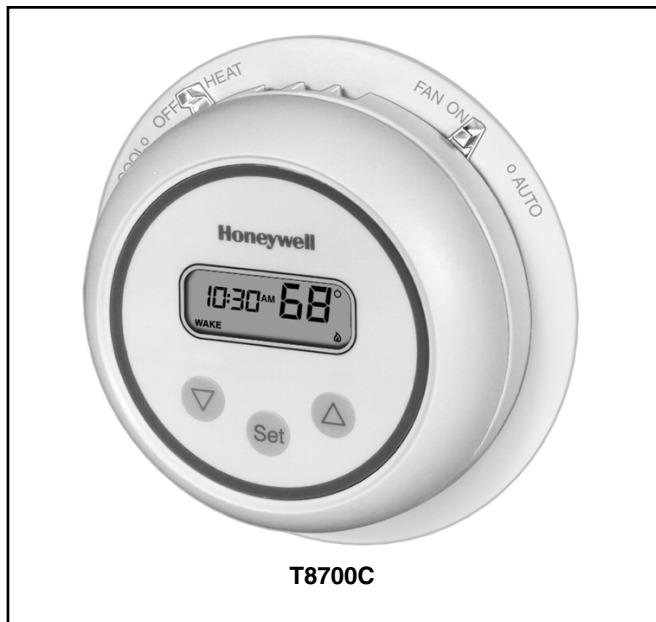


## T8700B,C An Electronic Round™ Programmable Thermostat

PRODUCT DATA



### FEATURES

- Attractive neutral styling complements any decor.
- Easy-to-use means fewer homeowner questions and increased homeowner satisfaction.
- Large easy-to-read display.
- Keys located near the display for easy access.
- Fan and System switches are located on the top of the wallplate to eliminate accidental setting changes.
- Quick and easy installation.
- Two-period programming for added energy savings.
- Manual changeover from heat to cool eliminates unexpected system operation (T8700C).
- °F or °C temperature display for added model flexibility.
- Selectable heating cycle rate (1, 3, 6 or 9 cph) allows a variety of applications and reduced inventory.
- Cooling (T8700C) cycle rate fixed at 3 cph (the standard setting for compressors) allows a speedy installation.
- Programming permanently held in memory (no batteries needed) and retained during power outages for increased installer and homeowner convenience.
- Compatible with most equipment and application needs including gas, oil and electric forced air; condensing gas furnaces; hydronic heat; and gravity and radiant heat systems.
- Powerstealing eliminates need to run additional wires.

### APPLICATION

The T8700 Electronic Round™ Programmable Thermostats provide single-stage, programmable temperature control for 24V heating and/or cooling systems. See Table 1 for model descriptions.

Table 1. T8700 Thermostat Description.

Model	System Selection	Fan Selection	Wiring Terminals Used
T8700B1007	HEAT-OFF	NONE	R,W
T8700B1015	HEAT-OFF	ON-AUTO	R,G,W
T8700C1005	HEAT-OFF-COOL	ON-AUTO	R,G,W,Y

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## SPECIFICATIONS

### IMPORTANT

*The specifications given in this publication do not include normal manufacturing tolerances; therefore, an individual unit might not exactly match the listed specifications. 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.*

T8700 TRADELINE® models include a thermostat, wallplate, decorator cover plate and owner's guide. The package also includes a resistor for use with Taco zone valves. See Fig. 11.

### Power:

T8700: 24 Vac nominal, 18 to 30 Vac, 60 Hz.

### Electrical Ratings:

Heating: .02 to 1.2A run; 3.5A inrush.  
Cooling: .02 to 1.2A run; 6.0A inrush.  
Fan: .02 to 0.5A run; 2.5A inrush.

### Current Draw:

T8700 Power Stealing Thermostat requires only 2.5 mA current draw when the thermostat calls for heat or cool and is compatible with most 24V systems. It can be used in most non-millivolt applications. See Power Stealing in the Operation section.

### Temperature Adjustment:

Setpoint temperature is adjusted by using the  $\nabla$  or  $\triangle$  keys. One press changes the setpoint one degree; pressing and holding changes the setpoint several degrees.

### Temperature Setting Range:

40°F (4°C) to 99°F (37°C).

### Operational Ambient Temperature Range:

30°F (4°C) to 110°F (43°C).

### Shipping Temperature Range:

-20°F (29°C) to 120°F (49°C).

### Operating Relative Humidity:

5% to 90% RH, noncondensing.

### Cycle Rates (at 50 Percent Load):

Heating: Selectable at 1, 3, 6 or 9 cph. See Table 2 for heating cycle rates and corresponding system equipment.  
Cooling (T8700C): Fixed at 3 cph.

Table 2. Heating Cycle Rates.

System	Cycles per Hour (cph)
Steam, Gravity	1
Hydronic Heat, Condensing Gas Furnaces	3
Gas or Oil Forced Air	6
Electric Furnace	9

### Finish:

T8700: Premier White® color.

### Dimensions:

See Fig. 1.

