



OILGEAR TYPE "A-A" & "A-B" AIR OPERATED CONTROLS FOR TYPE "D" UNITS

REFERENCE INSTRUCTION BULLETINS

Type "D" Variable Delivery Pumps w/o Controls - - - -	947000
Type "DN" Variable Delivery Pumps w/o Controls - - - -	947925
Type "DC" Any-Speed Transmissions w/o Controls - - - -	967900
Air Operator - - - - -	See Manufacturers Literature

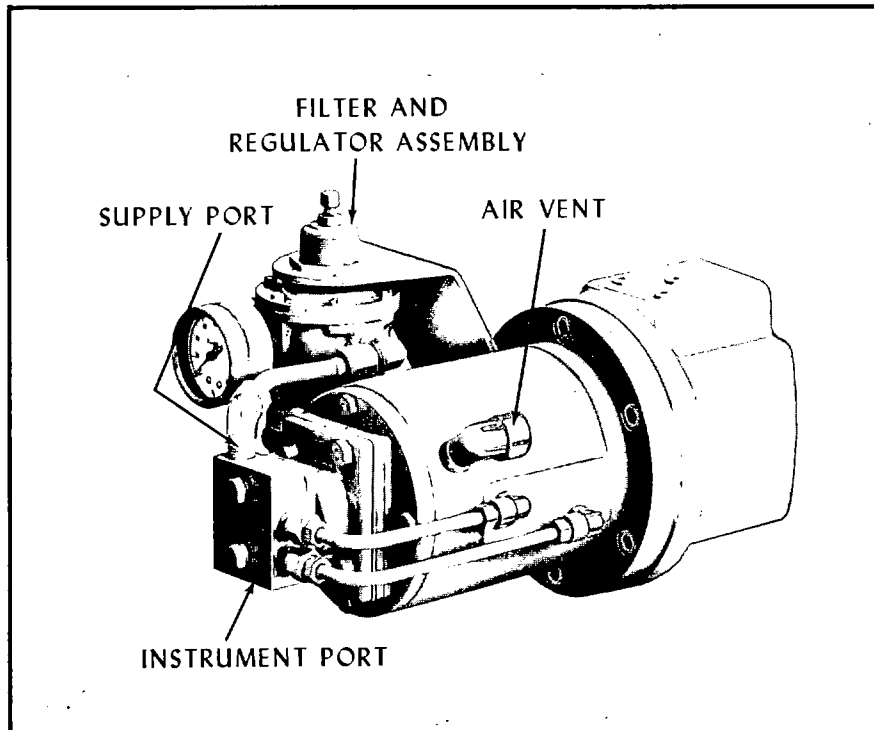


Figure 1. Oilgear Type "A" Control (53904).

TO THE USER AND OPERATOR OF OILGEAR "A" CONTROLLED UNITS

These instructions are printed to simplify and minimize your work of operating and maintaining Oilgear "A-A" and "A-B" controlled units. Your acquaintance with the construction, principle of operation and characteristics of these units will help you obtain optimum performance, reduce shut-downs and increase service life. We feel confident the unit will operate to your satisfaction if these instructions are adhered to. Some units have been modified for specific applications from those described and other changes may be made without notice. The bulletin describes the Annin type operators but other operators are also used. In those cases, refer to their manufactures literature.

I. OPERATOR INSTALLATION.

Clean air or non-corrosive gas of not more than 100 psi or less than 35* psi is required. Dirt, oil and moisture must be kept from air operator. Install a filter and drip well in supply line. Connect the air pressure supply line to the filter regulator assembly (320). Connect signal line to "Instrument" port. The operator responds to a small signal pressure (see section III for specifications).

* 50 psi on early models

II. CONSTRUCTION AND PRINCIPLE OF OPERATION

A. CONSTRUCTION.

The principle components of the type "A" controls are an air positioner (313A or B) and a hydraulic force amplifier assembly (300). The force amplifier includes a pilot plunger (305) with a follow-up bushing (304) which is locked to the control piston (301) and

