Honeywell

THE T7080A ELECTRONIC THERMOSTAT AND T7080B TRANSMITTER CONTROL SPACE TEMPERATURE WHEN EMPLOYED AS A REPLACEMENT FOR THE RANCO TR3 AND TR4 TRANSMITTER, OR WHEN APPLIED WITH THE HONEYWELL W7080 LOAD ANALYZER MULTIZONE CONTROL SYSTEM.

☐ T7080 Thermostat and C7100B Discharge Air Sensor provide the benefit of dual set point through simple replacement of the Ranco single set point thermostat and discharge sensor.

☐ T7080A Electronic Thermostat has an integral thermistor space temperature sensor.

☐ T7080B Transmitter is designed for use with a C7100B or T7047C1082 Remote Temperature Sensor.

☐ A single 2 to 22 Vdc voltage ramp provides both heating and cooling thermostat signals to the Ranco EA3 Load Analyzer Module or to the Honeywell W7080A Load Analyzer, W7084A Zone Adder and optional W7082A Integrating Analyzer.

☐ Separate heating and cooling set point adjustment levers on all models.

☐ Deadband adjustable from 3 F to 30 F [1.7 C to 17.0 C].

☐ Locking set point adjustment levers are concealed under device cover.

☐ 24 Vdc power to T7080 is provided by the Ranco EA3 Load Analyzer Module or the Honeywell W7080A Load Analyzer.

☐ Temperature anticipation sensing provided to system by C7100B or C7046B Discharge Air Sensor.

☐ Thermostat mounts on standard 2 x 4 in. outlet box or on a nonconductive flat surface.

☐ Meets ASHRAE 90-75 guidelines.

☐ Model available to meet United States Department of Defense Standards.

☐ All models include wiring plate.

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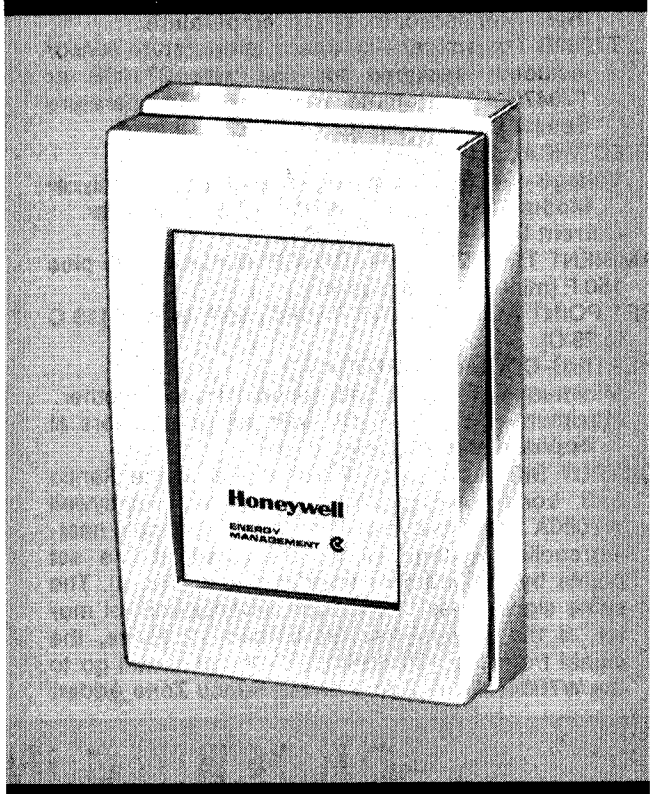
Form No.
60-2527

ELECTRONIC THERMOSTAT AND TRANSMITTER



T7080A,B

epc
Energy Products Center

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.

MODELS:

T7080A Electronic Thermostat and T7080B Transmitter for use as replacement[a] for the Ranco TR3 and TR4 thermostat/transmitters, and for use with the Honeywell W7080A Load Analyzer. Dual set point adjustment levers are concealed under the device cover.

[a]Discharge Air Sensor must be replaced at the same time with C7100B Discharge Air Sensor.

T7080A Electronic Thermostat—has an integral thermistor sensor for space temperature.

T7080B Transmitter—no space temperature sensor included; designed for use with C7100B or T7047C1082 Remote Return Air Temperature Sensor (order separately; see Accessories).

ELECTRICAL RATINGS:

Voltage—24 Vdc from Ranco EA3 Load Analyzer Module or Honeywell W7080A Load Analyzer.

Current Draw—4 mA or 0.004A.

AMBIENT TEMPERATURE RANGE: Minus 40 F to plus 150 F [minus 40 C to plus 66 C].

SET POINT ADJUSTMENT RANGE: 55 F to 85 F [13 C to 29 C].

HEATING-COOLING DEADBAND:

Minimum—3 F [1.7 C], with set point levers together.

Maximum—30 F [17.0 C], with set point levers at opposite ends of scale.

OUTPUT SIGNALS: 2 to 22 Vdc signal to the Ranco EA3 Load Analyzer Module or the Honeywell W7080A Load Analyzer. The signal is a single heating/cooling voltage ramp, displaced at the set points by the width of the deadband (Fig. 7). The same signal goes to the zone damper control motor. If the system has more than 12 zones, the signal from the 13th through 24th zones will go to the W7084A Zone Adder or the Ranco Zone Adder.

OUTPUT SIGNAL RATE OF CHANGE (upon deviation from set point): 5.0 Vdc/1 F [0.5 C].

COVER: Silver-bronze painted, molded plastic.

DIMENSIONS: See Figs. 1 and 2.

