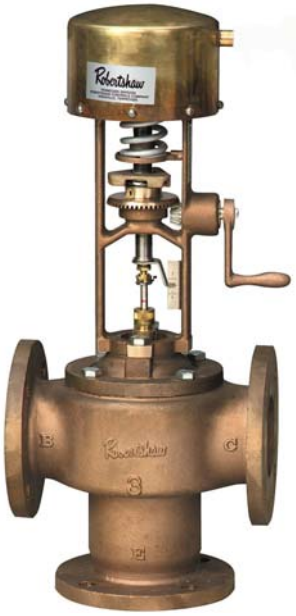
INSTRUCTION MANUAL

FOR

Bellows Actuated Control Valve

I-1081-A Series



Note to installer: Before installing, read instructions carefully. After installing, give this manual to operating personnel or see that it is filed for future reference.

Robertshaw
INDUSTRIAL PRODUCTS

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INSTRUCTION MANUAL NUMBER

P-2140

Rev. A

NOTES:

SECTION I - GENERAL INFORMATION

A. DESCRIPTION:

The I-1081-A Series Control Valves are for pneumatic or hydraulic control systems and are used for mixing or diverting service to control flow of oil, water or other fluids.

These control valves are recommended wherever the manual positioning feature is desirable. Should the Control Valve become inoperative due to damage or loss of pilot control pressure, the valve can be manually opened, closed or positioned by turning the hand crank. A stroke indicator shows the position of the valve poppet.

These control valves may be actuated by signals from any suitable temperature or pressure controller, such as the Robertshaw DT-700 "Fultrol" Pilot Temperature Controller. Air pressure from the controller is applied to the top of the bellows. As this pressure increases within the range of the loading spring, the actuator stem moves down.

B. ACTUATOR SPECIFICATIONS:

PRESSURE ASSEMBLY ..... All metal, two-ply seamless bellows

PRESSURE RANGE.....3-15 psig (0.2-1.0 bar)

MAX. BELLOWS PRESSURE..... 30 psig (2.07 bar)

PRESSURE CONNECTION.....1/4 NPT (female)

ACTION.....Air-to-push-down

MAX. AMBIENT TEMPERATURE .....200° F (93° C)

MAX. STROKE..... 1.031″ (26.19 mm)

ADJUSTMENT ..... Hand wheel for control pressure, crank for manual operation

FRAME.....Cast bronze

C. VALVE SPECIFICATIONS:

TYPE.....Three-way, type WD with balanced sleeve poppet

FLOW CHARACTERISTICS..... Quick opening

END CONNECTIONS..... Class 150 ANSI flanges

BODY MATERIAL ..... Brass standard (all sizes), steel optional (3″, 4″, 5″, 6″ sizes)

TRIM MATERIAL

- **STEM** .....316 stainless steel
- **PLUG** ..... Brass ASTM B16
- **POPPET**..... Brass ASTM B62
- **PIPE** ..... Brass ASTM B43
- **SEAT** .....Same as body
- **OTHER PARTS** ..... Non-ferrous metal

POPPET SEAL..... Buna-N (Nitrile) o-ring

POPPET SPRING.....302 stainless steel

PACKING.....EPT rubber U-cups

STEM CONNECTION .....Quick disconnect

MAX. SUPPLY PRESSURE

- **BRASS BODY** ..... 100 psig (6.9 bar)
- **STEEL BODY** ..... 150 psig (8.3 bar)

MAX. SUPPLY TEMPERATURE

- **BRASS BODY** .....200° F (93° C)
- **STEEL BODY** .....250° F (121° C)

MAX. PRESSURE DROP

- **2″, 2-1/2″, 3″ sizes**..... 40 psig (2.8 bar)
- **4″, 5″, 6″ sizes** ..... 25 psig (1.7 bar)

