



Installation and Maintenance

REPAIR AND ADJUSTMENT PROCEDURES FOR HONEYWELL MP-953B, MP-953D, OR MP-953F PNEUMATIC OPERATORS USED ON ARMSTRONG HUMIDIFIERS

This bulletin should be used by experienced personnel as a guide to the repair and adjustment of Honeywell MP-953B, MP-953D, or MP-953F pneumatic operators for Armstrong humidifiers. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact Armstrong or its local representative if further information is required.

WARNING: BE SURE THAT STEAM SUPPLY VALVE FOR THE HUMIDIFIER IS **CLOSED** BEFORE ATTEMPTING TO MAKE ANY REPAIRS TO THE OPERATOR.

Maintenance procedures for the Honeywell pneumatic operator include: removing the operator from the bonnet, installing the operator on the bonnet, replacing steam seals, changing operator springs, replacing the diaphragm, replacing the rolling seal, and replacing the valve and seat.

I. REMOVING THE PNEUMATIC OPERATOR

Many repair procedures require that the operator be removed from the bonnet assembly. To remove the operator, perform the following steps. Refer to Figure 1 (see back cover) to locate the parts by item numbers.

1. Turn off steam to the humidifier.
2. Turn off the instrument air and disconnect the line from the operator.
3. Loosen the two set screws (27) on both sides of the operator base (26).
4. Remove operator plug (35) from the MP-953D, or open the access plate on the MP-953B or MP-953F.
5. Insert a screwdriver into the slot at the top of the yoke assembly (36). Hold the operator and turn screwdriver clockwise until the yoke assembly disengages from the operator.
6. Lift the operator from the bonnet.
(See Figure 1 on back cover.)

