VENSTAR®

Digital Thermostat

RESIDENTIAL THERMOSTAT

T2300FS

7-Day Programmable

UP TO 2-HEAT & 2-COOL

HEAT COOL & HEAT PUMP

- Control up to 2 Heat & 2 Cool Stages
- 7-Day Programmable
- 4 Settings/Day
- Auto Changeover
- 5 minute Built-In Compressor Protection
- Self-Prompting Programming with Copy Command
- Display Either F°or C°
- Mounts Flush with the Wall
- Back-Lit display
- One For All™ Works with Virtually All Equipment
- Non-Volatile memory
- Holiday/Vacation Programming
- Keypad lockout
- Dual setpoint with Adjustable Deadband
- 'O' or 'B' Terminal
- Optional: Remote Sensor Ready
- Dry Contact Equipped

- Use with most Air Conditioning & Heating Systems including: 1 or 2 Stage Electric Cooling & 2 Stage Gas Heating, Heat Pump, Electric or Hydronic Heat.

ENERGY STAR

OWNER'S MANUAL

Table Of Contents

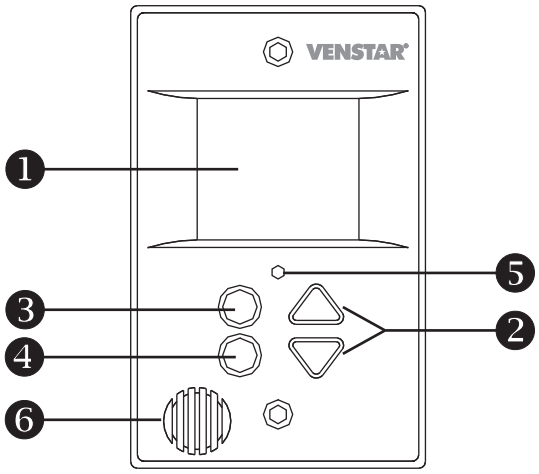
CAUTION Follow *Installation Instructions* carefully.

DISCONNECT POWER TO THE HEATER - AIR CONDITIONER BEFORE REMOVING THE OLD THERMOSTAT AND INSTALLING THE NEW THERMOSTAT.

WARNING

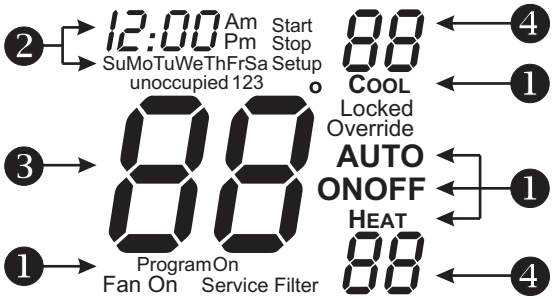
P/N T2300FS

Front Panel



1. **Liquid Crystal Display**
   with Thermoglow™
2. **Up/Down Buttons**
3. **Mode Button**
4. **Override Button**
5. **Heat or Cool Indicator**
   Red = Heat, Green = Cool
6. **Temperature Sensor**

Display



❶ Mode Indicators - *Page 7*

Selects the operational mode of the equipment.

HEAT - Indicates the heating mode.

COOL - Indicates the air conditioning mode.

AUTO - Indicates the system will automatically changeover between heat and cool modes as the temperature varies.

PROGRAM ON - Indicates the time period program is enabled to run.

OFF - Indicates heating and cooling are turned off.

❷ Clock with Day of the Week - *Page 6*

Indicates the current time and day. This clock is also used to program the time period schedules.

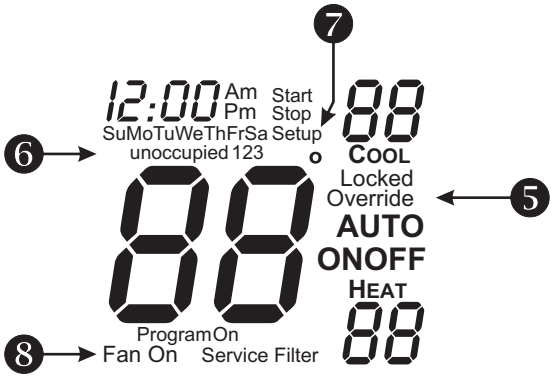
❸ Room Temperature Display

Indicates current room temperature and displays the outdoor temperature when selected (*page 17*).

❹ Desired Set Temperature - *Page 8*

Indicates desired room temperature(s).

Display



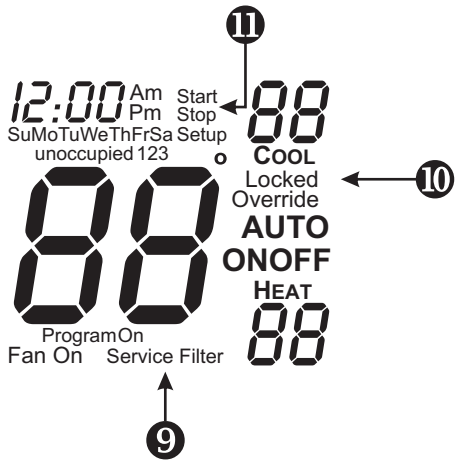
❺ **Override** icon - *Page 14*
Indicates the program is currently being overridden for up to four hours.

❻ **Occupied** & **Unoccupied** icons - *Pages 9-12*
Indicates the program number: Occupied 1,2,3 or Unoccupied.

