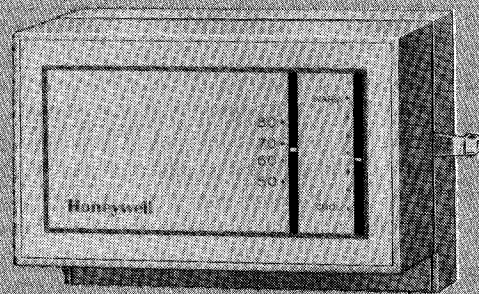


# Honeywell

## FLOATING CONTROL THERMOSTAT

THE T641A,B,C ROOM THERMOSTATS PROVIDE SPDT OUTPUTS TO CONTROL FLOATING ACTUATORS IN APPLICATIONS SUCH AS VARIABLE AIR VOLUME (VAV) TERMINAL UNITS.

- T641A standard Spdt floating control thermostat.
- T641B incorporates momentary system override switch providing external relay connection to be energized for override in Building Management Systems or other applications.
- T641C provides switch for manual changeover between heating and cooling.
- Model configurations include locking cover, blank cover, thermometer indication, internal or external set point adjustment, and Fahrenheit or Celsius scales.
- T641 has silent, environmentally reliable mercury switches operated by coiled bimetal element.
- Mounts directly on wall or horizontal outlet box; no separate subbase necessary.
- Electrically isolated (voltage type) fixed anticipators allow up to four actuators to be driven from one T641.
- Accessory wall plate allows for retrofit of T641 to existing competitive device installations.



## T641A,B,C

# SPECIFICATIONS

**MODELS:** The T641A,B,C room thermostats provide Spdt floating control used to control actuators in applications such as Variable Air Volume (VAV) terminal units.

**T641A:** Standard Spdt floating control thermostat.

**T641B:** Incorporates momentary system override switch providing external relay connection to be energized for override in Building Management Systems or other applications.

**T641C:** Provides manual heat/cool changeover switch.

Model	Feature
T641A1005	Blank, locking cover iwth internal set point (°F)
T641A1013	External thermometer (°F) with locking cover and internal set point (°F)
T641A1021	External set point (°F) less thermometer
T641A1039	External thermometer (°F) and Warmer-Cooler set point
T641A1047	External thermometer (°C) and Warmer-Cooler set point
T641A1054	External set point (°C), less thermometer
T641B1004	Blank, locking cover with internal set point (°F) with momentary system override switch
T641B1012	External thermometer (°F) and Warmer-Cooler set point with momentary system override switch
T641B1020	External set point (°F) less thermometer with momentary system override switch
T641B1038	External set point (°C) less thermometer with momentary system override switch
T641C1003	External set point (°F) less thermometer, with manual heat/cool changeover switch
T641C1011	External thermometer (°F) and Warmer-Cooler set point with manual heat/cool changeover switch
T641C1029	External thermometer (°C) and Warmer-Cooler set point with manual heat/cool changeover switch

## ELECTRICAL RATINGS:

Input voltage: 24 Vac 620%, 50/60 Hz.

**CONTACT RATINGS:** 1 Amp @ 24 Vac Maximum.

**MOMENTARY OVERRIDE SWITCH:** 2.5 Amp Maximum.

**DIMENSIONS:** See Fig. 1.

**SWITCHING:** Spdt Floating Control. Coiled bimetal sensing element operates mercury switches.

**TEMPERATURE ADJUSTMENT:** Internal or external lever for heating or cooling set point selection depending on model.

**TEMPERATURE SCALE RANGE:** 45° F to 85° F [7° C to 29° C].

**THERMOMETER RANGE:** 45° F to 85° F [7° C to 29° C].

**DEADBAND (CONTROL SPAN):** 3° F [° C]. See Fig. 8 for further explanation.

**ANTICIPATION:** Electrically isolated (voltage type) anticipators allow up to four motors to be driven from one thermostat, while also allowing a variety of motors to be used.

**AMBIENT TEMPERATURE (SHIPPING):** -40° F to 150° F [-40° C to ° C].

**OPERATING HUMIDITY:** 5 to 95% RH Noncondensing.

**MOUNTING:** The T641 is intended for horizontal wall mounting only and can be mounted either directly to a wall surface or a horizontal electrical outlet box. In order to insure proper thermostat operation, the device must be mounted level.

