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ZONING SYSTEM

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Publications

Litho U.S.A.

LZP-4 ZONE CONTROL PANEL

INSTALLATION INSTRUCTIONS FOR ZONE CONTROL PANELS USED WITH LENNOX HEATING AND COOLING EQUIPMENT

Shipping & Packing List

Package 1 of 1 contains the following:

- (1) Model LZP-4 Zone Control Panel
- (1) Model 88K38 Temperature Sensor
- (1) Installation Instructions
- (1) Owners Manual
- (1) Warranty Card

Required Components (ordered separately):

24 VAC Transformer – The size of the transformer needed is determined by the total power requirements for the control panel, thermostats and dampers. The control panel and thermostat together require 10VA. The dampers require 10VA each. The size of the transformer will depend on the greatest number of dampers that could be energized at any given time. **NOTE** – When using power close, spring open dampers, at least one zone's dampers will not be energized during a heating or cooling call.

TABLE 1 – TRANSFORMERS

Part Number	Size	Voltage Description
10P17	40VA	120/208/240V-24V
10P87	50VA	120/208/240V-24V
12P61	75VA	120/208/240V-24V
83P74		4" Square Electrical Box

Thermostats – see selection chart on page 5.
Only 24-volt electronic thermostats with a common connection are to be used with this zoning panel. Do not use mechanical or power robbing thermostats.

Dampers – 2 or 3-wire, 24-volt dampers required.
2-wire, power closed/spring open preferred.

Application

- Up to four zones
- Single or two-stage furnace
- Single or two-stage air conditioner
- Single or two stage-heat pump with one stage of electric auxiliary heat; separate emergency heat output available
- Single or two stage-heat pump with single-stage fossil fuel auxiliary heat (dual fuel system)

Features

- Adjustable high and low discharge air temperature limits
- Vacation (central) mode setting
- Staging control by number of zones calling
- Staging control by time or thermostat input
- Auxiliary heat control by time or thermostat input
- Standard single-stage heat/cool thermostats or heat pump thermostats can be used to control heat pumps or multi-stage equipment
- Dual fuel system compatible
- ON/OFF duct air purge control
- Visible LED outputs
- Time Delay Override
- Zone1 or Any Zone mode control
- 2 or 3-wire damper compatibility

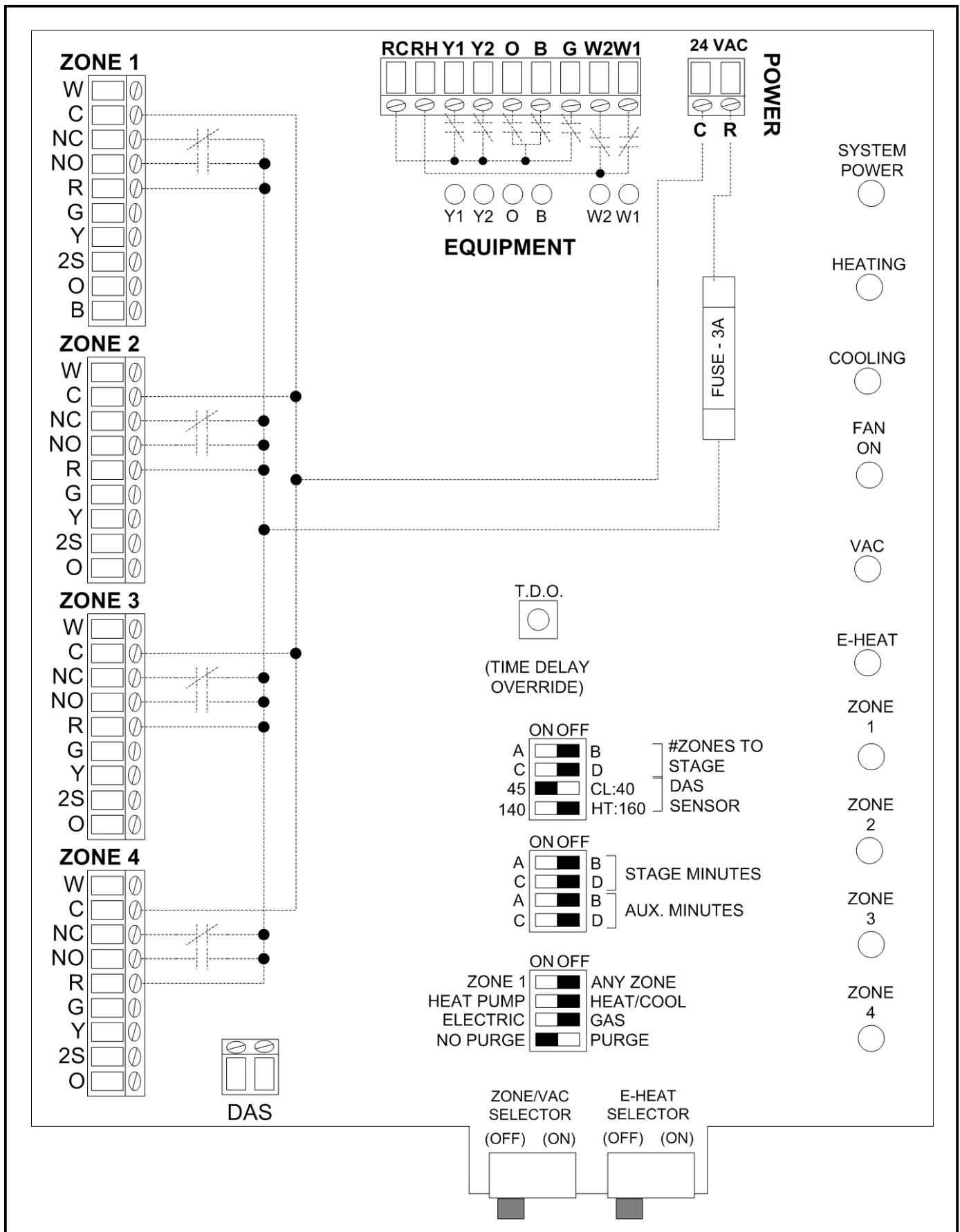
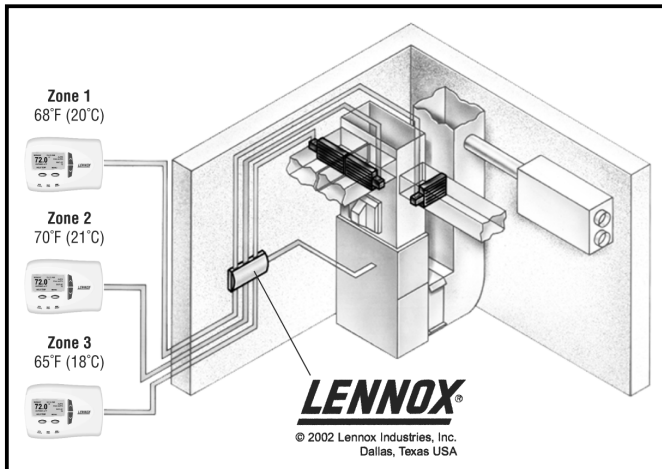


FIGURE 1 – LZP-4 CONTROL PANEL SCHEMATIC

Installation



The above illustration shows a system where three of the four zones are used.