❼ **Setup** icon - *Pages 15-19*
Indicates the thermostat is in the advanced setup mode.

❽ **Fan On** icon - *Page 15* Indicates constant, continuous fan operation. When **Fan On** is not lit - indicates the fan will only operate when necessary to heat or to cool.

Display

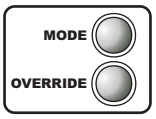


❾ **Service Filter** icon - *Page 17*
Appears when the filter should be serviced under normal conditions. Adjustable from 0 - 1950 hours or blower operation.

❿ **Locked** icon - *Page 25*
Indicates keypad has been locked.

⓫ **Start** & **Stop** icons - *Pages 10-11*
Appear when programming occupied time periods.

Quick Start *Set the Clock and Go*



Press the MODE and OVERRIDE buttons at the same time for two seconds to enter Setup screens.

During Setup & Programming:

Pressing the UP or DOWN buttons will modify the flashing selection.

Setting the Clock

12:00 Am Setup 1

Tip: *To change hours quickly, press and hold the OVERRIDE button and press the UP or DOWN buttons.*

To adjust the Clock or Day use

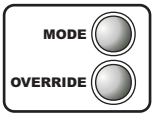
Press

buttons.

Setting the Day

Mo Setup 2

Press the MODE and OVERRIDE buttons at the same time to return to normal operation.



The thermostat is preprogrammed from the factory to operate one or two stage equipment* without the need for further programming. To optimize the installation of this thermostat, follow the instructions in the Advanced Setup section.

* *The thermostat is not preprogrammed from the factory to operate electric heat or heat pump systems. To control these systems, follow the steps in the Advanced Setup section, pages 15 & 16.*

Selecting the Heat or Cool Mode

Select Mode by Pressing the MODE Button

Heating Only

*The **HEAT** setting indicates the temperature the room has to reach before the furnace will turn on to heat the room.*

Cooling Only

*The **COOL** setting indicates the temperature the room has to reach before the air conditioner will turn on to cool the room.*

Heating or Cooling

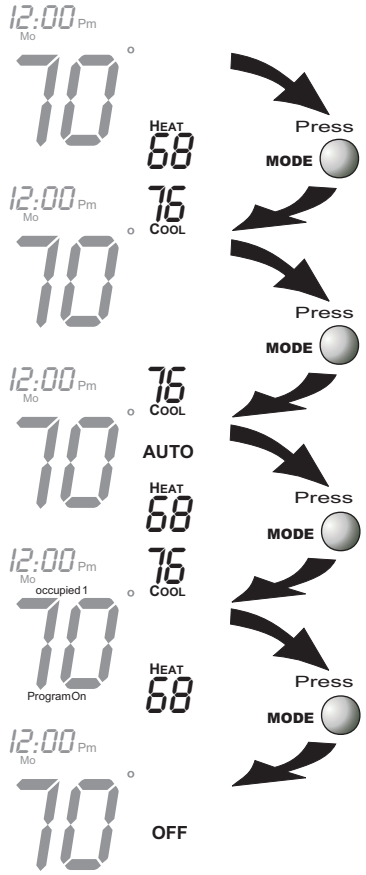
***AUTO** will automatically select heat or cool based on room temperature demand.*

Time Schedule for Heating or Cooling

***Program On** will activate the stored timer operation for the heating and cooling setpoints (occupied or unoccupied periods).*

Off

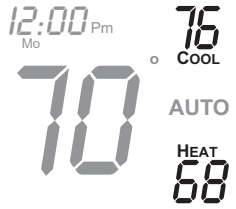
***OFF** indicates both heating and air conditioning systems are turned off.*



Basic Operation

Selecting Your Desired Temperature
(adjusting the setpoints)

AUTO OR PROGRAM MODE
Pressing the UP or DOWN buttons in Auto **or** Program mode will adjust **both** the heat and cool set temperatures simultaneously.



Adjust the desired set temperature with the

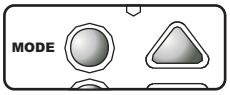
buttons.

HEAT OR COOL MODE
Pressing the UP or DOWN buttons in Heat **or** Cool mode will adjust only the heat **or** cool set temperature.

Adjust the desired set temperature with the

buttons.

Programming Occupied & Unoccupied Periods



Press the MODE button. While holding MODE, press the UP button for two seconds to enter time period programming.

Use the Programming Worksheet on the back cover to help with this section.

Select the maximum # of occupied periods to be used on any one day. Typically, most installations use only Occupied 1.

(1,2 or 3)

Occupied 1

Press MODE

Adjust the cooling setpoint for Occupied 1.

(35˚- 99˚, OF)

Occupied 1

74 COOL

Press MODE

Adjust the heating setpoint for Occupied 1.

(OF, 35˚- 99˚)

Occupied 1

74 COOL

HEAT 72

Press MODE

Adjust the cooling setpoint for unoccupied periods.

(35˚- 99˚, OF)

unoccupied

85 COOL

Press MODE

Continued

Programming Occupied & Unoccupied Periods

Adjust the heating set-point for Unoccupied periods.
(OF, 35°- 99°)

unoccupied 85 COOL

HEAT 55

Press MODE

Select the day for Occupied 1.
(Mo - Su)

Mo Occupied 1

Press MODE

Adjust the start time for Occupied 1.

7:00 Am Start
Mo Occupied 1

Press MODE

Adjust the stop time for Occupied 1.

