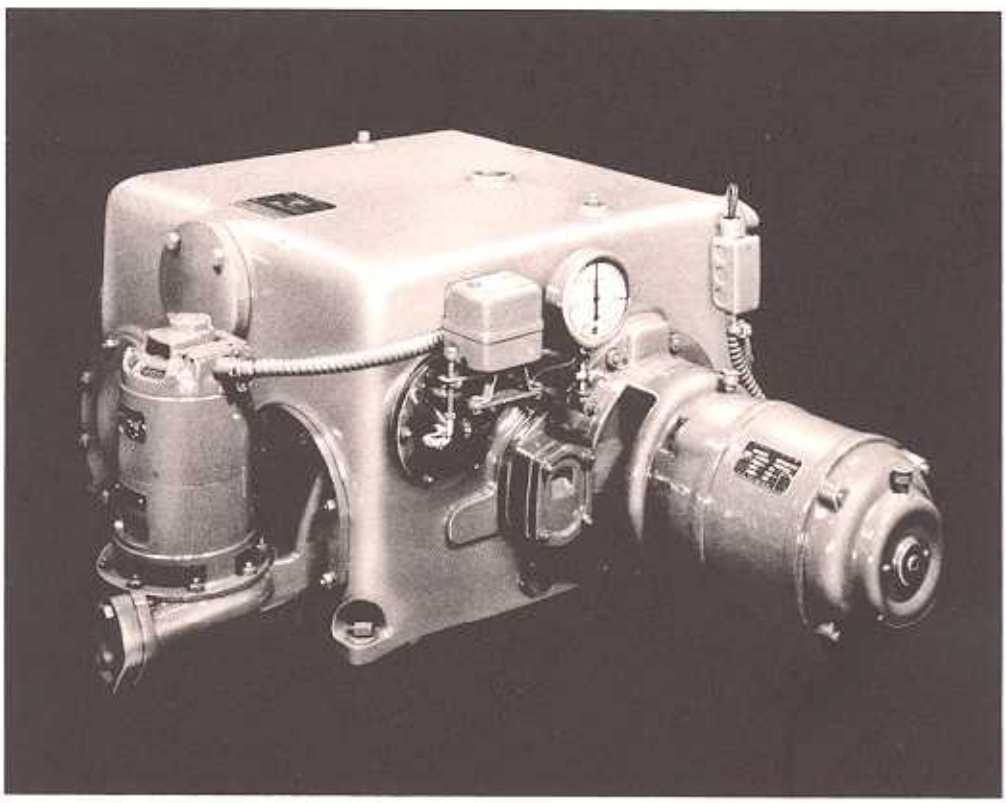
BULLETIN NO. 477-B

INSTALLATION

AND

OPERATION

NASH TYPE CSM SERIES 40
GLAND EXHAUSTERS
WITH BAROMETRIC CONDENSER



NASH® ENGINEERING COMPANY
SOUTH NORWALK, CONN.

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INTRODUCTION

This Installation and Operation Bulletin is for the guidance of those using CSM, Series 40, Gland Exhauster with barometric condenser, manufactured by the Nash Engineering Company, South Norwalk, Connecticut, U.S.A.

The information contained in this bulletin is the factory recommended procedure for installation and operation of these pumps to obtain most efficient performance and maximum service.

PARTS AND SERVICE

Parts and service for gland exhausters are assured through the facilities of a network of sales and service offices as listed on the back cover of this bulletin. Any request for service and parts should be directed to the nearest office.

When ordering replacement and spare parts for these pumps, give test number, size and type of pump. Parts may be identified by number and name by referring to the cross section in this bulletin applicable to the particular pump.

UNCRATING

When uncrating and putting the pump in position handle carefully. As soon as the equipment is received, the parts and accessories should be checked against the shipping list found in the envelope attached to the pump and inspected to determine if any damage has been done in shipment. Shortage or damage should be reported immediately to the agent of the carrier to prevent any controversy when claim is made against the transportation company.

REMOVE and KEEP ALL tags and instructions.

SETTING UP

Handle carefully when removing pump from crate. Any assembly, no matter how strong, can be sprung by careless handling. Locate the foundation bolts according to the drawings furnished, and set these to permit some movement after the concrete foundation has hardened. Foundation bolts in pipe sleeves will allow movement to conform with the holes in the base of the tank. If pump is to be mounted on steel work or floor, it should be placed over the superstructure, or near the walls for firm support.

ASSEMBLY

The Nash gland exhauster is shipped completely assembled with exception of the barometric condenser. Assemble condenser to receiver using flanged elbow if required. Adequate support, furnished by others, for the condenser is required (see Page 11) to prevent strain on the receiver. Control wiring, power supply and piping connections to the system are required.

ELECTRICAL CONNECTIONS

A wiring diagram accompanies each pump (see Page 10). This must be followed to connect the motors properly. Be sure to check the characteristics of the electric service at the point where the pump is to be installed, with that on the name plate of the motor.

CLEANING STRAINER

After completion of initial operating test and occasionally after periodic test runs, the strainer in the receiving tank should be removed, cleaned and replaced through the strainer clean-out covers.

ROTATION

Do not operate pumps until receiving tank and separator chambers have been partially filled with water. (See Starting the Pump)

After installing the pumps and completing the electric wiring, the direction of rotation of the motors should be checked. If it does not correspond with the arrows on the pump casings, change the wiring accordingly.

STARTING THE PUMP

Pumps can be damaged if operated without water.

For initial start up and whenever pump is drained and cleaned, follow these instructions:

1. Remove pipe plug on top of tank closest to center of tank and fill tank two-thirds (2/3) full of water. (See Page 9)
2. Remove separator pipe plug (nearest edge of tank on pump side) and pour 2 gallons of water into the separator. (See Page 9)

FUNCTION

Function of the Nash gland exhauster is to provide the most reliable and efficient means of preventing radioactive steam leakage to atmosphere. The turbine gland seal, stop valve, governor valve stem leak-offs and exhaust drain pot are piped to the Nash exhauster system.

The system consists of a barometric condenser, receiving tank, condensate pump and vacuum pump. The radioactive steam condensate and non-condensable gases are drawn off to the Nash exhauster. The steam is condensed in the condenser using cool condensate spray. The condensate and non-condensable gases are drawn into the receiver. The condensate pump discharges condensate at 50 psig to the suction side of the reactor coolant injection pump. The vacuum pump on the RCIC units discharge against 15 psig and send non-condensable gases to a disposal system. On the HPCI units the vacuum pump discharge is against 10″ of water pressure and send the non-condensable gases to a disposal system.

DESCRIPTION

(See Page 9)

The radioactive steam, condensate and non-condensables are drawn into the barometric condenser through one of the threadolet connections. There are a total of nine (9) threadolets of various sizes in the condenser. The ¾″ threadolet connection is piped to the exhaust drain pot. One 1″ threadolet is piped to the T & T valve; one 1″ to the governor for stem leak-off; and one 1″ is for gland exhausting. The four 2½″ threadolet connections contain spray nozzles and are connected to the cool condensate supply. This spray is used to condense the steam. The capacity of each spray nozzle is 4.2 gpm at 40 psig. The spray water is supplied to the spray nozzle from the coolant injection pump discharge via a pressure reducing valve.

The 1¼″ threadolet connection is for the bypass control valve (¾″ Fisher — Type 98H, cast iron body, stainless steel diaphragm and trim) which senses the vacuum pump discharge pressure. When valve set pressure is exceeded, discharging non-condensables will be passed back to the threadolet inlet connection in the condenser.

Cool condensate is used to condense the steam. Condensate and non-condensables are drawn into the receiver through the strainer. Condensate is drawn off through an internal passage in the side of the receiver directly into the impeller of the condensate pump which discharges to the suction line of the coolant injection reactor pump. Vent piping between inner head of condensate pump and receiver keeps the pump primed at all times. Non-condensables are drawn off from the top of the receiver through internal piping to the suction of the vacuum pump.

Seal water, to seal the vacuum pump, is taken from lower part of receiver through an orifice and check valve to the vacuum pump suction line.

Discharge from the vacuum pump, made up of non-condensables and entrained seal liquid, is discharged into a separator chamber which is part of the receiving tank casting but separate from the main part of the receiver. The separator chamber removes seal water from discharged non-condensables. Seal liquid is returned through the separator float valve to main part of the receiver. Non-condensables are discharged directly from the separator chamber to the disposal system.

LUBRICATION

The motors on the air pumps have grease fittings, or are equipped to receive grease fittings, and should be lubricated with a good grade ball bearing grease. Overgreasing should be avoided. See the motor manufacturer's instruction sheet attached to motor for recommendations.

SHAFT SEAL AND PACKING

Mechanical seals are used on all of the water pumps and require no adjustment.

Vacuum pumps have packing in the stuffing box with a lantern gland (Fig. 7-169) and an external grease fitting to supply "CRANDALL LUBALL" to the stuffing box as a lubricant and seal. A container of this lubricant is furnished with the order. New lubricant should be added from time to time. The packing is graphite impregnated asbestos, 5/16" square and 6" long. Six rings are required. The stuffing box gland nuts should be snug, but not tight. A tight stuffing box runs hot and will cause the pump to bind.

PRINCIPLE OF OPERATION

The principle of operation of the pump is shown in Fig. 5. A rotor (5) in hydraulic balance revolves freely without contact in an elliptical casing (6) containing a liquid, usually water (4). This rotor (5) is a circular casting consisting of a series of blades which project from a cylindrical hub to form pockets or chambers. Ports are arranged at the bottom of each chamber. A cone-shaped casting containing two inlet and two outlet ports as at (1) fits without contact into the rotor hub.

Starting at point "A" the chambers are full of water. The water turning with the rotor and constrained to follow the casing (6) by centrifugal force, alternately recedes from (4) and is forced back into the rotor (3) twice in a revolution. As the water recedes from the rotor (7) it draws air from the pump inlet into the cone, through the cone inlet port and into the rotor by means of the ports in the bottom of the rotor chambers. When the water is forced back into the rotor by the converging casing the air is discharged through the ports at the bottom of the rotor chambers, through the cone outlet ports and out the pump discharge.

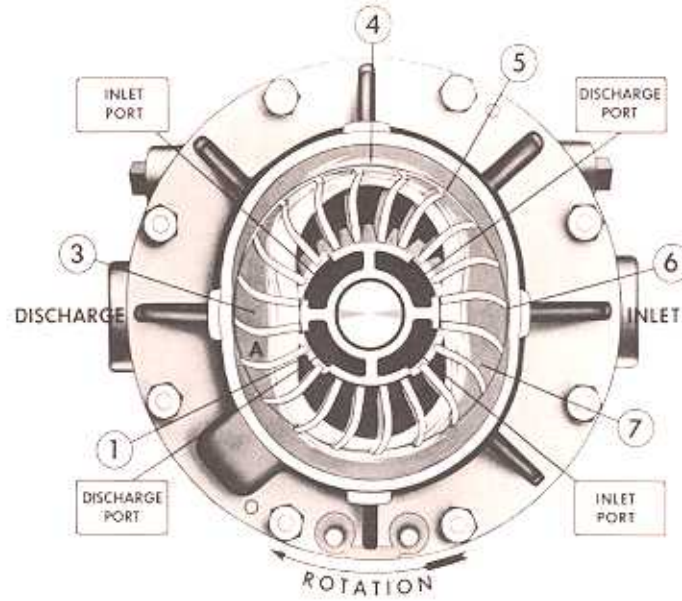


Fig. 5

TROUBLE SHOOTING — CONDENSATE PUMP NOT HANDLING WATER

Standard pumps are designed to deliver against a pressure range of 10 to 70 lbs. gauge at the pump. The pressure against which the pumps is discharging may be determined by inserting a pressure gauge in the water discharge near the pump. The gauge reading should not exceed nor be appreciably below the nameplate rating.

If the pump is not discharging all the condensate, check the following: The direction of rotation. Is Motor up to nameplate speed? Is valve on the water discharge fully open? Does the check valve in the discharge open away from the pump?

VACUUM PUMP NOT HANDLING AIR

To determine whether the pump is handling air, remove the pipe plug closest to the center of the top of tank. If the vacuum pump is operating properly, it will be immediately evident that air is being sucked in at this point.

See that air discharge line is open and that the check valve (Fig. 8A) in the suction line to vacuum pump is working properly. Access to the check valve is obtained by removing the check valve cover on the side of the tank adjacent to vacuum pump.