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

- Install the control panel indoors only. If the Vacation and/or Emergency Heat switches on the control panel will be used by the owner, mount in a location that is readily accessible to the owner.
- Install the control panel in a non-condensing environment.
- Do not install the control panel in a room where it will be exposed to elevated humidity levels such as a laundry room.
- Do not install the control panel directly to foundation walls, HVAC equipment or ductwork, where moisture may condense on the enclosure.
- Do not install the control panel in a location where the temperature will exceed 140°F or will drop below 32°F.

1. Press in the cover latch on the top of the enclosure and pull open the cover (see **Figure 2**).
2. There are six (6) keyholes on the base of the enclosure. Use the four that are visible with the circuit board in place.

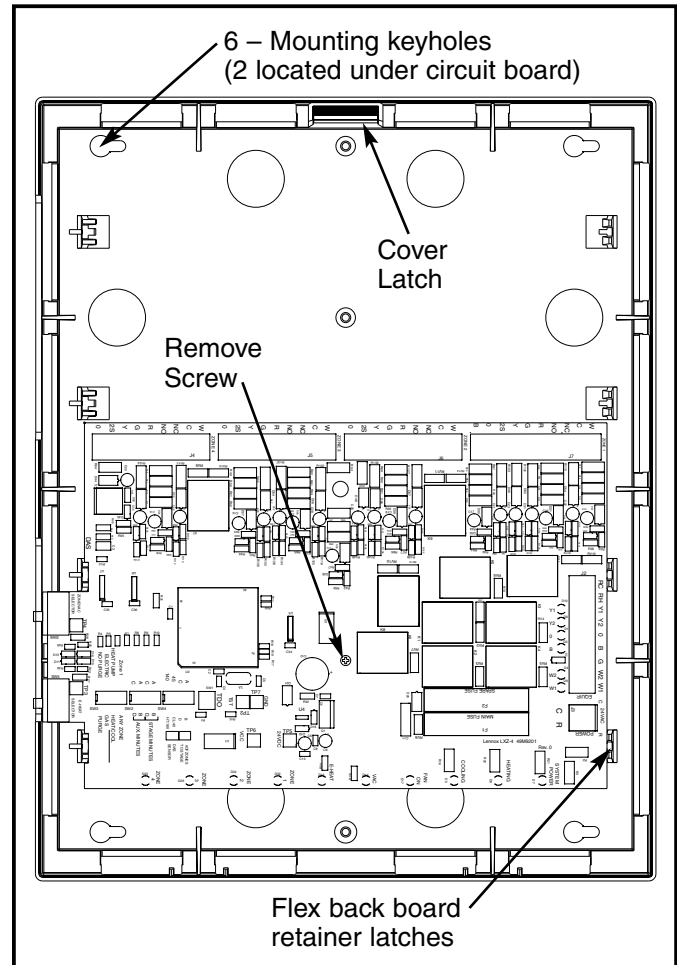


FIGURE 2 – ENCLOSURE BASE WITH CIRCUIT BOARD

3. Use #8 screws (field supplied) to install the base.
 - a. If space limits the use of the outside keyholes, the circuit board must be removed from the base to use the two center keyholes.

⚠ CAUTION

Electrostatic discharge can damage the control. Touch a grounded metal object before touching the circuit board, and then only touch the circuit board on the edges when handling.

- a. Carefully remove the screws securing the circuit board to the base.
- c. Flex back the latches holding the circuit board to release.
- d. Re-install the circuit board after installing the base.

Installation (continued)

4. Install and Wire the Discharge Air Temperature Sensor

⚠ CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

⚠ CAUTION

Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch.

The tip of the sensor must be located in a region of fully mixed supply of air before the take-offs (not in a dead air space) in order for the system to work correctly.

- Wire discharge air temperature probe to control center using thermostat wire. Note that the temperature sensor is not polarity sensitive.
- Be sure that the tip of the sensor is located at least 15 inches from the top of the indoor coil if using a furnace, or at least 15 inches from the top of the electric heat section if using a coil blower. Mount the sensor in the discharge plenum, $1/3$ of the depth ($D/3$) of the plenum (D) from the front (the front is the side with the furnace or CB access doors), and centered side to side. Move the adjustable bracket along the length of the discharge air sensor to achieve proper sensor tip location (tip of sensor to be located at $W \div 2$). The sensor can be mounted from any side of the plenum, as long as the tip of the sensor is in the correct position. See **Figure 3**.

IMPORTANT: The discharge air sensor is required. If a short or open circuit is detected between the Discharge Air Sensor terminals, the control panel will only respond to Zone 1 and the dampers will stay in their normal position.

- Install the system transformer – DO NOT USE the HVAC equipment transformer to power the control panel. Refer to the instructions provided with the transformer.

18 AWG thermostat wire minimum recommended.

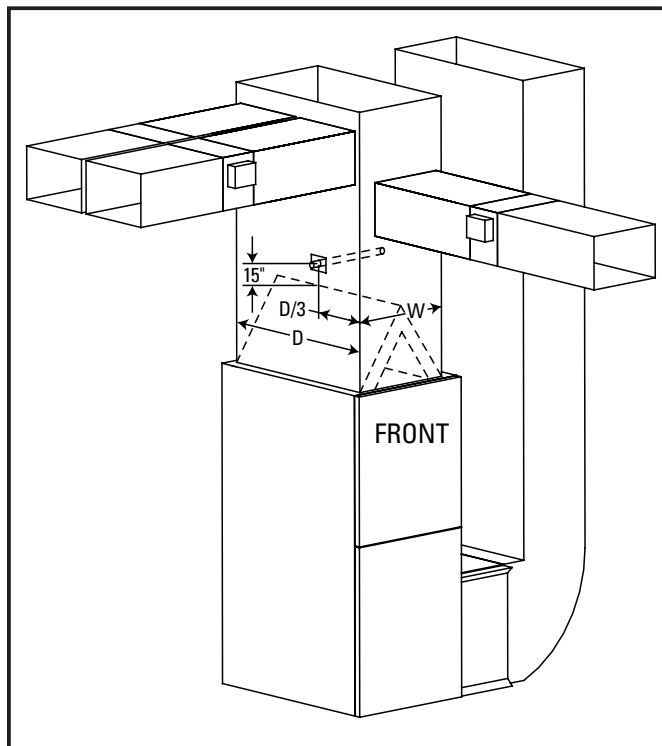


FIGURE 3 – DISCHARGE AIR SENSOR LOCATION

Sizing the Transformer:

The system requires approximately 10 VA for the control panel and thermostats and 10 VA for each damper. The size of the transformer will depend on the greatest number of dampers that could be energized at any given time (at least one zone's dampers will not be energized during a heating or cooling call when using power close, spring open dampers). The size of the transformer must not exceed 75VA. If the value is greater than 75VA, some dampers will need to be powered by a separate transformer – refer to Field Wiring Damper **Diagram 2** on page 10.