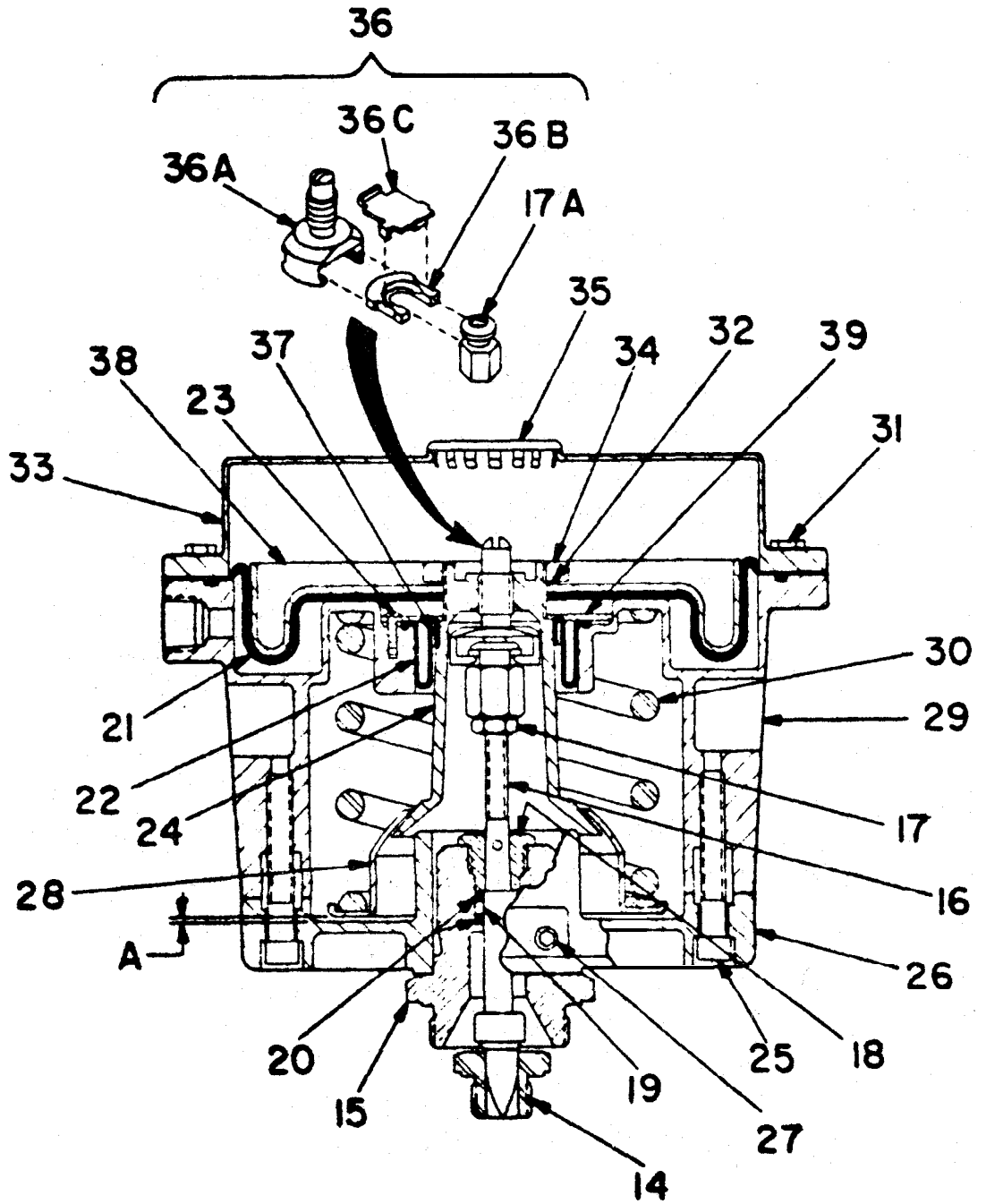


Figure 1.



II. INSTALLING THE PNEUMATIC OPERATOR

After necessary repairs have been made, perform the following steps to install the operator.

1. Press down the valve stem (16) so that the valve is completely closed.
2. If the stem nut (17) and stem adapter (17A) were not removed during repairs, check the adjustment shown in Figure 2. Adjust as required. If the stem nut (17) and stem adapter (17A) were removed during repairs, turn them onto the stem and adjust as shown in Figure 2.
3. Assemble the yoke assembly (36) and stem adapter (17A) in the following manner.
 - a) Hold the bearing (36B) in the orientation shown in Figure 1 (flat side down, depression up). Slide the bearing into the groove of the stem adapter (17A).
 - b) Place the spring (36C) on top of the stem adapter (17A) and bearing (36B) with the longer tabs pointed downward toward the notches in the sides of the bearing.
 - c) Slide the yoke (36A) over the spring (36C), bearing (36B), and stem adapter (17A) until the short tabs of the spring snap into place on both sides of the yoke. Center the yoke over the stem (16).
4. Place the operator over the yoke assembly (36) and lower the operator onto the bonnet (15).
5. Hold the operator to prevent it from turning. Insert a screwdriver into the slot in the top of the yoke (36) and turn counterclockwise until the operator base (26) contacts the mating surface of the bonnet (15).
6. Tighten the two set screws (27).
7. Load the stem by turning the yoke (36) clockwise until the spring cup (28) is from 1/16 to 1/8 inch above the operator base (26). (Dimension "A" in Figure 1).
- a. Install the operator plug (35) in the top of the MP-9530 or close the access plate on the top of the MP-953B or MP-953F.
9. Turn on the steam to the humidifier.
10. Connect the air line to the operator and turn on the instrument air. Make any necessary adjustments.

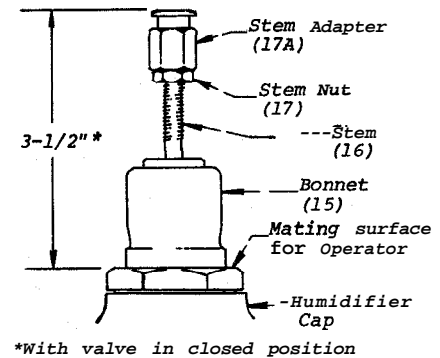


Figure 2.



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III. REPLACING STEM SEALS

There are stem seals in the bonnet assembly to prevent steam leaks around the stem. The following steps should be followed if these seals need to be replaced.

1. Remove the pneumatic operator in accordance with Section I.
2. Remove the bonnet assembly (15) from the humidifier cap.
3. Remove the yoke assembly (36), stem adapter (17A), and stem nut (17) from the stem (16).
4. Remove the packing gland (18) from the bonnet (15).
5. Push down the valve stem (16), then press it back into place. Repeat if necessary to loosen the seals (20) and spacer (19).
6. Remove the seals (20) and spacer (19).
7. With the stem (16) in the bonnet (15), place two new seals (20) with the spacer (19) between them, onto the stem. The open end of BOTH seals (with spring showing) should be toward the valve.
 - a. Carefully guide the seals into place in the bonnet (15). Slide the packing gland (18) over the stem and turn it into the bonnet. Tighten the packing gland securely.
9. Turn the bonnet assembly (15) into the humidifier cap, and tighten securely.
10. Install the pneumatic operator in accordance with Section II.

