I. PRINCIPLE OF OPERATION

The Ruelco "AR-1" relay is a pilot operated manual relay. It is a three (3) way, normally closed valve with a palm knob for relay position indication and automatic operation. In the closed position, pneumatic or hydraulic pressure coming into the "Inlet" port is locked from the "Outlet" port by the upper shaft o-ring. The spring keeps the spool in the down or closed position. The valve can be opened in the manual mode by manually pulling the palm knob outward, thus moving the shaft assembly upward, by simply supplying the necessary pilot pressure.
When the relay is in the open position, it causes the middle o-ring to engage the body seal bore and the upper o-ring to disengage from the body seal bore respectively. Supply pressure at the "Inlet" port may then flow through the body to the "Outlet" port.

When the pneumatic signal is removed from the pilot cap, the spring moves the shaft assembly downward. This causes the upper o-ring to engage the body seal bore and the middle o-ring to disengage the body seal bore respectively. With the supply pressure blocked, pressure will flow from the "Outlet" port and exit through the "Vent" port. The relay may also be closed manually by pushing the palm knob inward.

II. INSTALLATION

The "AR-1" can be mounted either vertically, horizontally, panel mounted (with optional panel mount nut), or supported by piping from any of its ports. If it is supported by piping, care should be taken that the strength of the pipe fittings used is adequate to prevent the fitting from breaking off in the relay body should the relay be inadvertently struck.

Proper pipe thread sealant should be used on any pipe fittings threaded into the relay ports. If stainless steel fittings are used, a sealant that will prevent galling is required. Supply gas or hydraulic fluid flowing through the relay should be free of large dirt particles. If compressed air is used, it does not have to be lubricated. If natural gas is used, it should contain as little condensate as possible. This will extend the life of the seals.

If the relay is going to be installed in a location where the stem will be exposed to excessive paint, sand, drilling fluids, etc., the use of the optional stem protector is recommended. The stem protector does not affect the operation of the relay and will prevent the relay from jamming should the exposed portion of the shaft accumulate excessive trash or debris.

III. DISASSEMBLY (REFER TO SPEC. SHEET 14A1)

Tools required are as follows:

- 7/16" open end wrench or suitable adjustable wrench
- 1" open end wrench or suitable adjustable wrench
- 7/8" open end wrench or suitable adjustable wrench and flat blade screw driver (for removal of optional stem protector)
- 1/8" Allen wrench (for complete disassembly)

A. PARTIAL DISASSEMBLY

1. To replace the two (2) shaft o-rings (Item 9) and the piston seal (Item 13), the relay does not have to be completely disassembled. The upper seal (Item 8) may not have to be replaced as often as the other moving seals.

2. Place the 7/16” wrench on the lock nut and rotate it clockwise while holding the knob (Item 1) until the knob is loose. Rotate the knob counterclockwise and remove it from the shaft subassembly (Item 10). If the optional stem protector is installed, pull the relay knob outward until the flat on the seal washer (Item 17) is visible. Use the 7/8” wrench to rotate the seal washer clockwise until the knob is loose. Remove the knob and seal washer simultaneously (rotate counterclockwise).

3. Remove any piping connections from the base (Item 15) that would prevent it from being removed from the body (Item 11). Using the 1” wrench, rotate the base counterclockwise until it is off the body.

4. Push the shaft subassembly through the valve body and slide the spring (Item 12) off the relay shaft.

5. The seals on the shaft may now be replaced as per instructions given in the repair section of this manual.

B. FULL DISASSEMBLY

1. Follow the procedures stated under partial disassembly. If the relay is panel mounted, it is not necessary to remove the relay from the panel, but it is recommended so that adequate inspection and cleaning of all parts may be performed.

2. Using the 1/8” Allen wrench, rotate the set screws counterclockwise approximately four (4) turns. The screws do not have to be completely removed.

3. Pull the head (Item 7) outward from the body. If the relay is panel mounted, pull the body from the head. If the head does not come completely out, it may be necessary to loosen the set screws more.

4. To remove the stem protector housing (Item 16), use the flat blade screw driver and rotate the screws (Item 4) counterclockwise.

5. The relay is now ready to be cleaned and repaired.

IV. REPAIR AND ASSEMBLY

1. Remove the piston and shaft seals from the shaft and the upper seal from the body.

2. Using an appropriate safety solvent, clean all parts.

3. Inspect the shaft assembly for any major damage such as burrs, nicks on the upper part where the upper seal (Item 8) contacts its. Also inspect it for straightness. Replace the shaft assembly is damaged.

4. Examine the relay body and head bores for any damage such as burrs, nicks, etc. Replace any damaged pieces.

5. Replacement seals from a Ruelco product repair kit are required for proper relay performance. It is recommended that all seals be lubricated before and after installation with a high quality silicone base grease.

6. Install the upper seal into the valve body. NOTE: This is a cup type seal. The inside of the cup should be facing down and toward the valve body as shown.

7. Install the head into the upper body. The panel mount threads should almost touch the body. If not, remove the head and verify that neither the set screws or any debris are obstructing the correct installation.

8. Using the Allen wrench, rotate the three (3) set screws clockwise until lightly tightened. Tighten all three (3) firmly afterwards.

9. Install the piston seal onto the shaft subassembly. NOTE: This is a cup type seal. The inside of the cup should be facing toward the bottom of the shaft subassembly as shown. Be sure that the inside lip of the seal is completely pushed into the piston groove.

10. Lubricate the shaft o-rings and install on the shaft subassembly.

11. Lightly lubricate the large bore in the relay body.

12. Slide the spring over the shaft subassembly and slide the shaft into the relay body.

13. Lubricate the base o-ring (Item 14) and install into the valve body.

14. Rotate the base clockwise onto the body and use the 1” wrench to tighten.

15. If a stem protector is to be used, locate the holes in the protector body over the threaded holes in the head. Insert the two (2) screws and rotate them clockwise to tighten.

16. Thread the lock nut over the shaft subassembly until it reaches the last thread. Do not tighten. Rotate the knob over the shaft thread until it touches the lock nut. Hold the knob and turn the lock nut counterclockwise with the 7/16” wrench until firmly tightened.

17. To install the stem protector washer and the knob, thread the washer as far down onto the shaft as possible. Screw the knob onto the exposed threads above the washer, but do not tighten. Pull the relay shaft fully outward and thread the protector washer until it stops. NOTE: The protector seal should now be completely inside the protector housing. Release the relay knob and allow the shaft subassembly to retract. Rotate the knob clockwise until it stops. Pull the knob outward again and use the 7/8” wrench to turn the protector washer counterclockwise until tight.

V. RECOMMENDED MAINTENANCE

Procedure and Interval

Operate Manually – Every thirty (30) days.

Disassemble, inspect and lubricate – Yearly or as required.

Replace all seals – Every two (2) years or as required.