

# Honeywell

T87F THERMOSTATS PROVIDE TEMPERATURE CONTROL FOR RESIDENTIAL HEATING, COOLING, OR HEATING-COOLING SYSTEMS.

☐ For 2-wire, 24 to 30 Vac control of heating or cooling systems.

The T87F features a dustproof spdt mercury switch, an adjustable heat anticipator, and a concealed wallplate for 2-wire heating hookups.

☐ TRADELINE T87F models feature a wallplate designed for 2-wire heating or cooling, 3-wire spdt heating (series 20), or 3-wire spdt heating-cooling with remote switching. The wallplate also provides cooling anticipation.

☐ Q539 Subbase may be added for system and fan switching. The Q539 Subbase also provides cooling anticipation.

☐ Thermostat cover ring may be painted to match room decor.

☐ Knurled dial provides easy set point adjustment.

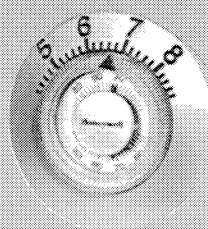
☐ Separate temperature setting and thermometer scale located on face of thermostat.

☐ Distinctive styling of T87F makes an attractive addition to almost any decor.

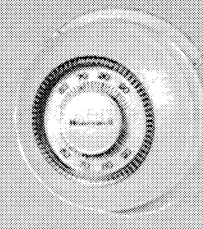
☐ Enhanced set point visibility model available for the visually impaired.

☐ Designer models with textured finish available.

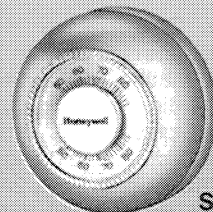
## THERMOSTATS



ENHANCED  
SET POINT  
VISIBILITY  
MODEL



DESIGNER  
MODEL



STANDARD  
MODEL

## T87F

# SPECIFICATIONS

## IMPORTANT

THE SPECIFICATIONS GIVEN IN THIS PUBLICATION DO NOT INCLUDE NORMAL MANUFACTURING TOLERANCES. THEREFORE, THIS UNIT MAY NOT MATCH THE LISTED SPECIFICATIONS EXACTLY. ALSO, THIS PRODUCT IS TESTED AND CALIBRATED UNDER CLOSELY CONTROLLED CONDITIONS, AND SOME MINOR DIFFERENCES IN PERFORMANCE CAN BE EXPECTED IF THOSE CONDITIONS ARE CHANGED.

## TRADELINE MODELS

TRADELINE models are selected and packaged for ease of handling, ease of stocking, and maximum replacement value. TRADELINE specifications are the same as those of standard models, except as noted below.

### TRADELINE MODELS AVAILABLE:

T87F Heating, Cooling, or Heating-Cooling Thermostat.

T87F Enhanced Set Point Visibility Model for the Visually Impaired.

T87F Designer Models with textured beige finish and tinted lens.

T87F models which meet Department of Defense (DoD) Manual 4270.1-M specifications:

Model for heating control. Locking cover, without thermometer, 72 F [22 C] max. heat.

Model for cooling control. Locking cover, without thermometer, 78 F [26 C] min. cool.

T87F with locking cover, range stops, 35 F to 65 F [2 C to 18 C] range.

### APPLICATION:

For use in series 80 heating, cooling, or heating-cooling circuit, or for use in series 20 (spdt) heating only circuit.

TEMPERATURE SETTING RANGE: 40 F to 90 F [4 C to

32 C]; 50 F to 90 F [10 C to 32 C] for model with positive OFF.

### MOUNTING MEANS:

T87F (less positive OFF) furnished with 137421A Wallplate, suitable for controlling 2-wire spdt heating or cooling, 3-wire spdt heating-cooling, or 3-wire spdt series 20 heating systems.

T87F with positive OFF furnished with 137421B Wallplate, suitable for controlling 2-wire spdt heating or cooling or 3-wire spdt heating-cooling systems.

### ADDITIONAL TRADELINE FEATURES:

Cover ring included for covering old thermostat marks or for mounting T87F on outlet box.

137421 Wallplate extends beyond thermostat for trim appearance (198170A Wallplate for Designer Models).

TRADELINE pack with cross reference label and special instruction sheet.