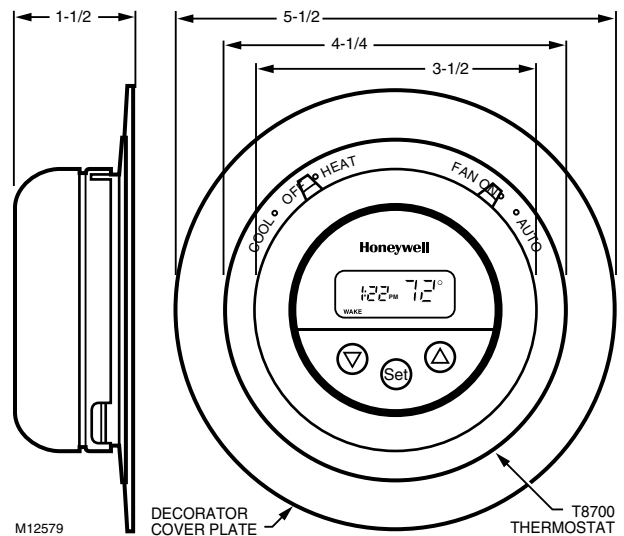


Fig. 1. T8700 Thermostat dimensions (T8700C shown).

## ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for the complete ordering number.

1. Order number.
2. Accessory, 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 Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Customer Logistics  
Honeywell Inc., 1985 Douglas Drive North  
Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Scarborough, Ontario M1V 4Z9.

International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

## 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

**Damage To Heating/Cooling System Possible. Be careful when handling wires during installation.** Disconnect power at furnace or at main breaker/fuse box before starting installation.



### RECYCLING NOTICE

If this control is replacing a control that contains mercury in a sealed tube, do *not* place your old control in the trash.

Contact your local waste management authority for instructions regarding recycling and the proper disposal of an old control containing mercury in a sealed tube.

### Location

Install the thermostat about 5 ft (1.5m) above the floor in an area with good air circulation at average temperature. See Fig. 2. Do not install the thermostat where it can 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 such as an outside wall behind the thermostat.

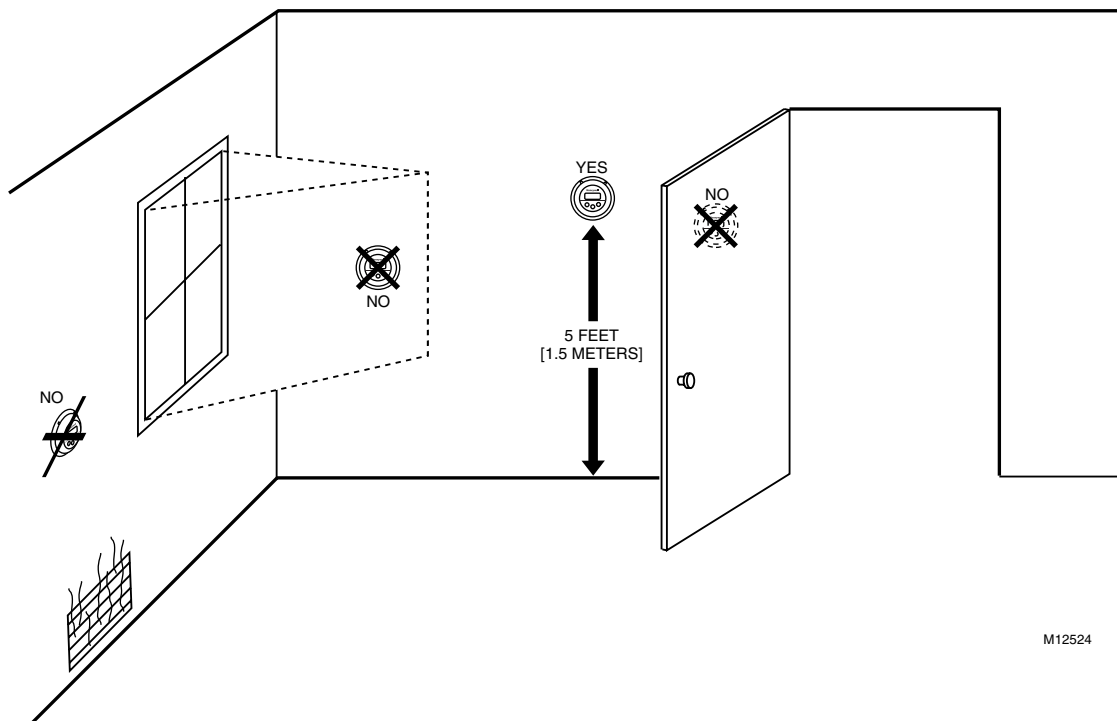
### Mounting Decorator Cover Plate and Wallplate to Wall

#### IMPORTANT

*Position and level the wallplate for appearance only. The thermostat functions properly even when not level.*

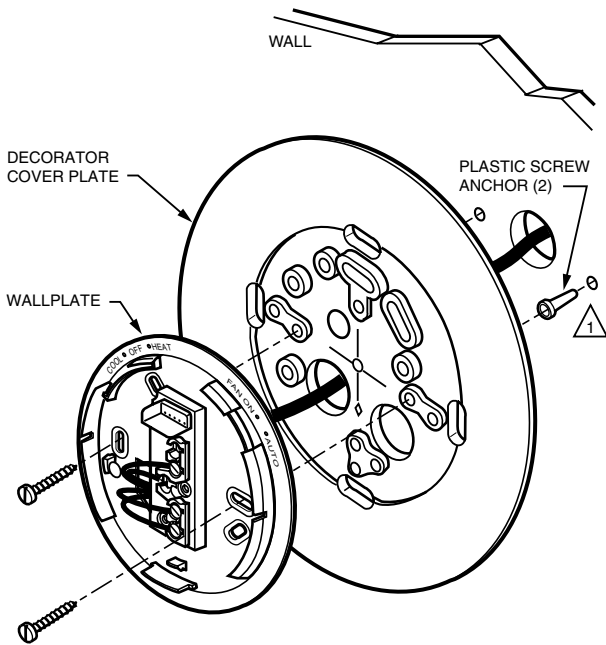
Mount decorator cover plate (if desired), wallplate, T8700 and the screws as follows; see Fig. 3:

1. Place the decorator cover plate and the wallplate on the desired wall location.
2. Pull the thermostat wire through the entrance hole on the decorator cover plate, then through the wallplate entrance hole.
3. Plug the wiring hole behind the thermostat to prevent drafts from affecting the thermostat.
4. Select the two mounting holes that best fit the application.
5. Fasten the decorator cover plate and the wallplate to the wall using the provided anchors (if necessary) and screws.



