

Installation and Start-Up Instructions

NOTE: Read the entire instruction manual before starting the installation.

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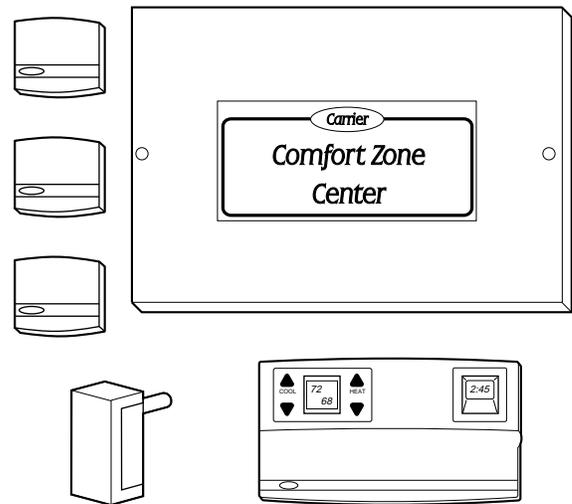


Fig. 1—Comfort Zone System

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SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause fire, electrical shock, or other conditions which may cause personal injury or property damage. Consult a qualified installer, service agency or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes and wear safety glasses. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions attached to the unit. Consult local and state building codes and Sheet Metal and Air Conditioning National Association (SMACNA) for special installation requirements.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit or in instructions and manuals, be alert to the potential for personal injury.

Understand the signal word DANGER, WARNING, or CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

INSTALLATION CONSIDERATIONS

1. Install in a non-condensing area with ambients between 32°F and 120°F.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

2. Use vibration isolators (flex connectors) on the zone dampers and ductwork to minimize noise.
3. Place dampers away from areas that may be noise sensitive.
4. TXV is required in air conditioning and heat pump applications.
5. Use separate isolated transformer to supply power to Comfort Zone System.
6. Load calculations must be performed to determine equipment size. Equipment selection is matched to block load. It is imperative the equipment is not oversized.
7. Duct work must be designed based off the sum of peaks plus 25 percent oversize. It is imperative the duct work is not under sized.

INTRODUCTION

This installation guide pertains to revision 1.6 or greater. The Comfort Zone System allows the air conditioning and heating equipment to control temperatures in up to 4 distinct spaces or **Zones** within a building. Each zone has independent temperature settings.

The comfort temperature settings can change automatically through the use of schedules. This allows Comfort Zone to change the temperature settings in zones to reflect occupancy or usage. For example, you may want to condition the bedrooms in a home from 5:00 PM through 7:00 AM or the kitchen from 3:00 PM through 6:00 PM.

The Comfort Zone System uses motorized air volume control dampers (also called zone dampers) to regulate the flow of conditioned air into the zones. In this manner Comfort Zone can selectively heat or cool certain portions of a building depending upon the space temperature requirements.

INSTALLATION

Step 1—Check Equipment and Jobsite

INSPECT EQUIPMENT — File claim with shipping company, prior to installation, if shipment is damaged or incomplete.

Step 2—Wiring

⚠ WARNING

To prevent personal injury or possible equipment damage disconnect the power supply before routing wire.

All wiring must comply with local and state codes.

NOTE: A remote room sensor requires a 2-wire cable, however, it is recommended that a 5-wire cable be installed to allow for a possible smart sensor upgrade. Connect white wire to terminal labeled B- if a 5-wire cable is used. Connect red wire to R+. Shielded cable is recommended to reduce noise interference.

NOTE: Use No. 22 AWG color-coded, insulated (35°C min) wire. If thermostats are to be located more than 100 ft from the Comfort Zone Center as measured along the control voltage wires, use 18 AWG colored-coded wires to avoid excessive voltage drop.

All wiring is run back to the Comfort Zone Center. Keep wires a minimum of 12 in. from any AC voltage. Do not tie-wrap wires together. When wiring to the COMM BUS, a 3-wire cable must be separate from the 5-wire cable. The thermostats should be located approximately 5 ft above the floor and must be located within 200 ft of the Comfort Zone Center.

SHIELDED CABLE

General

1. All wiring should be shielded (except damper wiring) with 18 or 22 gage. The 3-wire, 5-wire, and Remote Sensor wire must be in separate jacketed cable.

2. All system wiring must be within 1 building. Never connect devices between 2 or more buildings.

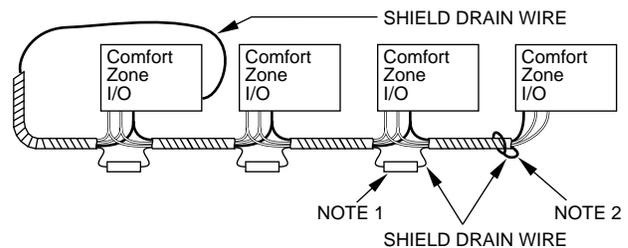
Shielding For A Single Comfort Zone System

1. Fig. 17 Shows a Comfort Zone System with all possible options. The shield from all devices should be tied together at the I/O board and terminated at the shield ground at the lower right hand corner of the board. Be sure shielding does not touch any other wiring on the board.

NOTE: Do not connect the shield wire at the device end. Cut end and tape up to avoid shorting.

Shielding For Multiple Comfort Zone Systems

1. If more than 1 Comfort Zone System resides on 1 job, they may be tied together for communications purposes. If no communications are required, then the Comfort Zone System should be wired separate and shielded as previously stated.
2. When 2 to 4 systems are on 1 job and require communications, they should be daisy chained together through the 3-wire communications bus at the COMM BUS HAM terminal. The shielding should only be grounded at 1 point on the end of the communications bus as shown in Fig. 2.



NOTES:

1. Use butt splices, or solder, for shield connections. Then tape up shield.
2. Do not connect the shield drain wire at the end of Communication Bus. Cut and tape up to avoid shorting.

Fig. 2—Daisy Chained Comfort Zone Systems A93251

3. If more than 4 systems are used on 1 job, multiple device buses must be used. Each device bus must be separated by an ISOSAT-01. A typical arrangement is shown in Fig. 3.

Communications Bus Guidelines for Maximum Number of Devices

1. The maximum number of Comfort Zone Systems allowed on 1 device bus is 4.
2. Four Zone Controllers must be addressed 4 addresses apart, example 4, 8, 12, 16 for a device bus with 4 Comfort Zone Systems.
3. Home Access Module (optional) will scan a maximum of 4 Comfort Zone Systems.
4. Multiple device buses can be tied together for communications via ISOSAT-01. An ISOSAT-02 is required for remote or direct communications via personal computer or modem. (See Fig. 4.)
5. Comfort Zone Systems may reside on a bus with VVT system devices. They may receive or broadcast time to these devices accordingly by toggling T5 enable broadcast on or off.

NOTE: If multiple 4-zone controllers are on 1 bus, only 1 can broadcast time. Turn all others off (T5).

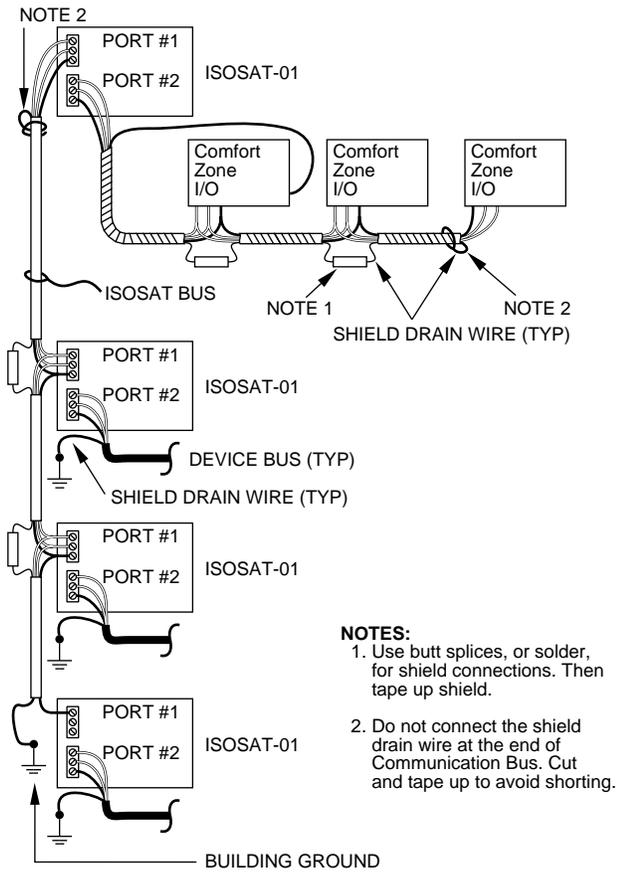


Fig. 3—Typical Communications Network

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Table 1—Wiring Requirements

FROM COMFORT ZONE CENTER TO	NO. OF WIRES	GAGE	MAX. LENGTH(FT)
Four Zone Controller	3	18/22	200/100
	5	18/22	200/100
Remote Room Sensors	2	18/22	200/100
Remote Duct Sensors	2	18/22	200/100
Dx Coil Sensor	2	18/22	200/100
Home Access Module	3	18/22	1000/100
ISOSAT*	3	18/22	1000/100
Transformer†	2	18	75

* When using ISOSATS in interfacing multiple buses together, the length of wiring between ISOSATS cannot exceed 4000 ft. with 18 gage.
 † 24vac, 50-75va

Step 3—Install Comfort Zone Center

NOTE: The Comfort Zone System is approved for indoor use only and should never be installed with any of its components exposed to the elements. The enclosure must be installed with the center cover to help prevent damage from other sources. Do not mount the Comfort Zone Center where it will be accessible to children. Do not locate the center in areas of the home that are noise sensitive since relays are energized and de-energized during operation and may be an annoyance. Install Comfort Zone in an area with a temperature range between 32°F and 120° F.

Install the Comfort Zone Center in either a vertical or horizontal position. Locate in an area that is easily accessible in case servicing should be required.

NOTE: Four vent plugs and 2 bushings have been supplied. Snap the bushings in the 1-in. diameter holes that are to be used for wiring and the plugs in the remaining holes.

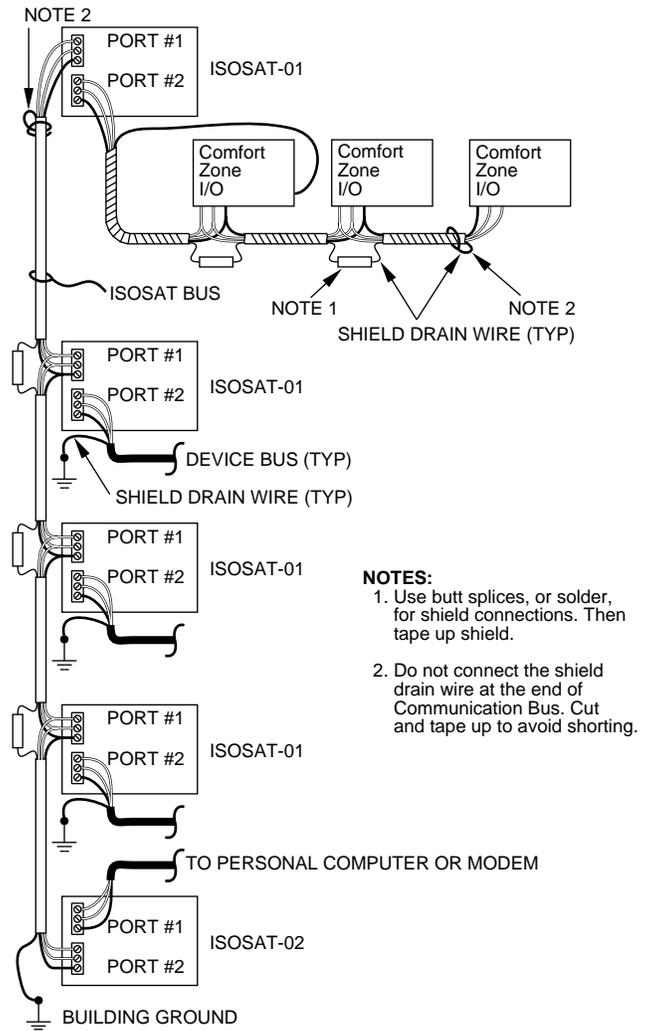


Fig. 4—Communication Network With An ISOSAT-02

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CAUTION

To prevent possible damage to the Comfort Zone Center, do not mount on plenum, ductwork, or flush against furnace.

1. Separate Comfort Zone Center cover. (See Fig. 5)
2. Mount the back plate of the center cover to the wall using screws and wall anchors provided.
3. Level the back plate and tighten screws.

Step 4—Install Zone Dampers

IMPORTANT: If conditions exist for possible condensing, the motor must be positioned for adequate draining. (See Fig. 6.)

Zone dampers may be installed in any direction.

Position the dampers so that the actuator is visible for inspection and accessible in the event it would ever need to be replaced. The black mark on the end of the damper shaft represents the position of the damper.

NOTE: In some areas where excessive condensing may occur, carefully insulate over the actuator assembly. Make sure insulation does not bind crank arm or interfere with operation of actuator.

Before insulating the ductwork, check for proper damper operation. Apply 24vac between COM and OP to open the damper and COM and CL to close the damper. (See Fig. 7.)

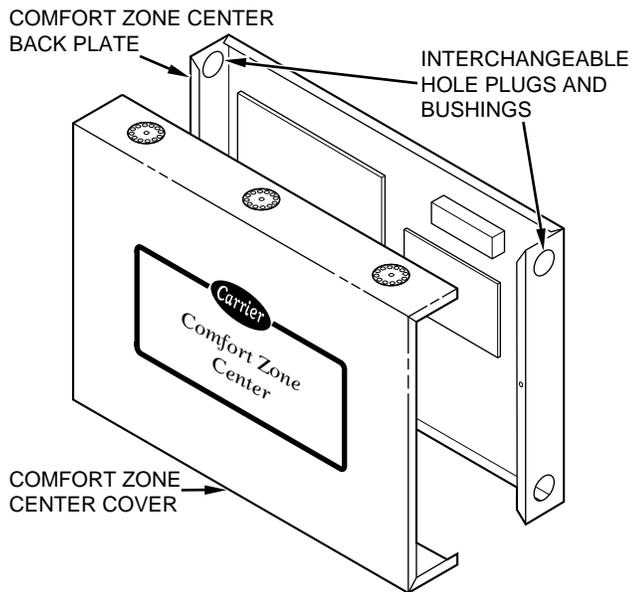


Fig. 5—Comfort Zone Center A93247

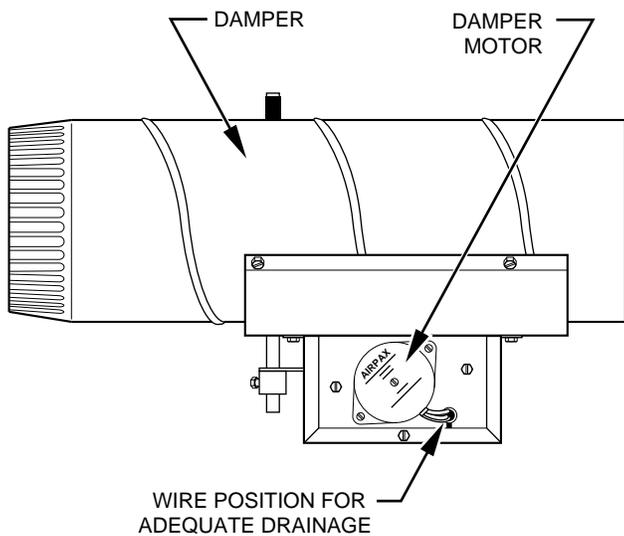


Fig. 6—Damper Motor Positioning A93248

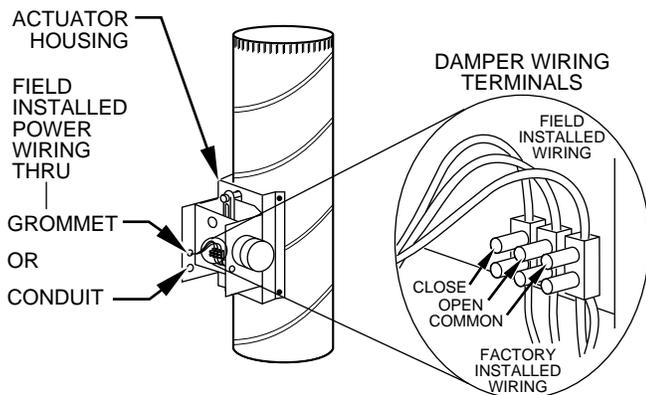


Fig. 7—Damper 24-vac Connections A92474

The damper will modulate counter-clockwise to open and clockwise to close. In the full-open position, the crank arm connection on the motors threaded shaft will be closest to the motor. In full-closed position, it will be furthest away from the motor.

If in an emergency it becomes necessary to force a damper open manually, loosen the set screws located on the crank and then turn the damper shaft. To realign, apply 24vac between COM and OP. Adjust and tighten screws.

To avoid noise and vibration, do not hard mount dampers to any solid structure (i.e. joists).

NOTE: There is a limit switch at the full-open position and the full-closed position to stop damper travel.

ROUND METAL DUCTWORK

IMPORTANT: If application exists with all metal ductwork without insulation, flex connectors must be used on each end of the zone dampers to avoid noise and vibration.

1. Crimp end of branch duct.
2. Slip end of zone damper over end of ductwork. Use self-tapping sheet metal screw to secure. (See Fig. 8.)

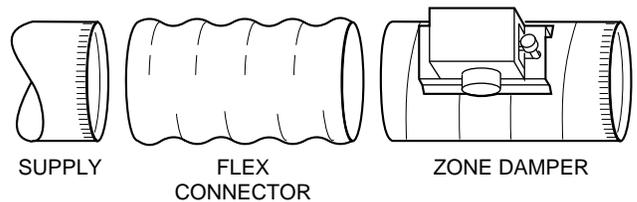


Fig. 8—Round Metal Ductwork A92477

3. Properly seal joint using duct tape, mastic, or other approved method.
4. Insulate damper using 1-1/2-in. to 2-in. insulation. (Check your local codes.)

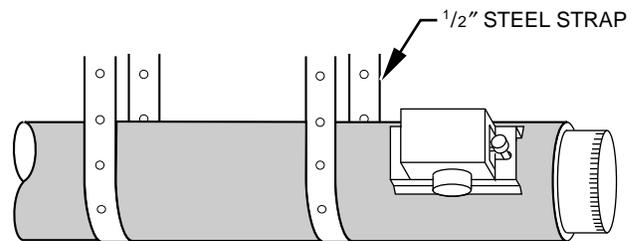


Fig. 9—Insulated Round Metal Ductwork A92475

NOTE: All zone dampers and ductwork must be properly supported according to local codes or SMACNA standards.

