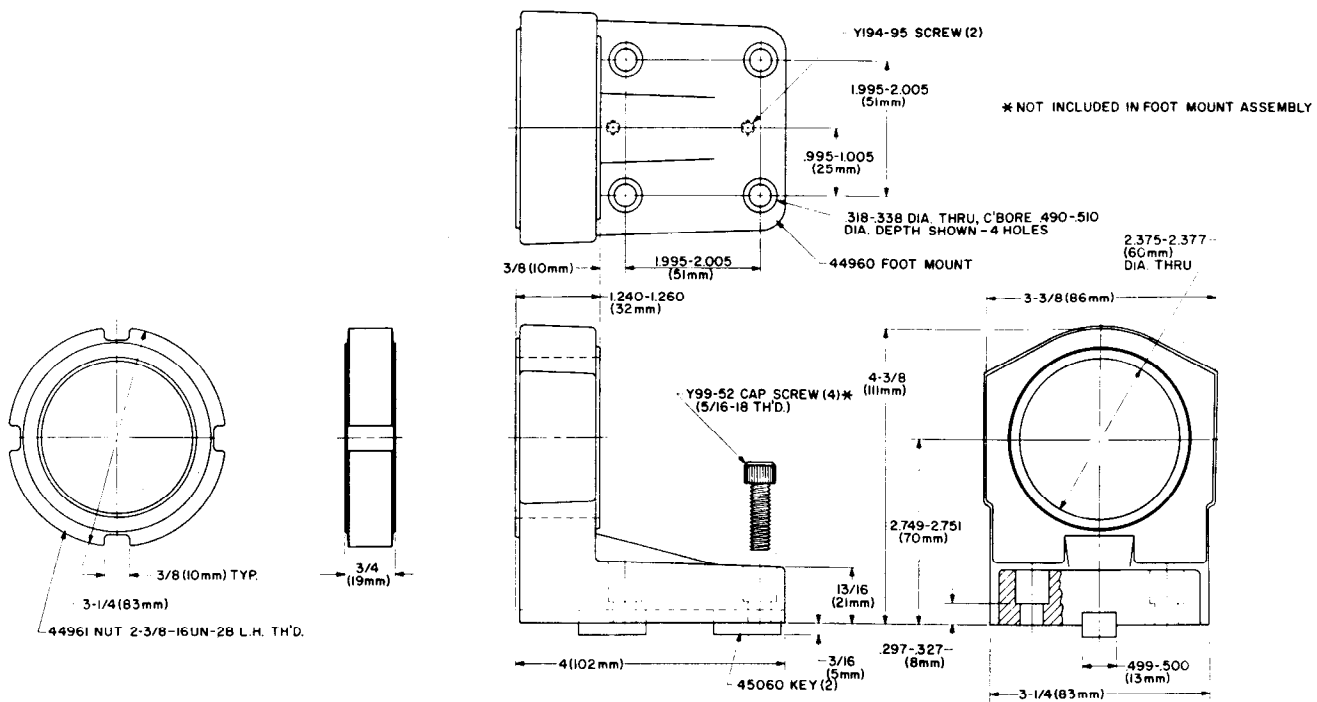


46253-1 SPANNER WRENCH

FOR REMOVAL OF 44898 BEARING LOCK SCREW, AVAILABLE AT EXTRA COST.

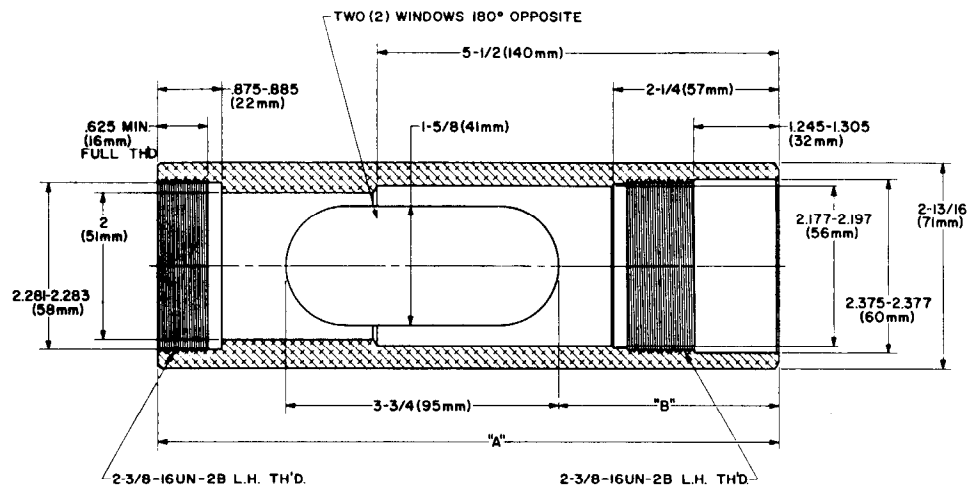
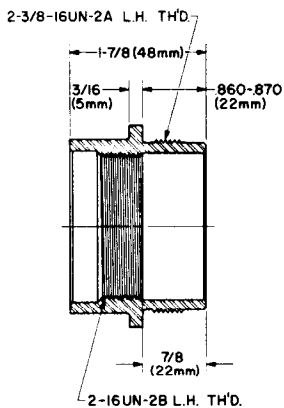
ACCESSORIES

