



# Installation, Operation, and Troubleshooting Instructions

## SAFETY CONSIDERATIONS

Read these instructions entirely before modifying the base rooftop unit.

### ⚠ WARNING

Before beginning any modification, make sure all power is disconnected to the unit and locked out. Failure to disconnect power supply prior to servicing may result in serious injury. All wiring must comply with applicable national and local codes.

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions of replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

### ⚠ CAUTION

When removing panels from the unit, be careful not to damage the roof or other surfaces with the panels.

## GENERAL

The Apollo control is a relay pack which is factory wired and mounted in the Carrier rooftop unit. The Apollo control allows the unit to be connected to a thermostat and a communication bus. The rooftop unit can then be used as part of a system which is controlled by devices on the communication bus. The thermostat and communication bus wiring must be field installed.

### ⚠ WARNING

Do not turn on unit power until Apollo control and thermostat have been installed. Unit is shipped with loose leads which may cause electrical shock or death.

**Carrier TEMP System** — The Carrier TEMP System usually consists of more than one thermostat and can be expanded to meet whatever number of single zone systems are required.

The TEMP System thermostat maintains proper temperatures by controlling the amount of heated or cooled air supplied to the area in which it is installed or the area it controls (if using a remote room sensor).

Each thermostat is responsible for controlling the temperature conditions in its space. Each thermostat will maintain its own independent occupied/unoccupied time schedule and heating (if applicable) and cooling set points. This allows the user to program the TEMP System thermostat so that it will maintain different temperature ranges at different times.

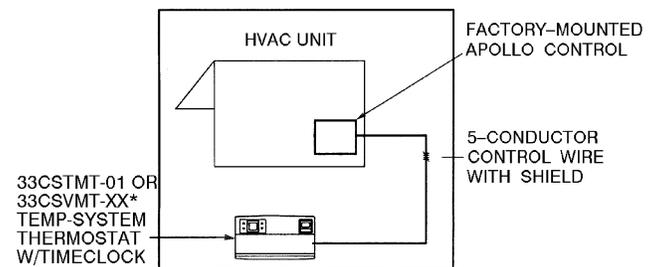
**TEMP System Components** — The Carrier TEMP System consists of one or more thermostats that communicate by way of a communication bus. Each thermostat controls an Apollo control which in turn controls the Carrier rooftop unit. See Fig. 1.

Each thermostat can be connected to others to provide communication between thermostats. Only one thermostat per system can have a timeclock that will broadcast time to the rest of the system. See Fig. 2.

**TEMP SYSTEM THERMOSTATS** — The 33CSTMT-01, or 33CSVMT-XX (with timeclock) and 33CSTM-01 or 33CSVMT-XX (without timeclock) TEMP System thermostats (see Fig. 3) have the following features:

- controls temperature to user-defined set points
- eliminates the need for external timeclocks, manual override timer, night low limit thermostat, battery backup, or unit time guard
- operates with 3 system switches for supply-air fan and the unit heating (if applicable) and cooling stages

NOTE: For 33CSVMT(T)-XX thermostats, the "XX" will be either "04," "16," or "32."



**HVAC** — Heating, Ventilation, and Air Conditioning

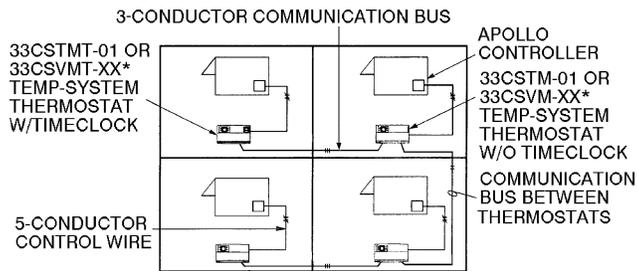
\*Where "XX" will be "04," "16," or "32."

**Fig. 1 — Carrier TEMP System Components**

**APOLLO CONTROL** — The Apollo control (see Fig. 4) has the following features:

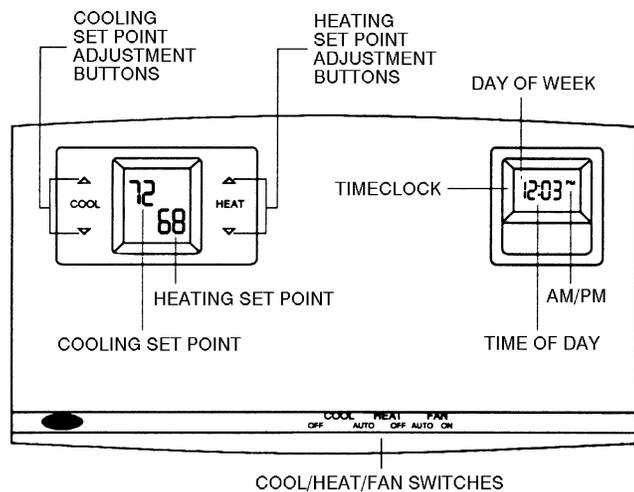
- serves as interface between thermostat, Carrier rooftop unit, and any external field-supplied sensors
- powered by 24 vac/10 va; supplies thermostat with 10 vdc. This power is supplied by the Carrier rooftop unit.