## STANDARD MODELS

### MODELS:

T87F Heating, Cooling, or Heating-Cooling Thermostat. Thermostat includes 104456B Wallplate for heating only systems. Order Q539 Subbase for heating-cooling.

ELECTRICAL RATING: 1.5 A at 30 Vac.

HEAT ANTICIPATOR: Adjustable 0.1 to 1.2 A.

COOLING ANTICIPATOR: 0 to 1.5 A, 24 to 30 Vac.

TEMPERATURE SETTING RANGE: 50 F to 100 F [10 C to 38 C].

SWITCHING ACTION: Dust-free spdt mercury switch.

TEMPERATURE SENSING: Coiled bimetal.

FINISH: Silver bronze. Beige textured on Designer Models.

DIMENSIONS IN in. [mm IN BRACKETS]: 3-1/4 [82.5] diameter, 1-1/2 [38.0] deep; with 137421 Wallplate: 3-11/16 [93.5] diameter, 1-3/4 [44.5] deep; with Q539 Subbase: 3-11/16 [93.5] diameter, 1-3/4 [44.5] deep.

MOUNTING MEANS: Thermostat mounts on furnished  
(continued on next page)

# ORDERING INFORMATION

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

1. Order number, TRADELINE, if desired.
2. Mounting means.
3. Optional specifications, if desired.
4. 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 SALES OFFICE (CHECK WHITE PAGES OF PHONE DIRECTORY).
2. RESIDENTIAL DIVISION CUSTOMER SERVICE  
HONEYWELL INC., 1885 DOUGLAS DRIVE NORTH  
MINNEAPOLIS, MINNESOTA 55422-4386 (612) 542-7500

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

wallplate, or subbase which must be ordered separately.

**OPTIONAL SPECIFICATIONS:**

1. Positive OFF models (specify heating or cooling) with 60 F to 100 F [16 C to 38 C] or 50 F to 90 F [10 C to 32 C] range.
2. Model with locking cover and range stops; 60 F to 90 F [16 C to 32 C] range.
3. Model with locking cover and range stops; 45 F to 75 F [7 C to 24 C] range; 68 F marked on scale.
4. Models with the following scale ranges: 40 F to 90 F [4 C to 32 C], 45 F to 75 F [7 C to 24 C], 5 C to 30 C [67 F to 112 F], 10 C to 30 C [67 F to 86 F], 10 C to 35 C [67 F to 95 F].

**REPLACEMENT PARTS:**

114855-01370 Thermostat Cover Ring.

198172 Thermostat Cover Ring for Designer Models.

**ACCESSORIES:**

1. Q539 Subbases—to provide system and fan switching for T87F heating, cooling, and heating-cooling thermostats.

The subbases also provide cooling anticipation, unless otherwise specified.

2. 129044A Adapter Plate Assembly—includes 127293 6 in. [152 mm] cover ring and 129044 Adapter Plate to fit 104456B Wallplate on cover ring.

3. 104994A Calibration Wrench—for thermostat recalibration.

4. TG503A1000 Metal Thermostat Guard. Includes locking cover, backplate, and bracket for mounting on a standard size outlet box. Also includes 104456B 2-terminal wallplate. Not for use with T87F mounted on 137421 Wallplate or Q539 Subbase.

5. TG587F1008 Key Lock Cover with window.

6. TG587F1016 Key Lock Cover without window.

7. 190881 spare keys for Key Lock covers (2).

8. 135734A indicator light package, field addable for certain Q539 Subbases. Contains light with leads, four lenses, two screws, and one shield.

9. 129571 light bulb, 1.2 W at 28 Vac, screw base, for use with Q539 Subbase.

## INSTALLATION

**WHEN INSTALLING THIS PRODUCT . . .**

1. Read these instructions carefully. Failure to follow them could cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

### CAUTION

1. Disconnect power supply to prevent electrical shock or equipment damage.
2. On systems using a low voltage gas valve, never apply a jumper across valve coil terminals. This may burn out thermostat heat anticipator.

**NOTE:** The T87F was carefully adjusted at the factory. HANDLE THE THERMOSTAT CAREFULLY.

**LOCATION**

Locate the thermostat about 5 ft [1.5 m] above the floor in an area with good air circulation at average temperature.

Do not install 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.
- unheated (uncooled) areas behind the thermostat, such as an outside wall.

