



INSTRUCTIONS

BULLETIN 947742C

OILGEAR TYPE "V-V & V-N" ELECTROHYDRAULIC SERVO CONTROLS FOR TYPE "D" UNITS

REFERENCE INSTRUCTION BULLETINS

- Type "D" Variable Delivery Pumps - - - - 947000
- Type "DN" Variable Delivery Pumps - - - - 947925
- Type "DC" Any-Speed Transmission - - - - 967900

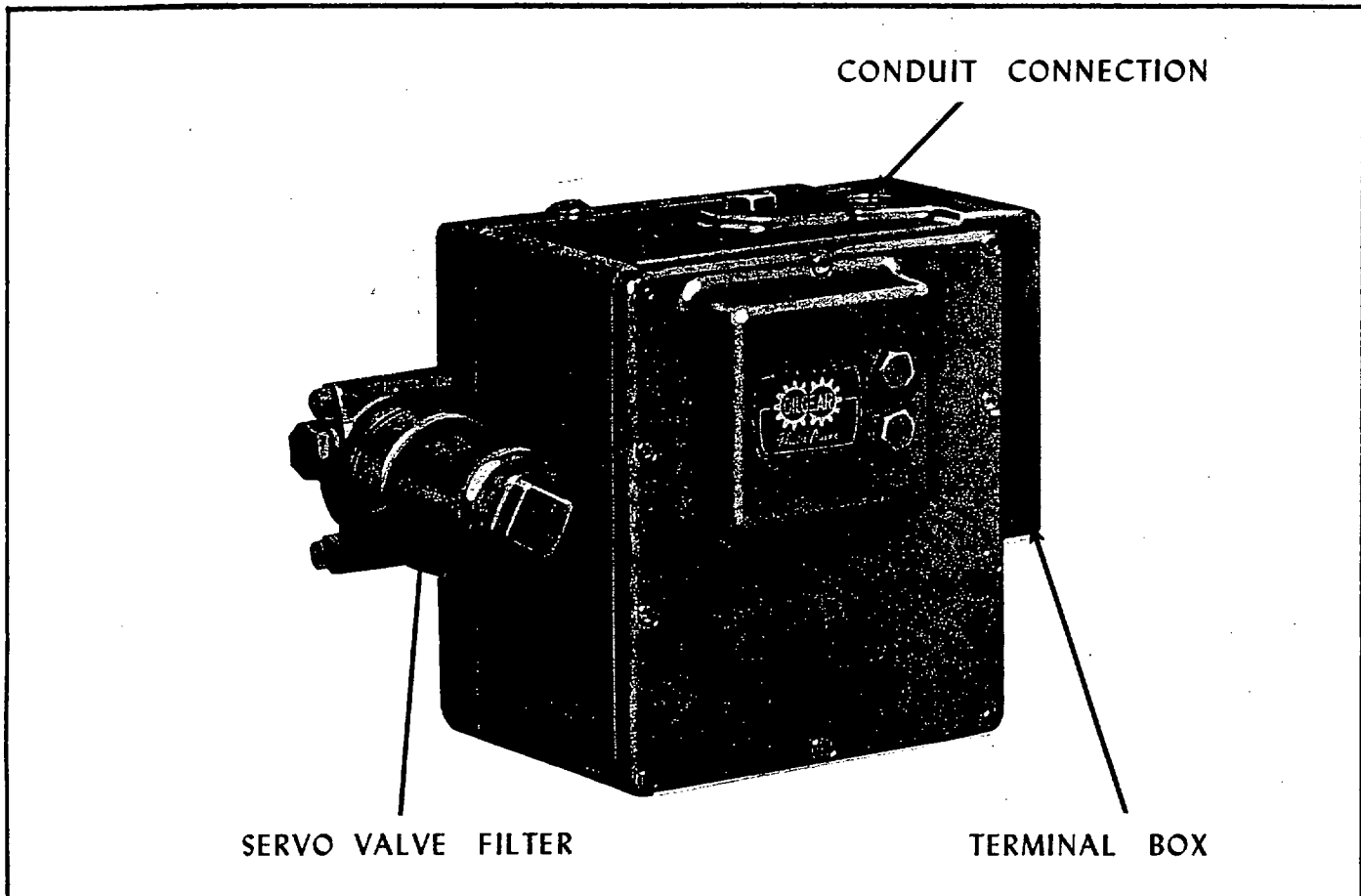


Figure 1. Type "V-V" and "V-N" Electrohydraulic Servo Control (54169).

TO THE USER AND OPERATOR OF OILGEAR "V-V" AND "V-N" CONTROL UNITS.