M12524

Fig. 2. Typical thermostat location.



1 WHEN USING WALL ANCHORS, DRILL 3/16 INCH HOLES FOR DRYWALL, 7/32 INCH HOLES FOR PLASTER OR WOOD.

M12532A

**Fig. 3. Mounting decorator cover plate and wallplate on wall (T8700C shown).**

## Wiring

### CAUTION

**Damage To Heating/Cooling System Possible. Be careful when handling wires during installation.**

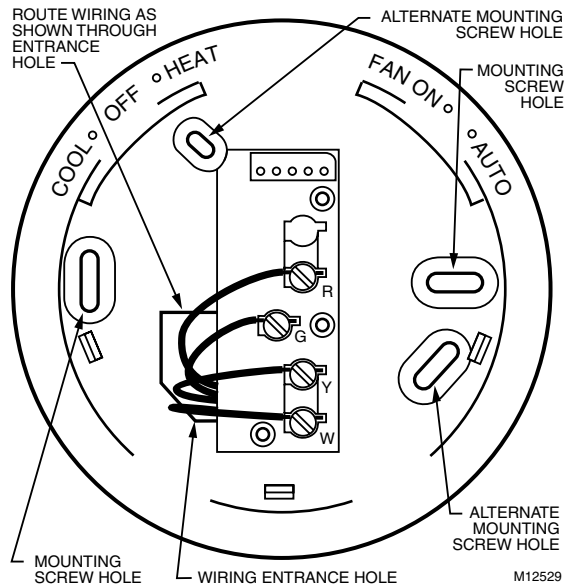
Disconnect power at furnace or at main breaker/fuse box.

### IMPORTANT

Use an 18-gauge maximum wire for wiring the T8700 Thermostat.

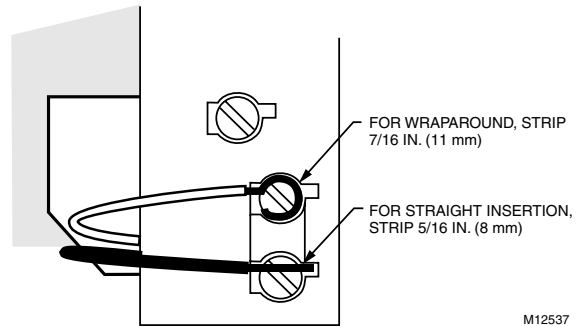
All wiring must comply with local electrical codes and ordinances. A letter is located near each terminal for identification.

NOTE: To ensure proper mounting of thermostat, restrict all wiring to the left side of the terminals. See Fig. 4.



**Fig. 4. T8700C wallplate wiring connections. (Refer to Table 1 for T8700B wiring connections.)**

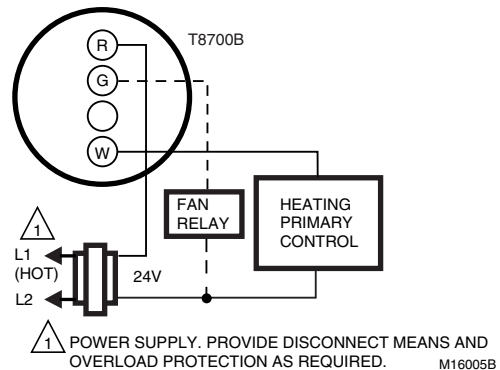
The shape of the terminals permits insertion of straight or wraparound wiring connections; either method is acceptable. See Fig. 5.



M12537

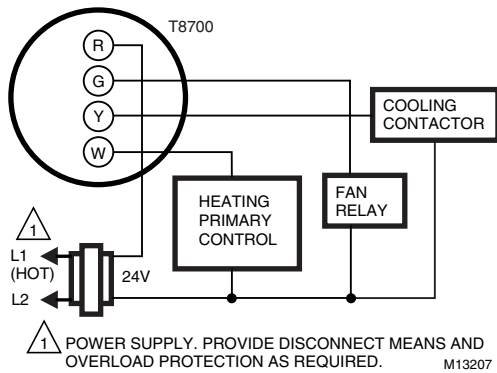
**Fig. 5. Wiring connections.**

The T8700 Thermostat steals power through the heating and/or cooling system controls and is adaptable to most, 24 Vac systems. Refer to Fig. 6 through 11 for typical wiring hookups.