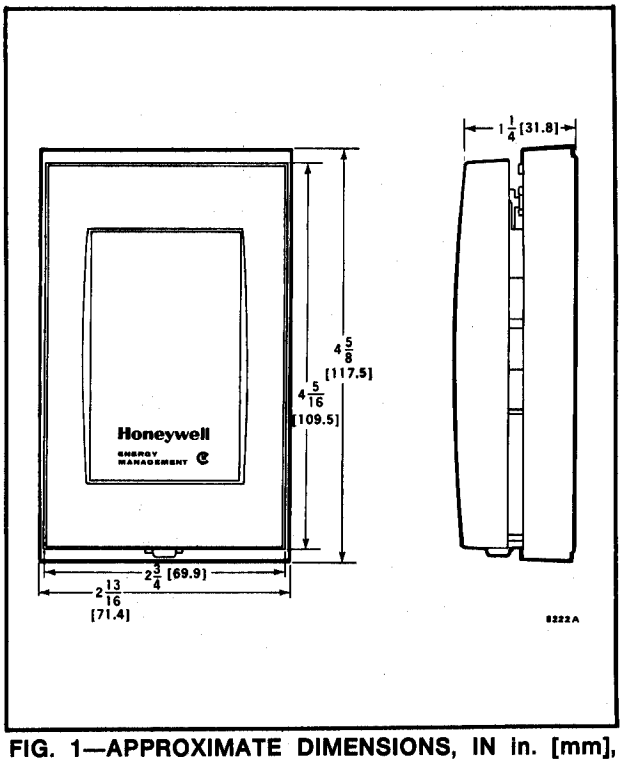


FIG. 1—APPROXIMATE DIMENSIONS, IN in. [mm], OF T7080 THERMOSTAT.

(continued on page 3)

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.**
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 SALES OFFICE (CHECK WHITE PAGES OF PHONE DIRECTORY).**
2. **RESIDENTIAL CUSTOMER SERVICE**
   HONEYWELL INC., 1885 DOUGLAS DRIVE NORTH
   MINNEAPOLIS, MINNESOTA 55422 (612)542-7500

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

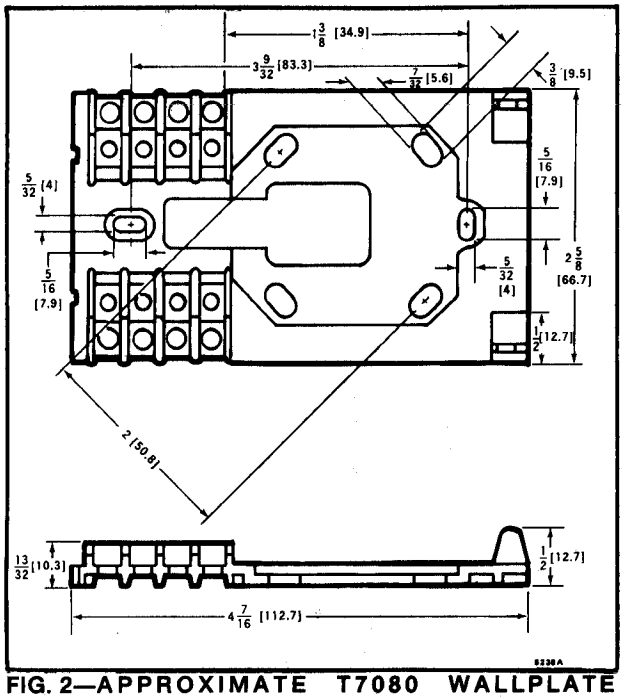


FIG. 2—APPROXIMATE T7080 WALLPLATE DIMENSIONS IN in. [mm].

MOUNTING: Mounts on standard vertical 2 x 4 in. outlet box or any nonconductive flat surface. Two No. 6-32 UNC, 5/8 in. [15.9 mm] screws are provided for mounting wallplate on outlet box. Thermostat mounts on wallplate. Use a 193120A Faceplate for horizontally mounting a T7080 on a horizontal outlet box.

ACCESSORIES:

M734J1056 Zone Damper Motor.

C7100B Duct Averaging Sensor (13 in. [330.2 mm]) for use as a Return Air Temperature Sensor.

C7100B Averaging Discharge Sensor (13 in.) [330.2 mm] for use as the anticipation discharge air sensor.

C7046B Discharge Air Sensor (6 in. [152.4 mm]) for use as the anticipation discharge air sensor only where 13 in. probe on C7100B is too long to mount in duct.

193120A Faceplate—for use in installations where the T7080 must be horizontally mounted on a horizontal outlet box.

T7047C1082 Remote Space Sensor—for use as wall mount sensor with T7080B Transmitter.

INSTALLATION

WHEN INSTALLING THIS PRODUCT . . .

1. Read these instructions carefully. Failure to follow them could damage the product or 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 all power before beginning installation to prevent electrical shock or equipment damage.
2. The T7080 is intended for use as a replacement for the TR3 and TR4 thermostat/transmitters in a Ranco Lodapt system, or for use in the Honeywell W7080A Load Analyzer system. Do not attempt to connect the T7080 to any other equipment without appropriate instructions.
3. Do not remove the protective cardboard that covers the T7080 circuit board.

LOCATION

T7080A

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

Do not mount where sensing element may be affected by—

—drafts, or dead spots behind doors and in corners.

—hot or cold air from ducts.

—radiant heat from the sun or appliances.

—concealed pipes and chimneys.

—unheated (uncooled) areas behind the thermostat.

T7080B

Mount the T7080B in a location where the thermostat settings will not be subject to tampering or unauthorized adjustments.