These instructions are printed to simplify and minimize your work of operating and maintaining these 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 from those described and other changes may be made without notice.

I. CONSTRUCTION

The principle components of the "V-V" electrohydraulic servo control are a control piston (301); servo valve and torque motor assembly (312); LVDT (326V), (linear variable differential transformer); control housing (329); base plate (330) and mounting adapter (300). A filter for control fluid is also included. The "V-V" controls are used with Oilgear Analog Control System made up of modules mounted in racks and using an LVDT which is demodulated for use with this system.

The "V-N" control is similar to the "V-V" control but employs a different type of LVDT (A. C. output) for use with Oilgear chassis mounted amplifiers.

NOTE: — "V-V" and "V-N" controls are not interchangeable without modifications and the electrical connections are also different. Parts unique to the "V-V" control are suffixed with the letter "V". Parts unique to the "V-N" control are suffixed with the letter "N".

THE OILGEAR COMPANY
MILWAUKEE, WISCONSIN, U. S. A. 53219

Reissued: Nov. 1978

BULLETIN 947742C

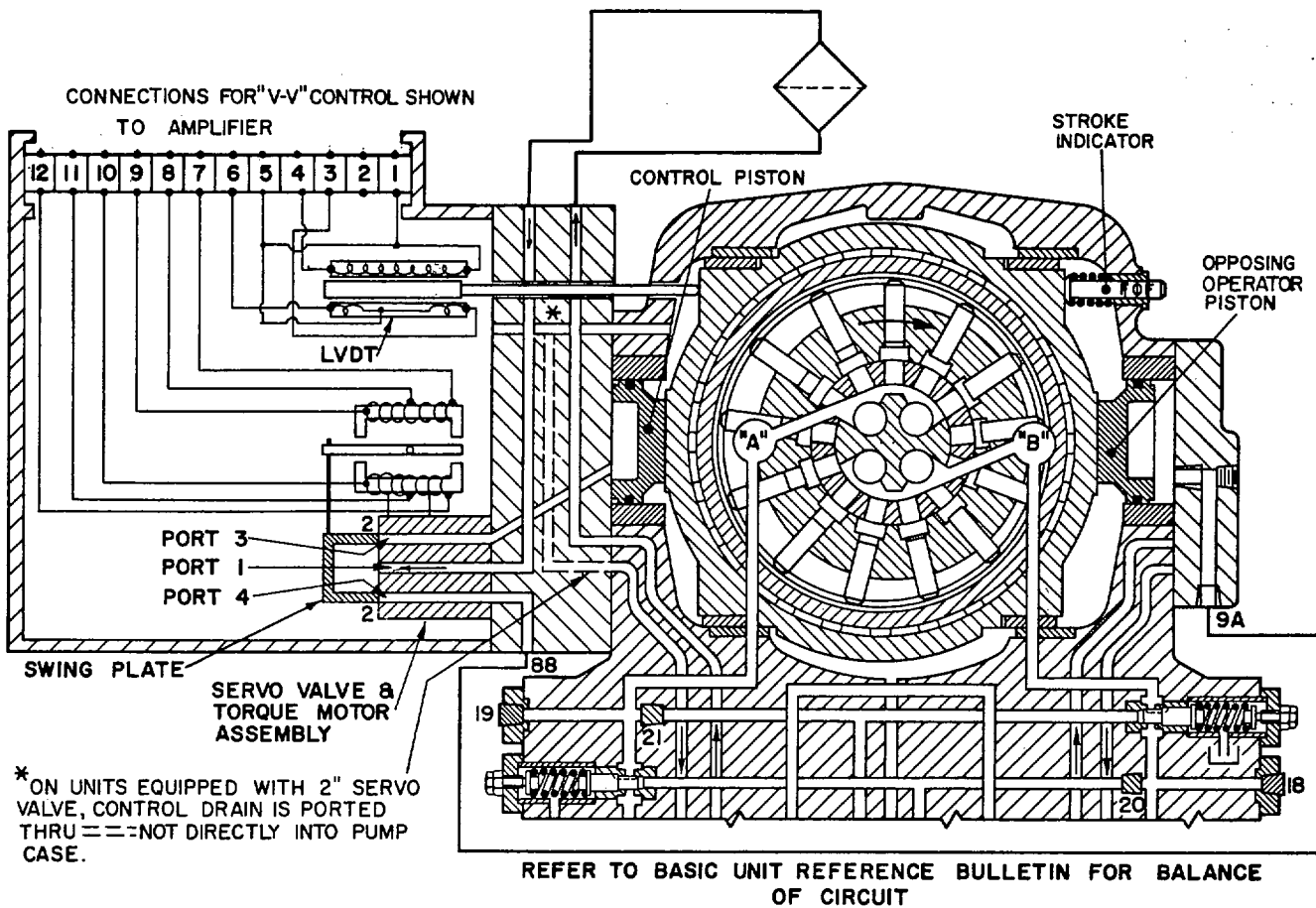


Figure 2. Schematic View of Typical Pump and "V-V" Control (5V-10108-L).

