

Induction Air Terminals

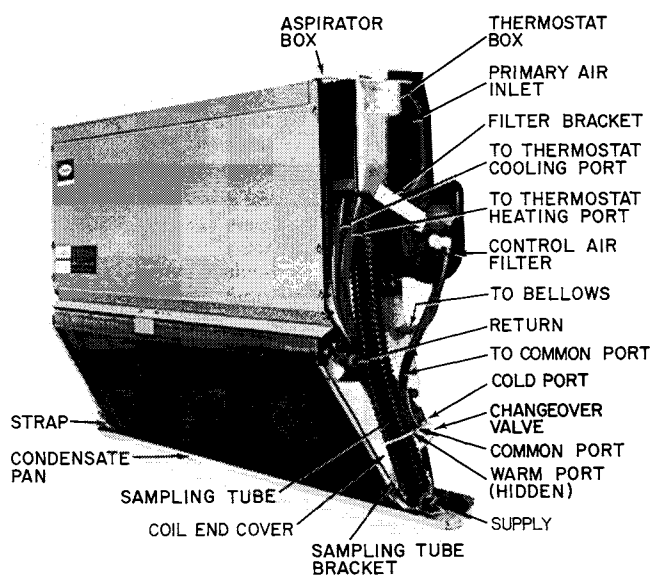
GENERAL

This book provides operating and maintenance instructions for 36R units, pages 1 thru 5, and for 36S units, page 6.

The 36R bypass induction air terminals are controlled by varying airflow over the unit coil. The 36S induction air terminals are controlled by varying water flow thru the coil.

36R UNIT OPERATION

Unit Description — A bypass damper, powered by duct pressure, controls room temperature by modulating the flow of induced air over the water coil. The unit may have changeover or nonchange-over control. A minimum primary air plenum pressure of 1.5 in. wg is required for satisfactory control operation.



**Fig. 1 — 36RV Base Unit with Changeover
(Optional Flare Fittings Shown)**

Operating Cycles (Fig. 2)

NONCHANGEOVER

1. Control air from plenum 1 passes thru filter 2 and orifice 3 into restrictor tee 4. There it divides to port 5 connected to bellows 7, and to port 6 connected to cooling port of thermostat 8.
2. Thermostat bimetal senses temperature of room return air induced thru sampling tube 12 by pri-

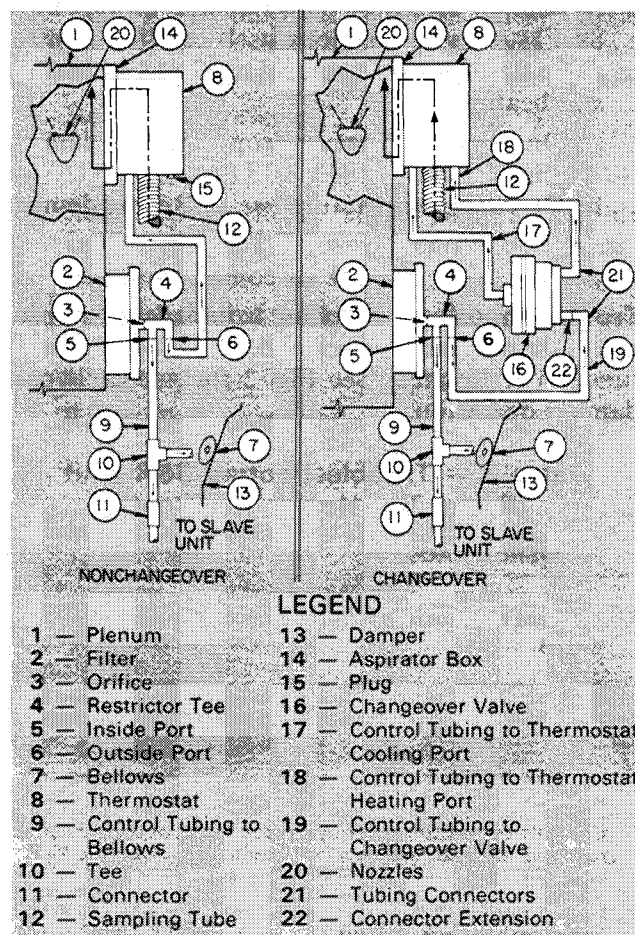


Fig. 2 — Operation Cycle Schematic Diagrams

mary air discharged from nozzles 20. Bimetal moves to position thermostat bleed port:

- a. On room temperature drop — Bleed port tends to close, increasing control system pressure. Pressure increase inflates bellows 7 causing damper 13 to open and allowing more room return air to bypass secondary water coil.
- b. On room temperature rise — Bleed port tends to open, decreasing control system pressure. The pressure decrease deflates bellows, causing damper to close and allowing more room return air over secondary water coil.