Install the remote temperature sensing element (T7047C1082 wall-mounted or C7100B return air) according to the instructions provided with it. The location restrictions given above for the T7080A also apply to the T7047C1082 Remote Temperature Sensor.

MOUNTING

The T7080 and T7047C1082 mount vertically on a standard 2 x 4 inch outlet box or nonconductive flat surface. If a horizontal outlet box is encountered, use the 193120A Faceplate (see ACCESSORIES).

To mount the thermostat:

1. Pull wires from the central system (Ranco EA3 or Honeywell W7080A—and the remote sensor, if used) through the hole in the wallplate.
2. Fasten the thermostat wallplate to the outlet box or flat surface. Two No. 6-32 UNC 5/8 in. [15.9 mm] long screws are provided for outlet box mounting. See Fig. 3.
3. Make wiring connections on the wallplate or subbase. See wiring.
4. Loosen the T7080 cover locking screw with the 5/64 in. [1.98 mm] Allen wrench provided.

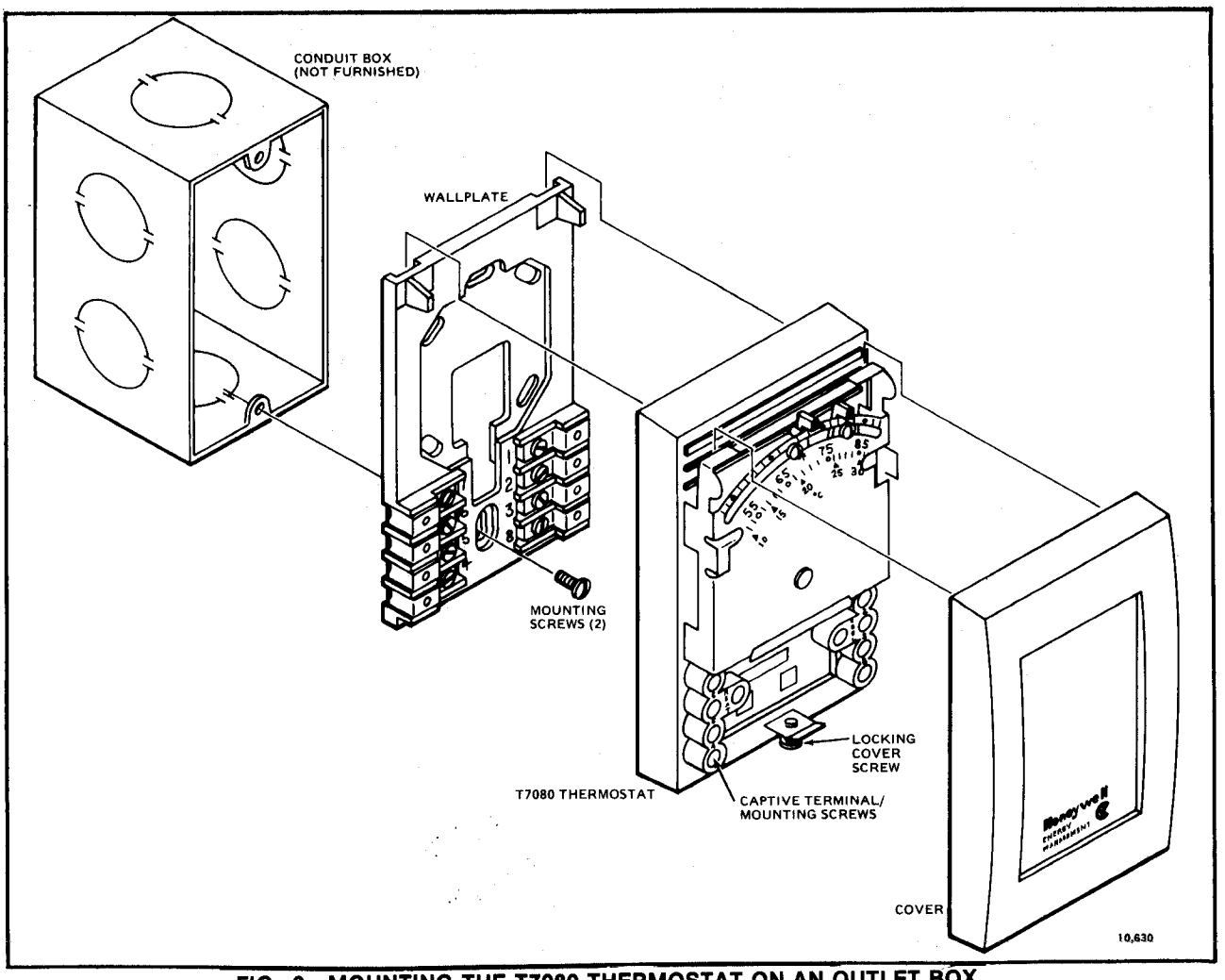


FIG. 3—MOUNTING THE T7080 THERMOSTAT ON AN OUTLET BOX.

5. Remove the thermostat cover by pulling out at the bottom and lifting it up off the tabs on the thermostat base.
6. Mount the thermostat on the wallplate or subbase.
7. Securely tighten all screws in the thermostat base to the wallplate. Do not overtighten.

NOTE: These screws make the electrical connections between the wallplate or subbase and the thermostat. If any screw is not securely tightened, the system will not operate properly.

8. With the cover off—
   a. Check out the thermostat per the instructions in the CHECKOUT section.
   b. Select the desired heating and cooling set points.
   c. Lock the set point levers if desired.
9. Replace the cover and tighten the cover locking screw.