Normally, the type "V-V" control is opposed by a hydraulically operated piston contained in a housing flanged to the opposite side of the unit (see "Standard Opposing Operators"). Tubing assembly (343) directs control fluid from the servo valve to the opposing operator.

II. PRINCIPLE OF OPERATION

See reference bulletin for radial piston units principle of operation. Filtered control fluid, under pressure, flows to servo valve inlet port 1. The servo valve positions slideblock for desired pump flow. Deflecting the servo valve swingplate in one direction connects control pressure (port 1) to area behind control piston (thru port 3) while the opposing operator (port 4) is connected to drain and slideblock moves away from control. Deflecting the servo valve swingplate in the other direction connects (port 3) control piston area to drain (port 2) while directing control pressure (port 1) to opposing operator piston (thru port 4) and slideblock moves toward control. Centering the swingplate blocks port 3 and 4, and slideblock movement stops where it is and holds position.

The torque motor armature is spring centered and deflects the servo valve swingplate in the direction of and in an amount proportional to current from the amplifier. The LVDT transmits an electrical voltage proportional to slideblock position. When control is operated, the pump slideblock position is

changed (by servo valve control) until the sum of command signal and LVDT voltage is zero. The servo valve swingplate then centers and stops slideblock motion.

III. SPECIFICATIONS (Standard Pumps)

- A. Gear pump relief valve setting for control pressure is 180 psi (ignore reference bulletins).
- B. Maximum eccentricity (see table).
- C. For "V-N" control only. LVDT AC voltage* at full stroke, points 3 and 6 (see table).
- D. For "V-V" controls only. LVDT AC voltage at full stroke, points 3 and 6 (see table).

Unit Size	8	12 & 20	35 & 60	100	150	200 & 230
B*	0.187	0.250	0.375	0.406	0.531	0.675
C*	14	19	28	18	24	24
D	0.83	1.10	1.65	1.78	2.33	2.93

*Minimum voltage listed for normal operations, in some cases higher voltages will be encountered.

IV. MALFUNCTIONS AND CAUSES

A. Erratic Control Action

1. Loose or broken electrical connections or defective electrical system.
2. Low control pressure or faulty gear pump relief valve.
3. Contaminated control fluid or clogged filter.
4. Faulty opposing operator.
5. Binding control piston or rings.
6. Faulty radial piston unit (see reference bulletins).

B. Insufficient Volume or Speed

1. Defective electrical system.
2. Improper LVDT neutral adjustment.
3. Low control pressure.
4. Faulty opposing operator.
5. Binding control piston or rings.
6. Faulty radial piston unit (see reference bulletins).

C. Slow Response

1. Defective Electrical System
2. Dirty or defective torque motor and servo valve assembly.
3. Low control pressure of faulty gear pump relief valve.
4. Contaminated control fluid or clogged control filter.
5. Faulty opposing operator.
6. Binding control piston or rings.
7. Faulty radial piston unit (see reference bulletins).

D. Excessive Heating

1. See reference bulletins

E. Excessive Noise

1. See reference bulletins

V. ADJUSTING AND TESTING

Malfunctioning could be electric and/or hydraulic. Isolate the electric power supply to the control and isolate the unit from the machine by providing bypass lines for high pressure ports "A" and "B" directly to reservoir or each other.

A. Electrical

1. Connections. Feel and inspect all terminal strip connections. Make certain they are tight, clean and not touching each other.

2. Amplifier. Test and adjust the amplifier for proper function. (See separate "Amplifier" bulletins).

3. LVDT

"V-V" Controls only — Check for excitation voltage of 6 volts AC RMS at 2500 Hz at points 1 and 4 of terminal strip (315). After the proper excitation voltage has been assured, test points 3 and 6 for a voltage increase from zero volts at neutral position of slideblock to (see "Specifications — III D for value) voltage with pump at full stroke. If proper voltage is not exhibited, LVDT is defective (assuming pump neutral is properly adjusted).

"V-N" Controls only — Check for an excitation voltage of 115 volts at points 1 and 2 on terminal strip (315). After the proper excitation voltage has been assured, test points 3 and 6 for a voltage increase from zero (0) volts at neutral position of slideblock, to (see Specifications, III C for value) voltage with pump at full stroke. If proper voltage is not exhibited, LVDT is defective (assuming pump neutral is properly adjusted).