3. See Fig. 6 for control air connections.

CHANGEOVER

1. Functionally similar to nonchangeover cycle. Automatic changeover valve 16 is added to

reverse thermostatic action from heating to cooling or vice versa. Valve is mounted on secondary water coil and senses coil water temperature.

2. System on Cooling (Water Temperature Below 63 F) — Valve positions itself to allow control air to flow only thru control tubing 17 to thermostat cooling port.
 - a. On room temperature drop — Bypass damper tends to open.
 - b. On room temperature rise — Bypass damper tends to close.
3. System on Heating (Water Temperature Above 89 F) — Valve positions itself to allow control air to flow only thru control tubing 18 to thermostat heating port.
 - a. On room temperature drop — Bypass damper tends to close.
 - b. On room temperature rise — Bypass damper tends to open.
4. See Fig. 7 for control air connections.

Troubleshooting — Follow troubleshooting procedure in sequence. Check and follow up until malfunction is isolated. See Fig. 3 for proper bypass damper operation.

**Table 1 — Troubleshooting 36R Unit
(Room Too Hot or Too Cold)**

POSSIBLE CAUSE	REMEDY
System on Cooling	
1. Incorrect thermostat setting.	1. <i>Room too cold</i> — Move thermostat knob to WARMER position until damper opens. <i>Room too hot</i> — Move knob to COOLER position until damper closes.
2. Loose or kinked control tubing.	2. Tighten tube connections; remove kinks.
3. Controls connected incorrectly or filter not properly installed.	3. See Fig. 6 and 7 for correct control connections. Re-install filter.
4. Bypass damper binding under seals or against unit side panels as a result of shipping.	4. Move damper back and forth with straight rod to free from seals. Hit side panels lightly to eliminate damper rubbing.
5. Insufficient plenum pressure.	5. Measure plenum pressure (Fig. 4); should be no less than 1.5 in. wg.
6. Defective controls.	6. Check Tables 2, 3 and 4 in sequence.
7. Unit operating at other than design conditions.	7. Check: primary airflow (nozzle pressure) as in Fig. 5; primary air temperature; secondary water temperature. Correct to design condition.
System on Heating	
1. Incorrect thermostat setting.	1. <i>Room too cold</i> — Move thermostat knob to WARMER position until damper closes. <i>Room too hot</i> — Move knob to COOLER position until damper opens.
2. Refer to POSSIBLE CAUSES 2 thru 7 above.	2. Follow procedures 2 thru 7 above.

Table 2 — Bypass Damper Check (Fig. 2, 3)

CHECK PROCEDURE	FOLLOW-UP
1. Disconnect tubing at outside restrictor port.	1. If damper closes, see procedure 2; if not, unit requires leveling.
2. Plug outside restrictor port with finger.	2. If damper opens, reconnect tubing and check as in Table 3. If not: <ol style="list-style-type: none"> a. Check for restrictions in filter and restrictor tee. b. Check for leaks in bellows or tubing to bellows. Replace defective part.

Table 3 — Changeover Valve Check (Fig. 2, 3)

CHECK PROCEDURE	FOLLOW-UP
This check should be performed when system is on Cooling (water temperature at 63 F or below).	
1. Disconnect tubing at valve cold port.	1. If damper closes, see procedure 2; if not, valve is defective. Replace.
2. Plug valve cold port with finger.	2. If damper opens, reconnect tubing to cold port and check Table 4; if not, valve is defective. Replace.
This check should be performed when system is on Heating (water temperature at 89 F or above).	
1. Follow procedures 1 and 2 above, disconnecting or plugging valve <i>warm</i> port instead of <i>cold</i> port.	1. Perform follow-up procedures 1 and 2 above. In procedure 2, reconnect to <i>warm</i> port instead of <i>cold</i> port.

Table 4 — Thermostat Check (Fig. 3)

(This check should be performed at room temperatures 65 F to 85 F.)