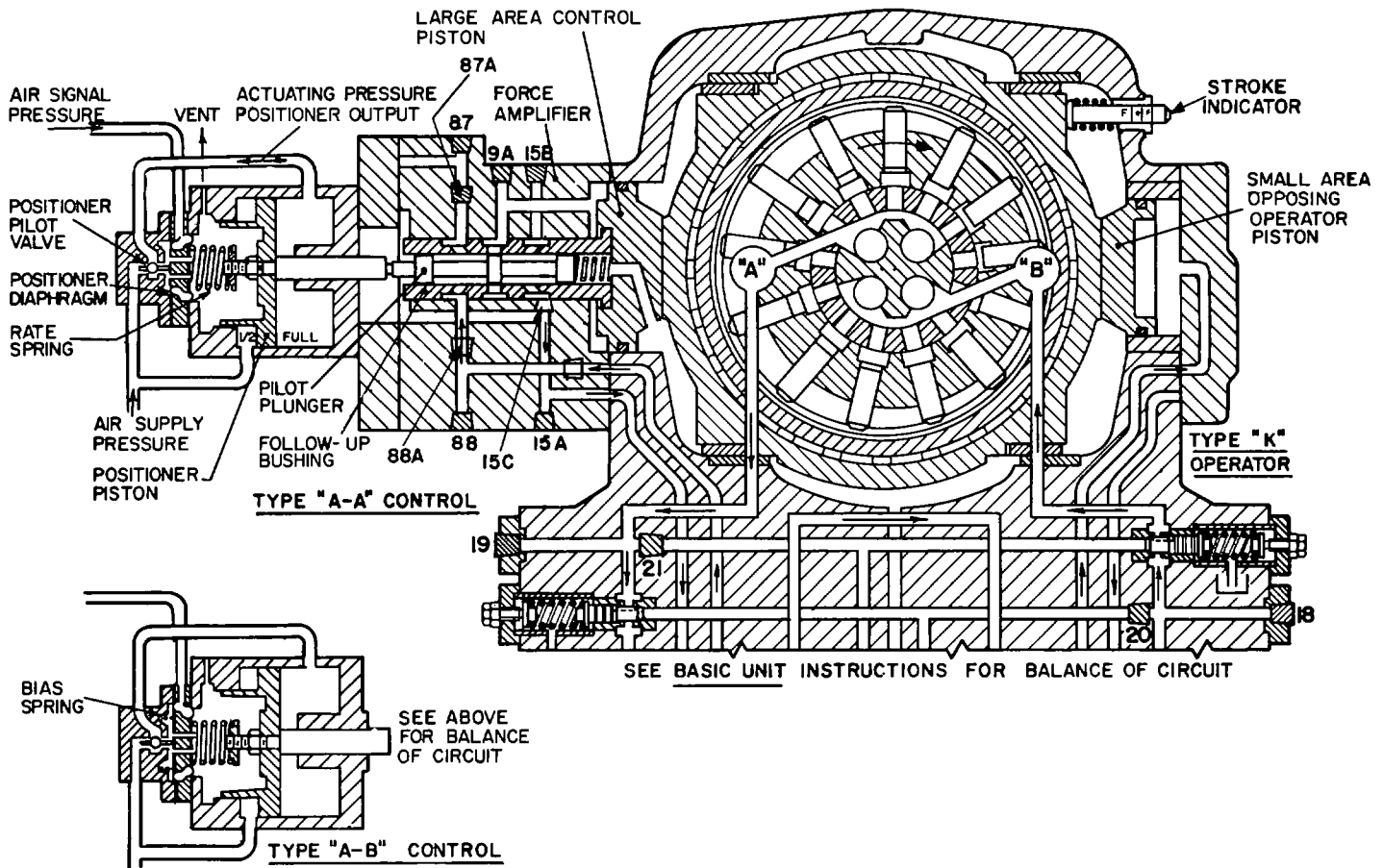


Figure 2. Cutaway Diagram of Type "A" Control (5V-10309-LA).

enclosed in housing (300). Type "A" controlled units are usually equipped with a Type "K" non-adjustable hydraulic opposing operator. See "Standard Opposing Operators". Some units may use other opposing controls for additional functions. These units may have a check valve for free flow out port 9A to 88. See reference instruction bulletin for principle of operation of Pump or Transmission w/o control.

B. PRINCIPLE OF OPERATION (Refer to figure 2).

1. Direct Operating Control (A-A). The supply air is piped to the positioner and to the half area side of the positioner piston. With a minimum air signal, the piston will be fully extended and the positioner pilot valve will be closed and all air from the full area side of the piston will be exhausted past the positioner pilot valve, thru diaphragm retainer and out the vent. As the signal pressure increases, the positioner pilot will open admitting air to the full area side of the piston. This retracts the piston and stem (as shown) until the rate spring has compressed to a point where the force exerted by the spring against the positioner diaphragm exactly equals the force exerted by the signal pressure against the other side of the diaphragm. At this point, the piston will have reached a position corresponding with the value of the signal pressure and the positioner pilot valve closes to maintain position.

The pilot plunger is held against the positioner stem by a spring arrangement. Therefore movement of the positioner results in movement of the pilot plunger. When the positioner stem retracts, the pilot valve moves toward the positioner. Control fluid is directed from behind the control piston thru the follow-up bushing, past the plunger and to the control drain port. The smaller area opposing operator piston forces the slideblock and large area control piston toward the air operator until the port in follow-up bushing covers the pilot plunger land. When the stem extends, it moves the pilot plunger away from the air positioner. The pilot plunger opens the port in the follow-up bushing to gear pump pressure. Fluid is directed to the area behind the large control piston which overcomes the force of the small area opposing operator piston and moves the slideblock away from the air positioner until the port in the follow-up bushing covers the pilot plunger land.