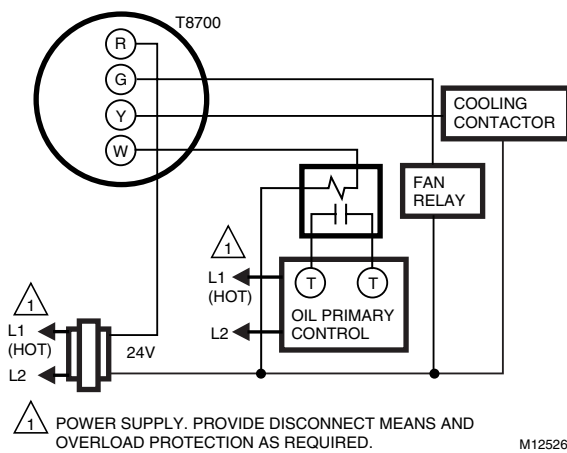


1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. M16005B

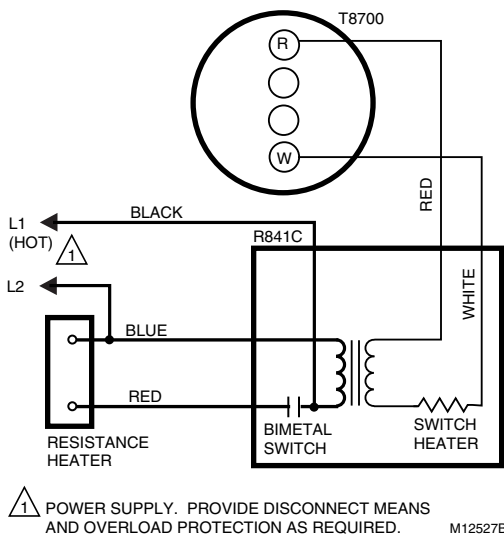
**Fig. 6. T8700B1007 Heat Only wiring diagram T8700B1015 Heat Only with Fan includes dotted line.**



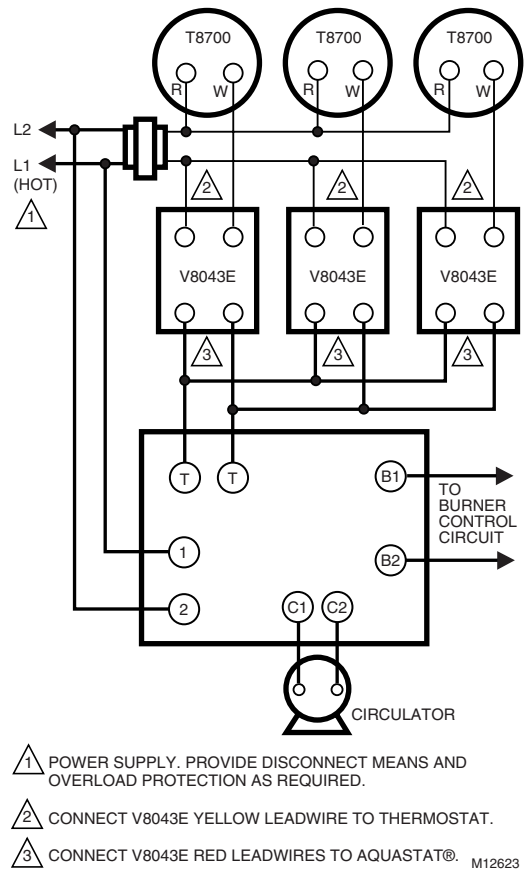
**Fig. 7. T8700C heat-cool wiring diagram in single transformer system with gas or electric heat/electric cooling.**



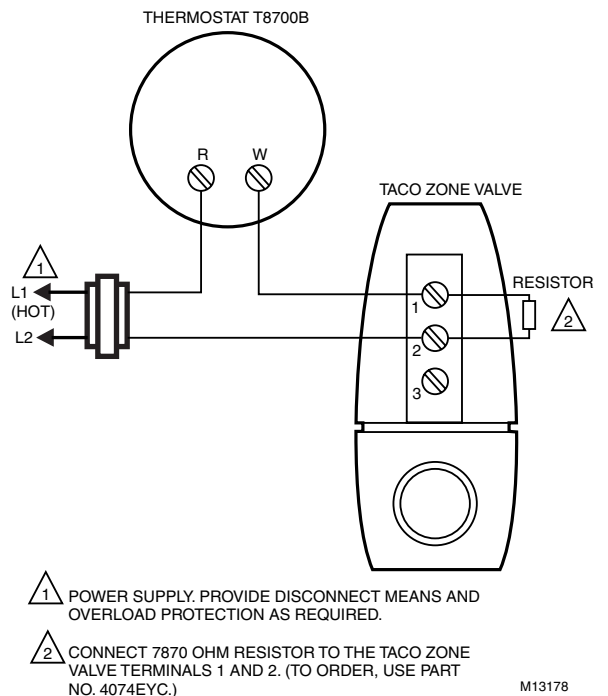
**Fig. 8. T8700C heat-cool wiring diagram in oil heating/electric cooling system. (Oil primary has its own transformer.)**



**Fig. 9. T8700B1007 Heat Only wiring diagram in electric baseboard or ceiling cable system.**



**Fig. 10. T8700B1007 Heat Only wiring diagram for controlling 2-wire hot water zone valves.**



**Fig. 11. T8700B1007 Heat Only diagram used with TACO zone valves. The 7870 OHM resistor is included.**

## Adjust Fan Operation Switch

The thermostat fan operation switch, labeled Fuel switch, is set at the factory in the F position. See Fig. 12. This is the correct setting for most systems. If this system is an electric heat system, set the switch to the E position. The E setting allows the fan to turn on immediately with the heating or cooling equipment in a system where the G terminal is connected.