The Apollo control must be used in conjunction with a Carrier 33CSTM(T)-01 or 33CSVM(T)-XX master thermostat. Figure 5 shows the Apollo control factory-installed in a rooftop unit.

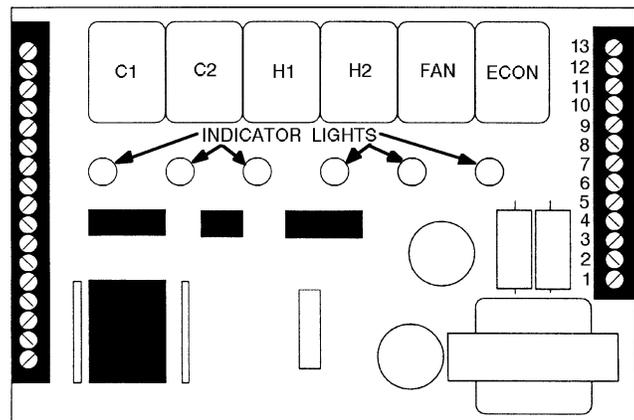


\*Where "XX" will be "04," "16," or "32."

**Fig. 2 — TEMP System Communication**

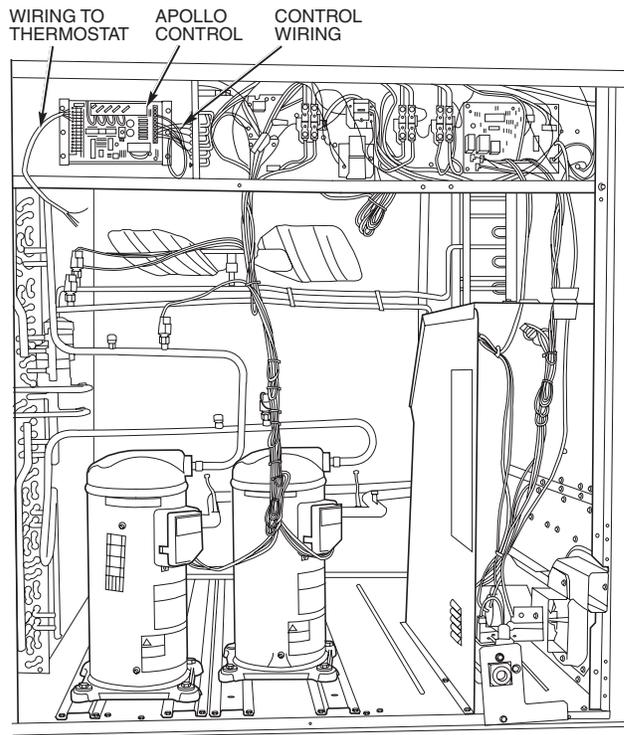


**Fig. 3 — TEMP System Thermostat (With Timeclock Shown)**



NOTE: The indicator lights verify each mode of operation.

**Fig. 4 — Apollo Control**



**Fig. 5 — Apollo Control Factory-Installed In Typical Unit**

**INSTALLATION**

**Wiring Requirements** — The wiring requirements for the TEMP System are:

**THERMOSTAT TO THERMOSTAT COMMUNICATION BUS** — Use field-supplied, 18 gage, 3-conductor, shielded, stranded wire, color coded (red, black, green), plenum rated (if required by code). Be sure wire is long enough to run from thermostat to thermostat in daisy-chain configuration.

**THERMOSTAT TO APOLLO CONTROL** — Use field-supplied, 18 gage, 5-conductor, shielded, stranded wire, color-coded (red, white, blue, yellow, green), plenum rated (if required by code). Be sure wire is long enough to run from thermostat to the Apollo control. The Apollo control is easily accessible in the Carrier rooftop unit. It is found in the unit control box.

**IMPORTANT:** Do not run the thermostat communication bus and the control wire in the same conduit for more than 5 ft. Never run wires near any cable carrying AC voltage. For further wiring information, consult your local Carrier distributor.