6:00 Pm Stop
Mo Occupied 1

Press MODE

On

Off

Select Occupied 1 to run on this day (On), or not to run on this day (Off).

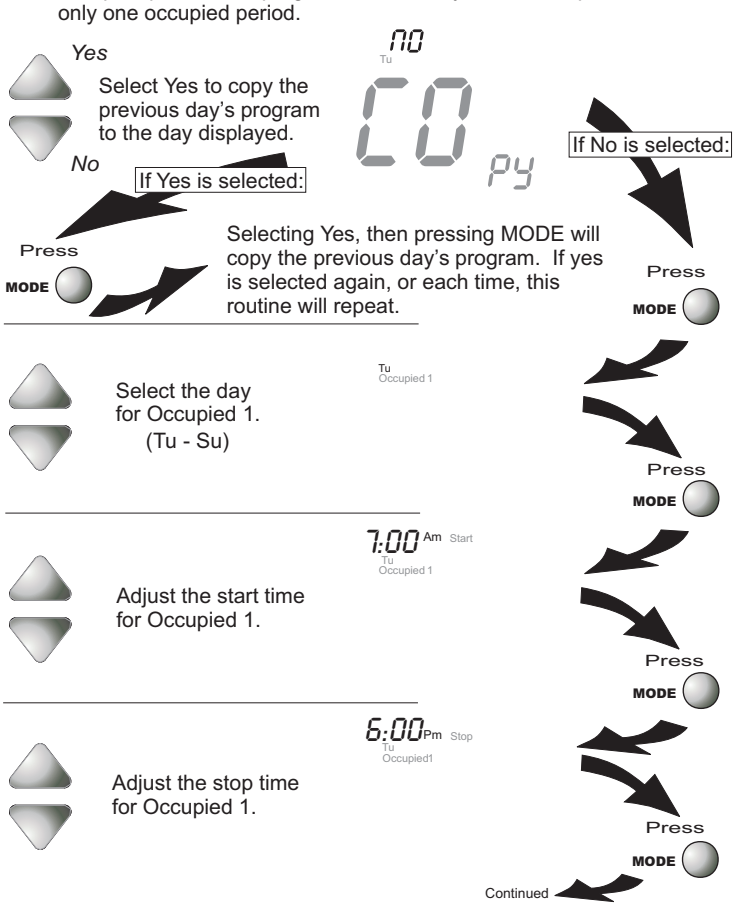
Mo Occupied 1

ON

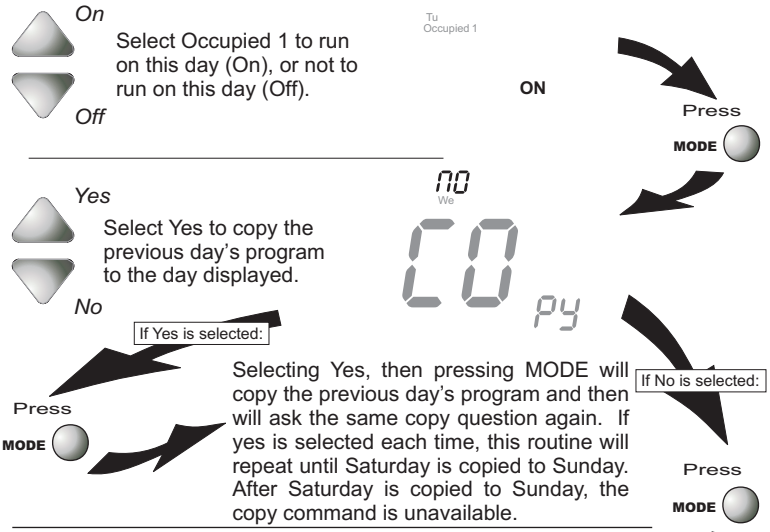
Press MODE

Continued

The copy command becomes available after the maximum # of occupied periods are programmed in a day. This example uses only one occupied period.



Programming Occupied & Unoccupied Periods

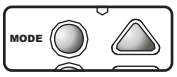


Select Occupied 1 to run on this day (On), or not to run on this day (Off).

Select Yes to copy the previous day's program to the day displayed.

Selecting Yes, then pressing MODE will copy the previous day's program and then will ask the same copy question again. If yes is selected each time, this routine will repeat until Saturday is copied to Sunday. After Saturday is copied to Sunday, the copy command is unavailable.

If **No** is selected, as in previous steps, flashing prompts will appear to input start and stop times for Occupied 1. If more than one occupied period was selected in the first programming step (*page 9*), then the cool and heat setpoints, and start and stop times for each additional occupied period will be prompted.



After programming for all seven days is complete, press the MODE and UP buttons at the same time for two seconds to leave the Setup screens. If no buttons are pressed, the display will leave the setup screens after 30 seconds.

PROGRAMMING TIPS

- If only the Occupied 1 period is selected in the first programming step (*page 9*), Occupied 2 & 3 programming steps are skipped. Furthermore, if Occupied 2 is selected, Occupied 3 programming steps are skipped.

- Heat & Cool setpoints for Occupied 1 are the same for every day of the week. If desired, Heat & Cool setpoints for Occupied 2 & 3 can be adjusted differently for each day of the week.