LOCKING SET POINT LEVERS

The set point adjustment locks provided are engaged by moving set point adjustment levers to desired settings and tightening locking screws as shown in Fig. 4.

To position the set point lever at the extreme end of the adjustment scale, remove the locking screws. (The locking screws interfere with the thermostat scaleplate when the set point levers are moved to the extreme end of the scale). Move the set point lever to the extreme

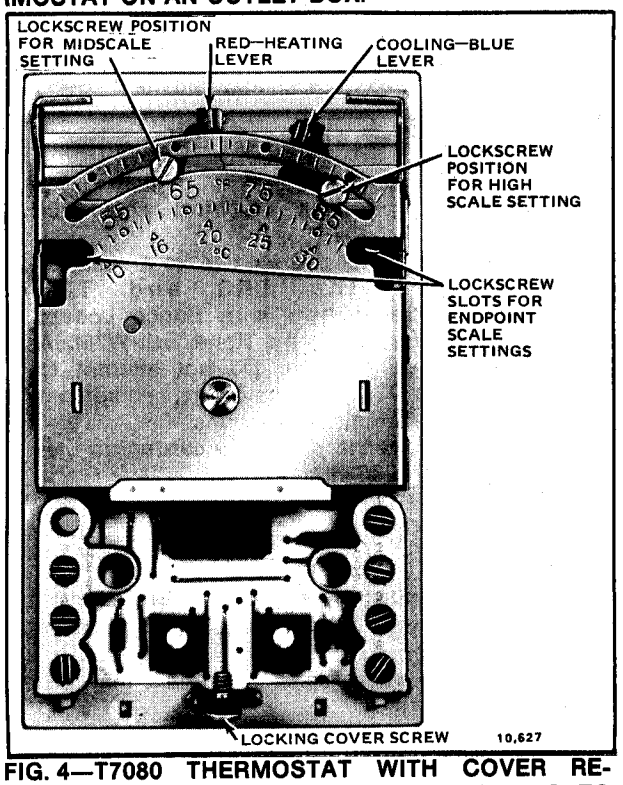


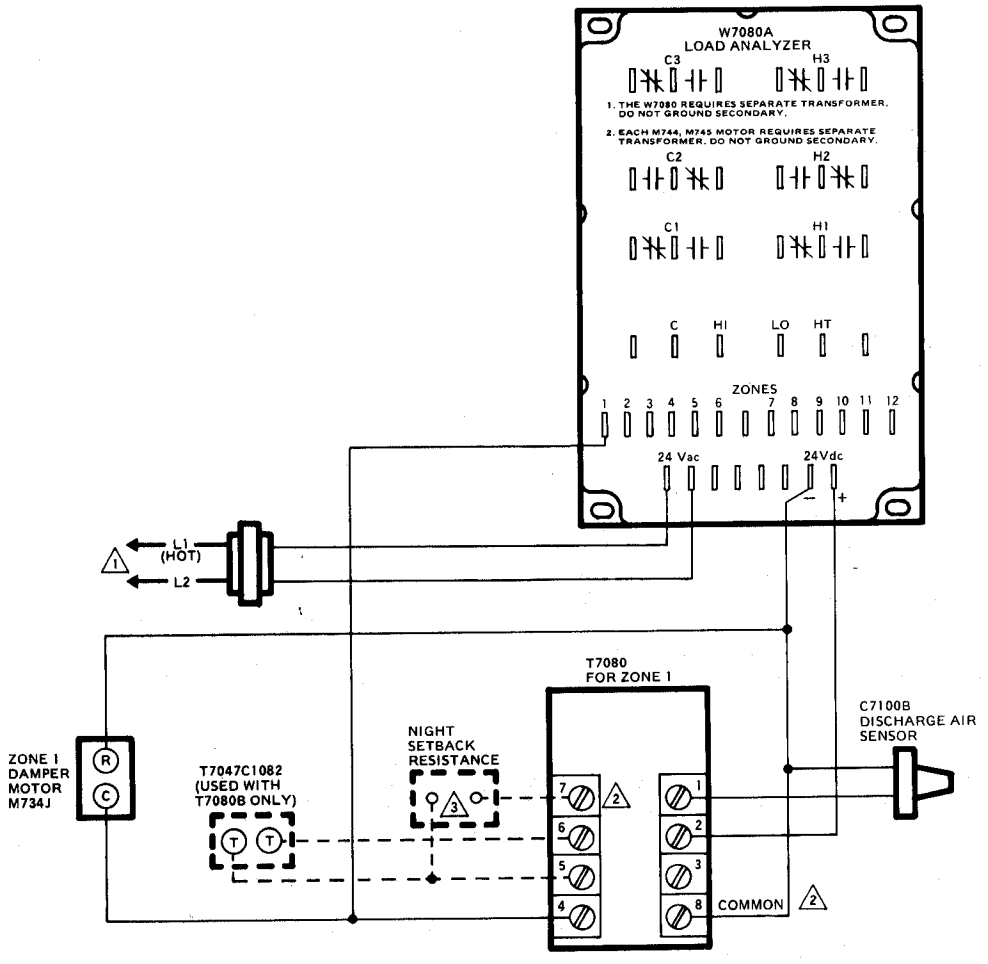
FIG. 4—T7080 THERMOSTAT WITH COVER REMOVED. TIGHTEN LOCKING SCREWS TO LOCK SET POINT ADJUSTMENT LEVERS.

position. The set point lever can be locked in place at the extreme end of the scale if the locking screw is reinserted into the lever lock through the hole below the end of the scale (Fig. 4).