44970 FOOT MOUNT ASSEMBLY



46695 NOSE HOUSING ADAPTER

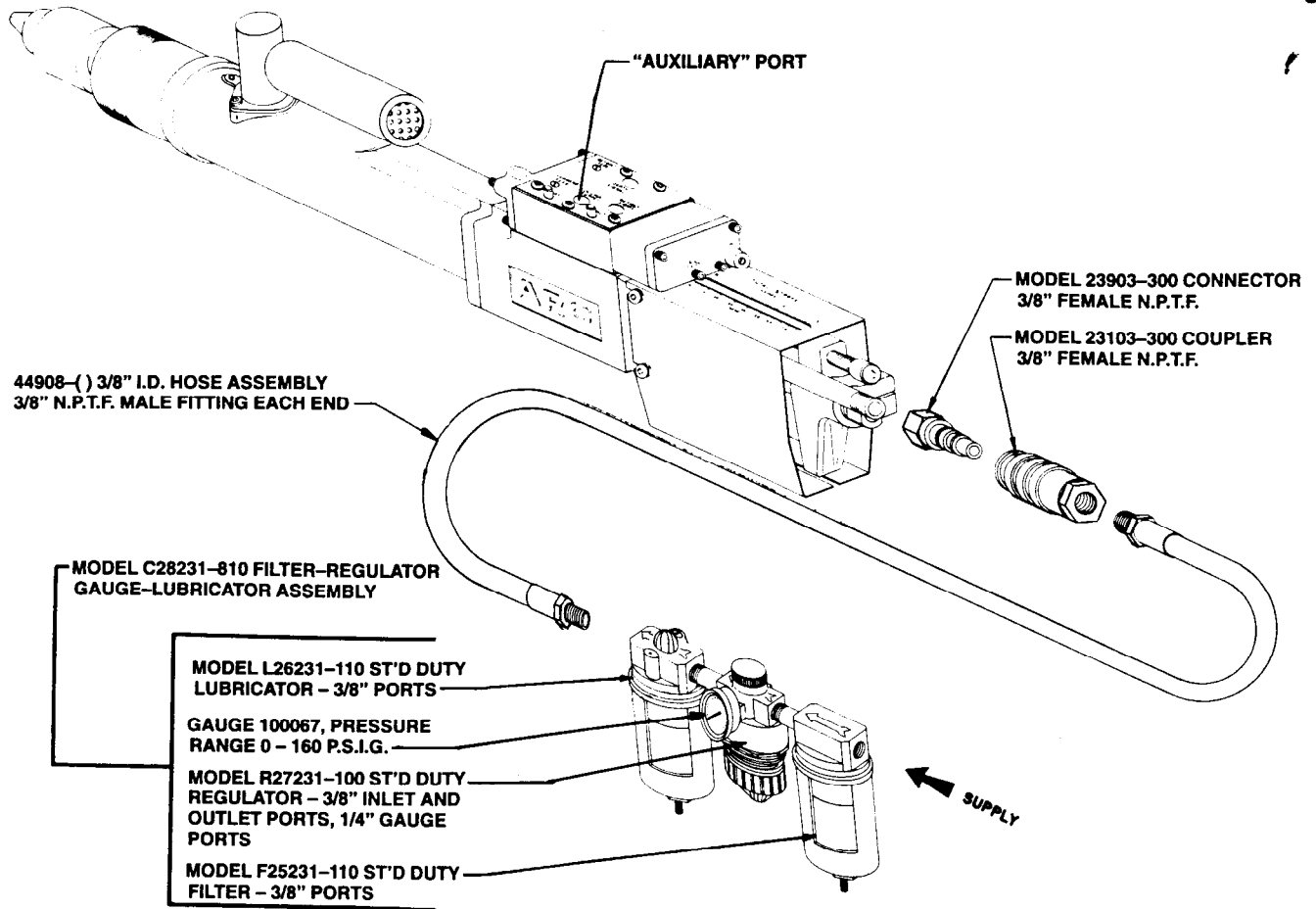
44971-() NOSE HOUSING



PART NO.	LENGTH "A"	LENGTH "B"	USED WITH
44971-2	8.490-8.510 (216mm)	2.290-3.010 (76mm)	8660-()-3, 3" STROKE

RECOMMENDED POWER AIR INLET SYSTEM

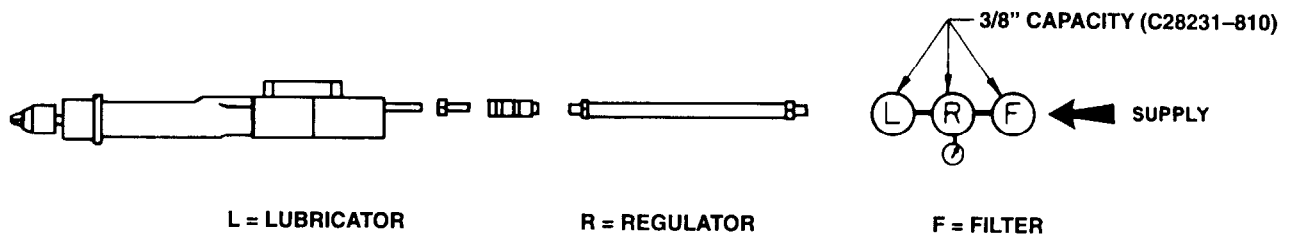
M105
30



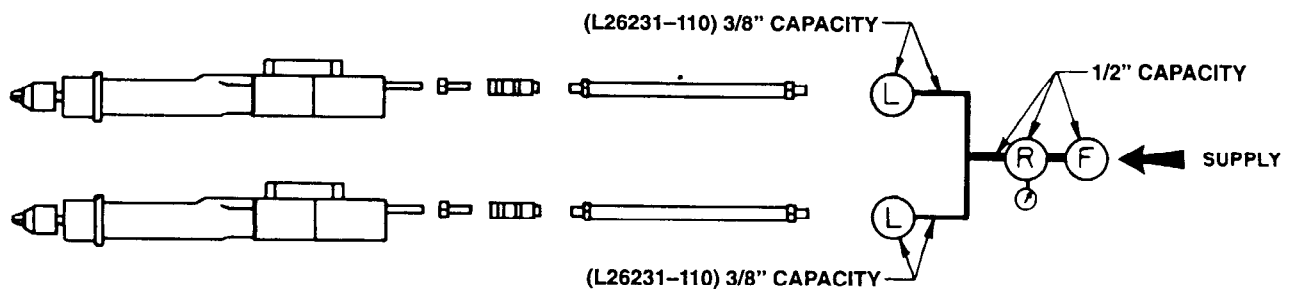
Your ARO self-feed tool is designed to deliver specific horsepower and thrust to achieve high rates of work. To assure the unit will develop this power, care must be taken that the power air inlet system is correctly sized to permit the proper rate of air flow. Shown above is a system for a single tool that will supply correct delivery.

IMPORTANT: The tool is power rated when 90 p.s.i. is present at the tool during operation. To check operating air pressure at the tool, a pressure gauge may be installed in a 1/8" n.p.t. port marked "Auxiliary Supply". **CAUTION:** This port is pressurized when tool is connected to air supply.