- **If the start time is set later in the day than the stop time,** the program will run from the start time to midnight and from midnight to the stop time on the same day. *For example: 9pm start, 8am stop, on Monday. In this example the program will run from 12am Monday to 8am Monday and again from 9pm Monday to 12am Tuesday.*

- **Unoccupied Operation:** The unoccupied settings take effect at all times when: (**1**) the program is on **and** (**2**) the current time is outside a preset occupied period. For this reason start and stop times are not necessary for unoccupied time periods.

- If the **same** start and stop times are programmed for an occupied period, then it will run 24 hours.

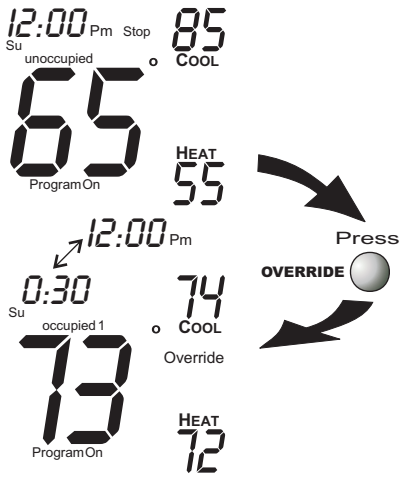
- If one occupied period starts and stops within another occupied period the lower occupied # has priority. *For example: If Occupied 3 is programmed to be on for 24 hours, and Occupied 2 is programmed to run that day, then the Occupied 2 setting will take over for Occupied 3 between Occupied 2 start and stop times.*

Overriding the Daily Schedule

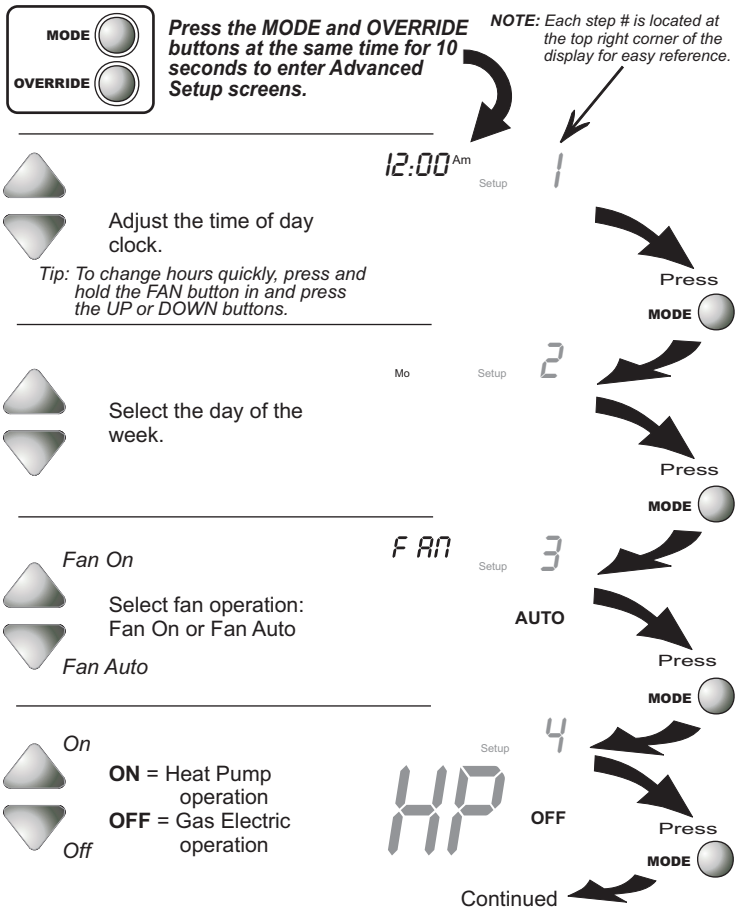
The OVERRIDE button may be used to interrupt the normal time schedule programming of the thermostat. Override may only be used when the thermostat is running the time schedule, in Program On mode.

Unoccupied Operation - During programmed, unoccupied periods, pressing the OVERRIDE button will temporarily force the thermostat into Occupied 1 comfort settings for 30 minutes. The remaining Override time will alternate with the clock (refer to the second display below). The Override timer can be set up to a maximum of four (4:00) hours, in increments of 30 minutes. If the timer has been set for the maximum time, the next press of the OVERRIDE button will reset the timer, returning the thermostat to the correct time period program for the day.

Occupied Operation - During programmed, occupied periods, a press of the OVERRIDE button will force the thermostat into an unoccupied period for the remainder of the day. During this forced unoccupied period the OVERRIDE button will operate as described above.



Advanced Setup



Advanced Setup

b

Select the reversing valve polarity for Heat Pump operation:

O = Energize in cooling

b = Energize in heating

O

*(Step 5 only appears if heat pump is **on** in step 4)*

Setup 5 0

Press MODE

On

Select Electric Heat operation:

On = 1st stage electric heat

Off = 1st stage gas heat

Off

*(Step 6 only appears if heat pump is **off** in step 4)*

Setup 6 EH OFF

Press MODE

Adjust the deadband for the 1st stage.

(1˚- 6˚)

db Setup 7 2

Press MODE

Adjust the minimum ***difference*** between cooling & heating setpoints.