2. Reverse Acting Control ("A-B"). The air supply is piped to the positioner and to the half area side of the positioner piston. A minimum air signal will fully open positioner pilot valve, admitting full air supply pressure to the full area side of the positioner piston. As the signal pressure increases, the positioner closes the positioner pilot valve and exhausts air from the full area side of the piston. The supply

air on the half area side of the piston extends the piston and stem, relieving a portion of the force exerted by the rate spring on the positioner diaphragm until the rate spring force, plus the force exerted by the signal pressure on the positioner diaphragm exactly equals the force exerted by the positioner bias spring. At this travel of the piston, a position will be established corresponding with the air signal value within its span. For operation of pilot plunger and force amplifier, see preceding paragraph.

III. SPECIFICATIONS

Unit Size	Max. Unit Eccen., Inches	Min. Signal psi	Max. Signal psi
4	.198	3	12.6
8	.187	3	15
12 & 20	.250	3	15
35 & 60	.375	3	15
100	.406	3	15
150	.531	3	15
200 & 230	.675	3	15

Some special units may be set for other values.

IV. MALFUNCTIONS AND CAUSES.

A. Unresponsive Control.

1. Low air pressure signal, low supply air pressure or restricted lines.
2. Faulty air operator.
3. Defective regulator, filter or instrument.
4. Binding control or opposing operator piston.
5. Binding pilot plunger.
6. Broken pilot plunger spring or piston rings.
7. Low gear pump pressure.
8. Defective radial piston unit, see reference bulletin.

B. Erratic Pump Delivery or Transmission Speed.

1. Low gear pump pressure.
2. Broken pilot plunger spring.
3. Improper neutral setting.

V. TESTING AND ADJUSTING

The air operator (313A or B) is tested and adjusted while dismounted from the rest of the control assembly. Factory adjustment for neutral was made with 30 psi air supply pressure from regulator. Changes in this pressure will vary neutral position. With air operator connected to air supplies, gradually increase the air signal. Movement of operator plunger should start with a signal of 3 psi. If plunger moves before or after this point, adjustment is necessary

A. The control can be adjusted as follows: See figure 3.

DIRECT ACTING ("A-A"). Loosen both set screws and turn spring button counterclockwise to increase starting point pressure and clockwise to decrease.

REVERSE ACTING ("A-B"). Loosen both set screws and turn spring button clockwise to increase starting point counterclockwise to decrease.

The following equation will be helpful in determining the number of turns required to raise or lower the starting point.

$$\frac{\text{max. signal} - \text{min. signal}}{\text{units eccentricity}} \times 0.0625 = \text{psi per turn of}$$

spring button. If a direct operator started at 2 psi instead of the required 3 psi for a size 35 unit: —

$$\frac{15 - 3 \times 0.0625}{.375} = 2 \text{ psi per turn of button.}$$

Therefore, 1/2 turn of button counterclockwise will correct it one psi.

NOTE: After adjusting, lock spring button in position by turning in the set screws.

If air operator does not function properly, see manufactures literature.