For instance, if you have 3 dampers, then you would require 10VA for the system, 20VA ($10\text{VA} \times 2$) for the dampers for a total of 30VA, so catalog number 10P17 would be an adequate transformer size at 40VA.

TABLE 1 – TRANSFORMERS

Part Number	Size	Voltage Description
10P17	40VA	120/208/240V-24V
10P87	50VA	120/208/240V-24V
12P61	75VA	120/208/240V-24V
83P74		4" Square Electrical Box

The transformers listed in this chart include a plate mount for a 4" square electrical box.

Installation (continued)

6. Install the thermostats. Refer to the instructions provided with the thermostat.
18 AWG thermostat wire minimum recommended.

Thermostat Selection Guide

The position of the HEAT PUMP / HEAT/COOL switch, the ZONE 1 / ANY ZONE switch and the AUX. MINUTES switch (see **DIP Switch Settings** section) will determine the thermostat requirements for each zone. Any 24-volt electronic thermostat with a "C" (24VAC common) connection can be used. Do not use mechanical or power robbing thermostats. Power robbing thermostats can cause unintended operation – DO NOT use power robbing thermostats. Use **Table 2** to determine which thermostat is required:

TABLE 2 – THERMOSTAT REQUIREMENTS

CONTROL PANEL SET-UP DIP SWITCH POSITIONS	ZONE 1			ZONES 2-4		
	Type	Terminals (see Tables 2a & 2b)	Recommended Thermostats (see Table 2c)	Type	Terminals (see Tables 2a & 2b)	Recommended Thermostats (see Table 2c)
Any Zone, Heat Cool	HEAT/COOL	R, C, W, Y, G	1, 2	HEAT/COOL	R, C, W, Y, G	1, 2
		Optional: W2 and Y2	3, 4, 7		Optional: W2 and Y2	3, 4, 7
Zone 1, Heat Cool	HEAT/COOL	R, C, W, Y, G, O, B	1, 2	HEAT/COOL	R, C, W, Y, G	1, 2
		Optional: W2 and Y2	3, 4, 7		Optional: W2 and Y2	3, 4, 7
Any Zone, Heat Pump, Aux Heat Timer > 0	HEAT/COOL	R, C, W, Y, G	1, 2	HEAT/COOL	R, C, W, Y, G	1, 2
		Optional: W2 and Y2	3, 4, 7		Optional: W2 and Y2	3, 4, 7
Zone 1, Heat Pump	HEAT/COOL	R, C, W, Y, G, O, B	1, 2	HEAT/COOL	R, C, W, Y, G	1, 2
		Optional: W2 and Y2	3, 4, 7		Optional: W2 and Y2	3, 4, 7
Any Zone, Heat Pump, Electric, Aux Heat Timer = 0	HEAT PUMP	R, C, W1, Y1, G, O	8	HEAT PUMP	R, C, W1, Y1, G, O	8
		Optional: Y2	5, 6		Optional: Y2	5, 6
Any Zone, Heat Pump, Gas, Aux Heat Timer = 0	HEAT PUMP	R, C, W1, Y1, G, O	5, 6	HEAT PUMP	R, C, W1, Y1, G, O	5, 6
		Optional: Y2	5, 6		Optional: Y2	5, 6

Installation (continued)

TABLE 2a – HEAT/COOL TERMINAL DEFINITIONS

Thermostat Terminal	Function
R	24 VAC Hot
C	24 VAC Common
W	1st Stage Heat
W2	2nd Stage Heat
Y	1st Stage Cool
Y2	2nd Stage Cool
G	Fan
O	Cooling Mode
B	Heating Mode

Tables 3-5 on the following pages detail how the zone panel will respond to specific thermostat input terminals being energized when set up in different DIP switch configurations. Refer to the setup flowchart to determine which DIP switch settings to use with your system.

TABLE 2b – HEAT PUMP TERMINAL DEFINITIONS

Thermostat Terminal	Function
R	24 VAC Hot
C	24 VAC Common
Y1	1st Stage Compressor
Y2	2nd Stage Compressor
W1	Auxiliary Heat
G	Fan
O	Reversing Valve – Cool
B	Reversing Valve – Heat

TABLE 2c – RECOMMENDED THERMOSTATS

1	SignatureStat 1H/1C Non-Heat Pump (51M26) ¹
2	Elite 1H/1C Non-Heat Pump (49M55)
3	SignatureStat 2H/2C Non-Heat Pump (51M27) ¹
4	Elite 2H/2C Non-Heat Pump (49M56)
5	SignatureStat 2H/2C Heat Pump (51M28) ¹
6	Elite 2H/2C Heat Pump (49M57)
7	T8624D2079 2H/2C Non-Heat Pump (37L61)
8	T8611G2101 2H/1C Heat Pump (37L60)

¹ When using the SignatureStat, only the basic modes of dehumidification and humidification can be used.

TABLE 3 – CONDENSING UNIT AND FURNACE SETUP OPTIONS

Setup'	Stat Type	Input/ output	First Stage Cool	Second Stage Cool	First Stage Gas or Electric Furnace	Second Stage Gas or Electric Furnace	First Stage Compressor Heat	Second Stage Compressor Heat	Auxiliary Heat	Emergency Heat
Heat/Cool Gas Any Zone	Heat/Cool	Panel Input	Y+G	Y+2S+G or by Stage Timer	W	W+2S or by Stage Timer	–	–	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	W1+B	W1+W2+B	–	–	–	–
Heat/Cool Gas Zone 1	Heat/Cool	Panel Input	Y+O+G	Y+2S+O+G or by Stage Timer	W+B	W+B+2S or by Stage Timer	–	–	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	W1+B	W1+W2+B	–	–	–	–
Heat/Cool Electric Any Zone	Heat/Cool	Panel Input	Y+G	Y+2S+G or by Stage Timer	W	W+2S or by Stage Timer	–	–	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	W1+B+G	W1+W2+B+G	–	–	–	–
Heat/Cool Electric Zone 1	Heat/Cool	Panel Input	Y+O+G	Y+2S+O+G or by Stage Timer	W+B	W+B+2S or by Stage Timer	–	–	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	W1+B+G	W1+W2+B+G	–	–	–	–