4. Torque Motor. An electrical check can be made on the torque motor by measuring the resistance across points (7 and 9) and (10 and 12). The resistance should be 75 ohms + 10%. If the measured resistance is not correct, replace the torque motor and servo valve assembly.

B. Hydraulic

1. Radial Piston Unit (see reference bulletins).

2. Gear Pump and Gear Pump Relief Valve. (See reference bulletin.) Pressure settings used with this control are indicated in III A. Do not use values specified in reference bulletins.

3. Filters or Fluid (see reference bulletins on fluid recommendations). This control is designed to operate with clean fluid. Inspect system and control filters for clogging and dirt. Replace filter element if necessary.

4. Torque Motor and Servo Valve Assembly. Remove cover and inspect assembly. CAUTION: DO NOT CONTACT TORQUE MOTOR WITH FERROUS TOOLS OR MATERIALS. Do not attempt adjustment of swingplate stroke. If assembly is defective, return it to the factory for repairs, adjustments or testing. Be sure lock nuts are tight. Start the pump and operate the servo valve by manually moving the torque motor armature. Maximum swingplate movement is approximately 0.015 inches each side of center. Observe slideblock indicator, if it's movement is normal, the servo valve is functioning properly.

5. Neutral Adjustment. Check neutral setting by blocking ports "A" and "B" and installing pressure gages (1000 psi above units rating) in each (or ports 18 and 19). When pressure readings (with pump operating) on both gages are equal, pump is at neutral position. If unit does not return to neutral with a zero command input it may be necessary to adjust the LVDT. De-energize all other system relays (to insure a zero command signal).

- (a) "V-V" Controls. Remove adjusting screw (320AV) with thrust bearing (320BV) from storage hole and exchange it with plug (331) directly above LVDT (some units have three plugs and may entail trial and error). Turn adjusting screw in until it just touches LVDT. Remove plug (332) on top of control housing and loosen clamp screw (319AV). With unit running, turn screw (320AV) to adjust LVDT (326V) inward or outward until neutral position is reached. Tighten clamp screw (319AV). Return adjusting screw (320AV) and plugs (332 and 331) in original positions.