Factory-supplied power required by each Apollo control is 24 vac/10 va. Typical wiring is 18-gage thermostat wire. Power to the Apollo control may be wired to the Carrier rooftop unit transformer if transformer is of sufficient va capacity. Otherwise, a dedicated transformer has been factory provided. The maximum load of a relay contact is 24 vac, 1 amp. A short in the field wiring or Carrier rooftop unit will cause non-warranty damage to the relay board. Test wiring before attaching to Apollo control.

Call your local Carrier representative for more information about wiring the Apollo control as needed.

**Thermostat Installation** — Begin the thermostat installation by determining where the thermostat will be located. In most cases, this will be pre-determined by the building plans.

Locate the thermostat on an interior wall, about 5 ft from the ground. The thermostat should be located away from direct sunlight, drafts, or interior heat sources which may influence temperature readings.

The thermostat may also be mounted in a remote location with the use of an optional remote room sensor. Refer to the specific thermostat information for more details on thermostat installation.

## Wiring Connections

### **⚠ WARNING**

Electric shock can cause injury or death. Ensure power to the rooftop unit has been disconnected, before wiring.

**WIRE APOLLO CONTROL TO THERMOSTAT** — Wire each thermostat to its respective Apollo control as shown in Fig. 6. Make wiring connections at the wiring connector board of the thermostat.

**WIRE THERMOSTAT TO COMMUNICATION BUS** — The thermostat is connected to the communication bus through the thermostat wiring connection block. Connect the black, red, and green wires from the communication bus to the thermostat wiring connection block. See Fig. 6. To connect other devices to the communication bus, refer to the application manual for that device.

**Provide Power To Apollo Control** — After the wiring has been completed, provide power to the Apollo control. Once power has been provided, the Apollo control will power the thermostat. The heating (if applicable) and/or cooling set points will appear on the thermostat display screen. The thermostat is now ready to be programmed. If the display is blank or blinking, recheck the wiring connections between the thermostat and Apollo control.

## OPERATION

There are 3 system switches which are used to control operation at the thermostat: Heat, Cool, and Fan. The Heat and Cool switches can be set to either AUTO. or OFF position. The Fan switch can be set to either AUTO or ON position. When the fan is running, the FAN indicator will be shown on the thermostat display screen. When Cooling mode is energized, the COOL indicator will be shown on the thermostat display screen. When Heating mode is energized, the HEAT indicator will be shown on the thermostat display screen. When the second stage of heating or cooling is energized, a decimal point is displayed between the heating and cooling set points.

**AUTO. Fan Mode** — The fan will energize any time the system energizes heating or cooling. The only exception is when the thermostat controls a gas heating rooftop unit. In this application, the thermostat will allow the rooftop unit to control the fan during Heating mode, and the fan will run in Cooling mode.

**ON Fan Mode** — The fan will operate continuously during the occupied mode. In unoccupied mode, the fan will only operate when a system mode is energized.

**AUTO. Heating Mode** — When the Heat switch is set to AUTO. position, the Apollo control will energize heating when the heating demand is 1.5° F or greater. The second stage of heating will energize when the demand becomes 2.0° F or greater.

**OFF Heating Mode** — When the Heat switch is set to OFF position, the Apollo control will not allow the rooftop unit to energize heating.

**AUTO. Cooling Mode** — When the Cool switch is set to AUTO. position, the Apollo control will energize cooling when the cooling demand is 1.5° F or greater. The second stage of cooling will energize when the demand becomes 2.0° F or greater.