(0˚- 6˚)

d IF Setup 8 COOL 2 HEAT

Press MODE

Select the cycles per hour limit:

d=cycles per hour limit defeated

d1=d + defeat 5 min. compressor lockout

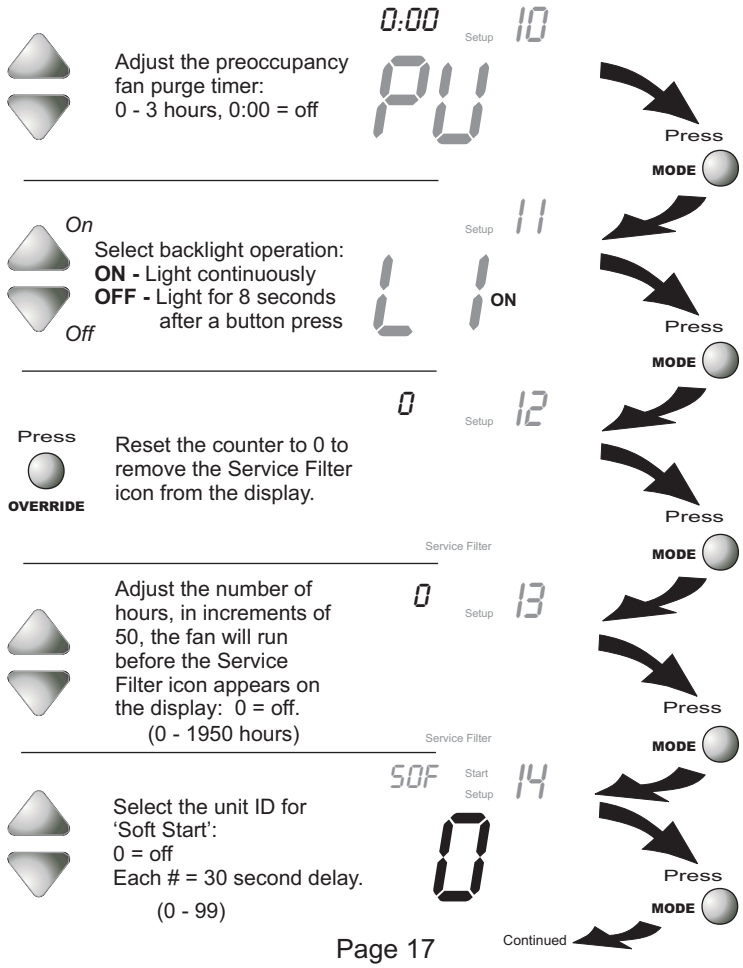
(d1, d, 2 - 6)

Setup 9 6 CY

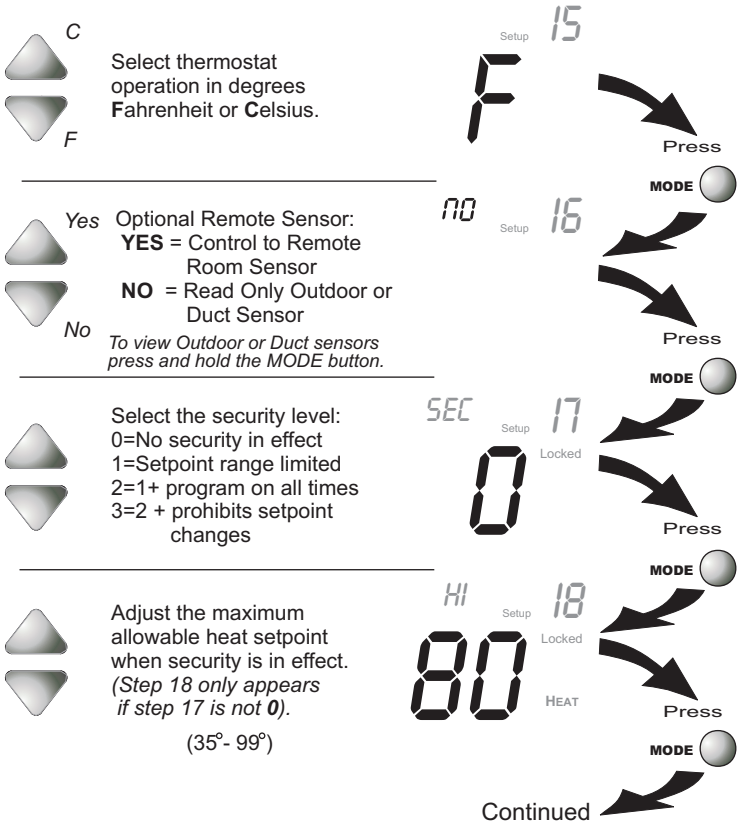
Press MODE

Continued

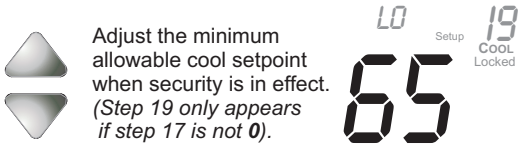
Advanced Setup



Advanced Setup

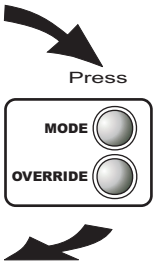


Advanced Setup



Adjust the minimum allowable cool setpoint when security is in effect. *(Step 19 only appears if step 17 is not **0**).*

(35°- 99°)



Press the MODE and OVERRIDE buttons at the same time for two seconds to leave the Setup screens. If no buttons are pressed, the display will leave the setup screens after 30 seconds.