TABLE 4 – HEAT PUMP WITH ELECTRIC HEAT SETUP OPTIONS

Setup'	Stat Type	Input/ output	First Stage Cool	Second Stage Cool	First Stage Electric Furnace	Second Stage Electric Furnace	First Stage Compressor Heat	Second Stage Compressor Heat	Auxiliary Heat	Emergency Heat
Heat Pump Electric Aux Min = 0 Any Zone	Heat Pump	Panel Input	Y+O+G	Y+2S+O+G or by Stage Timer	–	–	Y+G	Y+2S+G or by Stage Timer	Y+W+G (+2S if applicable)	W or by Emergency Switch
		Panel Output	Y1+O+G	Y1+Y2+O+G	–	–	Y1+B+G	Y1+Y2+B+G	Y1+W1+B+G (+Y2 if applicable)	W1+W2+B+G
Heat Pump Electric Aux Min = 0 Zone 1	Heat/Cool	Panel Input	Y+O+G	Y+2S+O+G or by Stage Timer	–	–	W+B	W+B+2S or by Stage Timer	–	By Emergency Switch Only
		Panel Output	Y1+O+G	Y1+Y2+O+G	–	–	Y1+B+G	Y1+Y2+B+G	–	W1+W2+B+G
Heat Pump Electric Aux Min > 0 Any Zone	Heat/Cool	Panel Input	Y+G	Y+2S+G or by Stage Timer	–	–	W	W+2S or by Stage Timer	By Aux Timer Only	By Emergency Switch Only
		Panel Output	Y1+O+G	Y1+Y2+O+G	–	–	Y1+B+G	Y1+Y2+B+G	Y1+W1+B+G (+Y2 if applicable)	W1+W2+B+G
Heat Pump Electric Aux Min > 0 Zone 1	Heat/Cool	Panel Input	Y+O+G	Y+2S+O+G or by Stage Timer	–	–	W+B	W+2S+B or by Stage Timer	By Aux Timer Only	By Emergency Switch Only
		Panel Output	Y1+O+G	Y1+Y2+O+G	–	–	Y1+B+G	Y1+Y2+B+G	Y1+W1+B+G (+Y2 if applicable)	W1+W2+B+G

TABLE 5 – HEAT PUMP WITH GAS FURNACE SETUP OPTIONS

Setup ¹	Stat Type	Input/output	First Stage Cool	Second Stage Cool	First Stage Gas Furnace	Second Stage Gas Furnace	First Stage Compressor Heat	Second Stage Compressor Heat	Auxiliary Heat	Emergency Heat
Heat Pump Gas Aux Min = 0 Any Zone	Heat Pump	Panel Input	Y+O+G	Y+2S+O+G or by Stage Timer	Y+W+G (+2S if applicable)	W or by Emergency Switch	Y+G	Y+2S+G or by Stage Timer	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	W1+B	W1+W2+B	Y1+B+G	Y1+Y2+B+G	–	–
Heat Pump Gas Aux Min = 0 Zone 1	Heat/Cool	Panel Input	Y+O+G	Y+2S+O+G or by Stage Timer	–	By Emergency Switch Only	W+B	W+B+2S or by Stage Timer	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	–	W1+W2+B	Y1+B+G	Y1+Y2+B+G	–	–
Heat Pump Gas Aux Min > 0 Any Zone	Heat/Cool	Panel Input	Y+G	Y+2S+G or by Stage Timer	By Aux Timer Only	By Emergency Switch Only	W	W+2S or by Stage Timer	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	W1+B	W1+W2+B	Y1+B+G	Y1+Y2+B+G	–	–
Heat Pump Gas Aux Min > 0 Zone 1	Heat/Cool	Panel Input	Y1+O+G	Y+2S+O+G or by Stage Timer	By Aux Timer Only	By Emergency Switch Only	W+B	W+B+2S or by Stage Timer	–	–
		Panel Output	Y1+O+G	Y1+Y2+O+G	W1+B	W1+W2+B	Y1+B+G	Y1+Y2+B+G	–	–

¹These charts apply when the # of Zones to Stage DIP switch is set to 1. If the Zone to Stage switch is set to greater than 1, the second stage conditioning will only be brought on if the number of zones calling for the same conditioning call is greater than or equal to the DIP switch setting.

Installation (continued)

7. Install the dampers. Power close, spring open dampers are preferred. Refer to the instructions provided with the damper.

18 AWG thermostat wire minimum recommended.

8. Re-install the cover on the base.

Bypass Damper Sizing

When fewer than the maximum number of zones are calling for heating or cooling, an excess volume of air is delivered, and because of the excess air, an excess amount of static pressure is produced as well. Zone systems often require a bypass duct to relieve this pressure. A properly sized barometric bypass damper must be installed in the bypass duct which is run between the supply and return air duct systems (see **Figure 4**). The barometric damper and the bypass duct must be sized to accommodate the excess static pressure from the supply duct.

The bypass tap in the return air duct must be at least 6 ft. from the furnace /air handler to ensure that the hot or cold air coming off of the plenum has time to mix with the return air before it passes through the air handler again. The provided discharge air sensor (field installed) protects the equipment from overheating or coil freeze-up by interrupting the HVAC equipment.

The bypass damper and duct should be sized to handle the excess pressure created when the smallest zone is operating alone (worst case). To size the bypass damper, subtract the total air volume capacity of the smallest zone from the total air volume of the system.

Example:

Total System air volume: 2000 cfm

Air volume of smallest zone: 600 cfm

Bypass requirement: $2000 - 600 = 1400$ cfm

In this example, the bypass duct should be sized to handle the 1400 cfm excess pressure created when only the smallest zone has a demand. For bypass damper air volume capacities, see **Table 6**.

TABLE 6	
Round	Rectangular
8 in. dia. – 400 cfm	12 x 8 – 1000 cfm
10 in. dia. – 750 cfm	12 x 10 – 1200 cfm
12 in. dia. – 1200 cfm	12 x 12 – 1400 cfm
14 in. dia. – 1800 cfm	20 x 8 – 1600 cfm
16 in. dia. – 2400 cfm	20 x 10 – 2000 cfm
	20 x 12 – 3000 cfm

Refer to the parts and supplies catalog for information on available barometric bypass dampers.