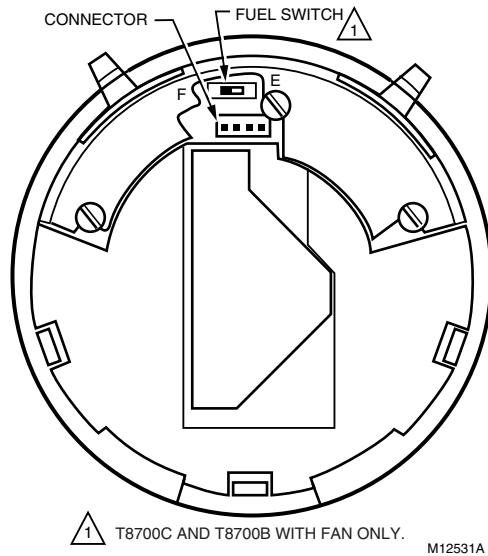


Fig. 12. Fuel switch, rear view of thermostat.

## Mounting Thermostat to Wallplate

1. Align and attach bottom center notch on the thermostat with bottom center tab on wallplate.
2. Next align tabs and connector at top of thermostat to the pins on the wallplate. Press firmly to attach.

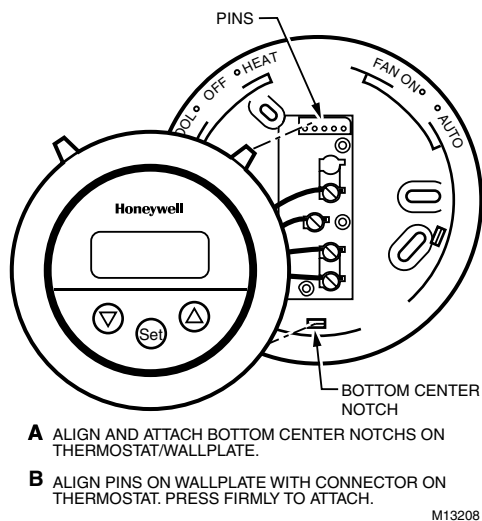


Fig. 13. Mounting thermostat to wallplate.

**NOTE:** To remove the thermostat from the wallplate, grasp the thermostat on both sides and pull the thermostat straight out.

## SETTINGS AND ADJUSTMENTS

### Setting Fan and System Switches

Fan and system settings are controlled manually using the switches located at the top of the thermostat wallplate. See Fig. 14 for switch locations.

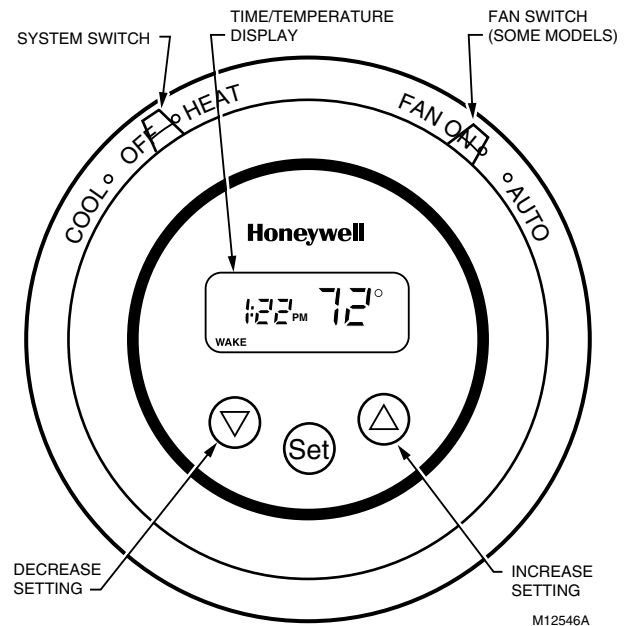


Fig. 14. T8700 time/temperature display and System/Fan switches (T8700C shown).

### Fan Switch

The Fan switch settings for the T8700B1015 with Fan and T8700C are:

- ON:** The fan runs continuously. Use to improve air circulation.
- AUTO:** Normal setting for most homes. In cooling, the fan starts and stops with the cooling equipment. In heating, the heating system directly controls the fan equipment. The fan may start a few minutes after the heating equipment turns on (for most systems). When the thermostat Fuel switch is set to the E position for electric heat, the fan starts and stops with heating equipment.

Slide the Fan switch on the thermostat to the desired fan setting.

### System Switch

The T8700B System switch controls the thermostat as follows:

- HEAT:** The thermostat controls the heating system.
- OFF:** Heating is off.





The T8700C System switch controls the thermostat as follows:

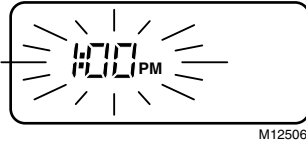
- COOL:** The thermostat controls the cooling system.
- OFF:** Both heating and cooling are off.
- HEAT:** The thermostat controls the heating system.

Slide the System switch on the thermostat to the desired system setting.

## SETTING THE CLOCK

1. To set the current time:

- a. Press the  key once. You will see a flashing clock.
- b. Use the  or  keys to set the current time.
- c. Press the  key until End is displayed.



## PROGRAMMING

The thermostat is preprogrammed for your convenience with the following time and temperature settings, see Table 3.

**Table 3. Preprogrammed Time/Temperature Settings.**

Period	Start Time	Heating Setpoint	Cooling Setpoint <sup>a</sup>
WAKE	6:00 AM	70°F (21°C)	78°F (25.5°C)
SLEEP	10:00 PM	62°F (16.5°C)	82°F (28°C)

<sup>a</sup> T8700C only.

WAKE is the time period when you want the house at a comfortable temperature during the day.

SLEEP is the time period you can set for an energy-saving temperature while you sleep.