**MOUNTING WALLPLATE OR SUBBASE**

**IMPORTANT**

1. Use plumb line or spirit level to accurately level the wallplate or subbase as in Fig. 1. Inaccurate leveling will cause thermostat control deviation.
2. When using the T87F with a Q539 Subbase, follow the mounting and wiring instructions furnished with the subbase.

Use 127293 Cover Ring (if desired), adapter plate (if needed), wallplate or subbase, T87F, and screws as shown in Figs. 2 and 3.

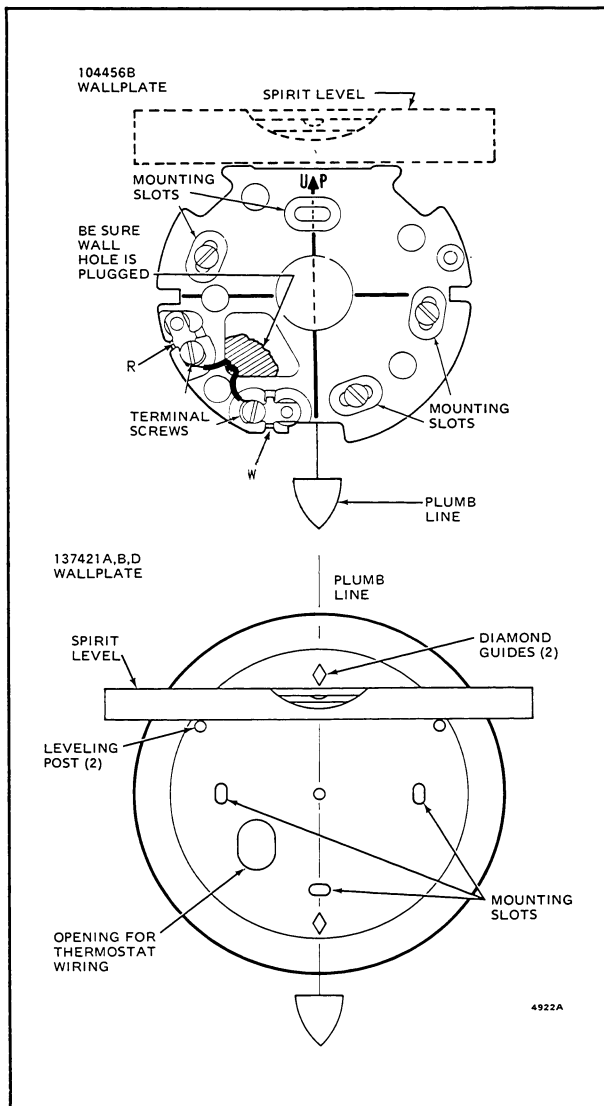
1. Place the cover ring on the wall at the desired location with the cable entrance holes to the left. If an outlet box is used, place the cable entrance holes toward the bottom. The side reading "MADE IN U.S.A." must be against the wall.

2. Bring the thermostat cable through the proper entrance hole of the cover ring and through the entrance hole of the wallplate or subbase, and adapter plate, (if used).

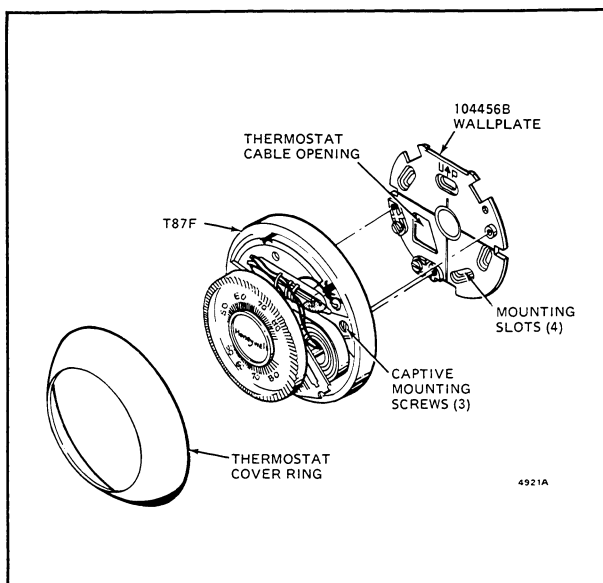
3. Fasten the cover ring, adapter plate (if used), and wallplate or subbase. Level according to Fig. 1 and tighten the screws.