RECTANGULAR METAL DUCTWORK

1. Make connections using S-lock and drives (See Fig. 10.)
2. Properly seal joint using duct tape, mastic, or other approved method.
3. Insulate damper using 1-1/2-in. to 2-in. insulation. (Check your local codes.)

NOTE: All zone dampers and ductwork must be properly supported according to local codes or SMACNA standards.

NOTE: There should be a minimum of 4 ft between the zone damper and the first branch duct if more than 1 branch duct is downstream of the zone damper.

ROUND FLEXIBLE DUCTWORK

1. Slip 1 end of flexible ductwork over 1 end of zone damper. (See Fig. 12.)
2. Secure the flexible duct to zone damper using SMACNA or other approved method.

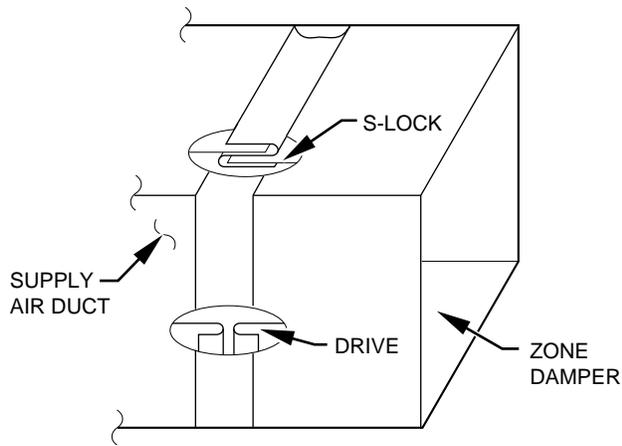


Fig. 10—Rectangular Metal Ductwork A92478

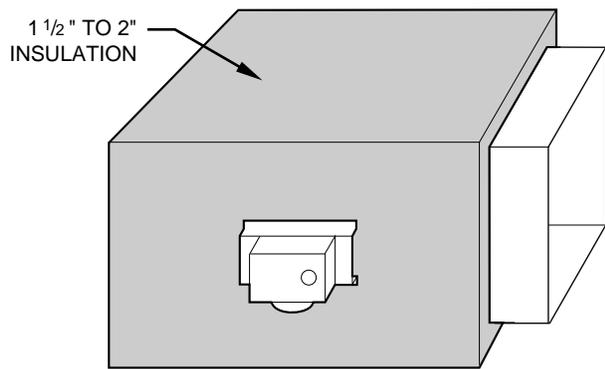


Fig. 11—Insulated Rectangular Metal Ductwork A92483

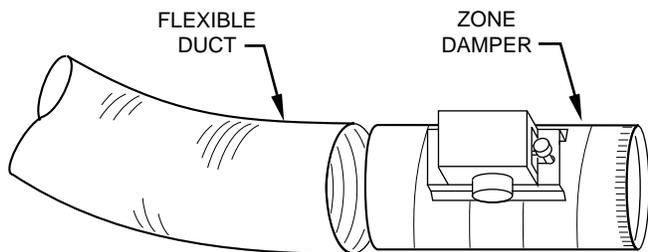


Fig 12—Round Flexible Ductwork A92479

3. Properly seal joint using duct tape, mastic, or other approved method.
4. Insulate damper using 1-1/2-in. to 2-in. insulation. (Check your local codes.)

NOTE: All zone dampers and ductwork must be properly supported according to local codes or SMACNA standards.

RECTANGULAR FIBROUS GLASS DUCTWORK

1. Insert 1 end of zone damper into 1 end of fibrous glass ductwork approximately 2 to 3 in. (See Fig. 14..)
2. Screw field-supplied screws and tabs into zone damper.
3. Properly seal joint using duct tape, mastic, or other approved method.
4. Insulate damper using 1-1/2 in. to 2-in. insulation. (Check your local codes.)

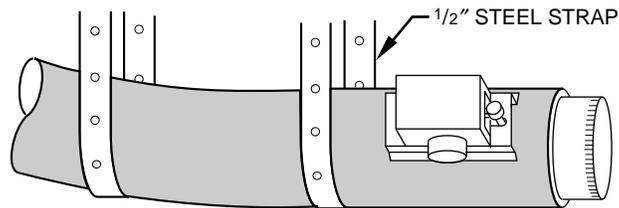


Fig. 13—Insulated Round Flexible Ductwork A92481

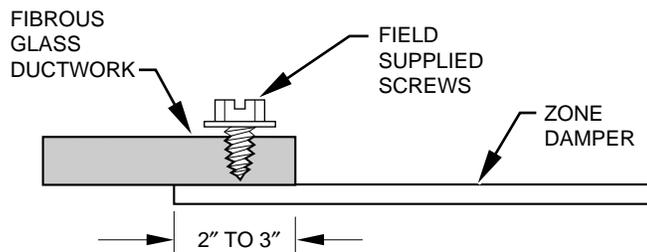


Fig. 14—Rectangular Fibrous Glass Ductwork A92480

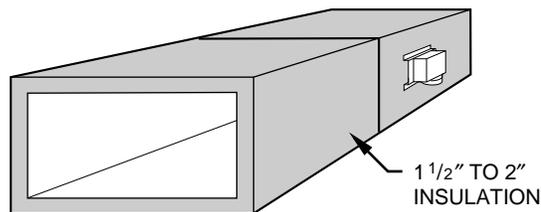


Fig. 15—Insulated Rectangular Fibrous Glass Ductwork A92482

Step 5—Install Barometric Bypass Damper

NOTE: The barometric bypass damper is a critical part of the Comfort Zone System for control of minimum airflow and noise reduction. It is recommended that the bypass be installed.

The bypass should be installed according to local codes and SMACNA standards. Be sure the bypass is properly supported.

For proper installation, refer to the Installation Instructions packaged with the barometric bypass.

CAUTION

Failure to properly install the bypass damper can cause permanent damage to the HVAC equipment. For single speed furnace applications the bypass air must never exceed 25 percent.

Step 6—Install Duct Temperature Sensor

Locate the duct temperature sensor in the main supply trunk after the heating and cooling coil and before the bypass damper and the first branch. The duct temperature sensor must be radiant shielded to prevent heat from affecting the correct air temperature.

1. Drill a 7/8-in. hole at the location in the unit where the sensor will be installed.
2. Remove cover and insert sensor probe through the 7/8-in. hole.
3. Drill two 1/16-in. holes to accept No. 6 screws through the pre-drilled holes in the duct temperature sensor back plate.

4. Use the two No. 6 sheet metal screws included with the sensor to mount the duct temperature sensor back plate to unit.
5. Insert 2-conductor wiring through 1 of the pre-drilled holes in side of back plate.
6. Connect sensor to 2-wire conductor using wire nuts provided. (See Fig. 16 for connection to Comfort Zone Center.)

Step 7—Install Dx Coil Sensor

The Dx coil temperature sensor is recommended for use in heat pump with fan coil applications only. The sensor should be installed between the Dx coil and the electric heaters. It measures the Dx coil temperature and adds extra protection for high/low temperature limits. The range is from 30°F to 180°F. The Dx coil sensor interfaces to the Comfort Zone Center on terminal TB-1. (See Fig. 16.) To activate the Dx coil temperature sensor. Turn T-27 on.

Step 8—Install Four Zone Controller

The Four Zone Controller (this is the zone 1 thermostat) is typically located in the zone that represents the most occupied area of the house. (i.e. living room, family room, etc.) .

DO NOT locate the controller where the supply air can blow directly on it. Avoid locating the controller where heat from any lamps, appliances, or direct sunlight will affect the temperature sensor on the controller. Do not locate on an outside wall or next to a return air grill.

1. Separate base plate from main body of controller.
2. Pull 3-wire cable for communication bus and 5-wire cable for controller through 3/4-in. round hole on base plate. Three-wire cable and 5-wire cable must be separate jacketed wiring. Do not use one 8-wire cable. (See Fig. 18.)

NOTE: Insulate or seal field wiring feed through hole to reduce draft.

3. Mount base plate using screws provided, starting screw in round hole first then second screw in slotted hole. On drywall it is recommended to use plastic wall anchors provided.

NOTE: If you are mounting the controller using an electrical box, mount the base plate using the pair of horizontal holes.

4. Level base plate and tighten screw in slotted hole first, then the screw in round hole.
5. Connect the 3 wires for communications bus and the 5 wires for controller to base plate terminal screws. (See Fig. 16.) Ensure that there are no excess or bare wires exposed.
6. Plug base plate connector into back of main body and ensure it is secure into connector located on the back of the 4-zone controller's main body. Ensure connectors and main body are secure.
7. Align main body with base plate and snap into place.

Step 9—Install Remote Room Sensors or Smart Sensors (Optional)

Comfort Zone may have up to 4 zones. The Four Zone Controller controls zone 1. Remote room sensors or smart sensors control the other 3 zones. If using a smart sensor, a smart sensor power pack must be used. The remote sensors should be located 5 ft above the floor and must be less than 200 ft away from the Comfort Zone Center.

DO NOT locate the sensors where the supply air can blow directly on them. Avoid locating the sensors where heat from any lamps, appliances, or direct sunlight will affect the temperature sensor on the room sensors. Do not locate on an outside wall or next to a return air grill.

1. Separate the 2 parts of the sensor and mount back plate with flat-head screw provided.

2. Pull a 2-wire conductor through hole on right hand side.
3. Connect black or white wire to terminal labeled B- and connect red wire to terminal labeled R+.
4. Align sensor case with base plate then press firmly until the cover snaps into place.

Step 10—Sequence of Operation

TEMPERATURE SETPOINTS

The Comfort Zone System uses 2 temperature setpoints. The setpoints are displayed in the left-hand window on the Four Zone Controller. (See Fig. 19.)

The temperature setpoints for any of the 4 zones can be displayed by the Four Zone Controller. When the Four Zone Controller rotary switch points to zone 1, the setpoints for zone 1 at the Four Zone Controller are displayed. Selecting zone 2, zone 3, or zone 4 will display the setpoints for each of these zones which use either remote room sensors or smart sensors. The system is not required to have all 4 zones installed.

In the display window, the cooling setpoint is shown on the upper left and heating setpoint is shown on the lower right.

HEATING AND COOLING COMFORT SETPOINTS

If the space temperature is between the Heating and Cooling setpoints for the zone, then the zone is said to be "satisfied" with respect to temperatures. When a zone is "satisfied" no heating or cooling equipment will turn on to condition the space. For example, if the Cooling Setpoint is 76°F and the Heating setpoint is 72°F, then a space temperature of 73°F is assumed to be satisfactory and no heating or cooling of the zone is required.

If the space temperature in a zone falls below the Heating setpoint, then that zone needs to have heat added to the zone which will raise the space temperature back to the Heating Setpoint. For example, if the Heating Setpoint is 72°F and the space temperature is 70°F, then the space temperature must be raised 2 degrees in order for the zone to be satisfied. In this case, the temperature "**heating demand**" for the zone is 2°F. (72°F minus 70°F.)

Otherwise, if the space temperature in a zone rises above the cooling setpoint, then that zone needs to have heat removed from the zone which will lower the space temperature back to the cooling setpoint. For example, if the cooling setpoint is 76°F and the space temperature is 77°F, the space temperature must be lowered 1° in order for the zone to be satisfied. In this case, the "**cooling demand**" for the zone is 1°F. (77°F minus 76°F.)

Comfort zone allows the owner or installer to set ranges for the comfort setpoints along with the maximum and minimum temperatures which can be used by the system.

Comfort zone allows both the heating and cooling comfort setpoints to operate in a 14 ° span. The heating and cooling temperature "spans" can be set to allow for a selected range of operation. Rotary switch position 9 sets the base temperatures for both the heating and cooling spans.

When the switch is set to 9, both the heating and cooling base temperatures are displayed and each can be modified by using the up/down setpoint buttons. **The base temperatures are the same for all 4 zones.**

If the cooling base temperature is set to 68°F, then the cooling comfort range will be 68°F to 82°F. If the heating base temperature is set to 54°F, then the heating comfort range will be 54°F to 68°F.

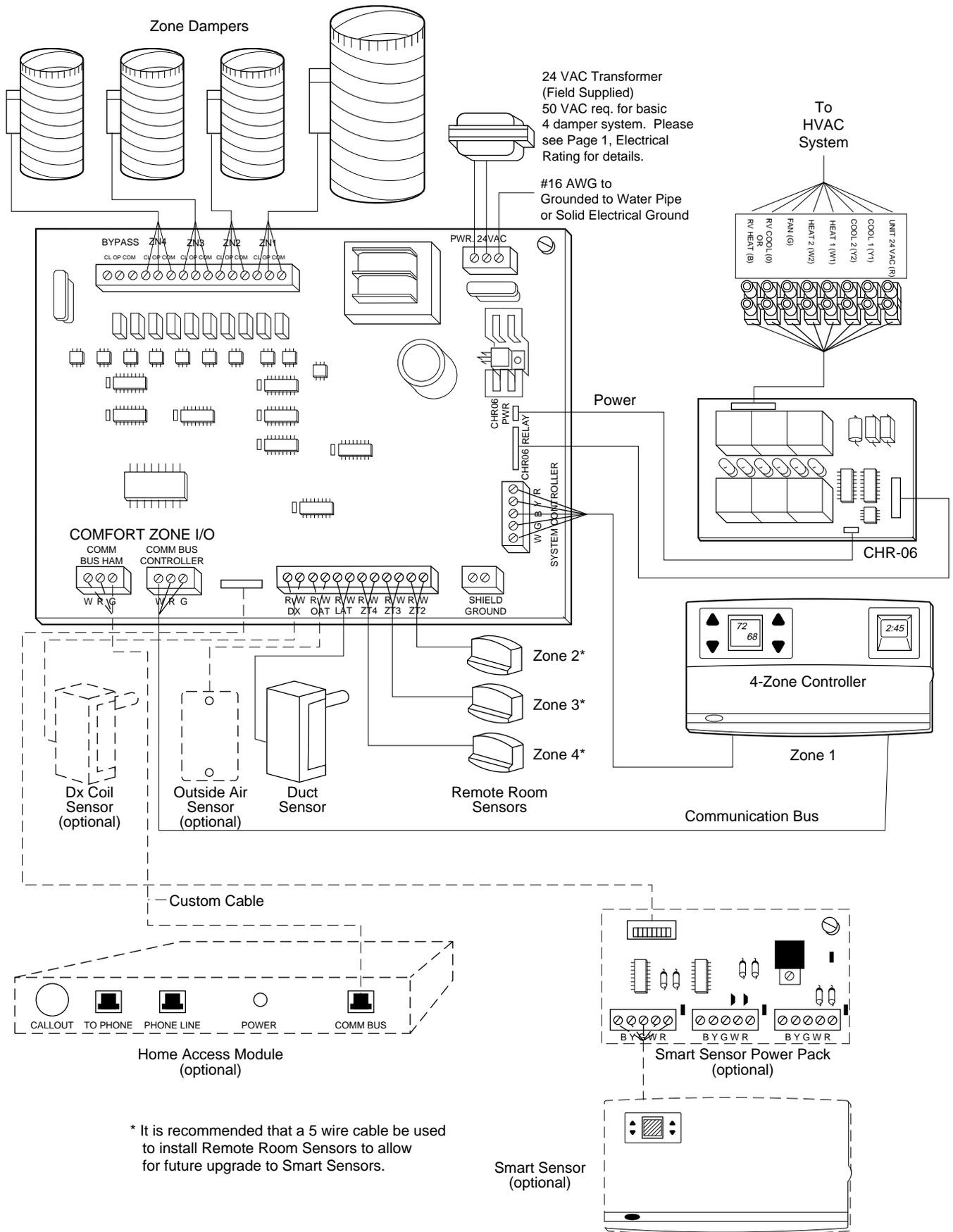


Fig. 16—Comfort Zone System Wiring Diagram

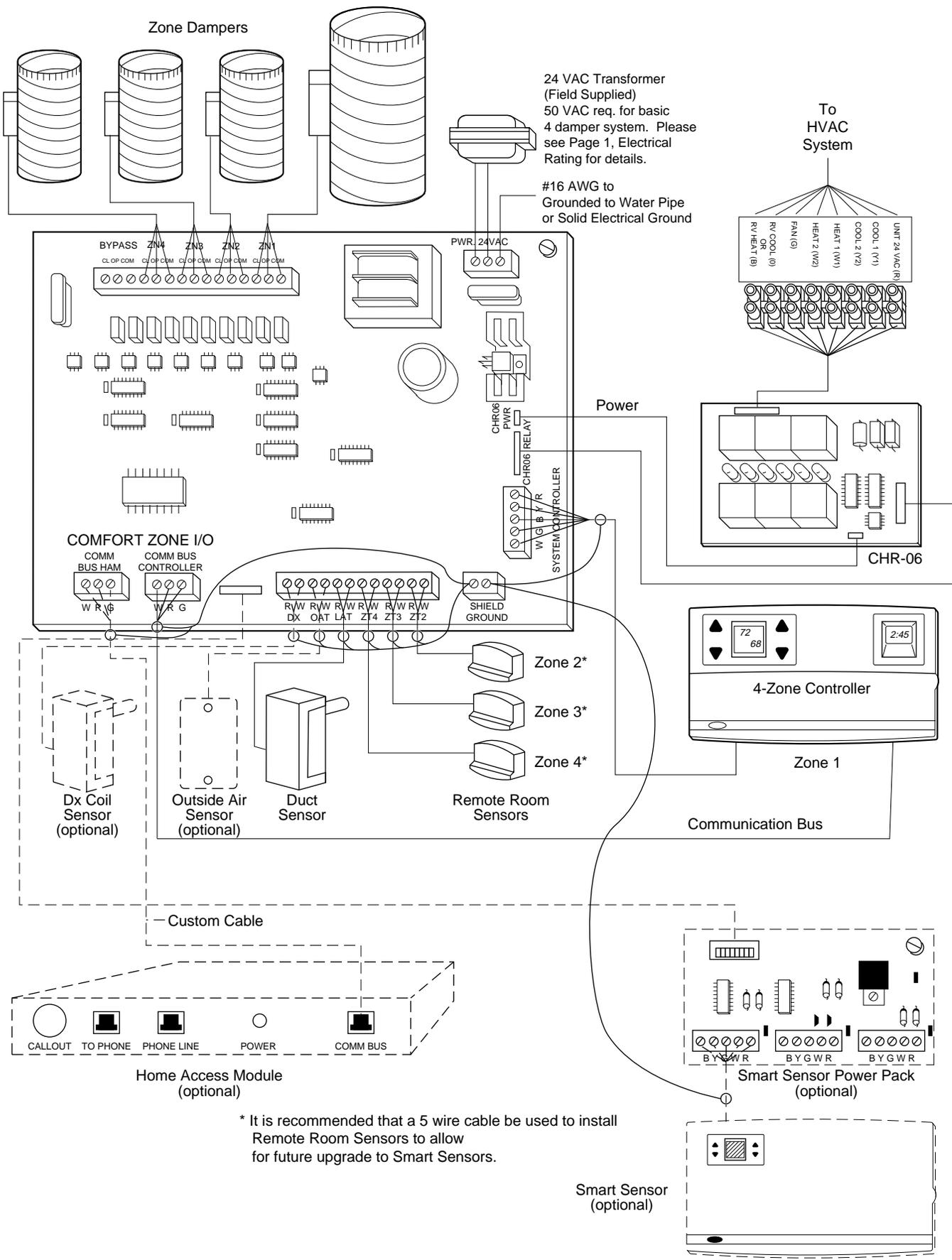


Fig. 17—Shielding For A Single Comfort Zone System

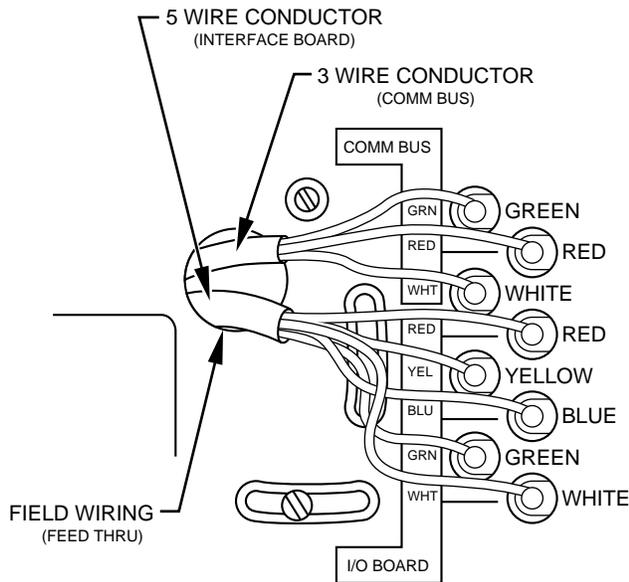


Fig. 18—Wiring Four Zone Controller

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⚠ CAUTION

Changing the base temperatures will change the Comfort Temperatures Setpoints used in the system schedules. Always set the Base Temperatures prior to programming the system schedules.