Advanced Setup Table

Step #	Description	Range	Factory Default
1	Time of Day	24 hour	12:00 am
2	Day of the Week	Mo - Su	Mo
3	Fan Operation	Auto / On	Auto
4	Heat Pump	Off / On	Off
5	Reversing Valve Polarity	O / b	O
6	Electric Heat	Off / On	Off
7	Deadband/Temp. Swing 1st Stage	1°- 6°	2°
8	Minimum Heat/Cool Differential	0°- 6°	2°
9	Cycles Per Hour	d, d1, 2 - 6	6
10	Fan Purge	0:00 - 3:00	0:00
11	Thermoglow Backlight	Off / On	On
12	Reset Service Filter Icon	read only	- -
13	Service Filter Run-Time Set	0 - 1950	0
14	Soft Start	0 - 99	0
15	Fahrenheit or Celsius	F / C	F
16	Thermostat Control to Remote Sensor?	Yes / No	No
17	Security Level	0 - 3	0
18	Max Heat Setpoint	35°- 99°	80°
19	Min Cool Setpoint	35°- 99°	65°

About Advanced Features & Operation

✻ CALIBRATION - Under normal circumstances it will not be necessary to adjust the calibration of the temperature. If calibration is required, please contact a trained HVAC technician to correctly perform the following procedure.

❶ **MODE**

Place the thermostat in the OFF mode.

❷ **MODE**

Press and hold the MODE button. While holding the MODE button, press and hold the DOWN button for 5 seconds. All icons will appear on the display.

❸

Press the MODE button once. The thermostat temperature will be displayed and may be calibrated using the UP or DOWN buttons.

❹ **MODE**

After calibration is complete, press the MODE button **once** to save your changes and return to normal operation.

✻ CLOCK BACKUP - In the event of a power loss, the thermostat's internal clock will continue to keep proper time for a minimum of 48 hours without external power or batteries.

✻ DEADBAND OPERATION - Controls up to two Heat and two Cool stages (please see the diagram on the next page).

The **1st Stage** of heat or cool is turned on when:

(**A**) The temperature spread from the setpoint is equal to or greater than: *the setpoint plus the 1st stage deadband (step #7, page 16),* This 1st stage deadband is adjustable from 1-6 degrees and the default is two degrees.

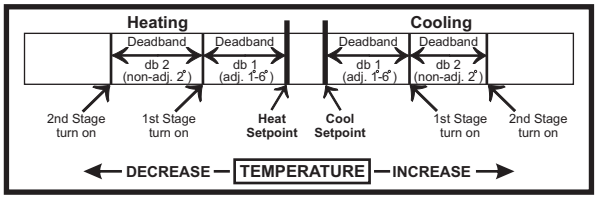
The **2nd Stage** of heat or cool is turned on when:

(**A**) The 1st Stage has been on for a minimum of *two minutes*.

And

(**B**) The temperature spread from the setpoint is equal to or greater than: *the setpoint plus the 1st stage deadband (step #7, page 16), plus the 2nd stage deadband.* This 2nd stage deadband is fixed at two degrees and is not adjustable.

About Advanced Features & Operation

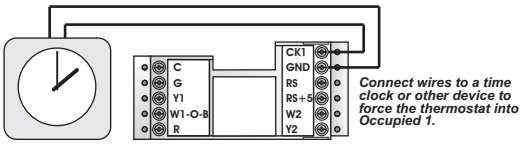


The above figure assumes the minimum on time for the prior stage has been met to allow the next stage to turn on, once the deadbands have been exceeded.

✻ DRY CONTACT SWITCH - This feature allows an external device such as a Central Time Clock, Occupancy Sensor, or a Telephone activated device to force 1 or more thermostats into Occupied 1.

The CK1 and GND terminals are 'normally open.' When the dry contact is energized, shorting CK1 and GND together, the thermostat will be forced into Occupied 1 setpoints and the Occupied 1 icon will blink (*page 9*).

Note: *The thermostat must be in Program On mode for this feature to have any effect.*



Important Note: ***For control of multiple thermostats by 1 source, refer to the enclosed yellow document P/N 88-175 'Potential Phasing Problems' before installation.***

✻ ELECTRIC HEAT - Selecting Electric Heat *(step #6, page 16)*, will cause the thermostat to turn on the fan immediately any time there is a heat demand. Since most gas furnaces control the fan, this feature should be off unless it is necessary for the thermostat to energize the fan with first stage heat.

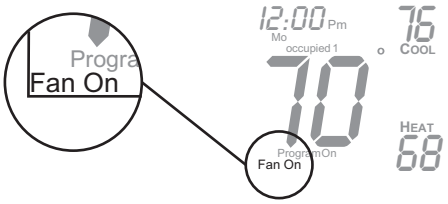
About Advanced Features & Operation

✻ EMERGENCY HEAT - Only available if you have a Heat Pump installed. To initiate the Emergency Heat feature, press the OVERRIDE button. While holding the OVERRIDE button press the UP button. The Cool setpoint display will read 'EH' (emergency heat).

Operation - During Emergency Heat operation the thermostat will turn on the fan and the 2nd stage of heat when there is a demand for heat. Also during Emergency Heat, the 1st stage of heating or cooling will be unavailable.

Exit Emergency Heat - Follow the same steps as entering Emergency Heat by pressing the OVERRIDE and UP buttons. During Emergency Heat, only OFF and HEAT modes are available by pressing the MODE button.

✻ ENERGY SAVING SMART FAN - This feature allows the fan to run continuously during Occupied 1, 2 or 3 and automatically de-energizes during Unoccupied, except when necessary to heat or cool. To use this feature, place the thermostat in the Program On mode. Next, program the fan for continuous operation *(step #3, page 15)* to display the **FanOn** icon (*see below*).



