HEATING SYSTEM

Cars are equipped with Vapor Company Zone heat system. The Zone heat system used on sleeping cars prior to 1946 has been covered in the A.C. Manual. In the later Zone heat systems, certain devices have been eliminated and others improved or modified for simplification of operation and maintenance. Figure 83 shows the layout.

VAPOR HEATING

REGULATOR: The new No. 955 Vapor regulator, Figure 84, is the heart of the heating system. It performs the functions of three devices used in former Vapor zone systems, namely the No. 901 regulator, No. 244 constant pressure valve, and No. 1651 flow limit valve. Its function is to reduce and regulate steam supply to maintain a constant supply of steam in the loop.

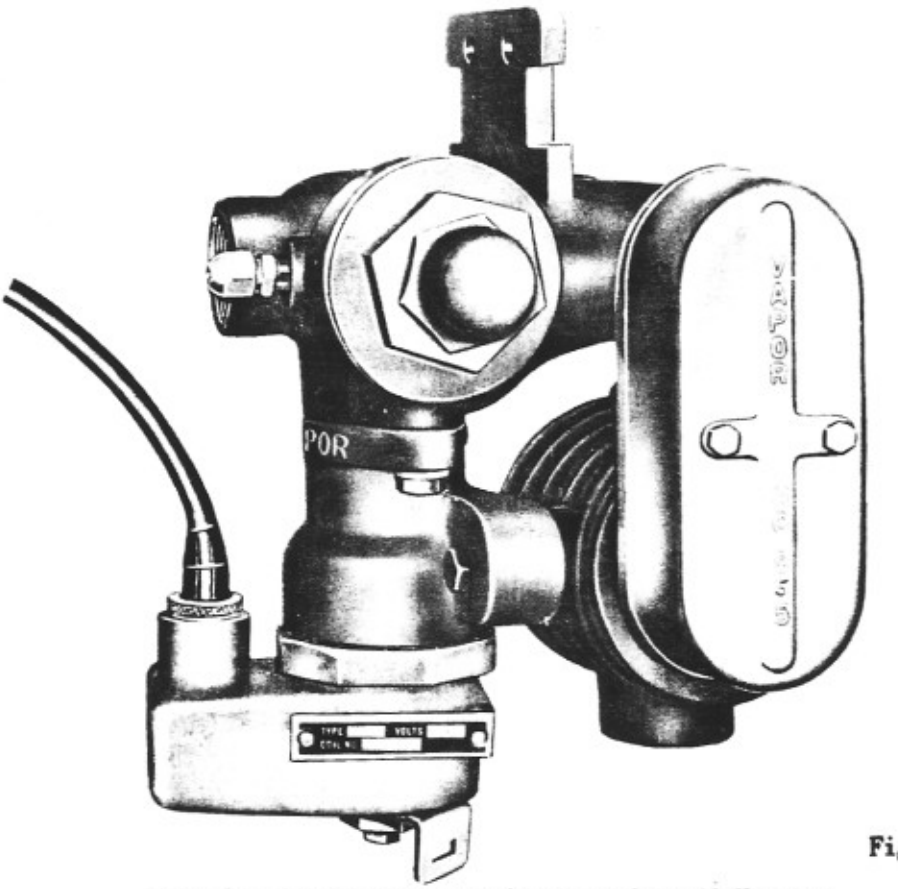


Figure 84

Vapor No. 955 Regulator with new style Coil Housing

Steam at trainline pressure enters the inlet side of the regulator where it passes through a strainer to No. 242-CC needle valve assembly. This needle valve is spring loaded and set to reduce steam pressure to 40 lbs. Adjustment of this setting can be made with screw under large acorn nut on the left-hand front of regulator, See Figures 85 and 86.

The steam at reduced pressure flows through cored port in the top of casting of regulator side. The regulator has a No. 900-Q needle valve assembly at top and No. 900-E economy diaphragm at the bottom. Action of the economy diaphragm is transmitted through an operating rod assembly to a fulcrum arm acting against the needle valve, See Figure 87. Regulated steam passes through needle valve to outlet side of regulator. Some of the regulated steam passes through another port to the flow limit valve. When the pressure in supply loop and flow limit valve chamber reaches 12 lbs., the spring pressure on flow limit valve will be overcome and valve will pop open, allowing steam to pass into diaphragm chamber. This will cause bellows diaphragm to expand and close the regulator needle valve. This cycle will repeat itself with flow limit valve opening and closing repeatedly to maintain 12 lbs. pressure in the loop. See Figure 88.

N.H.

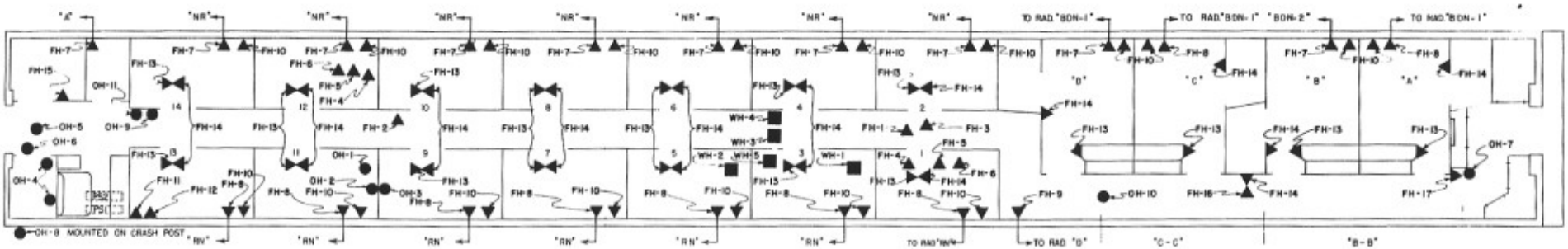


FIGURE 83

CODE

▲ F.H. - Floor Heat

● O.H. - Overhead Heat (Air Conditioning)

■ W.H. - Water Heating

HEATING LAY-OUT FOR

N.Y., N.H., & H.

14 Roomette - 4 Double Bedroom

STEAM HEAT SPECIALTIES (FLOOR HEAT)

Code No.	No. Used Per Car	Part No.	
FH-1	1	428	Strainer Tee
FH-2	1	429	Strainer Cross
FH-3	1	S-155	Steam Trap Train Line
FH-4	2	S-124	Valve-Shut Off & Drain
FH-5	2	953	Vapor Safe Control Regulator (1) 441-4 Union - 64 V.D.C.
	2	955 TT	Drain Tube 10" Lg. with (1) 441-4 Union
	22	955 RR2	Connector Receptacle
FH-6	2	970	Water Seal Fitting with (1) 441-7 Half Union
FH-7	10	L-1675	Valve-Solenoid - 64 V.D.C.
FH-8	9	R-1675	Valve-Solenoid - 64 V.D.C.
FH-9	1	L-1677	Valve-Solenoid
	20	881-N	Nipple-Inner Feed
	2	16597	Name Plate-For Solenoid Valve
FH-10	18	S-1643	Remote Control-Flexible Dim "A"=54" +(4) 1643-D5
	18	1643-EE	Remote Control Support
FH-11	1	918	Retarder
	4	885-1	Cap-Unit Fin
	16	886	Cap-Unit Fin
FH-12	1	125	1" Angle Valve

THERMO. SPECIALTIES (FLOOR HEAT)

Code No.	No. Used Per Car	Part No.	
FH-13	18	PN-64-2547	Switch Potentiometer - 64 V.D.C.
FH-14	19	56CWA-2501-80°	Thermostat - 64 V.D.C.
FH-15	1	64CW-2522-1-71°	Thermostat Toilet - 64 V.D.C.
FH-16	1	RN-2522-1-60°	Thermostat Layover - 64 V.D.C.
FH-17	1	AN-64-2547	Switch Potentiometer - 64 V.D.C.

STEAM HEAT SPECIALTIES (AIR COND.)

Code No.	No. Used Per Car	Part No.	
OH-1	1	S-124-OH	Valve-Shut Off & Drain-with OH Wheel (21465)
OH-2	1	958	Vapor Safe Control Regulator (1) 441-4 Union - 64 V.D.C.
	1	955-TT	Drain Tube 10" Lg. with (1) 441-4 Union
OH-3	1	970	Water Seal Fitting with (1) 441-7 Half Union
	2	955-RR 2	Connector Receptacle
OH-4	2	920	Retarder
OH-5	1	R-1668	Valve Solenoid - 64 V.D.C.
OH-6	1	OS1643	Remote Control-Flexible Dim "A"=6' 6"+ (6) 1643-D5

THERMO. SPECIALTIES (AIR COND.)

Code No.	No. Used Per Car	Part No.	
OH-7	1	WR-2501-300°	Thermostat Watt. Reg. - 64 V.D.C.
OH-8	1	C9620-50°	Thermostat Outside Sel. - 64 V.D.C.
OH-9	1	WN-2501-74°	Thermostat Htg. Inter. - 64 V.D.C.
OH-10	1	DN-2501-76°	Thermostat -OH Heat - 64 V.D.C.
OH-11	1	WN2-2501-76°-78°	Thermostat-Cooling
	1	No. 9505	Weather-Proof. Box - 64 V.D.C.
	1	AZ-43831-MDA	Control Panel Frig.Elec.Mech. 64 V.D.C.

WASH WATER HEATING

Code No.	No. Used Per Car	Part No.	
WH-1	1	S-124-HW	Valve-Shut Off & Drain-with HW Wheel (21465)
WH-2	1	960	Vapor Regulator with (2) 441-4 Union
WH-3	1	525-B	Valve-Water Mixing with Bellows
WH-4	1	588-6	Heater-Wash Water
	1	957-TA-3	Drain Tee with (1) 441-4 Union

WATER TANK AND FILLING VALVE PROTECTION

Code No.	No. Used Per Car	Part No.	
WH-5	1	948	Valve-Water Tank Loop Cut Out

RADIATION

	No. Used Per Car	Length	Type	Symbol
	1	10'-0"	Unit	"B-B"
	14	4'-7"	Unit	"NR"
	3	4'-2 1/2"	Unit	"BDN-1"
	1	3'-10"	Unit	"BDN-2"
	1	2'-8"	Unit	"A"
	1	10'-0"	Unit	"C-C"
	1	3'-3"	Unit	"D"
	1	1'-11 1/2"	Vulcan	"PS-1"
	1	1'-4 3/4"	Vulcan	"PS-2"

TRAIN LINE SPECIALTIES

	No. Used Per Car	Part No.	
	2	312	Coupler
	2	F-1117	End Valve
	2	FT3	Flexible Metalic Conduit with Insulation-Barco
	1	464FF	Platform Attachments

CLAMPS & STANDS

	No. Used Per Car	Part No.	
	8	S-899-10	Support Stand
	8	894	Clamp-Complete with 1 Bolt

