



# INSTRUCTIONS

BULLETIN 947401B

## OILGEAR TYPE "H" HYDRAULIC SERVO MOTOR LEVER CONTROLS FOR TYPE "D" AND "DC" UNITS

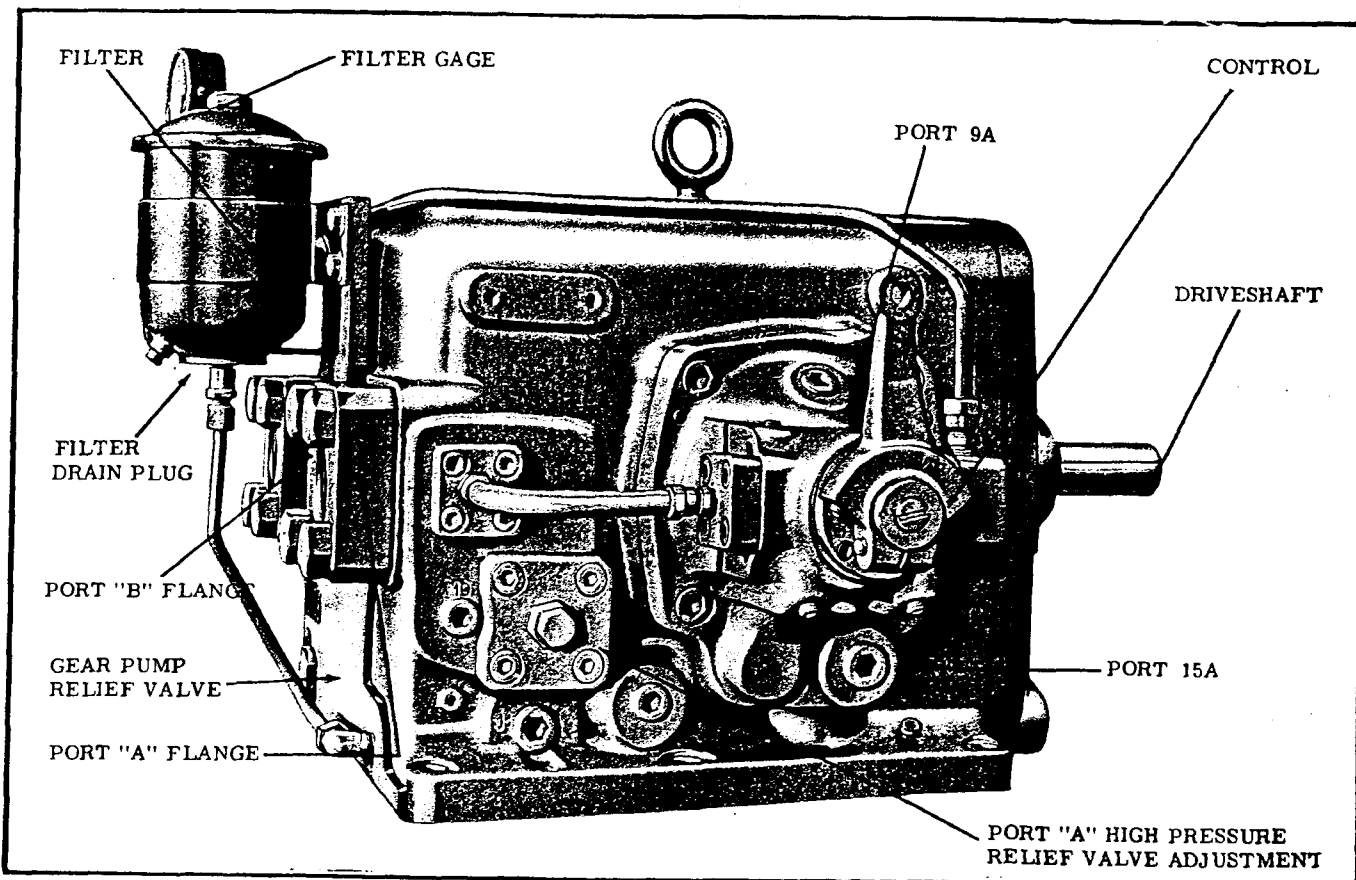


Figure 1. Type "DH" Pump (53265).

### REFERENCE INSTRUCTION BULLETINS

Type "D" Pump w/o Controls-----	947000
Type "DC" Transmission w/o Controls-----	967900
Standard Opposing Operators-----	DS-947015

### TO THE USER AND OPERATOR OF OILGEAR "H" CONTROLLED UNITS:

These instructions should simplify and minimize your work of operating and maintaining Oilgear "H" controlled units. Your acquaintance with the construction, principle of operation and characteristics of these units will help to assure satisfactory 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 from those described and other changes may be made without notice.

## I. CONSTRUCTION.

The type "H" servo-motor lever control consists essentially of rotary control plunger (309) closely fitted within control sleeve (307) which is pressed into control piston (301) and enclosed within the unit's case and control housing (300). The rotary plunger (309), with drilled fluid passages, spiral slots and a "land," has control lever (315) keyed and clamped to it. A dowel pin (314), pressed into gland (312),

limits lever movement in each direction. "H" controls are usually opposed by a single hydraulically operated control piston contained in a housing flanged to opposite side of the unit. (See "Standard Opposing Operators," Type "K"). Units equipped with other opposing controls or operators to provide additional functions may need a check valve for free flow out port 9A to port 11, 13 or 27.