DIMENSIONS	CONTROL VALVE PART NUMBER (BRASS VALVE BODY UNLESS OTHERWISE SPECIFIED)					
	I-1081-A1∗ I-1081-A6 2″	I-1081-A1∗ I-1081-A7 2-1/2″	1-1081-A1∗ I-1081-A5 I-1081-A11∗∗ 3″	I-1081-A2 I-1081-A8∗ I-1081-A12∗∗ 4″	I-1081-A3 I-1081-A9∗ I-1081-A13∗∗ 5″	I-1081-A4 I-1081-A10∗ I-1081-A14∗∗ 6″
A	18 - 9/16	18 - 3/8	18	19 - 1/8	21 - 1/2	21 - 1/2
D	14 - 3/8	14 - 3/8	14 - 3/8	15 - 15/16	15 - 15/16	15 - 15/16
F	6 - 1/2	6 - 1/2	6 - 1/2	6 - 1/2	6 - 1/2	6 - 1/2
G	4 - 3/16	4	3 - 5/8	3 - 3/16	5 - 9/16	5 - 9/16
H	8 - 5/8	10	10 - 1/2	15 - 7/8	19 - 1/4	23 - 1/2
L	5 - 3/16	6 - 1/2	6 - 3/4	8 - 9/16	11 - 5/8	13 - 7/16
STROKE	9/32	13/32	5/8	5/8	23/32	1 - 1/32
E-B Cv	64	81	115	220	344	506
E-C Cv	64	88	106	237	385	563

∗ ACTUATOR ONLY (SUPPLIED WITHOUT VALVE) ∗∗ STEEL VALVE BODY

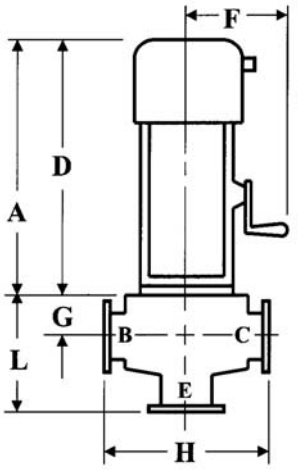

Figure 1

SECTION II - INSTALLATION

Control valves are sized to the demand of the vat, tank or process to be controlled and are frequently smaller than the supply line.

When making the connections, do not remove valve from the frame assembly unless absolutely necessary.

The control valve should be installed as close as possible to the unit to be controlled and a pipe line strainer should be placed just ahead of the valve. The control valve should be installed in the vertical position with the valve below the pressure element.

When controlling the flow of water used for cooling, the valve is usually on the supply end, but may be on either end of the unit, depending on the nature of the installation, particularly with regard to backing up full line pressure in the vessel.

Particular care must be taken when installing the three-way valve to make sure pipe connections are proper to obtain the control desired (See Section III). The connections may be identified by the letters E, B and C cast on the valve body.

For mixing applications, connect port "B" to hot supply and port "C" to cold supply. Port "E" is the outlet (See Figure 2 under "Typical Installations").

For diverting applications, port "E" is the inlet and "B" and "C" are outlets (See Figure 3 and 4 under "Typical Installations").

Stem pushed down closes "B", opens "C". Stem raised up closes "C", opens "B". "E" is common connection.

SECTION III – TYPICAL INSTALLATIONS

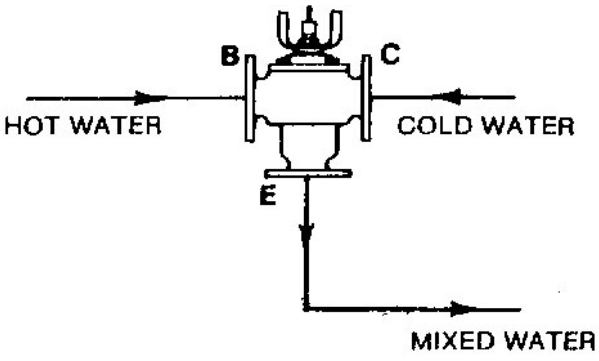

Figure 2 - Mixing

This figure illustrates a simple means for mixing hot and cold water where a rough mixing is suitable.

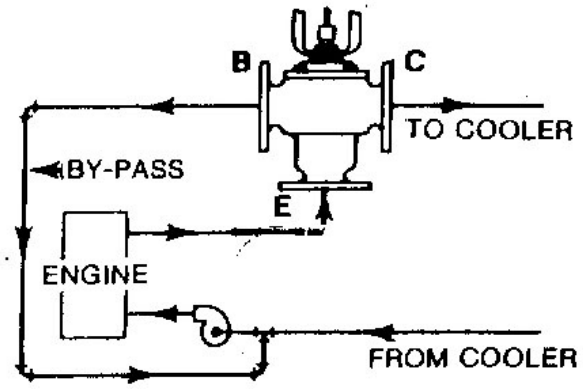

Figure 3 - Diverting

This figure illustrates the most widely used method of cooling water control for internal combustion engines.