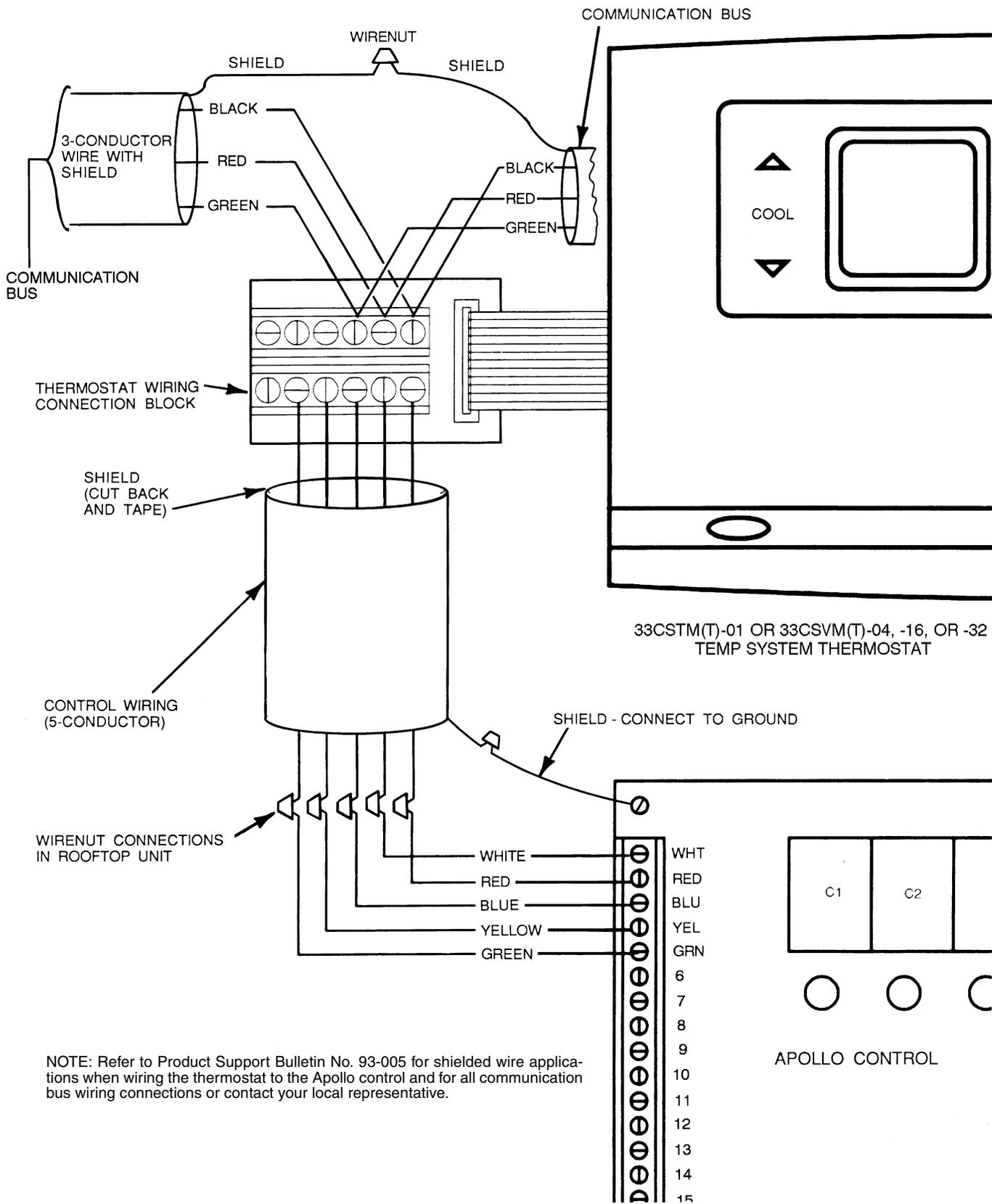
**OFF Cooling Mode** — When the Cool switch is set to OFF position, the Apollo control will not allow the rooftop unit to energize cooling.

**Temperature Trend Staging** — When the Temperature Trend Staging option has been configured at the thermostat, the thermostat tracks the temperatures at regular intervals in each cooling or heating mode. As long as the space temperature is improving, the Apollo control will not allow the second stage to be energized. If the space temperature stays the same or the demand becomes greater, the second stage will energize.

**Heating Lockout** — When the heating lockout temperature set point has been configured, and the heating lockout option has been configured to ON, the Apollo control will not allow heating to energize when the outdoor-air temperature rises above the heating lockout set point.

**Cooling Lockout** — When the cooling lockout temperature set point has been configured, and the cooling lockout option has been configured to ON, the Apollo control will not allow cooling to energize when the outdoor-air temperature drops below the cooling lockout set point.

**Time-Delay Relay** — The thermostat and the Apollo control utilize a 5-minute time delay between the different modes of operation for the rooftop unit. When a mode of operation is deenergized, another mode cannot begin for 5 minutes.



**Fig. 6 — Thermostat and Apollo Control Wiring**

## TROUBLESHOOTING

See Fig. 7-10 for Apollo factory, control, and system wiring.

### Blank Display or Blinking Display at the Thermostat

1. Check to ensure there is at least 20.5 vac across the 2 terminals labelled 24 vac. If there is not at least 20.5 vac, check the unit transformer which is powering the Apollo control.
2. If an ac voltage between 20.5 and 30 vac is read, check for 10 vdc between the terminals labelled WHT and RED. If there is 0 vdc between the terminals, replace the Apollo control. If a value between 1 and 10 vdc is read, check the wiring between the thermostat and the Apollo control.
3. If the thermostat display is blinking on and off, this is an indication that there is a communication problem between the thermostat and the Apollo control. The thermostat and the Apollo control communicate on the blue and yellow wires. If either one is shorted, open, or crossed, it will cause the thermostat display to blink.