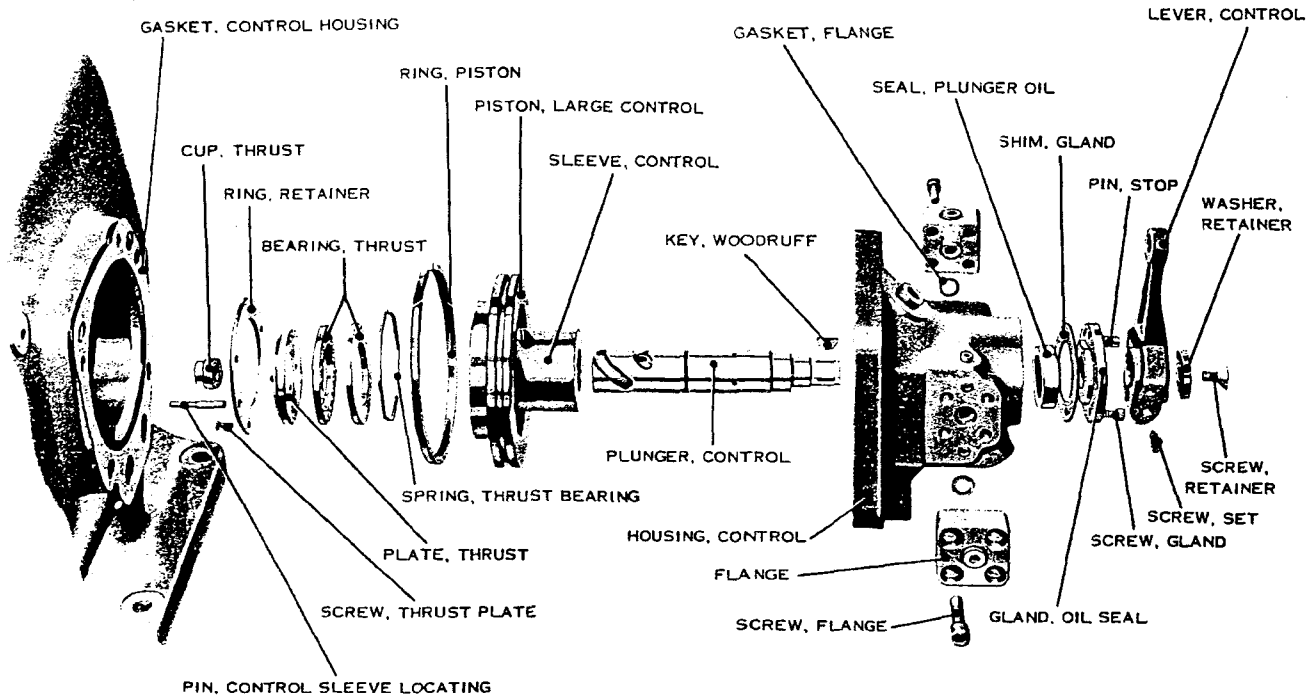


Figure 2. Standard Type "H" Servo-motor Lever Control-Exploded view (53253).