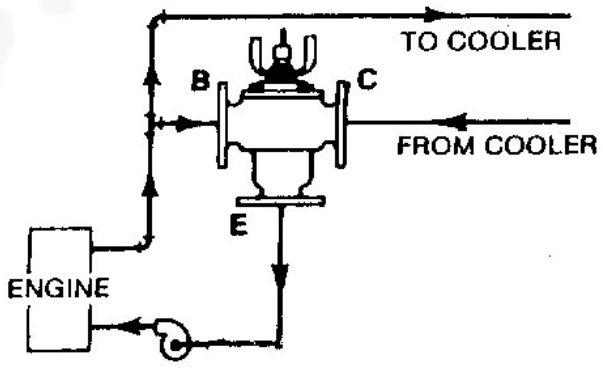

Figure 4 - Diverting

This figure illustrates a method of controlling the cooling of engine lubricating oil.

SECTION IV - ADJUSTMENTS

The control valve is factory set to operate through full stroke at 3-15 psi. (Begins strike at 3 psi, completes stroke at 15 psi.)

While this normally should not be adjusted, a slight adjustment may be made in this range by turning the adjustment wheel as shown if Figure 5.

To RAISE the pressure required to operate the valve through full stroke, turn the handwheel to the right (See arrow "A").

To LOWER the pressure required to operate the valve through full stroke, turn the handwheel to the left (See arrow "B").

The control valve has a scale plate located above the handwheel on the outside of the frame. The scale plate is calibrated to enable the operator to record and duplicate a previous setting.

Should it be desired to open, close or position the valve manually, it may be accomplished by turning the crank (manual positioner) as shown in Figure 5. The crank should not be forced when the stroke indicator is in either the extreme up or down position, as excessive pressure could result in poppet damage.

Before returning the control valve to automatic operation, pointer "F" must be positioned to "thermostatic" setting on scale "G" (with no pressure to actuating assembly). If this is not done, the manual override can prevent the valve from completing its full stroke.

The crank is designed so that it may be reversed to discourage tampering or accidental moving. Reversing can be accomplished as follows:

1. Removed cap screw and washer securing crank.
2. Remove crank, reverse it and replace it.
3. Replace washer and cap screw.