IV. CHANGING OPERATOR SPRINGS

1. Remove the pneumatic operator in accordance with Section I.
2. Remove the six cover screws (31) from the operator cover (33).
3. Lift the cover (33) from the frame (29).
4. Remove the hex nut (34) and washer (32) from the support (24).
5. Remove the follower (38) and diaphragm (21) from the frame (29).
6. **Invert** the operator and remove the screws (25) from the base (26).
7. Remove the base (26).
 - a. Carefully remove the cup (28) and support (24) -- avoid damaging the rolling seal (22).
9. Remove the old spring (30) and replace it with the new one.
10. Insert the support (24) through the center of the cup (28), and place the support and cup into the operator frame. Attach the rolling seal (22), and press the support back into place.



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11. Place the operator base (26) onto the frame (29), and secure it in place with screws (25).
12. Invert the operator back to its upright position. Place the diaphragm (21) and follower (38) into the frame (29).
13. Place the washer (32) around the top of the support (24), and turn on the nut (34). Tighten securely.
14. With outer edge of the diaphragm (21) in the groove of the frame (29), place the cover (33) over the frame. Align the screw holes.
15. Attach the cover with the cover screws (31). Tighten securely.
16. Install the pneumatic operator in accordance with Section II.

V. CHANGING THE ROLLING SEAL

To replace a rolling seal, perform the following steps.

1. Remove the pneumatic operator in accordance with Section I.
2. Perform Section IV (CHANGING OPERATOR SPRINGS) steps 2 through 8 to disassemble the operator.
3. With the operator in the upright position, remove the three screws (23) and ring (39) that secure the rolling seal (22).
4. Remove the rolling seal (22). Then separate the cup (37) from the old seal.
5. Place the cup (37) into the new rolling seal. Install the new seal in the frame.
6. Secure the new rolling seal (22) in place with the ring (39) and three screws (23). Tighten securely. Be sure that the edge of the rolling seal is in the groove in the frame.
7. Perform Section IV steps 10 through 15 to reassemble the operator. Be sure that the spring (30) is in place.
8. Install the pneumatic operator in accordance with Section II.

VI. REPLACING THE HUMIDIFIER VALVE AND SEAT

To replace the humidifier valve and seat, perform the following steps.

1. Remove the pneumatic operator in accordance with Section I.
2. Remove the bonnet assembly (15) from the humidifier cap.



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3. Using a socket wrench, remove the old valve seat (14) from the humidifier cap. Install a new valve seat in its place.
4. Remove the yoke assembly (36), from the stem (16).
5. Remove the old valve and stem assembly (16) from the bonnet, and replace with a new valve and stem assembly. NOTE: If the stem seals are worn, replace them by performing Section III (REPLACING STEM SEALS), steps 4 through 8.
6. Install the bonnet assembly (15) in the humidifier cap, and tighten securely.
7. Install the pneumatic operator in accordance with Section II.

VII. CHANGING THE DIAPHRAGM

To replace the diaphragm, perform the following steps.

1. Turn off the steam to the humidifier.
2. Turn off the instrument air to the operator. NOTE: Generally, the diaphragm is replaced without removing the operator from the humidifier. However, there are times that the location of the humidifier makes it more convenient to remove the operator to a workbench for repair.
3. Remove the six cover screws (31) from the operator cover (33).
4. Lift the cover (33) from the frame (29).
5. Remove the hex nut (34) and washer (32) from the support (24). [Do not disturb the yoke assembly (36).]
6. Remove the follower (38) and diaphragm (21) from the frame (29).
7. Discard the old diaphragm (21) and lay a new one in its place.
8. Place the follower (38) on the diaphragm. Then place washer (32) around the top of the support (24), and turn on the nut (34). Tighten securely.
9. With the outer edge of the diaphragm (21) in the groove of the frame (29), place the cover (33) over the frame. Align the screw holes.
10. Install and tighten the six cover screws (31).
11. Turn on the steam to the humidifier.
12. Turn on the instrument air to the operator. NOTE: THE FOLLOWING ADJUSTMENTS ARE NECESSARY ONLY FOR THE GRADUTROL RELAY USED WITH THE MP-953B OPERATORS AND WITH MP-953F PILOT POSITIONERS.