## II. PRINCIPLE OF OPERATION.

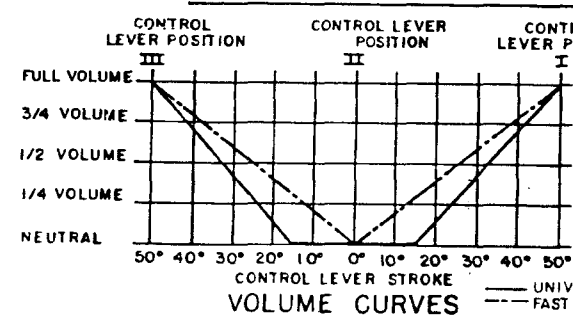
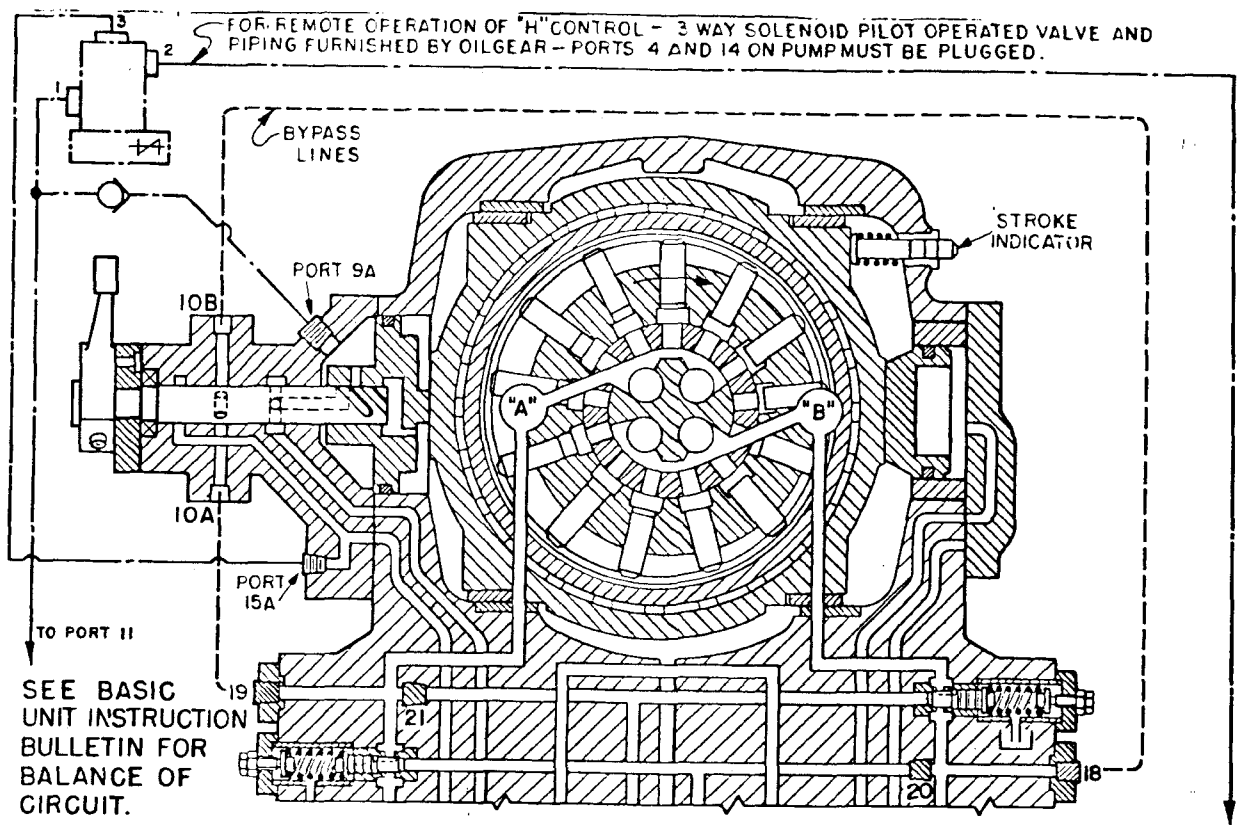
See reference instruction bulletin for radial piston unit principle of operation. Movement of control lever from neutral through either full stroke arc (see figure 3) increases slideblock eccentricity from zero to full stroke. When control lever is moved clockwise (facing it) from the neutral position, fluid in the chamber behind the large control piston is throttled out the control sleeve hole, spiral drain slot in pilot plunger, and drain holes in the thrust plate to the unit's case. Simultaneously, gear pump fluid behind the smaller opposing operator control piston exerts a force which moves the control piston and slideblock toward the "H" control until the hole in control sleeve is sealed by the rotary plunger's "land." Counterclockwise movement of the control lever from the neutral position directs gear pump fluid thru the rotary plunger and control sleeve hole to the chamber behind the large control piston; over-

comes the force behind the smaller control piston, and moves the slideblock toward the opposing operator until the hole in control sleeve (307) is sealed by the rotary plunger's "land." Type "H" controls are furnished either as "Universal" or "Fast Action" controls.

"Universal" type controls bypass fluid delivered by radial piston unit at lever rotations up to 15° on either side of neutral position. During the neutral bypass arc, fluid from radial piston unit flows thru port 18 or 19, control housing and radial holes in rotary plunger to return port. (Refer to figure 3a).

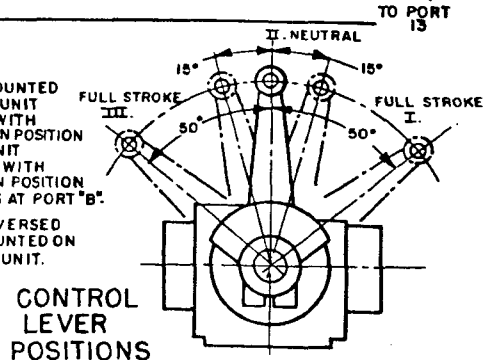
"Fast Action" controls usually do not bypass fluid at neutral. Some "Fast Action" controls have special rotary plunger functions for operation of decompression valves, etc. (Refer to figure 3, b thru g).

(Continued on Page 6)



WHEN CONTROL IS MOUNTED ON THE LEFT SIDE OF UNIT FACING DRIVESHAFT, WITH LEVER OPERATING ON POSITION I SIDE OF NEUTRAL, UNIT DELIVERS AT PORT "A" WITH LEVER OPERATING ON POSITION III SIDE, DELIVERY IS AT PORT "B".

FUNCTIONS ARE REVERSED WITH CONTROL MOUNTED ON THE RIGHT SIDE OF UNIT.