To check the wiring between the thermostat and the Apollo control:

1. Remove the thermostat and connector board.
2. Wire the connector board to the Apollo control with a short piece of field-supplied 5-conductor cable.
3. Plug the thermostat into the connector board.
  - a. If thermostat powers up, there is a wiring problem. Find the open or shorted wire, or replace the wiring between the thermostat and the Apollo control.
  - b. If the thermostat does not power up, try another thermostat. If the new thermostat powers up, replace the off thermostat. If the new thermostat will not power up, replace the Apollo control.

### The Control Will Not Energize Heating

1. The thermostat is not displaying the heat indicator:
  - a. Check the heating lockout temperature set point and options to make sure the outdoor-air temperature is locking out Heating mode.
  - b. Ensure that a sensor in the system is not reading above the heating high limit temperature. If a supply air sensor or a direct expansion (DX) coil sensor is not connected to the Apollo control, turn off the High and Low Limits option at the thermostat.
  - c. Check the Heat switch and make sure it is in the AUTO. position.
2. The thermostat is displaying the heat indicator.
  - a. Check to see if the H1 LED (light-emitting diode) is lit on the Apollo control. If it is not, replace the Apollo control. If the H1 LED is lit on the Apollo control, check the voltage across the H1 relay contact. If it reads 24 vac, replace the Apollo control. If it reads 0 to 2 vac, check the H1 contactor and the unit transformer.

### The Control Will Not Energize Second Stage Heating

1. The thermostat is not displaying the second stage indicator. A decimal point on the thermostat display screen is the indication that the thermostat is asking for second stage.
  - a. Check to see if the space demand is equal to or greater than 2° F. The control must see a 2° F demand before it will call for second stage.
  - b. Check the Temperature Trend Staging option. If this option is configured to “on” and space conditions are improving, the control will not energize the second stage.

2. The thermostat is displaying the decimal point.
  - a. Check to see if the H2 LED is lit on the Apollo control. If it is not lit, replace the Apollo control.
  - b. The LED is lit, but second stage is not energized. Check the voltage across the H2 relay contact. If it reads 24 vac, replace the relay board. If it reads 0 to 2 vac, check the H2 contactor and the unit transformer.

### The Control Will Not Energize Cooling

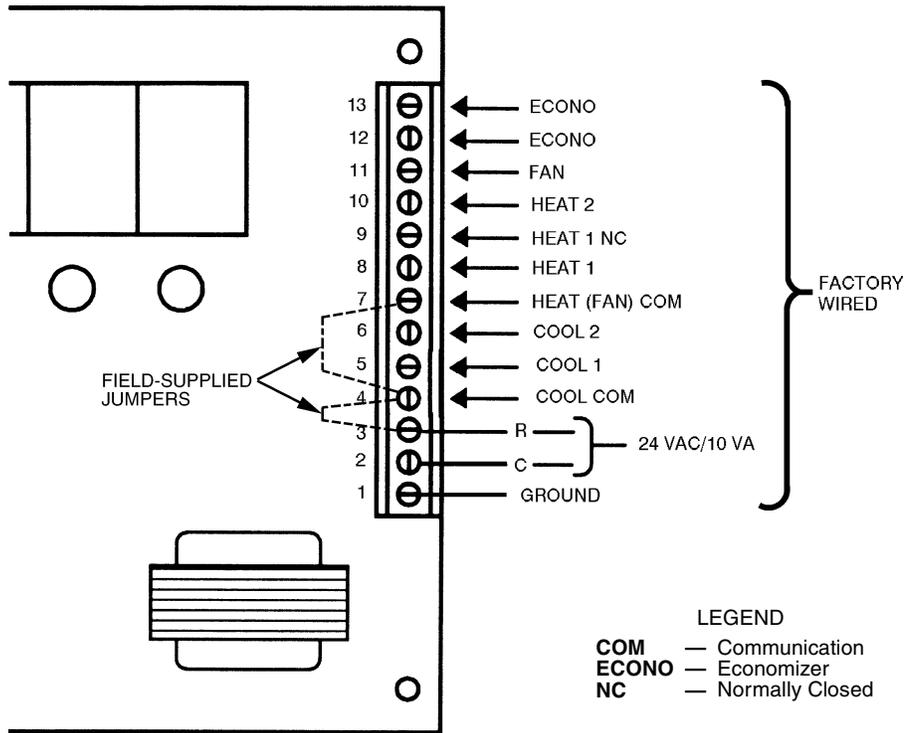
1. The thermostat is not displaying the cool indicator.
  - a. Check the cooling lockout temperature set point and options to make sure the outdoor-air temperature is not locking out Cooling mode.
  - b. Ensure that a sensor in the system is not reading below the cooling low limit temperature. If a supply air sensor or a direct expansion (DX) coil sensor is not connected to the relay pack, turn off High and Low Limits at the thermostat.
  - c. Check the Cool switch and make sure it is in the AUTO. position.
2. The thermostat is displaying the cool indicator.
  - a. Check to see if the C1 LED is lit on the Apollo control. If it is not, replace the Apollo control. If the C1 LED is lit on the Apollo control, check the voltage across the C1 relay contact. If it reads 24 vac, replace the Apollo control. If it reads 0 to 2 vac, check the C1 contactor and the unit transformer.