The seal water orifice admits the water necessary to operate the vacuum pump. This can be inspected to see that it is not plugged up. (See Page 12, Fig. 9)

Both the check valve and the orifice must be free from dirt and working properly for operation of the vacuum pump. Also see that the separator float valve is clear. (See Fig. 8)

VACUUM PUMP THROWING WATER OUT AIR DISCHARGE (See Fig. 8)

The air discharge separator is an integral part of the receiving tank. It consists of a chamber which separates the water from the air and a ball float assembly which allows the seal water to flow back to the receiving tank. If the float valve sticks open, backflow will occur into the receiving tank. If the ball float sticks shut, the seal water will fill the separator chamber and will be discharged with the non-condensables.

Should a pressure be built up in the receiving tank, it will prevent the flow of water from the separator back into the receiving tank.

DISMANTLING THE PUMP

Every pump is thoroughly tested at the factory, both for air and water capacity, with its own motor and control. Any trouble should be first looked for in the system rather than at the pump. Do not disassemble the pump unless it is certain something is wrong with the pump.

DISASSEMBLY — CENTRIFUGAL

(Referring to Cross Section Cut Fig. 6) The Motor and pump is built as a unit and may be taken from the receiving tank after disconnecting pump discharge and unfastening the eight hex nuts which hold the volute (201) to the tank. Disconnect the vent piping. Remove the eight hex nuts which hold volute (201) to the inner head and bracket (202). Unscrew impeller (210) from shaft. (Special tools used to remove impeller: to hold shaft, use offset screwdriver; to remove impeller, use pinned spanner socket.) The bracket (202) is generally not removed from the motor as the stationary portion of the mechanical seal (228) in front of the bracket is a self-contained unit, and if removed must be replaced by another seal assembly. If necessary, the bracket (202) may be removed from the motor by unfastening the four cap screws.

REASSEMBLY — CENTRIFUGAL

Install stationary seal assembly (228) in head and bracket (202). Press new seal ring (268A) carefully in head and bracket (202) if required. Mount head and bracket (202) on motor and tighten nuts evenly. Carefully press rotating ceramic portion of seal in impeller hub with its gasket. Screw impeller on motor shaft (210) using offset screwdriver to hold motor shaft. Tighten impeller with spanner wrench (Williams MNR-10). Install body (201) and volute with new seal ring (268) (if required) and gasket (238). Tighten nuts holding volute to head.

DISASSEMBLY — VACUUM PUMP

Refer to Cross Section Cut Fig. 7

The pump and motor assembly must first be removed from the receiver by removing the eight nuts holding the flanged portion of the bracket (101) to the tank. Be sure all nuts are removed, including those at the very bottom.

If it is necessary to dismantle the pump, care should be exercised to preserve the original gaskets and to mark the parts in order to insure correct reassembling. If the gaskets are broken, they should be replaced by others of the same material and of equal thickness. Careful attention should be given the dowel pins, two of which (149) maintain the concentricity of the lobe (106) and the port plate (107). The remaining two dowel pins (148) are tapered and maintain the concentricity of the port plate (107) and the bracket (101).

The first step in dismantling is to remove the lobe (106) by unfastening the nuts which hold it to the port plate (107). The gasket (133) should be removed and set aside in order to prevent it from being damaged. The rotor (110) will slide off the shaft after removing the lock screw (126). All working parts of the pump are exposed for inspection and no further dismantling should be required unless it is necessary to replace worn parts.

The laminated shim (164) for clearance adjustment between the rotor and shaft sleeve should be removed and saved for reassembly.

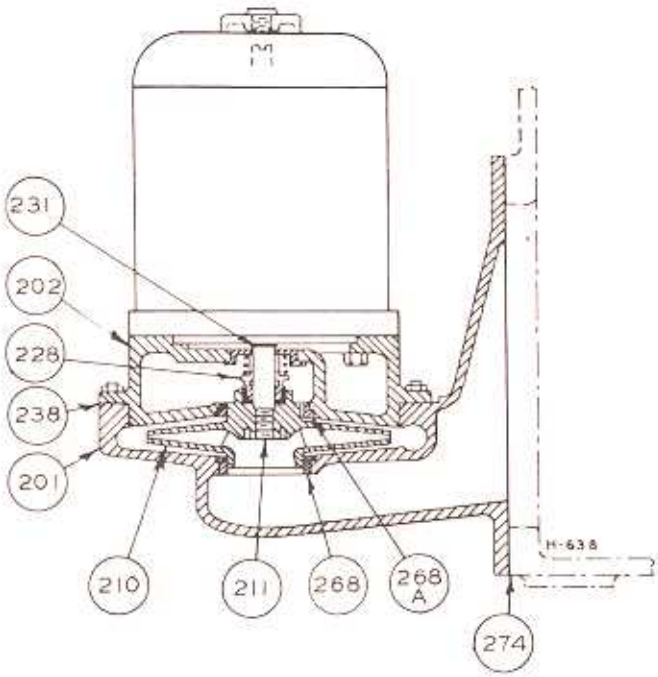
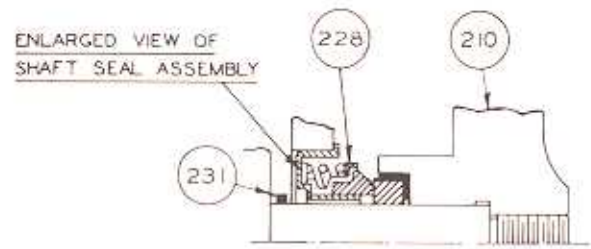


Fig. 6 Nominal Side Clearance .010"
Maximum Side Clearance .012"
Between Items 210, 268 and 210, 268-A



Part No.	Part Name
201	Body & Volute
202	Head & Bracket
210	Impeller
228	Shaft Seal Assembly
238	Gasket Volute
211	Motor Shaft
268	Sealing Ring — Lower
268A	Sealing Ring — Upper
274	Gasket — Tank
231	Slinger

Use MNR-10 Williams Spanner Wrench for removing Impeller

To remove port plate (107) it is necessary to first drive out the tapered dowel pins (149) from the underside of the bracket (101). The tapered dowel pins can be seen in the face of the port plate (107). The two driving out holes are located directly opposite the dowel pins on the underside of the bracket (101). A thin drift pin can be inserted in the holes on the underside of the bracket (101) in order to drive out the tapered dowel pins. These dowel pins only require a slight movement in order to push them out through the face side of the port plate (107). The port plate will now slide over the studs. The gasket (163) should be removed and set aside to prevent it from being damaged. The bracket (101) can be removed from the motor by unfastening the nuts which hold it to the face of the motor. If it is not necessary to remove the port plate (107) from the bracket (101) both these members can be taken off together by simply unfastening the nuts which hold the bracket (101) to the face of the motor. In replacing the bracket (101) and port plate (107) as a unit, it is advisable to tap the tapered dowel pins slightly to insure that they have not moved during dismantling.

The packing (128) and lantern gland (169) can now be taken from the stuffing box. Retain the lantern gland (169) for reassembly.

The shaft sleeve (114) should not be removed from the shaft unless absolutely necessary. Removal from the shaft usually damages the shaft sleeve and makes it unfit for further use. If it is necessary to drive off the shaft sleeve, care must be taken to avoid bending the shaft. A new shaft sleeve will slide over the shaft until it hits the knurling of the shaft. From this point on, it must be carefully driven until it is against the shoulder of the shaft. The end of the sleeve which faces against the rotor should not be tapped with a hammer or anything hard as this is liable to throw it off square and cause the rotor to be likewise.

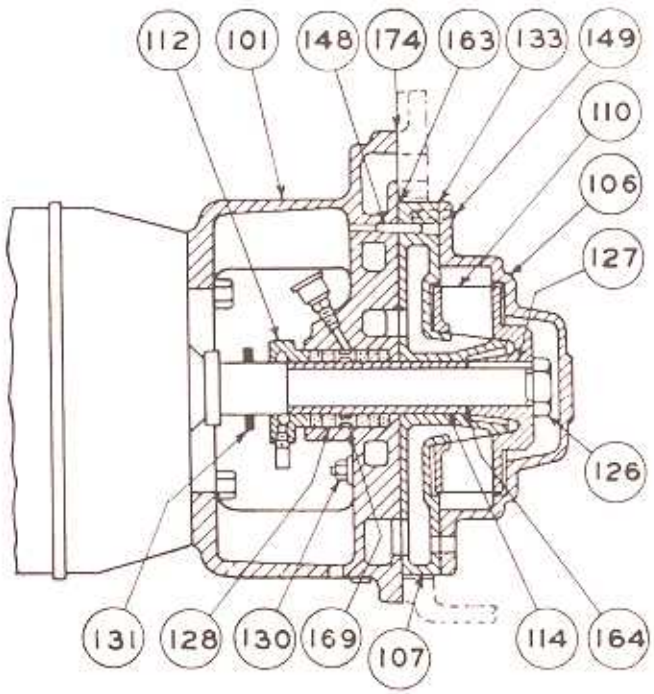


Fig. 7

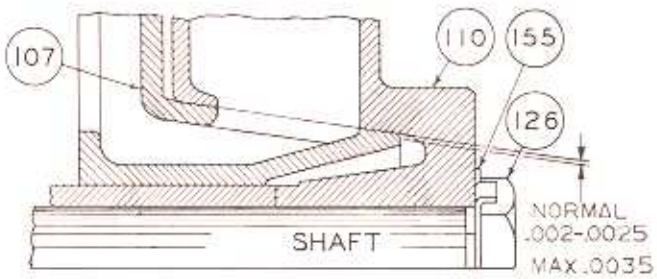
REASSEMBLY — VACUUM PUMP

The pump can be reassembled by reversing the above procedure provided it is not necessary to install new parts. If a new rotor, port plate or bracket are required, it will be necessary to accurately redowel these parts concentric with the shaft.

However, be sure to install the shaft slinger (131), the gland (112) and the lantern gland (169) prior to the installation of the bracket.

To install a new port plate, oversize tapered dowels should be used because the tapered holes in the bracket will have to be reamed again. It is advisable to have shaft in a vertical position in order to secure the most accurate concentricity of the port plate. The new port plate is installed against the face of the bracket with a gasket between. A machinist's indicator should be clamped to the shaft and should indicate the concentricity at the tapered face of the port plate. The port plate is concentric when the indicator does not vary during a full revolution of the shaft.

After the port plate is concentric, it should be clamped or bolted to the bracket in order to maintain the alignment while drilling and reaming for the tapered dowels. The new oversize tapered dowels should be installed in



Part No.	Part Name
101	Bracket
106	Lobe
107	Port Plate
110	Rotor
112	Gland
114	Shaft Sleeve
126	Lock Screw
127	Key-Rotor
128	Packing
133	Gasket — Lobe
148	Tapered Dowel — Port Plate
149	Dowel — Lobe
163	Gasket — Port Plate
164	Laminated Shim
169	Lantern Gland
130	Nut
131	Water Slinger
174	Gasket

the new port plate so that they go through the original tapered holes in the bracket. If a new bracket is used, the tapered dowels need not be oversize. They should be installed in the same place as the dowel holes of the original port plate. Care should be taken in order that reaming will not be too great for the size of the dowel. The large end of the dowels should go just below the face of the port plate.

If a machinist's indicator is not available, the port plate can be centralized with the shaft by forcing the tapered face of the rotor into the cone of the port plate. To do this, it is usually necessary to either remove the shaft sleeve or back off the shaft, otherwise the conical face of the rotor will be held away from the cone of the port plate. The shaft is moved back on the pump after loosening cap screw on pump end motor bearing. If the shaft sleeve has to be changed, this operation can be performed after the old sleeve is removed and before the new shaft sleeve is installed. This method of securing port plate concentricity is a rather crude way of doing precise work, but the results are fairly accurate if much care is taken.

The lobe must be centralized about the rotor and doweled to the port plate with the straight dowels to insure that it will not shift and rub on the periphery of the rotor. If the original lobe is used with a new port plate, it will be necessary to redowel the same as if a new lobe is used. To accurately centralize the lobe about the rotor, two machinist's indicators set 90° apart should be used to determine its total travel. The lobe is most concentric when it is shifted to a point where each indicator reads one-half of its total movement. The lobe should be clamped or securely bolted before drilling for dowels. The straight dowels are ¼ inch in diameter. A $^{15}/_{64}$ inch drill and a ¼ inch straight reamer should be used to provide the holes in the same location as the dowel holes of the original lobe. A new lobe has the dowel holes drilled but not reamed.

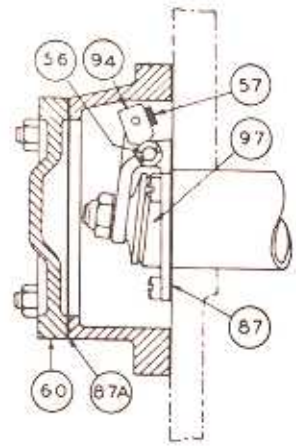
The lobe can be centralized without using machinists' indicators but the results are not accurate. However, if the shaft turns freely after the lobe is made up tight, the possibility of rubbing is remote.