<p><b>FIG. a. UNIVERSAL CONTROL</b> 15° NEUTRAL BYPASS</p> <p>PIPING FROM CONTROL FLANGES TO PORTS 18 AND 19 FURNISHED BY OILGEAR</p>	<p><b>FIG. b. FAST ACTION CONTROL</b> NO NEUTRAL BYPASS</p> <p>CONTROL FLANGES PLUGGED</p>	<p><b>FIG. c. FAST ACTION CONTROL</b> THREE-WAY DRILLING FOR OPERATION OF DECOMPRESSION VALVE-FLANGES CONNECT TO THE LEFT OF NEUTRAL</p> <p>CONTROL FUNCTIONS: LEVER BETWEEN II AND I OR II AND IV, PORT IOA BLOCKED, IOB CONN. TO DRAIN. LEVER BETWEEN II AND III, PORTS IOA AND IOB CONN. TO OPERATE DECOMP VALVE</p>	<p><b>FIG. d. FAST ACTION CONTROL</b> THREE-WAY DRILLING FOR OPERATION OF DECOMPRESSION VALVE-FLANGES CONNECT TO THE RIGHT OF NEUTRAL</p> <p>CONTROL FUNCTIONS: LEVER BETWEEN II AND III OR II AND IV, PORT IOB CONN. TO DRAIN, PORT IOA BLOCKED LEVER BETWEEN III AND I, PORTS IOA AND IOB CONN. TO OPERATE DECOMP. VALVE.</p>
<p><b>FIG. e. FAST ACTION CONTROL</b> THREE-WAY DRILLING TO OPERATE DECOMP. VALVE FLANGES CONN. TO LEFT OF NEUTRAL</p> <p>CONTROL FUNCTIONS: LEVER BETWEEN II AND I OR II AND III, PORT IOB CONN. TO DRAIN, IOA BLOCKED LEVER BETWEEN III AND II, IOA AND IOB CONN. TO OPERATE DECOMPRESSION VALVE.</p>	<p><b>FIG. f. FAST ACTION CONTROL</b> THREE-WAY DRILLING TO OPERATE DECOMP. VALVE FLANGES CONN. TO RIGHT OF NEUTRAL</p> <p>CONTROL FUNCTIONS: LEVER BETWEEN II AND III OR II AND IV, PORT IOB CONN. TO DRAIN, IOA BLOCKED LEVER BETWEEN III AND I, IOA AND IOB CONN. TO OPERATE DECOMPRESSION VALVE.</p>	<p><b>FIG. g. FAST ACTION CONTROL</b> THREE-WAY DRILLING FOR DECOMPRESSION RATE OF 800 CFM THROUGH PLUNGER.</p> <p>CONTROL FUNCTIONS: LEVER BETWEEN II AND I OR II AND IV, PLUNGER IS CLOSED. LEVER BETWEEN III AND I, PLUNGER IS OPEN, PORTS IOA AND IOB ARE CONNECTED FOR DE COMPRESSION.</p>	<p><b>NOTE</b></p> <p>(A) DECOMPRESSION VALVE, 2-WAY, LOW PRESS-UP SPRING RETURN VALVE AND FITTINGS NOT INCLUDED WITH PUMP. CONNECT PORT 1 TO MAIN CYLINDER AND 2 TO TANK BELOW FLUID LEVEL.</p> <p>(B) 3/8" RELIEF VALVE, 250 PSI SETTING, IS PIPED AND SUPPLIED WITH PUMP.</p> <p>FUNCTIONS ON THIS DRAWING ARE BASED ON CLOCKWISE PUMP ROTATION. OTHER SPECIAL CONTROL FUNCTIONS CAN BE FURNISHED BY OILGEAR.</p> <p>THESE DIAGRAMS DO NOT COVER TYPE "DH" DUPLEX PUMPS</p>

Figure 3. Cutaway Diagrams, Volume Curves and Control Lever Positions (5V-10102-L).

IX. PARTS LIST

Part No.	Description	Part No.	Description
300.	Housing, Control	316.	Washer, Retainer
300A.	Screw, Sock. Hd. Cap	317.	Screw, Retainer
*300B.	Pin, Locating	318.	Pin, Locating
301.	Piston, Control	319.	Pin, Locating
302.	Ring, Piston	320.	Screw, Sock. Hd. Set
303.	Cup, Thrust	321.	Flange
304.	Plate, Thrust	321A.	Screw, Sock. Hd. Cap
305.	Bearing, Thrust	322.	Gasket, Flange
**306.	Spring, Thrust Bearing	322A.	Seal, O'ring
307.	Sleeve, Control	323.	Flange
307A.	Pin, Locating	323A.	Screw, Sock. Hd. Cap
308.	Ring, Retaining	324.	Tubing w/Fittings
308A.	Screw, Retaining Ring	325.	Tubing w/Fittings
309.	Plunger, Control	† 326.	Collar, Locating
309A.	Plug, Pipe	† 326A.	Screw, Sock. Hd. Cap
310.	Seal, Plunger	† 327.	Shim, 0.025" Thick
311.	Shim, 0.003" Thick	† 327A.	Shim, 0.005" Thick
311A.	Shim, 0.005" Thick	328.	Plug, Pipe
312.	Gland, Seal	329.	Plug, Pipe
312A.	Screw, Sock. Hd. Cap	330.	Seal, O'ring
313.	Key, Woodruff	331.	Key, Sleeve
314.	Pin, Stop	332.	Plate, Seal
315.	Lever, Control	333.	Seal, O'ring
315A.	Screw, Locking	334.	Seal, O'ring

NOTE: When ordering replacement parts, be sure to include unit serial number, data sheet (DS) number and part number.

Specify type of hydraulic fluid used for packings and seals.

\*Part 300 B not used on size 4, 8 and 12 units.

\*\*Part 306 not used on size 4 units.

† Parts numbered 326, 326A, 327 and 327A are not used on all units.