4. After wiring the subbase or wallplate, plug the hole to prevent interior wall drafts from affecting the thermostat.

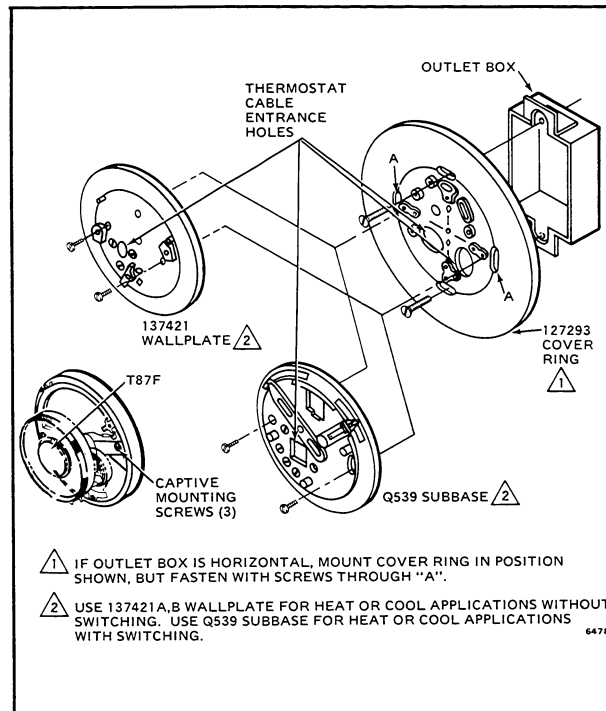
5. Before mounting the thermostat, see Heat Anticipator Adjustment under SETTING, ADJUSTMENT, AND CHECKOUT. Align the thermostat over the wallplate and tighten the 3 captive mounting screws.



**FIG. 1—LEVELING THE 104456B AND 137421A,B,D WALLPLATES.**



**FIG. 2—MOUNTING T87F AND 104456B WALLPLATE.**



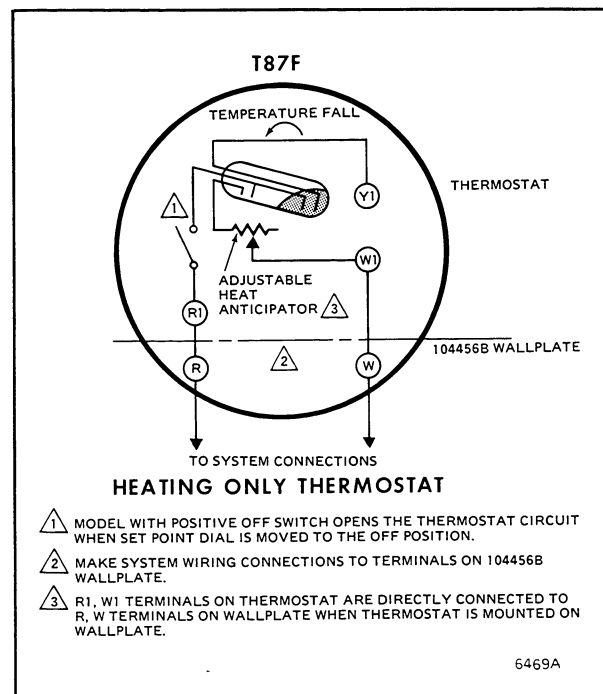
**FIG. 3—MOUNTING T87F AND Q539 SUBBASE OR 137421 WALLPLATE TO OUTLET BOX.**