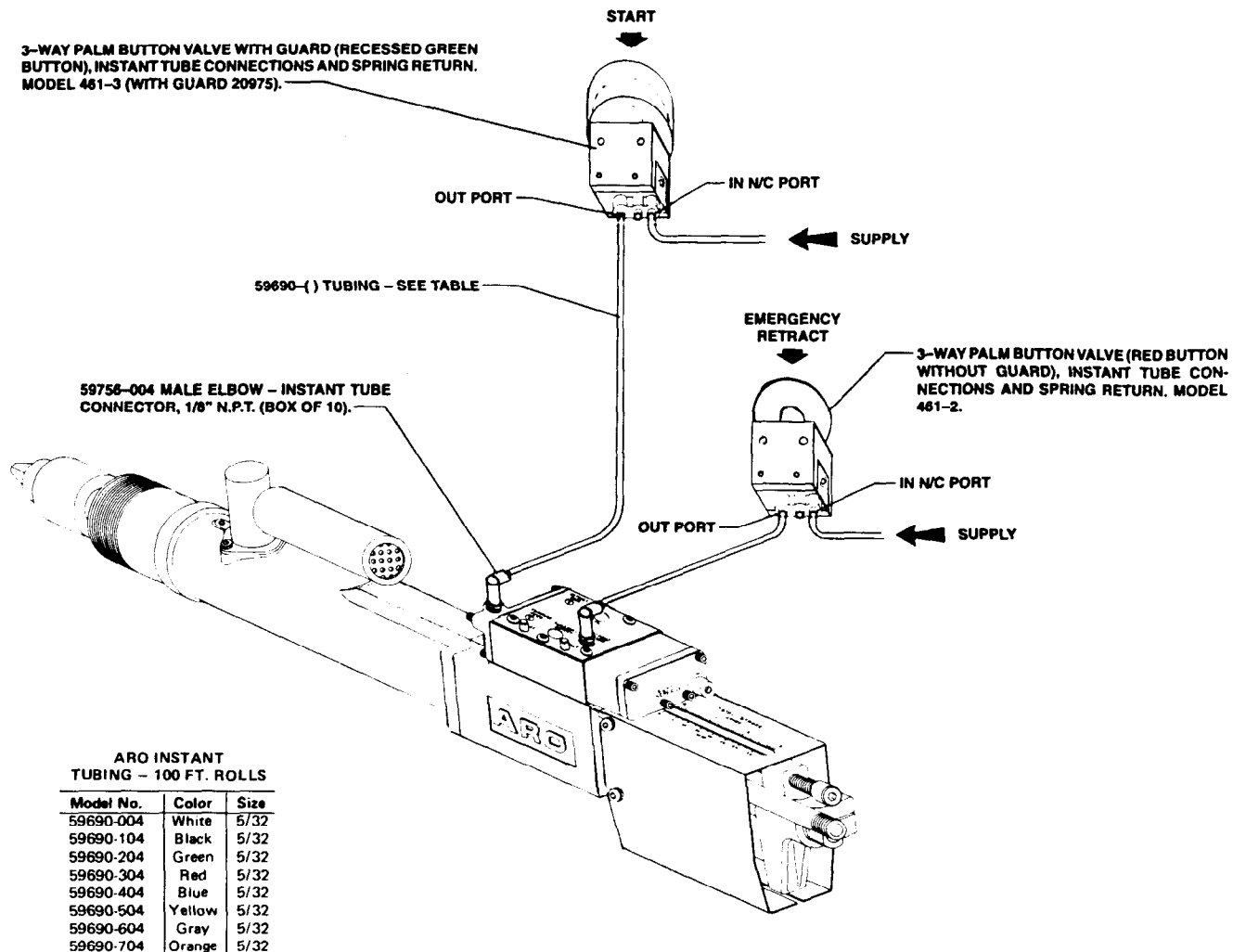
Shown below is the same system in schematic form.



If two units are to be installed, each unit should be supplied with a system like that shown below or use two systems like that above.



BASIC REMOTE CONTROL FOR START AND EMERGENCY RETRACT FUNCTIONS



REMOTE OPERATION

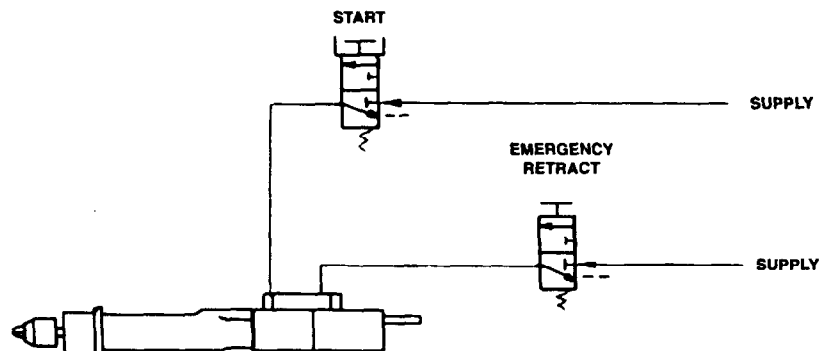
Remote operation of the unit may be achieved by connecting a 3-way valve to the remote start and/or remote retract ports, as shown above.