**APPROVALS:** Underwriters Laboratories INc. and Canadian Standards Association listings pending.

## ACCESSORIES:

221618—Wall plate for replacement of competitive devices.

ML6161A1019—Direct Coupled Actuator with 7 minute timing.

*continued on page 3*

# ORDERING INFORMATION

**WHEN PURCHASING REPLACEMENT AND MODERNIZATION PRODUCTS FROM YOUR TRADELINE WHOLESALE OR YOUR DISTRIBUTOR, REFER TO THE TRADELINE CATALOG OR PRICE SHEETS FOR COMPLETE ORDERING NUMBER, OR SPECIFY—**

1. **SUPER TRADELINE** order number.
2. **Accessories**, if desired.

**IF YOU HAVE ADDITIONAL QUESTIONS, NEED FURTHER INFORMATION, OR WOULD LIKE TO COMMENT ON OUR PRODUCTS OR SERVICES, PLEASE WRITE OR PHONE.**

1. **YOUR LOCAL HONEYWELL RESIDENTIAL AND BUILDING CONTROLS SALES OFFICE (CHECK WHITE PAGES OF PHONE DIRECTORY).**

2. **RESIDENTIAL AND BUILDING CONTROLS CUSTOMER SATISFACTION  
HONEYWELL INC., 1885 DOUGLAS DRIVE NORTH  
MINNEAPOLIS, MINNESOTA 55422-4386 (612) 542-75600**

**(IN CANADA—HONEYWELL LIMITED/HONEYWELL LIMITEE, 740 ELLESMERE ROAD, SCARBOROUGH, ONTARIO M1P 2V9) INTERNATIONAL SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES OF THE WORLD.**