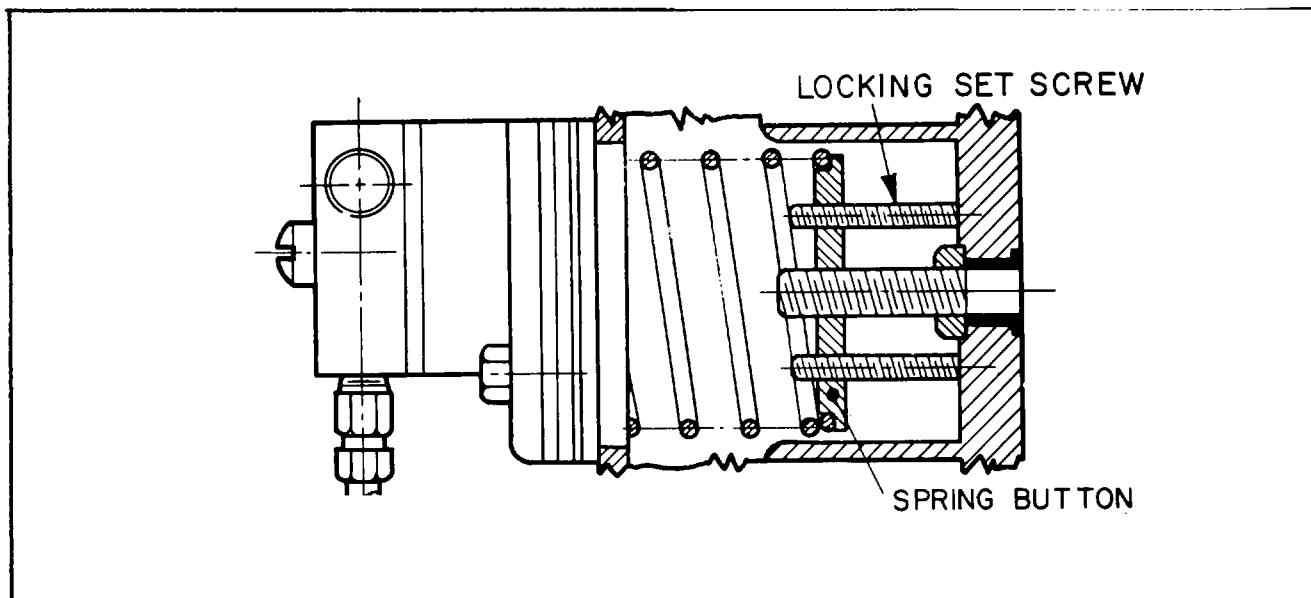


Figure 3. Partial Section of Air Operator (3V-9930-L).

B. Testing Control Stroke.

ONE-WAY UNITS. To determine neutral, insert a pressure gage (good for 1000 psi above units rating) in an auxiliary pressure port (or observe slideblock indicator stem) and block pressure line. Start unit at neutral by feeding a 3 psi signal to control. The gage should read zero (or indicator should be at "O" mark). A very slight increase in signal should show a fluctuation on gage and indicator should move off "O" mark.

TWO-WAY UNITS. To determine neutral, insert pressure gages (good for 1000 psi above units rating) in auxiliary pressure ports (or observe slideblock indicator stem). Signal the operator with air pressure value half way between minimum and maximum and start unit. Both gages should read alike (the indicator should be on the "O" mark).

If gages indicate excessive pressure at port "B" or indicator shows unit stroking on "B" side (with control mounted on left side facing driveshaft), it will be necessary to remove some of the shims (308-A, B, C). If excessive pressure is at port "A" or indicator shows unit stroking on "A" side, add shims.

C. Adjusting Control.

ONE-WAY UNITS. Normally, facing the driveshaft, the "A" control is on the left. With the "direct acting" operator ("A-A"), the minimum signal should result in zero delivery and the maximum signal with maximum delivery from port "A." Proportional signals result in proportional volumes. With "reverse acting" operator ("A-B"), maximum signal results in delivery from port "B." If control side is reversed or shaft rotation counterclockwise, delivery functions are reversed.

TWO-WAY UNITS. Normally, facing the driveshaft, the "A" control is on the left. With the "direct acting" operator ("A-A"), minimum signal results in maximum volume from port "B," maximum signal in maximum volume from port "A," half signal span in neutral. With "reverse acting" operator ("A-B"), minimum signal results in maximum volume from port "A," maximum signal in delivery from port "B," half signal span in neutral. If control side is reversed or shaft rotation counterclockwise, delivery functions are reversed.

VI. DISASSEMBLY.

Shut off air. Disconnect shop and signal supply lines to operator. When disassembling; tag all O'rings, shims and plugs so they will be returned to their original positions upon assembly. Remove mounting plate (309) with air operator (313A or B) as an assembly from amplifier housing (300). Further disassembly of this assembly is not necessary unless air operator is faulty. Remove retaining ring (319) used on sizes 8 thru 35, and withdraw pilot plunger (305) with spacer (308) and shims (308A & B). Do not disassemble plunger and spacer unless shims are to be added or removed. If so, press out pin (316) if used and unscrew spacer (308), add or remove shims. Reassemble spacer and pilot plunger. Use Loctite to secure spacer in pilot plunger. If further disassembly is necessary, remove the force amplifier assembly (300) from unit. The control piston (301) and bushing (304) assembly may come with the force amplifier or may remain in case, be careful not to allow it to fall.

Size 4 thru 35 Units. Withdraw follow-up bushing and control piston as a unit. Withdraw spring (312), if it did not come out with pilot plunger. Remove retaining plate (321), thrust plate (323), thrust bearing and ring (322), and snap ring (325). If necessary, control piston (301) and follow-up bushing (304) can be pressed apart. Piston ring (302) need not be removed unless damaged.

Size 60 and larger. Withdraw follow-up bushing (304) and control piston (301) as a unit. Remove retaining plate (321) and separate the piston and bushing (304) and withdraw spring (312). Remove spacer plate (327). Piston ring (302), and O'rings (328 and 329) need not be removed unless damaged.