V-V CONTROL SHOWN

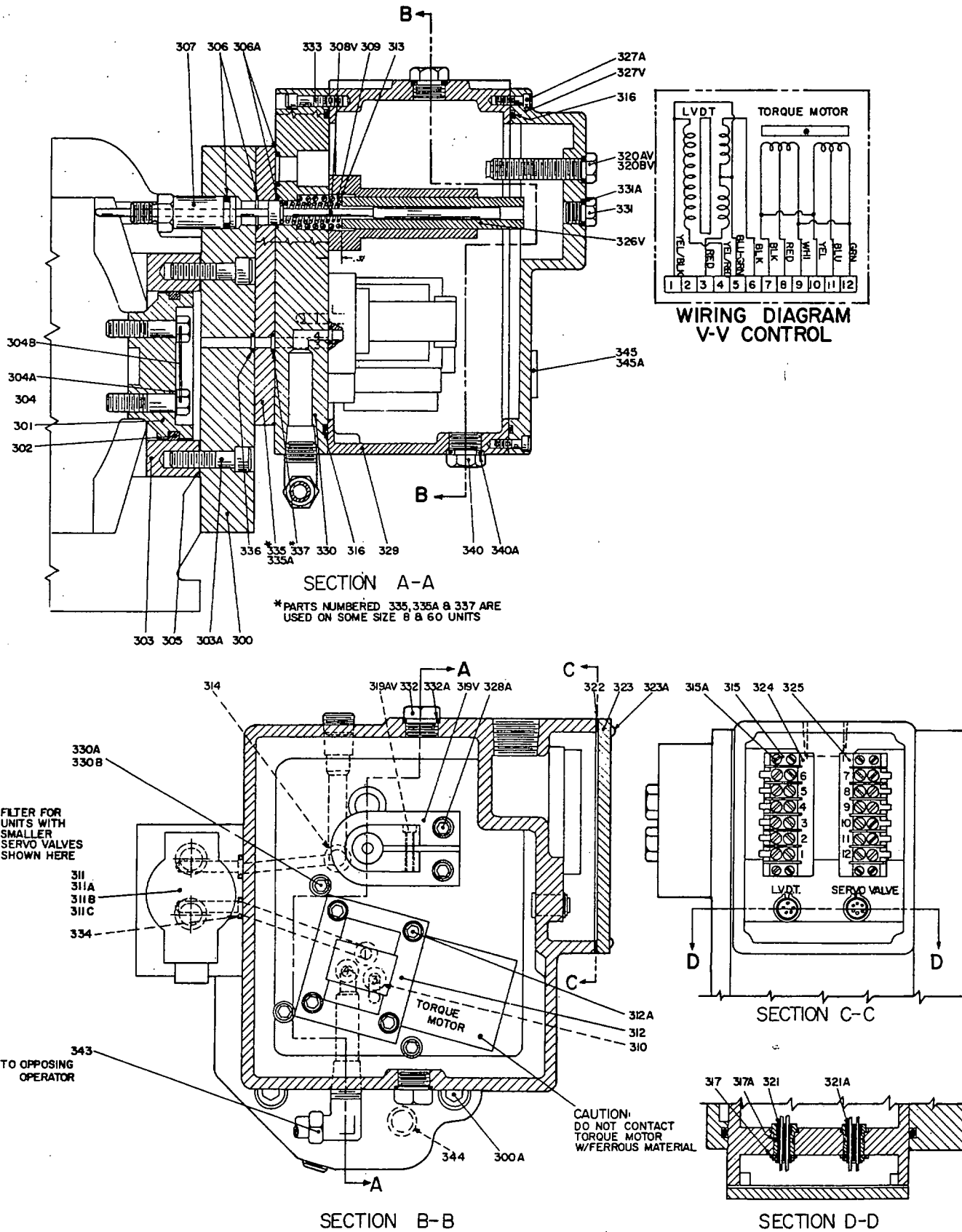


Figure 3. Parts Drawing, Type "V-V" and "V-N" Control, sheet 1 of 2, DS-947743D (501776D)

(b) "V-N" Control. Remove plug (332) and loosen cap screw (319AN) to loosen LVDT clamp (319N). Remove plug (331) directly above LVDT adjusting screw (320AN) from cover (327N). With unit running, turn adjusting screw (320AN) to move the adjusting block (320N) and LVDT (326N) inward or outward until neutral position is reached. Tighten clamp screw (319AN) and replace plugs (332) and 331.

VI. DISASSEMBLY

Disconnect the control from the circuit. Remove filter assembly (311) with O'rings (334), or bracket (347) and filter assembly (346) with tubing (348 and 349). Remove tubing assembly (343). Remove cover (323) with gasket (322). Disconnect electrical leads from terminals. Plug (340) should be removed from beneath control housing (329) to allow the fluid to be drained from beneath the control. Remove retaining ring (317) and carefully withdraw LVDT and torque motor leads with feedthrus (321 and 321A) with O'rings (317A) from their cored passages in the housing. Remove cover (327V or N) and O'ring (316). CAUTION: The torque motor, an integral part of the servo valve assembly (312), will be damaged if ferrous materials contact it. We recommend that non-ferrous tools be used to remove screws (312A). Carefully remove the servo valve and torque motor assembly and withdraw O'rings (310). Remove screws (328A) and withdraw LVDT assembly from control housing (329). Do not disassemble LVDT assembly further unless LVDT (326V or N) is replaced. This can be done by loosening clamp screw (319AV or N) and sliding LVDT out of clamp (319V or N).

Withdraw LVDT rod (308V or N) with LVDT core (and guide 318N on V-N units), spring (309), and spring (313) can be withdrawn. Be careful not to bend or damage rod (308).

Remove screws (330A) and lift base mounting plate (330) with control housing from the unit. Remove screws (333) and base mounting plate from control housing (329) to remove O'ring (316). On size 8 and 60 controls, remove screws (335A) and adapter (335); remove O'rings (306) and (337). Remove O'ring (336) and seals (306A) after base mounting plate (330) is separated from control head (300). Proceed by removing screws (300A) and withdrawing control head (300) with cylinder adapter (303) from the unit's case. Removal of screws (303A) will allow separation of cylinder adapter (303), gasket (305) and control head (300). Remove gasket (31), remove wire (304B), screws (304) with gaskets (304A) and withdraw control piston (301) with piston ring (302) from the case. Remove piston ring (302), if necessary. Control adapter (307) can be removed and O'ring (306) removed from it.