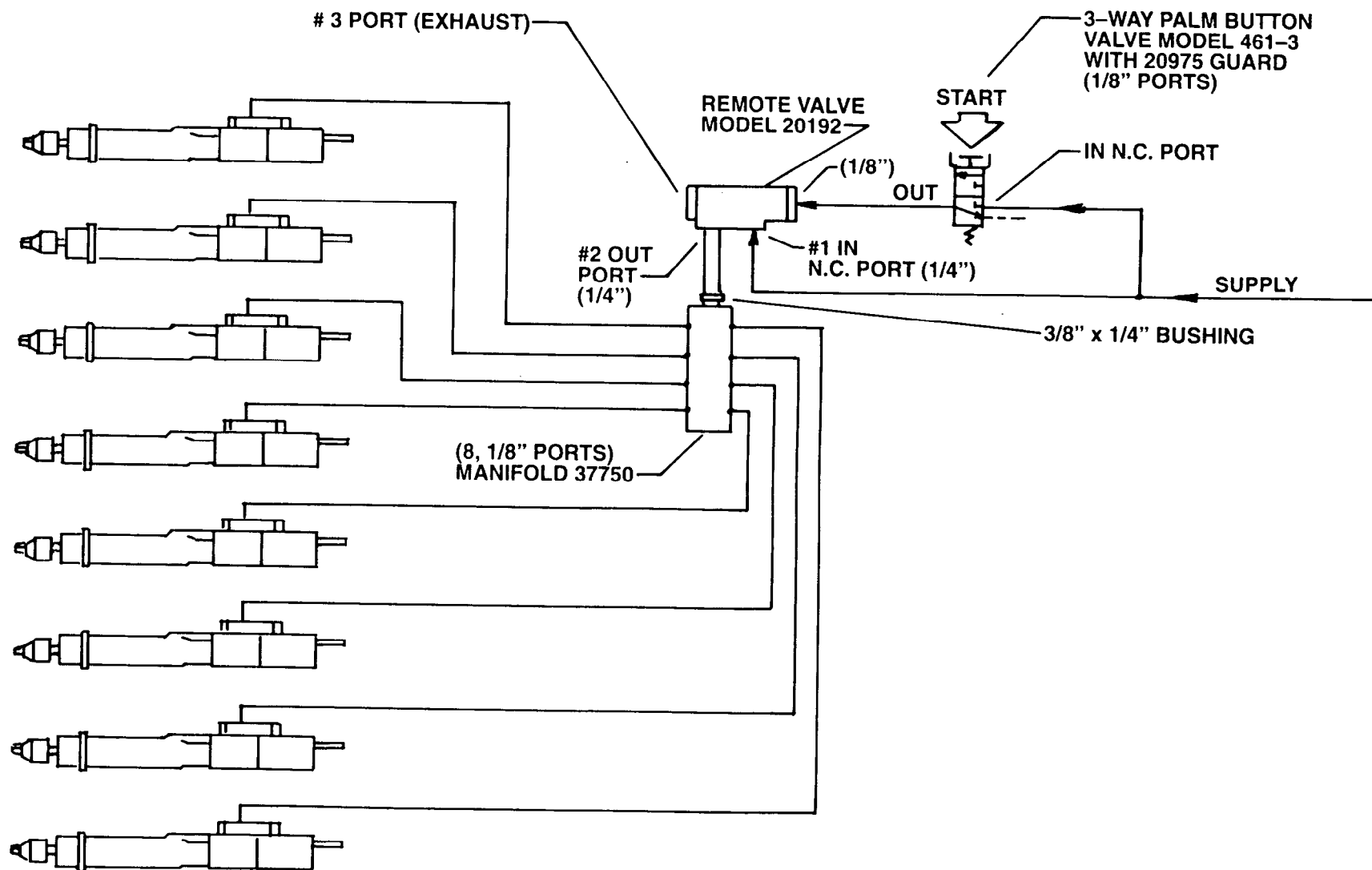
TO START: Depress the remote start button momentarily. The unit will advance the drill to a pre-set depth and automatically retract to the initial position, whereupon the unit will stop with all air to the unit shut off.