## WIRING

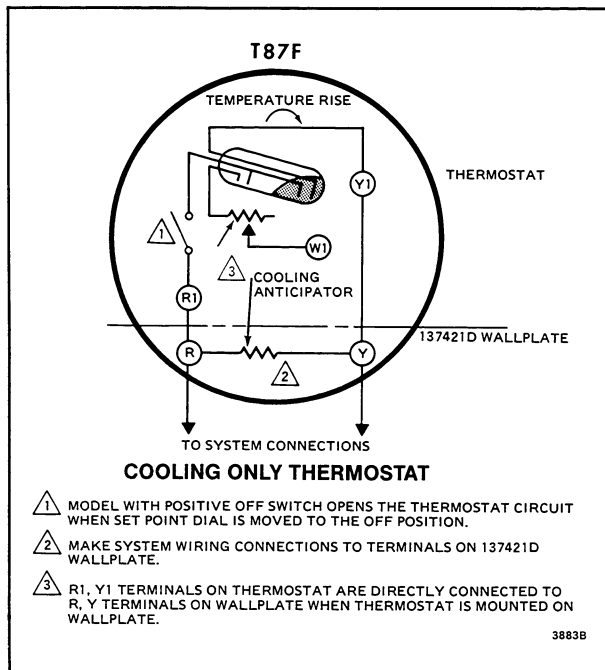
Disconnect power supply before beginning wiring to prevent electrical shock or equipment damage.

All wiring must comply with local electrical codes and ordinances.

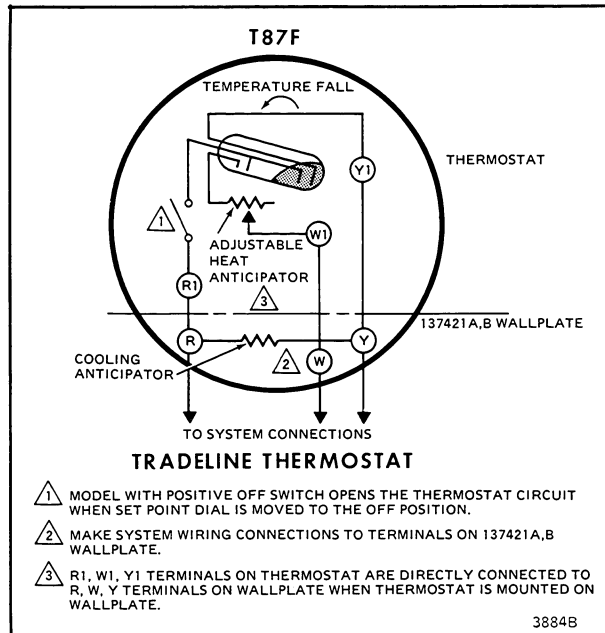
The T87F may be used in most 2- or 3-wire, spst or spdt, 24 to 30 Vac heating systems controlled by a low voltage thermostat. The following hookups represent typical applications.



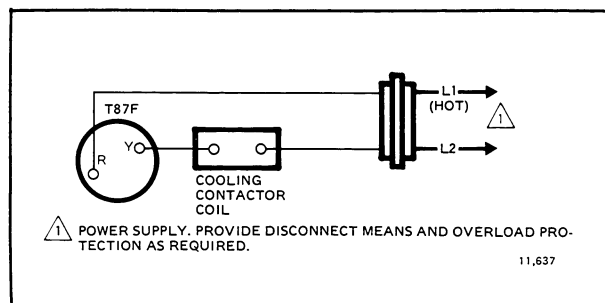
**FIG. 4—INTERNAL SCHEMATIC FOR T87F HEATING ONLY THERMOSTAT.**



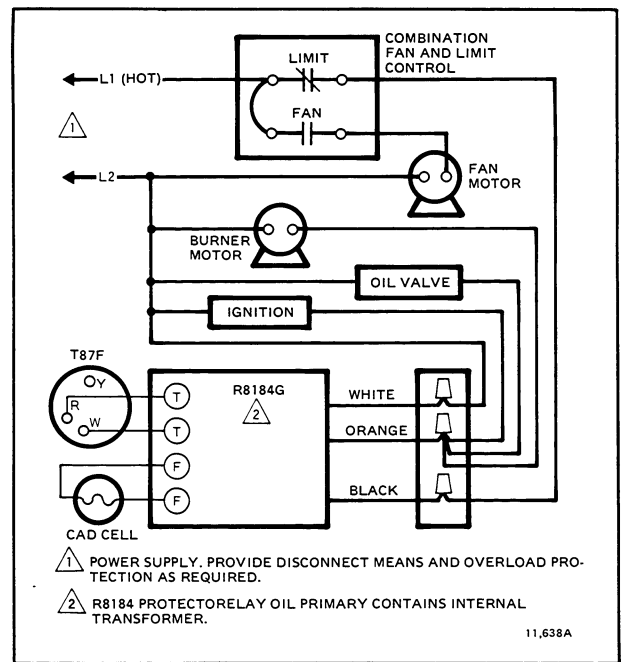
**FIG. 5—INTERNAL SCHEMATIC FOR T87F COOLING ONLY THERMOSTAT.**