Comfort Zone also uses a minimum temperature and a maximum temperature for the comfort setpoints. **The minimum and maximum temperatures are the same for all 4 zones.**

The **Maximum Temperature** is only used for cooling. It is set by selecting Rotary Switch Position S-2. The Maximum Temperature setting is used when a temperature above the 14° span is selected. If the Cooling Base Temperature is set to 68°F and the cooling setpoint is 82°F, any attempt to raise the cooling setpoint will select the Maximum Temperature.

The **Minimum Temperature** is only used for heating. It is set by selecting Rotary Switch Position S-3. The Minimum Temperature setting is used when a temperature below the 14 ° span is selected. If the Heating Base Temperature is set to 54°F, any attempt to lower the heating setpoint below 54°F will select the Minimum Temperature.

Both the Maximum and Minimum Temperatures are intended for use with schedules or setpoints which are extreme compared to normal building temperatures.

Comfort Zone also has one additional set of temperature settings. These are the **Vacation Setpoints**. The Vacation Setpoints are the heating and cooling setpoints to be used in all 4 zones whenever the Four Zone Controller rotary switch is turned to "Vacation." The Vacation option is used to place the entire building in setback during long unoccupied periods without the danger of freezing or extreme heat/humidity.

SEQUENCE OF EVENTS FOR A NORMAL HEATING OR COOLING CYCLE

Given the Comfort Setpoints and the space temperature for the zones within the system Comfort Zone will determine if active heating or cooling is required. If so, the Comfort Zone will perform the following:

1. Select a reference zone.
2. Make sure all zone dampers are fully open.
3. Energize the HVAC equipment fan.

4. Energize the heating or cooling equipment. The equipment may be a compressor, furnace, strip heater, etc.
5. Set the zone damper positions based upon the zone demand.
6. Energize additional stages of heating or cooling if demand warrants.
7. Continue to adjust the zone dampers as the conditions within the zones change.
8. Turn off the heating or cooling equipment when all zones are within 0.5°F of the desired comfort setpoint.
9. Open all zone dampers when the equipment is turned off.

This is the basic Sequence of Operation for the Comfort Zone system. The actual control of the dampers, HVAC equipment, and system fan will change with the configuration of the system. Depending upon the configuration, Comfort Zone can control heat pumps, furnaces, and dual fuel applications.

SELECTION OF A REFERENCE ZONE IN THE SYSTEM

The first step in any heating or cooling cycle requires Comfort Zone to evaluate the zones, determine if heating or cooling is needed, and select a **Reference Zone**.

The Comfort Zone system actively looks at the Comfort Setpoints and the space temperature in all zones. If any zone in the system has a demand of 1.5°F or more, then Comfort Zone will prepare to operate the heating or cooling equipment to reduce the demand.

First, Comfort Zone will select a reference zone in the system. The reference zone will be the zone with the greatest demand. The zone damper serving the reference zone will be forced fully open and will remain fully open as long as that zone is used as the reference.

As long as any zone in the system has a demand greater than or equal to 1.5°F, then the Reference Zone will be selected by the zone with the greatest demand. Once all zones have a demand less than 1.5°F, the Reference Zone selection will not change until the demand in that zone is below 0.5°F. At this point Comfort Zone will re-select the Reference Zone and position that particular zone damper fully open.

The objective of the Reference Zone is to ensure that the zone with the greatest demand is receiving as much conditioned air as the system will allow. It also gives the Comfort Zone system a point of reference in observing the response of the zones to the equipment operation.

PRE-POSITIONING DAMPERS AND STARTING THE SYSTEM FAN

In order to minimize noise and enhance the system operation, Comfort Zone maintains all Zone Dampers full open prior to starting the system fan or the heating, cooling equipment. The intent is to provide the HVAC equipment with unrestricted ductwork and reduce pressure surges. Comfort Zone also fully opens the dampers whenever a heating or cooling cycle is completed and the system fan is shutting down. If the Fan Switch on the Four Zone Controller is set to Auto, then all the zone dampers will remain fully open until the next heating or cooling cycle.

The other reason for opening the dampers is to provide unrestricted ductwork to other equipment which is not directly controlled by Comfort Zone. One example may be Heating Recovery Ventilator. If Comfort Zone is not actively controlling the HVAC system, then it must not impose any control influences (i.e., closed zone dampers) on the system and prevent proper operation of other devices.

For Fan operation, the switch settings on the Four Zone Controller and the system configuration can change the actual operation.

If the **Auto Fan Off For Heating** option (Rotary switch position number T-9) is ON, then Comfort Zone will only energize the fan for cooling cycles. This option is intended for furnaces which will control their own fan internally.

If the Fan Switch on the Four Zone Controller is set to ON instead of Auto, then the system fan will run continuously. Any time Comfort Zone is operating the fan, it will be in active control of the system.

NOTE: If the **Auto Fan Off For Heating** option (rotary switch position T-9) is ON, and the Fan Switch on the Four Zone Controller is ON, Comfort Zone will operate the fan full time.

Operating the fan continuously will place Comfort Zone in a **Float Mode** any time no active heating or cooling is taking place. During Float Mode, Comfort Zone will position the Zone dampers based upon the demand in each zone. Comfort Zone will check the air temperature in the ductwork and allow the air into the zones if it will help the zones reduce their individual demands. For example, if the temperature of the air in the ductwork is 65°F, the cooling comfort setpoint for a zone is 72°F, and the space temperature is 73°F, then Comfort Zone will open the damper servicing that zone and allow the cooler air into the space.

Ventilation Mode is only in effect when the temperature of the supply air is between 65°F and 80°F. Ventilation Mode establishes the minimum position of the zone dampers and is intended to help air movement throughout the zones and reduce the chance of having areas which are stagnant or have high humidities with respect to the rest of the system. The changes to the dampers are detailed in the next section "Controlling the Zone Dampers".

CONTROLLING THE ZONE DAMPERS

The zone dampers have a total of 16 possible positions or increments which are numbered 0 (zero) through 15. Position number 0 is fully closed and Position number 15 is fully open. While the damper servicing the reference zone remains fully open, all other zone dampers are positioned by selecting a position equal to the demand of the space in tenths of a degree. (See Table 2.)

**Table 2—Zone Damper Positions
Damper Position Versus Zone Demand**

DAMPER POSITION	DEMAND °F	DEMAND °C
0 Fully Closed	0	0
1	0.1	0.06
2	0.2	0.11
3	0.3	0.17
4	0.4	0.22
5	0.5	0.28
6	0.6	0.33
7	0.7	0.39
8	0.8	0.44
9	0.9	0.50
10	1.0	0.55
11	1.1	0.61
12	1.2	0.67
13	1.3	0.72
14	1.4	0.78
15 Fully Opened	1.5	0.83

For example, a zone which has a 1.0°F demand will have the damper set to position number 10 while a zone which has a demand of 0.5°F will have the damper set to position number 5. A demand of 0 (zero) will fully close the zone damper. Any zone which has a demand greater than 1.5°F will remain fully open.

Notice that the positions are based upon tenths of a degree Fahrenheit. If Comfort Zone has the Celsius Temperature Display option (rotary position T-2) turned on, the damper control is still based upon the Fahrenheit scale.

The damper positions in the table are also used during a Float Mode. A zone with a demand of 0.5°F will be set to position number 5.

The actual control of the zone dampers by the Comfort Zone system can be modified using 3 configurable options. These are Maximum Damper Position, Minimum Damper Position, and Ventilation Mode.

These options apply to all zone dampers simultaneously. Any dampers servicing Zone 1 cannot be configured differently than those servicing Zone 2. The options are as follows:

1. The **Maximum Damper Position** (rotary position number S-4) sets the maximum open damper position for all 4 zones. The allowable range for this option is damper positions number 8 through number 15 (fully open). The factory default is 15. The only time the zone dampers will exceed this position is if the system fan is off or the zone dampers are being calibrated.
2. The **Minimum Damper Position** (rotary position number S-5) sets the minimum open damper position for all 4 zones. The allowable range for this option is damper positions number 0 through number 7. The factory default is number 0 (fully closed). If Ventilation Mode (rotary position T-25) is turned OFF, then the minimum damper position will be an absolute minimum regardless of the operating mode. If Ventilation Mode is turned ON, then the minimum damper position will be the minimum position during a Ventilation Mode only and the dampers will be allowed to fully close at any other time.
3. **Ventilation Mode** (rotary position T-25). If Ventilation Mode is turned ON, then any time the air inside the supply air ductwork is between 65°F and 80°F, the system will be in a "Ventilation Mode". During a Ventilation Mode all zone dampers will have a minimum position which is set by the Minimum Damper Position (rotary position S-5). The zone dampers are not allowed to fully close as long as the supply air temperature remains within the 65°F-80°F range. If the supply air temperature falls outside the 65°F-80°F range, then the zone dampers may fully close.

NOTE: If the Ventilation Mode option (rotary position T-25) is turned ON, and the Minimum Damper Position (rotary position S-5) is set to position 0, **there is no difference between Float Mode and Ventilation Mode**. In other words, the Ventilation Mode option has no effect on the system.

OPERATING THE HEATING AND COOLING EQUIPMENT

Before any heating or cooling equipment is started, Comfort Zone must first choose between heating or cooling. For most of the year there is little question as to the need for heat or cooling. But for portions of the year, particularly during mid-season, a building may have simultaneous needs for both heating and cooling.

The first step in selecting heating or cooling is the determination of a Reference Zone. If there is a single zone which has the greatest demand, then it will become the Reference Zone and Comfort Zone will start the equipment based upon the needs of that zone. If 2 zones have the same "greatest demand" but in different modes (1 needs heating and the other needs cooling), then Comfort Zone will select the mode which has the greatest number of zones which require the same mode.

CONTROL STRATEGY FOR HEATING / COOLING STAGES

The Comfort Zone system will attempt to minimize the use of additional stages of heating or cooling equipment. In an ideal case, the building conditioning needs can be supplied by first stage cooling or first stage heating alone.

For most heat pump applications, there may be only 2 or 3 stages of heat depending upon the type of emergency heater present. For a heat pump, the secondary heat source will generally be an electric strip heater. The electric strip heat is much more expensive to operate when comparing the cost per unit of heat. Because auxiliary stages of heating tend to be more expensive to operate, Comfort Zone attempts to keep the number of stages at a minimum.

5. Dx Sensor (Rotary Position T-27).

6. Smart Start (Heat Pump Strip Heat Economy Feature)

The first options which must be set are based upon the type heater or heaters used. These are shown in Table 3. The only option which appears to impact cooling operation is **Two-Stage Heat Pump** which implies the availability of 2 stages of cooling. In reality there are no changes to the cooling control scheme.

Comfort Zone assumes that there are always two stages of cooling present. These are connected to the Comfort Zone Relay Pack on the Y1 and Y2 contacts.

RELAY PACK TO HVAC EQUIPMENT CONNECTIONS

Given the system configuration, Comfort Zone can determine the

Table 3—Heating System Option Vs. Type of Heater Used

HEATER TYPE USED IN SYSTEM	HEAT PUMP SYSTEM TOGGLE: T-6	TWO STAGE HEAT PUMP TOGGLE: T-26	DUAL FUEL SYSTEM SWITCH: S-7	FAN ON FOR COOLING ONLY TOGGLE: T-9
Single-Stage Heat Pump	On	Off	0°F (off)	Off
Two-Stage Heat Pump	On	On	0°F (off)	Off
Heat Pump/Furnace Dual Fuel	On	Off	10 to 60°F	Off
Two-Stage Heat Pump, Furnace Dual Fuel*	On	On	0°F	Off
Furnace Heat Only	Off	Off	0°F (off)	On or Off
Strip Heater Only	Off	Off	0°F (off)	Off

* Refer to the 2-speed heat pump Installation and Start-Up Instructions for details regarding 2-speed heat pump operation. It is recommended that the heat pump control board controls the operation of this equipment and not Comfort Zone.

Table 4—Available Heating and Cooling Stages Vs. System Type

TYPE OF HVAC EQUIPMENT USED	COOLING STAGE 1	COOLING STAGE 2	HEAT STAGE 1	HEAT STAGE 2	HEAT STAGE 3	HEAT STAGE 4
Cooling Only, any Heater Type	Y1	Y2	W1	W2	--	--
Single-Stage Heat Pump	Y1	--	Y1	W1	W2	--
Two-Stage Heat Pump	Y1	Y2	Y1	Y2	W1	W2

For cooling applications, the second stage of an air conditioner is not necessarily more expensive to operate than the first stage. But additional cooling can drive down the efficiency of a 2-speed air conditioner and longer use of the first stage alone tends to deliver better humidity control in moist climates. Again, because of these advantages, Comfort Zone will attempt to minimize the use of second stage cooling. This is not as great of a concern for a heating application, due to the fact that the majority of small air conditioning systems sold today (5 tons and below) are single stage cooling only.

CONFIGURATION OPTIONS FOR EQUIPMENT OPERATION

Comfort Zone has several configurable options which allow it to control different types of HVAC equipment and change the manner in which the equipment is controlled. This first group must be set given the type of HVAC equipment installed. These include:

1. Heat Pump Operation (Rotary Position T-6).
2. Two-Stage Heat Pump (Rotary Position T-26).
3. Dual Fuel trip temperature (Rotary Position S-7).
4. Auto Fan Off For Heat (Rotary Position T-9).

The second group modifies the way the HVAC equipment is controlled. These include:

1. Comfort Trend Staging (Rotary Position T-8).
2. System Mode Reselect (Rotary Position T-22).
3. High/Low Temperature Limits Enabled (Rotary Position T-10).
4. High Temperature Trip Limit (Rotary Position S-6).

number of heating stages that it will actually control and which relay outputs will be used to control each stage of heat. Comfort Zone can control up to 4 stages of heat depending upon the system configuration.

For cooling only applications with any type of heater, Comfort Zone will only control 2 stages of heat. If the system uses a heat pump, then Comfort Zone will control 3 stages of heat. The additional stage is the heat pump compressor contact. The auxiliary heat is still 2 stages. If the system uses a 2 stage heat pump, then Comfort Zone will control 4 stages of heat. Two stages for the heat pump and 2 stages for auxiliary heat.

The Comfort Zone Relay Pack outputs are shown in Table 4. The Y1 and Y2 contacts are used for the compressor contacts only. Comfort Zone operates the heat pumps by energizing the compressor contacts and controlling the reversing valve through the Reversing Valve (RV) relay output. The W1 and W2 contacts are always used for heat sources. These are heating only units such as furnaces, strip heaters, etc. The relay outputs for Comfort Zone 1.4 are shown in Table 4.

⚠ CAUTION

Under no circumstances may the W1 and Y1 contacts on the relay pack be jumpered together. This is a common practice for many heat pump installations but will cause improper operation of the Comfort Zone (1.4 or greater) system.

STARTING THE HVAC EQUIPMENT

Once Comfort Zone selects a mode, the controller will use the configuration options to modify control of the HVAC equipment.

The controller first selects the number of stages of heating and cooling that may be applied to the building load. The "available" stages are determined by the Reference Zone temperature demand and are shown in Table 5.

Using Table 5, if the Reference Zone has a 2.3°F demand, then Comfort Zone **may** use 2 stages of cooling or 2 stages of heating. The HVAC equipment may not have 3 stages of heat or even 2 stages of cooling. The table is only used to determine what equipment Comfort Zone **is allowed to turn on** at any given time during a heating or cooling cycle. Actual operation of the stages depends on other variables as well.

**Table 5—HVAC Equipment Stages
Vs. Zone Demand**

HEATING & COOLING EQUIPMENT STAGES	DEMAND °F	DEMAND °C
First Stage Cooling	1.5	0.83
Second Stage Cooling	2.0	1.11
First Stage Heating	1.5	0.83
Second Stage Heating	2.0	1.11
Third Stage Heating	2.5	1.39
Fourth Stage Heating	3.0	1.67

Normally Comfort Zone will start equipment operation when it has a demand of 1.5°F or greater. In some cases, Comfort Zone will be facing a demand greater than 1.5°F when a mode is starting. This can occur when the user changes the setpoints in a zone or if a schedule change has reset the Comfort Setpoints.

NOTE: Comfort Zone uses a 3 minute timer to delay the start of second stage (heating or cooling). This timer is started whenever first stage heating or cooling is energized. This delay cannot be overridden or disabled.

STAGE CONTROL DURING EQUIPMENT OPERATION

As shown earlier, Comfort Zone has 6 configurable options which help govern the equipment operation. They are:

1. Comfort Trend Staging (Rotary Position T-8).
2. System Mode Reselect (Rotary Position T-22).
3. High/Low Temperature Limits Enabled (Rotary Position T-10).
4. High Temperature Trip Limit (Rotary Position S-6).
5. Dx Sensor (Rotary Position T-27).
6. Smart Start (Heat Pump Strip Heat Economy Feature)

Comfort Trend Staging and **High/Low Temperature Limits** control the use of extra stages of heating and cooling. Both can be turned off by the installer but the use of these options is highly recommended.