VII. INSPECTION

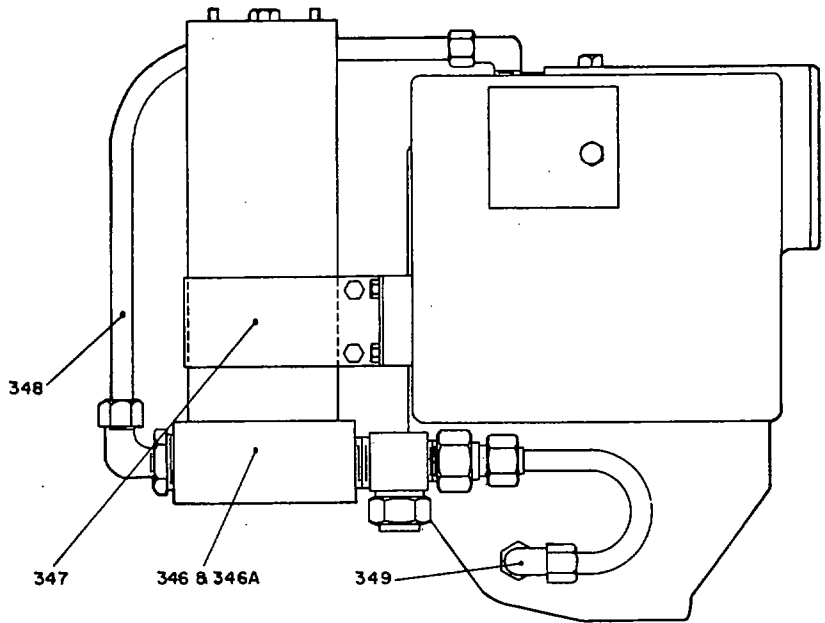
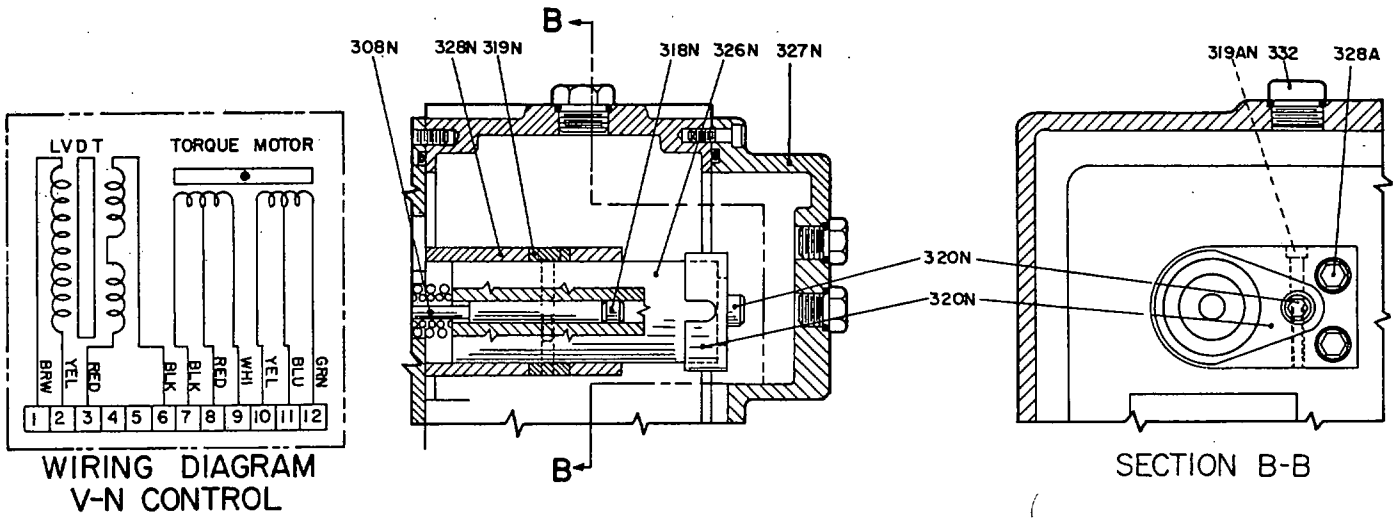
Check for hardening or deterioration of seals and gaskets and replace, if necessary. Inspect control pistons and piston rings for undue wear or damage. Be sure pistons do not bind in their bores. Inspect all other parts and replace any part which appears unduly worn or damaged. Wash parts thoroughly prior to assembly.