No. 955 VAPOR REGULATOR ASSEMBLY

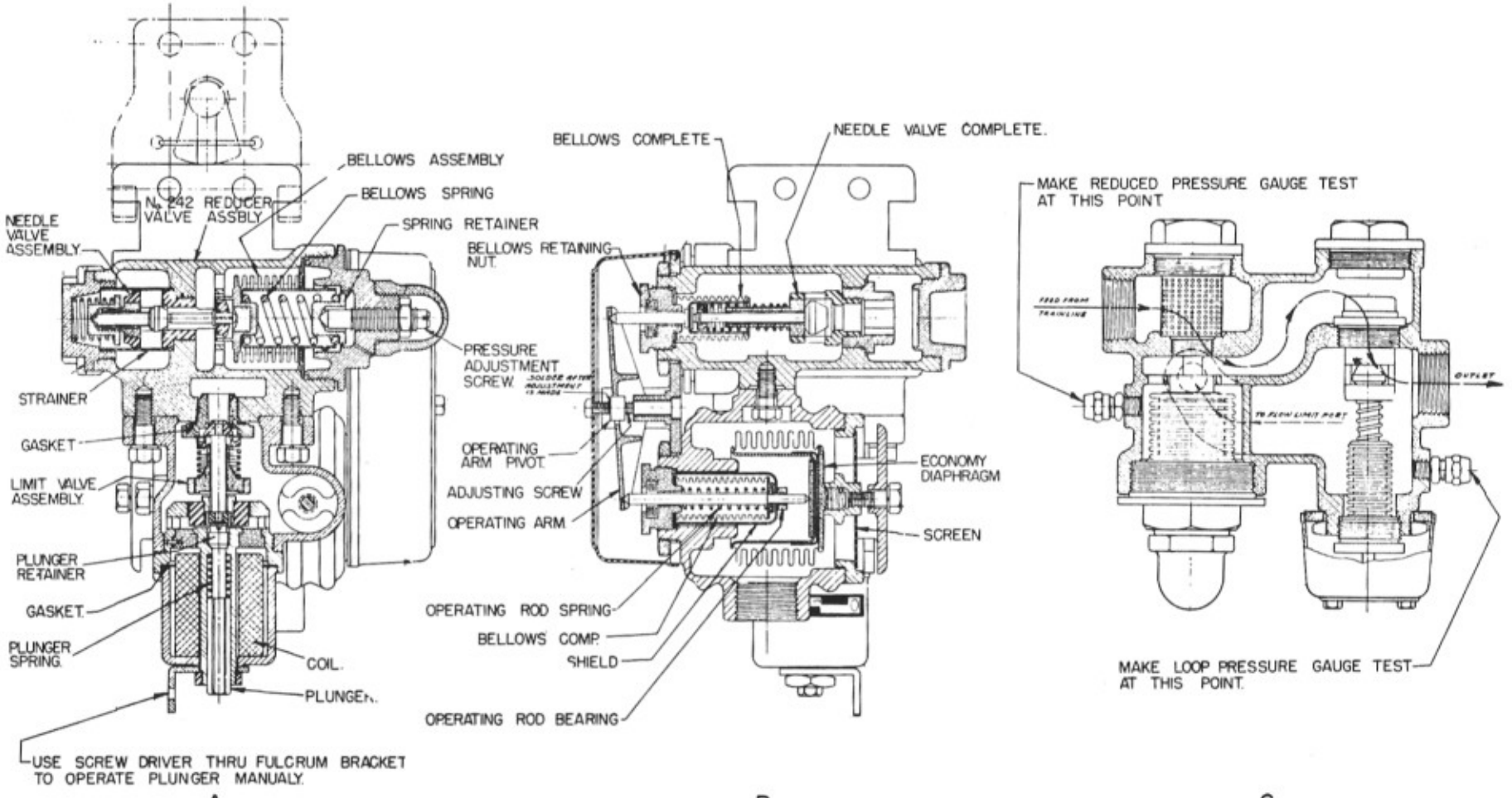
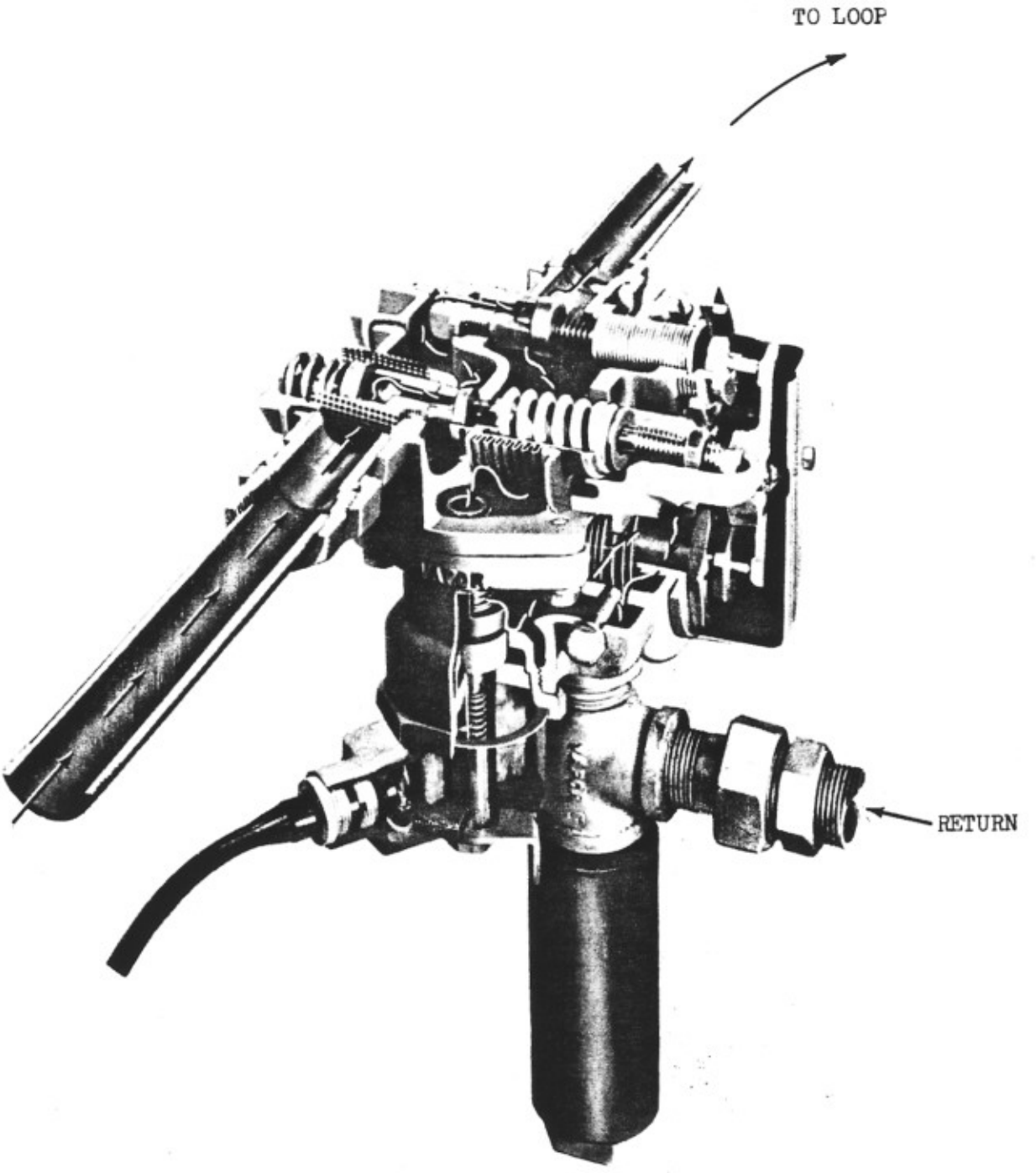
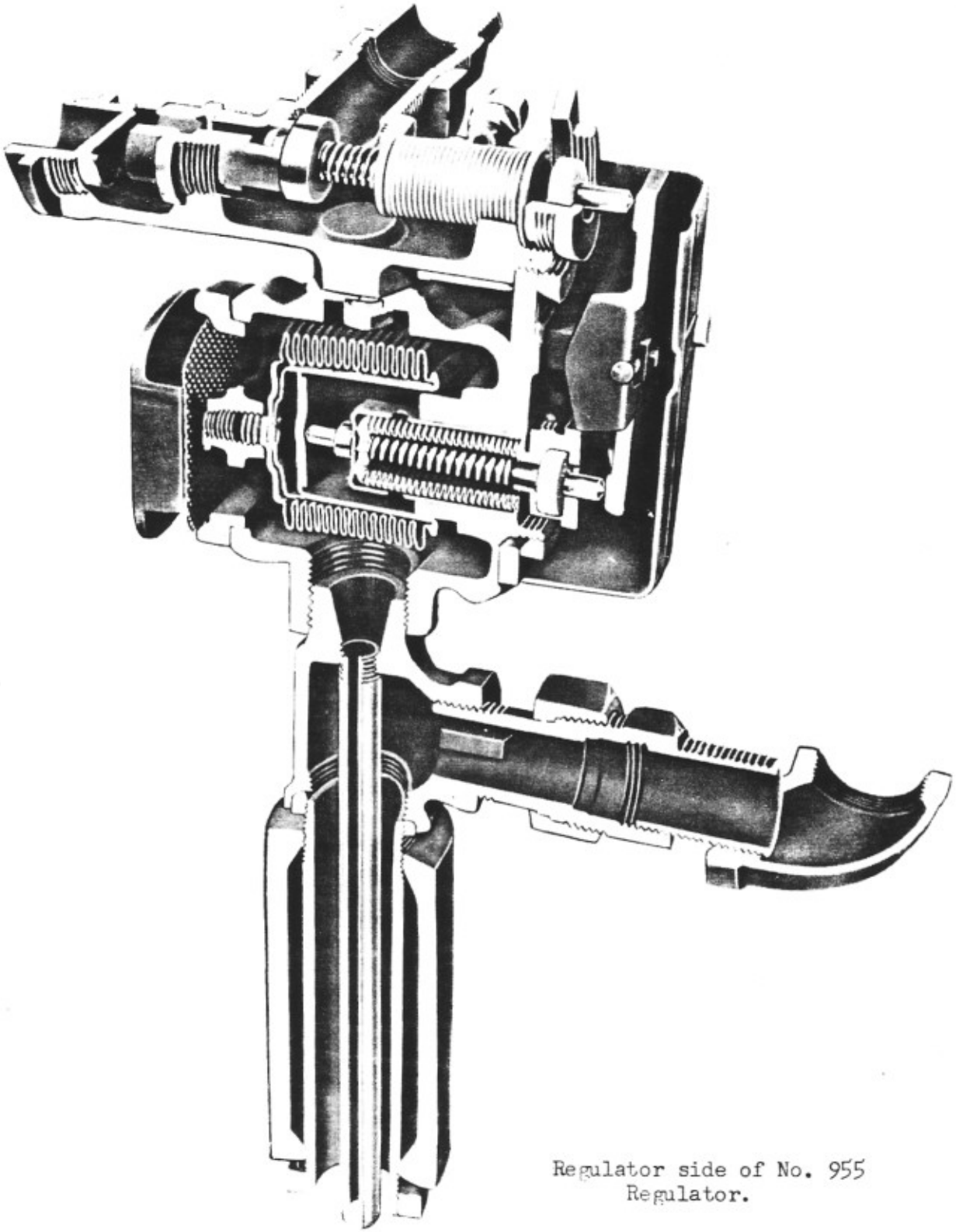


Figure 85



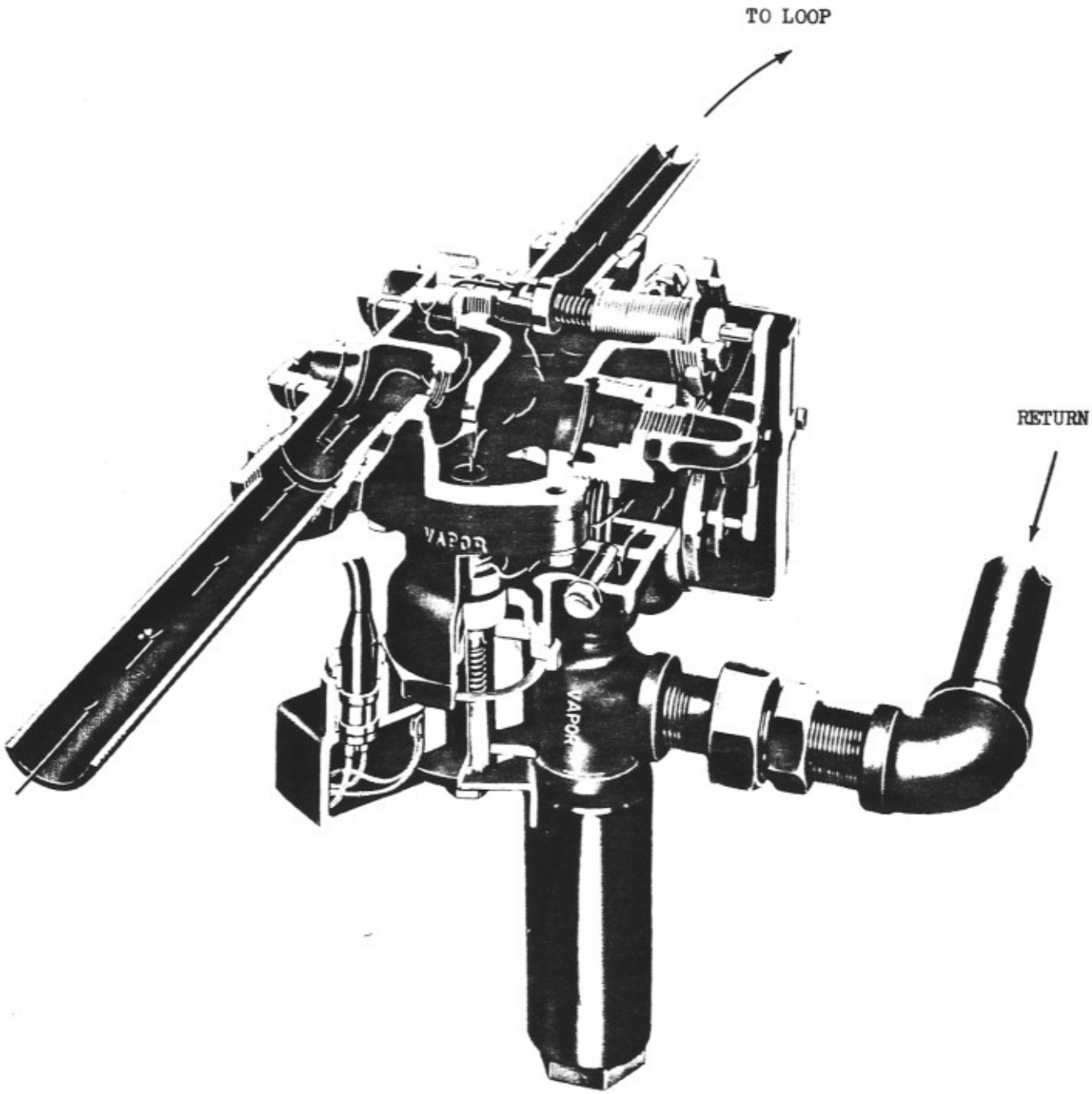
Vapor No. 955 Regulator with Old Style coil housing and showing steam circuit.

Figure 86



Regulator side of No. 955 Regulator.

Figure 87



Vapor No. 955 Regulator with New Style coil housing and showing steam circuit.

Figure 88

The flow limit valve has a 64 volt D.C. operated solenoid which is controlled by the layover heat relay on main control panel. The valve is normally de-energized in heating season except when under layover control. When the cooling system is turned "ON" the valve is energized to prohibit steam loop pressure.

The No. 953 Regulator is identical to the No. 955 Regulator except for the use of a 3 lb. flow limit spring, and is used in floor heat circuits. The No. 958 Regulator is identical to the No. 955 Regulator except for the use of an 8 lb. flow limit spring and is used in the Overhead heat circuit.

The No. 956 Regulator is the same as the No. 955 Regulator except that it is not equipped with a solenoid coil. The No. 959 Regulator is the same as the No. 958 Regulator except that it is not equipped with a solenoid coil. The No. 957 type Regulator is an adaptation of the No. 955 type, being equipped with a 957-TT single type drain tube to permit control of the bellows by return steam and is not provided with a solenoid coil. See Figure 89 and parts list.

SOLENOID ADMISSION VALVES There are several types of solenoid admission valves being furnished for the latest Zone heat systems. Valves No. 1671, 72, 73, 74, 75, 76, and 77 are for floor heat; No. 1668 is for overhead heat. Figure 90 shows typical floor heat admission valve, Figure 91 shows the 1668 admission valve. These valves are all of the same general construction and have minor variations to suit installation conditions. They all have three settings: manually "OFF", manually "ON", and "AUTOMATIC", by use of lever at front of valve. When set on "AUTOMATIC" the valves are under thermostatic control. All floor heat valve bodies have a vacuum breaker screw fitting in rear of return chamber. The screw is to be removed only when the valve is used to feed radiation over 40 ft. in length.

All valves are furnished in either right or left hand styles, to suit the installation. Right hand valves have the outlet on the right side of lever arm, while left-hand valves have the outlet on the left side of lever arm. All floor heat valves are normally open under spring-tension and close only when the solenoid coil is energized. For variations and details of the valves, see Figures 92, 93, 94, 95 and 96.

Two needle valve assemblies are used in floor heat valves, No. 1671-CC and 1675-CC. All needle valve assemblies are marked with the part number on the rim of the actuator, and are identifiable at a glance because of the difference in the size of valve needles. That portion of the valve needle that protrudes through the bottom of needle valve body is 35/64" on the No. 1671-CC and 26/64" on the No. 1675-CC.

The No. 1671 Solenoid Admission Valve is an electrically operated valve for use with Unit Fin floor radiation. A 3/32" orifice seat is installed in the return chamber of this valve and acts to retain steam in the radiation. This eliminates the use of bellows retarder in return piping to loop under car. The cap over return chamber has 3/16" hole to identify valve as being fitted with orifice seat. This valve is used where Unit Fin radiation is under 40 ft. in length. This valve uses the No. 1675-CC needle valve assembly.