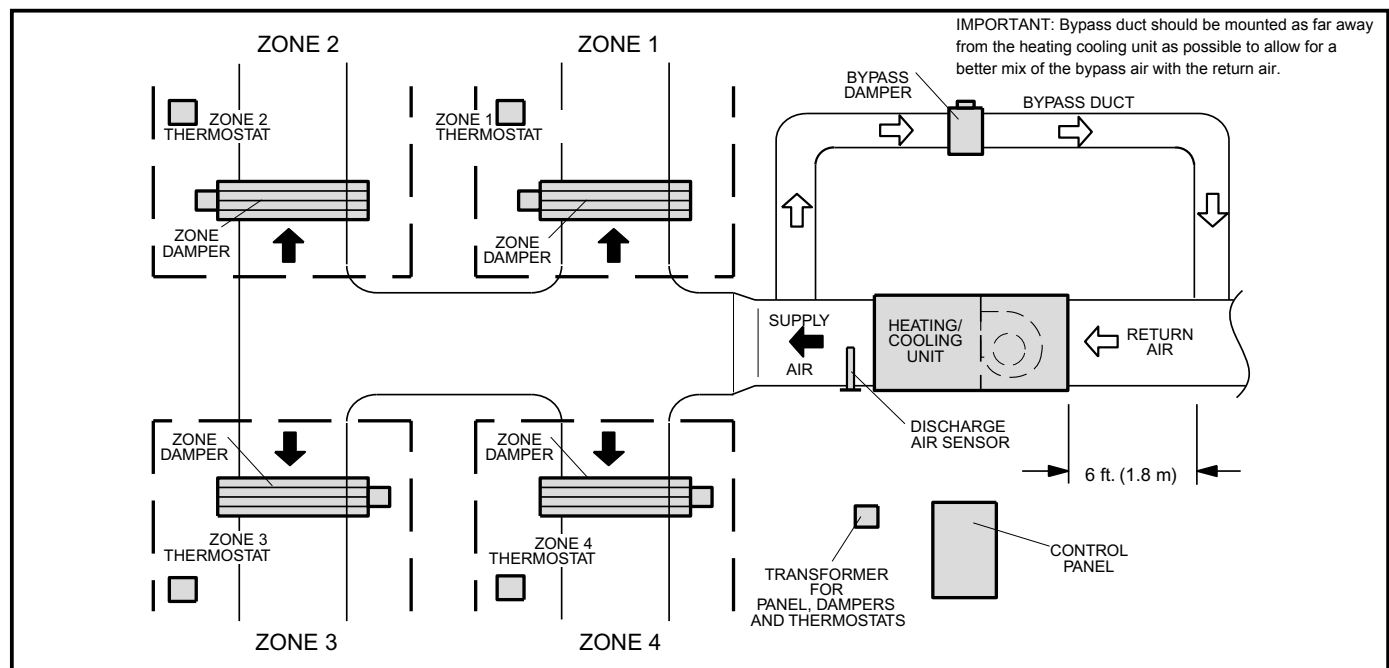
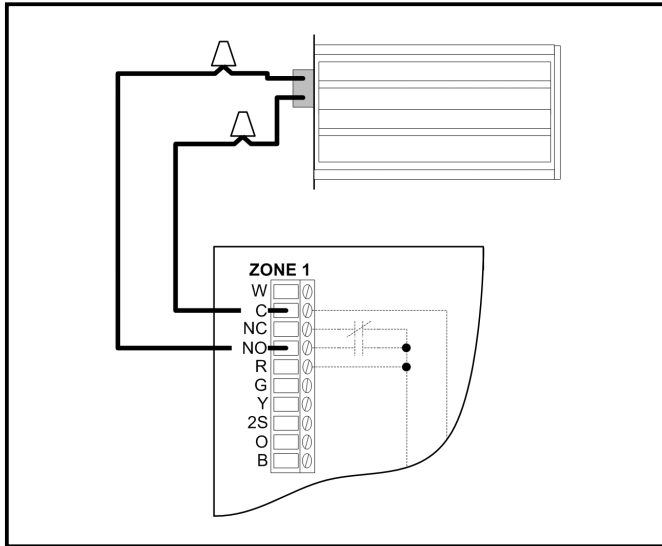
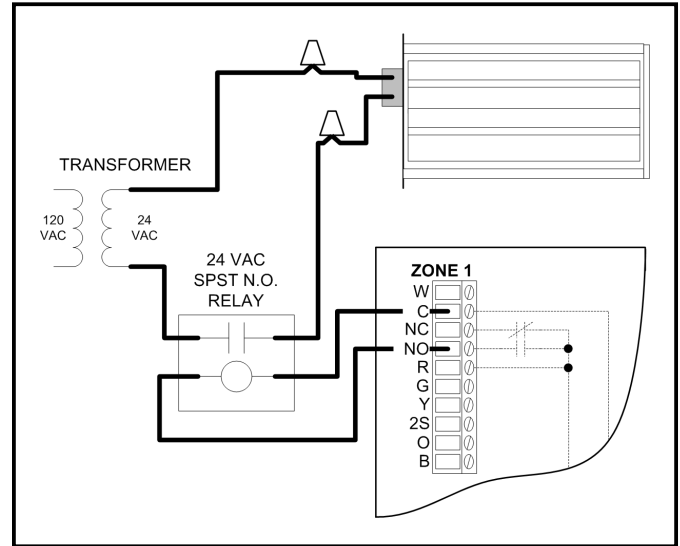