**NOTE:** The heating and cooling program times are the same. Changing your cooling WAKE time also changes your heating WAKE time.




The following is a heating program example. The System switch is in the HEAT position. To change to the cooling program (T8700C), move the System switch to the COOL position and enter the cooling temperature settings.

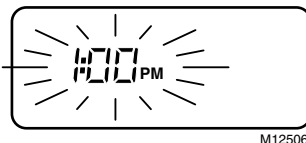
### IMPORTANT

*When programming the T8700B, first move the System switch to the heat position.*




**To program your own Time and Temperature settings follow steps 1 through 6.**

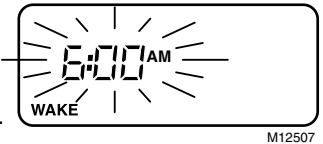
1. Set the current time.

- a. Press the  key once. You will see a flashing clock.
- b. Use the  or  keys to set the current time. The clock is now set.






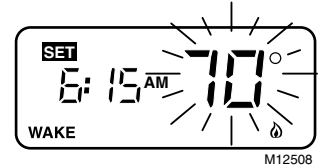
2. Set your WAKE time.

- a. Press the  key once. You will see a flashing WAKE time.
- b. Use the  or  keys to set your desired WAKE time. The WAKE time is now set.






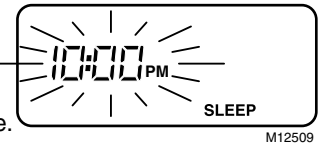
3. Set your WAKE temperature.

- a. Press the  key once. You will see a flashing WAKE temperature.
- b. Use the  or  keys to set your desired WAKE temperature. The WAKE temperature is now set.






4. Set your SLEEP time.

- a. Press the  key once. You will see a flashing SLEEP time.
- b. Use the  or  keys to set your desired SLEEP time. The SLEEP time is now set.




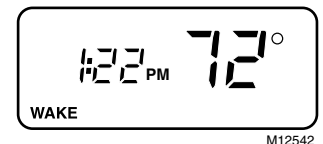
5. Set your SLEEP temperature.


- a. Press the  key once. You will see a flashing SLEEP temperature.
- b. Use the  or  keys to set your desired SLEEP temperature. The SLEEP temperature is now set.




6. Run program.

- a. Press the  key once. You have completed your program changes. End is displayed for five seconds indicating the end of programming. The thermostat then displays the current time and room temperature.



**NOTE:** To exit the programming mode at any time, press the  key until End is displayed.

### Preprogrammed Time and Temperature settings.

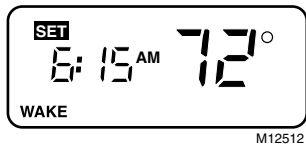
After the clock is set, you can use the preprogrammed Time and Temperature settings, (see table 3) press the  key until End is displayed.

The preprogrammed Temperature settings can now be used.

## Operating the Thermostat

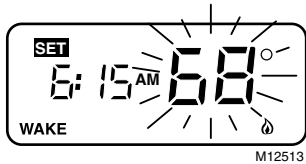
### To Display Temperature Setting.

Press  $\nabla$  or  $\triangle$  once to display present temperature setting. After approximately five seconds, the thermostat displays current time and room temperature.

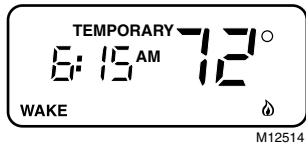


### To Make a Temporary Temperature Change.

a. Press  $\nabla$  or  $\triangle$  until desired temperature is displayed.



b. TEMPORARY is displayed. The TEMPORARY change is in effect until the next program period.



NOTE: To cancel your TEMPORARY change, press  $\text{Set}$  until End is displayed.

### To Use Hold Function.

To hold the thermostat at one temperature indefinitely, program both WAKE and SLEEP to the same temperature.

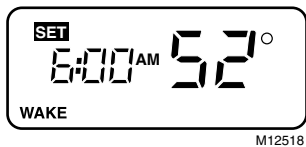
## Installer Setup

The following instructions provide the information necessary to change the heating cycle rate, select either Fahrenheit (F °) or Celsius (C °) and 12- or 24-hour clock format.

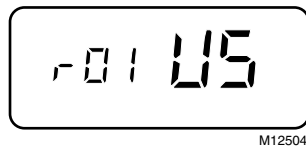
NOTE: To exit at any time, press  $\text{Set}$  until End is displayed.

### 1. Enter Installer Setup.

a. Use  $\nabla$  or  $\triangle$  keys to set the temperature set-point to 52°F (11°C).



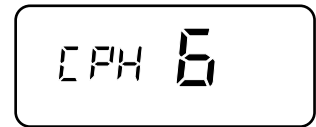
b. After the thermostat reverts back to displaying room temperature (approximately five seconds), simultaneously press  $\nabla$  and  $\triangle$  keys and hold for three seconds. Release the keys after the display changes.



c. Press  $\text{Set}$  within five seconds.

### 2. Select Cycles Per Hour.

The display changes to show current cycle rate setting.



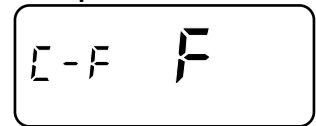
a. Use  $\nabla$  or  $\triangle$  to select 1, 3, 6, or 9 cph. Refer to Table 4.