Comfort Trend Staging is used by Comfort Zone as an aid to decide if second stage (heating or cooling) is needed. The system must have at least 1 zone with a demand equal to or greater than 2.0°F to allow the use of second stage. Comfort Trend looks at the temperature inside the zone and watches the trend over time. If the zone demand is being lowered by the first stage operation, the second stage is not energized. Stage 1 would remain ON and Stage 2 would remain OFF as long as the temperature trend continued to improve.

Comfort Trend Staging uses a 6 minute timer and a record of the Reference Zone demand to control second stage. When Comfort Trend Staging starts, the demand in the Reference Zone is recorded and temperature in the zone is continuously monitored. If the demand in the Reference Zone is reduced (the temperature is approaching the comfort setpoints), then the 6 minute timer is

restarted and the new demand is recorded. If the 6 minute timer expires and the demand is the same or has grown greater, the Comfort Zone will start second stage.

Comfort Trend works for all stages of heating and cooling operation.

Comfort Trend staging will be used if rotary Position T-8 is turned ON. If T-8 is turned OFF, then second stage will be energized whenever the Reference Zone demand meets or exceeds 2.0°F and after the 3-minute delay.

System Mode Reselect allows Comfort Zone to switch between heating and cooling even if the current system demand has not been satisfied. For example, if Comfort Zone is providing heat, System Mode Reselect allows Comfort Zone to look at any cooling needs which may also exist in the building. If the cooling demand exceeds the heating demand for 20 minutes, Comfort Zone will stop providing heat and switch into a cooling mode. Once the cooling demand is satisfied (or System Mode Reselect dictates a switch), Comfort Zone will revert to a heating mode in order to try and satisfy that demand.

The need for System Mode Reselect usually indicates some type of system problem. Common use of System Mode Reselect may be caused by poor or improper ductwork, open windows or doors, HVAC equipment failure, improper equipment sizing, etc. The need for System Mode Reselect usually occurs in larger installations where the zone use or occupancy may vary widely. For residential application, the need for System Mode Reselect is normally not frequent unless the building has unusual architectural features or problems with the HVAC system.

High/Low Temperature Limits is an option that allows Comfort Zone to control equipment stages and position dampers based upon the temperature of the supply air leaving the HVAC equipment. As the Comfort Zone system operates through a heating or cooling cycle, the zone demands and damper positions will change. This changes the actual tonnage or BTUH that is applied to the HVAC equipment. The tonnage generated by the HVAC equipment must equal the tonnage placed into the zones. If the zone's airflow decreases, the cooling equipment will tend to drive down the supply air temperatures. Conversely, the heating equipment will tend to drive up the supply air temperatures.

With High/Low Temperature Limits turned ON, Comfort Zone will detect this condition and take corrective action. The first step taken by Comfort Zone will be to start turning off extra stages of equipment. This will continue until either the Leaving Air Temperature problem is corrected or the system is operating on first stage heating or cooling only.

If the system is operating on first stage heating or cooling, Comfort Zone will begin to gradually open zone dampers. This can continue until the system has become a fully-open constant-volume system if needed. The objective is to provide the required heating or cooling as best as possible prior to shutting off the equipment. In practice the control tends to match the equipment capacity to the zone demands and will seldom revert back to a fully open system.

The Leaving Air Temperature control can also indicate problem zones within a system which are not receiving sufficient airflow. If 1 area (or zone) within a building has difficulty becoming satisfied then there may be a sizing problem or an obstruction in the ductwork supplying that zone.

To use the Leaving Air Temperature Control, 3 options must be setup properly. They are:

1. High/Low Temperature Limits Enabled (Rotary Position T-10).
2. High Temperature Trip Limit (Rotary Position S-6).
3. Dx Coil Sensor For Leaving Air Temperature Checking (Rotary Position T-27).

First, **High/Low Temperature Limits Enabled** must be turned ON. This is the ON-OFF switch for the control option. The temperature used for this control is measured by the Remote Duct Sensor and (optionally) the DX Coil Sensor.

The **High Temperature Trip Limit** (Rotary Position S-6) is the supply air temperature for heating that the Leaving Air Temperature control uses to detect a problem during heating modes only. The Comfort Zone thermostat will display a number between 05 and 55°F. The actual temperature is 100°F greater, such that the actual range is 105°F to 155°F. Comfort Zone cannot display the 100's digit.

Selecting the Offset Temperature picks the temperature when Comfort Zone will start taking action to correct the Leaving Air Temperature. If the limit temperature is between 105°F and 109°F, then the temperature at which first stage will be shut down will be offset 5°F above the limit value (110°F to 114°F). If the limit temperature is between 110°F and 155°F, then the temperature at which the first stage will shut down will be offset 20°F above the limit value (130°F to 175°F). For Cooling modes the temperature is fixed at 50°F (10°C) for starting the control and 45°F (7.2°C) for turning off first stage cooling.

The heating value must be set given the type of heater used in the system. **This is for the final heat source.** So a heat pump with strip heat would use a temperature appropriate for the strip heaters. A furnace application may have a setting in the 130°F to 155°F range. Strip heaters may fall into a 115°F to 130°F range. Heat pump only systems may use 105°F to 115°F. Check the equipment manufacturer recommendations and verify the setting is in accordance with UL, NFPA, or any applicable Local or State Building Codes. If there is any question about what may be an appropriate temperature setting, use conservative (low) temperatures.

Dx Coil Sensor For Leaving Air Temperature (Rotary Position T-27) allows Comfort Zone to use a DX Coil Sensor in addition to the Remote Duct Sensor for Leaving Air Temperature Checking. The DX Coil Sensor is used in heat pump with fan coil applications and will be located after the dx coil and before to any strip heaters. This sensor is only active during heat pump operation. The temperature setting for this sensor is fixed at 105°F for initiating the control option and 110°F for shutting down first stage.

Heat Pump-Strip Heat Economy Feature (Smart Start). This is an automatic control within Comfort Zone and not a selectable option. The Smart Start feature is used whenever the primary source of heat is a heat pump. As such, the Heat Pump toggle (Rotary Position T-6) must be turned ON. Smart Start is designed to help minimize the use of strip heat or emergency heat whenever a large heating demand occurs due to a scheduled setpoint change. Smart Start looks at the scheduled comfort setpoints for the next hour. If the scheduled setpoints will make the system provide heat, the Smart Start will start the heat pump an hour early. Smart Start will operate until the zone demand is brought within 0.5°F (0.28°C) of the next hour's heat setpoint or the setpoints change due to the schedule (the hour expires).

Smart Start assumes the auxiliary heat is more expensive to operate when compared to the heat pump and it assumes that the heat pump is a relatively "slow" source of heat. Smart Start allows a zone to recover from a setback or unoccupied period and use the most economic source of heat in doing so. The idea of using a setback or unoccupied schedule is to save money in operating costs. There is little incentive to use schedules if the zone is heated with the most expensive source of heat available.

Step 11—Configuring Four Zone Controller

PROGRAMMABLE OPTIONS-SETTINGS

Turn the zone selector dial to position S. (See Fig. 19.) The controller display shows the setting number and its value.

The upper 2 digits show the settings number and the lower 2 digits show the value of the setting.

Press the COOL up or down setpoint buttons to change the setting number and the HEAT up or down setpoint buttons to change the value. Refer to Table 6 for the settings and their definitions.

Table 6—Programmable Options-Settings

SETTING NO.	SETTING NAME	VALUE	FACTORY DEFAULT
S-1	4 Zone Controller Bus Address	4-64	4
S-2	Maximum Cooling Setpoint	80-95	85
S-3	Minimum Heating Setpoint	34-64	65
S-4	Maximum Damper Position	8-15	15
S-5	Ventilation/Minimum Damper Position	0-7	0
S-6	High Temperature Trip Limit	105-155	105
S-7	Dual Fuel Setpoint	0 or 10-60	0

1. Zone Controller Bus Address (S-1)

This setting establishes the identity of the 4 zone controller on the Carrier communications bus.

NOTE: Remote room sensors do not require addressing.

If using optional Smart Sensors, they must be addressed as follows:

ZONE 1 Address of 4 zone controller

ZONE 2 Address must be 1 less than zone 1

ZONE 3 Address must be 2 less than zone 1

ZONE 4 Address must be 3 less than zone 1

To set address of a Smart Sensor, rotary switch position 1 on the Smart Sensor must be selected first.

2. Maximum Cooling Setpoint (S-2)

This is the highest temperature value to which the cooling setpoint can be adjusted. All zones will use the same value. The maximum cooling setpoint can be programmed from 80°F to 95°F. This allows cooling setpoints to be programmed above the normal range.

Example: Maximum cooling setpoint is programmed at 92°F. The temperature range for the cooling setpoint is 70°F to 84°F. When the COOL setpoint up button is pressed to adjust the cooling setpoint above 84°F, the setpoint will jump to 92°F.

3. Minimum Heating Setpoint (S-3)

This is the lowest temperature value to which the heating setpoint can be adjusted. All zones will use the same value. The minimum heating setpoint can be programmed from 34°F to 64°F. This allows heating setpoints to be programmed below the normal range.

Example: Minimum heating setpoint is programmed at 56°F. The temperature range for the heating setpoint is 66°F to 80°F. When the HEAT setpoint down button is pressed to adjust the heating setpoint below 66°F, the setpoint will jump to 56°F.

4. Maximum Damper Position (S-4)

This is the highest open position to which a damper will change. Full open is designated as position 15. Maximum open damper position can be programmed between 8 (half open) and 15, in increments of 1. All zone dampers will use the same programmed maximum value.

5. Ventilation/Minimum Damper Position (S-5)

When there is no demand for cooling or heating, this is the minimum position that every zone damper will maintain as long as the air temperature in the ductwork is between 65°F and 80°F. Full closed is designated as position 00. Minimum open damper position can be programmed between 7 (half-open) and 00, in increments of 1. All zone dampers will use the same programmed ventilation value.

6. High Temperature Trip Limit (S-6)

The trip temperatures limits are the duct temperatures used to turn the HVAC equipment off to prevent damage to the equipment. Temperature values are measured by the duct temperatures sensor.

The low temperature trip limits are 50°F (turn off second stage cooling) and 45°F (turn off first stage cooling) and cannot be changed.

The second stage high temperature trip limit can be programmed from 105°F to 155°F.

If a value of 105 to 110 is selected (second stage heating is turned off at this value) then the first stage high temperature trip limit is the programmed value plus 5°F (first stage is turned off).

If a value of 111 to 155 is selected (second stage heating is turned off) then the first stage high temperature trip limit is the programmed value plus 20°F (first stage is turned off).

Example 1:

High temperature trip limit selected is 105°F. (Shown as 05 in controller display.)

Second stage heat will turn off when the duct temperature sensor measures a temperature greater than 105°F.

First stage heat will turn off when duct temperature sensor measures a temperature greater than 110°F.

Example 2: High temperature trip limit selected is 140°F. (Shown as 40 in controller display.)

Second stage heat will turn off when the duct temperature sensor measures a temperature greater than 140°F.

First stage heat will turn off when duct temperature sensor measures a temperature greater than 160°F.

7. Dual Fuel Setpoint (S-7)

This option is used with a system that has a heat pump and another heat source (possibly gas) that should not run at the same time as the heat pump. When any heat pump is on, all auxiliary heat will be off, and vice versa.

NOTE: The auxiliary heat must always have greater heating ability than the heat pump at low outdoor temperatures for this option to have any value.

NOTE: If the Dual Fuel setpoint is set to 0, then this option is disabled. If Dual Fuel option is used, an outside air temperature sensor or refrigerated air sensor must be used.

When the dual fuel setpoint variable is set to the outdoor temperature (10°F to 60°F) that is the crossover point between running the heat pump or using the auxiliary heat as the preferred method of heating.

The setpoint is used only when the first stage of heating is brought on. If the outdoor temperature is above the setpoint, the heat pump (Y1) is energized. If the outdoor temperature is below the setpoint, the auxiliary heat (W1) is used. If the heat pump is started and the outdoor temperature goes below the setpoint, the dual fuel option is not used for that heating cycle.

PROGRAMMABLE OPTIONS-TOGGLES

Turn the zone selector dial to position **T**. (See Fig. 19.) The controller display shows the setting number and its value.

The upper left 2 digits show the setting number while the right side shows the value of ON or OFF.

Press the COOL up or down setpoint buttons to change the toggle number and the HEAT up or down setpoint buttons to change the status of the toggle. (See Table 11.)

Step 12—Wiring Diagrams

**Table 7—Wiring Diagram Reference
For Fig. 20 and 21**

FAN COIL WITH AIR CONDITIONER			
OUTDOOR UNIT	Indoor Unit (Fig. 20)		
	FA4A FB4A FC4B	FK4A	FK4B
Single-Stage Air Conditioner	A	A	B
Two-Speed Air Conditioner	C‡	D	E

FURNACE WITH AIR CONDITIONER					
Outdoor Unit	INDOOR UNIT (FIG. 21)				
	58VUA/VCA	58PAP 58RAP 58GFA 58DFA 58EFA 58SXA 58DXA	58WAV 58ZAV 58PAV 58RAV 58SXC 58DXC 58EJA 58MXA 58MCA	58MVP	58TUA 58TMA
Single-Speed Air Conditioner	A* B	B	B	C	C
Two-Speed Air Conditioner	D E*	F‡	G‡	H	H I ‡

* KGATT0101VSP (Optional) Two-stage relay kit— may help to control over conditioning.

† KSAIF01012SP B Furnace Interface Kit—This is required to allow 2-speed outdoor units to select indoor airflow.

‡ Latent capacity control—Required, field supplied. See 2-speed Installation Instructions.

**Table 8—Wiring Diagram Reference
For Fig. 22 and 23**

FAN COIL WITH HEAT PUMP			
OUTDOOR UNIT	Indoor Unit (Fig. 22)		
	FA4A FB4A FC4B	FK4A	FK4B
Single-Stage Heat Pump	A	A	B
Two-Speed Heat Pump	C‡	D	E

FURNACE WITH HEAT PUMP					
Outdoor Unit	INDOOR UNIT (FIG. 23)				
	58VUA/VCA	58PAP 58RAP 58GFA 58DFA 58EFA 58SXA 58DXA	58WAV 58ZAV 58PAV 58RAV 58SXC 58DXC 58EJA 58MXA 58MCA	58MVP	58TUA 58TMA
Single-Speed Heat Pump	A** B* **	C	C	D	D
Two-Speed Heat Pump	E** F* **	G‡	H‡	I	I

* KGATT0101VSP (Optional) Two-stage relay kit— may help to control over conditioning.

† KSAIF01012SP B Furnace Interface Kit—This is required to allow 2-speed outdoor units to select indoor airflow.

‡ Latent capacity control—Required, field supplied. See 2-speed Installation Instructions.

** Field-supplied isolation relay.

Step 13—Start-Up

1. Verify that the zone number for remote room sensors and corresponding zone damper wire connections are the same in the Comfort Zone Center.

2. Check that the AC power wires (dampers and transformer) are kept away from the DC wires (remote room sensors, four zone controller, communication bus) leading up to, and in the Comfort Zone Center.
3. Check location of four zone controller and remote room sensors to make sure that they are not near heat producing devices such as lamps, sunlight, and appliances.
4. Make sure that the 3 wire communication bus cable for the four zone controller is not run in the same conduit, or use the same cable jacket, as the 5 wire conductor of the four zone controller.
5. Make sure on a remote room sensor that you follow the wire guide stamped on the base by the terminal screws in order to keep polarity and voltages correct. Otherwise the sensor will not work properly.
6. Make sure the duct temperature sensor is placed in the supply air ductwork, downstream of the furnace and evaporator coil, and upstream of the bypass damper.
7. Write down on a piece of paper **AND GIVE TO THE OWNER** a list showing what rooms are controlled by what dampers, and their corresponding zone numbers. Keep list for your future use.
8. Instruct the owner to turn the cool switch OFF in the fall, and turn it ON in the spring.
9. Make sure the emergency heat switch is in the OFF position. If a gas furnace is used this switch should never be turned on. It is for heat pumps only.
10. Be sure and set the clock to the correct time of day. You only need to do this when you first power up the system, or after a power outage lasting longer than 8 hours.
11. Go to rotary switch setting 2 on the four zone controller. Check calibration of room sensor. Do the same for zones 2, 3 and 4 (rotary switch 3-4-5). **Sensors must be calibrated.**
12. Instruct owner in operation of Comfort Zone System
13. Instruct owner to call 800 number supplied with Comfort Zone Center to receive free "How to use Comfort Zone" video tape.
14. For toggle settings for configuration see Programmable Toggles and Options and Table 9.

Step 14—Programming Schedules

The four zone controller is the program center for your Comfort Zone System. The Four Zone Controller provides the ability to program the system for the unique demands of each zone at different times during the day and week. See Fig. 19 to become familiar with the various parts of the Four Zone Controller.

SYSTEM SWITCHES

System switches select the desired equipment operation

Heat Switch

OFF—Heat will not come on.

AUTO—Heat will come on when any zone is more than 1.5°F below the desired heat setpoint.

Cool Switch

OFF—Cooling will not come on.

AUTO—Cooling will come on when any zone is more than 1.5°F above the desired cool setpoint.

Fan Switch

ON—Fan will stay on continuously (recommended).

AUTO—Fan will come on only when heating or cooling is required.

Emergency Heat Switch (Heat Pump Systems only)

OFF—Electric strip heat will not come on unless there is a zone more than 2°F below the desired heat setpoint and comfort trend demand has been satisfied.

ON—When any zone requires heat, the electric strip heat will turn on. The compressor will remain off.

CONTROLLER DISPLAY

When set for normal operation, the Four Zone Controller display shows the current zone temperature setpoints and allows the adjustment of these setpoints using the setpoint buttons. By pressing both heating or cooling setpoint buttons simultaneously, the controller will lock in and display the temperatures for that zone. To release, push both buttons simultaneously again. This will only work when T-20 is off.

ZONE SELECTOR DIAL

To view the setpoints for each zone, turn the zone selector dial to the zone number you wish to view.

The setpoints for the selected zone will be displayed in the controller display.

Program Schedules

Each zone has 3 different weekly periods, (Weekdays, Saturday, and Sunday) and up to 4 different possible combinations of heating and cooling setpoints that can be programmed to provide automatic climate control depending upon the day of the week and time of each day. Each zone can be programmed independently. (See Table 9.)

NOTE: All zones must be programmed.