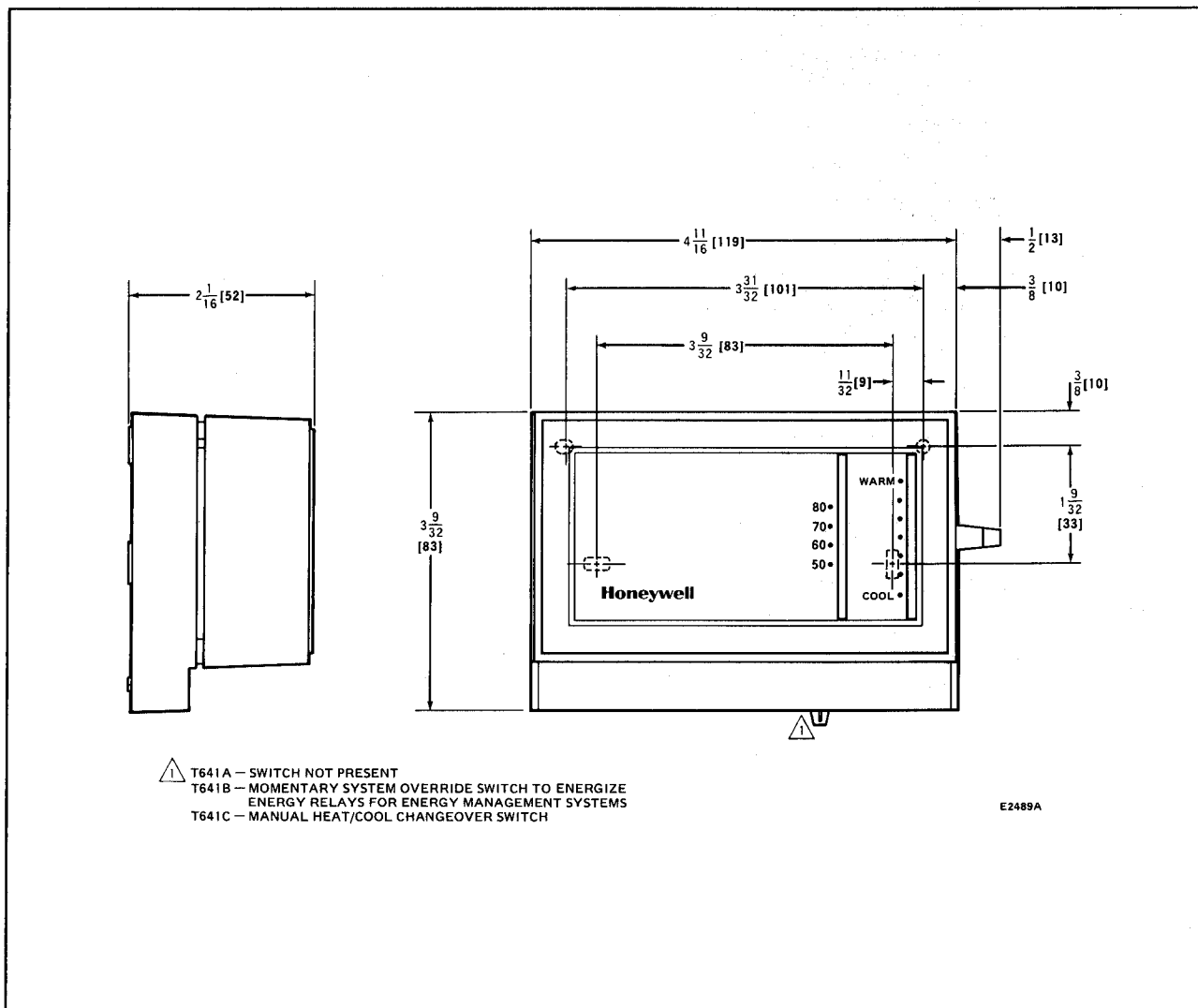


FIG. 1— DIMENSIONS OF T641A,B,C IN in. [mm IN BRACKETS].

## INSTALLATION

### WHEN INSTALLING THIS PRODUCT...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Installer must be a trained, experienced service technician.
3. After installation is complete, check out product operation as provided in these instructions.

### CAUTION

Disconnect power supply before beginning installation to prevent electrical shock to or equipment damage.

### LOCATION

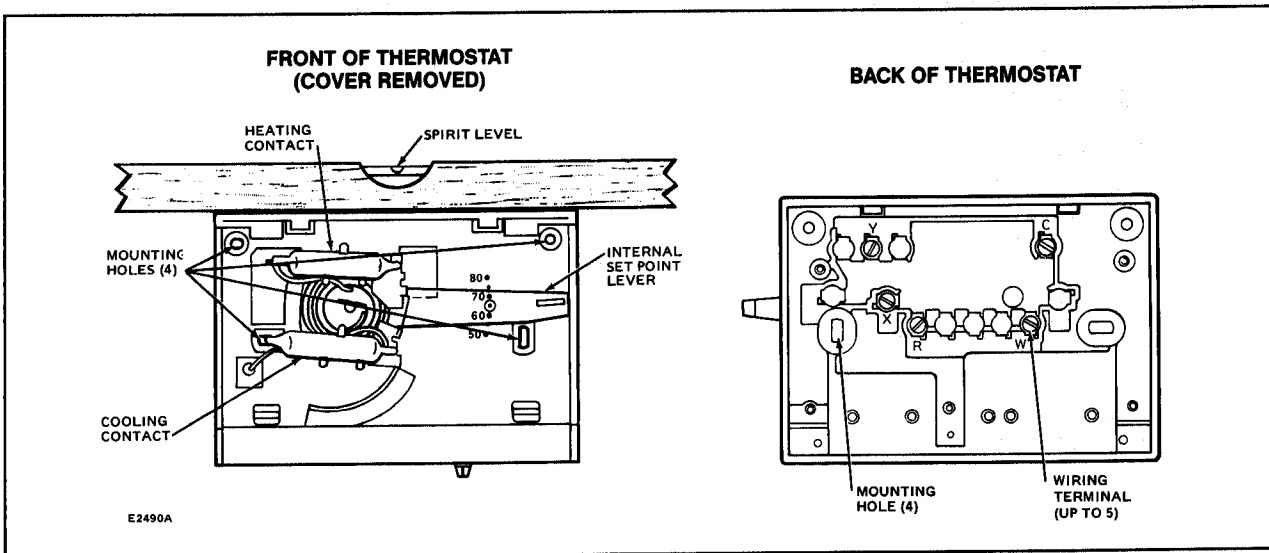
- Locate the thermostat about 5 ft. above the floor in an area with good circulation at average temperature.
- Do not mount the thermostat where it may be affected by:
- drafts or dead spots behind doors and in corners
  - hot or cold air from ducts
  - radiant heat from sun or appliances
  - concealed pipes and chimneys

### MOUNTING

The T641 requires horizontal mounting either directly to a wall surface or horizontal electrical outlet box. Two screws are used for outlet box mounting and four for wall mounting (the T641 includes four mounting screws). For locking cover devices, an additional bag assembly including two screws and an allen wrench are provided with the T641. In order to insure proper thermostat operation, the device must be mounted level. Level the thermostat exactly using a spirit level as shown in Fig. 2.