ADJUSTMENT

The pump operates most efficiently with a clearance between the rotor and the cone as set at the factory. Under constant use this clearance may increase and lower the pump capacity. If the wear has been uniform it will be possible to change the clearance by readjusting.

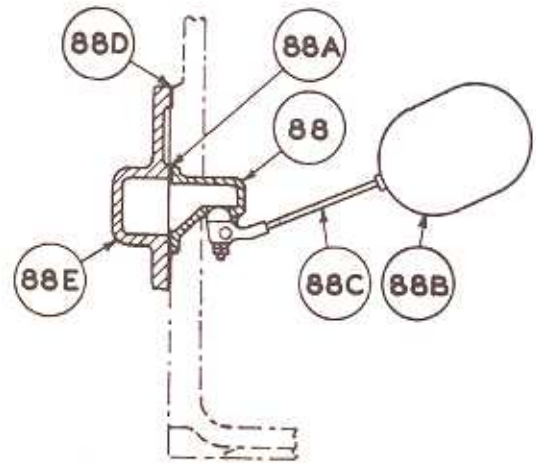
Adjustment of the clearance between the rotor (110) and the port plate (107) may be accomplished by removal of sections of the laminated shim (164). The total thickness of the laminations when originally installed in the pump was approximately .031". Each lamination is .003" thick.

The required clearance between the tapered bore of the rotor (110) and the conical surface of the port plate (107) is .002" to .0025". To measure this clearance, first rotate the shaft to see that there is no binding. Then bring the rotor (110) up to the port plate (107) by removing lamination from the shim (164) tightening the shaft nut (128) at each trial. When the rotor (110) rubs, lamination should be added to back the rotor (110) away from the port plate (107). This is accomplished by adding laminations totaling as close as .012" to .016" as the lamination will permit. Then secure the lock screw (126) and if the shaft will rotate freely proceed with the assembly of the lobe on the pump.



Part No.	Part Name
56	Clapper Pin
57	Bumper
60	Cover — Check Valve
87	Gasket
87A	Gasket — Cover
94	Clapper
97	Seat

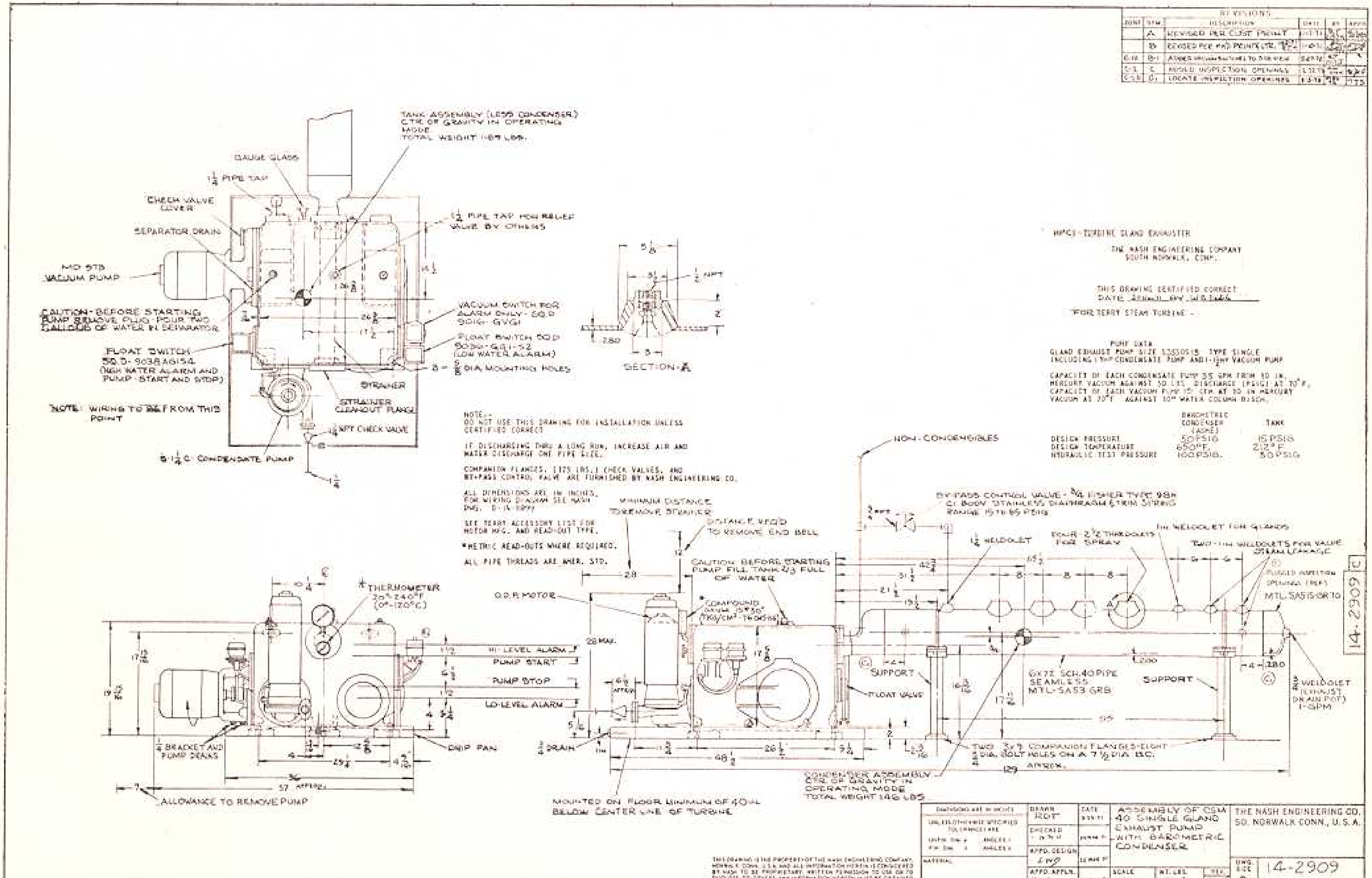
Fig. 8A



Part No.	Part Name
88	Float Valve Assembly Complete with Float 88B & Stem 88C
88A	Gasket
88B	Float — Only
88C	Stem — Only
88D	Gasket — Flange
*88E	Flange — Float Valve

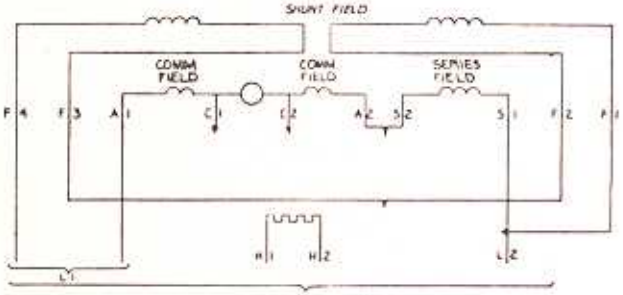
*Not Furnished with Assembly (88)

Fig. 8


REVISIONS
A REVISED PER CUST PRINT
B REVISED PER NASH PRINT LTR.
B1 ADDED VACUUM SWITCHES TO END VIEW
C ADDED INSPECTION OPENINGS
C1 LOCATE INSPECTION OPENINGS
TANK ASSEMBLY (LESS CONDENSER) CTR OF GRAVITY IN OPERATING MODE TOTAL WEIGHT 1185 LBS.
GAUGE GLASS
1 1/4 PIPE TAP
CHECK VALVE COVER
SEPARATOR DRAIN
MD 573 VACUUM PUMP
CAUTION - BEFORE STARTING PUMP REMOVE PLUG - POUR TWO GALLONS OF WATER IN SEPARATOR
FLOAT SWITCH SQ.D. 9038AG154 (HIGH WATER ALARM AND PUMP START AND STOP)
NOTE: WIRING TO BE FROM THIS POINT
1 1/2 PIPE TAP FOR RELIEF VALVE BY OTHERS
VACUUM SWITCH FOR ALARM ONLY - SQ.D 9016-GVG1
FLOAT SWITCH SQ.D 9036-GG1-52 (LOW WATER ALARM)
8 - 5/8 DIA MOUNTING HOLES
STRAINER
STRAINER CLEANOUT FLANGE
1/4 NPT CHECK VALVE
S-1 1/4 C. CONDENSATE PUMP
SECTION-A
HPCI-TURBINE GLAND EXHAUSTER
THE NASH ENGINEERING COMPANY
SOUTH NORWALK, CONN.
THIS DRAWING CERTIFIED CORRECT
FOR TERRY STEAM TURBINE -
PUMP DATA
GLAND EXHAUST PUMP SIZE S3SSOS1B TYPE SINGLE INCLUDING 1 HP CONDENSATE PUMP AND 1-1/2 HP VACUUM PUMP
CAPACITY OF EACH CONDENSATE PUMP 35 GPM FROM 10 IN. MERCURY VACUUM AGAINST 30 LBS. DISCHARGE (PSIG) AT 70°F. CAPACITY OF EACH VACUUM PUMP 15 CFM AT 10 IN MERCURY VACUUM AT 70°F AGAINST 10" WATER COLUMN DISCH.
BAROMETRIC CONDENSER (ASME) / TANK
DESIGN PRESSURE 50 PSIG 15 PSIG
DESIGN TEMPERATURE 650°F. 212°F
HYDRAULIC TEST PRESSURE 100 PSIG. 30 PSIG
NOTE:-
DO NOT USE THIS DRAWING FOR INSTALLATION UNLESS CERTIFIED CORRECT
IF DISCHARGING THRU A LONG RUN, INCREASE AIR AND WATER DISCHARGE ONE PIPE SIZE.
COMPANION FLANGES, (125 LBS.) CHECK VALVES, AND BY-PASS CONTROL VALVE ARE FURNISHED BY NASH ENGINEERING CO.
ALL DIMENSIONS ARE IN INCHES.
SEE TERRY ACCESSORY LIST FOR MOTOR MFG. AND READ-OUT TYPE.
*METRIC READ-OUTS WHERE REQUIRED.
ALL PIPE THREADS ARE AMER. STD.
MINIMUM DISTANCE TO REMOVE STRAINER
DISTANCE REQ'D TO REMOVE END BELL
CAUTION: BEFORE STARTING PUMP FILL TANK 2/3 FULL OF WATER
O.D.P. MOTOR
*COMPOUND GAUGE
NON-CONDENSIBLES
BY-PASS CONTROL VALVE - 3/4 FISHER TYPE 98H CI BODY STAINLESS DIAPHRAGM & TRIM SPRING RANGE 15 TO 65 PSIG
1 1/4 WELDOLET
FOUR - 2 1/2 THREDOLETS FOR SPRAY
1 IN WELDOLET FOR GLANDS
TWO - 1 IN WELDOLETS FOR VALVE STEAM LEAKAGE
PLUGGED INSPECTION OPENINGS (REF)
MTL. SA515-GR70
SUPPORT
FLOAT VALVE
6X72 SCH.40 PIPE SEAMLESS MTL-SA53 GRB
3/4 WELDOLET (EXHAUST DRAIN POT) 1-GPM
TWO 3X3 COMPANION FLANGES - EIGHT 3/4 DIA. BOLT HOLES ON A 7 1/2 DIA. B.C.
129 APPROX.
CONDENSER ASSEMBLY CTR OF GRAVITY IN OPERATING MODE TOTAL WEIGHT 146 LBS
*THERMOMETER 20°-240°F (0°-120°C)
HI-LEVEL ALARM
PUMP START
PUMP STOP
LO-LEVEL ALARM
DRIP PAN
1/4 BRACKET AND PUMP SEALS
3/4 DRAIN
ALLOWANCE TO REMOVE PUMP
MOUNTED ON FLOOR MINIMUM OF 40 IN. BELOW CENTER LINE OF TURBINE
DRAWN RDT
CHECKED
APPD. DESIGN
APPD. APPLN.
ASSEMBLY OF CSM 40 SINGLE GLAND EXHAUST PUMP WITH BAROMETRIC CONDENSER
THE NASH ENGINEERING CO. SO. NORWALK CONN., U.S.A.
SCALE
WT. LBS. 1325
DWG. SIZE D
14-2909

REVISIONS					
ZONE	SYM.	DESCRIPTION	DATE	BY	APPD
	A	REVISED PER CUST. MARK-UP PRINT	11-7-51	[illegible]	[illegible]

DIRECT CURRENT
MOTOR CONNECTIONS

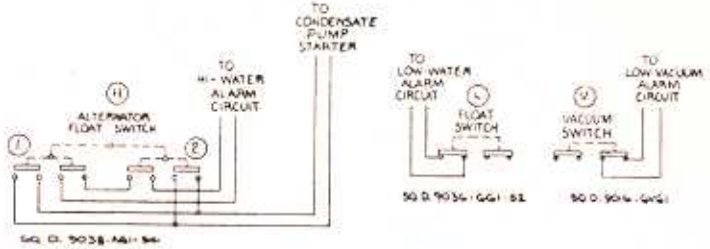


TO
REDUCED VOLTAGE
STARTER

FOR CW OPERATION OF WATERPUMP MOTORS

OPERATION OF SWITCHES

NOTE: CONTACTS (1) & (2) OF H CLOSE AT HI-LEVEL ALARM ELEVATION. EITHER (1) OR (2) CONTACTS OPEN 6½ INCHES BELOW HI-LEVEL ALARM ELEVATION.
CONTACTS (1) OR (2) OF H CLOSE AT PUMP START LEVEL. CONTACT WHICH CLOSED WILL OPEN 6½ INCHES BELOW PUMP START LEVEL.
CONTACTS OF L CLOSE AT LO-LEVEL ALARM ELEVATION AND OPEN 3 INCHES ABOVE LO-LEVEL ALARM ELEVATION.
CONTACTS OF V CLOSE AT 3 IN. HG. VAC. AND OPEN AT 8 IN. HG. VAC.