WIRING

All wiring must comply with local codes and ordinances. Terminal screws are provided on the wallplate for wiring connections. Wiring to thermostat is low voltage and need not be in conduit unless required by local codes. Make the connections to the wallplate as shown in Figs. 5 and 6. Complete system connections are shown in instructions for the W7080 Load Analyzer.

Fig. 5 shows the connections required between the W7080 and the T7080A,B. Terminals 3, 7 and 8 are the system commons. Terminal 1 supplies the C7100B or C7046B discharge air temperature signal to the T7080. (The C7100B or C7046B provide heating and cooling anticipation sensing for the T7080.) Terminal 2 is the point where the 24 Vdc output of the W7080 is connected to power the T7080. Terminal 4 is the voltage output terminal for the heating/cooling signal from the T7080. Terminals 5 and 7 are used to introduce resistance into the T7080 output to accomplish night setback. Terminals 5 and 6 are used for connection of a remote sensor to the T7080B and would not be used in the T7080A.



1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 TERMINALS 3, 7 AND 8 ARE ALL EQUIVALENT COMMON TERMINALS.

3 RESISTOR AND TIME SWITCH IN SERIES BETWEEN TERMINALS 5-7. SEE FIG. 6, PAGE 6.

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FIG. 5—W7080 AND T7080 WALLPLATE WIRING CONNECTIONS.

HEATING SETBACK/COOLING SHUTDOWN

Heating setback/cooling shutdown can be accomplished with the T7080 thermostat with use of a time clock, double pole relay, and resistor as shown in Fig. 6. By varying the value of the resistor, you vary the amount of heating setback according to Table 1.

When the time clock goes to night mode, the relay is energized — breaking the cooling circuit and introducing the resistance into the T7080's sensing circuit at terminal 5, causing a downward shift in the effective set point.

TABLE 1 – RESISTOR VALUES FOR DESIRED AMOUNTS OF NIGHT SETBACK

DESIRED SETBACK AMOUNT	RESISTOR
6 F [3.3 C]	10.0 K Ohms
10 F [5.6 C]	4.87 K Ohms
14 F [7.8 C]	2.67 K Ohms
18 F [10.0 C]	1.43 K Ohms
22 F [12.2 C]	681 Ohms

NOTE: If cooling is not locked out or disabled, the system may cause cooling to come on in night setback if the setback is greater than the heating/cooling deadband (Fig. 6).

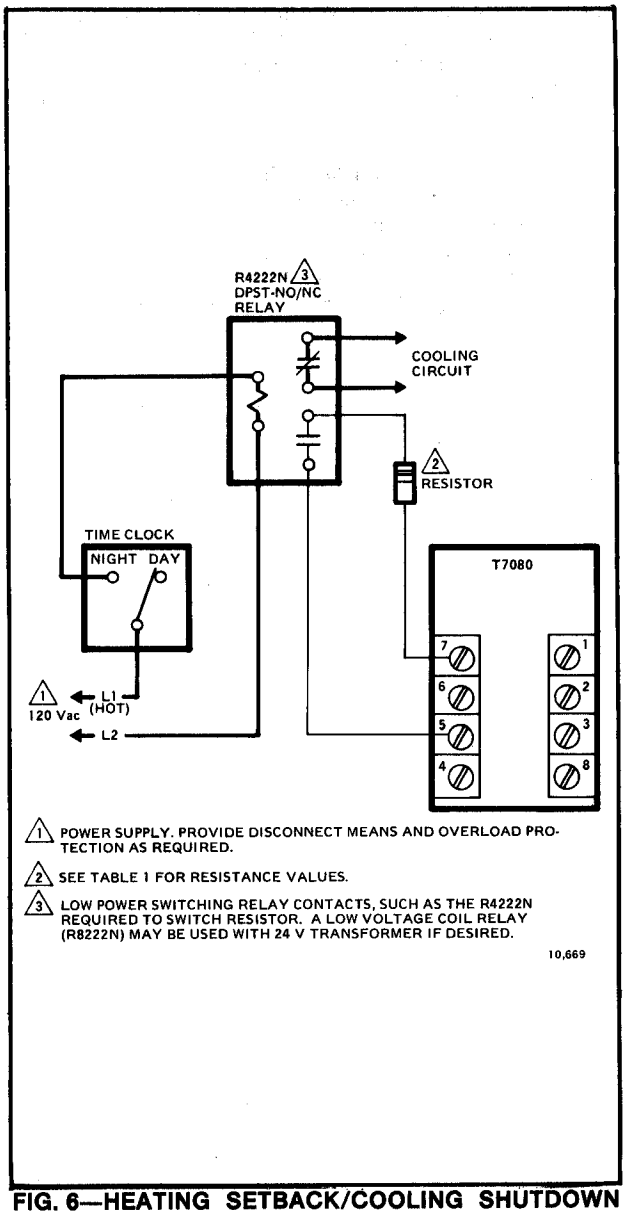

FIG. 6—HEATING SETBACK/COOLING SHUTDOWN IS ACCOMPLISHED WITH A TIME CLOCK, RELAY, AND RESISTOR.

REPLACEMENT OF RANCO TR3 AND TR4 THERMOSTAT/ TRANSMITTER WITH THE T7080

To replace a Ranco TR3 or TR4 thermostat/ transmitter with a Honeywell T7080, remove the Ranco thermostat. Wire the T7080 exactly as the Ranco thermostat was wired, with the identical terminal numbering. The only wiring difference arises if you are using a remote sensor and T7080B transmitter. The remote sensor is connected to terminals 5 and 3 on the Ranco transmitter but will be connected to terminals 5 and 6 on the T7080B. Also note that for convenience in wiring on the T7080, terminals 3, 7 and 8 are all common.