### IMPORTANT

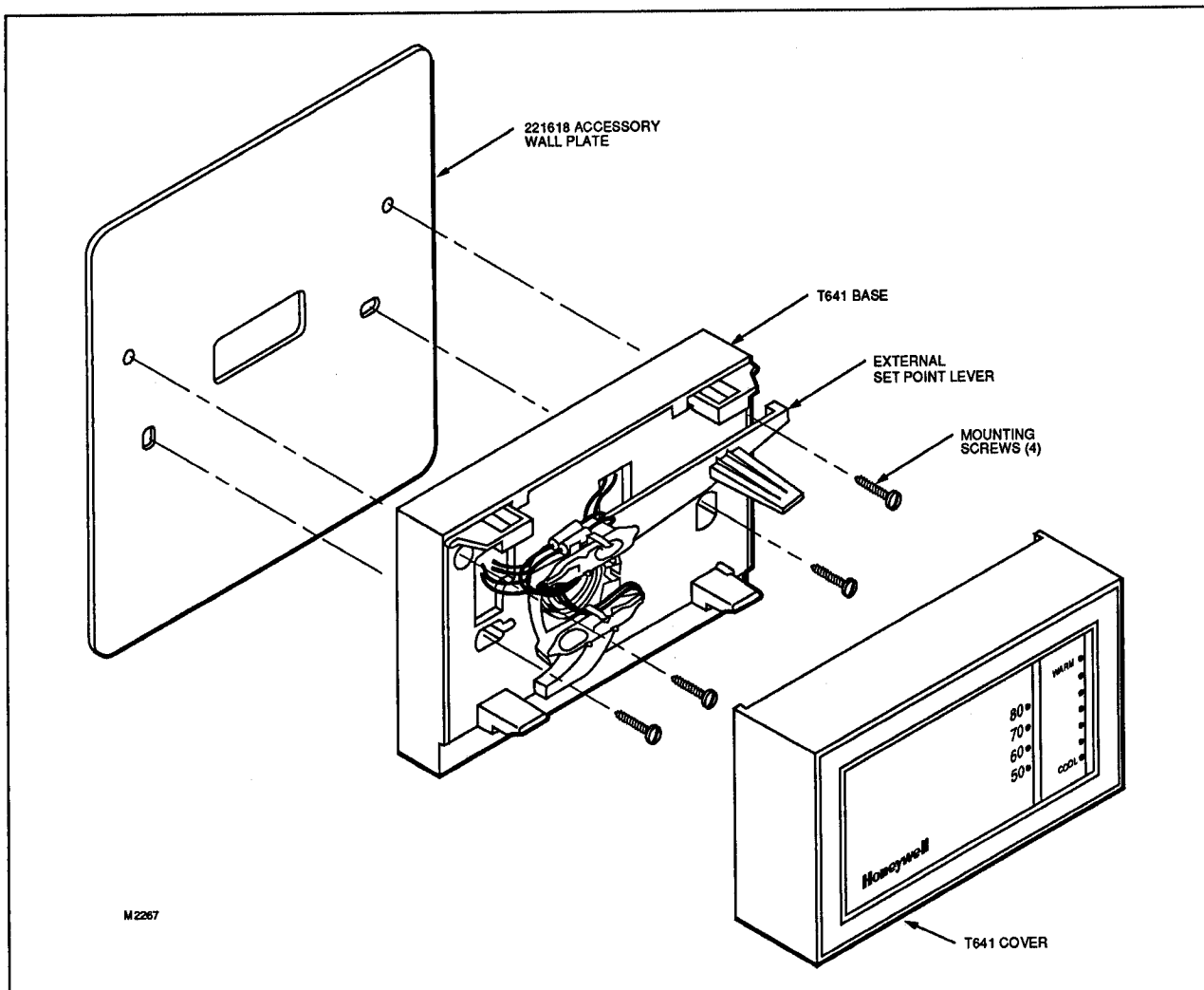
This thermostat was calibrated at the factory mounted at true level. Any inaccuracy in leveling during mounting will cause control point deviation. The T641 is not intended to be field calibrated.