Table 9—Example Weekly Schedule

WEEKDAYS		SATURDAY		SUNDAY	
6 AM	72/70	7 AM	72/68	8 AM	72/70
8 AM	85/65	10 AM	85/65	10 AM	85/65
5 PM	70/68	2 PM	70/68	7 PM	70/68
10 PM	85/65	11 PM	85/65	10 PM	85/65

WEEKLY PERIOD	
Start Time	Cooling Setpoint/Heating Setpoint

Vacation Mode

Vacation mode displays the current vacation temperature setpoints and allows the adjustment of these setpoints using the setpoint buttons. These setpoints are used by all zones until the selector dial is returned to 1 of the zone selection positions. At all times, the setpoints displayed will be the temperature range that the system will maintain.

This mode can also be used to maintain the entire home at 1 constant temperature-typically when unoccupied.

NOTE: If the Fan Switch is set to ON, the fan will continue to run in vacation mode.

To enter vacation mode, turn the selector dial to VACATION. The word "VACATION" will appear on the controller display whenever the system is in this mode. Set vacation mode setpoints.

Setting The Clock

The clock display will normally show the hour, minutes, AM or PM, and the day.

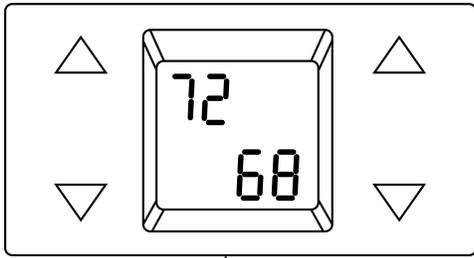
1. Set the minutes.

Press SELECT MIN/HR/DAY button once.

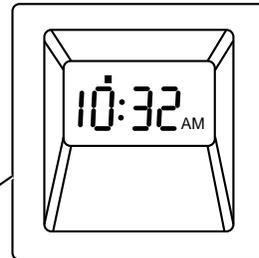
Press ADVANCE TIME/DAY button to scroll to proper minutes.

2. Set the hour.

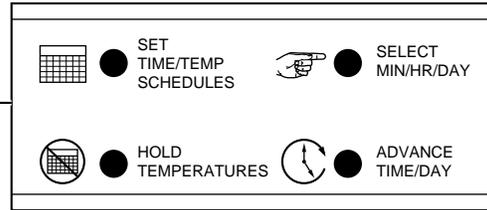
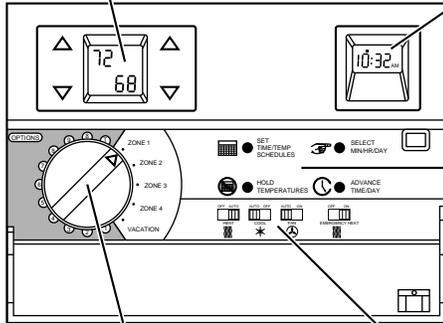
CONTROLLER DISPLAY
INDICATES ZONE SETPOINTS, ZONE TEMPERATURES,
AND PROGRAMMING INFORMATION AND
ALLOWS SETPOINT ADJUSTMENT.



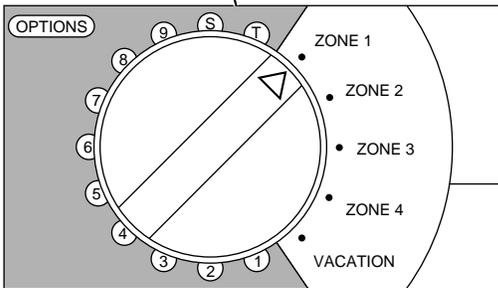
CLOCK DISPLAY
INDICATES THE CURRENT TIME AND DAY
AND THE START TIMES/WEEKLY PERIODS
DURING PROGRAMMING.



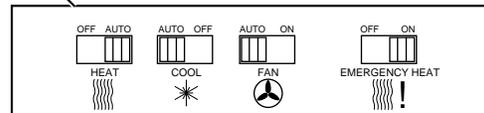
**FOUR
ZONE
CONTROLLER**



PROGRAMMING ADJUSTMENT BUTTONS
ALLOWS FOR PROGRAMMING WEEKLY PERIODS, START TIMES
FOR EACH ZONE AND SETS THE CLOCK FOR DAY AND TIME.



ZONE SELECTOR DIAL
PROVIDES ACCESS TO INFORMATION AND PROGRAMMING
FOR EACH ZONE AND SELECTION OF VACATION MODE.
OPTION AREA IS FOR USE BY INSTALLATION/SERVICE.



SYSTEM SWITCHES
PROVIDES FOR SELECTION OF HEAT, COOL,
FAN AND EMERGENCY HEAT OPERATION.

Fig. 19—Four Zone Controller

A93232

- Press **SELECT MIN/HR/DAY** button once again.
- Press **ADVANCE TIME/DAY** button to scroll to proper hour, AM or PM.
- 3. Set the day.
 - Press **SELECT MIN/HR/DAY** button once again.
 - Press **ADVANCE TIME/DAY** button to scroll to proper day.
- 4. Return to normal operation.
 - Press **SELECT MIN/HR/DAY** button once again. The newly programmed time will be displayed.

Programming Schedules

1. Enter Program Mode
 - Press **SET TIME/TEMP SCHEDULES** button to enter program mode. The program mode and the current zone will be shown on the controller display.
2. Select a zone.
 - Turn the rotary switch to the zone to be programmed.

3. Select a weekly period.
 - The clock display will show **MTWTHF**.
 - Pressing the **ADVANCE TIME/DAY** button selects the weekly period to be programmed.
 - Pressing the button 1 time will change the clock display to **SA**. A second press will change display to **SU**. A third press return the displays to **MTWTHF**.
4. Program time periods.
 - There are 4 start times that can be programmed in each weekly period.
 - Press the **SELECT MIN/HR/DAY** button to program the start times for the selected weekly period.
 - Pressing the **SELECT MIN/DAY/HR** button once shows the first program start time on the clock display and the setpoints, with the word **PROGRAM** for this start time on the controller display.
 - Additional presses display start times 2, 3, 4, and then back to weekly period display.

NOTE: While in program mode, if a period of 4 1/2 minutes passes without a change to some value, the controller will return to normal operation.

5. Program start time

NOTE: Start times **must** be programmed in chronological order and must be in the same day. Any times **before** the previous time period will be ignored. In the **WRONG** example below, periods 2 and 4 will be ignored.

<u>RIGHT</u>	6 AM - TIME PERIOD 1
	8 AM - TIME PERIOD 2
	5 PM - TIME PERIOD 3
	9 PM - TIME PERIOD 4
<u>WRONG</u>	6 AM - TIME PERIOD 1
	2 AM - TIME PERIOD 2
	9 PM - TIME PERIOD 3
	5 PM - TIME PERIOD 4

Press the ADVANCE TIME/DAY button until the desired start time is displayed.

6. Adjust setpoints.

Adjust the setpoints using the up and down buttons until the desired temperatures for the selected time period appears in the display. These setpoints will be used during the time period currently displayed in the clock window.

7. Complete time period programming.

Repeat 4 through 6 to program remaining weekly period start times. Each weekly period can be programmed with 4 different time periods.

8. Complete week schedule.

After completing start time programming, press the SELECT MIN/HR/DAY until **MTWTHF** reappears in the clock display.

Repeat steps 3 through 7 to program weekly periods. Once finished, this will complete programming of 1 zone.

9. Program a different zone.

To program a different zone, turn the rotary switch to the desired zone to be programmed and repeat 2 through 8.

10. Exit program mode.

Exit program mode by pressing SET TIME/TEMP SCHEDULES button.

Overriding Programming

To override the time programming, press any setpoint button. This will also adjust the setpoints for the override period. Once the setpoints are adjusted, they will not change until the next programmed time period for that zone.

If the HOLD TEMPERATURES button is pressed, then the current setpoints will not change with time, but remain at the last values entered for as long as the hold mode is active.

To release the hold mode, press the HOLD TEMPERATURE button a second time.

The controller display will show the word **HOLD** whenever the hold mode is active.

Temperature Sensor Calibration

NOTE: Temperature sensors are factory calibrated; however, field calibration is recommended.

The setpoint display shows the actual temperature (Fahrenheit or Celsius).

The upper left-hand corner of the display indicates the whole number value. The lower right-hand corner indicated the tenths.

Pressing either the HEAT or COOL buttons either raises or lowers the displayed temperature by 1/10 of a degree.

If temperature readings are not stable within 0.5°F, refer to the troubleshooting section for details.

Table 10—Temperature Sensor Calibrations

ZONE SELECTOR DIAL	SENSOR TO BE CALIBRATED
Position 1	Damper Service Position
Position 2	Zone 1 Temperature Sensor
Position 3	Zone 2 Temperature Sensor
Position 4	Zone 3 Temperature Sensor
Position 5	Zone 4 Temperature Sensor
Position 6	Duct Temperature Sensor
Position 7	Outside Air Temperature Sensor
Position 8	Dx Coil Sensor
Position 9	Base Temperature Setpoint Scale

Damper Service Mode

The Damper Service Mode can be selected to check full operation of each zone damper independently. The controller display shows the zone number in the upper left digits, and the damper position in the lower right digits. The left hand setpoint buttons will toggle the zone number (1-4) and 5.

NOTE: No. 5 not used for damper service mode, see below for details when setting the motorized bypass damper pressure relief limit.

When this mode is selected, all 4 zone dampers are activated and opened to position 15. (See Table 2.) Fan will energize. Use the right hand setpoint buttons to toggle down from position 15 to position 0. This feature can verify that each zone damper is operating properly by manually opening and closing each zone. When the rotary switch dial is moved onto another position, the Damper Service Mode will be cleared and controller will resume normal operation.

Bypass Damper Pressure Relief Limit

We do not encourage using a motorized bypass damper. Using a barometric bypass damper is the preferred method to control the operating pressures in the supply duct.

The display shows the zone number in the upper left digits, and the lower right digits show the damper position. The left hand setpoint buttons will toggle the zone number (1-4) and also to 5 where the collective damper position is programmed in for the bypass. When it is toggled to position 5 and the annunciator is toggled from OFF to ON with the right hand buttons, the controller totals all of the dampers positions and stores it. While displaying 1-4, the damper for that zone can be directed to any position with the right hand buttons. The collective damper position that is programmed at position 5 is the minimum total damper open position. The largest minimum open position is 60 (4 zones with 15 positions each). Whatever number is programmed in will be the minimum total damper open positions that the bypass will try to maintain. The bypass damper positions are 1 for every 3 that the total needs. (Example: The maximum total is 60, but only 3 dampers are open. This is only 45, so the bypass takes 60, subtracts 45, comes up with 15, and divides this number by 3. The result is 5, so the bypass goes to position 5.)

Step 15—Accessories

Refer to the individual instructions packaged with the kits or accessories when installing.

HOME ACCESS MODULE

The Home Access Module (HAM) is designed to detect Comfort Zone System errors. The HAM can report when the system is

operating correctly, or when an error is detected. The HAM can automatically call an ACS dealer or the ACS National Response Center.

NOTE: The HAM must be programmed via Report Logger or PC Command Center Software prior to installation.

SMART SENSOR AND SMART SENSOR POWER PACK

NOTE: These 2 accessories must be used together.

The Smart Sensor provides the ability to view and adjust the setpoints in the zone where the sensor is located.

The Smart Sensor replaces a Remote Room Sensor and requires a single 5-wire conductor instead of a 2-wire conductor.

OUTSIDE AIR DAMPER

The outside air damper allows fresh outside air into the building.

OUTSIDE AIR TEMPERATURE SENSOR

The Outside Air Temperature Sensor must be used whenever an Outside Air Damper is installed. An Outside Air Temperature Sensor must also be used for dual fuel applications.

Step 16—Troubleshooting

This section contains information to assist you in troubleshooting problems and errors associated with the Comfort Zone System. The most common operating problems and different types of errors associated with the Comfort Zone System are:

Operating Problems...No display, flashing display, and flashing HEAT or COOL annunciators. Comfort zone controller selects a

system mode but does not energize the heating/cooling unit.

Hardware Failure (HF) Errors...Occur when the comfort zone controller detects a problem with 1 of its own components or an associated device.

Storage Failure (SF) Errors...Occur when the comfort zone controller detects and replaces faulty data contained within its memory with factory selected default values.

Transparent Errors...Occur when the comfort zone controller detects a system or zone operating problem.

When any zone cannot maintain room temperature within 5°F of the desired setpoint for a period of 20 minutes, a comfort trend error is declared. This error is transparent and will not be shown on the controller display. If a Home Access Module (HAM) is on the system, the ACS dealer or national ACS response center will receive a call identifying this error.

CARE AND MAINTENANCE

For continuing optimum performance and to minimize possible equipment failure, it is essential that periodic maintenance be performed on this equipment. Consult your servicing contractor or User's Manual for the proper frequency of maintenance. Frequency of maintenance may vary depending upon geographic areas.

Step 1—Leave User's Manual With Homeowner

Explain system operation and maintenance procedures outlined in User's Manual.

Table 11—Toggle Summary

TOGGLE SETTING	ON	OFF	DEFAULT
(T1)-Timeguard Override	Time guard delay is 30 sec, overrides 5-minute delay between de-energizing and re-energizing HVAC stages. This option automatically returns to OFF after 30 sec timeout. If equipment has been shut down due to a leaving air temperature trip, the timeguard override has no effect.	Time delay is standard 5 minutes between de-energizing and re-energizing HVAC stages.	OFF
(T2)-Celsius Display	Temperature and setpoints are displayed in Celsius degrees.	Temperature and setpoints are displayed in Fahrenheit degrees.	OFF
(T3)-2400 Baud Rate	Communication baud rate is 2400.	Communications baud rate is 4800.	ON
(T4)-Error Code Display	Non-critical errors are displayed.*; when set to ON both SF/HF errors are displayed.	Only critical errors are displayed.	ON
(T5)-Enable Broadcast	The system broadcasts the time on the communications bus with every scan.	The system does not broadcast the time or outside air temperatures on the bus.	ON
(T6)-Heat Pump Operation	Heat Pump mode First stage heat pump will energize Y1 to turn compressor on.	No heat pump operation. Used for electric heat or gas furnace. W1 will be energized for heat.	OFF
(T7)-Outside Air Temperature	The system assumes that an outside air temperature sensor is attached and will broadcast the outside air temperature on the communication bus if enable broadcast is turned on.	The outside air temperature sensor is not attached.	OFF
(T8)-Comfort Trend Staging	The system will energize the second stage only if zone demand exceeds 2°F and the zone temperature has not improved at least 0.1°F for 6 minutes. The 6 minute timer is reset if the zone temperature trend is improving.	A 2°F demand alone will energize the second stage after timeguard between stages has been satisfied.	ON
(T9)-Auto Fan Off For Heat	When the fan switch is set to AUTO, the system will not energize the fan during heat modes. This allows the equipment to control fan operation for proper heat exchanger warm-up.	The fan relay is energized during heating and cooling.	OFF
(T10)-High/Low Temperature Limits	The system will check leaving air temperature (measured by the duct sensor) for excessive heating and cooling limits. Cool limits are fixed at 50° F (second stage cool de-energized) and 45° F (first stage cool de-energized). Heating limits are programmable between 105/110 to 155/175°F.	Operates the same as 'ON' position, but dampers will not modulate open in a LAT trip.	ON
(T11)-Installer Switch Lockout	Rotary switch positions 1 through 7 and S on the controller display will display dashes.	All switch positions operate normally.	OFF
(T12)-Force Outside Air Ventilation	The outside air damper is forced to a minimum position of 2 when fan is on.	The outside air damper is set to the position the system requests.	OFF
(T13)-Smart Sensor Attached For Zone 2	The system assumes a smart sensor is attached to zone 2. The 4 zone controller will read zone temperature and setpoints for zone 2 via the 3-wire communications bus at 1 address below the controller.	The system reads zone 2 temperature via the remote room sensor.	OFF
(T14)-Smart Sensor Attached For Zone 3	The system assumes a smart sensor is attached to zone 3. The 4 zone controller will read zone temperature and setpoints for zone 3 via the 3-wire communications bus at 2 address below the controller.	The system reads zone 3 temperature via the remote room sensor.	OFF
(T15)-Smart Sensor Attached For Zone 4	The system assumes a smart sensor is attached to zone 4. The 4 zone controller will read zone temperature and setpoints for zone 4 via the 3-wire communications bus at 3 address below the controller.	The system reads zone 4 temperature via the remote room sensor.	OFF
(T16)-Zone 2 Active	Zone 2 is being used.	Zone 2 is not being used.	ON
(T17)-Zone 3 Active	Zone 3 is being used.	Zone 3 is not being used.	ON
(T18)-Zone 4 Active	Zone 4 is being used.	Zone 4 is not being used.	ON
(T19)-Economizer	The system will use the outside air as first stage cooling and mechanical cooling as second stage. When the outside air temperature drops below 65° F, the damper will modulate 10 percent open. Full open in cooling.	The system will use only mechanical cooling.	OFF
(T20)-Enable Alternate Display	The controller display will alternate between setpoints and zone temperatures.	The controller display will continuously show setpoints.	OFF
(T21)-Outside Air Damper Attached	The system will operate the fifth motorized damper as an outside air damper.	The system will operate the fifth motorized damper as a motorized bypass damper.	OFF
(T22)-System Mode Reselect	The system will re-evaluate demand while still in a mode. If simultaneous demand exists and the demand for the opposite mode exceeds the demand for the current mode for 20 minutes the system will change modes.	The system will not change modes until current mode has been satisfied.	OFF
(T23)-System Error Checking	The system will report a transparent error when any zone cannot be maintained within 5° F for longer than 20 minutes.	The system will not report the error.	OFF
(T24)-50 Hz Operation	The system will be set to operate using 50 hz power source.	The system will be set to operate using 60 hz power source.	OFF
(T25)-Ventilation Mode	When the duct temperature is below 65°F or above 80°F the damper will go fully closed, i.e., below minimum damper position in order to avoid over conditioning the zone.	Damper position will not go below the minimum damper position, which is set as S5, even when the duct temperature is too cold or too hot.	OFF
(T26)-Two Stage Heat Pump	Y2 will be used to turn on second stage of a 2-stage compressor in a heat pump system.	Second stage operation will be canceled.	OFF
(T27)-DX Sensor for LAT Checking	DX Sensor will be LAT checked in addition to the Duct Temperature Sensor. (T-10 must also be on)	DX Sensor is ignored for LAT checking.	OFF
(T28) Cool Without Fan	The fan will not be energized. The cooling equipment must provide a way to turn fan on.	The fan relay is energized anytime there is a cooling demand.	OFF

* Pressing any setpoint button when a hardware error exists causes a reset if in a run position.