OPERATION

The T7080 Electronic Thermostat is a solid state temperature control device designed to replace the Ranco TR3 and TR4 transmitter/thermostat or to function in the Honeywell W7080 Multizone Control System. The thermostat receives 24 Vdc power from the load analyzer and generates a single voltage ramp output that controls both heating and cooling (Fig. 7). This voltage goes to the load analyzer, which controls the central HVAC equipment, and to the modulating motor controlling the zone's inlet dampers.

When space temperature is between thermostat set points, the T7080 constantly outputs 12 V. This causes the load analyzer (Ranco EA3 or Honeywell W7080A) to maintain all cooling and heating units off, and causes the zone mixing dampers to drive to a preset midposition (45 degrees). When space temperature falls below heating set point, the voltage output drops below 12 V and is interpreted by the load analyzer as a call for heating. This signal also causes the zone dampers to drive to provide more warm air.

When space temperature rises above cooling set point, the T7080 output rises above 12 V and is interpreted by the load analyzer as a call for cooling. The zone dampers drive to provide more cooling air.

Zone temperature is monitored by a thermistor sensor which is either internal to the T7080A thermostat or located remotely and connected to a T7080B transmitter. To avoid unauthorized adjustment or tampering

with the thermostat settings, the T7080B can be remotely located in a secured area and zone space temperature sensing is accomplished by a T7047C1082 wall-mounted sensor located like a conventional thermostat, or by a C7100B or C7046B sensor mounted in the return air duct.

The resistance of the thermistor sensor changes inversely with changes in zone temperature. The chart below gives the approximate resistance values of the thermistor sensors for several different temperatures. The resistance of the sensor is not linear, but will change approximately 800 ohms/1 F [0.6 C] in the temperature range around 70 F [21 C].

TABLE 2 – THERMISTOR SENSOR RESISTANCE VALUES FOR C7100B, C7046B AND T7047C1082

TEMPERATURE		RESISTANCE (ohms)
F	C	
70 F	21.1	28,000 ± 600
71 F	21.6	27,200 ± 600
72 F	22.2	26,400 ± 600
73 F	22.8	25,600 ± 600
74 F	23.3	24,900 ± 600
75 F	23.9	24,200 ± 600

The change in resistance causes the thermostat to change its dc voltage ramp signal, which is at all times proportional to the zone temperature deviation below the heating set point or above the cooling set point. This signal is sent to the load analyzer which passes it on to the limit controller. The limit controller modifies the signal (if necessary) by using deck temperature status information provided by hot and cold deck sensors. It then sends the modified signal back to the load analyzer which uses the voltage to switch the appropriate number of heating or cooling stages on or off to satisfy the zones' demands (Fig. 3).

As the T7080 output voltage signal increases above 12 V, the limit controller will return a voltage to the load analyzer that will cause more stages of cooling to be turned on — unless the low limit is being violated; in which case, the limit controller will not call for further cooling until cold deck temperature is above the low limit. As the T7080 output voltage signal decreases below 12 V, the limit controller will return a voltage to the load analyzer that will cause more stages of heating to be turned on — unless the high limit is being violated; in which case, the limit controller will not call for further heating until hot deck temperature is below the high limit. Even though the T7080 thermostat has separate set points for heating and cooling, there is only one voltage output. The load analyzer determines whether additional stages of cooling or heating should be turned on or off based on the signal it receives from the limit controller.

Cooling and heating anticipation sensing is provided to the T7080 by the C7100B Discharge Air Temperature Sensor. The C7100B is mounted in the zone discharge air duct downstream from the zone mixing dampers, and its output is coupled to the thermistor sensor circuit. The authority ratio is 20:1, which means that a 20 F [11 C] change in discharge air temperature affects the T7080 output as if there had been a 1 F [0.6 C] change in zone temperature.

Fig. 7 shows the output voltage ramp for the T7080. The voltage changes approximately 5 Vdc 11 F [0.6 C]. The minimum output voltage is 2 Vdc; the maximum is 22 Vdc.

The T7080 provides for a variable deadband of 3 F to 30 F [1.7 C to 17 C]: the temperature range between heating and cooling set points.