VII. INSPECTION.

Inspect O'rings for hardening or deterioration. Inspect piston rings, pistons and bores for signs of wear. Replace any part which appears unduly worn. Check sliding fits of pilot plunger (305) in bushing (304). All sliding fits should be smooth. Tap if necessary. Clean all parts thoroughly and lubricate lightly just before assembly. If air operator was disassembled, assemble per manufactures instructions.

VIII. ASSEMBLY.

Size 4 thru 35 Units. If bushing (304) was removed from piston (301), press it into place. Reinstall piston ring (302), if removed. Place snap ring (325) in its counterbore and insert bearing and thrust ring assembly (322) in its proper location. Install thrust plate (323) and secure it in place with retaining plate (321). Position spring (312) in pilot plunger bore (305) and slide assembly into bushing and secure with retaining ring (319). Be sure all O'rings are in place and fit assembly into amplifier housing. Position control flange gasket, insert control piston into units control cylinder bore and secure force amplifier assembly (300) to case. Secure mounting plate (309) with O'rings and air operator to amplifier. and air operator to amplifier.

Size 60 and larger Install O'rings (328 and 329) on spacer plate (327). Insert spacer plate and bushing (304) in control piston (301) and secure with retaining plate (321). Install piston ring (302) on control piston. Position spring (312) in pilot plunger bore and slide assembly into bushing. Be sure spring is properly positioned in control piston and pilot plunger counterbores (spring position can be observed thru drilled passages in control piston and bushing). Holding pilot plunger against spring, lay assembly on control pistons face. Slide amplifier housing (300) down over assembly. Position mounting plate (309) with O'rings and air operator (313A or B) and secure to amplifier. Be sure all O'rings are in place, fit piston into cylinder bore of case and secure assembly to case.

Connect all signal and supply lines, test and adjust as outlined in section IV.

Parts list and Parts Drawing on pages 6 & 7.

IX. PARTS LIST

Part No.	Description	Part No.	Description
300.	Housing, Amplifier	313B.	Assembly, Reverse Oper.
300A.	Screw, Sock. Hd. Cap	314.	Seal, O'ring
301.	Piston, Control	315.	Seal, O'ring
301A.	Pin, Dovel	†316.	Pin, Lock
302.	Seal, Piston	317.	Bracket, Filter Regulator
303.	Cup, Thrust	318.	Assembly, Tubing
304.	Bushing, Follow-up	319.	Ring, Retaining
305.	Plunger, Pilot	320.	Assembly, Regulator
*306.	Seal, O'ring	321.	Retainer, Ring
307.	Retainer, Spring	321A.	Screw, Retainer Ring
308.	Spacer, Pilot Plunger	322.	Bearing, Thrust
308A.	Shim, 0.002"	323.	Plate, Thrust
308B.	Shim, 0.007"	*324.	Spacer, Thrust Bearing
309.	Plate, Mounting	325.	Ring, Snap
309A.	Screw, Sock. Hd. Cap	326.	Seal, O'ring
309B.	Screw, Sock. Hd. Cap	327.	Spacer, Bushing
310.	Seal, O'ring	328.	Seal, O'ring
311.	Gasket, Operator Mtg.	329.	Seal, O'ring
312.	Spring, Pilot Plunger	330.	Seal, O'ring
313A.	Assembly, Direct Oper.	†331.	Limiter, Stroke