About Advanced Features & Operation

✻ FACTORY DEFAULTS - If, for any reason, you desire to return all the stored settings back to the factory default settings, follow the instructions below.

WARNING: This will reset all Time Period and Advanced Programming to the default settings. Any information entered prior to this reset will be permanently lost.

❶ **MODE** Place the thermostat in the OFF mode.

❷ **MODE** Press and hold the MODE button. While holding the MODE button, press and hold the DOWN button for 5 seconds. All icons will appear on the display.

❸ **OVER RIDE** After all of the icons appear, release the MODE and DOWN buttons. Then press and hold the OVERRIDE button for 5 seconds.

❹ **MODE** After the letters **Fd** appear on the display (Factory Default), release the FAN button. Press the MODE button **twice** to return to normal operation.

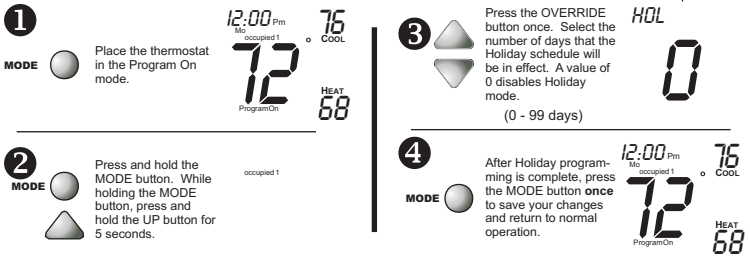
✻ FAN PURGE TIMER - When this feature is activated, the fan will turn on during an unoccupied period at a preset amount of time prior to Occupied 1. This preoccupancy fan purge timer may be set from zero to three hours, in 15 minute increments. Zero means this feature is turned off.

✻ HEAT/COOL DIFFERENTIAL - The Heat and Cool setpoints will not be allowed to come any closer to each other than the value set in Advanced Setup *step # 8, on page 16*. This minimum difference is enforced during Auto changeover and Program On operation.

Note: *To increase the spread between the heating and cooling setpoints, press the MODE button until only the heat setpoint is displayed; adjust to the desired setpoint. Press the MODE button until only the cool setpoint is displayed; adjust to the desired setpoint. Press the MODE button again to enter the Auto-changeover mode where both the heat and cool setpoints are displayed.*

About Advanced Features & Operation

✻ HOLIDAY MODE - When the thermostat is programmed for Holiday mode, it will take effect at 12:00 am of the next day. *In order for the Holiday mode to take effect, the thermostat must be in the Program On mode.* The thermostat will control to the Unoccupied cooling and heating setpoints *(see pages 9 & 10)*. Holiday setpoints will be enforced for the number of days specified in the Holiday setup step below (0 - 99 days).



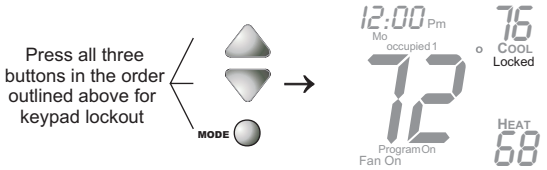
Note: You cannot set the Heat setpoint any higher than the Cool setpoint minus the deadband setting in Advanced Setup step #8 on page 15.

Holiday Display - When the thermostat is placed into the Holiday mode, the thermostat will display the screen shown below. To return the thermostat to normal operation from Holiday mode, follow the steps above and adjust the number of days to zero.

Overriding the Holiday Mode - Pressing the OVERRIDE button during Holiday Mode will temporarily force the thermostat into Occupied 1 comfort settings for 30 min. The remaining Override time will alternate with the clock display *(see page 14)*. The Override timer can be set up to a maximum of four (4:00) hours, in increments of 30 minutes. If the timer has been set for the maximum time, the next press of the OVERRIDE button will reset the timer, returning the thermostat to Holiday Mode.

About Advanced Features & Operation

✻ KEYPAD LOCKOUT - To prevent unauthorized use of the thermostat, the front panel buttons may be disabled. To disable, or 'lock' the keypad, press and hold the MODE button. While holding the MODE button, press the UP and DOWN buttons together. The LOCKED icon will appear on the display, then release the buttons.



To ***unlock*** the keypad, press and hold the MODE button. While holding the MODE button, press the UP and DOWN buttons together. The LOCKED icon will disappear from the display, then release the buttons.

✻ SOFT START - This feature is utilized on job sites where multiple thermostats and installed controlled by a Central Time Clock via the thermostat Dry Contact terminals. Assigning a unique Soft Start number to each thermostat will stagger the turn on times, even though the Dry Contact closes for all the thermostats connected at the same time. Each Soft Start number represents a multiple of 30 seconds from the Dry Contact closure.

For example, #1 = turn on 30 seconds after Dry Contact closure, #2 = turn on 60 seconds after closure, #3 = turn on 90 seconds after closure, and so on. See step 14 on page 17 to configure the thermostat for Soft Start.

About Advanced Features & Operation

✽ REMOTE SENSORS **(Optional Accessory)** - The thermostat is programmed from the factory to automatically recognize when a Remote Sensor is connected (*step #16, page 18)*. When the thermostat is programmed to read the temperature from the remote sensor, the degree icon above the room temperature will blink once a second.

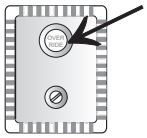
The Remote Sensor measures indoor air temperature and sends this information to the thermostat; it measures temperature with a range of 32° to 99° F.