EMERGENCY RETRACT: Depress the emergency retract 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 with all air to the unit shut off.

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.





(DUPLICATE FOR REMOTE RETRACT CIRCUIT, EXCEPT USE MODEL 461-2 PALM VALVE WITH RED BUTTON)

WHEN MORE THAN EIGHT (8) TOOLS ARE REQUIRED, PROVIDE ANOTHER 20192 VALVE AND 37750 MANIFOLD. THE SECOND SET OF TOOLS CAN BE ACTUATED FROM THE SAME 3-WAY PALM VALVE.

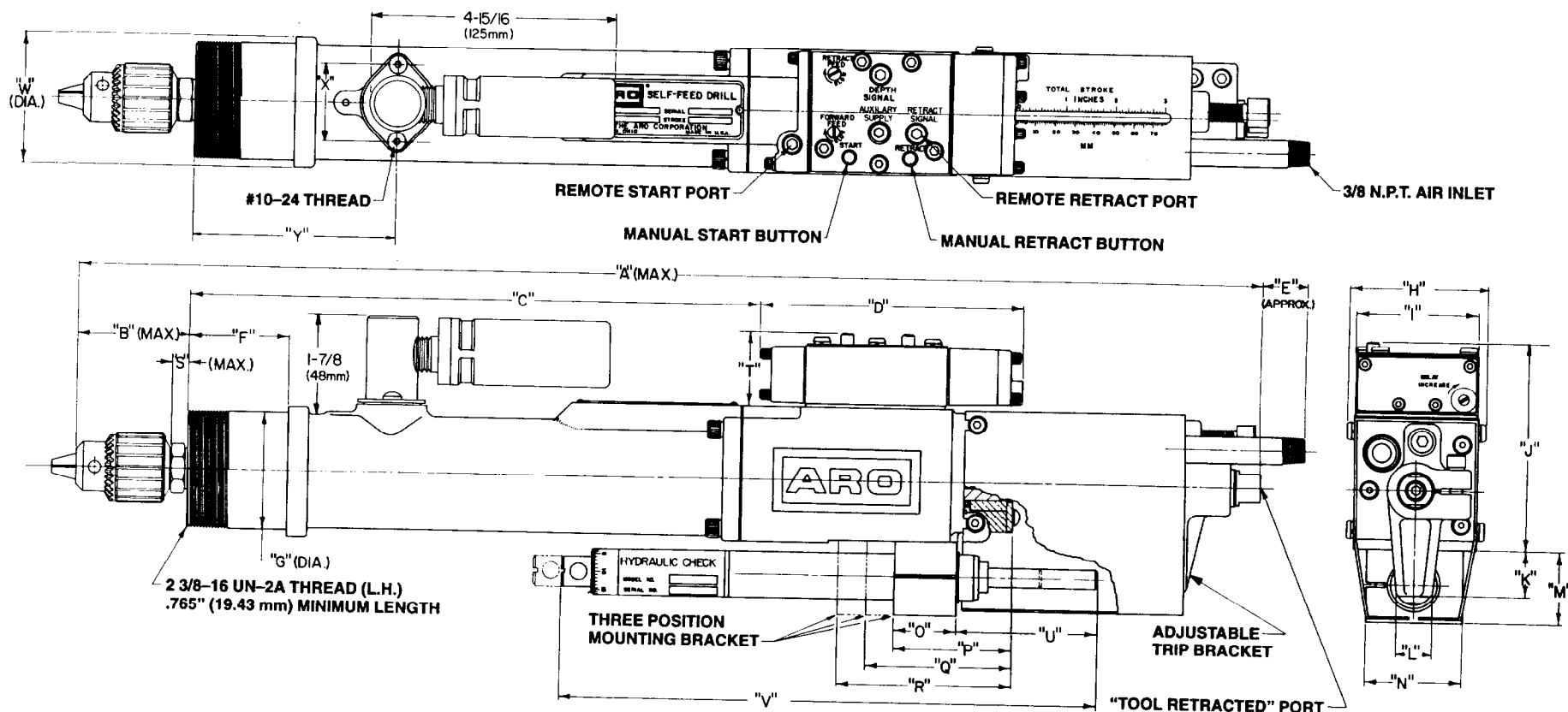
TROUBLE SHOOTING

LISTED BELOW ARE SOME OF THE MOST COMMON CAUSES FOR THE SELF-FEED DRILL TO MALFUNCTION. MALFUNCTIONS BEYOND THE SCOPE OF THIS MANUAL SHOULD BE BROUGHT TO THE ATTENTION OF YOUR ARO REPRESENTATIVE OR RETURN THE TOOL TO THE FACTORY FOR REPAIR.