O'RING SIZES

(Cross Section x O.D. , Duro ± 5)

Part No.	Unit Size	
	150	
322A.	1/8 x 1	, 90
330.	1/8 x 11-3/4	, 70
333.	1/8 x 1-7/8	, 70
334.	1/8 x 1-7/8	, 70

NOTE:  
 WHEN ORDERING REPLACEMENT PARTS BE SURE TO INCLUDE  
 UNIT SERIAL NUMBER, DATA SHEET (DS) NUMBER AND PART  
 NUMBER; SPECIFY TYPE OF HYDRAULIC FLUID FOR O-RINGS,  
 PACKINGS AND SEALS.  
 \*PART NO. 3008 NOT USED ON SIZE 4, B & B II UNITS.  
 \*\*PART NO. 309 NOT USED ON SIZE 4 UNITS.  
 †PARTS NO. 328, 328A, 327, 327A NOT USED ON ALL UNITS.

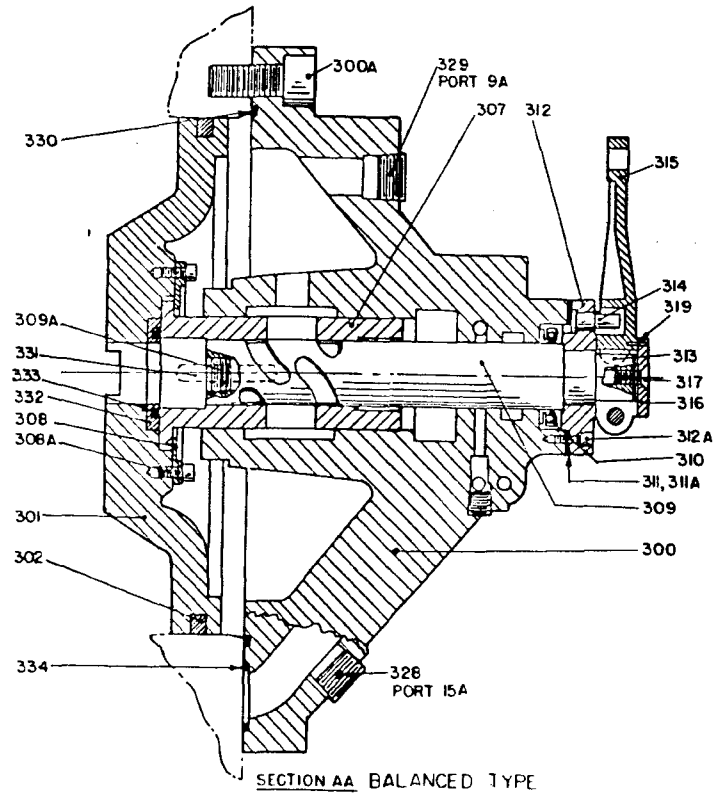
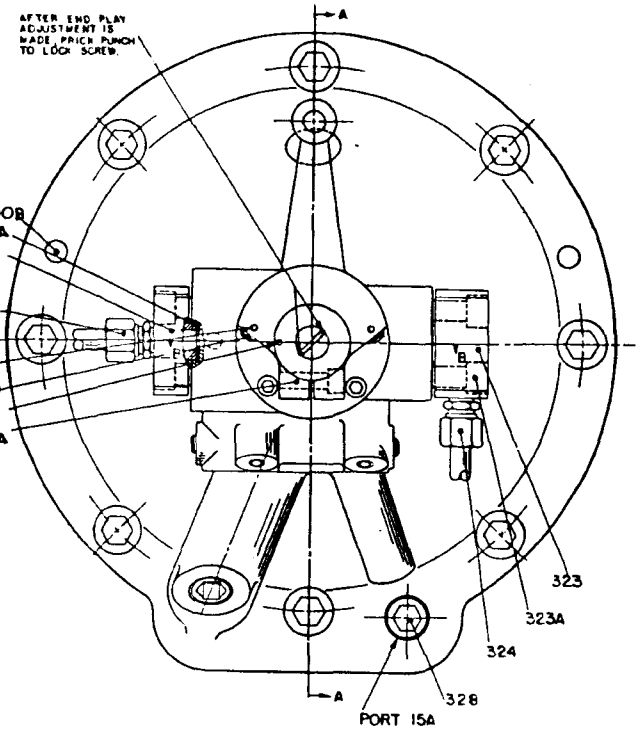
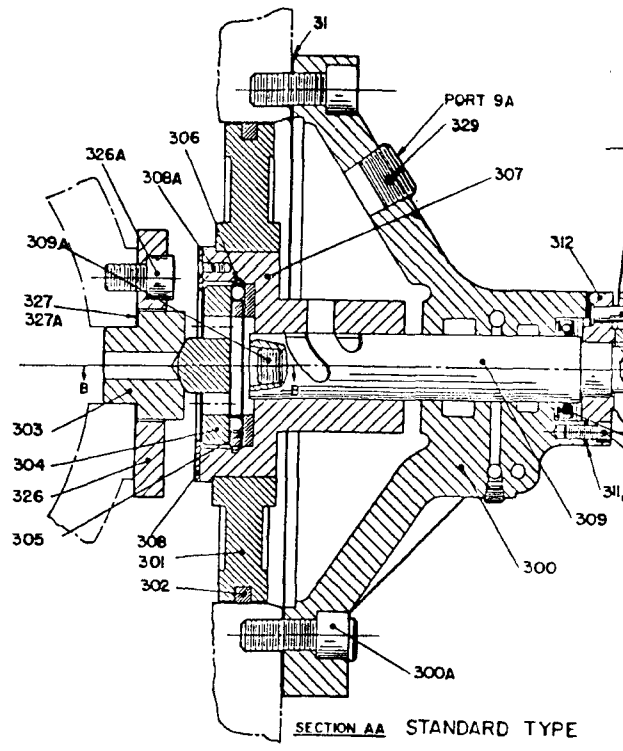
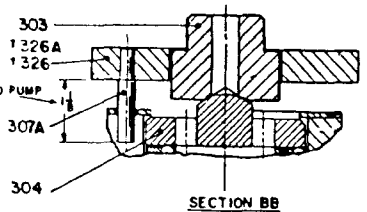


Figure 4. Parts Drawing, Type "H" Controls. DS-947401E (54685E).