### The Control Will Not Energize Second Stage Cooling

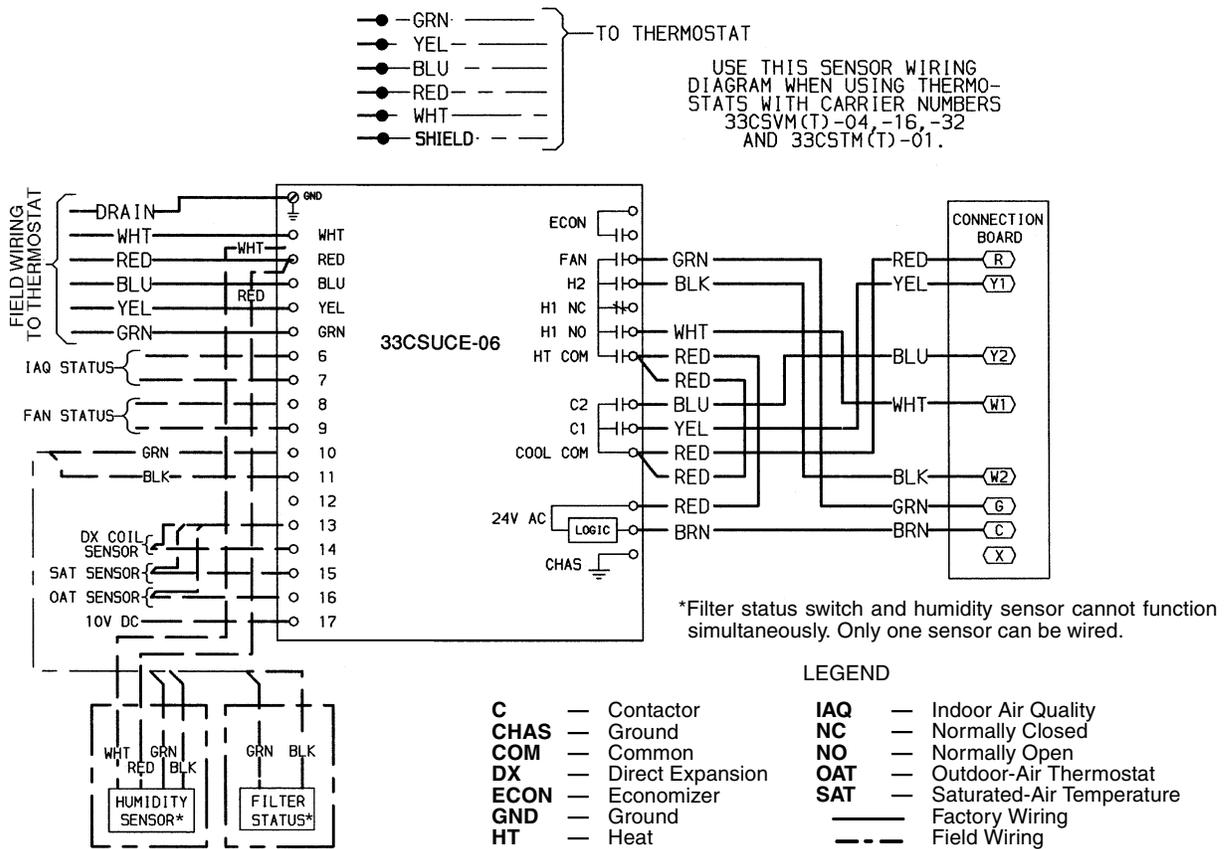
1. The thermostat is not displaying the second stage indicator. A decimal point on the thermostat display screen is the indication that the thermostat is asking for second stage.
  - a. Check to see if the space demand is equal to or greater than 2° F. The control must see a 2° F demand before it will call for second stage.
  - b. Check the Temperature Trend Staging option. If this option is configured to “on” and space conditions are improving, the control will not energize the second stage.
2. The thermostat is displaying the decimal point.
  - a. Check to see if the C2 LED is lit on the Apollo control. If it is not lit, replace the Apollo control.
  - b. The LED is lit, but second stage is not energized. Check the voltage across the C2 relay contact. If it reads 24 vac, replace the relay board. If it reads 0 to 2 vac, check the C2 contactor and the unit transformer.