VIII. OPERATING RANGE AND START POINT - MP-953B (See Figure 3)

1. Using a wrench (Honeywell Part No. 301572A supplied with gradutrol), loosen the cover locking screw.
2. Unscrew the start point adjustment knob and make adjustments according to the directions printed inside the knob as follows:

Range adjustment -

- a) 3 lb. range, all screws backed off to friction stop.
- b) 5 lb. range, plated (outer) screws tightened. Black (inner) screws backed-off to friction stop.
- c) 10 lb. range, all screws tightened.

Start point adjustment -

- a) Tighten cover until it bottoms.
- b) Back off (one turn max.) until desired start point of correct range scale lines up with indicator near "B" marking.
- c) Tighten the cover locking screw until it engages the relay housing. Do not overtighten.

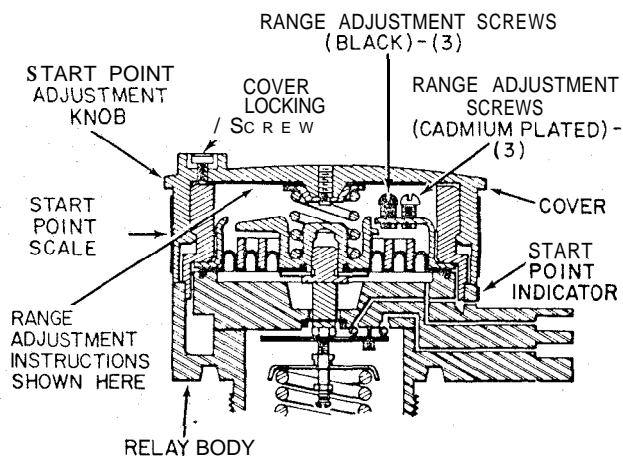


Fig. 3 - Adjustment Points of Gradutrol Relay.

IX. OPERATING RANGE AND START POINT - MP-953F PILOT POSITIONER

1. Set the start point on the positioner to the value desired. Each click of the start point knob adjusts the start point 1/4 psi.

NOTE: ON THE MP-953F PILOT POSITIONER, ONLY THE START POINT IS ADJUSTABLE. THE SPRING RANGE IS NOT ADJUSTABLE. THE RANGE CAN ONLY BE CHANGED BY REPLACING THE FEEDBACK SPRING.

2. Honeywell MP-953F operators (with positioners) come standard with an 8 - 13 psi (black) main spring. This spring does not change. The feedback spring, however, maybe changed in order to vary the spring range of the operator. It is available in 3, 5, or 10 lb. ranges. (See Chart 4) Since the start point is adjustable, full open point will be the start point plus the spring range.



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CHART 4

Feedback springs are available in a kit containing:

- 1 - Bias Spring
- 1 - White feedback spring, operating range 3 psi
- 1 - Bronze feedback spring, operating range 5 psi
- 1 - Violet feedback spring, operating range 10 psi

- 3. To change the feedback spring:
 - a) Turn off the instrument air.
 - b) Remove the pilot positioner by removing the two **phillips** head screws and one cover screw. Do not remove the pneumatic tubing.
 - c) The feedback spring is located in the operator on top of the main diaphragm. Remove the old feedback spring.
 - d) Insert the feedback spring that will give the desired operating range. Replace the bias spring located on top of the operator.
 - e) Replace the pilot positioner.
 - f) Turn on the instrument air.

X. ADJUSTMENT CHECK (MP-953B AND MP-953F MODELS ONLY)

- 1. Install guages in the main and pilot air lines.
- 2. Main air pressure should be equal to or more than top of sequencing range: 13 psi is minimum main pressure for device to function.
- 3. Slowly apply pilot pressure and note the pressure at which valve stem travel starts. This pressure should be within $\pm 3/4$ psi for the B model (± 1 psi for the F model) of the start point setting.
- 4. Slowly increase pilot pressure until valve stem travel is complete. This pressure should be within $\pm 3/4$ psi for the B model (± 1 psi for the F model) of the start point pressure plus the range setting.
- 5. Make fine adjustments, if necessary, with the start point adjustment knob. CAUTION (B MODEL ONLY): Loosen the cover locking screws before turning the start point adjustment knob.