**FIG. 2—THERMOSTAT COMPONENTS AND LEVELING PROCEDURE.**

An accessory wall plate, part number 221618, is available for field replacement of competitive devices without resurfacing the existing wall decor. The wall plate and the mounting procedure are outlined in Fig. 3. The Honeywell T641 does not directly replace the Barber Colman TF-

1111, TC-1191, or Johnson T58 thermostats due to its four-wire operating requirement. These competitive devices operate on a three-wire system, therefore an additional transformer "common" wire must be used for field interchangeability.



**FIG. 3—MOUNTING THE T641 USING THE ACCESSORY WALL PLATE.**

**WIRING**

All wiring must comply with local electrical codes and regulations. The T641 utilizes a four-wire operation, therefore an additional transformer "common" wire must be present for correct wiring and operation. See Fig. 4 for functional schematic of T641. Screw terminals are provided for easy hookup (four terminals for the T641A,C and five terminals for the T641B).

1. Run wiring from the actuator (if necessary) to the thermostat location. Connect the wires to the back of the T641 (See Fig. 5 for typical wiring connection).

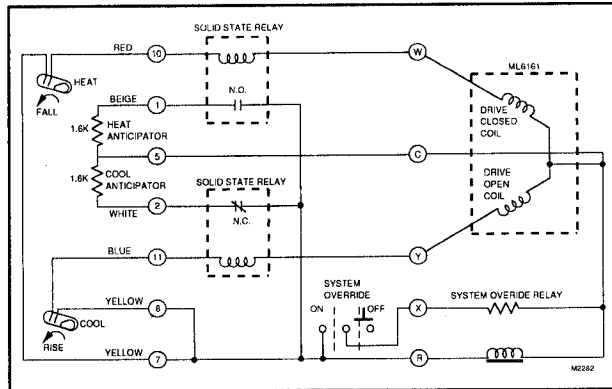
2. Loosely secure the T641 to the wall or outlet box with provided screws through the two mounting holes in the middle of the device.

3. Level the T641 exactly using a spirit level. Tighten the two mounting screws at the middle of the device.

4. Install remaining two provided screws in top mounting holes and tighten.

## WARNING

As a result of the cooling anticipator operating continuously in the floating band, the T641 incorporates a factory offset which calibrates the thermostat. Because of this, the T641 will appear to be switching 10.5° F lower, when unpowered than that which occur in actual operation. The cooling anticipator is necessary to provide proper thermostat cycling to match the current draw of the ML6161 actuator. Therefore, the "C" terminal must be used in order to insure proper thermostat calibration and operation.



**FIG. 4—FUNCTIONAL EQUIVALENT ANTICIPATOR CIRCUIT OF T641. NOTE: SYSTEM OVERRIDE SWITCH ONLY ON T641B. T641C HAS A DOUBLE SPDT SWITCH TO REVERSE Y & W FOR HEAT/COOL CHANGEOVER.**

**IMPORTANT**

The T641 is electrically compatible and designed to operate with actuators that have seven minute timings for full stroke of 90° (angular). Use with motors with timings less than seven minutes (90° full stroke) will result in unstable temperature control.

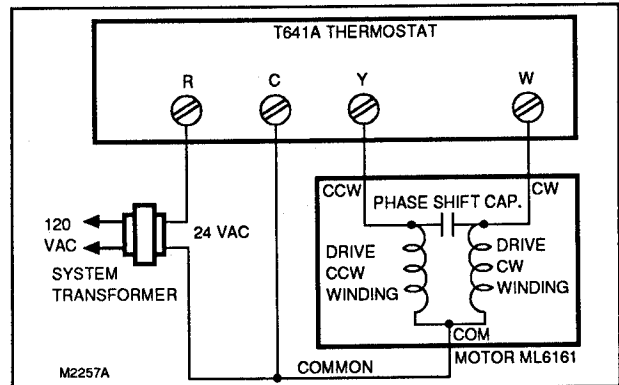
The T641B has a momentary system override switch which when pressed to the ON position will energize a relay that can be used in Building Management Systems or other applications. The momentary override switch will output a

24 Vac signal as long as the switch is held in the ON position. Once returned to the OFF position, no output signal will be present. For use in BMS or other application, the system that the T641B interfaces with must be capable of detecting a contact closure and respond accordingly to perform a desired action. For the T641B there are five screw terminals for hookup. See Fig. 7 for typical wiring connections.