CONDITION	POSSIBLE CAUSE	CORRECTIVE ACTION
LOW SPEED OR FAILURE TO OPERATE.	<ol style="list-style-type: none"> 1. INADEQUATE AIR SUPPLY. 2. IMPROPER LUBRICATION OF UNIT (MOTOR AND/OR GEARING), DIRTY MOTOR (ROTOR BLADES STICKING, ETC.), OR BROKEN OR BADLY WORN ROTOR BLADES OR BEARINGS IN MOTOR. 3. MOTOR NOT TIGHTENED DOWN OR IMPROPERLY SPACED. 	<ol style="list-style-type: none"> 1. CHECK AIR SUPPLY FOR CORRECT REGULATOR ADJUSTMENT (90 P.S.I.G. MAX. WHEN TOOL IS OPERATING). 2. BE SURE LUBRICATOR IS FULL OF OIL AND GEARING IS LUBRICATED REGULARLY, REFER TO PAGE 4. DISASSEMBLE, CLEAN, INSPECT, REPLACE WORN OR DAMAGED PARTS, LUBRICATE. REFER TO PAGES 4, 6 AND 8 3. BE SURE BEARING LOCK SCREW (44898) IS SUFFICIENTLY TIGHTENED. INSURE PROPER INSTALLATION OF MOTOR. REFER TO PAGE 8.
MOTOR DOES NOT SHUT OFF AFTER COMPLETION OF CYCLE.	<ol style="list-style-type: none"> 1. WORN OR DAMAGED "O" RINGS IN VALVE HOUSING (44919). 	<ol style="list-style-type: none"> 1. DISASSEMBLE, CLEAN, INSPECT, REPLACE "O" RINGS. REFER TO PAGES 4 AND 10.
IRREGULAR OR ERRATIC FEED.	<ol style="list-style-type: none"> 1. INADEQUATE AIR SUPPLY. 2. FEED CONTROL NEEDLE VALVES (34617) IMPROPERLY ADJUSTED OR RESTRICTED WITH FOREIGN MATERIAL. 3. WORN OR DAMAGED "O" RINGS ON SPOOL VALVE (44978). 4. WORN OR DAMAGED "O" RINGS ON PISTON (44985), IN HOUSING (44989) OR VALVE HOUSING (44919). 5. LEAKING OR DAMAGED GASKETS (44948, 44950, 44956 OR 42639). 6. TIMING VALVE (59231) IMPROPERLY ADJUSTED OR RESTRICTED (DIRTY). 	<ol style="list-style-type: none"> 1. CHECK AIR SUPPLY FOR CORRECT REGULATOR ADJUSTMENT (90 P.S.I.G. MAX. WHEN TOOL IS OPERATING). 2. DISASSEMBLE, CLEAN, INSPECT, REPLACE "O" RINGS IF NECESSARY. REFER TO PAGES 4, 8 AND 9. 3. DISASSEMBLE, CLEAN, INSPECT, REPLACE "O" RINGS. REFER TO PAGES 4, 8 AND 9. 4. DISASSEMBLE, CLEAN, INSPECT, REPLACE "O" RINGS. REFER TO PAGES 4, 5, 8, 9 AND 10. 5. CHECK TORQUE ON CAP SCREWS. BE SURE ALL SCREWS ARE PROPERLY TIGHTENED. REPLACE GASKET(S), IF NECESSARY. 6. DISASSEMBLE, CLEAN, INSPECT TIMING VALVE AND BALL CHECK AREAS. REFER TO PAGES 3, 4, 8 AND 9.
FAILURE TO FEED FORWARD.	<ol style="list-style-type: none"> 1. SEE ITEMS 1 THRU 3 OF ERRATIC FEED. 2. LEAKING OR DAMAGED GASKET (44950). 3. IMPROPER SET-UP OF ACCESSORY HYDRAULIC CHECK (38922-) 	<ol style="list-style-type: none"> 1. SEE ITEMS 1 THRU 3 OF ERRATIC FEED. 2. BE SURE SCREWS IN END CAP (44949) ARE PROPERLY TIGHTENED. REPLACE GASKET IF NECESSARY. 3. BE SURE PROPER SET-UP AND ADJUSTMENT PER INSTRUCTIONS ON PAGE 12.
FAILURE TO RETRACT.	<ol style="list-style-type: none"> 1. SEE ITEMS 1 THRU 3 OF ERRATIC FEED. 2. LEAKING OR DAMAGED GASKET (44956 OR 42639). 3. IMPROPER ALIGNMENT OR CONTACT OF STROKE ADJUSTMENT SCREW (Y157-64) AND RETRACT VALVE STEM (44981). 4. BADLY WORN OR DAMAGED "O" RING ON RETRACT VALVE STEM (44981). 	<ol style="list-style-type: none"> 1. SEE ITEMS 1 THRU 3 OF ERRATIC FEED. 2. CHECK TORQUE ON CAP SCREWS (Y154-38). REPLACE GASKET IF NECESSARY. 3. BE SURE TRIP BRACKET (44909) IS PROPERLY POSITIONED ON PISTON ROD, ALLOWING STROKE ADJUSTMENT SCREW TO ALIGN AXIALLY WITH VALVE STEM. REFER TO SET-UP PROCEDURE, PAGE 3. 4. DISASSEMBLE AND REPLACE "O" RING. PAGE 10.