### III. SPECIFICATIONS.

	Unit Size							
	4	8	12	20	35	60	100	150
A. Max. eccentricity, in.	.198	.187	.250	.250	.375	.375	.406	.531
B. Gear Pump Relief Valve Settings, psi	130	130	150	130	150	130	150	150
C. Max. Torque Req'd. to Move Control Lever, lb. in.	50	50	50	50	50	50	75	*50 75

\* Balanced type control

### IV. MALFUNCTIONS AND CAUSES.

#### A. Erratic or Unresponsive Control.

1. Binding, loose or disconnected linkage.
2. Sticking control plunger (309).
3. Excessive clearance between lever (315) and gland (312).
4. Control plunger (309) in wrong position.
5. Broken piston rings (302).
6. Low gear pump pressure (see reference bulletins).
7. Broken, disengaged or bent guide pin (307A).
8. Insufficient negative seal between plunger (309) and control sleeve (307).
9. Faulty opposing operator.

#### B. Sticking Control

1. Binding linkage.
2. Binding plunger (309) or piston (301).
3. Misaligned housing (300) or guide pin (316).
4. Faulty radial piston unit (see reference bulletin).
5. Faulty opposing operator.

#### C. Unit Delivery at Neutral.

1. Improper shimming of plunger (309) for neutral.

### V. TESTING AND ADJUSTING.

For radial piston units see reference bulletins.

#### A. Testing.

Neutral position of control lever (315) should coincide with zero unit delivery. To determine neutral position, stop unit, disconnect bypass piping and plug ports. Proceed as follows:

1. Two-Way Units. Screw gages good for 1000 psi above unit's rating into auxiliary pressure ports, block main pressure ports. Start unit. Normally, with the control lever at neutral, the gages will show identical pressures. If not, it will be necessary to readjust the neutral setting. If control is mounted on the left side (facing driveshaft) and higher pressure is at port "A" side, remove some shims (311 & 311A). If pressure is higher at port "B" side, add shims. Reverse this shimming procedure if control is mounted on opposite side of unit.

2. One-Way Units. Screw pressure gage good for 1000 psi above units rating in auxiliary pressure port and block pressure port. Set control lever at neutral

and start unit. Move the control lever until there is a very slight indication of pressure. The pressure should raise immediately as the lever is rotated from the neutral position. Add or remove shims (311 and 311A) as described in preceeding paragraph to correct the neutral setting.

#### B. Adjusting.

Control lever rotation is limited by a dowel pin (314) pressed into gland (312), and by set screws (320) in the lever. Operating linkage attached to the control lever should be provided with independent stops. To change lever positions 90° or 180° to either side of neutral position, loosen locking screw (315A) and remove screw (317). Retainer washer (316) is pinned to lever (315); pull lever with washer from plunger, Remove Woodruff key (313) and screws (312A). Rotate gland (312) one-quarter or one-half revolution in the desired direction. **CAUTION: Hold the end of plunger while turning gland to prevent plunger from turning. Control plunger and sleeve (307) must remain in their original positions. The plunger must be assembled with the milled slots upward and the hole in the sleeve must be at the top.**

On late model controls, "TOP" is stamped on the end of plunger to assure correct assembly. Older models do not have this marking and must be assembled with care to prevent improper mounting of plunger. Secure the gland to control housing. Install Woodruff key in the proper keyway in plunger and install the control lever and retainer washer. If plunger tends to slide into housing when mounting the control lever, turn screw (317) partially into tapped hole in plunger end and hold plunger out. Check control end play after screw (317) is tightened by measuring the gap between gland (312) and control lever (315). This gap should be approximately 0.001 inch. A larger gap is undesirable. Adjust by turning screw (317) inward or outward until proper gap is obtained, then tighten clamping screw (315A). If unit "hunts" during operation, provide more negative seal between plunger and piston by increasing size of hole in control sleeve (307) until it is slightly wider than the "land" on plunger (309).

### VI. DISASSEMBLY

Disconnect control linkage and remove any external piping to control. Remove screws and separate control assembly from the unit. Pull straight out to avoid scratching plunger (309) in sleeve (307) bore. Withdraw control piston with sleeve and piston

ring (301, 307 and 302). Be careful not to bend guide pin (307A) when used.

#### Standard Type Control

The thrust bearing can be disassembled by removing screws (308A) and retaining ring (308); then withdraw thrust plate (304), thrust bearing (308) and thrust bearing spring (306) (if used). Control sleeve (307) can be pressed from control piston (301) if separation is necessary.

#### Balanced Type Control

If necessary, remove screws (308A), retaining ring (308) and the control sleeve (307) can be separated from control piston (301). Key (331) should remain in sleeve.