FIGURE 4 – BYPASS DAMPER INSTALLATION

Field Wiring – Dampers



**DIAGRAM 1 – POWER CLOSE/SPRING OPEN
DAMPER WIRING**



**DIAGRAM 2 – DAMPER WIRING WITH
SEPARATE TRANSFORMER**

Field Wiring – Thermostats

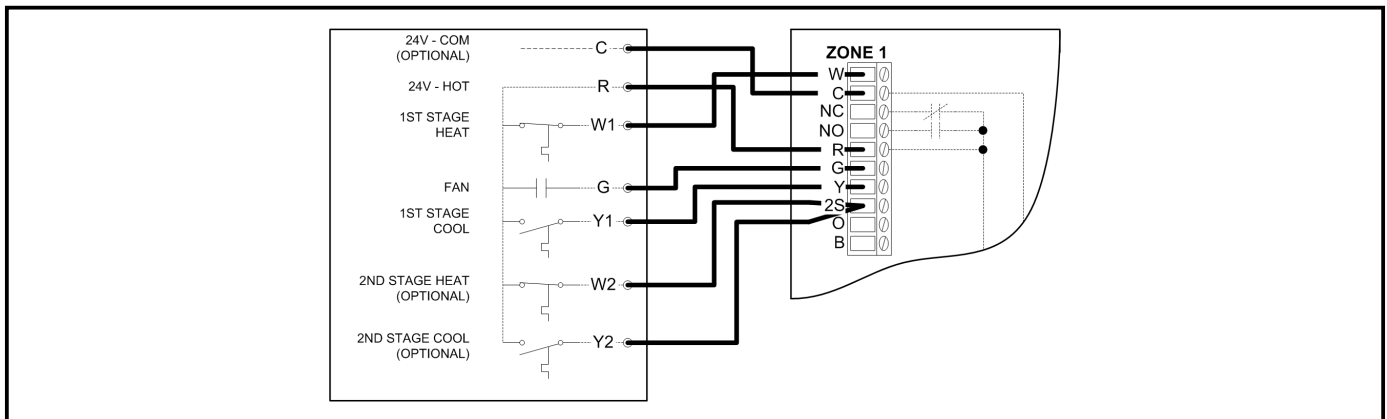


DIAGRAM 3 – HEAT/COOL THERMOSTAT WITHOUT O AND B TERMINALS

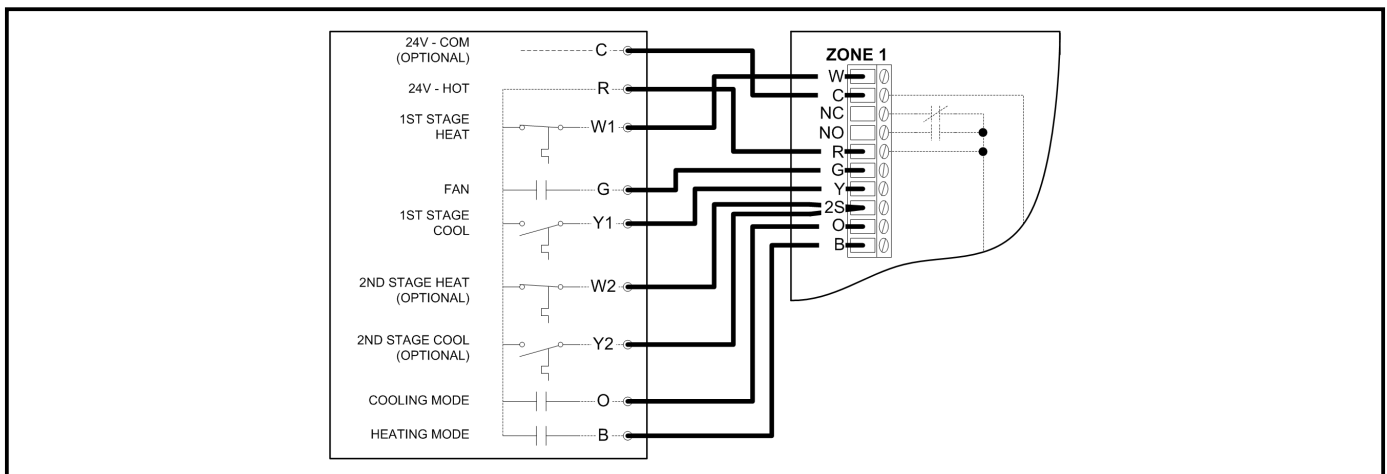


DIAGRAM 4 – HEAT/COOL THERMOSTAT WITH O AND B TERMINALS

Field Wiring – Thermostats (continued)

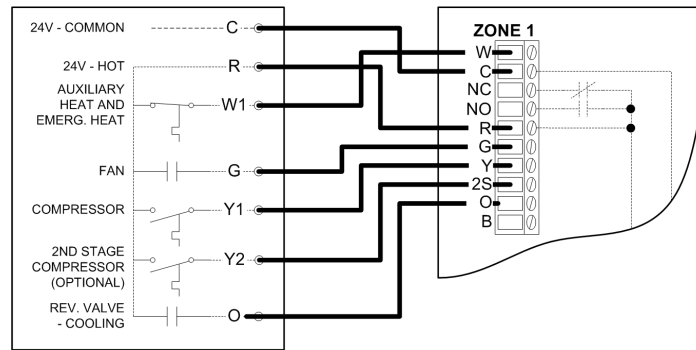


DIAGRAM 5 – HEAT PUMP THERMOSTAT

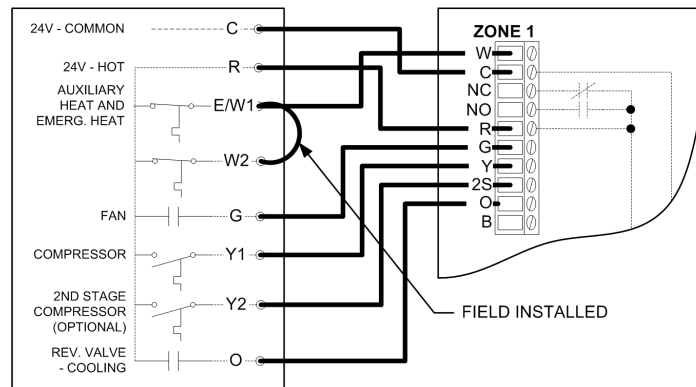


DIAGRAM 6 – HEAT PUMP THERMOSTAT SignatureStat (51M28) AND ELITE (49M57)