VIII. ASSEMBLY

Install piston ring (302) on control piston (301), place gaskets (304A) on screws (304) and secure the piston to slideblock locking with wire (304B). Place O'ring (306) in its groove on control adapter (307) and install the adapter in unit's case. Assemble cylinder adapter (303) with gasket (305) to control head (300). Position gasket (31) (and O'ring 344, when used) and install the control head assembly to the unit's case. Insert O'ring (336). On size 8 and 60 pumps install adapter (335) with O'rings (337 and 306). Place O'ring (316) in its bore in base plate (330) and secure the base plate to control housing (329) with screws (333). Install seal (306A) and O'ring (314) in base plate and secure the base plate to the unit with screws (330A) and dyna seal (330B). Install rod (308V or N) with guide (318V), when used, and springs (309 and 313). If LVDT was disassembled, slide LVDT (326V or N) into clamp (319V or N) until it is 0.31" from assembly mounting face and tighten lock screw (319AV or N). If "V-N" is used, secure block (320N) to bracket (328). Secure LVDT assembly to base mounting plate (330) with screws (328A). Insert O'rings (310) in their counterbores in the servo valve base. Secure the servo valve and torque motor assembly (312) to the base mounting plate. Torque screws (312A) to 15 ft. lbs. Return drain plug (340) to its position in housing (329). Carefully feed LVDT and torque motor leads with feedthrus (321) and (321A) with O'rings (317A) thru their passages in housing (329) and secure with retaining ring (317). Connect wires to the proper terminals on terminal strip (315). Securely attach cover (323) with gasket (322) to the control housing. Insert O'ring (316) in cover (327V or N) and secure the cover to housing (329). Insert O'rings (334) in filter (311) and install the filter assembly on the control housing or install bracket (347) and filter (346) and tubing (348 and 349) on control housing. Reinstall tubing assembly (343). Connect the control to circuit. Test and adjust as described in Section V.

Parts List on page 7

PARTIAL VIEW FOR V-N CONTROL SHOWN



FILTER ARRANGEMENT FOR UNITS WITH LARGE SERVO VALVES SHOWN HERE
SEE DS-89907 FOR PARTS & INSTRUCTIONS.

Figure 4. Parts Drawing, "V-V" and "V-N" Control, sheet 2 of 2, DS-947743-D (501776D).

IX. PARTS LIST

Part No.	Description	Part No.	Description	Part No.	Description
300	Head, Control	314	Seal, O'ring	329	Housing, Control
300A	Screw, Sock. Hd. Cap	315	Strip, Terminal	330	Plate, Base Mfg.
301	Piston, Control	315A	Screw, Rd. Hd. Mach.	330A	Screw, Sock. Hd. Cap
302	Ring, Piston	316	Seal, O'ring	330B	Seal, Dyna
303	Adapter, Cylinder	317	Ring, Retaining	331	Plug, Parker
303A	Screw, Sock. Hd. Cap	317A	Seal, O'ring	331A	Seal, O'ring
304	Screw, Piston	318N	Guide, LVDT	332	Plug, Parker
304A	Gasket, Screw	319VorN	Clamp, LVDT	332A	Seal, O'ring
304B	Wire, Locking	319AVorN	Screw, Nylock	333	Screw, Sock. Hd. Cap
305	Gasket, Adapter	320N	Block, Adjusting	334	Seal, O'ring
306	Seal, O'ring	320AVorN	Screw, LVDT Adjust.	335	Adapter
306A	Sq. Packing or O'ring	320BV	Bearing, Thrust	335A	Screw, Sock. Hd. Cap
307	Adapter, Control	321	Assem. , LVDT	336	Seal, O'ring
308VorN	Rod, LVDT		Feed-thru	337	Seal, O'ring
309	Spring, LVDT Inner	321A	Assem. , SV Feedthru	340	Plug, Parker
310	Seal, O'ring	322	Gasket, Term. Box	340A	Seal, O'ring
311	Assembly, Filter	323	Cover, Term. Box	343	Tubing, w/fittings
311A	Element, Filter	323A	Screw, Rd. Hd. Mach.	344	Seal, O'ring
311B	Screw, Sock. Hd. Cap	324	Strip, Term. Marking	345	Plate, Name
311C	Seal, Filter O'ring	325	Strip, Term. Marking	345A	Screw, Drive
312	Assem. Servo Vlv & Torque Motor	326VorN	Assem. , LVDT	346	Assem. Filter
312A	Screw, Nylock	327VorN	Cover, Control Hsg.	346A	Element, Filter
313	Spring, LVDT Outer	327A	Screw, Sock. Hd. Cap.	347	Bracket, Filter
		328N	Bracket, LVDT	348	Assem. , Filter Pipe
				349	Assem. , Filter Pipe

Parts suffixed by letter "V" are unique to "V-V" controls; by letter "N" are unique to "V-N" controls.

Parts used in this assembly are per Oilgear specifications. Use Oilgear parts to insure compatability with assembly requirements. When ordering replacement parts, be sure to include pump type and serial number, bulletin number and part number. Specify type of hydraulic fluid for packings and seals.