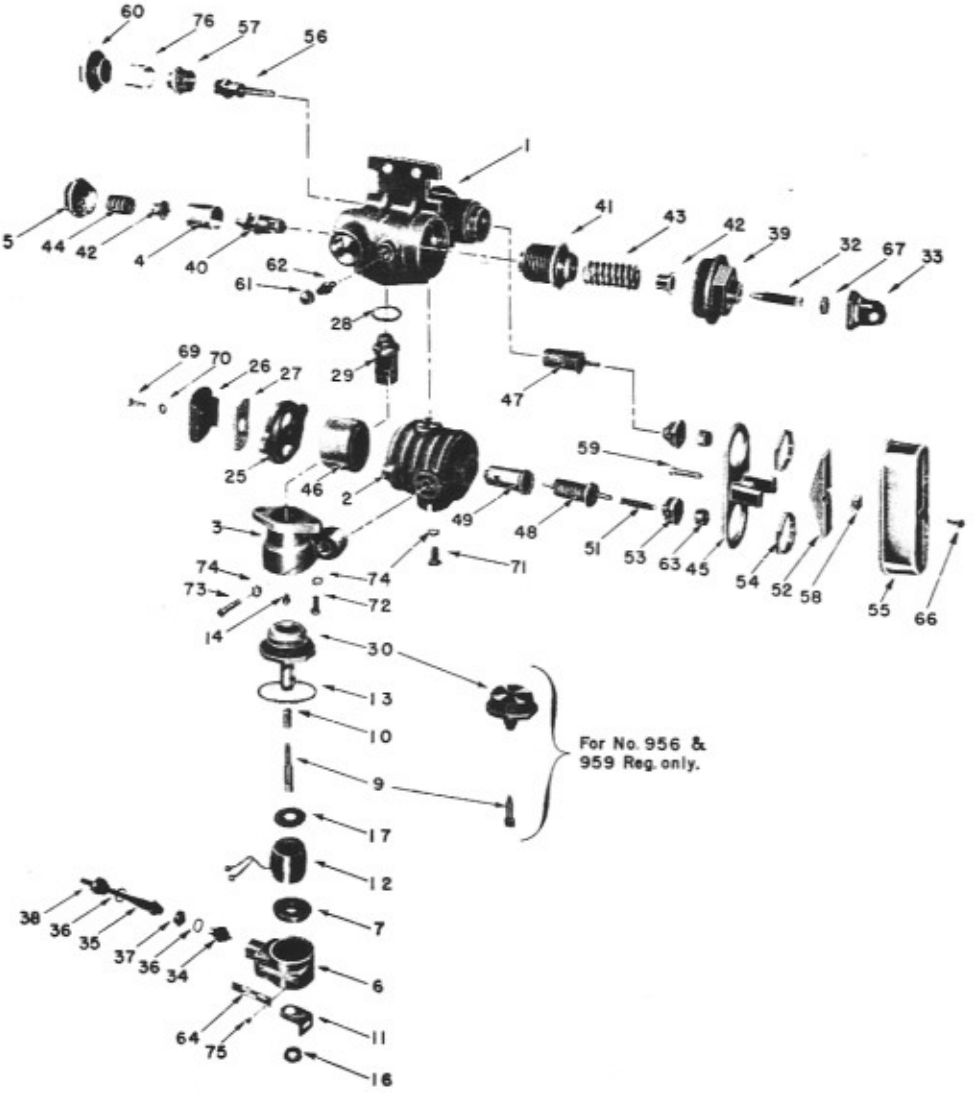
The No. 1672 Solenoid Admission Valve is an electrically operated valve for use with Unit Fin floor radiation. This valve has two outlets and feeds two pieces of radiation at the same time. No. 1671-EE Bellows assemblies are installed in the two return chambers of this valve to retain steam in the radiation. This eliminates the use of bellows retarder in the return piping to loop under car. The cap over the return chamber is undrilled and a No. 1671-CC needle valve assembly is used. All parts are interchangeable with the 1671 valve except the valve body.

The 1673 Solenoid Admission Valve is an electrically operated valve for use with Vulcan Fin floor radiation. This valve does not have either an orifice seat or bellows retarder. Therefore, a retarder must be installed in the return piping to the loop under car. The cap over the return chamber has a 1/2" hole to indicate valve is not equipped with retarder or orifice seat. A No. 1671-CC needle valve assembly is used and all parts are interchangeable with the No. 1671 valve except the cap over return chamber.

The No. 1674 Solenoid Admission Valve is an electrically operated valve for use with Unit Fin floor radiation. This valve has two outlets and feeds two pieces of radiation at the same time. Orifice seats are installed in the two return chambers of this valve to retain steam in the radiation. This eliminates the use of bellows retarder in return piping to loop under car. The cap over return chamber has a 3/16" hole to identify the valve as being fitted with orifice seat. All parts of this valve are interchangeable with the No. 1671 except the body. This valve uses the No. 1671-CC needle valve assembly.

The No. 1675 Solenoid Admission Valve is an electrically operated valve for use with Unit Fin floor radiation. A No. 1671-EE bellows assembly is installed in the return chamber of this valve and acts to retain steam in the radiation. This eliminates the use of a bellows retarder in the return piping to the loop under car. This valve is used where less radiation is needed and a No. 1675-CC needle valve assembly is used. The cap over the return chamber is undrilled and all parts except the needle valve assembly and the cap over the return chamber are interchangeable with the No. 1671 valve.

N.H.



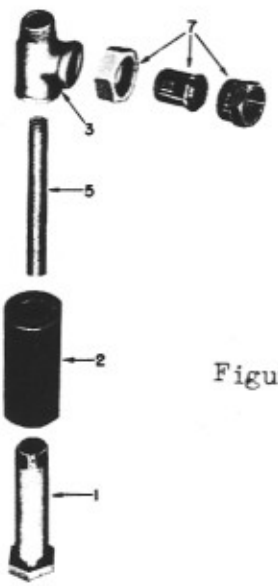


Figure 89

LIST OF PARTS
NO. 955-TT DRAIN TUBE

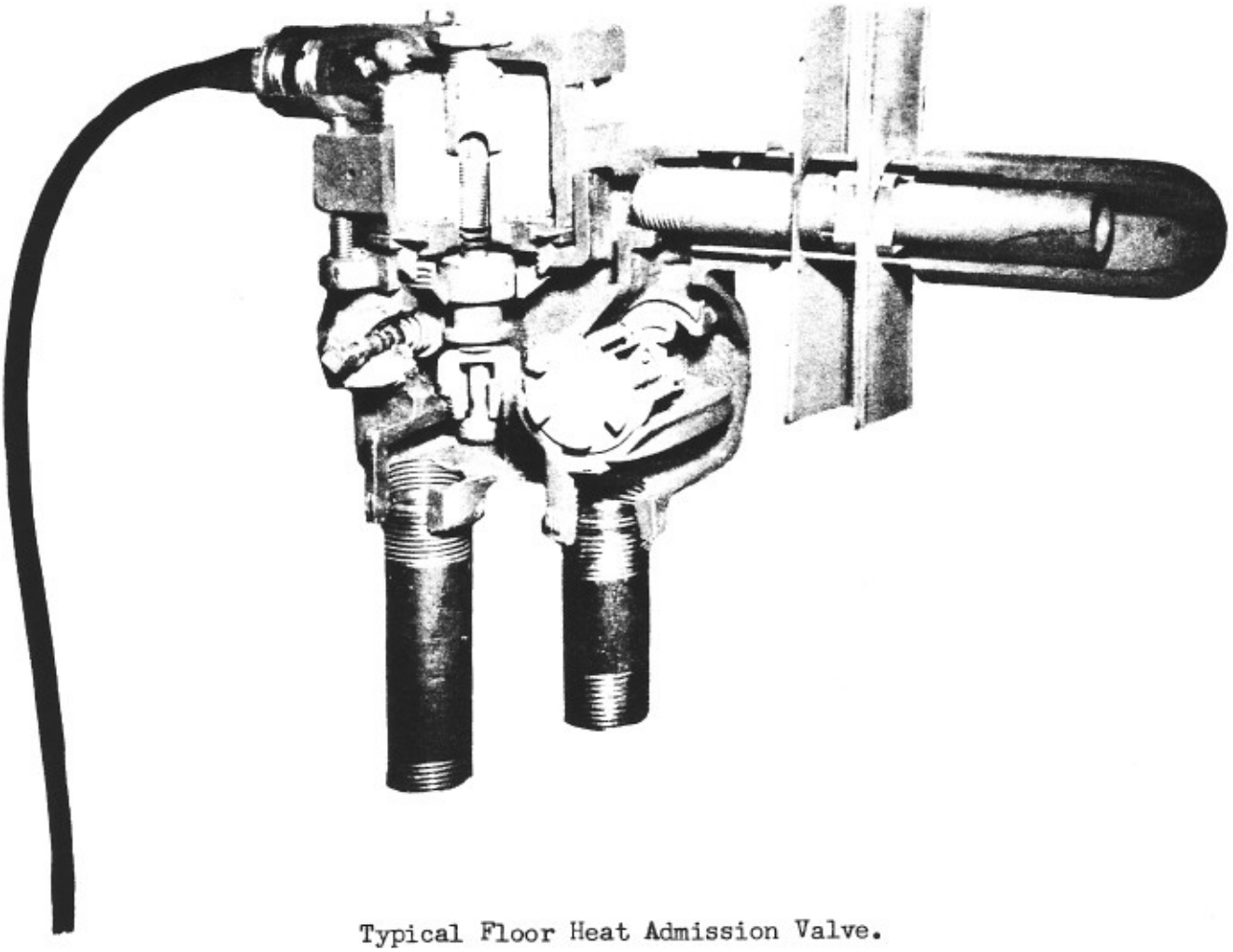
Sym.	Part No.	Description	Amt.
1	B-440-T-1	Tube	1
2	B-440-T-2	Jacket	1
3	955-TA-3	Tee	1
5	955-TA-5	Inner Tube	1
7	441-2	Union Complete	1

LIST OF PARTS
NO. B-440-TT DRAIN TUBE

Sym.	Part No.	Description	Amt.
1	B-440-T-1	Tube	1
2	B-440-T-2	Jacket	1

VAPOR SAFE-CONTROL REGULATOR PARTS LIST

Sym.	Description	Amt.	Part No. 955	956	958	959
1	Body	1	955-1	955-1	955-1	955-1
2	Housing (Diaphragm)	1	955-2	955-2	955-2	955-2
3	Body (Safe-Control Valve	1	955-3	955-3	955-3	955-3
4	Strainer	1	955-4	955-4	955-4	955-4
5	Cap (Bottom)	1	955-5	955-5	955-5	955-5
6	Housing (Solenoid)	1	955-6		955-6	
7	Washer	1	955-7			
9	Plunger	1	955-9	956-29	955-9	956-29
10	Spring (Plunger)	1	955-10	955-10	955-10	955-10
11	Bracket (Relief Valve Operating)	1	955-11	955-11	955-11	955-11
12	Coil	1	955-B-2		955-B-2	
13	Gasket	1	955-13		955-13	
14	Retainer (Plunger)	1	955-14	955-14	955-14	955-14
16	Nut	1	955-16	955-16	955-16	955-16
17	Washer	1	955-R-8			
25	Cap (Diaphragm Body)	1	955-25	955-25	955-25	955-25
26	Shield (Diaphragm Cap)	1	955-26	955-26	955-26	955-26
27	Screen	1	955-27	955-27	955-27	955-27
28	Gasket	1	955-28	955-28	955-28	955-28
29	Limiting Valve Assembly	1	955-CC	955-CC	958-CC	958-CC
30	Adapter Assembly	1	955-EE		955-EE	
30	Cap	1		956-30		956-30
31	Connector Comp. (Incl's R-2, R-3, and R-5)	1	955-RR-2		955-RR-2	
32	Screw	1	242-M	242-M	242-M	242-M
33	Cap	1	242-N	242-N	242-N	242-N
34	Plug	1	955-R-1		955-R-1	
35	Receptacle	1	955-R-2		955-R-2	
36	Washer	2	955-R-3		955-R-3	
37	Locking Ring	1	955-R-4		955-R-4	
38	Jam Nut	1	955-R-5		955-R-5	
39	Bonnet	1	242-B	242-B	242-B	242-B
40	Needle Valve Assembly	1	242-CC	242-CC	242-CC	242-CC
41	Bellows Assembly	1	242-EE	242-EE	242-EE	242-EE
42	Retainer (Spring)	2	242-H	242-H	242-H	242-H
43	Spring (Bellows)	1	242-J	242-J	242-J	242-J
44	Spring (Needle Valve)	1	242-K	242-K	242-K	242-K
45	Yoke	1	901-C	901-C	901-C	901-C
46	Diaphragm (Economy)	1	900-E	900-E	900-E	900-E
47	Bellows Complete (Valve Pack.)	1	900-G	900-G	900-G	900-G
48	Bellow Complete (Diaphragm Pack.)	1	900-H	900-H	900-H	900-H
49	Shield	1	900-J	900-J	900-J	900-J
50	Bearing (Oper. Rod)	1	900-K	900-K	900-K	900-K
51	Spring (Oper. Rod)	1	900-L	900-L	900-L	900-L
52	Arm (Operating)	1	901-M	901-M	901-M	901-M
53	Nut (Bellows Retaining)	2	901-N	901-N	901-N	901-N
54	Nut (Yoke Retaining)	2	901-O	901-O	901-O	901-O
55	Cover	1	901-P	901-P	901-P	901-P
56	Needle Valve Comp.	1	355-QQ	955-QQ	955-QQ	955-QQ
57	Adapter	1	901-Q-1	900-Q-1	901-Q-1	901-Q-1
58	Pivot (Opr. Arm)	1	900-R	900-R	900-R	900-R
59	Screw (Adjusting)	1	901-S	901-S	901-S	901-S
60	Cap (Strainer)	1	901-T	901-T	901-T	901-T
61	Cap	2	7/16" 20 SAE	7/16" 20 SAE	7/16" 20 SAE	7/16" 20 SAE
62	Half Union	2	⅛" IPS x ¼" ODCT	⅛" IPS x ¼" ODCT	⅛" IPS x ¼" ODCT	⅛" IPS x ¼" ODCT
63	Washer	2	1901-A-90	1901-A-90	1901-A-90	1901-A-90
64	Plate (Identification)	1	1657-B-22		1657-B-22	
65	Union Complete (Not Furnished with Reg.)	1	441-4	441-4	441-4	441-4
66	Cap Screw (Hex. Hd.)	2	¼" 20 x ½" LG	¼" 20 x ½" LG	¼" 20 x ½" LG	¼" 20 x ½" LG
67	Locknut	1	244-17	244-17	244-17	244-17
68	Union Complete (Not Furnished with Reg.)	1	441-3	441-3	441-3	441-3
69	Cap Screw (Hex. Hd.)	1	5/16" 18 x ¾" LG	5/16" 18 x ¾" LG	5/16" 18 x ¾" LG	5/16" 18 x ¾" LG
70	Lockwasher (St'd)	1	5/16" Split Type	5/16" Split Type	5/16" Split Type	5/16" Split Type
71	Cap Screw (Hex. Hd.)	3	⅜"-16 x ¾" LG	⅜"-16 x ¾" LG	⅜"-16 x ¾" LG	⅜"-16 x ¾" LG
72	Cap Screw (Hex. Hd.)	2	⅜"-16 x 1" LG	⅜"-16 x 1" LG	⅜"-16 x 1" LG	⅜"-16 x 1" LG
73	Cap Screw (Hex. Hd.)	1	⅜"-16 x 1½" LG	⅜"-16 x 1½" LG	⅜"-16 x 1½" LG	⅜"-16 x 1½" LG
74	Lockwasher (St'd)	6	⅜" Split Type	⅜" Split Type	⅜" Split Type	⅜" Split Type
75	Screw (Rd. Hd. Mach.)	2	#6-32 x 3/16" LG		#6-32 x 3/16" LG	
76	Strainer	1	955-76	955-76	955-76	955-76
77	Solenoid and Adapter Assembly, Inc. Sym. 9, -10, -11, -13, -14, -16, -30, -78	1	955-BB		955-BB	
78	Solenoid Housing Assembly Inc. Sym. 6, -7, -12, -17, -34, -36, -37, -64, -75	1	955-BB-1		955-BB-1	



Typical Floor Heat Admission Valve.