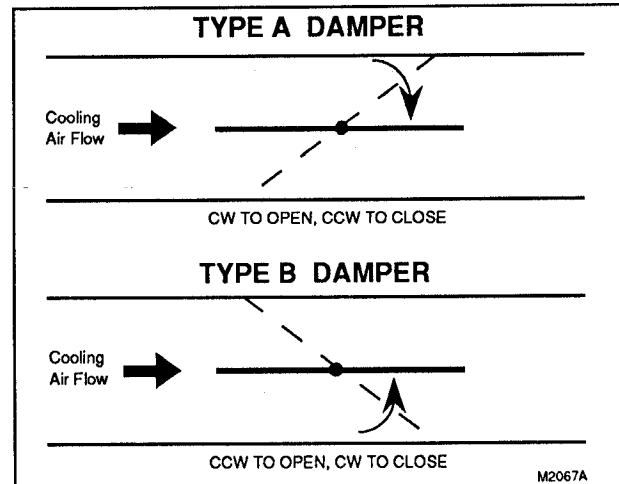
The T641C has a manual heat/cool changeover switch. With this switch set in the cool (or Direct Acting) position, wire to damper actuator as shown in Fig. 5. Be sure to determine direction of damper opening for correct wiring between the T641 and ML6161 (See Fig. 6).

The changeover switch can be placed in the heat position to reverse action at terminal Y & W.

The ML6161 is designed to open a damper by driving the damper shaft in either the clockwise (CW) or counterclockwise (CCW) directions. To wire the T641 correctly to the ML6161 for the desired operation, see Figs. 5 and 6.



**FIG. 5—ML6161 USED WITH T641 FOR TYPE "B" DAMPER APPLICATIONS, Y TERMINAL WILL ENERGIZE THE CCW WINDING ON A CALL FOR COOLING, DRIVING THE MOTOR OPEN. (T641C IN COOL MODE) TO REVERSE OPERATION (CW-OPEN), REVERSE Y AND W LEADWIRES (OR USE SWITCH ON T641C). NOTE: SEE FIG. 5 TO DETERMINE WHICH TERMINAL (Y OR W) OPENS THE MOTOR FOR DIFFERENT DAMPER APPLICATIONS.**



**FIG. 6—DETERMINING DIRECTION OF DAMPER OPENING FOR CORRECT WIRING OF ML6162 TO T641.**

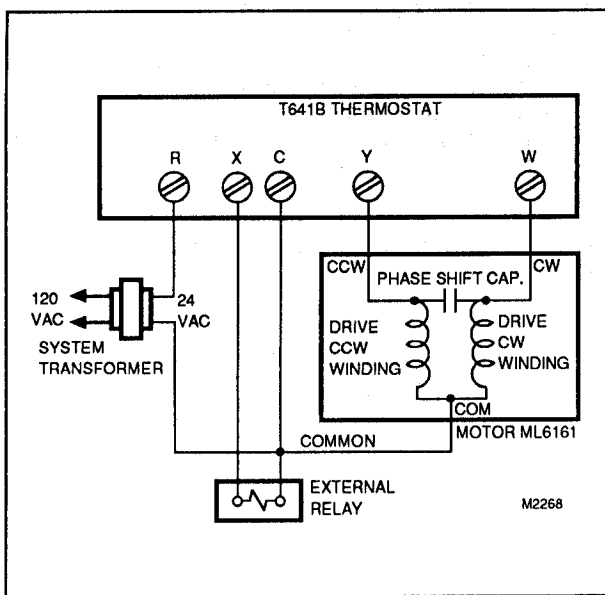


FIG. 7—T641B SHOWING TERMINAL X AND C ENERGIZING AN EXTERNAL RELAY WHEN MOMENTARY SYSTEM OVERRIDE SWITCH IS PRESSED TO THE ON POSITION.