MAINTENANCE TOOL FURNISHED WITH EACH MODEL

Y106-3 ALLEN WRENCH (1/8")
 Y106-5 ALLEN WRENCH (3/16")
 Y106-8 ALLEN WRENCH (5/16")
 Y106-21 ALLEN WRENCH (7/64")



CHUCK NO.	"A"	"B"	
33906 (1/4" CAP.)	23 13/16" (605 mm)	2 1/16" (52 mm)	OPTIONAL
30016 (3/8" CAP.)	24 3/8" (619 mm)	2 5/8" (67 mm)	OPTIONAL
30018 (1/2" CAP.)	24 1/2" (622 mm)	2 3/4" (70 mm)	STANDARD

		"C"	"D"	"E"	"F"	"G"	"H"	"I"	"J"	"K"	"L"	"M"	"N"	"O"	"P"	"Q"	"R"	"S"	"T"	HYDRAULIC CHECK						"W"	"X"	"Y"		
																					"U"		"V"							
INCHES		11 11/16	5 5/16	1 1/16	1.990 - 2.010	2.372 - 2.374	2.784	2.500	4.312	61/64	.750	1.500	2.000	1.250	2.375	2.937	3.500	5/16	1.500	1" STROKE	2" STROKE	1" STROKE	2" STROKE	2.625	1.562	4.125				
MM		297	135	27	50.55 - 51.05	60.25 - 60.30	70	64	110	24	19	38	51	32	60	75	89	19	38	49	75	200	275	67	40	105				

SERVICE KIT NO. 45831

<u>QTY</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>	<u>QTY</u>	<u>PART NUMBER</u>	<u>DESCRIPTION</u>
5	15066	"O" RING	2	44986	BACK-UP RING
1	32814	LOCATING PIN	4	59230	WASHER
1	33705	BEARING	1	59378	"O" RING
1	33709	BEARING	5	Y14-10	LOCKWASHER
3	39679	SPRING	3	Y16-6	BALL
1	41795	MOTOR OIL	1	Y145-23	RETAINING RING
1	41799	GEAR LUBE	3	Y147-1	RETAINING RING
1	41954	"O" RING LUBE	2	Y147-43	RETAINING RING
2	41981	BACK-UP RING	1	Y147-75	RETAINING RING
5	42018	ROTOR BLADE	1	Y178-18	ROLL PIN
2	42321	SPRING	2	Y325-6	"O" RING
1	42639	GASKET	2	Y325-7	"O" RING
1	44899	SEAL	2	Y325-8	"O" RING
2	44915-1	SNAP RING	1	Y325-10	"O" RING
1	44915-2	SNAP RING	3	Y325-11	"O" RING
2	44915-3	SNAP RING	11	Y325-16	"O" RING
1	44945	GASKET	3	Y325-210	"O" RING
1	44948	GASKET	1	Y325-214	"O" RING
1	44950	GASKET	1	Y325-223	"O" RING
1	44956	GASKET	1	Y325-224	"O" RING
3	44967	BALL	1	59105	"O" RING
1	44968	"O" RING	1	Y154-31	SCREW