Figure 90

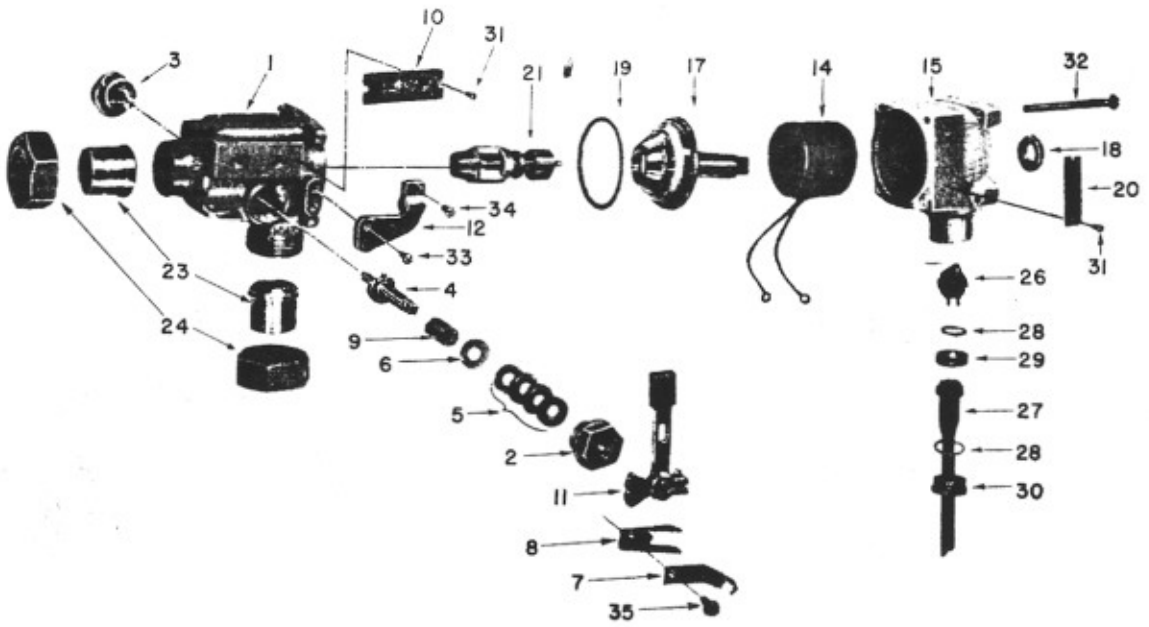


Figure 91

LIST OF PARTS

Sym.	Part No.	Description	Amt.	Sym.	Part No.	Description	Amt.
1	1668-A-1	Body	1	20	1668-B-22	Coil Housing Nameplate	1
2	1671-A-2	Nut (Seal Retaining)	1	21	1668-CCB	Needle Valve Assembly	1
3	1668-A-3	Retaining Nut	1	23	441-3-A	Body (1⅛" O.D.C.T.)	2
4	1671-AA-4	Operating Arm Assembly	1	24	441-B	Ring	2
5	1671-AA-7	Packing Assembly	1	25	955-RR-2	Connector Comp. (Incl. sym. 27, 28,30)	1
6	1671-A-8	Washer (Packing)	1	26	955-R-1	Plug	1
7	1671-A-11	Spring	1	27	955-R-2	Receptacle	1
8	1671-A-12	Bracket	1	28	955-R-3	Washer	2
9	1671-A-13	Spring (Packing)	1	29	955-R-4	Locking Ring	1
10	1668-A-15	Plate (Identification) L.H.	1	30	955-R-5	Jam Nut	1
10	1668-A-14	Plate (Identification) R.H.	1	31	4"x3/16"	Parker Kalon Screw (Binder Head)	4
11	1671-AA-23	Control Arm Assembly	1	32	4"x3/16"	Cap Screw (Hex. Head)	4
12	1668-A-31	Manual Control Bracket L.H.	1	33	#10—24x½"	Screw (Round Head)	2
12	1668-A-30	Manual Control Bracket R.H.	1	34	#10—24x⅜"lg.	Screw (Round Head)	1
14	1668-B-2	Coil (Specify Voltage)	1	35	#10—24x5/16"	Screw (Round Head)	1
15	1671-B-3	Housing	1		1668-BB-1	SOLENOID ASSEMBLY (Incl. sym. 14, 15, 17, 18, 19, 20, 26, 29, one of 28 and two of 31)	
17	1668-BB-15	Core Assembly	1				
18	1671-B-18	Locknut (Core Retaining)	1				
19	1671-B-21	Gasket	1				

No. 1671 SOLENOID STEAM ADMISSION VALVE

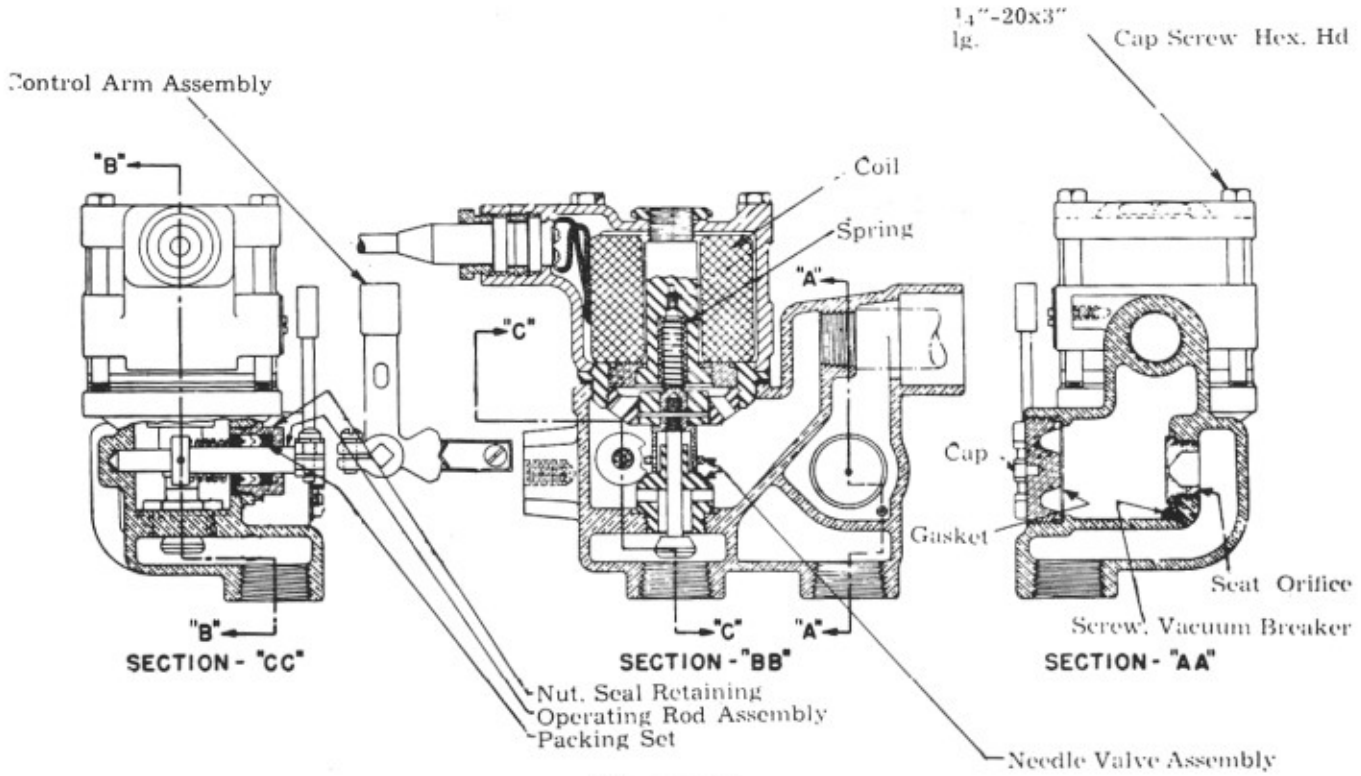


Figure 92

No. 1672 SOLENOID STEAM ADMISSION VALVE

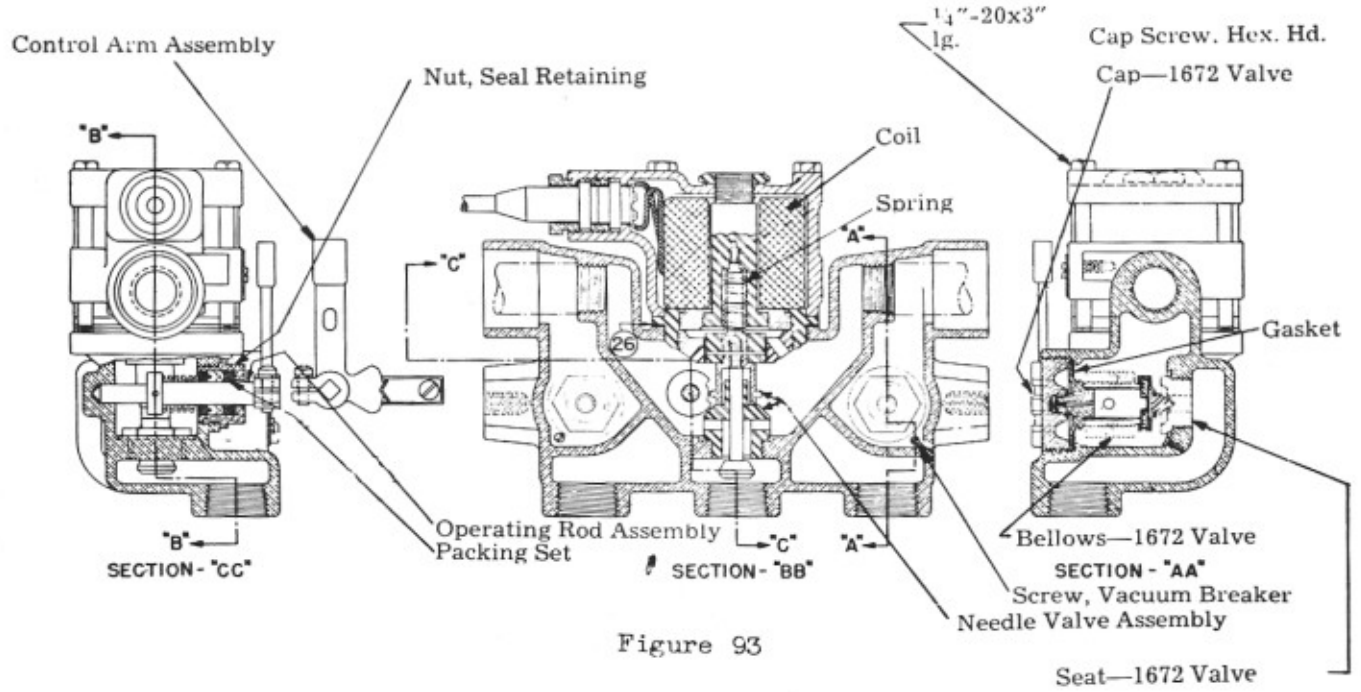
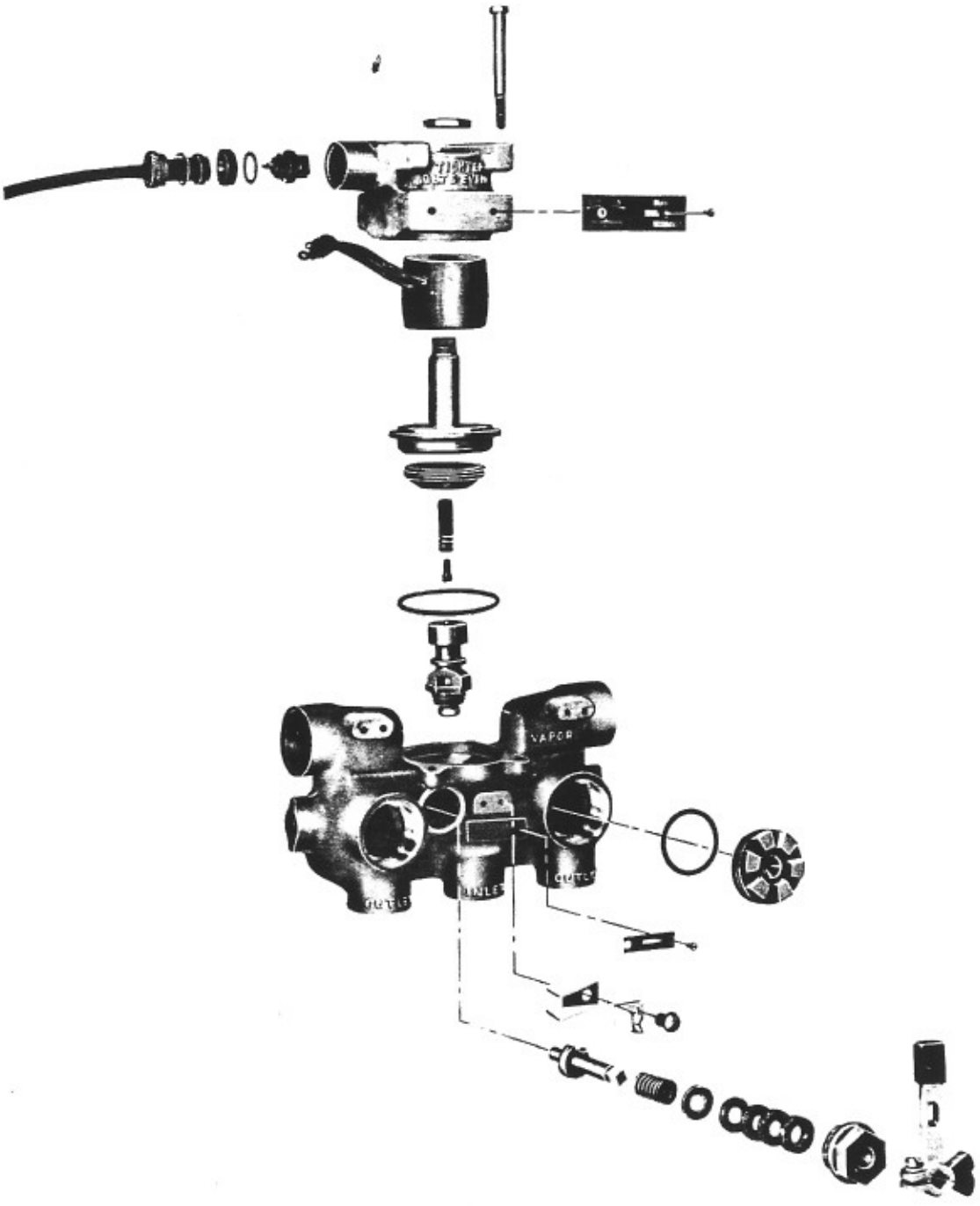