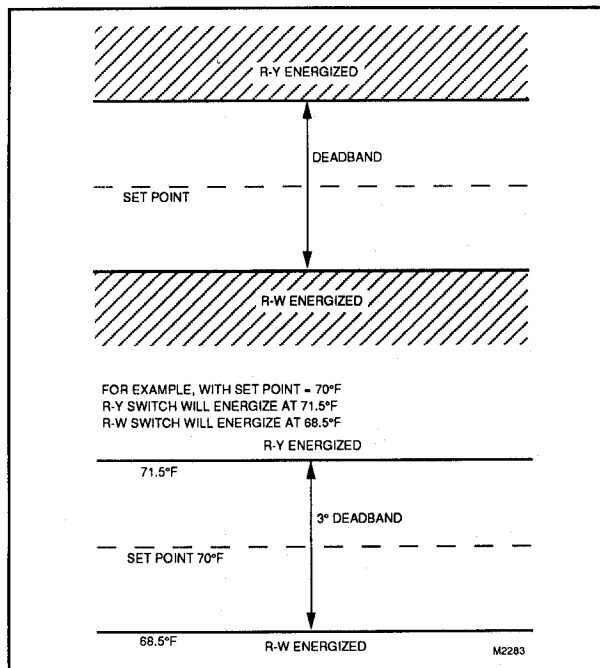


FIG. 8—T641 FLOATING CONTROL.

## OPERATION AND CHECKOUT

### FLOATING CONTROL

The control provided by the T641 is conventionally termed as floating control. Floating control, a variation of two-position control, is where the thermostat provides a three output control; Advance motor, Reverse motor, and Hold.

On a change in temperature, the T641 drives the actuator to an intermediate position and then opens the circuit to the actuator. The actuator remains in this position until there is a further temperature change at the T641. The actuator is said to float between the limits of the T641 to satisfy various load requirements. For further explanation of the T641's floating control, see Fig. 8.

### VAV SYSTEMS

VAV systems control the temperature within a space by varying the volume of supply air. Air is delivered to the space at a fixed temperature. The volume of supply air is controlled by the space thermostat modulating the supply air damper. When full heating and cooling flexibility is required in a zone, it is handled by perimeter heating, or reheat capability in the air terminal units. As individual zones "shut down" the total air flow in the system is regulated by a central duct static pressure controller. The fan system is sized to handle an average peak load, not the sum of the individual peaks. As each zone peaks at a different time of day, extra air is borrowed from the off-peak zones. This transfer from low-load to high-load zones occurs only in true VAV systems.

Pressure dependent systems do not incorporate an individual zone air flow sensor and depend on a stable system pressure to maintain flow. These systems require slower motors such as the 7 minute ML6161 models which are typically controlled by the T641 wall thermostats.

### HEAT ANTICIPATION/COOL ANTICIPATION

Control of heating or cooling units with a thermostat does not allow for the temperature to remain exactly at the thermostat set point, but varies within a certain temperature range. Anticipation is added to the thermostat to reduce this range.

The anticipator is a small resistive heater in the thermostat which heats when the system is on or off. The heat produced by the anticipator raises the internal bimetal temperature slightly faster than the surrounding room temperature. The thermostat "anticipates" the need to shut off the heating system sooner than it would if affected by room temperature only. The T641 has fixed or voltage anticipation.

### T641 CHECKOUT

With the T641 controlling the ML6161 (or equivalent actuator) lower the set point of the thermostat to call for cooling. Observe the operation of the motor; if the damper is closed it should begin to open. If not, adjust the set point of the T641 higher to determine if the wiring is correct. If no movement is observed, check for the presence of 24 volts between terminals C and Y during a call for cooling. With the proper wiring the 24 volts present, the actuator should operate correctly. If 24 volts is not present between C and Y on a call for cooling, replace the T641.

To checkout the ML6161 when controlled by T641, determine the direction the damper shaft moves to open the damper (CW or CCW). See Fig. 5. Place 24 volts across the appropriate common-clockwise or common-counterclockwise terminals to energize the actuator. The ML6161 should begin to open the damper. If the motor does not run, try switching the 24 volts across the opposite common-CW or CCW terminals to determine if the damper will begin to close. If the motor does not run in either direction replace the ML6161.

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