O'ring Sizes
Cross Section x O.D. Duro ± 5

<u>Part No.</u>	<u>All Sizes</u>
306	3/32 x 3/4 70
317A	1/16 x 1/2 70
331A	ARP 905
332A	ARP 908
340A	ARP 908
337	3/32 x 1 70(Size 8) 3/32 x 3/4 70(Size 60)

Part No. Units w/Smaller Servo Valves

306A	Square Packing Used
310	1/16 x 1/2 70
311C	1/8 x 2-1/4 70
314	3/32 x 5/8 70
316	1/8 x 8-1/2 70
334	1/16 x 1/2 70
336	3/32 x 1 70

Part No. Units w/Larger Servo Valves

306A	3/32 x 7/8 70
310	3/32 x 15/16 70
314	1/8 x 1-1/8 70
316	1/8 x 11-3/4 70
336	1/8 x 1-1/8 70(Size 60) 1/8 x 1-3/8 70(Size 100 to 230)

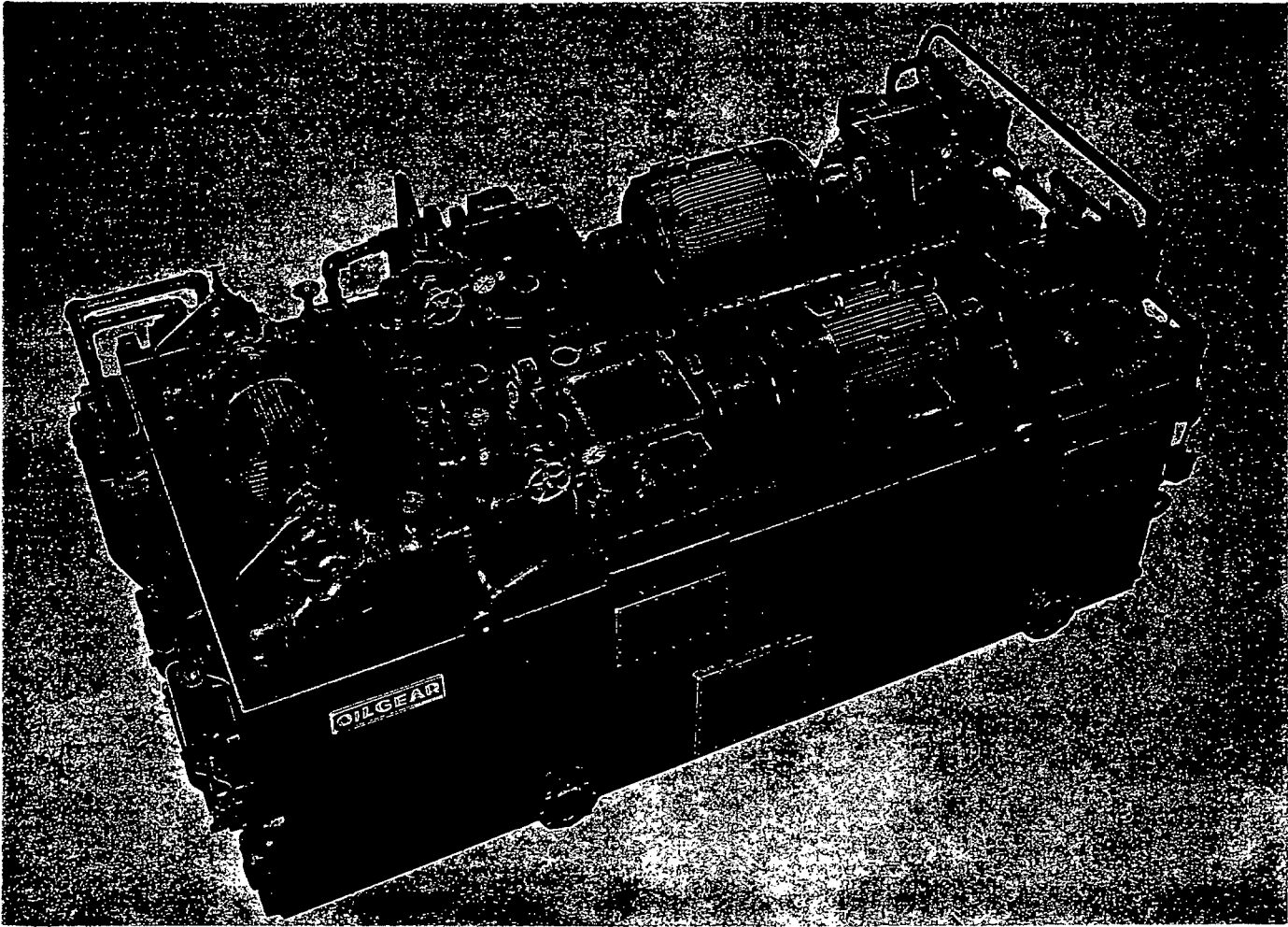


Figure 5. 3000 gallon Oilgear Power Pak with four "DV-N" Pumps and accessory equipment necessary to power huge hydraulic elevator (54270).