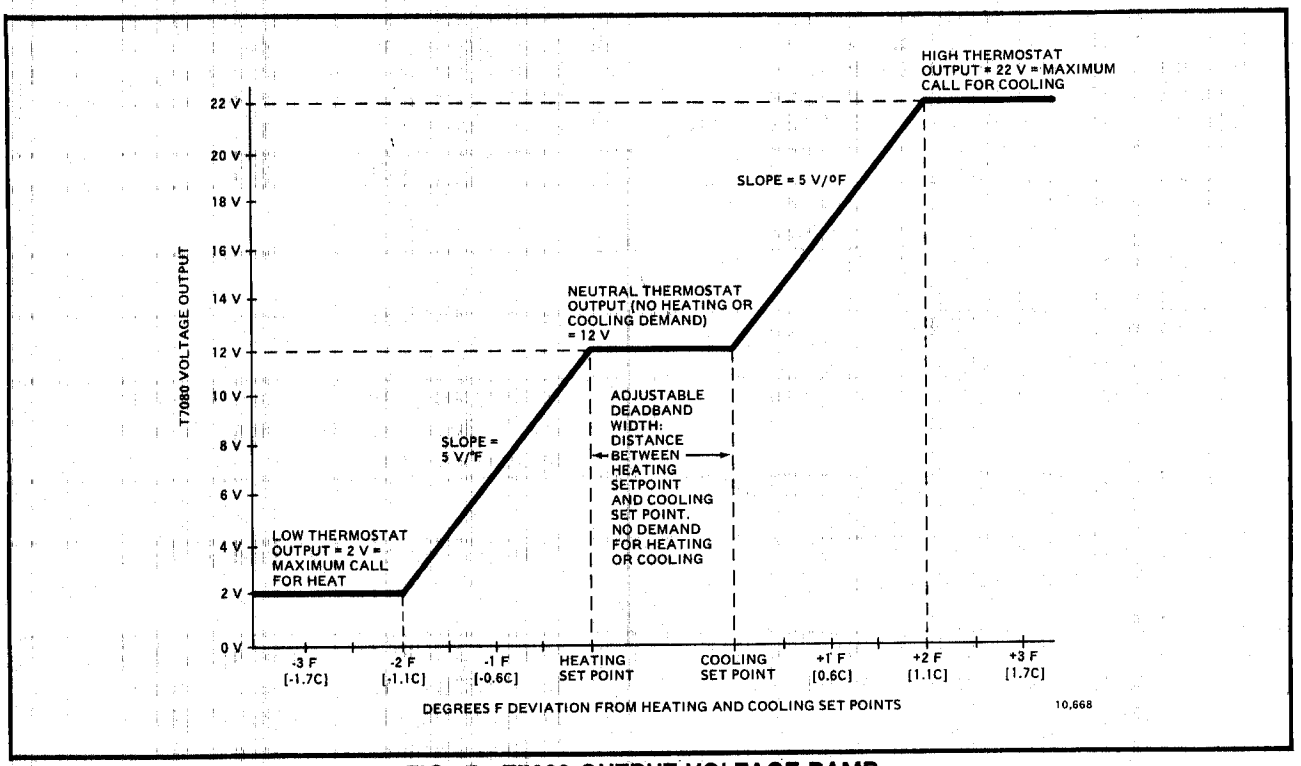

FIG. 7—T7080 OUTPUT VOLTAGE RAMP.

Upon power failure, the output of the T7080 drops to zero. On power restoration the output will rise to reflect the zone's need for heating or cooling.

The T7080 output directly affects the staging of heating and cooling by the load analyzer. Table 3 shows the standard on/off voltages for 3 stages of heating and 3 stages of cooling. When the electric heat sequencer is used, these on/off voltages are different. See the Honeywell W7080 or Ranco EA3 Load Analyzer specification sheet for those values.

TABLE 3 – VOLTAGE ON/OFF VALUES FOR HEATING AND COOLING STAGING.

STAGE	ON	OFF
Heat 1	6.0 Vdc	10.0 Vdc
Heat 2	4.5 Vdc	8.5 Vdc
Heat 3	3.0 Vdc	7.0 Vdc
Cool 1	18.5 Vdc	13.5 Vdc
Cool 2	20.0 Vdc	16.0 Vdc
Cool 3	21.5 Vdc	17.5 Vdc

CHECKOUT

Successful completion of the following checkout procedure indicates that the thermostat is powered and operating properly.

Do this checkout on initial installation and anytime the system is serviced. For more detailed checkout and troubleshooting procedures for the thermostat (as well as for the entire control system) refer to the Honeywell W7080A Load Analyzer instructions (form 60-2526).

If the thermostat fails to meet any of the verifications cited in this checkout, it is probably faulty and should be replaced.

QUICK T7080 CHECKOUT

For quick checkout of the T7080, follow this procedure. Move both set point levers 5 F to 10 F [2.8 C to 5.6 C] above space temperature. Voltage output (measured with positive lead on (4) and negative lead on (3) should be 2 V, which corresponds to a maximum call for heat. Move both levers slowly down toward space temperature. As they come to a point 2 F to 3 F [1.1 C to 1.7 C] above space temperature, voltage should begin to slowly increase (representing a decreasing call for heat) until at space temperature voltage output of the T7080 should be 12 V. As you continue to slowly move both set points to the left, the voltage output should remain at 12 V while space temperature is between the two set points. (With the set points together, this will be a 3 F [1.7 C] deadband.) When the cooling (blue) set point crosses the space temperature moving left, voltage should begin to increase above 12 V, representing an increasing call for cooling. At 2 F [1.1 C] or more below space temperature, the T7080 output should be at a maximum of 22 V (representing a maximum call for cooling), and it should stay there as you continue to move the set points to the extreme left.

EXPANDED T7080 CHECKOUT

NOTE: The S7080 Simulator is a component of the Honeywell W7080A Multizone Control System intended specifically for system checkout. It produces a variable voltage output to simulate various thermostat demands for cooling and heating for simple, thorough W7080A system and component checkout.

The expanded T7080 checkout verifies step-by-step that the thermostat is properly powered and that its voltage output to the load analyzer is appropriate for the relation between space temperature and thermostat set points. In addition, this checkout verifies that the discharge anticipation sensor and, if there is one, the remote space or return air sensor are functioning properly.

ACTION	VERIFICATION
1. Using Allen wrench (supplied), remove cover from T7080 thermostat or transmitter.	–
2. Connect dc voltmeter with positive lead at (2) and negative lead at (3).	–
3. Connect (3) on T7080 to (–) on load analyzer or load integrator.	–
4. Connect (2) on T7080 to (+) on load analyzer or load integrator.	Reading should be 24 Vdc, which shows that the T7080 is receiving the proper power from the load analyzer.
5. Disconnect zone discharge air sensor from T7080.	–
6. Connect dc voltmeter with positive lead to (1) and negative lead to (3), and measure voltage.	Voltage should be approximately 14.8 Vdc.
7. Connect dc voltmeter with positive lead to (6) and negative lead to (3) and measure voltage.	Voltage should be approximately 14.7 V for T7080B with remote sensor disconnected, or approximately 12 V for T7080A and T7080B with remote sensor connected.