Table 12—Operating Problems

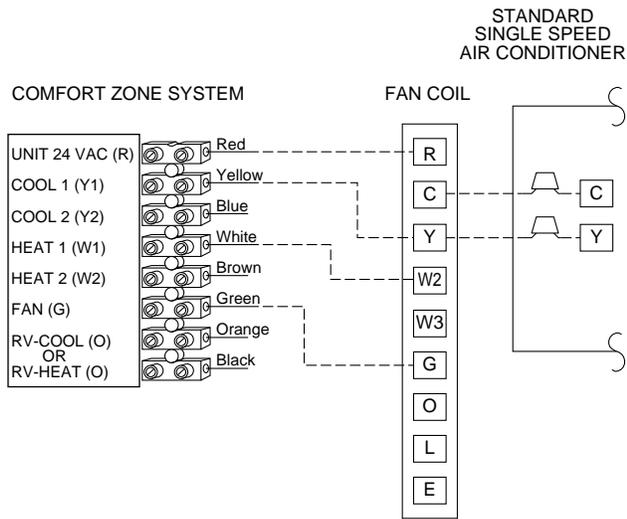
SYMPTOM	POSSIBLE CAUSE
No Display	Thermostat is not receiving power. 1. Verify that comfort zone center is receiving 24-vac. (50-va minimum required with 4 motorized dampers, 5 va for each additional motorized damper.) 2. Check that the thermostat is receiving a steady 10 VDC across the red and white wires at the system controller terminal block on the comfort zone, I/O board, and on the Red/White terminals on the base plate of the 4 zone controller.
Blinking Temperature Display	Low voltage. 1. Verify that the comfort zone center is receiving 24-vac. (50-va minimum required with motorized dampers, 5-va for each additional motorized damper.) 2. Check that the thermostat is receiving a steady 10 VDC across the red and white wires at the system controller terminal block on the comfort zone, I/O board, and on the red/white terminals on the base of the 4 zone controller. 3. Check that the yellow or blue wires are connected properly and not broken at the system controller terminal block on the comfort zone I/O board and on the yellow/blue terminal on the base of the 4 zone controller. 4. Verify that the terminals are properly installed on the base plate of the controller. 5. Wiring connector block for smart sensor could be defective.
Blinking HEAT or COOL Annunciator	1. Check to see if high/low temperature trip Limits have been exceeded. 2. Temperature sensor is improperly wired or defective.
Cooling or Heating is Requested But The HEAT or COOL Annunciator is not displayed	1. Must have at least 1 zone with a demand greater than 1.5° F from setpoints. 2. Check system switches. They must be set to AUTO or ON to operate. 3. Have you waited for timeguard (5 minutes) to expire?
COOL or HEAT Annunciator is Lit But Cool or Heat is Not On	1. Check that the LEDs on the CHR06 relay pack are indicating the correct relay is closed, If not, check for a bad relay. 2. Measure voltage across common (red) and any de-energized relay. Voltage should be 24vac. 3. Apply 24vac directly across relay.
Damper Will Not Open or Close	1. Verify that there are no obstructions binding the damper blade or shaft. 2. Check for 24 VAC across common and either the open or close terminals. 3. Check stop switch. If defective, replace actuator. 4. Verify that motor is operating correctly. 5. Check damper fuse.
System is Too Noisy	1. Make sure bypass damper is working properly. 2. Verify that ductwork is properly sized.
Unstable Temperature Readings	1. Check for drafts. 2. Use shielded cable.
Room Sensors Fluctuating	1. Make sure that the sensor wire is not run in parallel with any wires carrying AC voltage. 2. Disconnect all other sensors from the comfort zone I/O board and check to see if the sensor reading is still fluctuating. 3. Disconnect all other sensors from the comfort zone panel and check to see if the problem still exist. 4. Disconnect the 4 zone controller and re-wire it directly to the I/O board with a separate 5-conductor cable. 5. If all sensors are still fluctuating, replace the 4 zone controller. 6. If only 1 sensor is fluctuating, disconnect that sensor from the I/O board and re-wire it directly to the I/O board using a separate 2-conductor cable. 7. If the sensor still has the problem, replace the I/O board. 8. Verify if shielded or non-shielded cable is being used. 9. If shielded, follow through the remaining steps. If non-shielded, go to No. 6. 10. Verify that the shield is connected to the comfort zone panel and that the panel is properly grounded to the chassis. 11. Remove the shield wire and check to see if the problem still exist. 12. Verify that the shield wire has been clipped off at the sensor end and is not touching any other wires or any exposed metal. 13. Ensure that there is a solid electrical ground on the electric power box.

Table 13—Storage Failure Errors
Error Display (Dial Position T4) must be turned on.

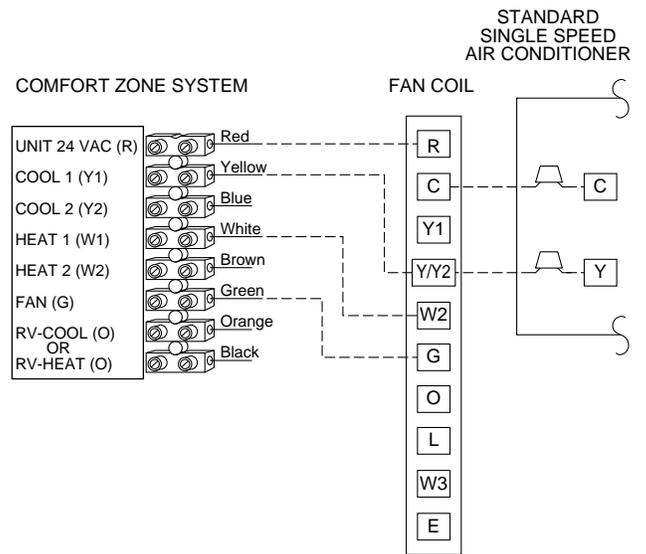
SF ERROR CODE	DESCRIPTION	SOLUTION
01	Temperature Programming Error	Reprogram the scheduled temperatures.
02	Time Period Programming Error	Reprogram the scheduled time periods.
03	Zone 1 Temperature Calibration Out of Range	1. Turn selection dial to position 2. 2. Change temperature value. 3. Return selection dial to any run mode position. Valid temperature range = 30°—180°F.
04	Zone 2 Temperature Calibration Out of Range	1. Turn selection dial to position 3. 2. Change temperature value. 3. Return selection dial to any run mode position. Valid temperature range = 30°—180°F
05	Zone 3 Temperature Calibration Out of Range	1. Turn selection dial to position 4. 2. Change temperature value. 3. Return selection dial to any run mode position. Valid temperature range = 30°—180°F
06	Zone 4 Temperature Calibration Out of Range	1. Turn selection dial to position 5. 2. Change temperature value. 3. Return selection dial to any run mode position. Valid temperature range = 30°—180°F
07	Duct Temperature Calibration Out of Range	1. Turn selection dial to position 6. 2. Change temperature value. 3. Return selection dial to any run mode position. Valid temperature range = 30°—180°F
08	Outside Temperature Calibration Out of Range	1. Turn selection dial to position 7. 2. Change temperature value. 3. Return selection dial to any run mode position. Valid temperature range = -30°—120°F
09	Dx Coil Temperature Calibration Out of Range	1. Turn selection dial to position 8. 2. Change temperature value. 3. Return selection dial to any run mode position. Valid temperature range = 30°—180°F
10	LAT Error	1. Turn selection dial to position S. 2. Select variable number 6. 3. Enter a new value. 4. Return selection dial to any run mode position.
11	Device Address Error	1. Turn selection dial to position S. 2. Verify correct address of the 4 zone controller is as shown in the Programming and Operation Section. 3. Verify smart sensor address(es) are as shown in the Programming and Operation Section.
12	Configuration Error	1. Turn selection dial to position T2, T11, T12, T18, T20, T22, and T24.. 2. Check and correct the configuration. 3. Return selection dial to any run mode position.
13	Configuration Error	1. Turn selection dial to position T4, T5, T6, T13, and T17. 2. Check and correct the configuration. 3. Return selection dial to any run mode position.
14	Configuration Error	1. Turn selection dial to position T7, T8, T9, T10, T19, T21, T23, and T25. 2. Check and correct the configuration. 3. Return selection dial to any run mode position.
15	Configuration Error	1. Turn selection dial to position T26 and T27. 2. Check and correct the configuration. 3. Return selection dial to any run mode position.
16	Configuration Error	Push HOLD button on/off.
17	Current Setpoints	1. Turn the error display T4 off. 2. Change any setpoint. 3. Turn the error display T4 on. 4. Return selection dial to any run mode position.
18	Vacation Setpoints	1. Turn the error display T4 off. 2. Turn the selection dial to Vacation. 3. Change any setpoint. 4. Turn the error display T4 on. 5. Return selection dial to any run mode position.
19	Maximum/Minimum Temperature Setpoints	1. Turn selection dial to position S. 2. Change the maximum cooling setpoint (S2).Must be outside 14° range. 3. Change the minimum heating setpoint (S3).Must be outside 14° range. 4. Return selection dial to any run mode position.
20	Maximum/Minimum Damper Ventilation	1. Turn the selection dial to position S. 2. Change the maximum damper position (S4).Default = 15 3. Change the vent damper position (S5).Default = 0 4. Return selection dial to any run mode position.
21	Bypass Damper Total	1. Turn the selection dial to position 1. 2. Re-program bypass damper pressure relief limit according to instructions on Programming Section.
22	Baud Rate	1. Turn selection dial to position T1. 2. Toggle the baud rate twice (T3). 3. Return selection dial to any run mode position.
23	Dual Fuel Trip Temperature Error	1. Turn selection dial to position S7 2. Change the value. 3. Return selection dial to any run mode position.
24	Base Temperatures Error	1. Turn selection dial to position 9. 2. Set base temperatures. Do not overlap with 14° maximum cooling/minimum heating set point range. 3. Return selection dial to any run mode position.

Table 14—Hardware Failure Errors
Error Display (Dial Position T4) must be turned on.

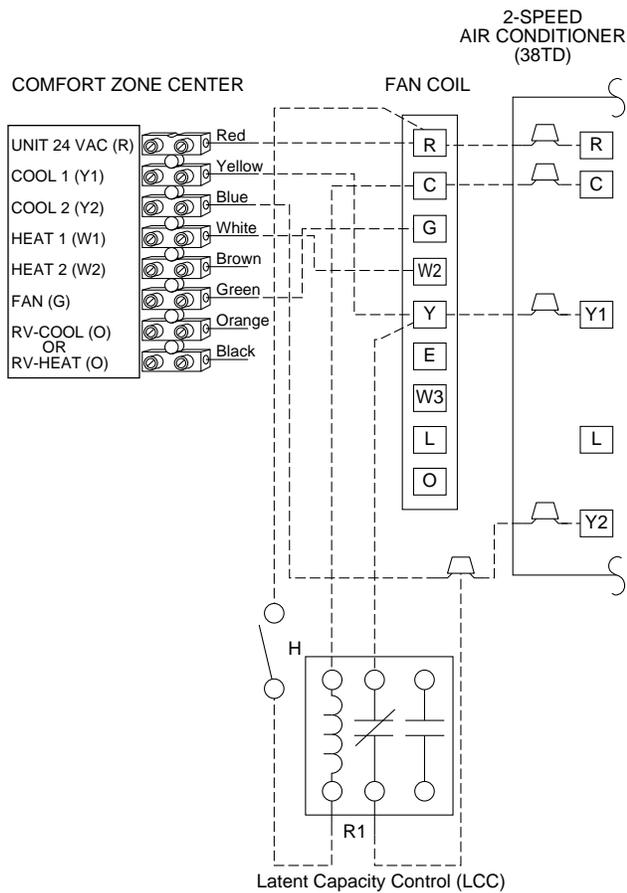
HF ERROR CODE	DESCRIPTION	SOLUTION
40	Zone 1 Temperature Sensor	Bad sensor, shorted or open. 1. Check wiring and sensor. 2. Replace failed sensor, if necessary. Valid temperature range = 30°—180°F
41	Zone 2 Temperature Sensor	Bad sensor, shorted or open. 1. Check wiring and sensor. 2. Replace failed sensor, if necessary. Valid temperature range = 30°—180°F
42	Zone 3 Temperature Sensor	Bad sensor, shorted or open. 1. Check wiring and sensor. 2. Replace failed sensor, if necessary. Valid temperature range = 30°—180°F
43	Zone 4 Temperature Sensor	Bad sensor, shorted or open. 1. Check wiring and sensor. 2. Replace failed sensor, if necessary. Valid temperature range = 30°—180°F
44	Duct Temperature Sensor	Bad sensor, shorted or open. 1. Check wiring and sensor. 2. Replace failed sensor, if necessary. Valid temperature range = 30°—180°F.
45	Outside Air Temperature Sensor	Bad sensor, shorted or open. 1. Check wiring and sensor. 2. Replace failed sensor, if necessary. Valid temperature range = -30°—120°F
46	Dx Coil Sensor	Bad sensor, shorted or open. 1. Check wiring and sensor. 3. Replace failed sensor, if necessary. Valid temperature range = 30°—180°F
47	Bus Access Error	Controller can not communicate on bus. 1. Check 3-wire bus between controller and comfort zone center. 2. Replace faulty controller/center boards, if necessary
48	Zone 2 Smart Sensor	Cannot communicate with zone 2 smart sensor. 1. Turn toggle 13 off if there is no smart sensor attached to zone 2. 2. Check wiring between sensor and comfort center. 3. Verify correct address. 4. Must be addressed 1 less than 4 zone controller's address.
49	Zone 3 Smart Sensor	Cannot communicate with zone 3 smart sensor. 1. Turn toggle 14 off if there is no smart sensor attached to zone 3. 2. Check wiring between sensor and comfort center. 3. Verify correct address. 4. Must be addressed 2 less than 4 zone controller's address.
50	Zone 4 Smart Sensor	Cannot communicate with zone 4 smart sensor. 1. Turn toggle 15 off if there is no smart sensor attached to zone 4. 2. Check wiring between sensor and comfort center. 3. Verify correct address. 4. Must be addressed 3 less than 4 zone controller's address.
51	Clock Not Ready	No correction possible.
52	Parker Custom Chip Not Ready	No correction possible. Fatal Error
53	Non-Volatile RAM Not Ready	No correction possible. Fatal Error



A

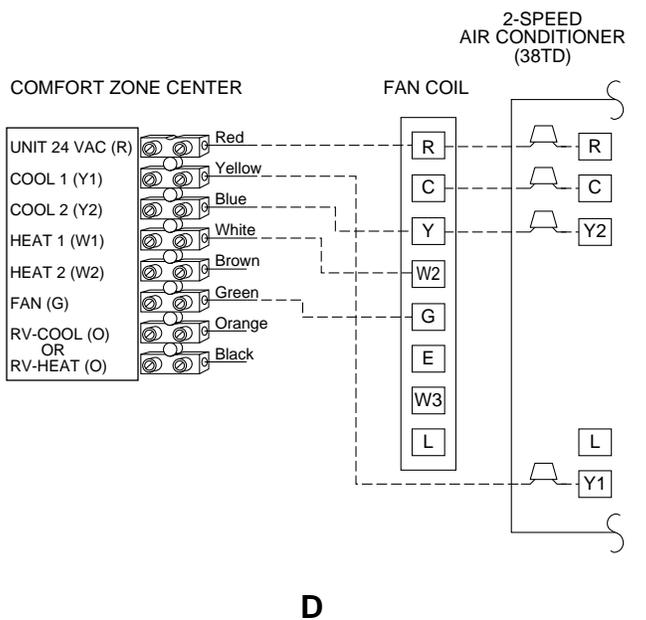


B



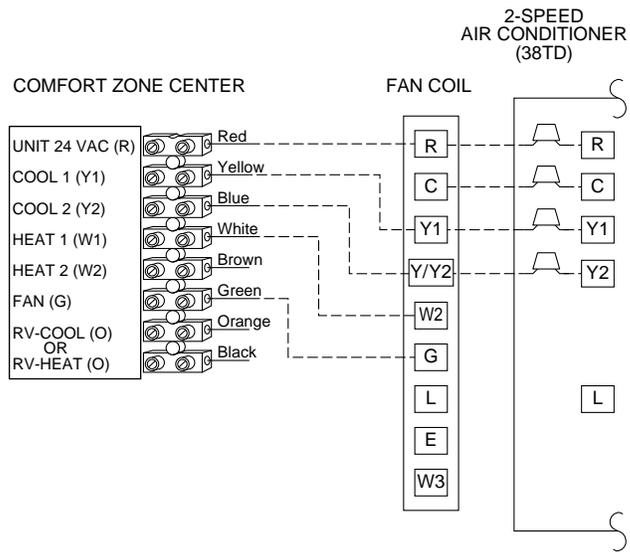
R1 = Relay DPST, Pilot Duty, 24-v coil (HN61KK324) or Equivalent.
H = Humidistat, opens on humidity rise (HL38MG026)

C



D

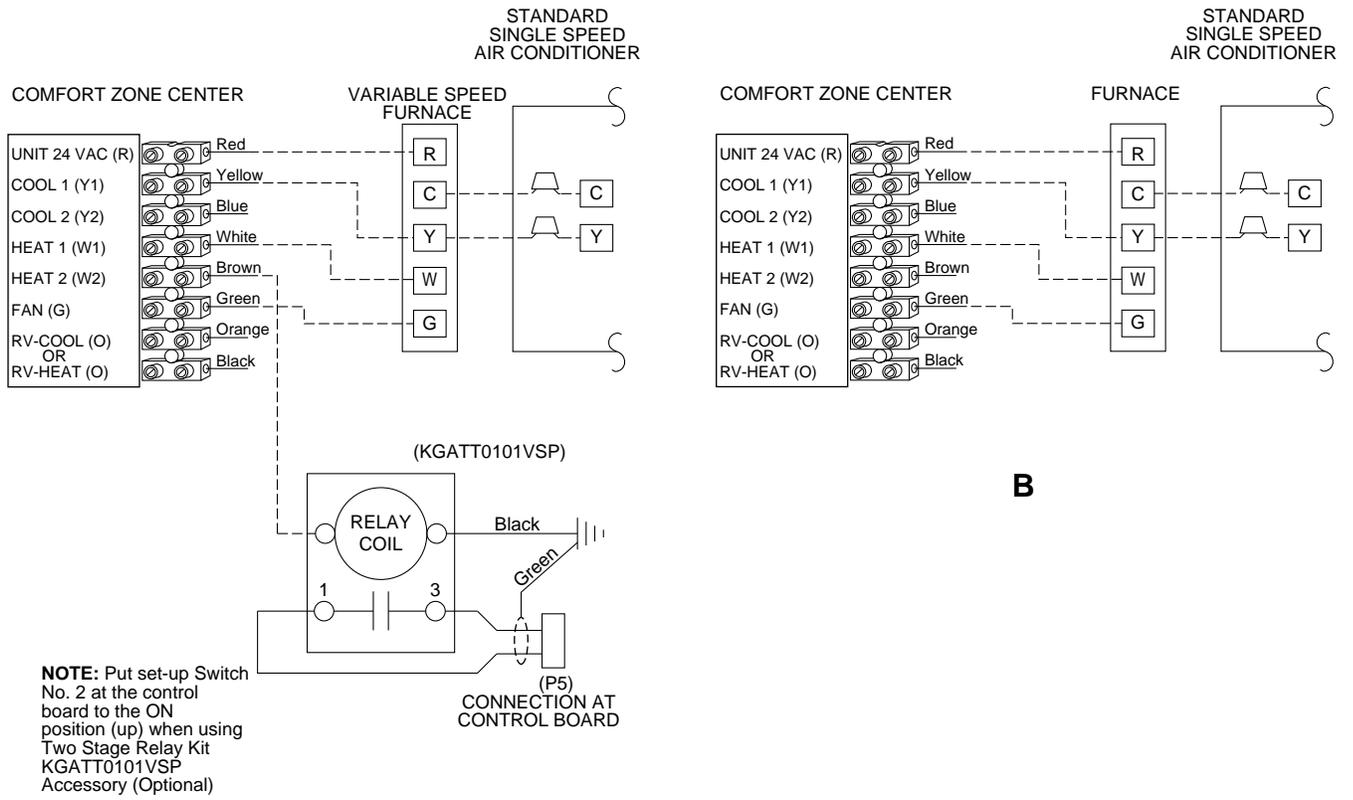
Fig. 20—Typical Wiring Diagrams (Fan Coil with Air Conditioner)