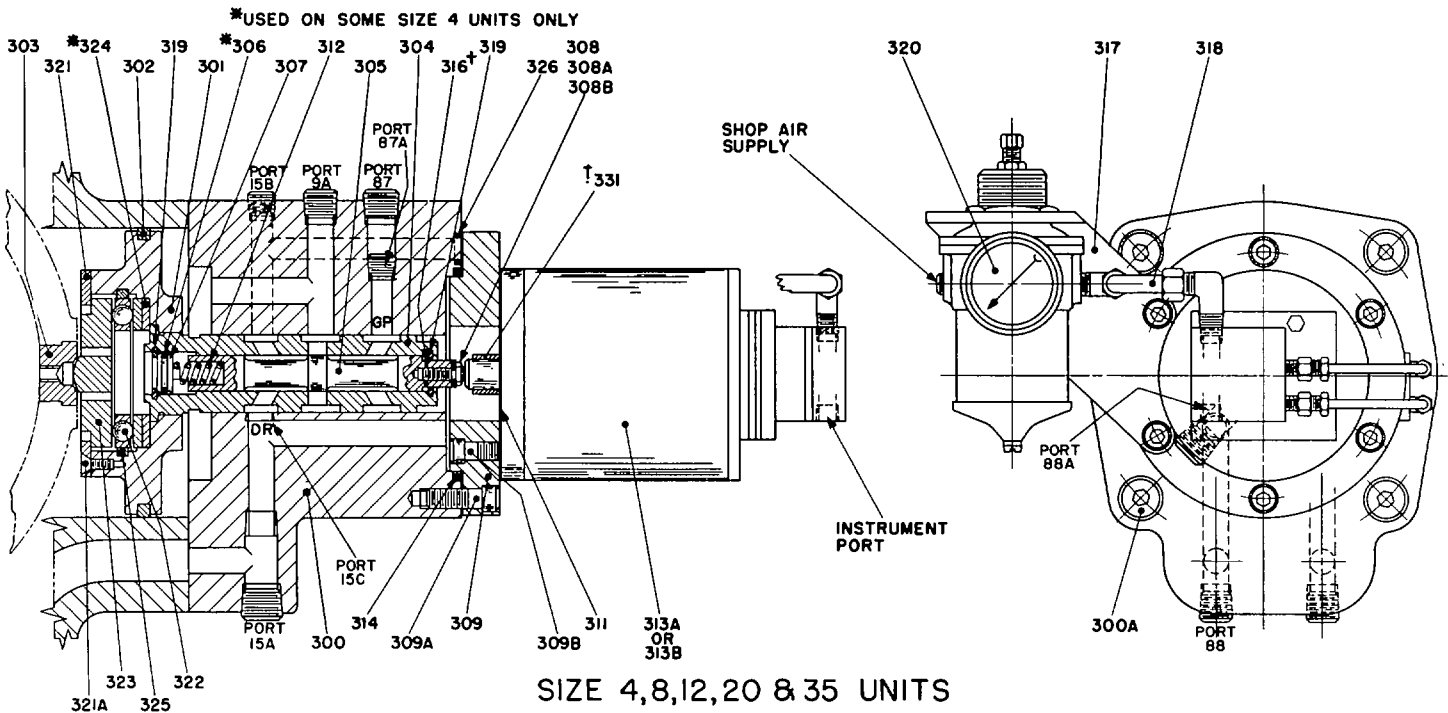
† not used on all units.

* Parts 306 and 324 used only on some size 4 units.

Parts used in this assembly are per Oilgear specifications. Use Oilgear supplied parts to insure compatibility with assembly requirements. When ordering replacement parts, be sure to include unit serial number, Bulletin number and Part number. Specify type of hydraulic fluid for O'rings and seals.

O'RING SIZES
Cross Section X.O.D. Duro ± 5

Part No.	SIZE UNIT					
	4	8 & 12	20 & 35	60	100	150, 200 & 230
306	3/32 x 3/4 70	-----	-----	-----	-----	-----
310	-----	-----	-----	1/8 x 9-1/4 70	1/4 x 11-1/2 70	1/4 x 12-1/2 70
314	1/8 x 4-1/2 70	1/8 x 4-1/2 70	1/8 x 4-1/2 70	1/8 x 4-1/2 70	1/8 x 4-1/2 70	1/8 x 4-1/2 70
315	-----	-----	-----	1/8 x 1-5/8 70	1/8 x 1-3/4 70	1/8 x 1-7/8 70
326	-----	1/16 x 1/2 70	1/16 x 1/2 70	1/16 x 1/2 70	1/16 x 1/2 70	1/16 x 1/2 70
328	-----	-----	-----	1/8 x 3-5/8 70	1/8 x 3-5/8 70	1/8 x 3-5/8 70
329	-----	-----	-----	1/8 x 3-1/4 70	1/8 x 3-1/4 70	1/8 x 3-1/4 70
330	-----	-----	-----	3/32 x 15/16 70	3/32 x 15/16 70	3/32 x 15/16 70



SUGGESTED PNEUMATIC CIRCUIT (ALL SIZES)