SQ. D. 9038-A61-54

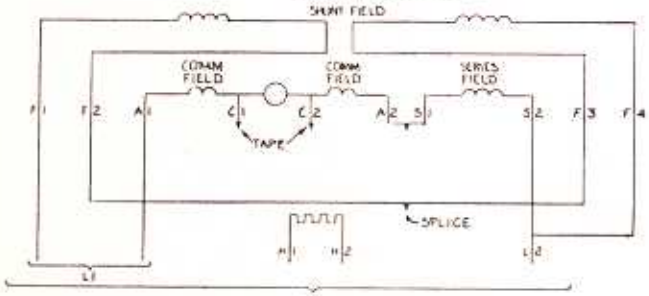
SQ. D. 9036-GG1-52

SQ. D. 9016-GHG1

SWITCHES ON RECEIVER

THIS DRAWING IS CERTIFIED CORRECT FOR TERRY STEAM TURBINE
DATE- 8-29-51

DIRECT CURRENT
MOTOR CONNECTIONS



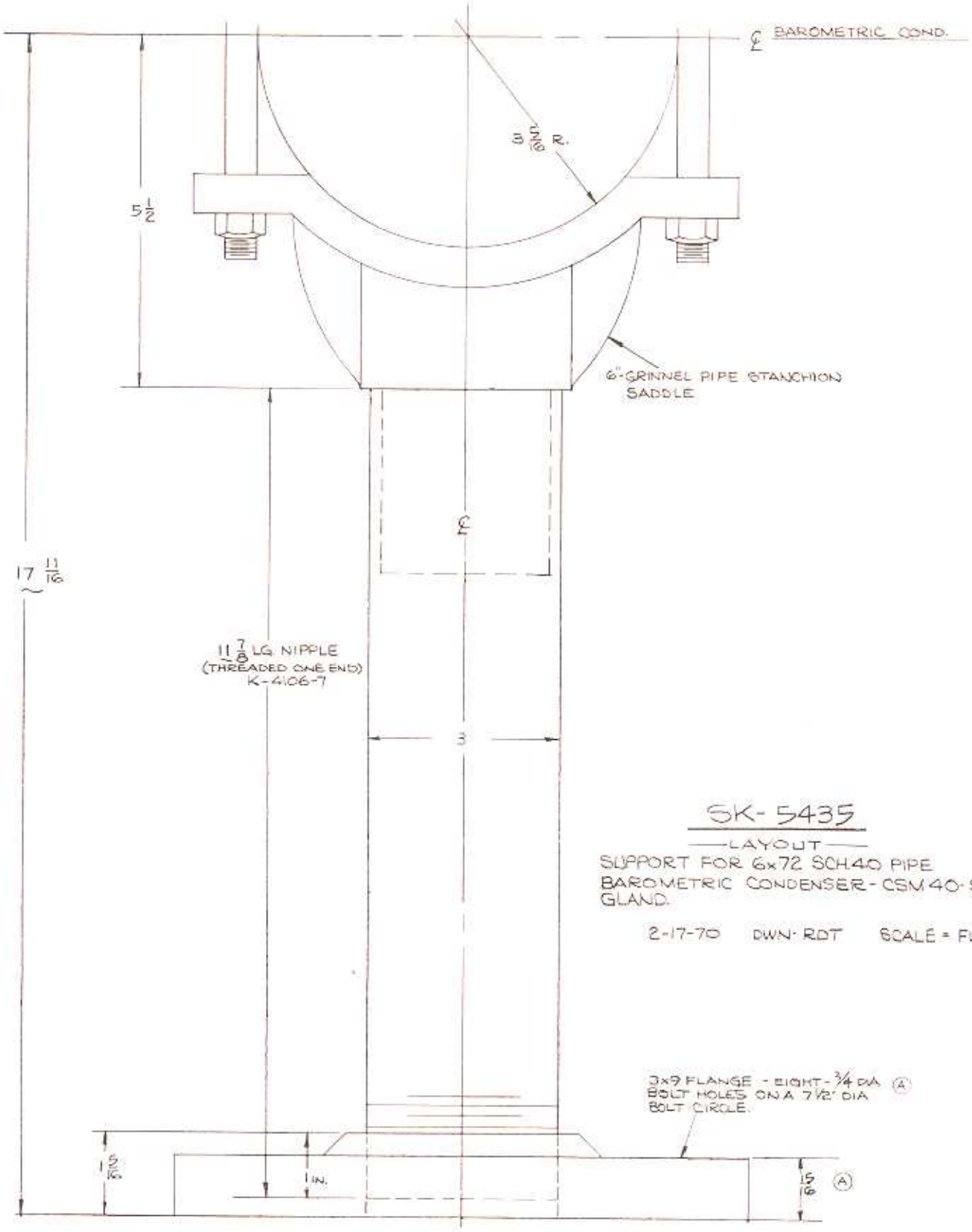
TO
REDUCED VOLTAGE
STARTER

FOR CCW OPERATION OF A.I.P. PUMP MOTORS

DRAWN P.E.	DATE 5-8-51	WIRING DIAGRAM AIR & WATER EXHAUSTEM	THE NASH ENGINEERING CO. SO. NORWALK CONN., U.S.A.	
CHECKED				
APPD. DESIGN				
APPD. APPLN.		SCALE	WT. LBS.	DWG. SIZE D
				14-2899

14-2899 A

10



SK-5435

LAYOUT

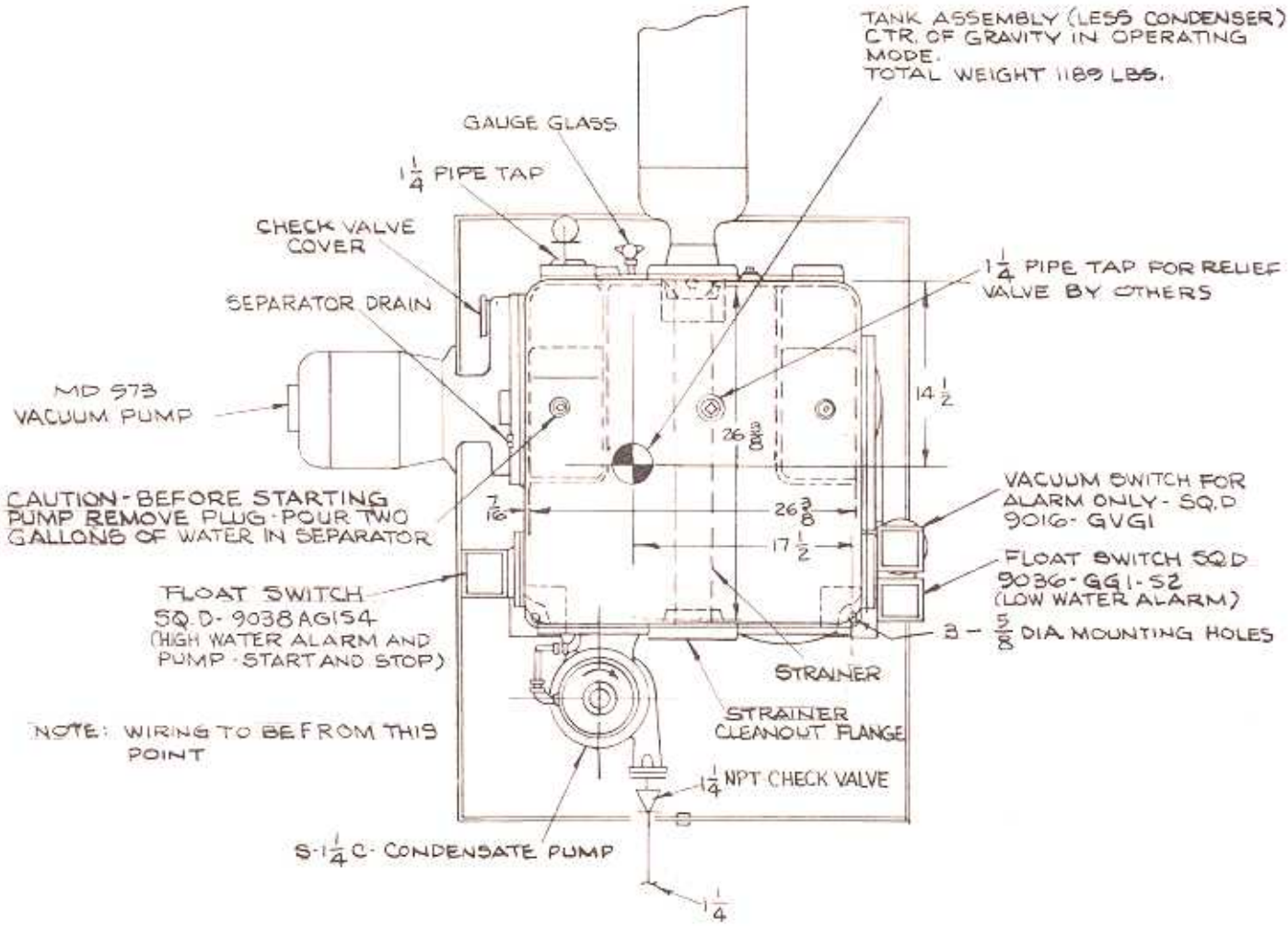
SUPPORT FOR 6x72 SCH 40 PIPE BAROMETRIC CONDENSER - CSM 40 - SINGLE GLAND.

2-17-70 DWN: RDT SCALE = FULL

REVN. A - ADDED NOTE & DIM. RDT 6-4-70

SOU-02621 THRU 32 & 02609 THRU 20

Proper installation and maintenance of the Nash Gland Exhauster to assure the maximum operating efficiency cannot be over-emphasized.