Table 4. Heating Cycle Options

System	Program Setting (cph)
Steam, Gravity	1
Hydronic Heat, Condensing Gas Furnaces	3
Gas or Oil Forced Air	6
Electric Heat	9

### 3. Select Fahrenheit - Celsius Temperature.

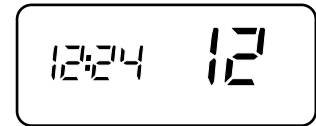
a. Press  $\text{Set}$  to display the current °F or °C setting.



b. Use  $\nabla$  or  $\triangle$  to choose between °C and °F.

### 4. Clock Format.

a. Press  $\text{Set}$  to display the current 12- or 24-hour clock setting.



b. Use  $\nabla$  or  $\triangle$  to choose either a 12- or 24-hour clock format.

Press  $\text{Set}$  once to exit Installer Setup. Upon exiting, the temperature setting will be at 52°F (or 11°C). Press  $\text{Set}$  six times to return the thermostat to the normal operating mode with End appearing on the display.





## OPERATION

### Zero Droop Performance

The T8700 Thermostat can control temperature closer to setpoint than electromechanical thermostats. This is because proportional plus integral control (P + I) maintains a constant indoor temperature independent of the outdoor temperature. This feature allows the T8700 Thermostat to provide tight temperature control with virtually no noticeable swings in temperature, a condition referred to as *droop*. This zero droop performance provides improved comfort and occupants do not need to continually adjust thermostat settings to be comfortable, even during extreme weather.

### Power Stealing

The T8700 Thermostat steals power through the heating and/or cooling system controls; therefore, it can be used in applications where it is not possible to run additional wires. See Fig. 15.

The T8700 Thermostat requires only 2.5 mA of load current when the heating and/or cooling is on. When the heating and/or cooling is off, the thermostat operates at 0.1 mA. This low current draw allows the T8700C to be used with most 24V heating and/or cooling systems.

The T8700 Thermostat operates only when mounted on the wallplate with 24V applied. Batteries are not required for operation. Temperature setpoints, programming and configuration settings are retained permanently in memory.

### Sequence of Operations

The Heat and Cool outputs are transistor controlled. A loss of ac power or a change in the System switch setting can turn off outputs. Table 5 shows the Fan and System sequence of operations.


### Fan Control

The FAN switch settings for the T8700B1015 with Fan and T8700C are ON and AUTO.

ON: The fan runs continuously.


AUTO: In cooling, the fan starts and stops with the cooling equipment. In heating, the fan starts a few minutes after the heating equipment turns on. With the Fuel switch in the E position for electric heat, the fan starts and stops with the heating equipment.

### Heat Mode

With the T8700 system switch in the HEAT position, the thermostat controls the heating system. On a call for heat, the W terminal is energized and a flame icon  shows on the digital display.

If the Fuel switch is in the E position, both the W and G terminals are energized on a call for heat.

### Cool Mode

With the T8700C System switch in the Cool position, the thermostat controls the cooling system. On a call for cool, the G and Y terminals are energized and a snowflake icon  shows on the digital display. A flashing snowflake indicates that the minimum-off timer is in effect.

### Minimum Off-Timer T8700C

A minimum off-timer for the T8700C assures that the cooling compressor does not come on again for at least five minutes after it turns off. The minimum-off timer is triggered when the compressor turns off or when the System switch is changed. If the compressor turns off when the setpoint is changed, the minimum-off timer is triggered. Power interruption and power restoration also trigger the minimum off-timer.

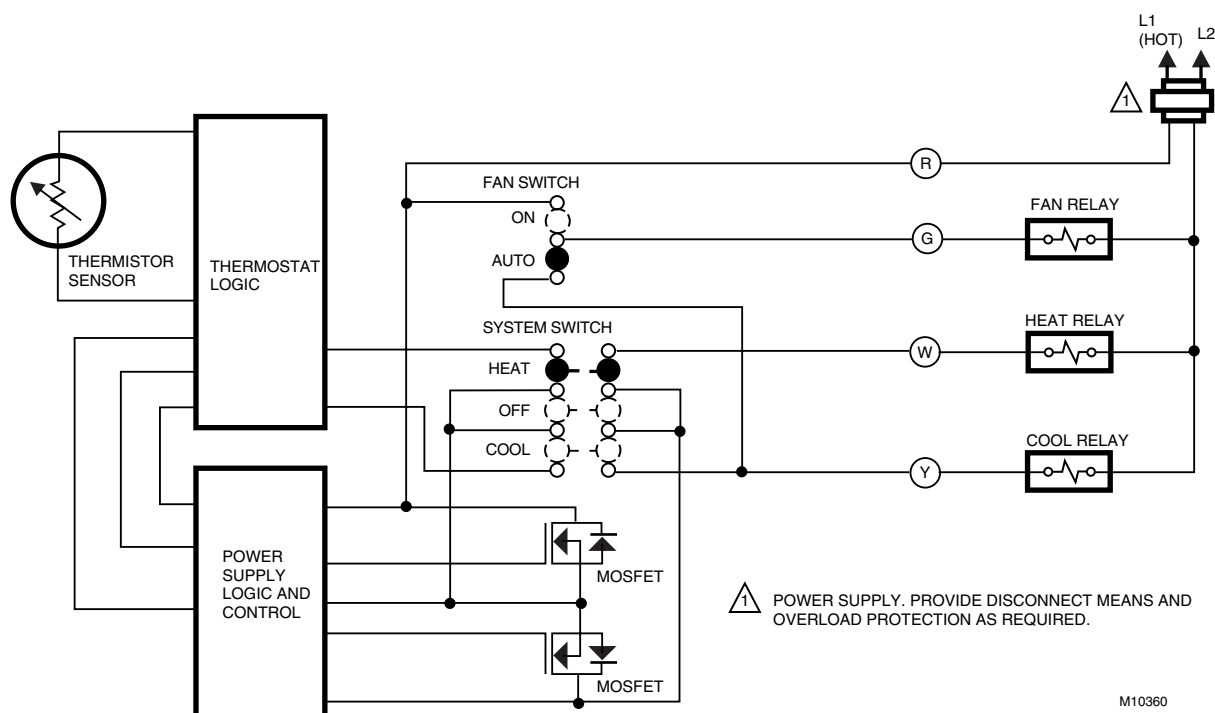


Fig. 15. T8700C power stealing internal schematic.