The Remote Sensor should be connected to the thermostat using solid conductor CAT 5, CAT 5e, or CAT 6 type network communication cable. This is an unshielded cable with four twisted pairs of 24 gauge solid wire; *DO NOT use stranded cable*. The cable length should not exceed 250 feet. If less than 75 feet of cable is required to connect the thermostat to the Remote Sensor, a three conductor thermostat cable (18-24 gauge) may be used; this cable is NOT suitable for any length greater than 75 feet.

IMPORTANT: Do no use shielded wire. Do not run sensor wiring in the same conduit as the 24VAC thermostat wiring. Electrical interference may cause the sensor to give incorrect temperature readings.

See the Remote Sensor instructions for further details.

Optional RF Sensor



Optional Remote Sensor

The Override button on the remote sensor works slightly different than the Override button on the front panel of the thermostat. Each press of the remote OVERRIDE button adds 2 hours to the override timer. If the timer was already active, the first button press will round the runtime to either 2:00 or 4:00. Subsequent button presses will not wraparound as the Override button on the thermostat does. Instead, every subsequent button press will set the runtime to maximum setting *(4:00)*. The Locked feature has no effect on the remote OVERRIDE button.

Warranty

One-Year Warranty - This Product is warranted to be free from defects in material and workmanship. If it appears within one year from the date of original installation, whether or not actual use begins on that date, that the product does not meet this warranty, a new or remanufactured part, at the manufacturer's sole option to replace any defective part, will be provided without charge for the part itself provided the defective part is returned to the distributor through a qualified servicing dealer.

THIS WARRANTY DOES NOT INCLUDE LABOR OR OTHER COSTS incurred for diagnosing, repairing, removing, installing, shipping, servicing or handling of either defective parts or replacement parts. Such costs may be covered by a separate warranty provided by the installer.

THIS WARRANTY APPLIES ONLY TO PRODUCTS IN THEIR ORIGINAL INSTALLATION LOCATION AND BECOMES VOID UPON REINSTALLATION.

LIMITATIONS OF WARRANTIES – ALL IMPLIED WARRANTIES (INCLUDING IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY) ARE HEREBY LIMITED IN DURATION TO THE PERIOD FOR WHICH THE LIMITED WARRANTY IS GIVEN. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE MAY NOT APPLY TO YOU. THE EXPRESSED WARRANTIES MADE IN THIS WARRANTY ARE EXCLUSIVE AND MAY NOT BE ALTERED, ENLARGED, OR CHANGED BY ANY DISTRIBUTOR, DEALER, OR OTHER PERSON WHATSOEVER. ALL WORK UNDER THE TERMS OF THIS WARRANTY SHALL BE PERFORMED DURING NORMAL WORKING HOURS. ALL REPLACEMENT PARTS, WHETHER NEW OR REMANUFACTURED, ASSUME AS THEIR WARRANTY PERIOD ONLY THE REMAINING TIME PERIOD OF THIS WARRANTY.

THE MANUFACTURER WILL NOT BE RESPONSIBLE FOR:

1. Normal maintenance as outlined in the installation and servicing instructions or owner's manual, including filter cleaning and/or replacement and lubrication.
2. Damage or repairs required as a consequence of faulty installation, misapplication, abuse, improper servicing, unauthorized alteration or improper operation.
3. Failure to start due to voltage conditions, blown fuses, open circuit breakers or other damages due to the inadequacy or interruption of electrical service.
4. Damage as a result of floods, winds, fires, lightning, accidents, corrosive environments or other conditions beyond the control of the Manufacturer.
5. Parts not supplied or designated by the Manufacturer, or damages resulting from their use.
6. Manufacturer products installed outside the continental U.S.A., Alaska, Hawaii, and Canada.
7. Electricity or fuel costs or increases in electricity or fuel costs for any reason whatsoever including additional or unusual use of supplemental electric heat.
8. ANY SPECIAL INDIRECT OR CONSEQUENTIAL PROPERTY OR COMMERCIAL DAMAGE OF ANY NATURE WHATSOEVER. Some states do not allow the exclusion of incidental or consequential damages, so the above may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

Programming Worksheet

see Page 9

DAY	PERIOD	START TIME	COOL	HEAT	
MONDAY	Unoccupied				
	Occupied 1				
	Occupied 2				
	Occupied 3				
TUESDAY	Unoccupied				*Copy Mon → Tue*
	Occupied 1				☐ *No*
	Occupied 2				☐ *Yes*
	Occupied 3				
WEDNESDAY	Unoccupied				*Copy Tue → Wed*
	Occupied 1				☐ *No*
	Occupied 2				☐ *Yes*
	Occupied 3				
THURSDAY	Unoccupied				*Copy Wed → Thu*
	Occupied 1				☐ *No*
	Occupied 2				☐ *Yes*
	Occupied 3				
FRIDAY	Unoccupied				*Copy Thu → Fri*
	Occupied 1				☐ *No*
	Occupied 2				☐ *Yes*
	Occupied 3				
SATURDAY	Unoccupied				*Copy Fri → Sat*
	Occupied 1				☐ *No*
	Occupied 2				☐ *Yes*
	Occupied 3				
SUNDAY	Unoccupied				*Copy Sat → Sun*
	Occupied 1				☐ *No*
	Occupied 2				☐ *Yes*
	Occupied 3				

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