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8. Connect duct sensor between terminals (1) and (3), connect remote sensor between terminals (5) and (6) for T7080B.	–
9. Move heat lever to extreme left and cool lever to extreme right.	Voltage should be 12 V if room temperature is between 57 F and 85 F [14 C and 29 C].
10. Move cool lever to left past room temperature.	Voltage should increase from 12 to 22 V.
11. Move cool lever to extreme right.	Voltage should drop to 12 V.
12. Move heat lever to the right past room temperature.	Voltage should decrease from 12 to 2 V.
13. Move heat lever until voltage is between 4 and 10 V.	Note voltage for reference in steps 14 and 15.
14. Disconnect discharge sensor.	Voltage should decrease below voltage in step 13.
15. Jumper terminals (1) and (3).	Voltage should increase above voltage noted in step 13.
16. To check the resistance of the remote thermistor sensor or the discharge air sensor, disconnect one lead from each of the sensors and connect an ohmmeter across each of the sensors.	Resistance should roughly correspond with that given in the cahrt on page 7 and/or Fig. 8.
17. The resistance of the integral thermistor sensor in the T7080A cannot be checked by the user.	

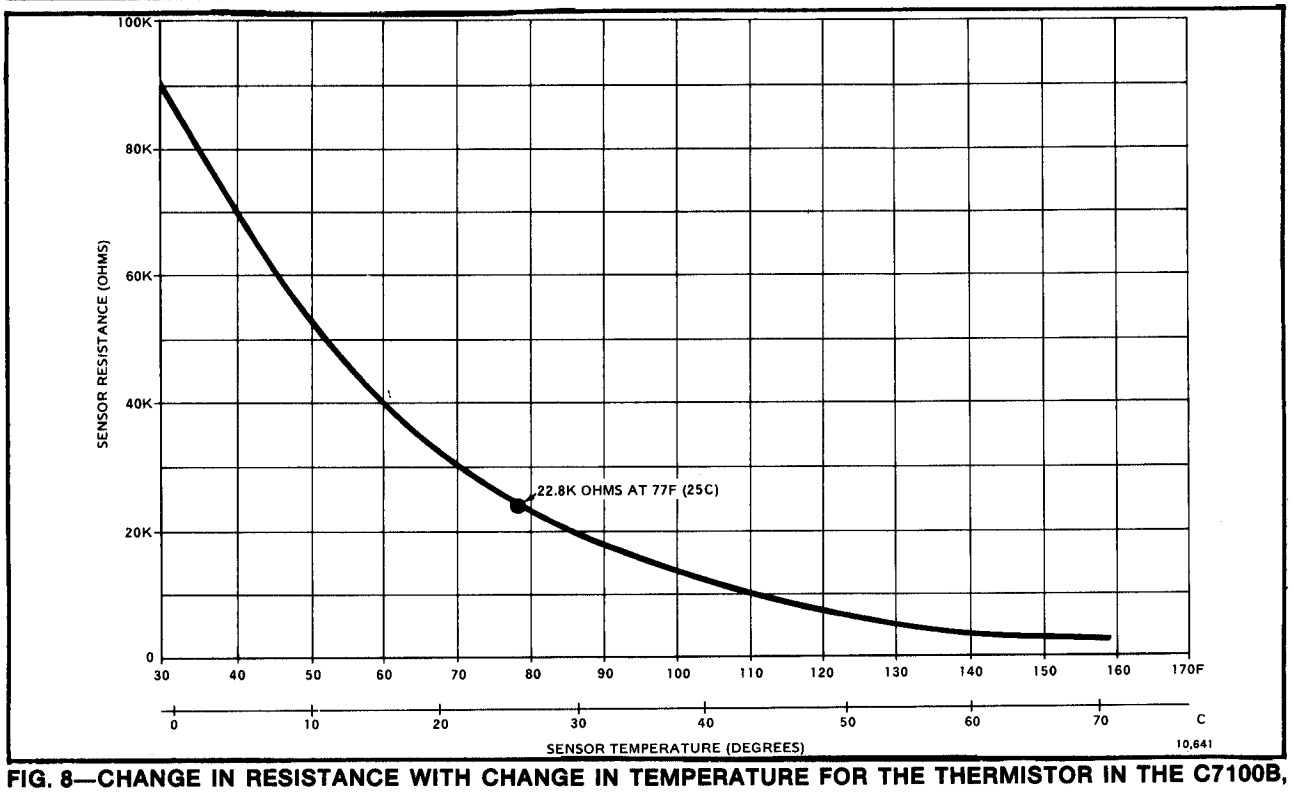

FIG. 8—CHANGE IN RESISTANCE WITH CHANGE IN TEMPERATURE FOR THE THERMISTOR IN THE C7100B, C7046B, AND T7047C1082.

If the T7080 meets all of the verifications, you can assume that it is working properly. If it fails any of the verifications it is probably faulty and should be replaced.

NOTE: There are no user-serviceable parts in the T7080.

Dear Customer,

We welcome your comments and suggestions for improving this publication. Your assistance is greatly appreciated and will enable us to provide better technical information for you.

Please send your comments and suggestions to:
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PRINTED IN U.S.A.