CHECK PROCEDURE	FOLLOW-UP
1. Move thermostat knob to extreme cool position.	1. <i>Chilled water in coil</i> — If damper closes, see procedure 2; if not, thermostat is defective. Replace the assembly. <i>Hot water in coil</i> — If damper opens, see procedure 2; if not, thermostat is defective. Replace assembly.
2. Move thermostat knob to extreme warm position.	2. <i>Chilled water in coil</i> — If damper opens, thermostat is operating properly; if not, it is defective. Replace. <i>Hot water in coil</i> — If damper closes, thermostat is operating properly; if not, it is defective. Replace.

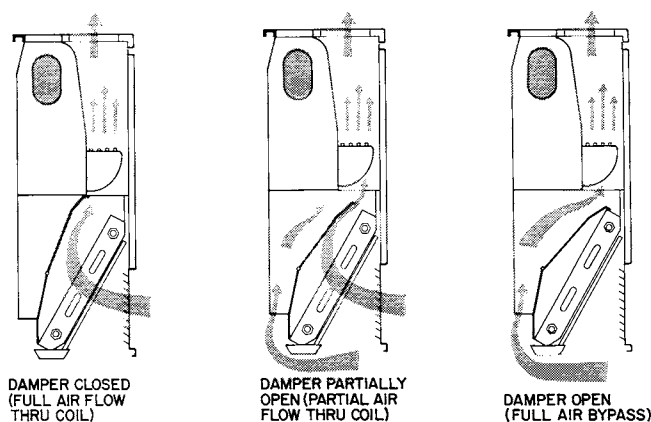


Fig. 3 — Bypass Damper Operation

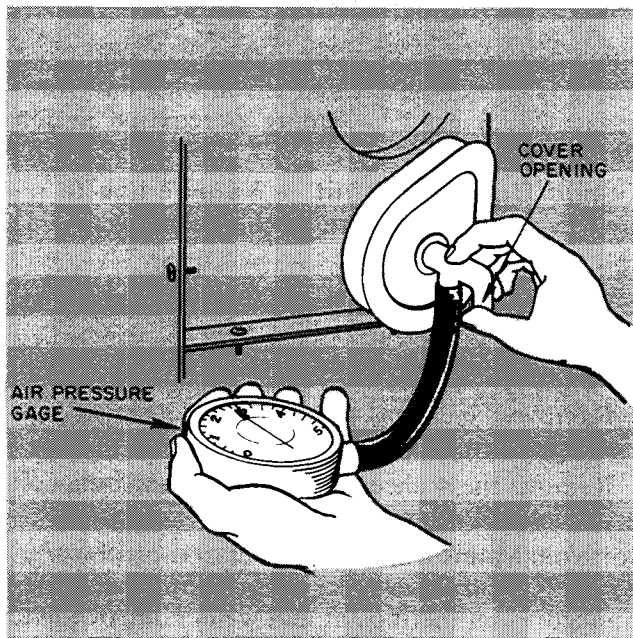


Fig. 4 — Measuring Plenum Pressure

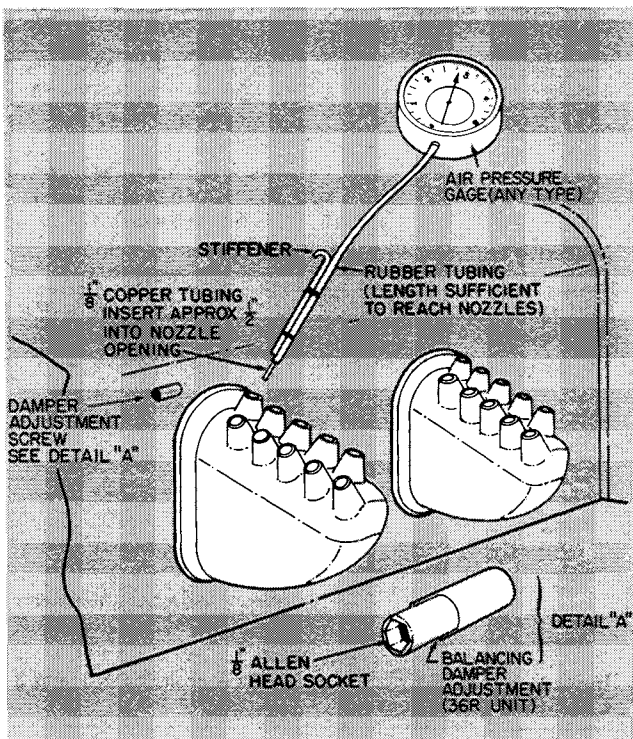


Fig. 5 — Measuring Nozzle Pressure

36R UNIT MAINTENANCE

→ **Lint Screen** (Accessory) — Remove front panel and clean screen with soft brush or vacuum. Schedule cleaning as job conditions dictate.