Table 5. Sequence of Operations.



Fan Switch Settings	System Switch Settings	Call for Action	Energize Terminals	Display Icons
AUTO	OFF	None	None	None
ON	Any	Any	G	None
AUTO	COOL <sup>b</sup>	Cooling <sup>b</sup>	G, Y	*
AUTO	HEAT	Heating	W,G <sup>a</sup>	🔥

<sup>a</sup> When fuel switch is in the E position. (T8700B with Fan and T8700C).

<sup>b</sup> T8700C only.

## CHECKOUT

### Heating (T8700B,C)

1. Slide the System switch to HEAT and the Fan switch to AUTO. (For T8700B1007 Heat Only model, a Fan switch is not an option).
2. Press and hold the  key to raise the temperature setting several degrees above the room temperature the heating equipment should start. In conventional systems, the system turns on the fan through a limit control. When using the thermostat with the fuel switch set to the E position for electric heat, the fan starts immediately.
3. Press the  key to lower the temperature setting below the room temperature. Heating equipment should stop.

### Cooling (T8700C)



## CAUTION



**Equipment Damage Possible.**

**Operating at too low of an outdoor temperature can cause compressor damage.**

Do not attempt to operate cooling when outdoor temperature is below 50°F (10°C). Refer to manufacturer recommendations.

### IMPORTANT

*A minimum off-timer for the T8700C assures that the cooling compressor does not come on again for at least five minutes after it turns off. The minimum-off timer is triggered when the compressor turns off or when the System switch is changed. If the compressor turns off when the setpoint is changed, the minimum-off timer is triggered. Power interruption and power restoration also trigger the minimum off-timer.*

1. Slide the System switch to COOL and the Fan switch to AUTO.
2. To start the cooling equipment, press the  key to lower the temperature setting several degrees below room temperature. The fan starts and stops with the cooling equipment.
3. Press the  key to raise the temperature setting above the room temperature. Cooling system should shut down.

### Fan (T8700B1015 with Fan, T8700C)

1. Slide the System switch to OFF and the Fan switch to ON. The Fan should run continuously.
2. Slide the Fan switch to AUTO. In heating, the fan is controlled directly by the heating equipment and starts a few minutes after the heating equipment turns on (for most systems). When using the thermostat with the Fuel switch set to the E position for electric heat, the fan starts and stops with the heating equipment. In cooling, the fan starts and stops with the cooling equipment.

Make certain all equipment responds properly to the thermostat.

## TROUBLESHOOTING

Symptom	Possible Cause	Corrective Action
Heating/cooling equipment does not operate.	No ac power.	Check power to heating/cooling equipment: <ul style="list-style-type: none"> <li>— On/Off switch.</li> <li>— Fuse or circuit breaker.</li> <li>— Loose 24V connection: at thermostat; at furnace/air conditioner.</li> <li>— Incorrect wiring: check appropriate wiring diagram.</li> </ul>
	Thermostat inoperative.	See Checkout section.
	Incorrect wiring.	Check wiring.
	Heating/cooling equipment inoperative.	Consult equipment manufacturer instructions.
	System switch on thermostat in wrong position.	Reset System switch.
Flashing ❄ Snowflake	Minimum-off timer in thermostat operating for cooling.	Wait five minutes or follow steps in Checkout section.
Partial display.	Still in installer setup mode.	See Installer Setup section for instructions on how to exit.
	Damaged thermostat.	Replace thermostat.
Displaying only time and not temperature.	Power to thermostat is currently interrupted.	Check the power to thermostat.
Blank display.	No power to thermostat.	Check the power to thermostat.
	Thermostat mounted incorrectly on wallplate.	See installation instructions for correct mounting.
Temperature display is incorrect.	Thermostat is configured incorrectly for °F or °C.	Reconfigure display. See Installer Set-up for instructions to change display.
Cannot change temperature setting.	Upper or lower temperature setpoints were reached.	Check temperature setpoints; temperature setting range is 40°F (4°C) to 99°F (37°C).
Time loss.	Power to thermostat was interrupted longer than 20 minutes.	Reset clock. See Setting The Clock

**Home and Building Control**

Honeywell Inc.  
Honeywell Plaza  
P.O. Box 524  
Minneapolis MN 55408-0524

**Honeywell Latin American Region**

480 Sawgrass Corporate Parkway  
Suite 200  
Sunrise FL 33325

**Home and Building Control**

Honeywell Limited-Honeywell Limitée  
155 Gordon Baker Road  
North York, Ontario  
M2H 3N7

**Honeywell Europe S.A.**

3 Avenue du Bourget  
1140 Brussels  
Belgium

**Honeywell Asia Pacific Inc.**

Room 3213-3225  
Sun Hung Kai Centre  
No. 30 Harbour Road  
Wanchai  
Hong Kong

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