E

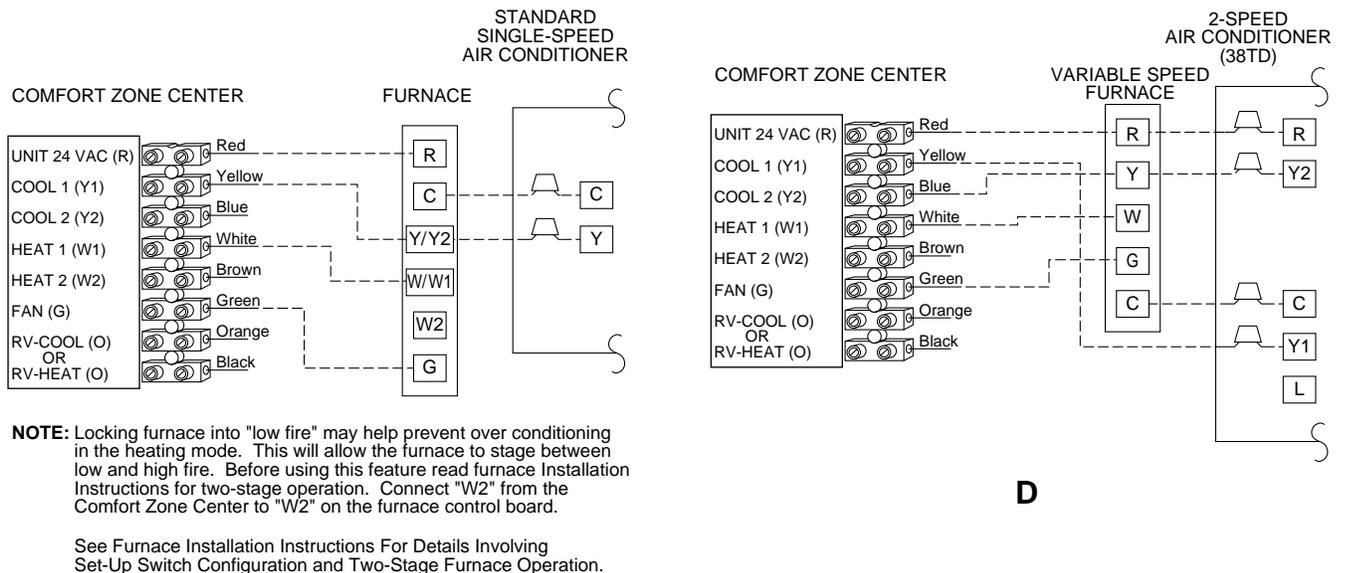
Fig. 20—Typical Wiring Diagrams (Fan Coil with Air Conditioner) Continued

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A

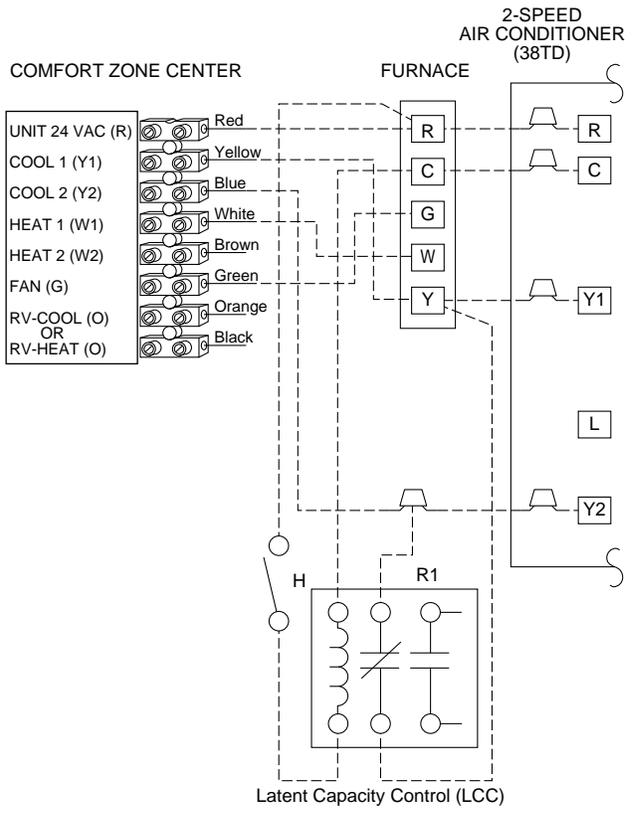
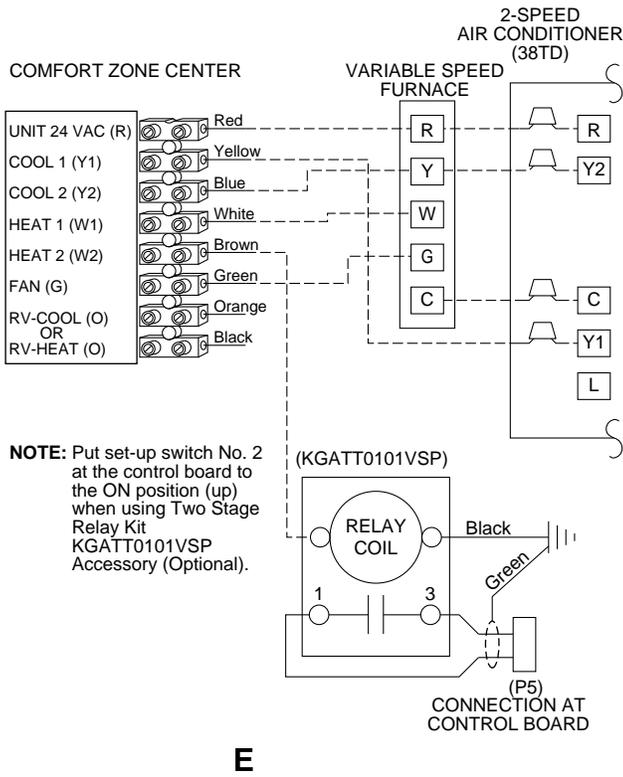
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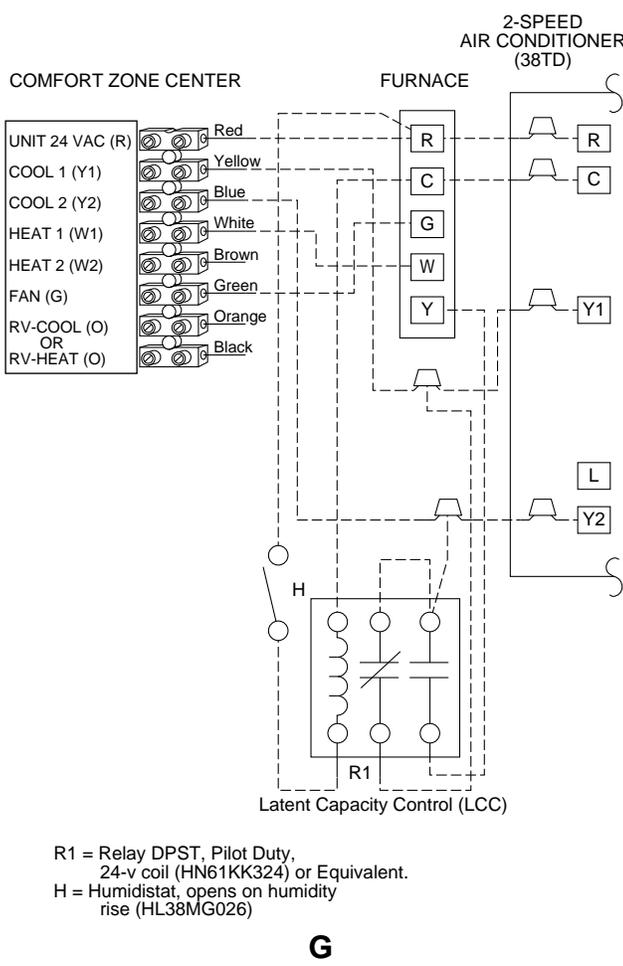
C

D

Fig. 21—Typical Wiring Diagrams (Furnace with Air Conditioner)



R1 = Relay DPST, Pilot Duty, 24-v coil (HN61KK324) or Equivalent.
 H = Humidistat, opens on humidity rise (HL38MG026)



R1 = Relay DPST, Pilot Duty, 24-v coil (HN61KK324) or Equivalent.
 H = Humidistat, opens on humidity rise (HL38MG026)

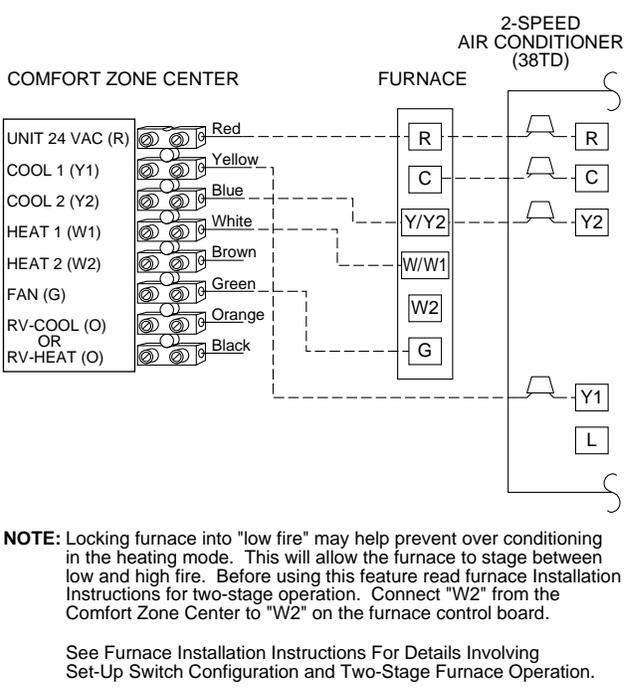


Fig. 21—Typical Wiring Diagrams (Furnace with Air Conditioner) Continued

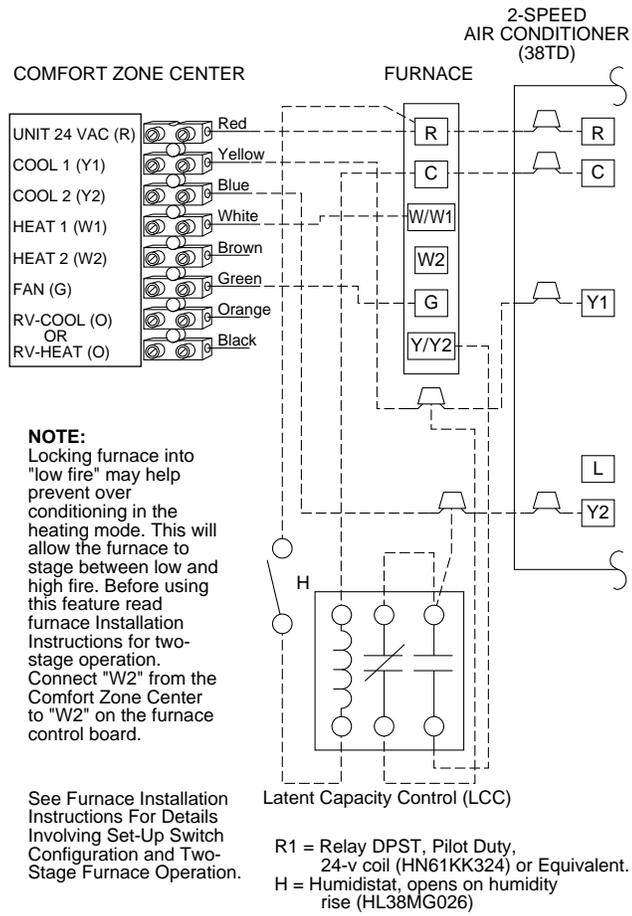
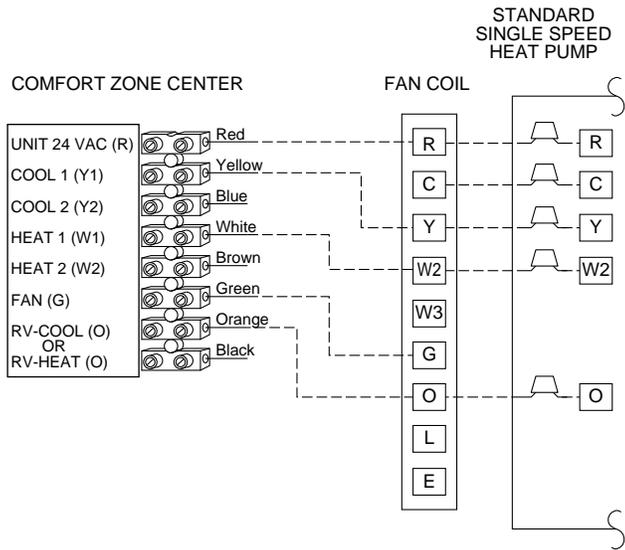
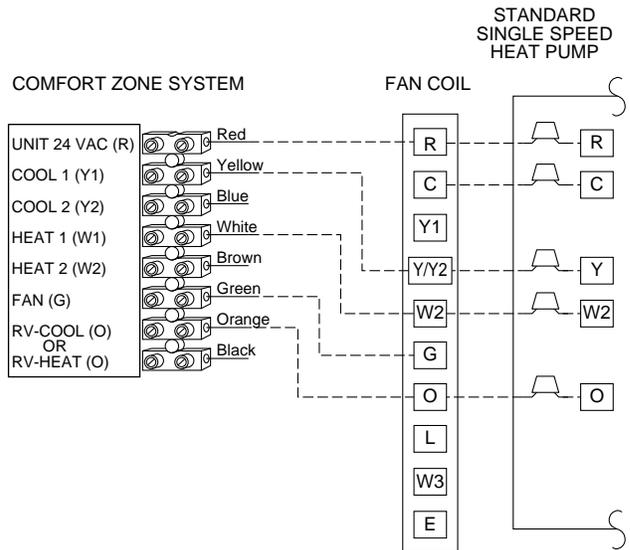


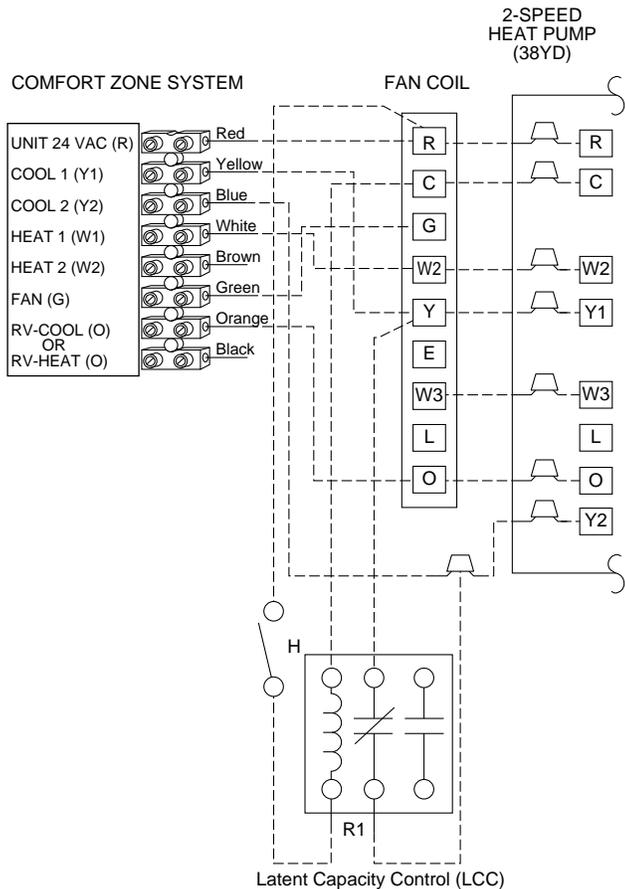
Fig. 21—Typical Wiring Diagrams (Furnace with Air Conditioner) Continued



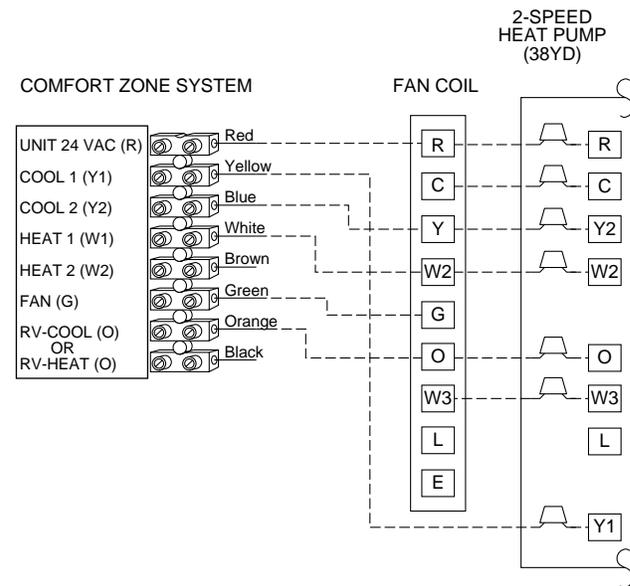
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B