Foreign Objects in Unit — Vacuum unit to remove debris dropped thru discharge grille.

Control Air Filter Removal (Fig. 7)

1. Disconnect control tubing from restrictor ports.

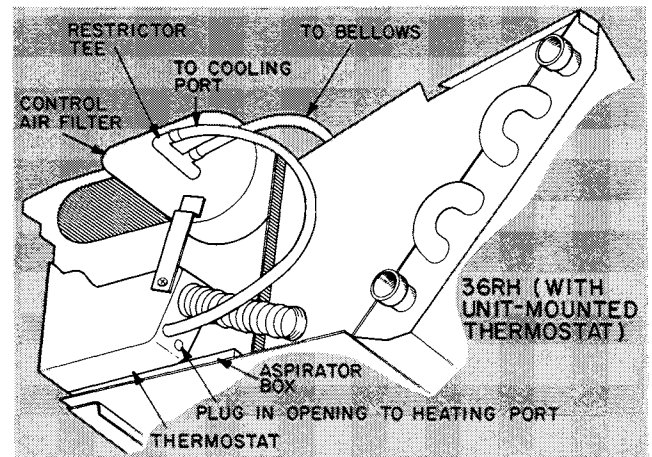
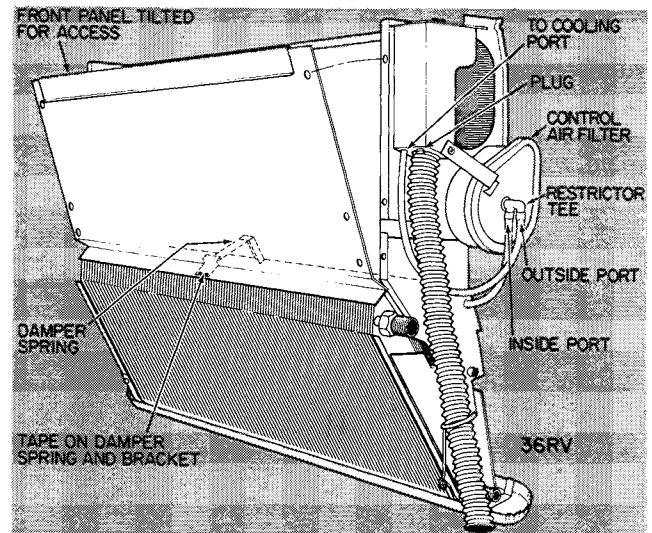


Fig. 6 — Control Air Connections (Nonchangeover)

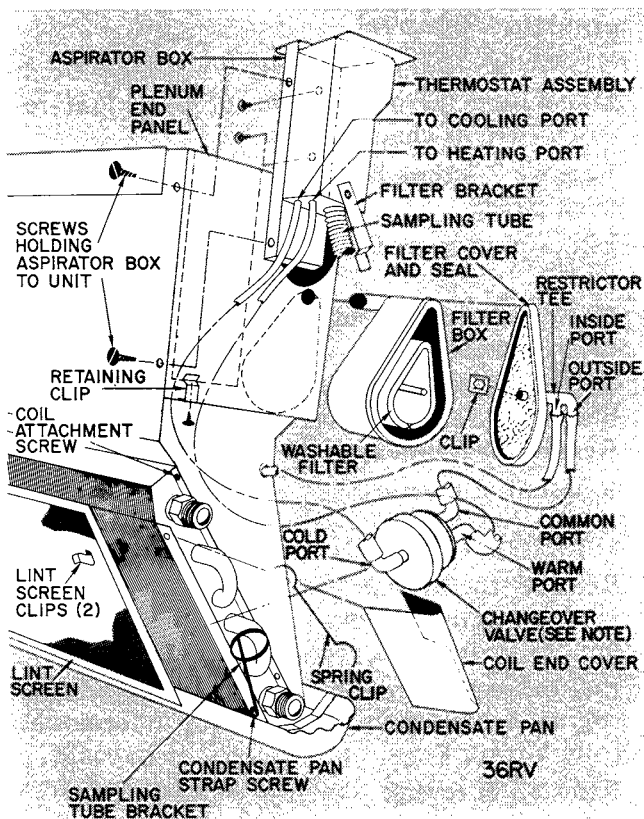
2. Swing filter bracket away from filter box; pull filter assembly from unit end panel.
3. Remove filter cover for access to filter media.