Figure 93



1674 Admission Valve

Figure 94

No. 1673 ADMISSION VALVE

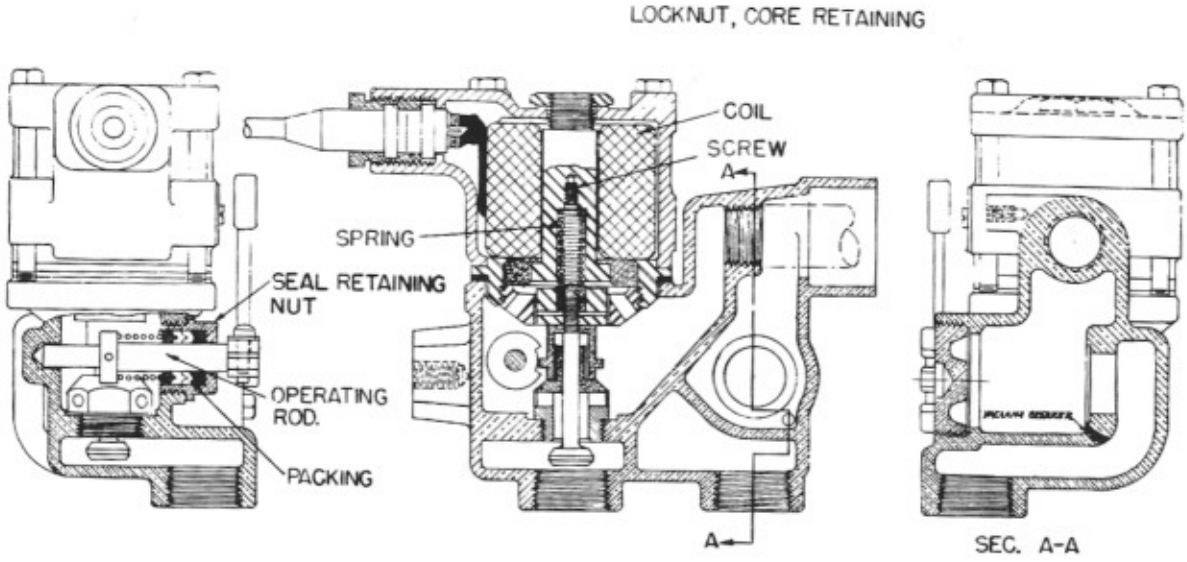


Figure 95

No. 1668 ADMISSION VALVE

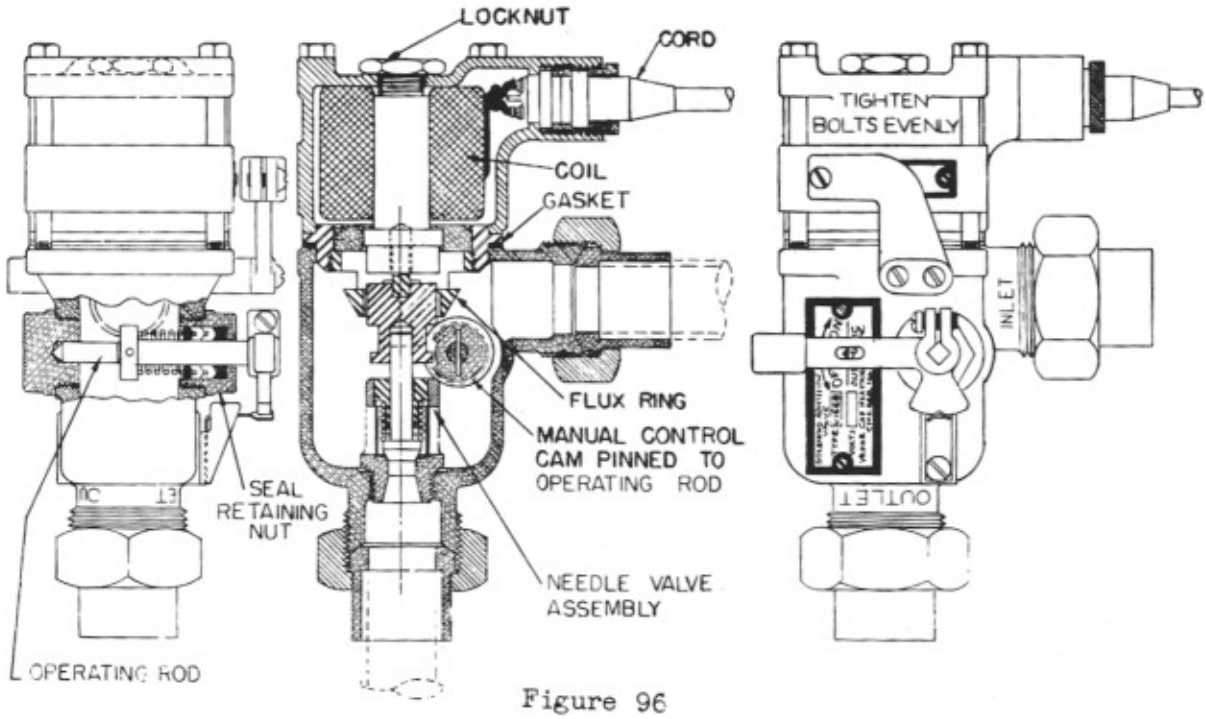


Figure 96

The No. 1676 solenoid admission valve is an electrically operated valve for use with Vulcan Fin floor radiation. This valve has two outlets and feeds two pieces of radiation at the same time. This valve does not have either an orifice seat or a bellows retarder in the return chamber, therefore, a retarder must be installed in the return piping, from each piece of radiation, to the loop under the car. A No. 1671-CC needle valve assembly is used and parts are interchangeable with No. 1672 valve.

The No. 1677 Solenoid Admission Valve is an electrically operated valve for use with Unit Fin floor radiation. A No. 1671-EE bellows assembly is installed in the return chamber of this valve and acts to retain steam in the radiation. This eliminates the use of a bellows retarder in the return piping to the loop under the car. The cap over the return chamber is undrilled and a No. 1671-CC needle valve assembly is used. Parts are interchangeable with the No. 1671 valve.

The No. 1668 Solenoid Steam Admission Valve is an electrically operated valve for use with overhead heat. It is similar to the floor heat valves, but constructed slightly different. This valve has no return chamber, as the steam feeds through valve to radiator and outlet of radiator is connected direct to return piping under car. This valve is normally closed under spring-tension, and the needle valve assembly is different from those on floor heat valves. The solenoid coil is not interchangeable. The valve is mounted at overhead radiator, and a 1643 Manual Remote Control Cable is used for hand operation.

RADIATION: The floor heat radiation is divided into three or more zones. In each zone the radiation is under the independent control of a separate thermostat, and heat is supplied as needed in that particular zone. Both Unit Fin and Vulcan Fin radiation are used. See Figures 97 and 98.

In the common floor heat circuit, steam is taken from trainline through a strainer to a No. S-124 shut-off and drain valve, then to a No. 955 regulator. A steam supply loop from outlet of regulator to regulator drain tube is divided into a feed and return portion by a No. 920 loop retarder. The retarder establishes a reservoir of steam in the feed portion of the loop. The condensate, which forms in the feed portion of piping is released through the No. 920 retarder into the return portion of the loop. Steam from the feed portion of supply loop flows through a No. 912 water seal fitting to a solenoid admission valve. Steam feeds from this valve into a radiator; condensate which forms in outer tube of radiator returns through a valve body outlet to return portion of loop; then to No. 955-TT drain tube on regulator. One or more valves may be operated on each supply loop, and the steam circuit will be same for each one. Figure 99 shows this circuit.

When the steam pressure within the supply loop reaches 3 or 8 lbs., the flow limit valve in the regulator opens, and steam is admitted into regulator bellows chamber: bellows expands, shutting off steam supply. Condensate in bellows chamber drains through inner portion of drain tube.

The overhead heating system heats the fresh and re-circulated air according to temperature demands. The overhead radiator is mounted in back of evaporator as part of the A.C. Unit. Steam for this radiator is supplied in a manner similar to floor heat, except that no water seal fitting is used. A typical overhead circuit is shown in Figure 100.

The No. 912 water seal is a fitting which serves to keep the steam admission valve from being heated while in the "OFF" position, as explained on Page 241 of the A.C. Manual. Steam from feed portion of the supply loop flows through the water seal fitting to inlet side of admission valve.

REPAIRS AND TESTING

CHECK FOR CAUSE OF STEAM BLOWING AT REGULATOR: A blowing of steam from outer drain tube of No. 955 regulator indicates a defective retarder, which can be located as follows:

1. If only No. 1671 or 1674 valve is used on the loop, the blowing of the outer drain tube of regulator is due to a faulty bellows in the loop retarder.
2. In the case of the No. 1668 valve used with overhead radiators, a blowing with valve energized indicates a blower fan failure.
3. In all cases, if blowing continues with all valves shut off, the bellows in loop retarder is faulty.

A blowing of steam from inner drain tube of No. 955 regulator indicates a defective regulator and trouble can be located as follows:

N.P.

1. If dirt has lodged between the Vapor valve and seat of regulator, it can be dislodged by closing S-124 shut-off valve for a few minutes and then re-opening valve.
2. If blow continues, the thermostatic bellows is probably defective. Check for cause of regulator not feeding steam to system.
3. Lever arm adjustment loose. (See shop test of 955 regulator item 6).

Several things may interfere with the No. 955 regulator supplying steam to system. The following checks should be made:

1. Be sure S-124 valve is open.
2. Dirt under seat of flow limit valve may prevent proper operation.
3. Broken or missing inner drain tube allowing steam from return piping to actuate 900 E bellows.
4. Clogged Strainers. (If strainer is found in regulator side as shown in Figure 89 it is to be removed and discarded).
5. Lever arm adjustment too tight. (See shop test of 955 regulator item 6).

To free dirt under seat of flow limit valve, insert a screw driver through rectangular opening in the bracket at rear of valve; then, using bracket as a fulcrum, push up the plunger and hold in this position. Pressure will equalize and the additional steam will have a flushing action.

Two fittings are provided in the regulator for mounting steam gauges to determine the operating pressures. The fitting close to the inlet is used to check reducing valve pressure; the opposite fitting is used to check the loop pressure.

A common indication of reducing portion of regulator being set too high is the high pitched singing of the regulator. Apply test gauge to regulator " reduced pressure test " fitting (see Figure 101). If pressure varies more than 10% from the 40 lbs. setting, the regulator is definitely defective.

Where a regulator is definitely defective, it can be easily removed by disengaging the clamp on supporting bracket and breaking three unions. New regulator can be quickly applied and old regulator tested and adjusted on test rack in shop. See testing instructions which follow.

An escape of steam through the tell-tale hole in pressure reducing valve spring bonnet indicates a rupture in the bellows seal which encloses spring. It will be necessary to replace seal in order to correct this condition.

SHOP TEST OF NO. 955 REGULATOR:

1. Make up test assembly as shown below with one end fitted with restriction washer having 1/4" orifice.
2. Connect inlet side to steam line.
3. Connect above fitting in outlet side of regulator.
4. Raise plunger on flow limit valve all the way up. Gauge pressure will then show pressure at which reducing valve is set.

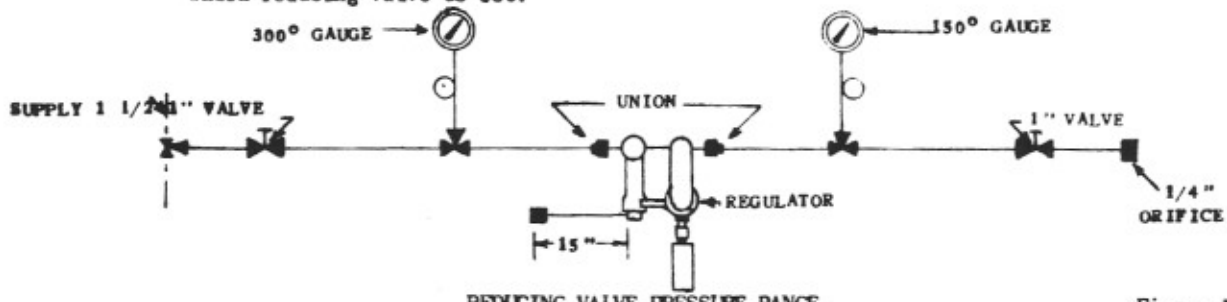


Figure 101

REDUCING VALVE PRESSURE RANGE

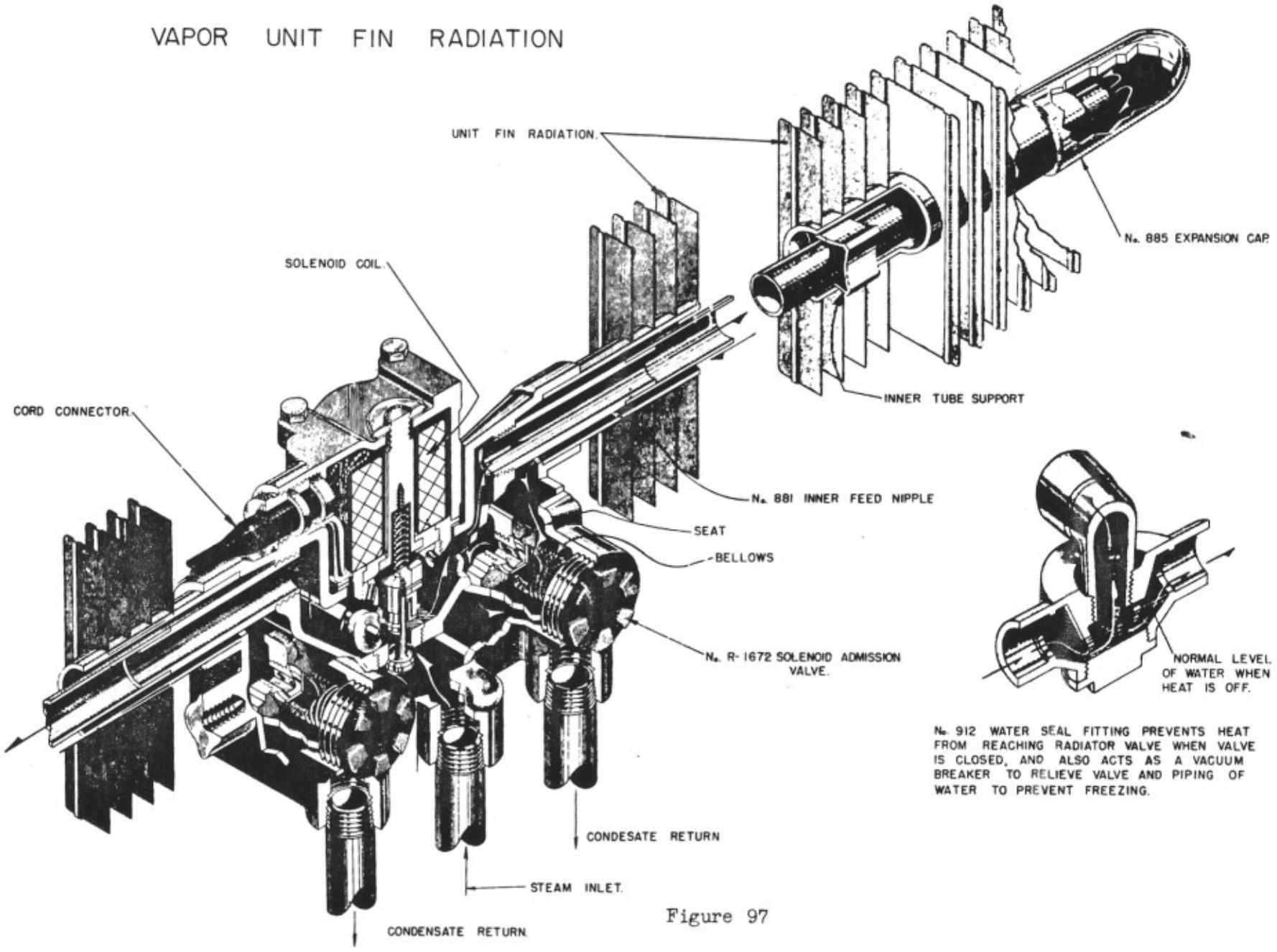
Inlet	Outlet	Inlet	Outlet
75 lbs.	51 lbs.	150 lbs.	50 lbs.
100 lbs.	51 lbs.	175 lbs.	49 lbs.
125 lbs.	50 lbs.	200 lbs.	49 lbs.
		225 lbs	48 lbs.