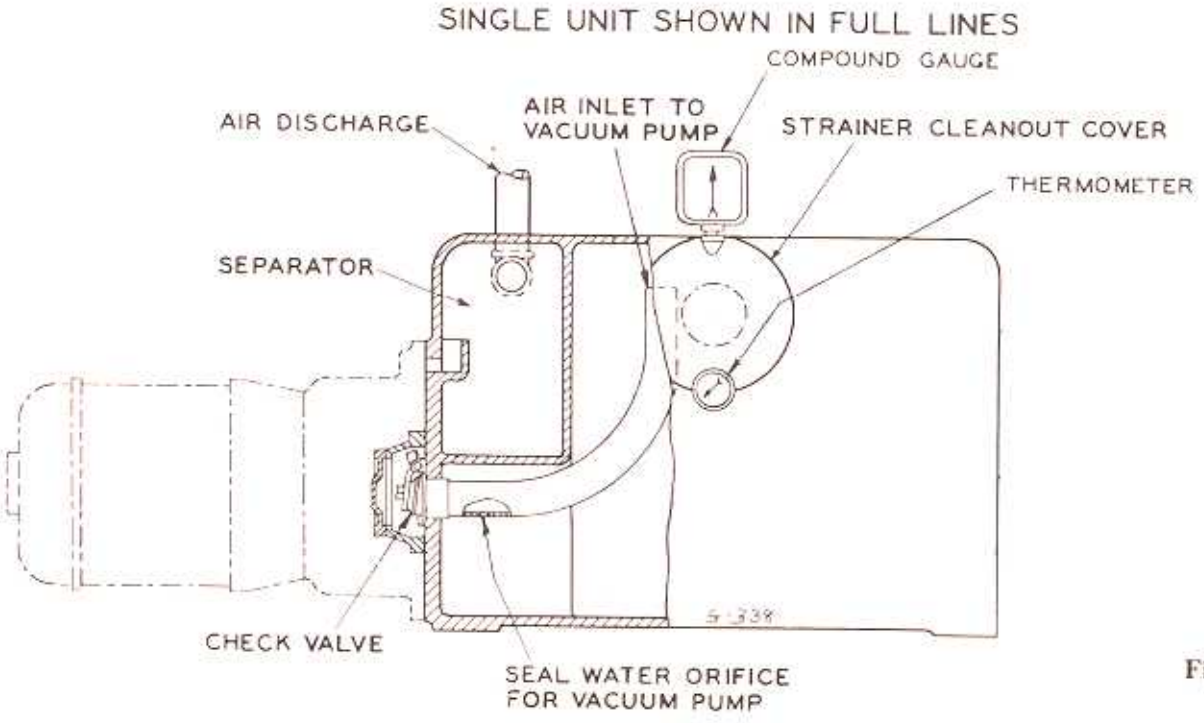
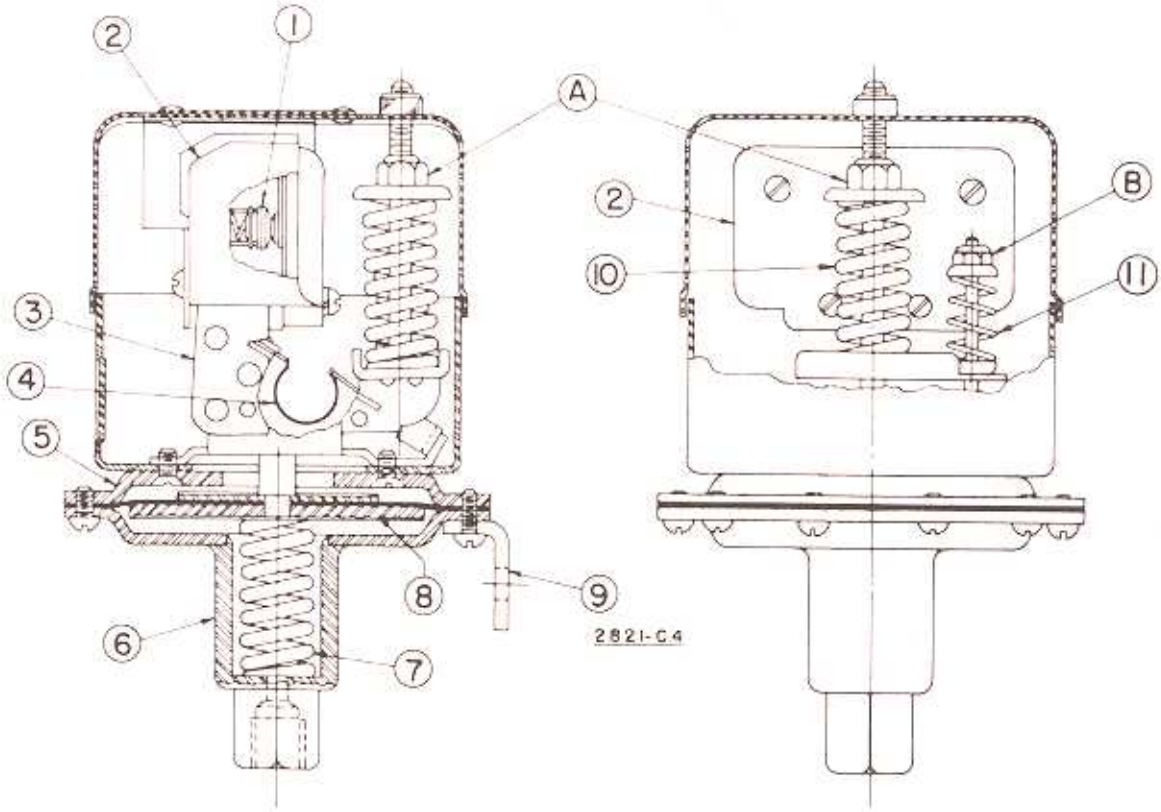


Fig. 9

VACUUM SWITCH ASSEMBLY

REPLACEMENT PARTS—In ordering replacement parts, always give the serial number of the switch and the full nameplate reading.

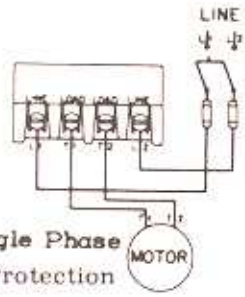


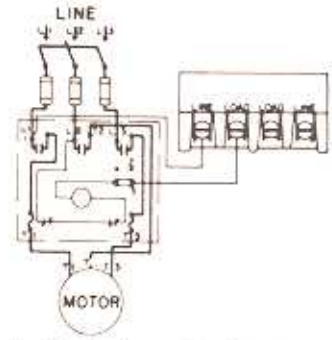
Item Number	Description	Number Req'd.	Part Number
—	Set of Movable and Stationary Contacts (Includes Diaphragm Assembly)	1 set	9998-PC-5
1	Movable Contacts	2	2554-G13
2	Stationary Contact Block Assembly (Includes Stationary Contacts)	1	2821-C2-G1
3	Switch Mechanism (Less Stationary Contact Block)	1	2821-B2-G1
4	Toggle Spring	1	2821-D14-X1
5	Upper Flange	1	2821-D4-X1
6	Lower Flange	1	2821-D7-G2
7	Vacuum Spring	1	2821-X6
8	Diaphragm Assembly	1	2821-D2-G1
9	Mounting Bracket	1	2821-D12-X1
10	Range Spring	1	1515-D1-X1
11	Differential Spring	1	1122-X26

Fig. 10

VACUUM SWITCH

WIRING DIAGRAMS—Class 9016





A. C. Automatic Starter with Pressure Switch

ELECTRICAL RATINGS

Volt.	Sing. Ph.	Poly	D. C.
110	2HP	3HP	1HP
220	3HP	5HP	1HP
440-550	5HP	5HP	- - -
32	- - -	- - -	½HP

Cut-Out Vacuum Inches of Mercury	Minimum Differential Inches of Mercury	Maximum Differential Inches of Mercury
5	4	4½
8	4	6
10	5	9
15	5	10
20	5	11
25	5	12

INSTRUCTIONS

WORKING RANGE — Contacts open on an increase in vacuum. To INCREASE the cut-out point (i.e. from 4" to 8" of Hg) turn the range adjustment nut (Item "A") COUNTERCLOCKWISE. To LOWER the cut-out point, turn the range nut CLOCKWISE.

In setting this control always adjust the range first to establish the cut-out point. The desired cut-in point can then be set by adjusting the differential.

DIFFERENTIAL — Refers to the inches of vacuum between opening and closing of the switch. (Cut-out and cut-in points). Differential adjustment affects cut-in point only. To INCREASE the differential turn the differential nut (Item "B") CLOCKWISE compressing the differential spring. To DECREASE the differential turn the differential nut COUNTERCLOCKWISE.

MOUNTING — The Class 9016 Type GVG vacuum switch may be mounted in any position directly on a ¼" I.P.S. pipe, or by the convenient mounting bracket supplied with Form F switches.

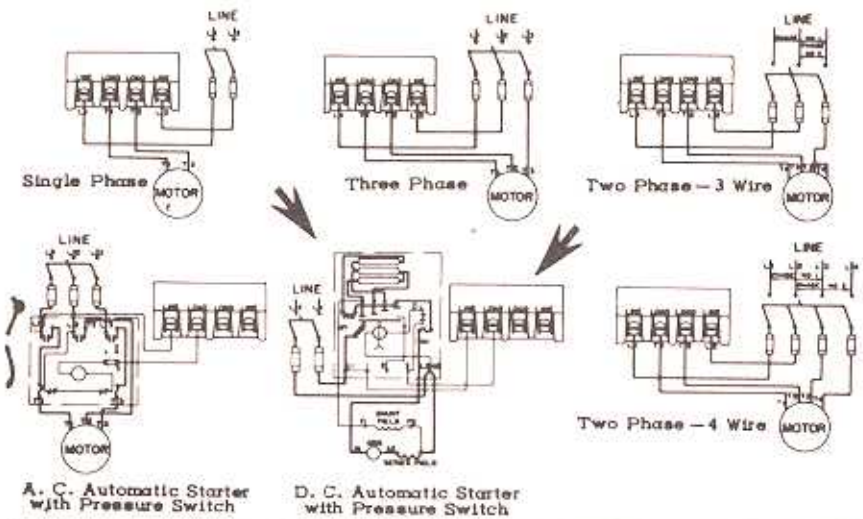
REPAIR — Minor repairs can be made in the field if desired (see other side for table of parts which can be replaced in the field). To facilitate diaphragm replacement the flange should be held in place by clamps or No. 10 machine screws of sufficient length to engage flange when vacuum spring is free. This will ease compression of vacuum spring in the assembly of lower flange to upper flange.

Fig. 11

FLOAT SWITCH

Replaces 9238 EG1-4

WIRING DIAGRAMS



INSTRUCTIONS

APPLICATION — Opens and closes an electric circuit by an upward and downward movement of the lever arm as in controlling the liquid level in a receiving tank or sump.

WIRING AND PARTS — The wiring diagrams given above and the parts listed on the reverse side are for the Class 9036 Type GG two pole float switch. The switch is provided with ⅞" knockouts for ½" conduit connection in wiring. The motor connections are made to the terminal screws marked "load" and the line should be connected to the terminal screws marked "line". All wires should be tightly fastened under the proper screws.

MOUNTING — The switch may be mounted in any position consistent with free lever movement, using the mounting feet provided with each unit.

OPERATION — The position of the bearing pin (9) determines the operation of the switch. When the pin is in position (9) of the diagram on the reverse side, the contacts open when the lever is in the "up" position. When the pin is in position (10), the contacts close when the lever is in the "up" position.

ADJUSTMENT — Switches are factory set, no further adjustment being required.

MOTOR PROTECTION — A float switch of this type does not include motor protection, but may be used as a piloting device to operate a starter which may provide this feature. The Square D Company manufactures a complete line of motor protective switches and motor control, information on which will be furnished on request.

Model 9036-GG1 - S2

(S2 indicates mounting bracket is to Nash specification)

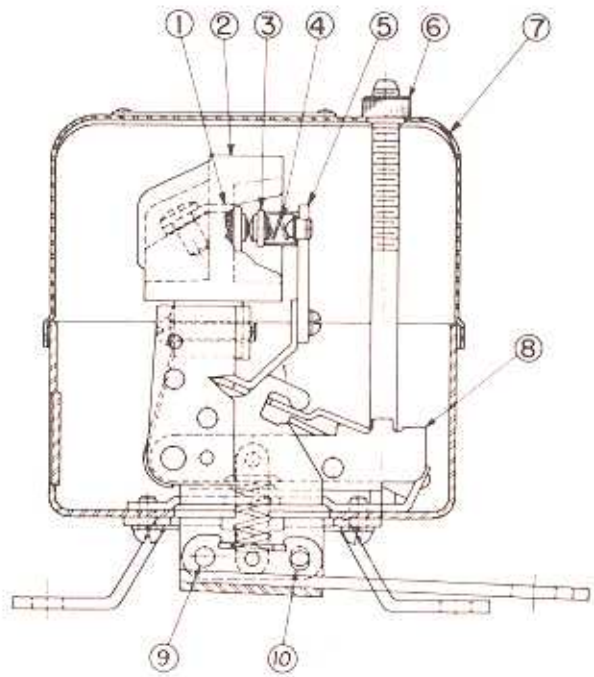
Class 9036 Types GG-1-2-3

FLOAT SWITCH

Replaces 9238 EG1-4

JANUARY, 1961

REPLACEMENT PARTS — In ordering replacement parts for the Class 9036 float switch, always give the serial number of the switch and the full nameplate reading.