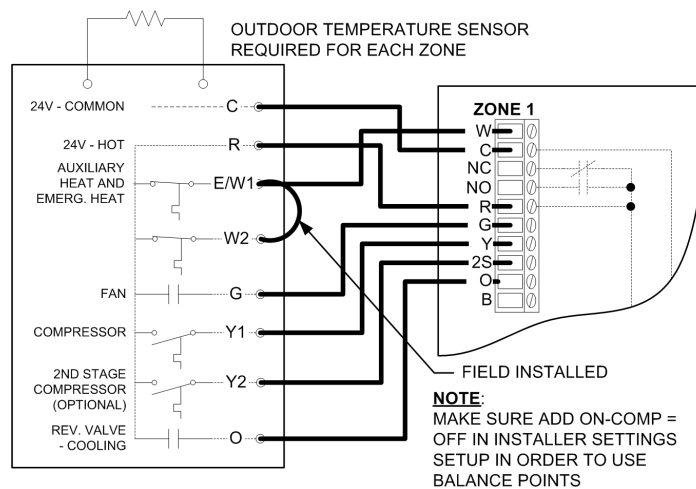


DIAGRAM 7 – HEAT PUMP THERMOSTAT SignatureStat (51M28) AND ELITE (49M57) DUAL FUEL

Field Wiring – HVAC Equipment: Furnace and Air Conditioner

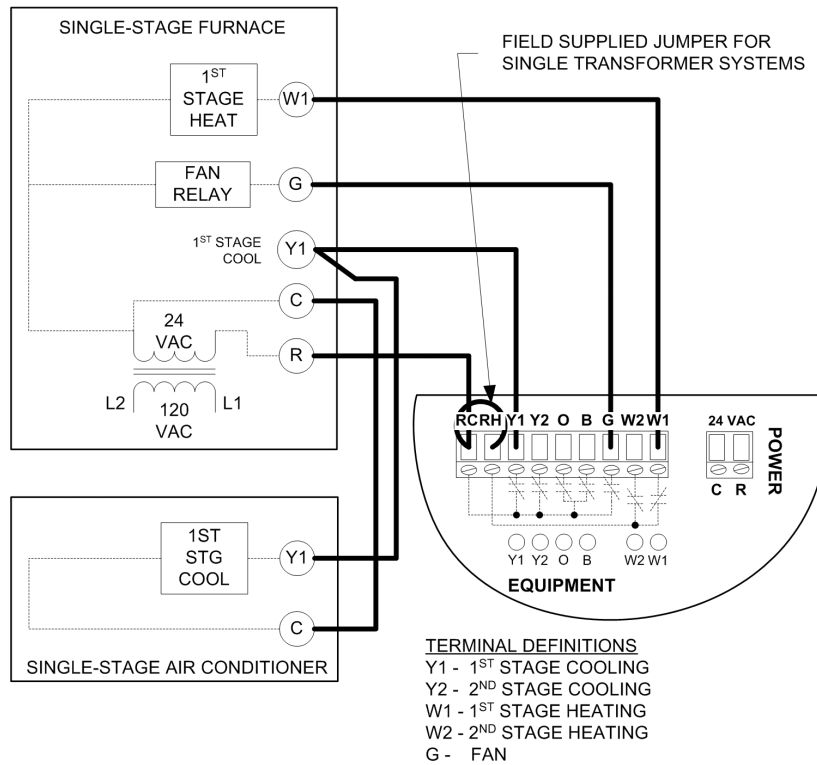


DIAGRAM 8 – SINGLE STAGE FURNACE AND AIR CONDITIONER

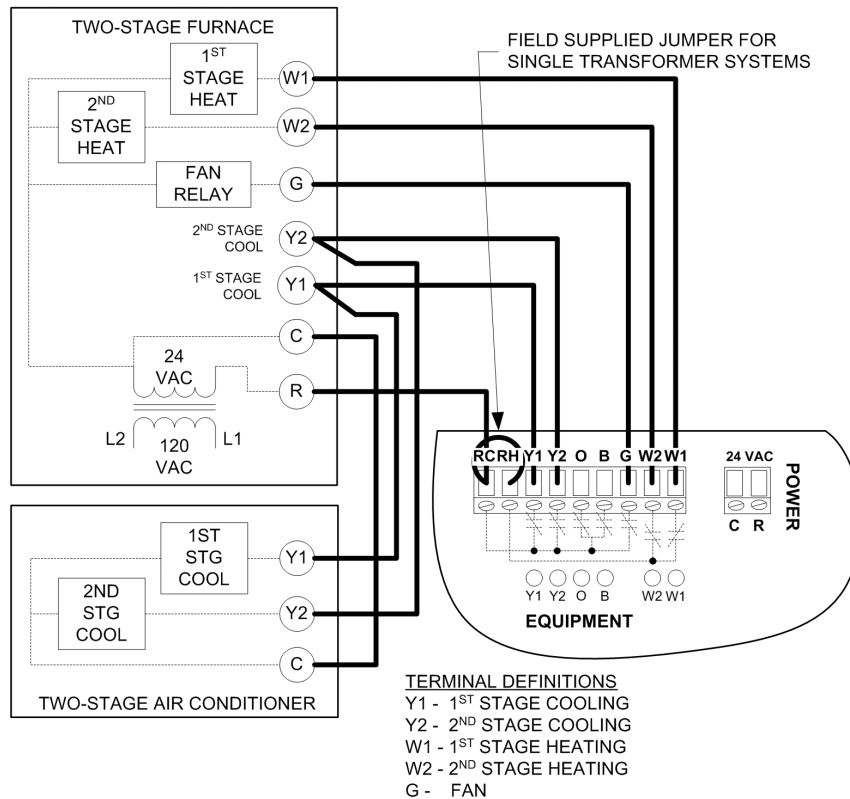


DIAGRAM 9 – TWO-STAGE FURNACE AND TWO-STAGE AIR CONDITIONER