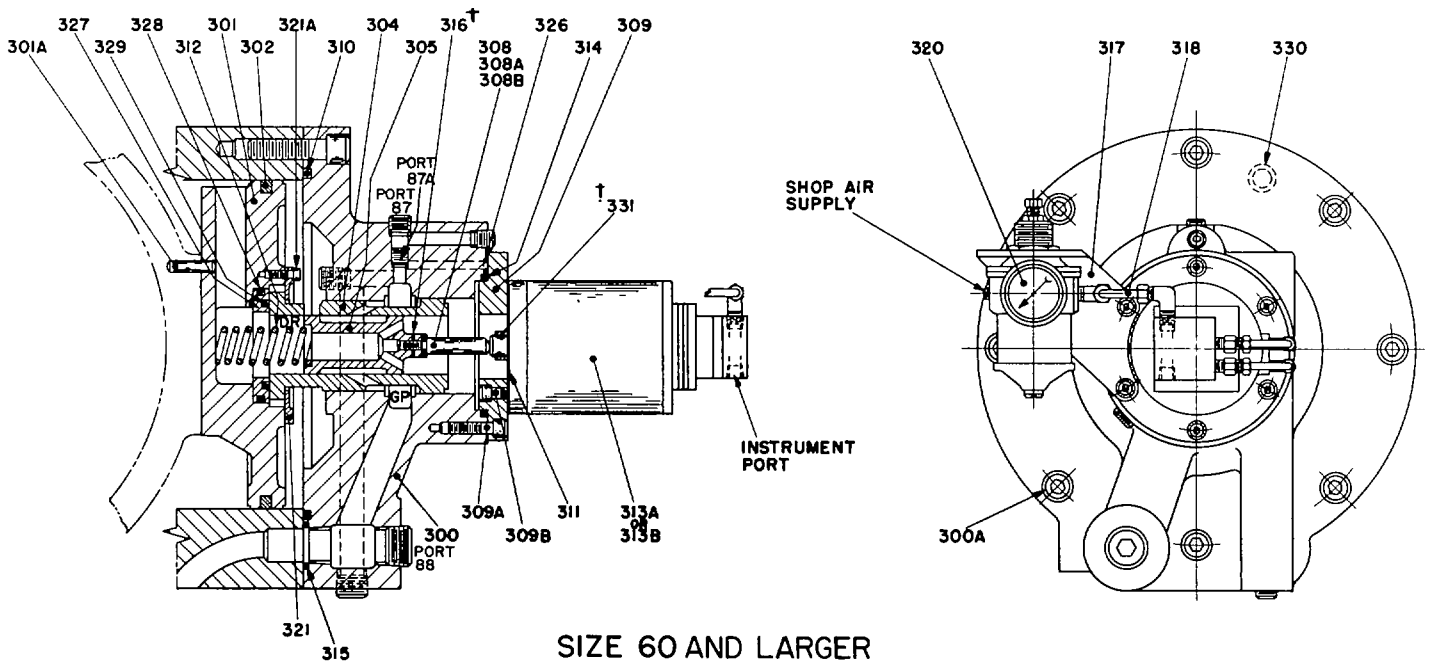
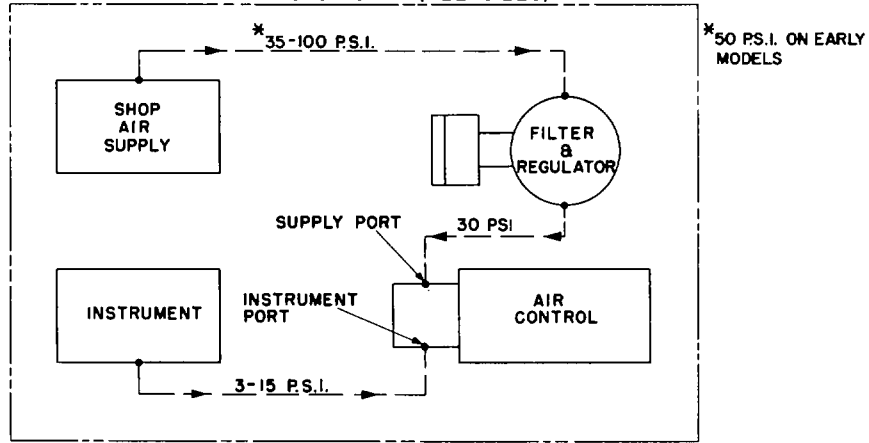


Figure 4. Parts Drawing, Type "A" Control DS-947005-C (500615-C).