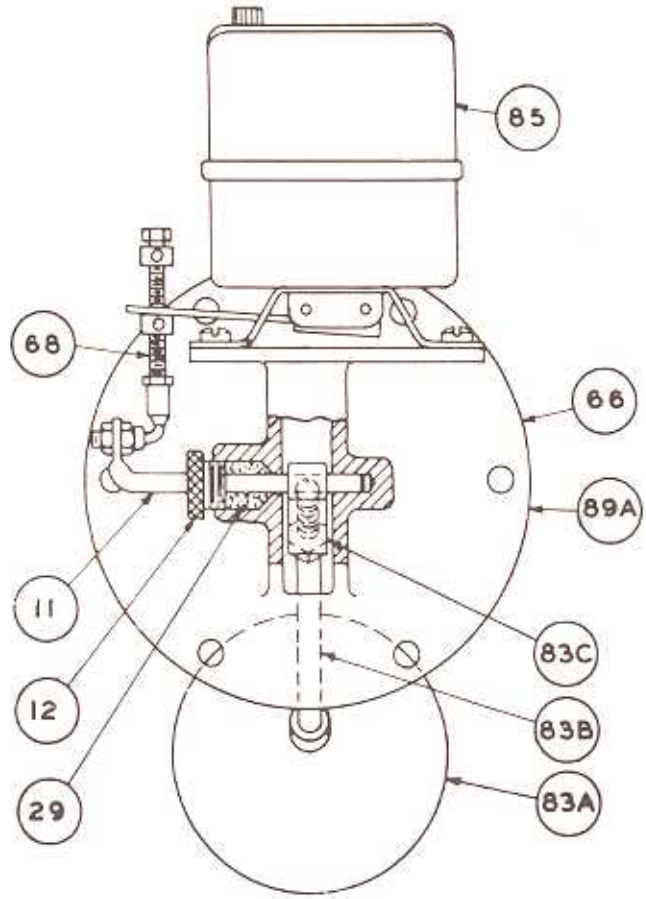
Item Number	Description	Number Req'd.	Part Number
—	Set of Movable and Stationary Contacts	1 Set	Kit No. 9998PC-2
1	Stationary Contact	4	2554-G12
2	Stationary Contact Block (Complete with Stationary Contacts)	1	2554-C7-G2
3	Movable Contact	2	2554-G13
5	Movable Contact Assembly	1	2554-M3-G1
—	Beryllium Copper Toggle Spring	1	2663-D12-X1

Supersedes Inst. Card L-4147 dated November, 1953

SQUARE D COMPANY
ELECTRICAL EQUIPMENT
BINGHAM ROAD
ASHEVILLE, NORTH CAROLINA

INST. CARD L-4147

FLOAT SWITCH ASSEMBLY



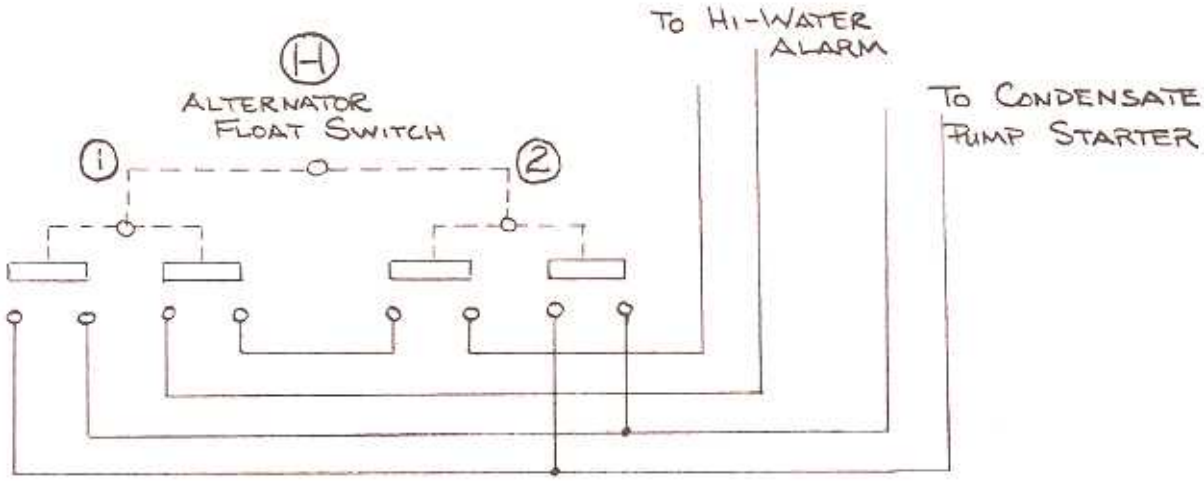
PART NO.	PART NAME
11	Shaft
12	Gland
29	Packing
66	Housing
68	Trip Rod Assembly
85	Float Switch
83A	Ball
83B	Stem
83C	Hub
89A	Gasket — Housing

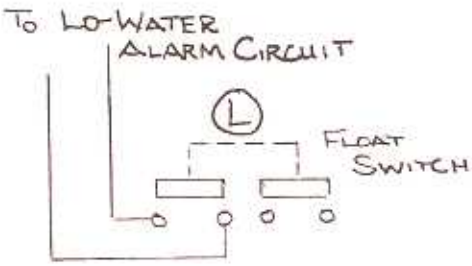
OPERATION OF FLOAT SWITCHES

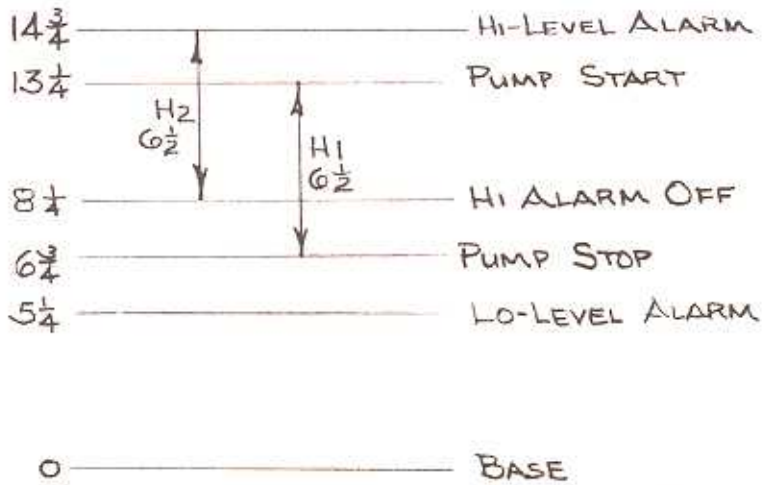
Two float switches are indicated on the schematic: a high level float switch (H) and a low level float switch (L).

If the water level drops to 5¼ inches above the level of the base, the contacts of L will close and an alarm will flash.

H has two sets of contacts, labeled 1 and 2. When the water level reaches 13¼", both contacts of H1 will close thus completing the motor circuit and starting the centrifugal pump motor. The alarm will not flash because the contact at H2 is still open. When the water level rises to 14¾", both contacts of H2 close and the alarm circuit is completed. Note that the contacts at H2 also complete the motor circuit which has already been done by H1. This serves as insurance for the motor start. When the water level falls to 8¼" (6½" below hi-level alarm), H2 will open and the alarm will cease; however, the pump will continue to operate until H1 opens at a level of 6¾".







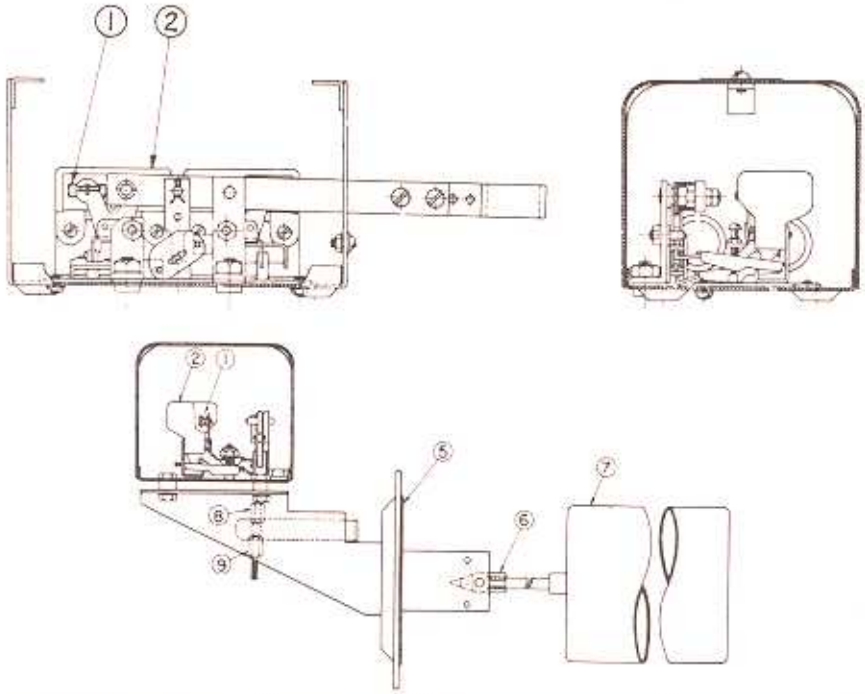
Class 9038 Types AG-1, BG-7-15

MECHANICAL ALTERNATOR

Formerly Class 9049 — Types A, A-1, FA and FA-1

JANUARY, 1961

REPLACEMENT PARTS — When ordering replacement parts, always give complete Nameplate data.



Item Number	Description	Number Req'd	Part Number
—	Switch Mechanism (AG & BG Types)	1	1551-C7-G1
—	Set of Movable and Stationary Contacts (Includes all attaching parts.) For AG Types.	1 set	1530-M15-G8
—	Set of Movable and Stationary Contacts (Includes all attaching parts.) For BG Types.	1 set	1530-M15-G3
1	Movable Contacts with attaching parts	4	2923-D1-G3
2	Stationary Contact Block, complete (AG Types)	2	1530L7G2
	Stationary Contact Block, complete (BG Types)	2	1530-D47-G1
5	Flange Assembly (BG Types)	1	1551B11G1
6	Float Rod Lever (BG Types)	1	Fig. 1 1226G4 Fig. 2 1226G9 Fig. 3 1226G5
7	Float (BG Types)		1551L7X1

Supersedes Inst. Card L-4084 Dated July, 1960

SQUARE D COMPANY
ELECTRICAL EQUIPMENT
BINGHAM ROAD
ASHEVILLE, NORTH CAROLINA

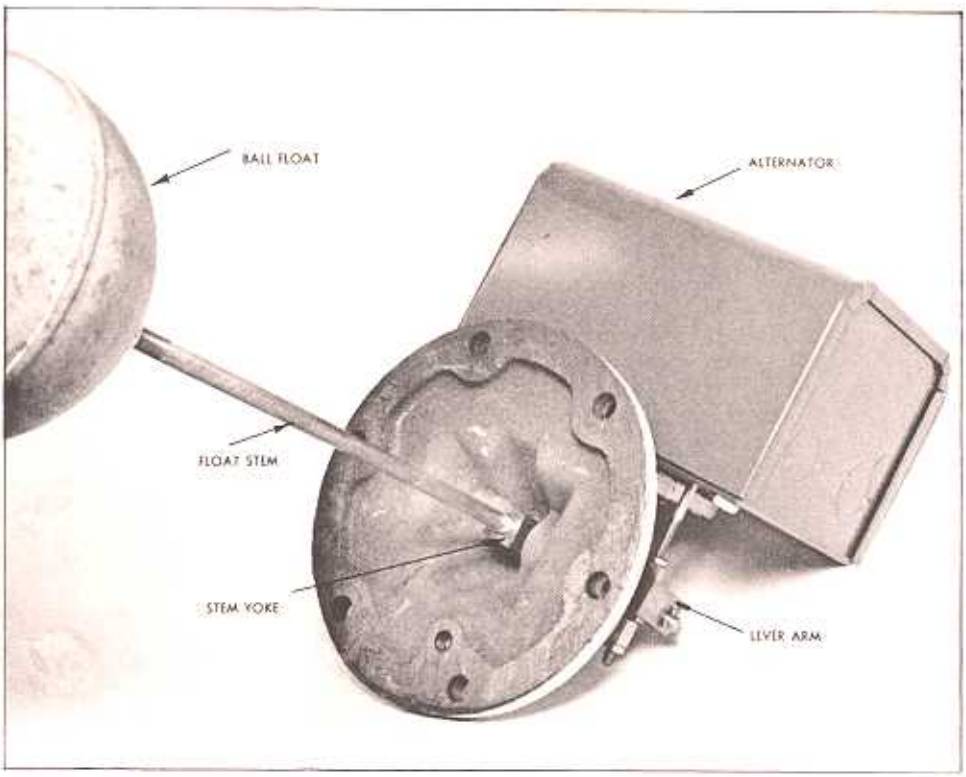
INST. CARD L-4084

INSTRUCTIONS FOR INSPECTION AND ADJUSTMENT

OF "SQUARE D" ALTERNATOR FLOAT SWITCH FOR MODIFIED DUPLEX AND DUPLEX PUMPS

The Alternator Float Switch which actuates the Nash condensate pump may be shipped either assembled on the condensate receiver or packed separately. Normal movement in shipment may cause this switch to go out of adjustment. If your pump is furnished with an Alternator Float Switch, check the Packing List to determine whether this switch is mounted on the receiver, or packed separately. The following instructions cover switch installation and/or adjustment.