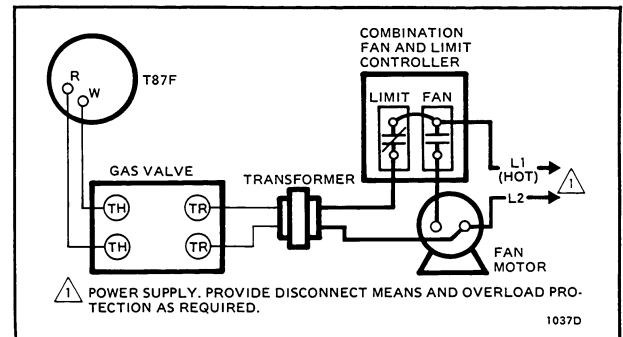
**FIG. 6—INTERNAL SCHEMATIC FOR TRADELINE T87F THERMOSTAT.**



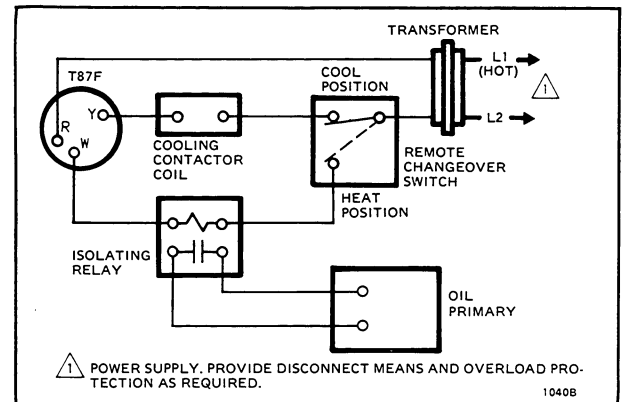
**FIG. 7—TYPICAL HOOKUP FOR T87F USED AS A COOLING ONLY THERMOSTAT.**



**FIG. 8—T87F IN TYPICAL OIL HEATING SYSTEM.**



**FIG. 9—T87F IN TYPICAL GAS HEATING SYSTEM.**



**FIG. 10—T87F IN HEATING-COOLING APPLICATION USING A REMOTE MOUNTED SYSTEM CHANGEOVER SWITCH. USE Q539 SUBBASE FOR SWITCHING AT THE THERMOSTAT LOCATION.**

### TO REPLACE A SERIES 10 THERMOSTAT

To adapt the T87F to a series 10 three-wire heating system:

1. Connect wires from thermostat (R and W) to terminals on three-wire primary (B and W). See Figs. 11 and 12.

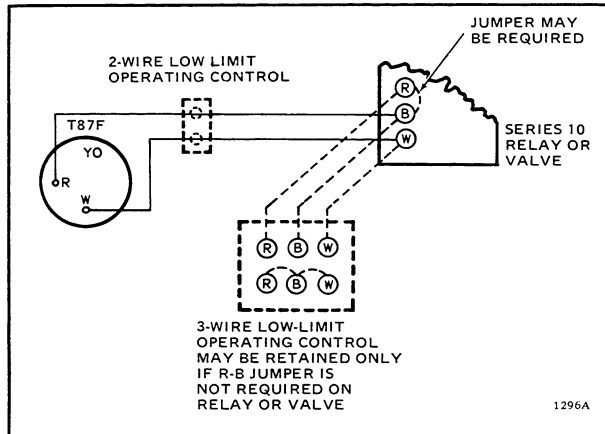
2. Some three-wire controls manufactured by other companies cannot be satisfactorily operated by a two-wire thermostat. Before connecting the T87F to such controls, consult the manufacturer.