Remove screws (312A) and carefully pull control lever, gland and plunger unit from control housing. Remove shims (311 & 311A). Withdraw fluid seal (310). If the plunger (309) must be separated from control lever (315), loosen clamping screws (315A), remove screw (317) and slide lever with washer (312) from plunger. Withdraw Woodruff key (313).

### VII. INSPECTION.

Clean all parts thoroughly and make certain fluid passages in control plunger, control sleeve and control housing are clean. Check the clearance between control plunger and plunger bore in housing. The clearance should be about 0.0003 inch. Check clearance between control sleeve and control plunger; this clearance should be about 0.001 inch. Inspect all parts for signs of excessive wear or damage and replace, if necessary.

### VII. ASSEMBLY

Insert Woodruff key (313) in plunger (309). Place gland (312) over plunger and check to be sure pin (314) is pressed in place. Slide control plunger into control lever (315) and secure in place by installing screw, (317). Install fluid seal (310) in its bore

and place shims (311 and 311A) in place and secure the gland with control lever to the control housing (300) with screws (312A).

#### Standard Type Control

If piston (301) and control sleeve (307) were separated, press the control sleeve into the piston. Install piston ring (302). Insert thrust bearing spring (306), bearing (305), thrust plate (304) in control sleeve and secure by installing retainer ring (308) with screws (308A). Install the control piston and sleeve assembly. NOTE: Be sure the spiral milled slots in plunger and the hole in the control sleeve are on top. If control sleeve locating pin (307A) is being replaced, press in until shoulder on large diameter is flush with slideblock on size 4 thru 35. Locating pin on size 60 controls has no shoulder and should protrude 1-1/8 inches from slideblock face (see parts drawing). Locating pins in size 100 and 150 controls are pressed into a locating collar (326) which is bolted to the slideblock. Insert thrust cup (303) if it was removed. Position gasket (31), being sure its holes line up with control housing and unit case holes to prevent blocking of fluid passages. Carefully match plunger (309) with bore in sleeve (307) and slide control housing against units case and secure.

#### Balanced Type Control

Insert seal plate (332) and O'ring (333) in control piston. Insert control sleeve (307) in piston bore and secure with retaining ring (308) and screws (308A). Install the control piston and sleeve assembly in units control flange bore. NOTE: Be sure the key (331) in sleeve is positioned to match key slot inside control housing (300). Check plunger position in relation to control housing "TOP" stamping on lever end of plunger should be on top side of assembly. Place O'rings (330 & 334) in control housing and carefully slide control housing assembly over control sleeve with key (331) engaging and plunger (309) matching control sleeve bore. Secure control assembly to units case.

Complete piping to control, test and adjust the control as described in section V.

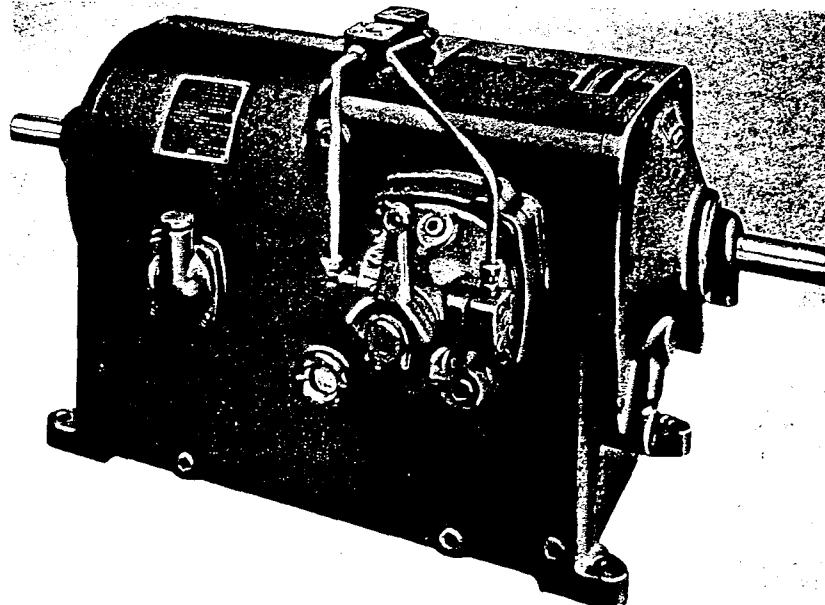


Figure 5. Oilgear Type "DHC" Any-Speed Transmission (52213).