To adjust tension on reducing valve spring, remove the reducing valve screw bonnet and adjust the reducing valve screw to give the correct reducing valve pressure as outlined above.

5. After operation No. 4 release plunger on flow limit valve. Pressure should drop and remain constant. Gauge reading will now show the loop pressure.
6. To correct a lever arm adjustment, should it ever become loose, unsolder adjusting screw on fulcrum arm and turn the screw down until steam blows from regulator inner drain tube. Then turn the screw back until steam blow stops. Adjusting screw should now be tightened one full turn and re-soldered so that adjustment will not change.

N.H.

VAPOR UNIT FIN RADIATION



No. 912 WATER SEAL FITTING PREVENTS HEAT FROM REACHING RADIATOR VALVE WHEN VALVE IS CLOSED, AND ALSO ACTS AS A VACUUM BREAKER TO RELIEVE VALVE AND PIPING OF WATER TO PREVENT FREEZING.

Figure 97

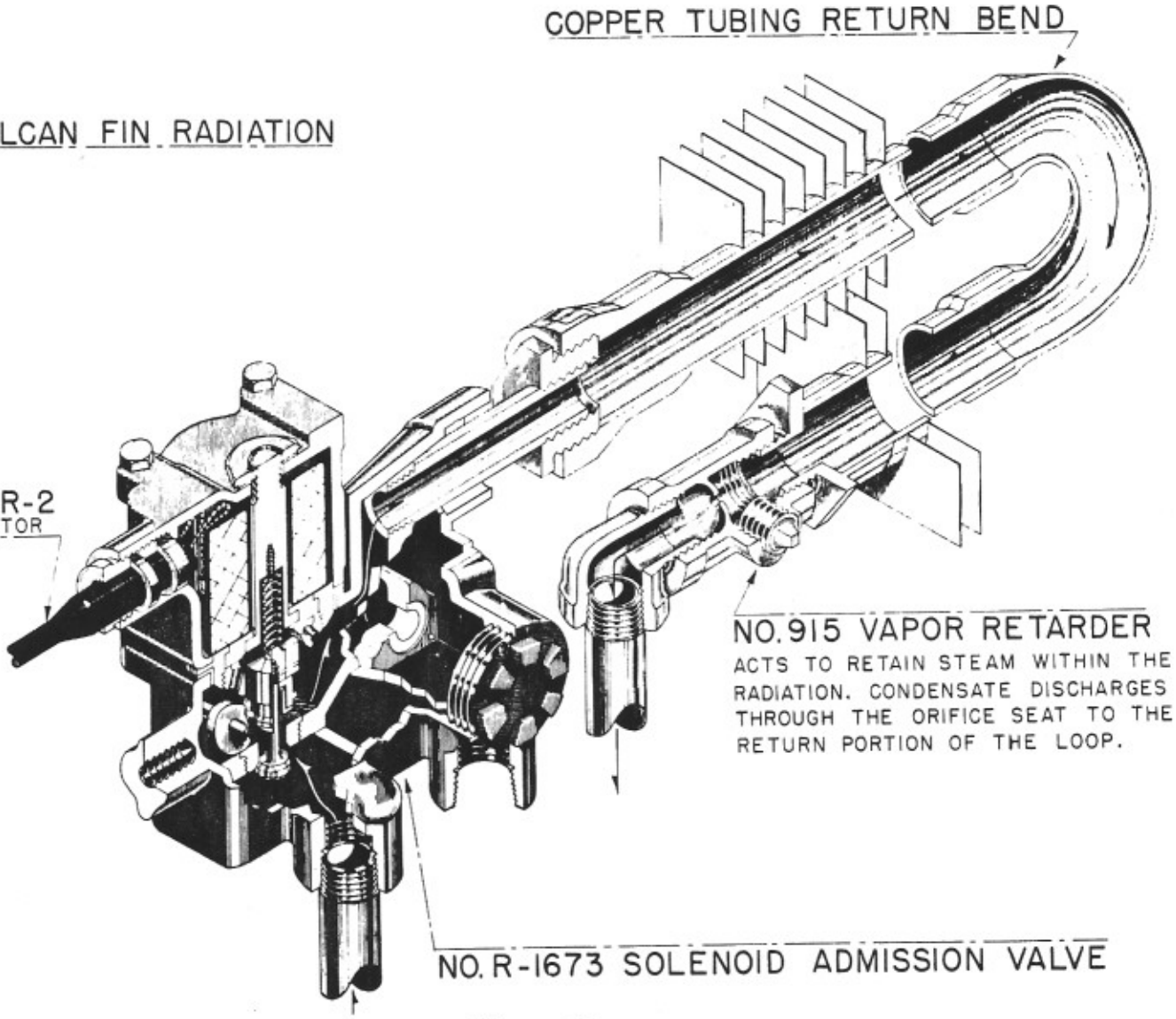
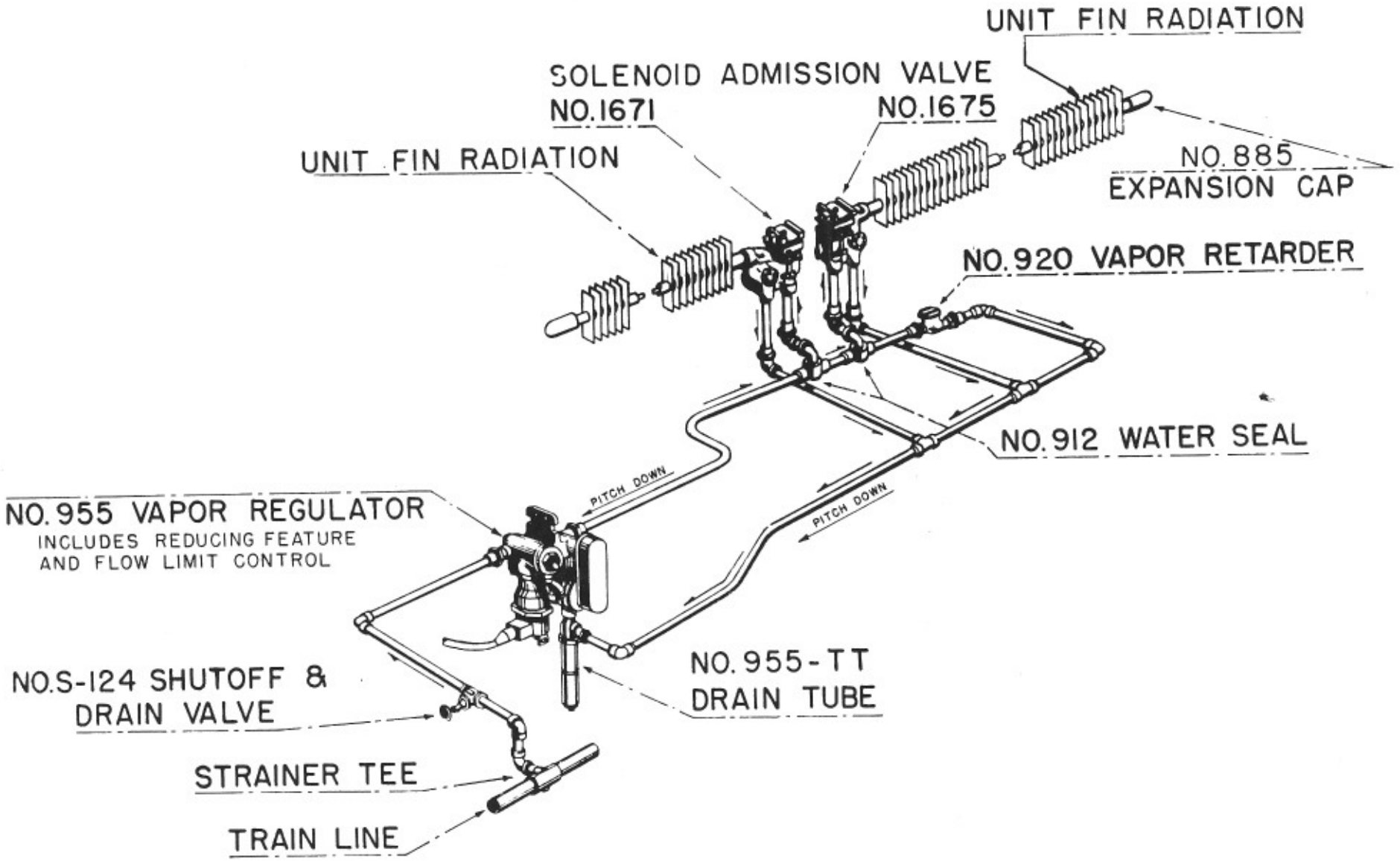
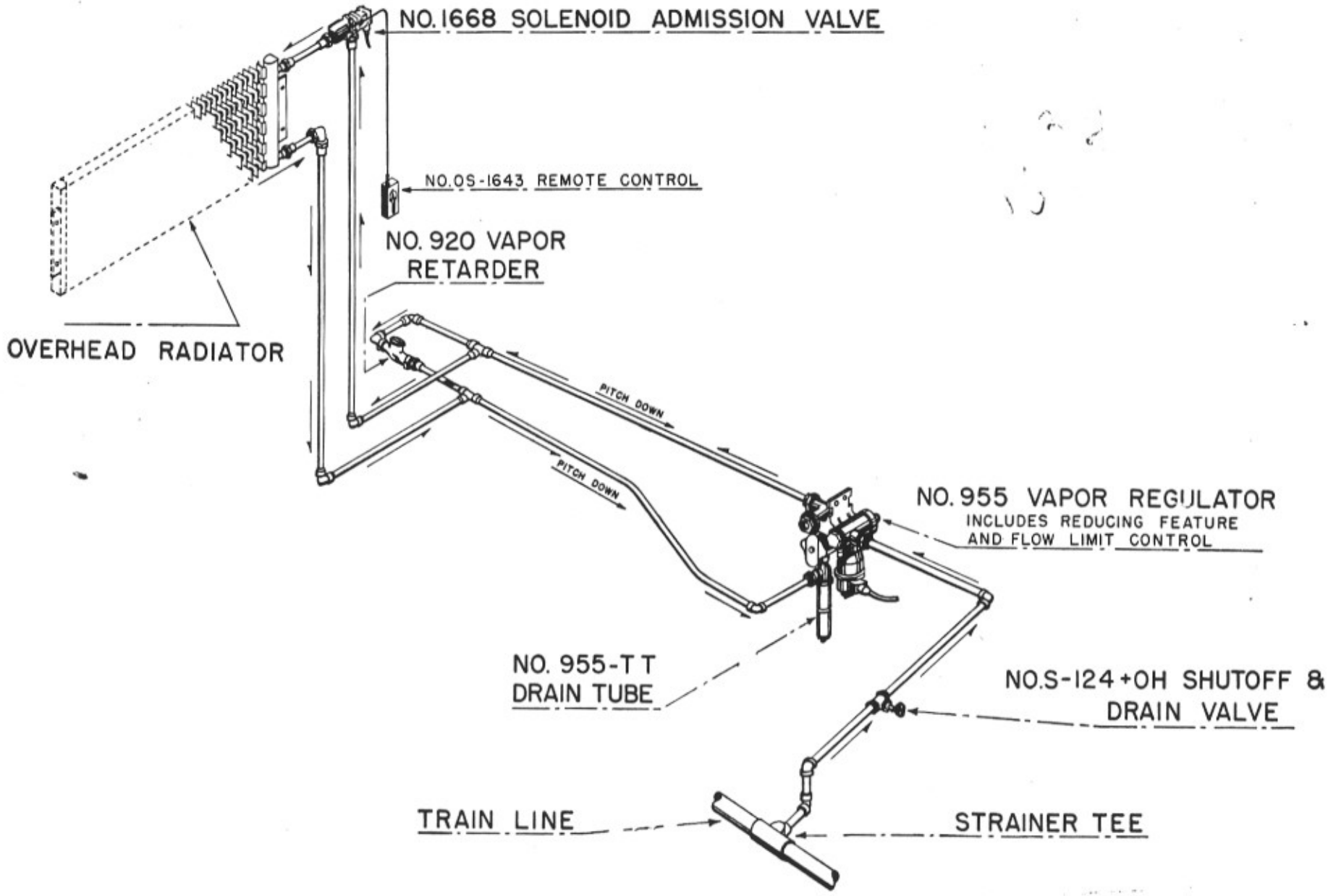

COPPER TUBING RETURN BEND
VAPOR-VULCAN FIN RADIATION
NO.1671-RR-2
CORD CONNECTOR
NO.915 VAPOR RETARDER
ACTS TO RETAIN STEAM WITHIN THE RADIATION. CONDENSATE DISCHARGES THROUGH THE ORIFICE SEAT TO THE RETURN PORTION OF THE LOOP.
NO.R-1673 SOLENOID ADMISSION VALVE

Figure 98



ZONE FLOOR HEAT GENERAL LAY-OUT



OVERHEAD HEAT LAYOUT

Figure 100

THERMOSTATIC BELLOWS: The following thermostatic bellows, Figure 102, are used in Zone heat systems:

1. No. 900 E used in No. 955 steam regulator.
2. No. 1671-EE used in bodies of floor heat admission valves No. 1672 and No. 1675 also is No. 918 retarder.
3. No. 920-EE used in conjunction with No. 1668 admission valve, located in return piping under car. This bellows is also used as a retarder for supply loops.

REPLACING VALVE SOLENOID COIL (FLOOR VALVE).

1. Unscrew jam nut at receptacle and pull receptacle loose from plug.
2. Remove locking ring holding connector plug. (Use wrench Q-1622).
3. Pull out connector plug and disconnect two leads.
4. Remove four hexhead bolts holding solenoid housing.
5. Remove core retaining locknut and lift off solenoid housing assembly.
6. Lift out old solenoid coil and place new coil in its place.
7. Re-assemble by reversing above operations. *CAUTION* Check the solenoid housing gasket closely; replace, if necessary.

REPLACING SOLENOID MANUAL CONTROL ARM ASSEMBLY (FLOOR VALVE):

1. Remove control arm.
2. Remove seal retaining nut.
3. Pull control arm assembly out.
4. Re-assembly by reversing above operations.

REPLACING SOLENOID NEEDLE VALVE ASSEMBLY (FLOOR VALVE):

1. Remove solenoid housing assembly as called for under " Replacing Valve Solenoid Coil ".
2. Remove Manual Control Arm assembly as called for under " Replacing Solenoid Manual Control Arm Assembly ".
3. Lift out core assembly.
4. Using socket wrench Q-1625 with guide Q-1624, the needle valve assembly can be screwed free of valve body and lifted out.
5. Re-assemble by reversing above operations.