3. Some Honeywell series 10 relays will require an R-B jumper (Fig. 11). These relays are:

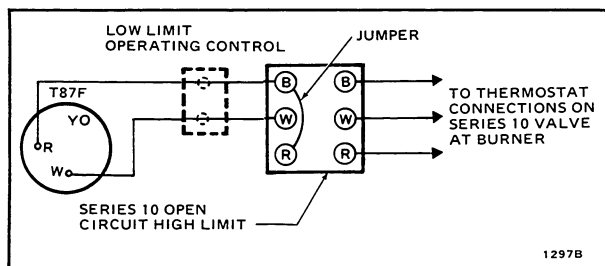
R114A,B	R125	R117	R187A1,A4
R116	R126	R178	R190B1,B8
R117	R161	R180	

4. Relays or valves that do not require a jumper may retain a three-wire, low limit control as shown in Fig. 11. If the jumper is required, a two-wire control must be used.

5. A three-wire, open contact, high limit control requires a jumper as shown in Fig. 12.



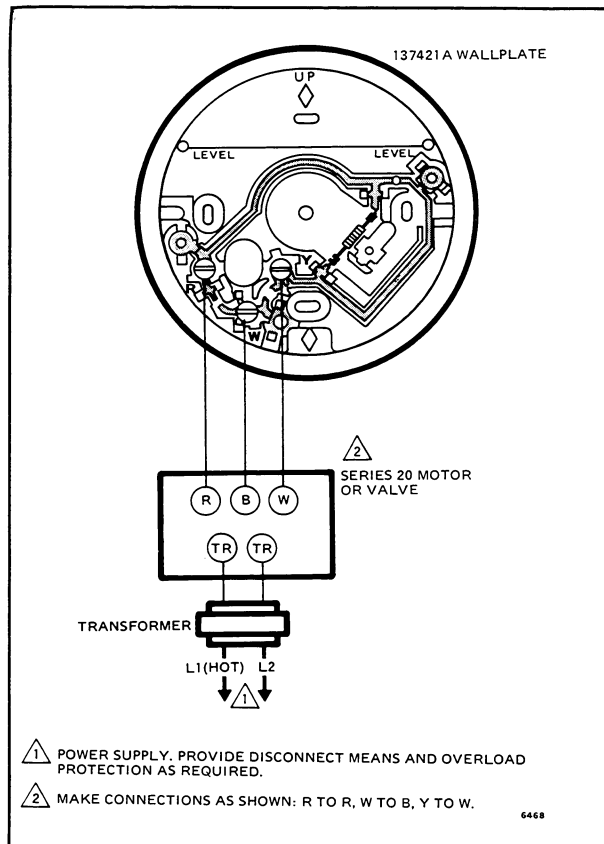
**FIG. 11—T87F REPLACING A SERIES 10 THERMOSTAT CONNECTED TO A 2- OR 3-WIRE LOW LIMIT CONTROL.**



**FIG. 12—T87F REPLACING A SERIES 10 THERMOSTAT CONNECTED TO A 3-WIRE OPEN CONTACT, HIGH LIMIT CONTROL.**

## TO REPLACE A SERIES 20 THERMOSTAT

TRADELINE T87F Thermostats directly replace series 20 spdt thermostats, or thermostats in heating installations that require contact on both a rise and fall in temperature (Fig. 13).



**FIG. 13—TRADELINE T87F IN SERIES 20 HEATING CIRCUIT.**

To wire a series 20 thermostat:

1. Connect leadwire from R terminal of valve or motor to R terminal of T87F.
2. Connect leadwire from B terminal of valve or motor to W terminal of T87F.
3. Connect leadwire from W terminal of valve or motor to Y terminal of T87F.

# SETTING, ADJUSTMENT, AND CHECKOUT

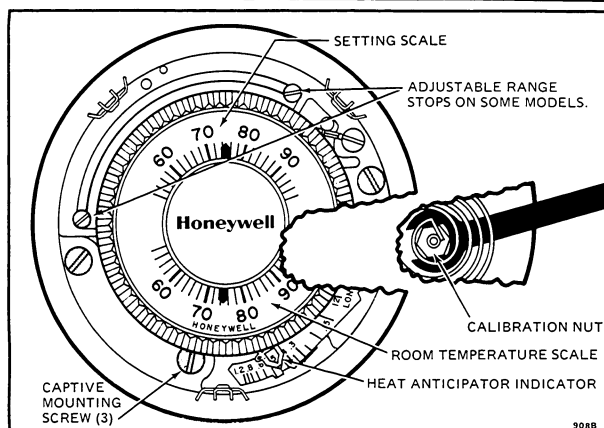
## TEMPERATURE SELECTION

To select the desired temperature, turn the transparent dial until the desired point on the setting scale (top scale) is in line with the pointer.