### The Control Will Not Energize The Fan

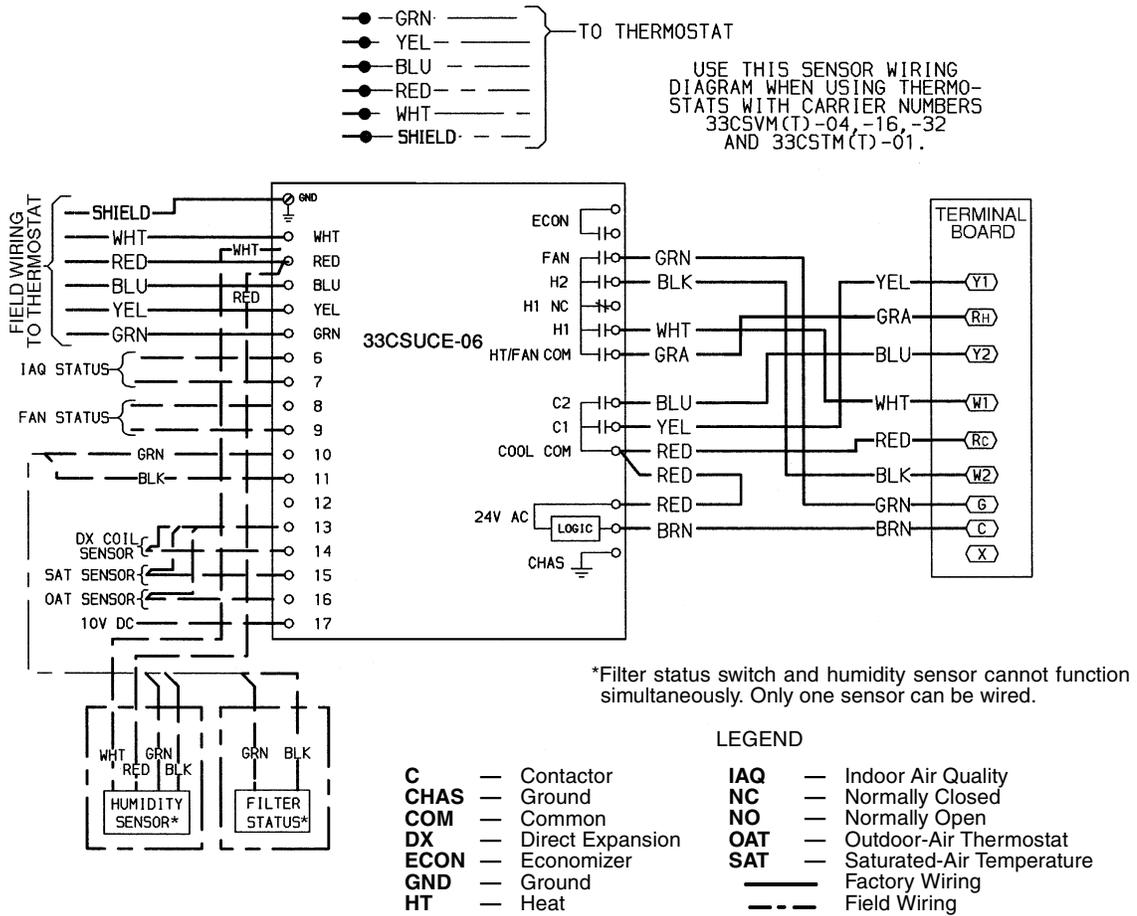
1. The fan indicator is not lit on the thermostat.
  - a. The Fan switch is in the AUTO. position and the control is not in a mode (HEAT or COOL position).
  - b. The fan switch is in the ON position but the thermostat is in setback and has no mode.
  - c. The thermostat has just received power or has just reset and is going through its initialization process.
2. The fan indicator is lit on the thermostat.
  - a. Check the fan LED on the Apollo control. If it is not lit, replace the Apollo control.
  - b. If the fan LED is lit, check the voltage across the fan relay contact. If it reads 24-vac, replace the relay board. If it reads 0 to 2 vac, check the fan contactor and the unit transformer.