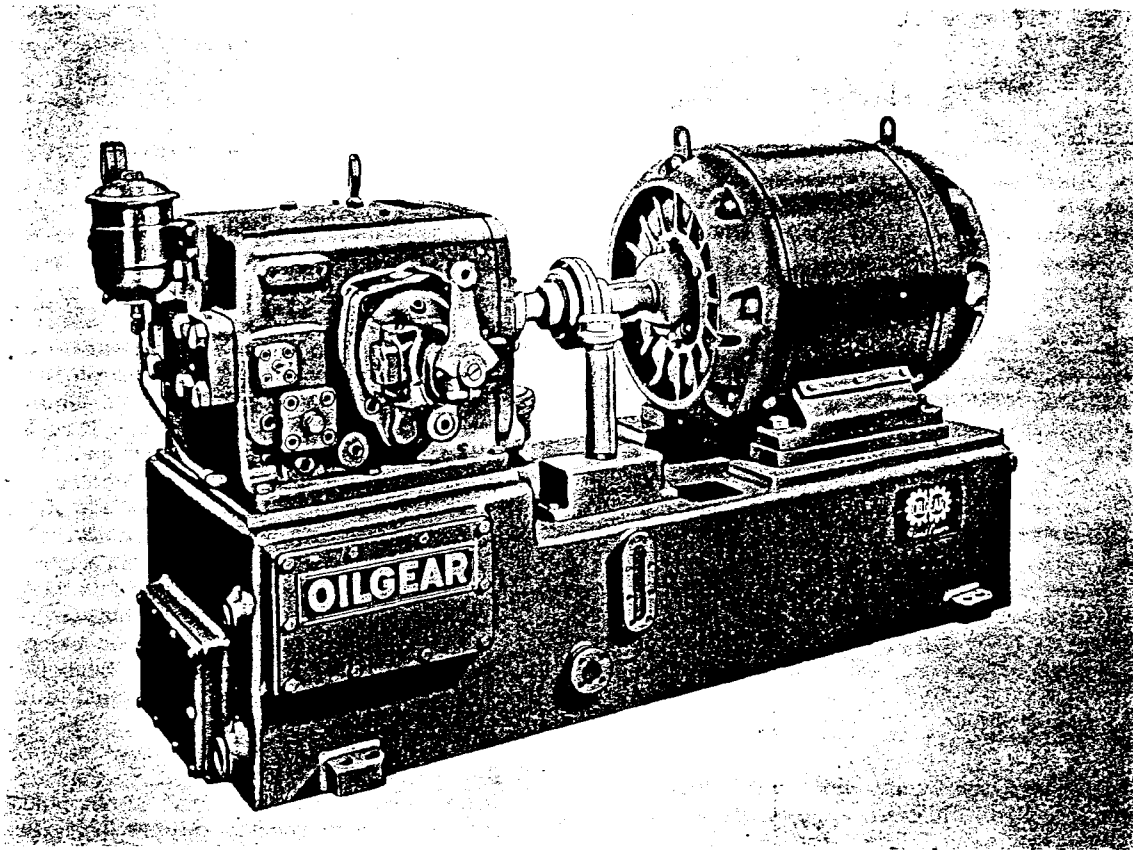


Figure 6. Standard Oilgear Pump and Motor Reservoir Base (54156).

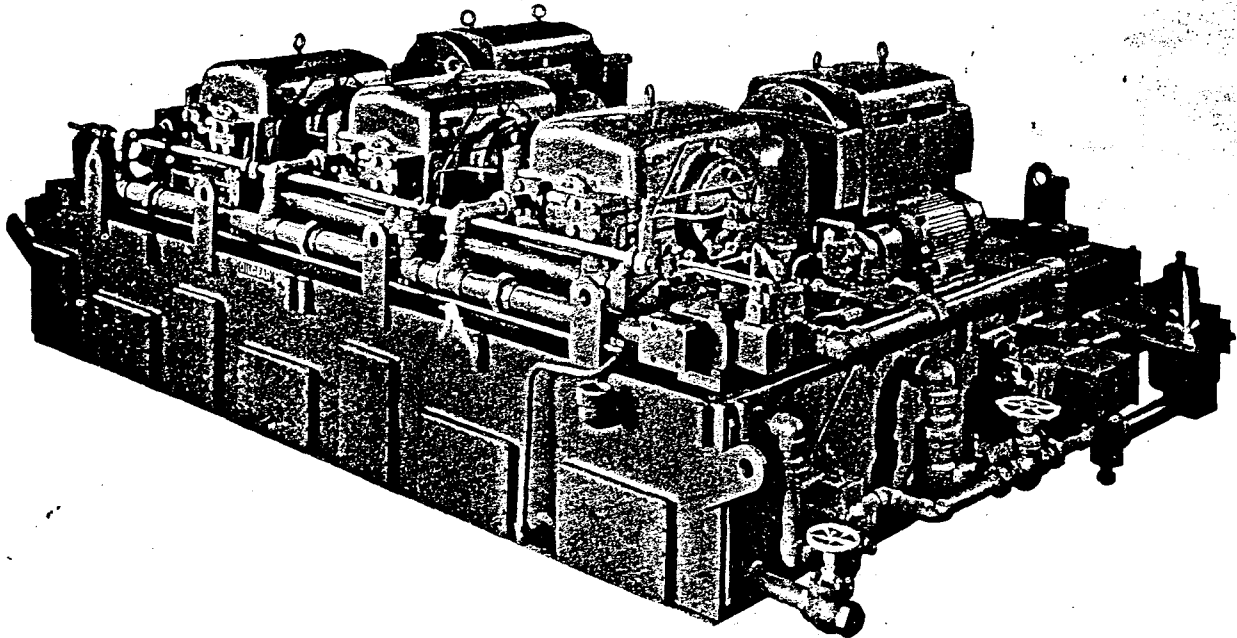


Figure 7. Oilgear Power-Pak with Three "DH-15025" Variable Delivery, Two-Way Pumps. Used on a Large Extrusion Press (54547).

THE OILGEAR COMPANY

MILWAUKEE, WISCONSIN, U. S. A. 53204

BULLETIN 947401B

Litho in U. S. A.