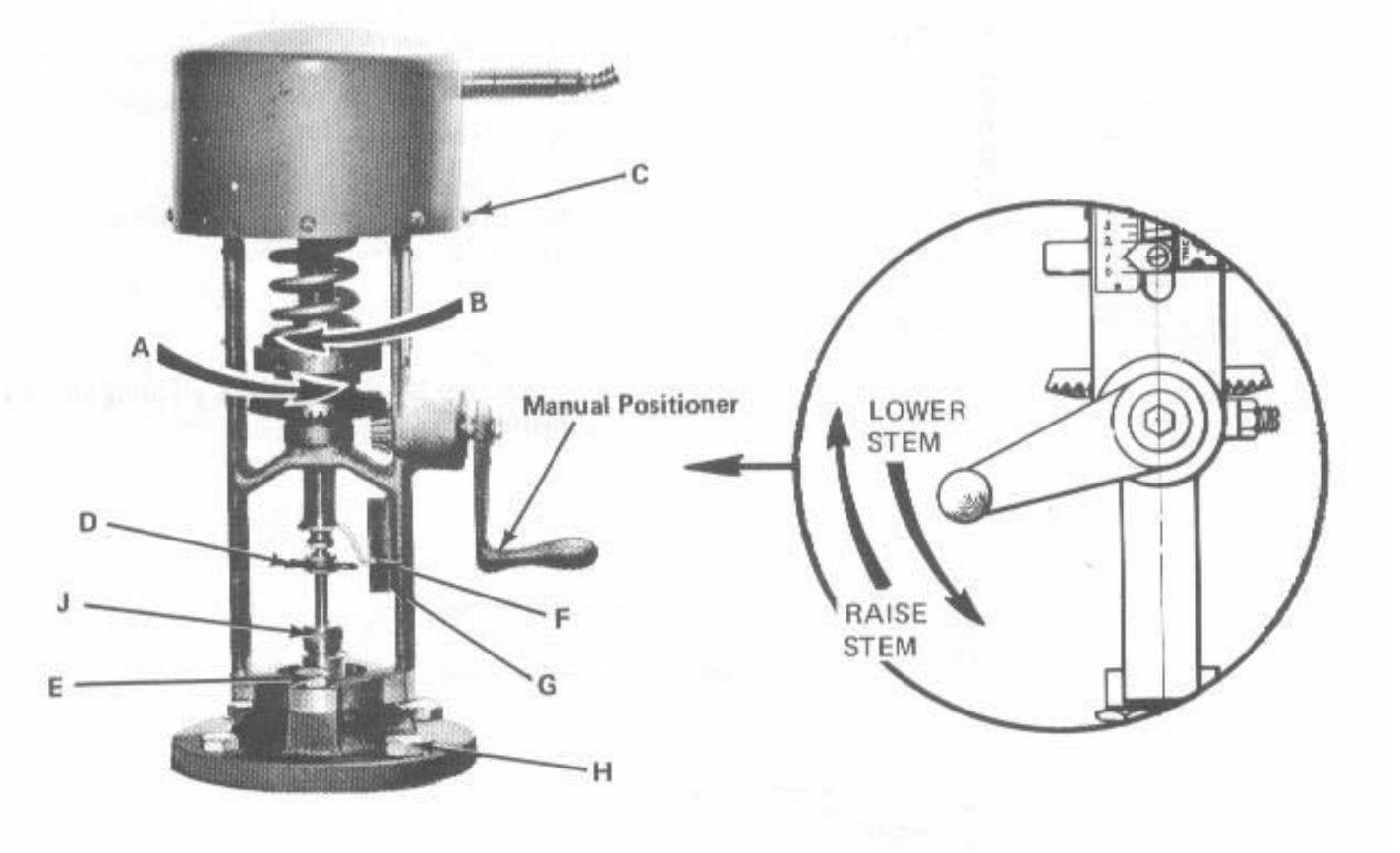

Figure 5

SECTION V - MAINTENANCE

The control valve, if properly installed and used, should require very little attention or maintenance, however, every piece of mechanical equipment deserves some care.

A. PACKING:

Valve stem packing nut (J in Figure 5) should be kept only finger tight. If valve stem packing must be replaced, follow these steps. (See Figures 5 and 6.)

1. Remove the upper works per Paragraph C.
2. Remove the packing nut (J) and packing gland.

Removal of the bonnet is not necessary but removing the bonnet makes it easier to remove the old packing.

3. Remove the cap screws (H) and remove the bonnet from the valve.
4. Remove old packing from the packing box.
5. Clean out packing box with a clean rag or soft paper.
6. Wipe off stem with clean rag. DO NOT attempt to polish. If stem is scratched or nicked around packing area, it should be replaced.
7. Inspect bonnet gasket. Replace if damaged.
8. Place bonnet and gasket on valve and secure with cap screws (H).
9. Carefully place new packing in packing box. If U-cup packing is not available, in an emergency, repack with a good grade of graphited string packing. Put a small amount of good packing lubricant in the stuffing box while repacking. This packing, however, should be replaced with U-cup packing as soon as possible.
10. Replace packing gland.
11. Replace packing nut (J) and finger tighten.
12. Replace the upper works on the valve per Paragraph C.

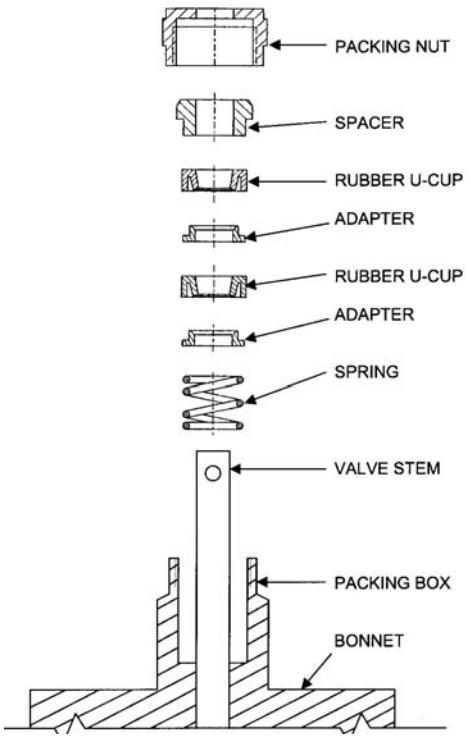

Figure 6

B. REFACING VALVE SEAT:

Under ordinary circumstances, this valve does not require especially tight seating; therefore, it should not be necessary, except in cases of excessive leakage, to resurface the seats. Under normal operating conditions, the valve will throttle between seats to maintain a steady control. In case it does become necessary to reface valve seats follow these steps.