Changeover Valve Removal (Fig. 7 and 8)

1. Remove coil end cover; disconnect control tubing from valve ports.
2. If a pre-1973 changeover valve is to be removed, remove screw fastening valve to coil.
3. Remove valve and replace with one as shown in Fig. 7 and 8.
4. To remove changeover valve (as shown in Fig. 7 and 8), loosen spring clip, replace with new one and attach to coil as before.

Coil Removal (Fig. 7)

1. Shut off water to and from unit; disconnect lines to and from coil.
2. Remove coil end cover; remove changeover valve if used.
3. Remove 2 sheet metal screws fastening condensate pan strap to unit.
4. Remove 4 sheet metal screws fastening coil to unit; remove coil.



NOTE: On 36R units manufactured prior to 1973, loosen screw cap on valve and remove valve from coil and replace with valve as shown.

Fig. 7 — Control Assembly (Changeover)

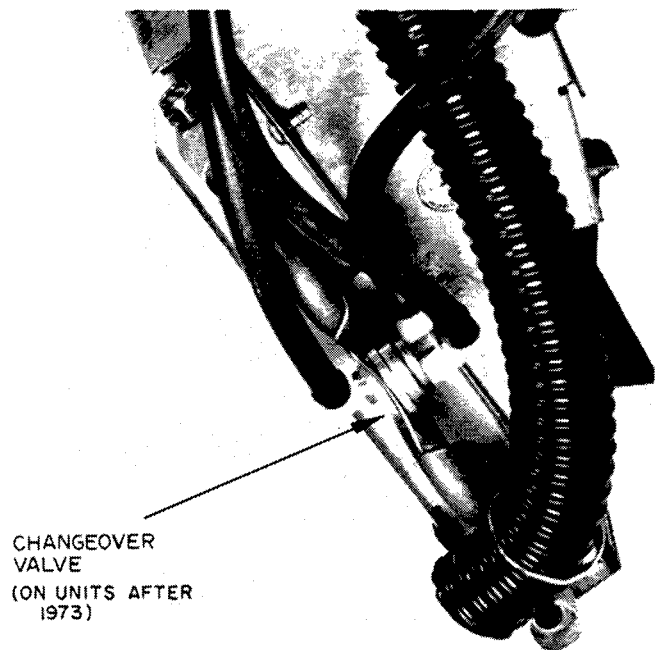


Fig. 8 — Changeover Valve

Bypass Damper Removal

1. Remove screws holding unit front panel; tilt panel forward from top, pivoting on top edge of coil (Fig. 6). Pull tape from top of damper spring; remove front panel.
2. Remove 4 screws fastening bottom rear panel to unit (Fig. 9).
3. At left end of unit (end opposite control tubing), remove wing nut fastening bellows assembly to unit; lift this end of assembly from screw.
4. Spread left side panel slightly to disengage bearing; then disengage bearing on opposite end.
5. Slide damper assembly diagonally out thru front of unit above coil.
6. Reinstall in reverse.

Bellows Assembly Removal (Fig. 9)

1. Disconnect control tubing from inside port of restrictor tee. Pull free end thru opening in side panel.
2. Remove wing nuts fastening bellows assembly to unit.
3. Lift bellows assembly from screws; lower to floor level and slide out beneath unit.

NOTE: If lack of clearance prevents this method of removal, remove thru front of unit above coil. (See steps 1 and 5 of Bypass Damper Removal.)