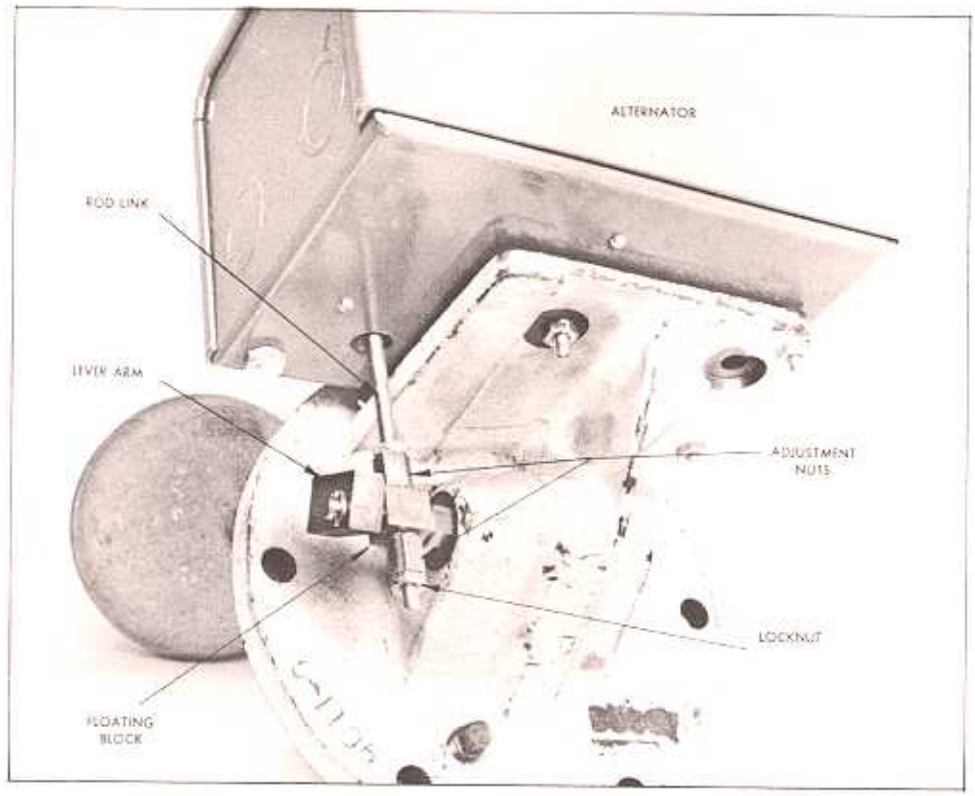
NASH® ENGINEERING COMPANY
SOUTH NORWALK, CONN.



ASSEMBLY

The installation of the alternator to condensate receiver should be preceded by an inspection of critical areas of the alternator to be certain no damage or loosening has occurred in shipment and handling.

Attach float stem to stem yoke and ball float to float stem. Holding lever arm with open end wrench, apply light force on ball float, back and forth, to check effectiveness of set screw in stem yoke. Set screw is inserted in stem yoke onto a flat portion of brass shaft to lock the motion of ball float to that of lever arm. If there is the slightest play in this check test, remove float stem and use Allen wrench to properly lock stem yoke onto flat of brass shaft.

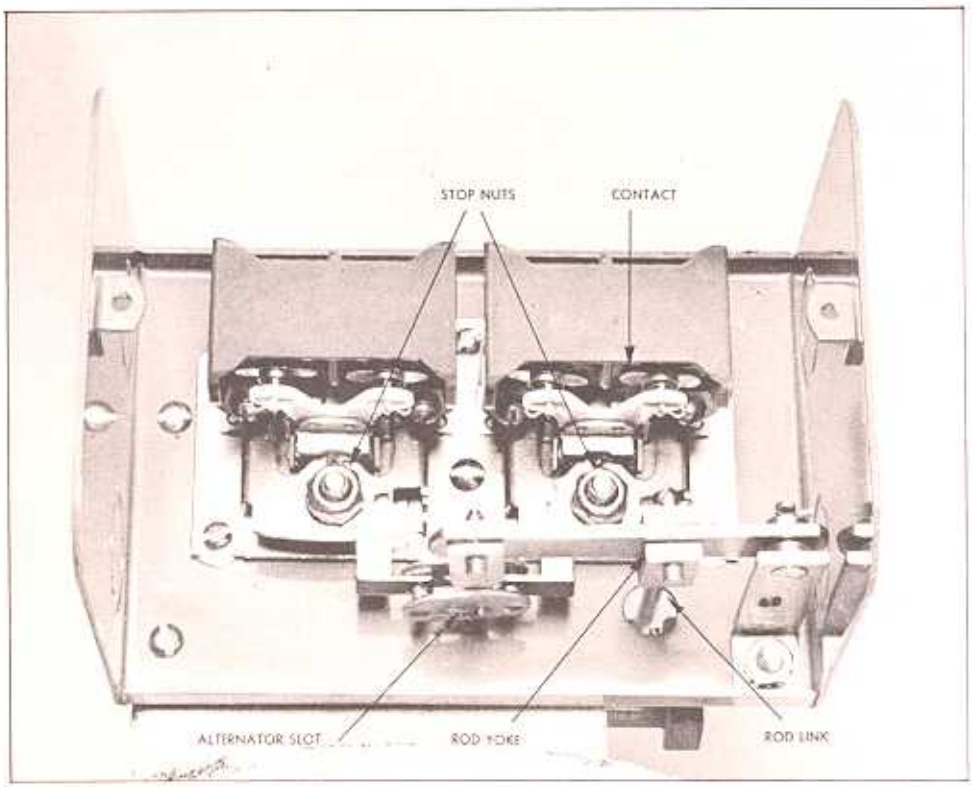


ADJUSTMENT

To make preliminary settings before installation on receiver, consider first the arc of swing that ball float must move to obtain proper operation. With the flange of alternator in an upright position, the float stem should lower to about 10 degrees above horizontal to trip out the switch. Work the float up and down while turning top adjustment nut to obtain the 10 degree trip-out level. Then, bring the bottom adjustment nut up against floating block with a slight clearance between nut and block. This clearance is important to prevent binding. Too much clearance will increase differential. The locknuts can be tightened up against adjustment nuts after final adjustment but should not be allowed to decrease the clearance on floating block.

The next point of inspection is the length of insertion of rod link into the rod yoke. The rod link should be threaded into rod yoke only thru the solid portion and not project up into slot. Any projection could interfere with cross bar action.

Adjustment of stop nuts on switch tables should be checked. The Square D factory sets the stop nuts so that switch mechanism will just trip and then moves them up 1¼ turns. This results usually in about three full threads showing above nut.



INSPECTION & INSTALLATION

Inspect contacts for proper assembly with holding springs in place.

Alternator slot should have thin film of light grease. Over greasing or oiling of this part will prevent proper alternate switching.

Alternator assembly can now be assembled to receiver and operation checked with pump running. Should no condensate return, making automatic operation impossible, an approximate check can be made with open end wrench on lever arm.

For the Nash CS10, CSI10, CS20, and CSI20 receivers, differential must be maintained at or near minimum (as set before installing). For the larger CS40 and CSI40 receivers, differential can be widened by separating adjustment nuts farther from the floating block.

The resulting total operation on all tanks shall be a lower limit of one inch above the level at which pump begins to fluctuate on discharge pressure, and an upper limit of bottom of the inlet pipe.

Instruction Manual and Parts List
Types 98H & 98L

TYPE NUMBER EXPLANATION

Type 98L - A relief valve suitable for service on such fluids as water, steam, air, gas and oil. Four springs provide a relief pressure range of 2 - 38 psi. Body and orifice sizes are 1/4", 3/8", 1/2", 3/4" and 1".

Type 98H - A modification of the 98L providing a relief pressure range of 15 - 200 psi (4 springs).

INSTALLATION

Thoroughly clean and blow out all pipe lines before installing the relief valve. Be certain that flow is in the direction indicated by the arrow cast on the body. Apply suitable pipe compound to the pipeline threads when installing the regulator. Observe the pressure-temperature ranges given in the table below.

ADJUSTMENT

Every unit is set for the relief pressure for which it was ordered. To increase the setting, loosen locknut (Key 17) and turn adjusting screw (Key 15) clockwise (into the spring case). Turning the adjusting screw counterclockwise (out of the spring case) decreases the relief pressure. Be certain to tighten locknut after making this adjustment.

MAINTENANCE

Type 98 is available with either metal or composition seats. By removing the cap screws (Key 16), the spring case (Key 2) and inner valve (Key 4) can be lifted off the body. The orifice (Key 3) seating surface can then be examined. When replacing the inner valve or orifice, be careful not to mar the finish, especially on the metal seating surfaces.

The inner valve is replaced by sliding the old one off the pusher post (Key 6) and sliding a new inner valve onto the post. To replace "O" ring seats (Key 22), remove the screw (Key 24) and "O" ring retainer (Key 21).

Type 98 is also furnished with either a metal or composition diaphragm. If a change is made from a metal diaphragm to a composition diaphragm or vice versa, a new pusher post (Key 6) is required. This is because different length pusher posts are used with each diaphragm material. Each pusher post is marked either "Metal" or "Comp." to indicate with which diaphragm it must be used.

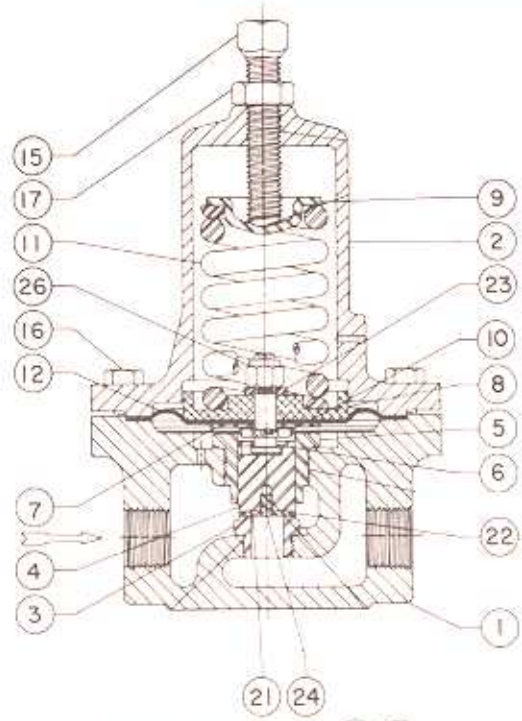
When replacing the metal diaphragms, the "top hat", or raised portion of the diaphragm should be installed towards the spring case. Two metal diaphragms are used - one directly above the other.

SERIAL NUMBER

When ordering replacement parts or corresponding with the factory or representative about these valves, always give the complete serial number on the name plate attached to the spring case.

PRESSURE-TEMPERATURE CHART

TYPE	BODY MATERIAL	DIAPHRAGM & INNER VALVE SEAT MATERIAL	MAXIMUM INLET PRESSURE & TEMPERATURE
98L	Cast Iron	Composition	60 psi, 150° F.
98L	Cast Iron	Stainless Steel	60 psi, 450° F.
98L	Cast Steel	Composition	125 psi, 150° F.
98L	Cast Steel	Stainless Steel	125 psi, 450° F.
98H	Cast Iron or Steel	Composition	300 psi, 150° F.
98H	Cast Iron	Stainless Steel	250 psi, 410° F.
98H	Cast Steel	Stainless Steel	300 psi, 450° F.