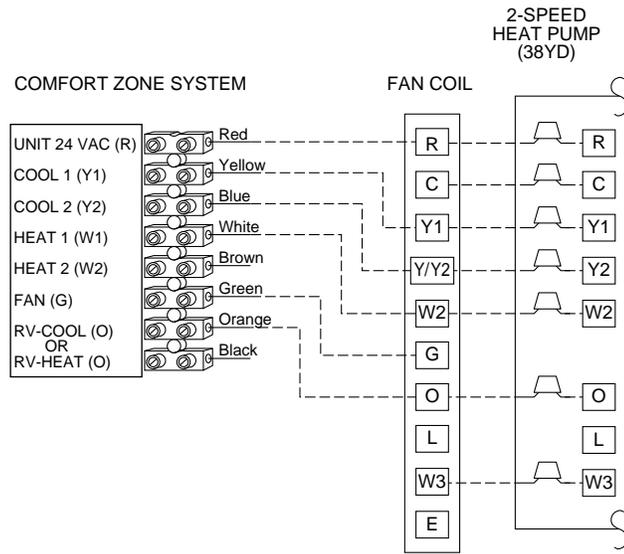
C



D

R1 = Relay DPST, Pilot Duty,
24-v coil (HN61KK324) or Equivalent.
H = Humidistat, opens on humidity
rise (HL38MG026)

Fig. 22—Typical Wiring Diagrams (Fan Coil with Heat Pump)



E

Fig. 22—Typical Wiring Diagrams (Fan Coil with Heat Pump) Continued

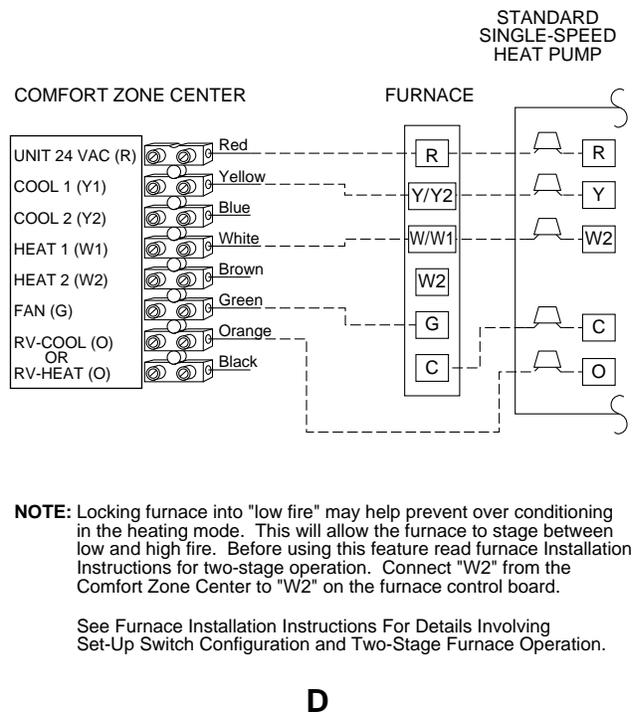
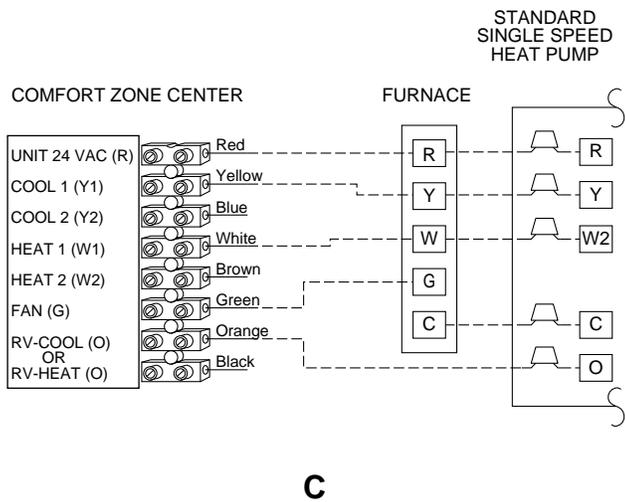
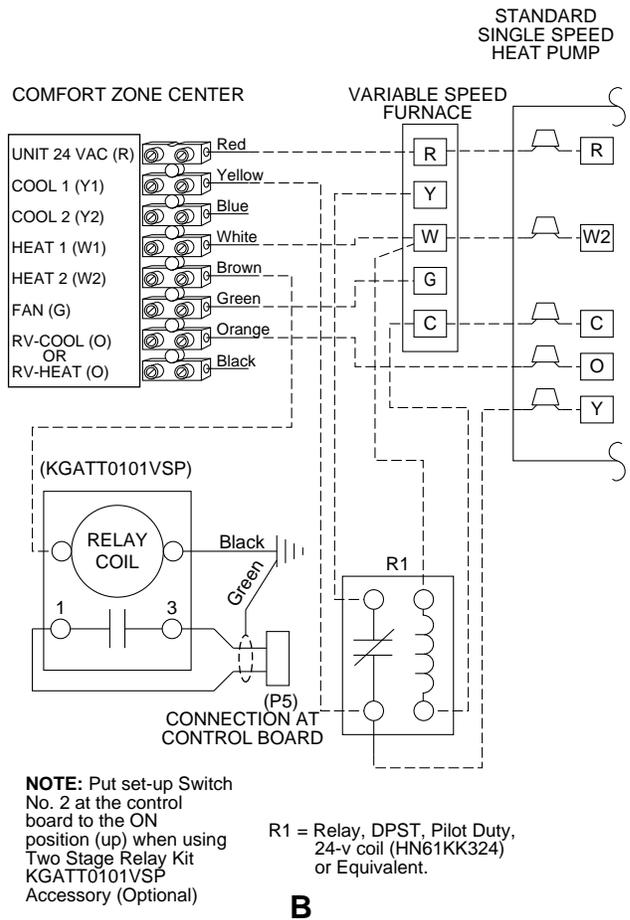
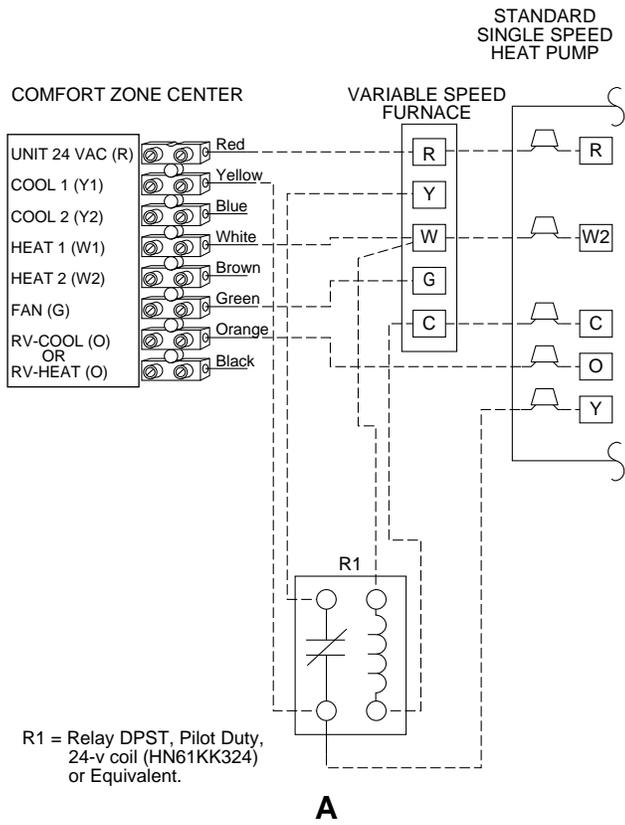
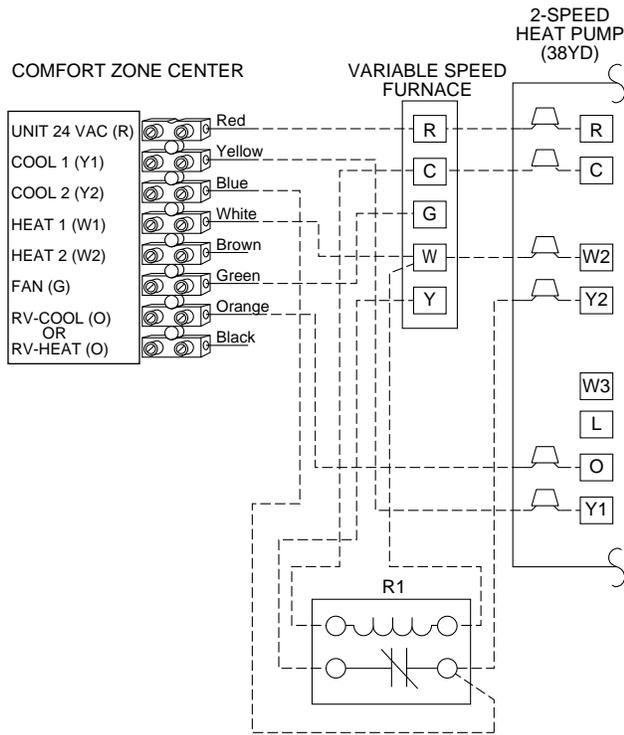
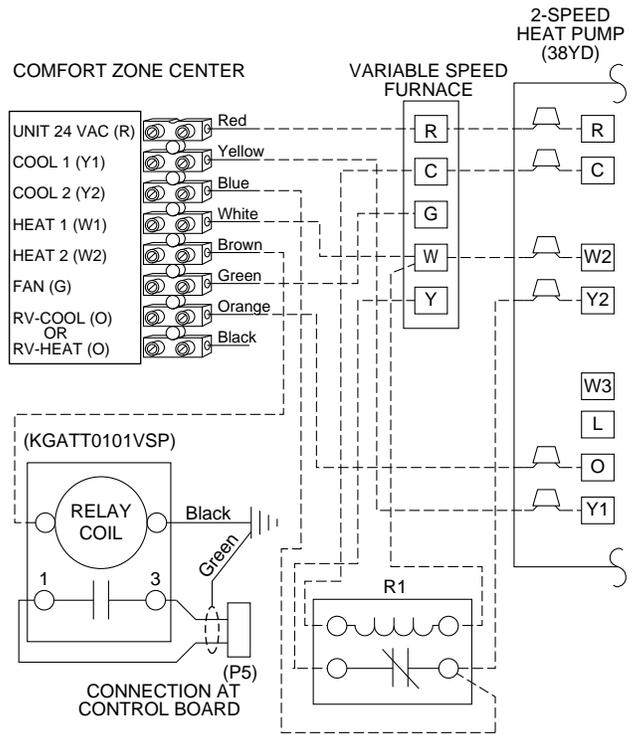


Fig. 23—Typical Wiring Diagram (Furnace with Heat Pump)



R1 = Relay DPST, Pilot Duty,
24-v coil (HN61KK324) or Equivalent.

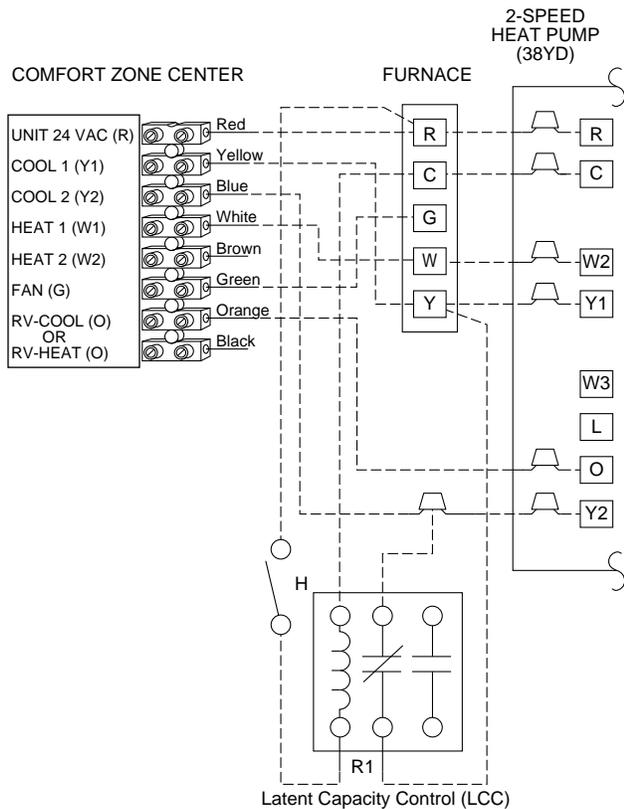
E



R1 = Relay DPST, Pilot Duty,
24-v coil (HN61KK324) or Equivalent.

NOTE: Put set-up Switch
No. 2 at the control
board to the ON
position (up) when using
KGATT0101VSP
Accessory (Optional)

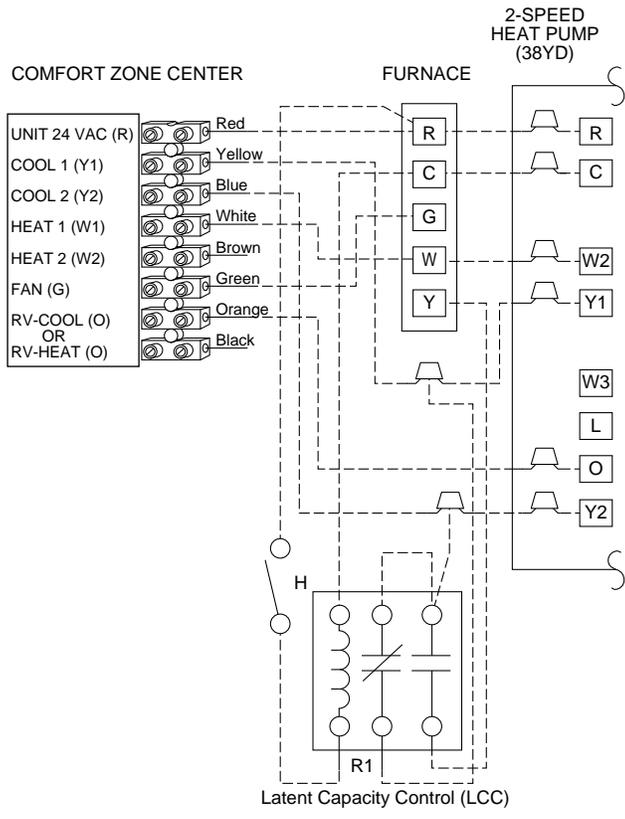
F



R1 = Relay DPST, Pilot Duty,
24-v coil (HN61KK324) or Equivalent.
H = Humidistat, opens on humidity
rise (HL38MG026)

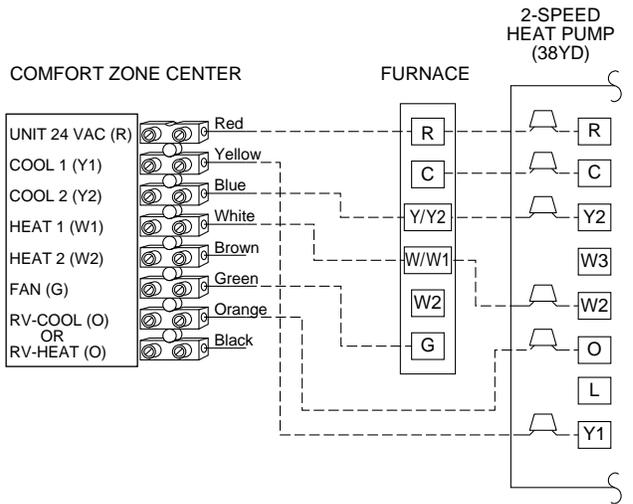
G

Fig. 23—Typical Wiring Diagrams (Furnace with Heat Pump) Continued



R1 = Relay DPST, Pilot Duty, 24-v coil (HN61KK324) or Equivalent.
 H = Humidistat, opens on humidity rise (HL38MG026)

H



NOTE: 38YD – with dual fuel, use the 38YD “Furnace Interface” and “Balance Point” feature on the heat pump control to operate dual fuel option. Configure the 4-Zone controller to act as if it were controlling a single speed heat pump. Turn (T-6) ON. Turn (T-9 & T-26) OFF. Set (S-7) to 0. (Let the 38YD perform the dual fuel optimization).

In addition, lock furnace into “low fire”. This may help prevent over conditioning during the back-up heat (furnace) mode. This will also allow the furnace to stage between low and high fire. Before using this feature read furnace Installation Instructions for two-stage operation. Connect “W2” from the Comfort Zone Center to “W2” on the furnace control board.

See Furnace Installation Instructions For Details Involving Set-Up Switch Configuration and Two-Stage Furnace Operation.

38YDA – with dual fuel, same as above, however in addition if (T-26) is turned “ON”, and stage 2 latch pot is set to zone position, 4 stages of heat are possible.

See Heat Pump Installation Instructions For Details Involving Two-Speed Configuration and Operation.

I

Fig. 23—Typical Wiring Diagrams (Furnace with Heat Pump) Continued

Comfort Zone Configuration Table

TOGGLE	DESCRIPTION	FACTORY DEFAULT	RECORD JOB SETTING
T1	Timeguard Override	OFF	
T2	Celsius Temperature Display	OFF	
T3	2400 Baud Rate	ON	
T4	Error Code Display	ON	
T5	Enable Broadcast	ON	
T6	Heat Pump Operation	OFF	
T7	Outside Air Temp Sensor Attached	OFF	
T8	Comfort Trend Setting	ON	
T9	Auto Fan Off For Heat	OFF	
T10	High/Low Temperature Limits	ON	
T11	Installer Switch Lockout	OFF	
T12	Force Outside Air Ventilation	OFF	
T13	Smart Sensor Attached For Zone 2	OFF	
T14	Smart Sensor Attached For Zone 3	OFF	
T15	Smart Sensor Attached For Zone 4	OFF	
T16	Zone 2 Active	ON	
T17	Zone 3 Active	ON	
T18	Zone 4 Active	ON	
T19	Economizer	OFF	
T20	Alternating Display	OFF	
T21	Outside Air Damper Attached	OFF	
T22	System Mode Reselect	OFF	
T23	System Error Checking	OFF	
T24	50 Hz Operation	OFF	
T25	Ventilation Mode	OFF	
T26	Two-Stage Heat Pump	OFF	
T27	Dx Sensor For LAT Checking	OFF	
T28	Cool Without Fan	OFF	
SETTING			
S-1	4 Zone Controller Bus Address	04	
S-2	Max Cooling Setpoint	85	
S-3	Min Heating Setpoint	65	
S-4	Max Damper Position	15	
S-5	Ventilation Damper Position	00	
S-6	High Temp Trip Limit	105	
S-7	Dual Fuel Setpoint	00	
ROTARY			
09	Base Temp Setpoint Scale		
08	Calibrate Dx Coil Sensor		
07	Calibrate Outside Air Temp Sensor		
06	Calibrate Duct Temperature Sensor		
05	Calibrate Zone 4 Temp Sensor		
04	Calibrate Zone 3 Temp Sensor		
03	Calibrate Zone 2 Temp Sensor		
02	Calibrate Zone 1 Temp Sensor		
01	Damper Service Position		

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.