4. Reinstall in reverse.

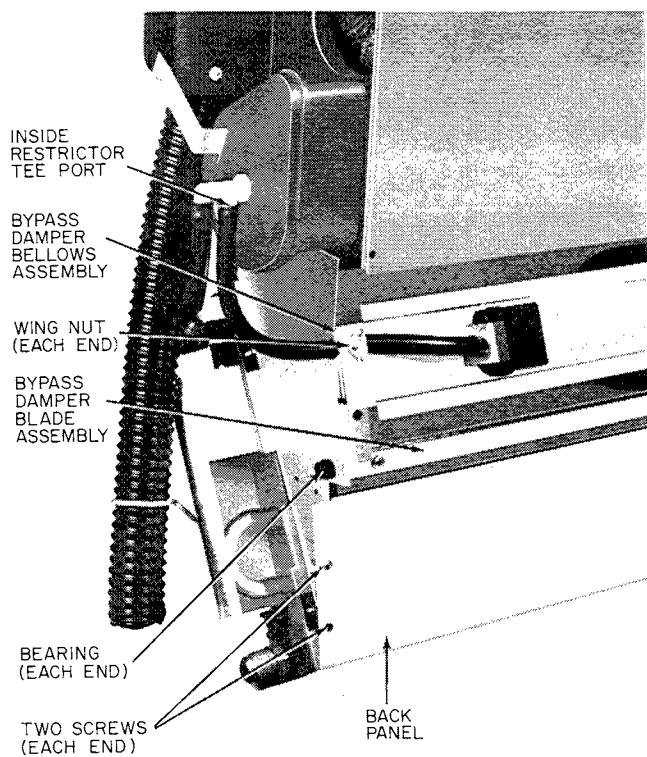


Fig. 9 — Bypass Damper Assembly

Thermostat Removal

UNIT-MOUNTED THERMOSTAT (Fig. 7)

1. Disconnect thermostat control tube(s) at restrictor tee or changeover valve.
2. Remove 2 screws holding aspirator box to unit front panel.
3. Lift aspirator and thermostat assembly from unit.
4. Remove 2 screws holding aspirator box to thermostat assembly.
5. Remove sampling tube from thermostat assembly (sampling tube has left-handed threads). Remove filter bracket from thermostat assembly.
6. Reinstall in reverse.

WALL-MOUNTED THERMOSTAT (Fig. 10)

1. Remove thermostat cover plate and control knob; remove 2 screws fastening thermostat to box.
2. Pull thermostat from box far enough to remove control tubing from ports; remove thermostat from box.
3. Reinstall in reverse.

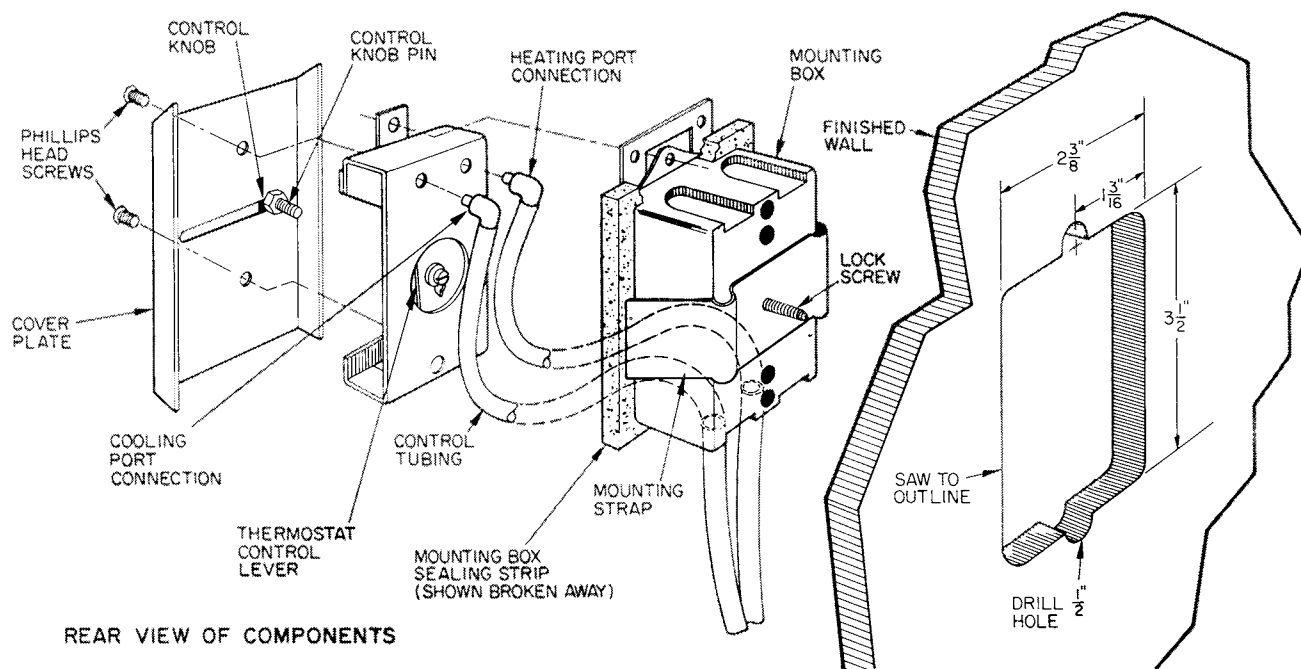
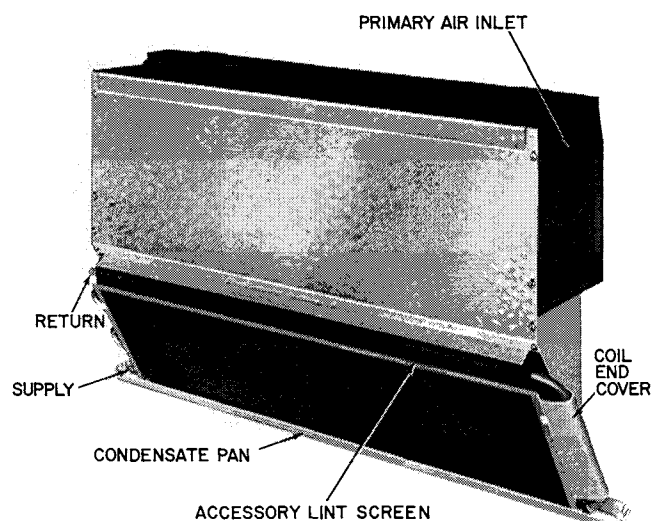