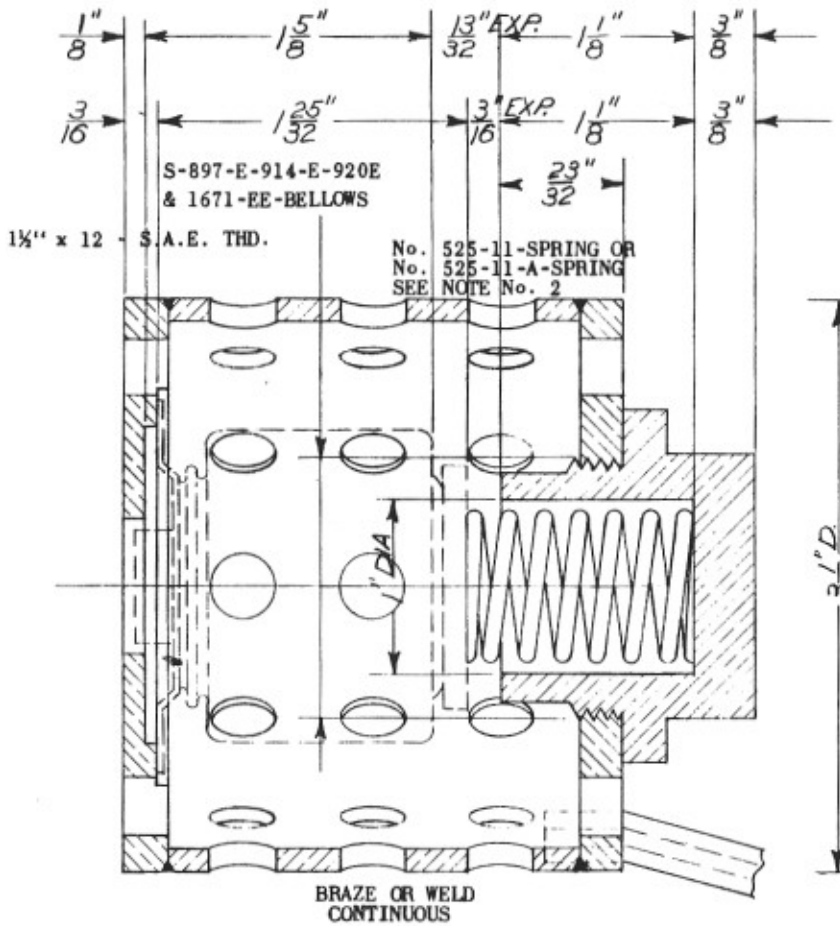
REPLACING ORIFICE SEATS IN VALVE BODIES:

1. Using wrench Q-1623, remove cap over the return chamber.
2. Screw orifice seat out of cap and apply new.
3. Re-assembly by reversing above operations.

REPLACING 1671-EE BELLOWS IN VALVE BODY:

1. Using wrench Q-1623, remove cap over the return chamber.
2. Screw 1671-EE bellows out of cap.
3. Re-assemble by reversing above operations.

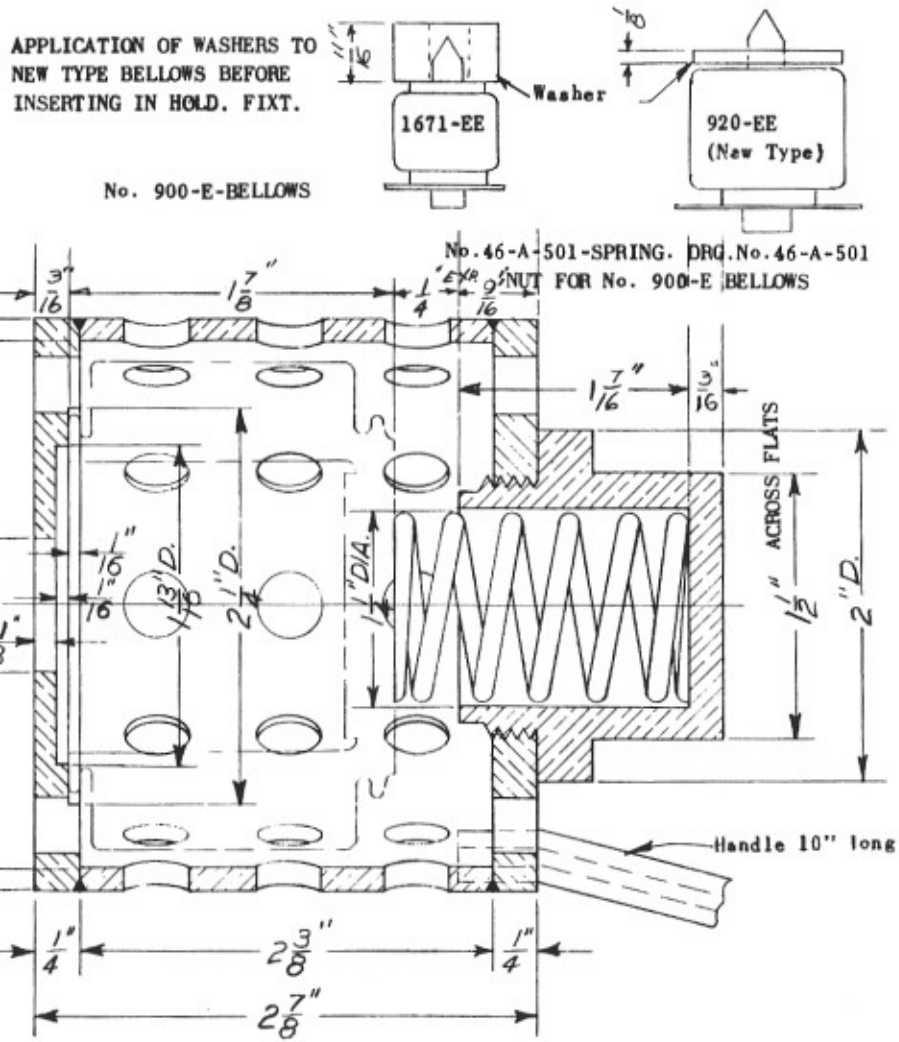
N.H.



NUT FOR No.525-E-914-E-920-E H 1671-EE-BELLOWS
NO SPRING USED WHEN TESTING-S-897-E-914-E-920-EE(OLD & NEW STYLE)& 1671-EE BELLOWS
NOTE NO. 2.

WHEN TESTING BELLOWS OF THE No. 525-VALVE BE SURE TO USE THE RESPECTIVE SPRINGS FOR EACH BELLOWS AS FOLLOWS:
No. 525-104-135°-BELLOWS USE SPRING No. 525-11.
No. 525-104-A-115°-BELLOWS USE SPRING No. 525-11-A.
No. 525-104-B-160°-BELLOWS USE SPRING No. 525-11.

BELLOWS TESTING FIXTURE



NOTE NO. 1

SUBMERGE IN COLD WATER BEFORE APPLYING. BELLOWS SHOULD THEN BE TIGHT AGAINST INTERNAL STOP DUE TO VACUUM WITHIN.

WHEN SUBMERGED IN BOILING WATER EXPANSION SHOULD BE AS FOLLOWS.
No. 900-E-3/8'' - No. 525-13/32''.
No. S-897-E-914-E-920-EE= 3/16'' & 1671-EE = 1/8''

SUBMERGE IN COLD WATER AFTER TESTING BEFORE REMOVING FROM FIXTURE. WHEN TESTING 1671-EE & NEW STYLE 920-EE BELLOWS, FOLLOW PRELIMINARY PROCEDURE INDICATED IN UPPER R.H. CORNER

Figure 102

WATER HEATING AND PROTECTION LOOP: Hot water is provided by means of Vapor Company's No. 960 regulator, Figure 103, located on the outside of water tank casing, and Vapor's No. 588-6 wash water heater, Vapor's 525 mixing valve, Vapor's 948 two-way control valve, and swing check valves located inside tank casing.

Water tank is protected against freezing by a steam protection loop in water tank casing, which also runs through water filling valves. The steam in this loop is controlled by Vapor Company's No. 960 regulator. It will be noted from Figure 104 that loop valve No. 948 has a winter and summer setting. When set for winter service the steam is supplied from the No. 960 regulator through the No. 948 valve, then through the heat protection loop to the wash water heater, and back to the regulator. The No. 948 valve is the only control valve in the circuit. When set for summer service, steam from the No. 960 regulator cannot pass into the protection loop but is entirely directed into the wash water heater. The check valve prevents steam backing into the protection loop. Steam pressure in the loop is reduced to vapor pressure as the end of the loop is open to the atmosphere.

If the No. 960 regulator is found blowing, it may be due to dirt lodging between the valve and the seat. This dirt can usually be dislodged by closing the shut-off valve ahead of the regulator for a few minutes to allow the bellows to cool, and then re-opening the valve. If the regulator continues to blow, the bellows is probably defective and should be renewed.

Cold water from outlet at bottom of water tank flows through a 3/4" I.P.S. gate type shut-off valve, and a check valve to cold water inlet on mixing valve. A branch circuit carries cold water from shut-off valve past the pressure chamber, another check valve, 3/4" I.P.S. angle drain valve and to cold water inlet of wash water heater. The heated water then goes to hot water inlet of mixing valve, where it is mixed with cold water so that temperature of water delivered to car piping is 135°. Figure 105 shows the mixing valve.

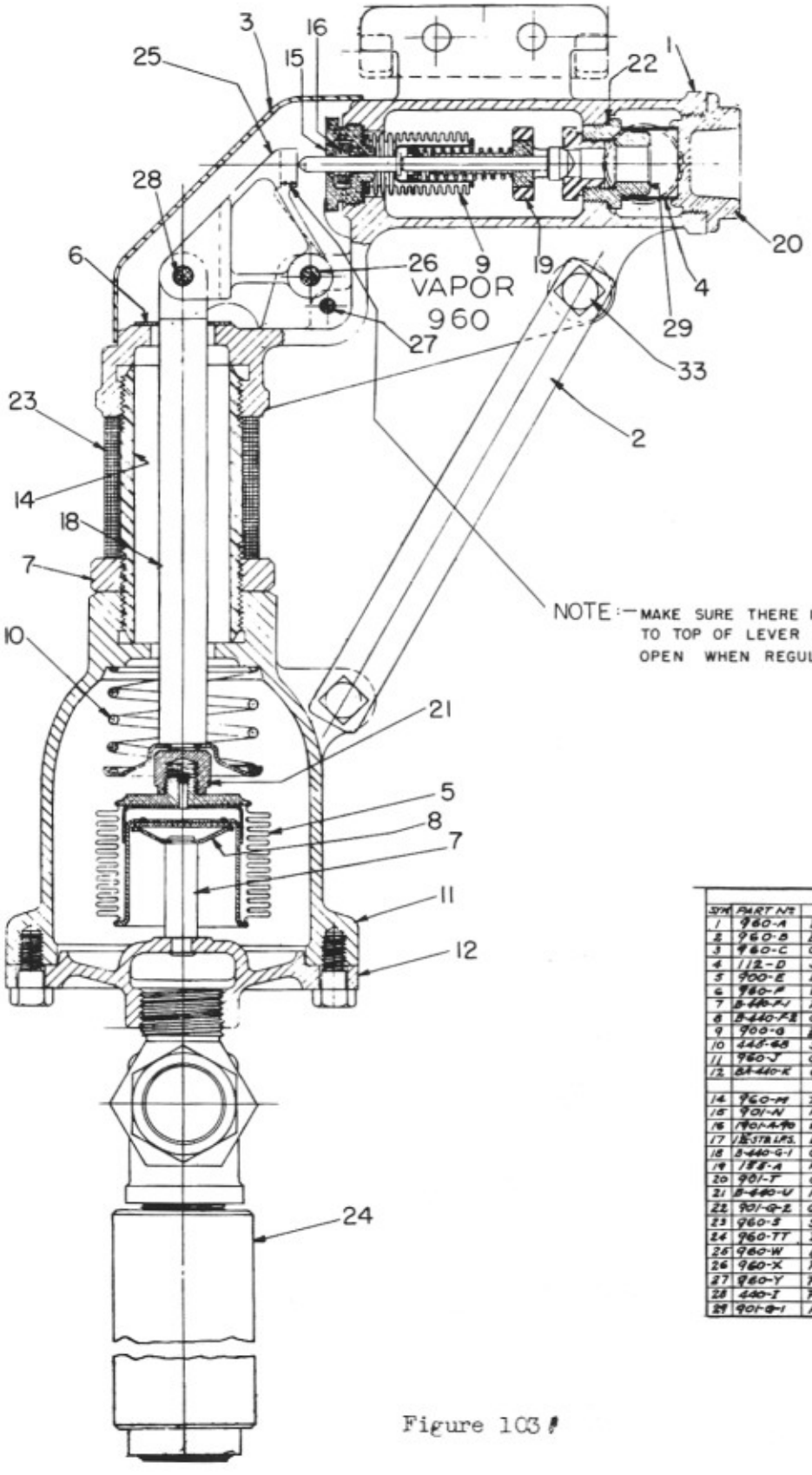
Note in Figure 105 that spring No. 525-11 opposes bellows No. 525-104 locating the piston at the hot and cold water inlet ports in proper position to permit right mixture. Water in bellows chamber over 135° causes bellows to expand, allowing more cold and less hot water to flow.

These mixing valves are originally set to deliver hot water at the basin faucets at temperature of 135°. If repairs are made to valve, it must be adjusted while in place and cars on steam, holding a thermometer under the hot water faucet and regulating the adjusting screw until water temperature of 135° is obtained.

STEAM TRAINLINE: The steam trainline is 2-7/8" extra strong copper bearing steel pipe insulated with 1" thick "Wovenstone". A Vapor S-155 trap is installed at the low point, usually about center of the car. See Figure 106.

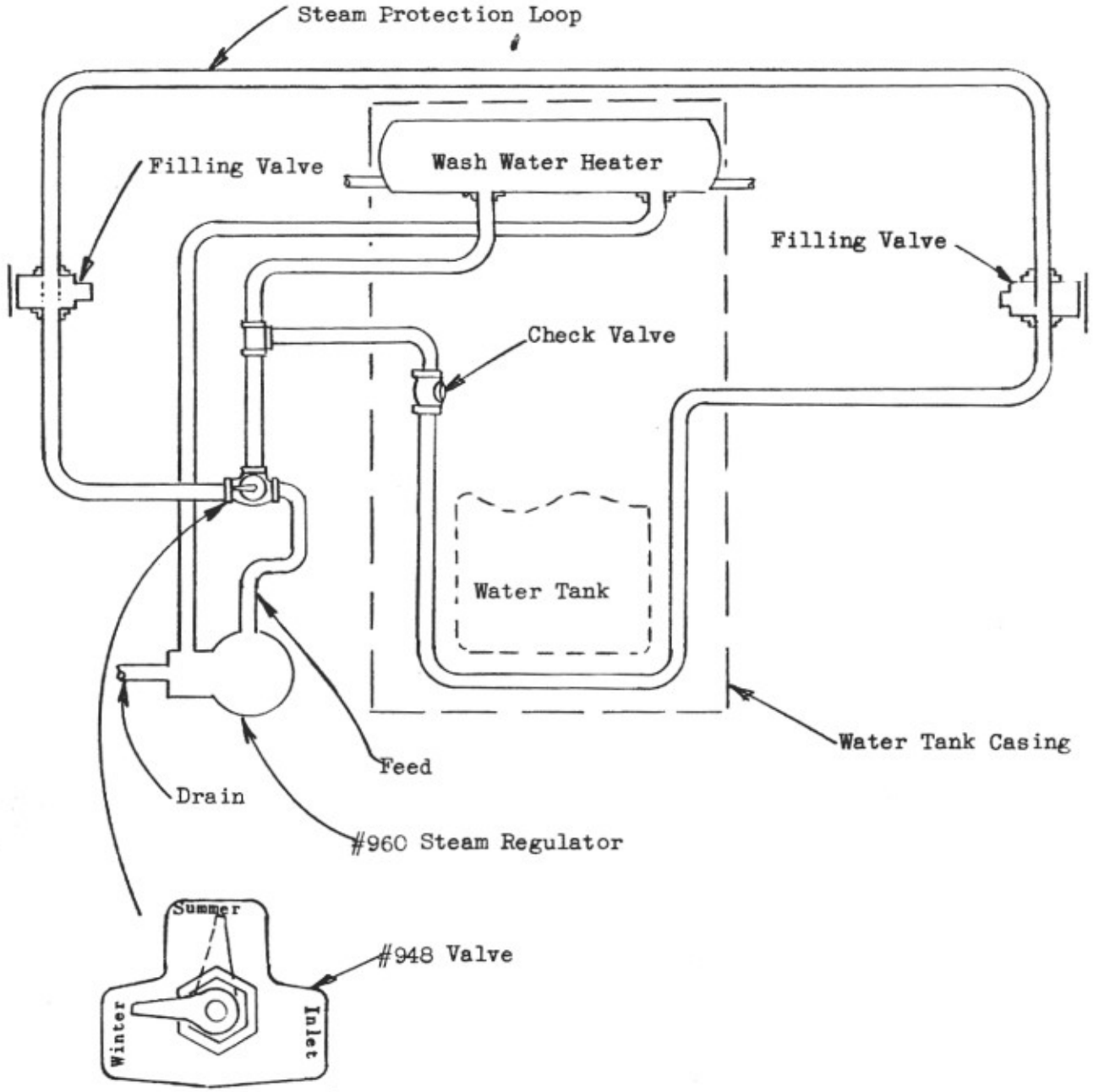
N.H.