1. Remove the upper works per Paragraph C.
2. Remove valve from line.
3. Remove the cap screws (H in Figure 5) and bonnet from the valve.
4. Lift out the poppet assembly.
5. Machine a very light amount from seating surfaces C, D, E and/or F (See Figure 7).
6. Add values of amount of metal removed from these surfaces and then machine that amount from either surfaces A or B (or from both) in order to maintain original valve stroke.
7. Place the poppet assembly into the valve body taking care not to cut or pinch the o-ring.
8. Remove the packing nut (J in Figure 5) from the packing box.
9. Inspect bonnet gasket. Replace if damaged.
10. Place bonnet and gasket on valve. As the valve stem pushes out the packing components push them back onto the stem and into the packing box.
11. Secure bonnet with cap screws.
12. Replace packing nut and finger tighten.
13. Replace valve in line.
14. Replace upper works per Paragraph C.

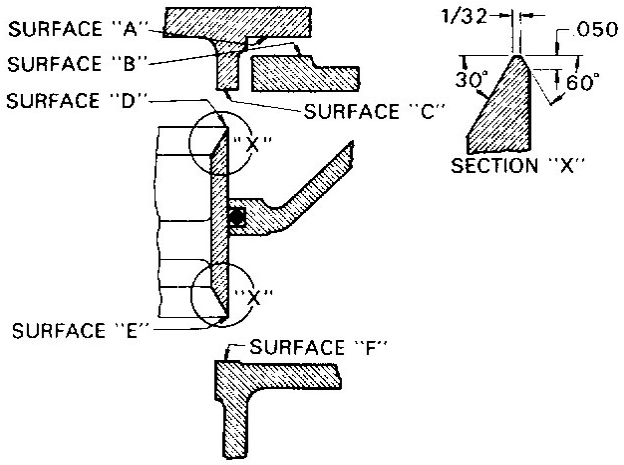

Figure 7

C. UPPER WORKS REMOVAL & INSTALLATION (See Figure 5):

1. Refer to the scale plate located above the handwheel on the frame and record the setting of the indicator.
2. Turn the handwheel to the left (See arrow "B") to lessen the load on the lock pin (D) and remove the

lock pin. As an alternate to turning the handwheel a slight amount of air pressure (approximately 3 psi) can be applied to the pressure assembly. Do not disturb the upper works connector.

3. Remove cap screws (E) and lift upper works from valve.
4. If reinstalling the original upper works reverse the above procedure.
5. If installing a replacement upper works:
   a. Place the upper works on the valve and secure with cap screws (E).
   b. Refer to the scale plate located above the handwheel on the frame and record the setting.
   c. Turn the handwheel to the left (See arrow "B") to align the holes in the upper works connector and the valve stem. Insert the lock pin (D). As an alternate to turning the handwheel a slight amount of air pressure (approximately 3 psi) can be applied to the pressure assembly.
   d. Check for full stroke through the pressure range (3-15 psi). If adjustments are necessary refer to Section IV.

D. REPLACING O-RING SEAL:

O-ring is cut to allow an approximate 1/8" gap between ends to allow for expansion and prevent binding. This is not a true o-ring seal. It acts as a floating gasket.

1. Remove cap screws (H in Figure 5) securing bonnet to valve.
2. Lift out entire poppet assembly and upper works.
3. Remove old o-ring and replace with a new o-ring.
4. Inspect bonnet gasket. Replace if damaged.
5. Replace entire poppet assembly and upper works taking care not to cut or pinch the o-ring.
6. Secure bonnet with cap screws.

E. REPLACING PRESSURE ASSEMBLY:

The pressure assembly consists of a two-ply metal bellows with brass heads encased in a brass housing. If for any reason this assembly becomes damaged, it must be replaced as a unit following these steps (See Figure 5).

1. Disconnect actuating pressure line from control valve.
2. Refer to the scale plate located above the handwheel on the frame and record the setting of the indicator.
3. Turn the handwheel to the left (See arrow "B") until handwheel is all the way down and spring fully relaxed.
4. Remove screws (C) and lift off pressure assembly.
5. Install new pressure assembly and secure with screws (C).
6. Turn handwheel to the right (See arrow "A") until indicator is at the original position.
7. Check for full stroke through the pressure range (3-15 psi). If adjustments are necessary refer to Section IV.

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