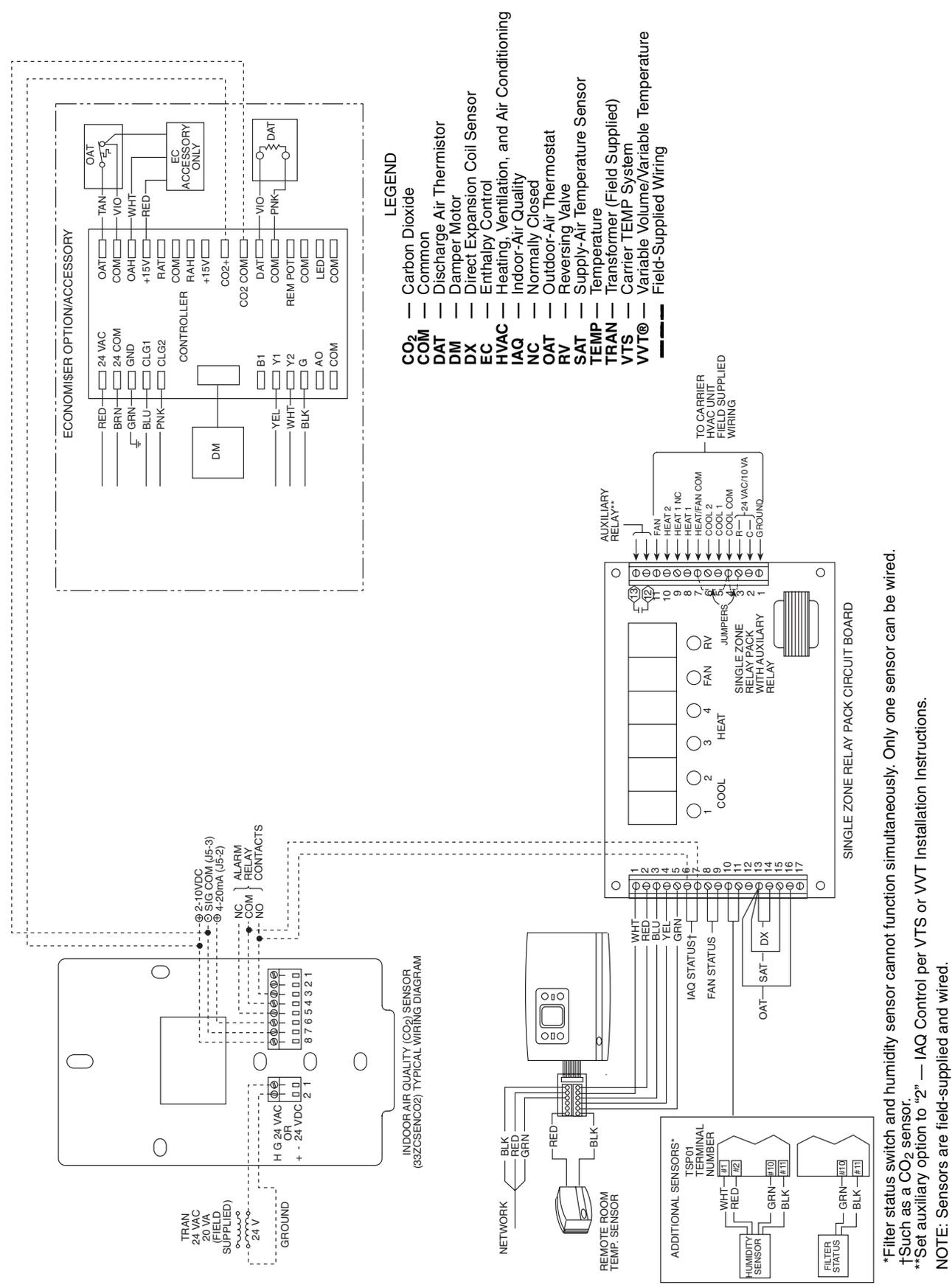
**Fig. 7 — Factory-Supplied Wiring to Rooftop Unit and Apollo Control**



**Fig. 8 — Apollo Control Wiring Schematic — 48/50HJ, 3 to 20 Ton Units; 48/50TF, TM, 3 to 12-1/2 Ton Units; 48/50TJ, TM, 15 to 25 Ton Units; 50HJQ/TFQ, 3 to 10 Ton Units**



**Fig. 9 — Apollo Control Wiring Schematic — 50HJQ, 12<sup>1</sup>/<sub>2</sub> and 15 Ton Units**



**Fig. 10 — Apollo Wiring as Part of an Indoor-Air Quality System**