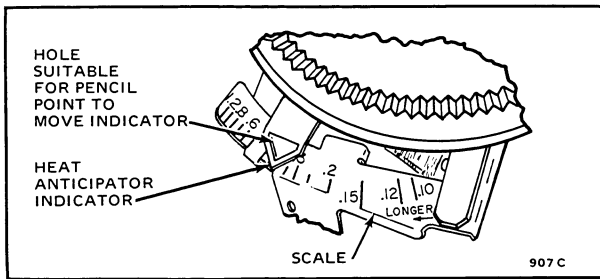
On models with range stops the temperature range may be limited at either extreme. The left stop is for the low extreme, right stop for high extreme (Fig. 14).

## HEAT ANTICIPATOR ADJUSTMENT

The thermostat's adjustable heat anticipator must be set on the number that corresponds to the current rating of the system's primary control (gas valve, oil primary, etc.).



**FIG. 14—INTERIOR DETAIL OF T87F.**



**FIG. 15—ADJUST HEAT ANTICIPATOR TO MATCH CURRENT RATING OF THE PRIMARY CONTROL.**

If the current rating is not known, proceed as follows:

1. Connect an ac ammeter of appropriate range (0 to 2.0 A, for example) between the R and W terminals on the wallplate, or between R and W on subbase.
2. Let the system operate through the ammeter for at least one minute before taking reading.
3. Set the heat anticipator to correspond to the ammeter reading (Fig. 15).

A slightly higher setting to obtain longer burner-on times (and fewer cycles per hour) may be desirable in systems such as a one-pipe steam system. **EXAMPLE:** If burner-on time is too short with a heater setting of 0.4, adjust to 0.45 setting and check system operation, adjust to 0.5 setting and recheck until the desired burner-on time is obtained.

#### **IMPORTANT**

When T87F is used in a series 20 heating circuit (requires contact on both a rise and fall in temperature), set anticipator indicator to 1.2.

## **CHECKING THERMOSTAT OPERATION**

### **CAUTION**

On systems using a low voltage gas valve, **NEVER** apply a jumper across the valve coil terminals, even temporarily. This may burn out thermostat heat anticipator.

Turn down temperature setting to lowest point. If subbase is used, move system switch to HEAT position. Raise temperature setting until burner starts. Slowly turn dial back. Burner should stop when dial has been turned below room temperature. If T87 controls cooling, move subbase system switch—(if used) to COOL and lower setting until cooling equipment starts. Raise setting

above room temperature and cooling system should shut down. Make certain equipment functions properly in response to the thermostat.

## **RECALIBRATION**

The T87F is accurately calibrated at the factory under controlled conditions and no recalibration should be necessary. If it appears that the thermostat is out of calibration, make sure that it is level and is not subjected to radiant heat from the sun, radiators, or appliances.

Remove thermostat cover ring so you can observe mercury switch action. After a 5 or 10 minute off period (with thermostat setting below room temperature), slowly raise the setting until the switch just makes contact. If thermometer pointer and setting indicator read the same the instant you see the switch make, no recalibration is necessary. If recalibration is necessary, proceed as follows:

1. Turn the setting dial a few degrees above room temperature and remove cover.

#### **IMPORTANT**

For calibration identification only:

If the thermostat scaleplate moves (pointer is stationary) when setting temperature, the thermostat is a Group I model.

If the scaleplate is stationary and the pointer moves, the thermostat is a Group II model.

2. Slip the 104994 Calibration Wrench (available on request) onto the hex under the bimetal coil (Fig. 14) and, holding the dial firmly, turn the hex counterclockwise ↺ for Group I models, clockwise ↻ for Group II models, until the mercury breaks contact.

3. Turn the dial to a low setting so that the thermostat loses the heat it has gained from your hands and its own operation. Wait at least 5 minutes.

4. Slowly turn the dial until the pointers read the same.

5. Firmly holding the dial from turning, carefully turn the hex clockwise ↻ for Group I models, counterclockwise ↺ for Group II models, until the mercury switch slips to the heating contact end of the tube.

6. Recheck calibration, select the desired temperature, and replace cover.

**NOTE:** When T87F provides cooling control, calibration for heating automatically calibrates for cooling.