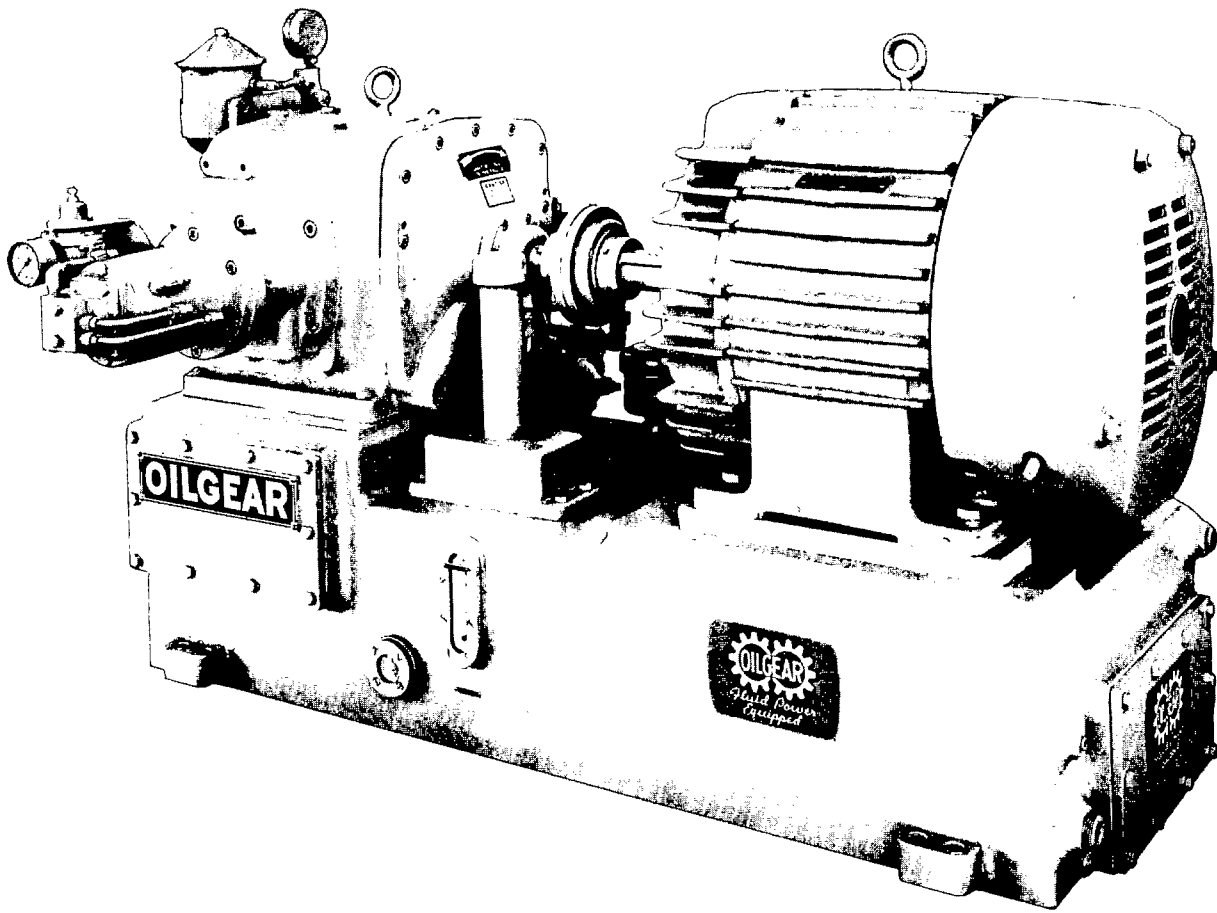


Figure 5. Oilgear Type "DA" Variable Delivery Pump and Motor Reservoir Base (53782).

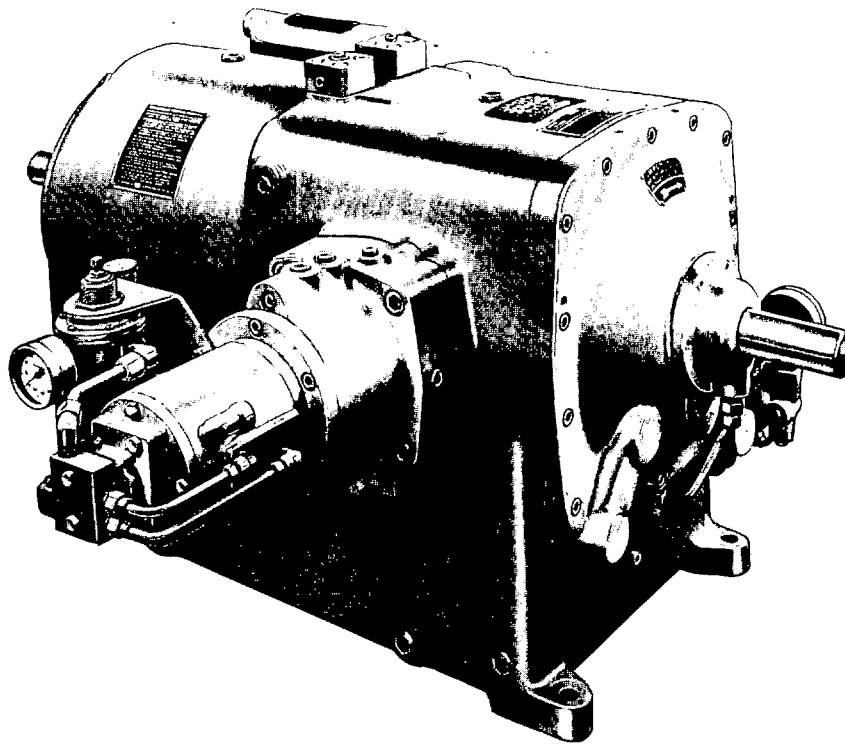


Figure 6. Oilgear Type "DAC" Any-Speed Transmission with Integral Reservoir (53951).