No. 960 VAPOR REGULATOR



LIST OF PARTS				
SYM	PART NO	DESCRIPTION	NO	MATERIAL
1	960-A	BODY	1	MALLEABLE
2	960-B	BRACE	1	H.R. STEEL
3	960-C	COVER	1	H.R. STEEL
4	112-D	STRAINER	1	BRASS
5	900-E	BELLOWS ASSEMBLY	1	
6	960-F	WASHER	1	SM. BRASS
7	B-440-FJ	POST	1	STEEL C.R.
8	B-440-FE	CAP	1	SM. BRASS
9	900-G	BELLOWS (VALVE PRESSURE)	1	
10	445-GB	SPRING	1	PHOSPHOR BRONZE
11	960-J	CASING (DIAPHRAGM)	1	CAST IRON
12	B-440-K	COVER (CASING)	1	MALLEABLE
14	960-M	TUBE	1	CU. NICK.
15	901-N	NUT (BELLOWS RETN.)	1	BRASS ROD
16	901-A-90	WASHER	1	FELT
17	1/8 STR. LPS.	LOCKNUT	1	MALLEABLE
18	B-440-G-1	OPERATING ROD	1	C.R. STEEL
19	188-A	NEEDLE VALVE ASSEMBLY	1	
20	901-T	CAP (GRADUATED)	1	SEMI-STEEL
21	B-440-U	NUT	1	BRASS ROD
22	901-Q-2	GASKET	1	SHEET COPPER
23	960-S	SHIELD (TUBE)	1	SHT. BRASS
24	960-TT	DRAIN TUBE	1	
25	960-W	LEVER	1	CAST IRON
26	960-X	PIN (LEVER)	1	BRASS ROD
27	960-Y	PIN (GUIDE)	1	BRASS ROD
28	440-I	PIN (DIAPHRAGM POST)	1	BRASS ROD
29	901-Q-1	ADAPTER	1	CAST BRASS (MACHINED)

Figure 103



WATER HEATING AND STEAM PROTECTION LOOP

Figure 104

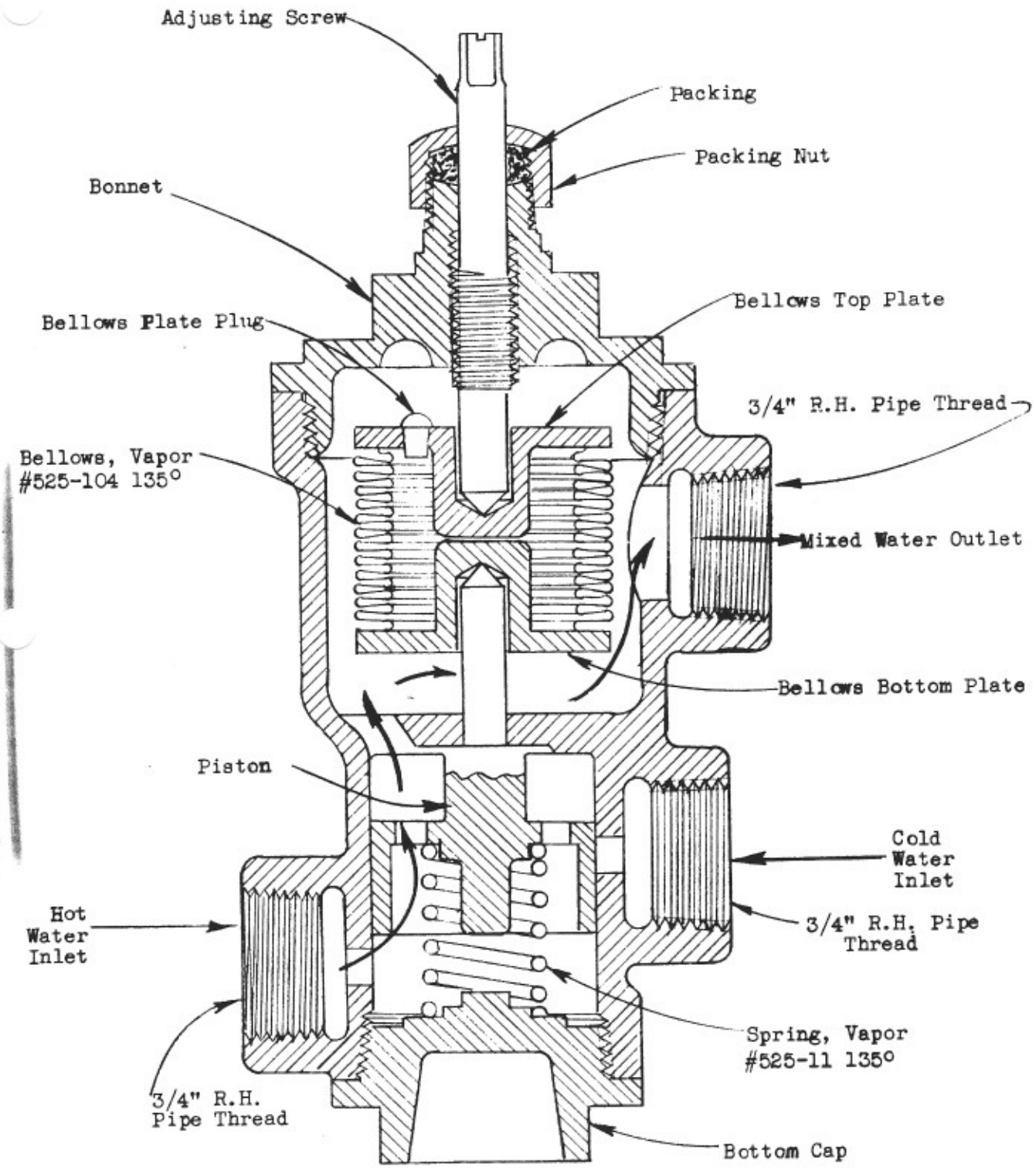


Figure 105 WATER MIXING VALVE

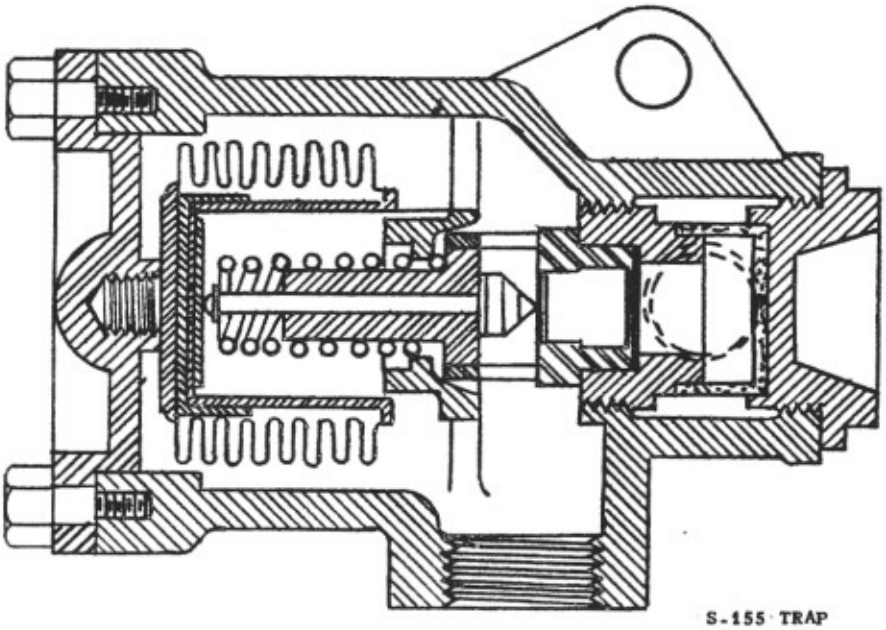


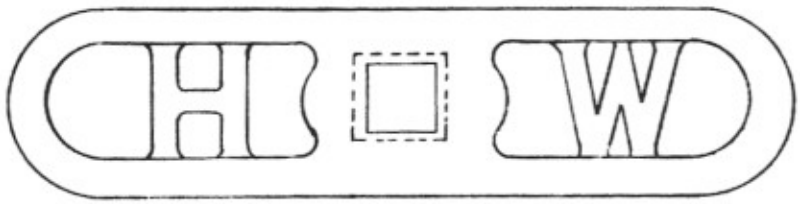
Figure 106

This trap is used to drain off condensate and prevent freezing. It is non-adjustable bellows type. When steam is on the trainline, the No. 900E bellows expands, closing the valve. The trap should drain condensate only. If it continues to blow a steady stream of steam, it is due either to dirt being lodged between the seat and the bellows stem or to a defective bellows.

END VALVES AND METALLIC CONDUIT. Vapor Company's No. 1117 end valve, 2½" x 2" bushed, and Barco Company's Type F-12, 2" metallic conduits are used with Vapor No. 312 coupler. The operating rods for the end valves are so arranged that these valves can be opened and closed from the ground or from the car platform.

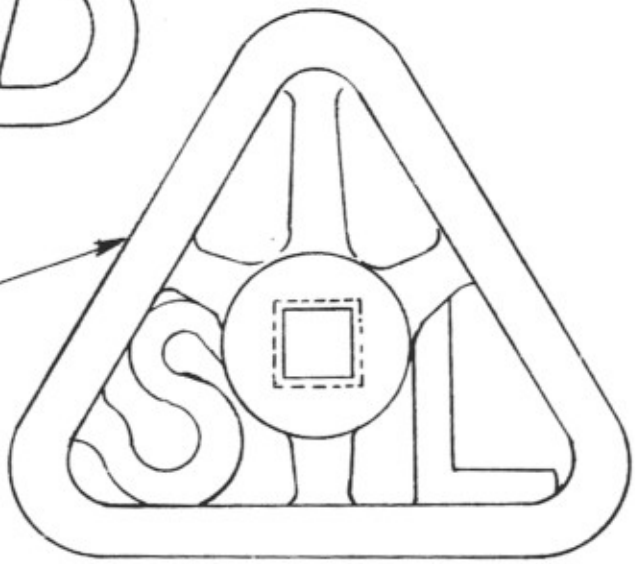
Refer to Manual on "Maintenance Instructions of Metallic Steam Conduits" for details.

No. 124 SHUT-OFF AND DRAIN VALVE: This valve is the same as No. 124 valve described on P. 226 of the A.C. Manual; however, some valves are now fitted with handles having cast letters to identify circuit they control. Figure below shows examples of these handles.

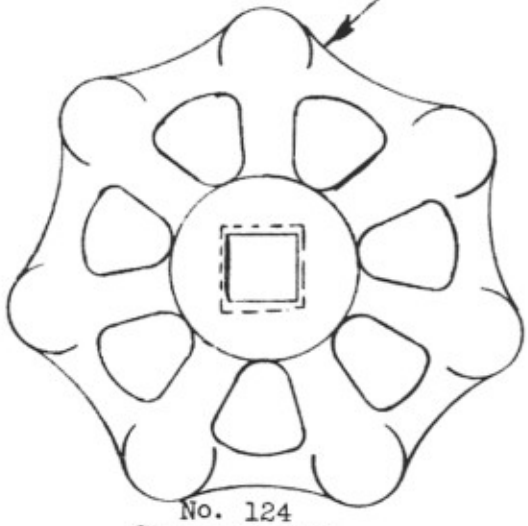


No. 124 H.W.
Steam to Hot Water Jacket

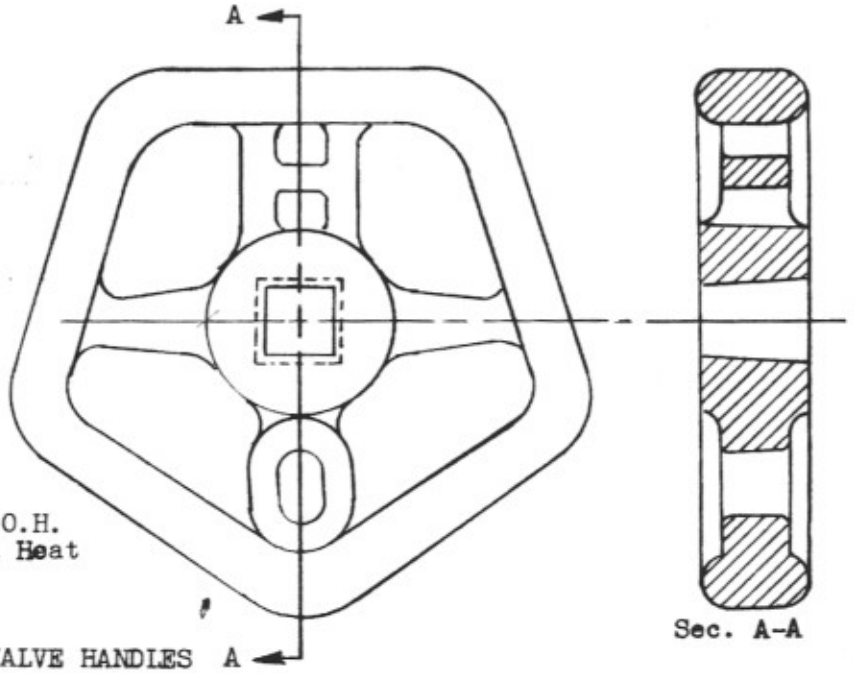
Optional



No. 124 S.L.
Steam to Loop.



No. 124
Steam to Loop



No. 124 O.H.
Overhead Heat

Sec. A-A

NO. 124 SHUT-OFF AND DRAIN VALVE HANDLES