Fig. 10 — Wall-Mounted Thermostat Assembly

→ 36S UNIT OPERATION

Unit Description — The 36S units control room temperature by means of a field-supplied water flow control valve that modulates the flow of hot or chilled water thru the unit coil.



→ **Fig. 11 — 36SV Base Unit with Optional Lint Screen (L.H. Unit Shown)**

Operation — Primary air from the central station air handling apparatus flows thru high pressure, high velocity ductwork to the 36S unit.

The conditioned primary air flows thru the unit plenum and then passes thru a balancing damper into induction nozzles. As the primary air leaves the nozzles, it induces secondary (room) air thru the unit coil. Depending on the temperature of the water flowing thru the coil, the secondary air is cooled or heated.

Unit capacity is controlled either manually or by a field-supplied room thermostat modulating a field-supplied water control valve. The valve, in turn, modulates water flow thru the coil to maintain the desired temperature.

→ 36S UNIT MAINTENANCE

Lint Screen (Accessory) — Remove unit front panel for access. Then clean screen with soft brush or vacuum. Schedule cleaning as required by job conditions.

Foreign Objects in Unit — Vacuum unit to remove debris dropped thru discharge grille.

Coil Removal

1. Shut off water to and from unit. Disconnect lines to and from coil.
2. Remove coil end cover.
3. Remove the 2 sheet metal screws fastening condensate pan to unit.
4. Remove the 4 sheet metal screws fastening coil to unit and remove coil.

Controls Maintenance — Refer to control manufacturer's instructions for maintenance of field-supplied room thermostat and water control valve.

→ **Table 5 — Troubleshooting 36S Unit (Room Too Hot or Too Cold)**

POSSIBLE CAUSE	REMEDY
System on Cooling	
1. Incorrect thermostat setting.	1. <i>Room too cold</i> — Move thermostat knob to WARMER position until control valve closes. <i>Room too hot</i> — Move knob to COOLER position until control valve opens.
2. Defective controls.	2. Check control manufacturer's instructions.
3. Unit operating at other design conditions.	3. Check primary airflow (nozzle pressure) as in Fig. 5; primary air temperature; secondary water temperature. Correct to design condition.
System on Heating	
1. Incorrect thermostat setting.	1. <i>Room too cold</i> — Move thermostat knob to WARMER position until control valve opens. <i>Room too hot</i> — Move knob to COOLER position until control valve closes.
2. Refer to POSSIBLE CAUSES 2 and 3 above.	2. Follow procedures 2 and 3 above.

For replacement items use Carrier Specified Parts.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.