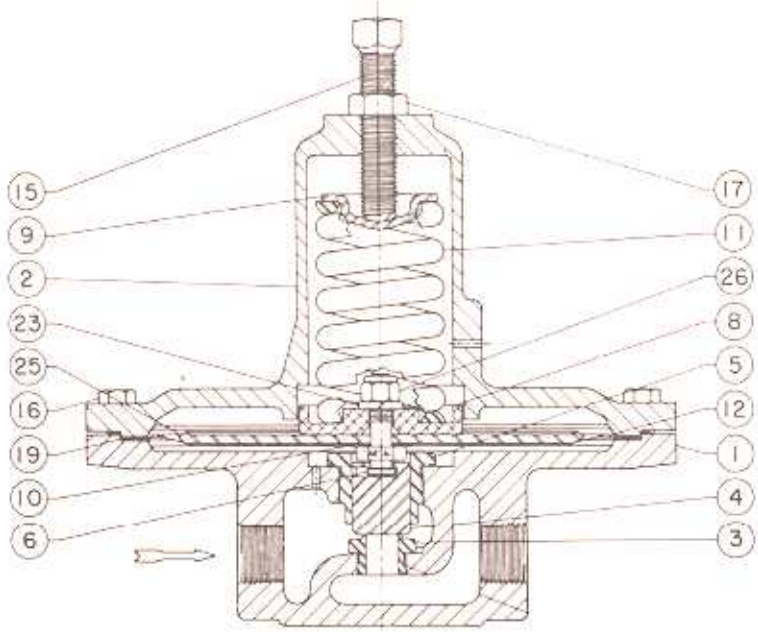


PARTS NOT SHOWN (13) (18)

NAMEPLATE, PART NO.13 TO BE ON RIGHT SIDE LOOKING INTO INLET

Dwg. CL3386

Type 98H



PARTS NOT SHOWN (13) (18)

NAMEPLATE PART NO.13 TO BE ON RIGHT SIDE LOOKING INTO INLET

Dwg. CL3384

Type 98L

Parts Reference

KEY NO.	PART NUMBER	PART NAME	MATERIAL
1	1L3464 1901	1/4 in. Body, 98H	Cast Iron
	1L3465 1901	1/4 in. Body, 98L	Cast Iron
	1L3721 2201	1/4 in. Body, 98H	Cast Steel
	1L3723 2201	1/4 in. Body, 98L	Cast Steel
	2L3394 1901	3/8 in. Body, 98H	Cast Iron
	2L3391 1901	3/8 in. Body, 98L	Cast Iron
	2L3686 2201	3/8 in. Body, 98H	Cast Steel
	2L3690 2201	3/8 in. Body, 98L	Cast Steel
	2L3395 1901	1/2 in. Body, 98H	Cast Iron
	2L3392 1901	1/2 in. Body, 98L	Cast Iron
	2L3687 2201	1/2 in. Body, 98H	Cast Steel
	2L3689 2201	1/2 in. Body, 98L	Cast Steel
	2L3425 1901	3/4 in. Body, 98H	Cast Iron
	2L3419 1901	3/4 in. Body, 98L	Cast Iron
	2L3734 2201	3/4 in. Body, 98H	Cast Steel
	2L3182 2201	3/4 in. Body, 98L	Cast Steel
	2L3426 1901	1 in. Body, 98H	Cast Iron
	2L3420 1901	1 in. Body, 98L	Cast Iron
	2L3735 2201	1 in. Body, 98H	Cast Steel
	2L3183 2201	1 in. Body, 98L	Cast Steel
2	2E3912 1901	1/4 in. Bonnet, 98H	Cast Iron
	2J1275 2201	1/4 in. Bonnet, 98H	Cast Steel
	2E3913 1901	1/4 in. Bonnet, 98L	Cast Iron
	2J1279 2201	1/4 in. Bonnet, 98L	Cast Steel
	2J4962 1901	3/8 in. & 1/2 in. Bonnet, 98H	Cast Iron
	2L4163 2201	3/8, 1/2 in. Bonnet, 98H	Cast Steel
	3J4963 1901	3/8, 1/2 in. Bonnet, 98L	Cast Iron
	3L4161 2201	3/8, 1/2 in. Bonnet, 98L	Cast Steel
	3E3978 1901	3/4 & 1 in. Bonnet, 98H	Cast Iron
	3E4087 2201	3/4 & 1 in. Bonnet, 98H	Cast Steel
	4E3979 1901	3/4 & 1 in. Bonnet, 98L	Cast Iron
	4E5929 2201	3/4 & 1 in. Bonnet, 98L	Cast Steel
3*	1E3916 4617	Orifice, 1/4 in., 98H&L, for Metal Seat	416 SS
	1L3459 3513	Orifice, 1/4 in., 98H&L, for O Ring Seat	416 SS
	1E3950 4617	Orifice, 3/8 & 1/2 in., 98H&L for Metal Seat	416 SS
	1L3417 3513	Orifice, 3/8 & 1/2 in., 98H&L for O-Ring Seat	416 SS
	1E3980 4617	Orifice, 3/4 & 1 in., 98H&L, for Metal Seat	416 SS
	1L3431 3513	Orifice, 3/4 & 1 in., 98H&L, for O-Ring Seat	416 SS
4*	1L3452 4617	Inner Valve, 1/4 in., 98H&L, for Metal Seat	416 SS
	1L3451 3513	Inner Valve, 1/4 in., 98H&L, for O-Ring Seat	416 SS
	1L3441 4617	Inner Valve, 3/8 & 1/2 in., 98H&L, for Metal Seat	416 SS
	1L3443 3513	Inner Valve, 3/8 & 1/2 in., 98H&L, for O-Ring Seat	416 SS
	1L3437 4617	Inner Valve, 3/4 & 1 in., 98H&L, for Metal Seat	416 SS
	1L3436 3513	Inner Valve, 3/4 & 1 in., 98H&L, for O-Ring Seat	416 SS
5	1L3458 3513	Valve Guide, 1/4 in., 98H&L	416 SS
	1L3416 3513	Valve Guide, 3/8 & 1/2 in., 98H&L	416 SS
	1L3429 3513	Valve Guide, 3/4 & 1 in., 98H&L	416 SS
6	1L3457 3513	Pusher Post, 1/4 in., 98H&L for Metal Diaphragm	416 SS
	1L3456 3513	Pusher Post, 1/4 in., 98H&L for Comp. Diaphragm	416 SS
	1L3445 3513	Pusher Post, 3/8 & 1/2 in., 98H&L for Metal Diaphragm	416 SS
	1L3442 3513	Pusher Post, 3/8 & 1/2 in., 98H&L for Comp. Diaphragm	416 SS
	1L3449 3513	Pusher Post, 3/4 & 1 in., 98H&L for Metal Diaphragm	416 SS
	1L3438 3513	Pusher Post, 3/4 & 1 in., 98H&L for Comp. Diaphragm	416 SS
7	1L3447 3601	Washer, 1/4 in., 98H&L, use with Comp. Diaphragm	302 SS
	1L3398 3601	Washer, 3/8 & 1/2 in., 98H&L use with Comp. Diaphragm	302 SS
	1L3428 3601	Washer, 3/8 & 1 in., 98H&L use with Comp. Diaphragm	302 SS

KEY NO.	PART NUMBER	PART NAME	MATERIAL
8	1L3446 0901	Lower Spg. Seat, 1/4 in., 98H&L	Aluminum
	1L3397 0801	Lower Spg. Seat, 3/8 & 1/2 in., 98H&L	Aluminum
	1L3427 0801	Lower Spg. Seat, 3/8 & 1 in. 98H&L	Aluminum
9	1B7985 2501	Upper Spg. Seat, 1/4 in., 98H&L	Steel
	1D6671 2507	Upper Spg. Seat, 3/8 & 1/2 in., 98H&L	Steel
	1E3987 2507	Upper Spg. Seat, 3/4 & 1 in. 98H&L	Steel
10*	1L3448 0402	Gasket, 1/4 in. 98H&L	Asbestos
	1L3411 0402	Gasket, 3/8 & 1/2 in. 98H&L	Asbestos
	1L3434 0402	Gasket, 3/4 & 1 in. 98H&L	Asbestos
11		Springs - See Table	Steel
12*	1L3450 3601	Diaphragm, 1/4 in. 98H, 2 Req.	302 SS
	1L3449 0211	Diaphragm, 1/4 in. 98H	Neoprene
	1L3454 3601	Diaphragm, 1/4 in. 98L, 2 Req.	302 SS
	1L3453 0211	Diaphragm, 1/4 in. 98L	Neoprene
	1L3399 3601	Diaphragm, 3/8 & 1/2, 98H, 2 Req.	302 SS
	1L3412 0211	Diaphragm, 3/8 & 1/2, 98H	Neoprene
	1L3414 3601	Diaphragm, 3/8 & 1/2, 98L, 2 Req.	302 SS
	1L3413 0211	Diaphragm, 3/8 & 1/2, 98L	Neoprene
	1L3432 3601	Diaphragm, 3/4 & 1, 98H, 2 Req.	302 SS
	1L3433 0211	Diaphragm, 3/4 & 1, 98H	Neoprene
	1L3422 3601	Diaphragm, 3/4 & 1, 98L, 2 Req.	302 SS
	1L3423 0211	Diaphragm, 3/4 & 1, 98L	Neoprene
13	1L3387 1103	Nameplate, All Sizes	Aluminum
15	1E6399 2899	Adj. Screw, 1/4 in. 98H&L	Steel
	1F2236 000A	Handwheel Adj. 1/4 in. 98H&L	Steel
	1D9954 2899	Adj. Screw, 3/8 & 1/2 in. 98H&L	Steel
	1J4965 000A	Handwheel Adj. 3/8 & 1/2 in. 98H&L	Steel
	1A3308 2899	Adj. Screw, 3/4 & 1 in. 98H&L	Steel
	1F2238 9902	Handwheel Adj. 3/4 & 1 in. 98H&L	Steel
16	1A3917 2405	Cap Screw, 1/4 in. 98H, 6 Req.	Steel
	1A4078 2405	Cap Screw, 1/4 in. 98L, 10 Req.	Steel
	1A3526 2405	Cap Screw, 3/8 & 1/2 in. 98H, 6 Req.	Steel
	1A3816 2405	Cap Screw, 3/8 & 1/2 in. 98L, 10 Req.	Steel
	1A3369 2405	Cap Screw, 3/4 & 1 in. 98H&L, 8 Req.	Steel
17	1A3522 2412	Jam Nut, 1/4 in. 98H&L	Steel
	1A3537 2412	Jam Nut, 3/8 & 1/2 in. 98H&L	Steel
	1A3192 2412	Jam Nut, 3/4 & 1 in. 98H&L	Steel
18	1A3682 2899	Drive Screw, All Sizes, 2 Req.	Steel
19*	1E3931 0402	Dia. Gasket, 1/4 in. 98H, Use with Metal Diaphragm	Asbestos
	1E3940 0402	Dia. Gasket, 1/4 in. 98L, Use with Metal Diaphragm	Asbestos
	1E3961 0402	Dia. Gasket, 3/8 & 1/2 in. 98H, Use with Metal Diaphragm	Asbestos
	1E3970 0402	Dia. Gasket, 3/8 & 1/2 in. 98L, Use with Metal Diaphragm	Asbestos
	1E3993 0402	Dia. Gasket, 3/4 & 1 in. 98H, Use with Metal Diaphragm	Asbestos
	1E3904 0402	Dia. Gasket, 3/4 & 1 in. 98L, Use with Metal Diaphragm	Asbestos
21	1L3460 3513	O-Ring Retainer, 1/4 in. 98H&L, Use with O-Ring Seat	416 SS
	1L3415 3513	O-Ring Retainer, 3/8 & 1/2 in. 98H&L, Use with O-Ring Seat	416 SS
	1L3430 3513	O-Ring Retainer, 3/4 & 1 in. 98H&L, Use with O-Ring Seat	416 SS
22*	1C8538 0699	O-Ring, 1/4 in. 98H&L	Synthetic Rubber
	1D2888 0699	O-Ring, 3/8 & 1/2 in. 98H&L	Synthetic Rubber
	1C7821 0699	O-Ring, 3/4 & 1 in. 98H&L	Synthetic Rubber
23	1C2256 2899	Lockwasher, 1/4, 3/8, 1/2 98H&L	Steel
	1H6243 2899	Lockwasher, 3/4 & 1 in. 98H&L	Steel
24	1L3462 3899	Screw, 1/4 in. 98H&L	SS
	1L3444 3899	Screw, 3/8 & 1/2 in. 98H&L	SS
	1L3435 3899	Screw, 3/4 & 1 in. 98H&L	SS
25	1L3455 2507	Diaphragm Head, 1/4 in. 98L	Steel
	1L3396 2507	Diaphragm Head, 3/8 & 1/2 in. 98L	Steel
	1L3421 2507	Diaphragm Head, 3/4 & 1 in. 98L	Steel
26	1L8723 2412	Locknut, 1/4, 1/2, 3/8 in. 98H&L	Steel
	1L8722 2412	Locknut, 3/4 & 1 in. 98H&L	Steel

* Indicates Recommended Spare Parts for Stock.

Parts Reference

Key No. 11 SPRING TABLE, 98H & 98L

REGULATOR SIZE	PART NUMBER	SPRING COLOR CODE	RANGE, PSI	
			98H	98L
1/4 Inch	1E3925 2702	Yellow	15-35	2-7
	1E3926 2701	Green	27-75	6-14
	1E3927 2714	Red	70-140	12-25
	1L3461 2714	Blue	130-200	20-38
3/8 & 1/2 Inch	1E3956 2702	Yellow	15-35	2-7
	1D7455 2714	Green	27-75	6-14
	1E3957 2709	Red	70-140	12-25
	1L3800 2714	Blue	130-200	20-38
3/4 & 1 Inch	1E3989 2702	Yellow	15-35	2-7
	1E3990 2714	Green	25-75	6-14
	1E3991 2716	Red	70-140	12-25
	1L3801 2723	Blue	130-200	20-38