Field Wiring – HVAC Equipment: Heat Pumps

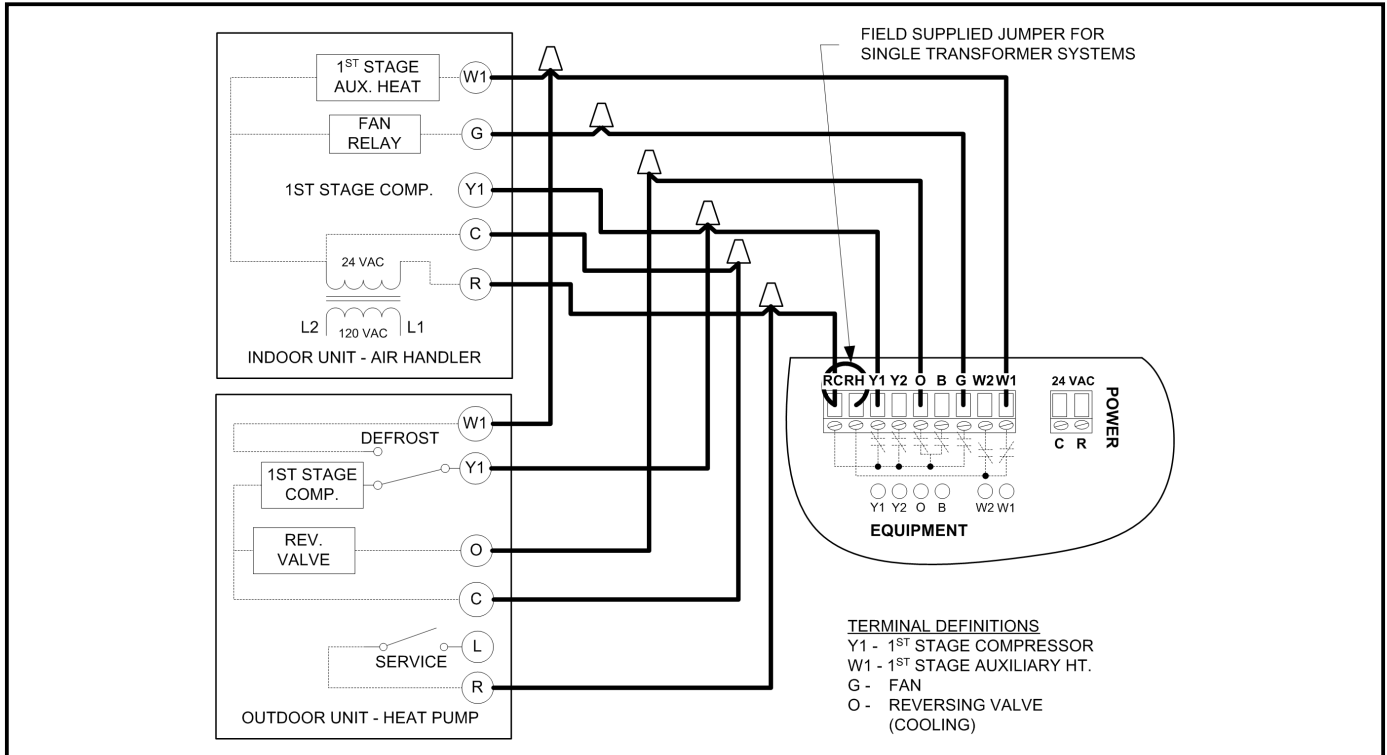


DIAGRAM 10 – SINGLE STAGE HEAT PUMP

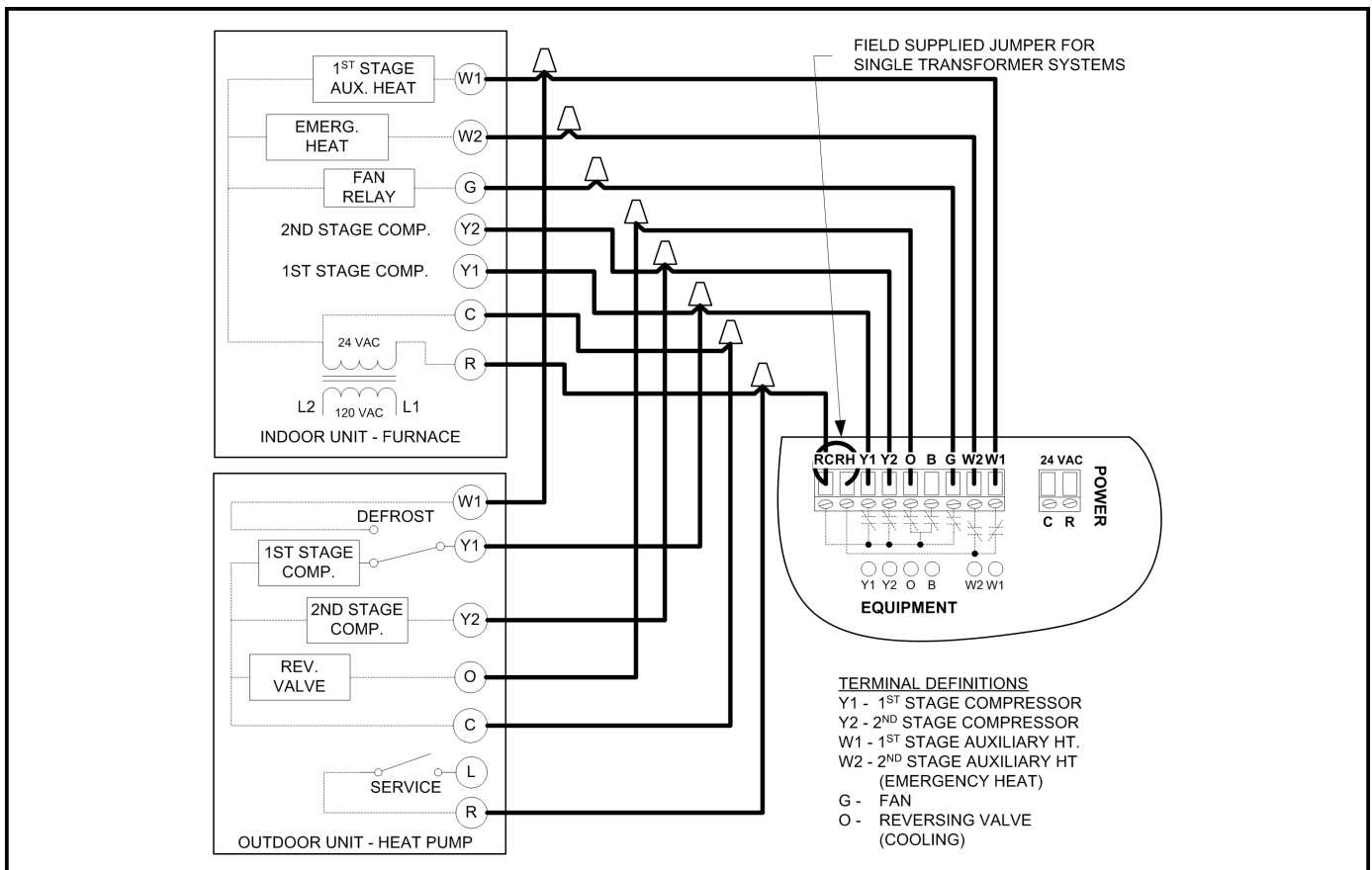


DIAGRAM 11 – TWO-STAGE HEAT PUMP

Field Wiring – HVAC Equipment: Heat Pumps (continued)

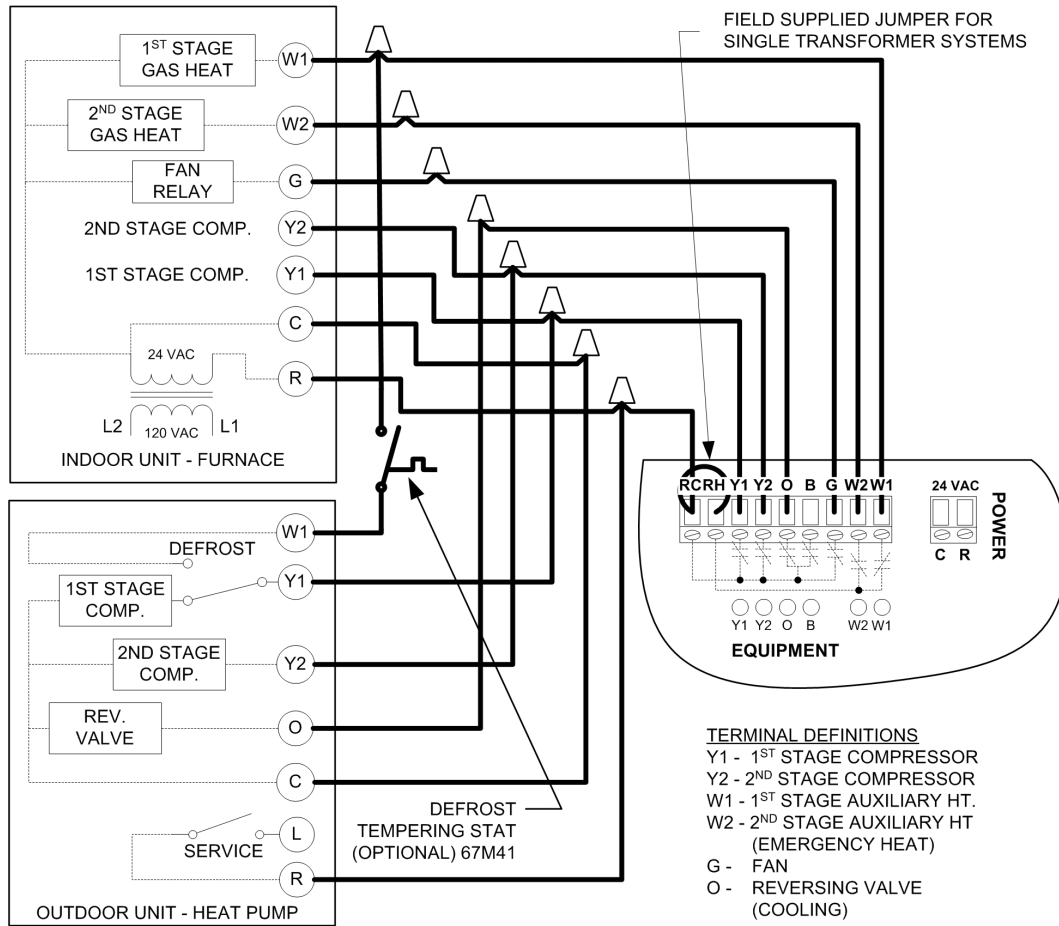
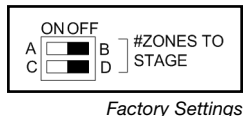


DIAGRAM 12 – TWO-STAGE HEAT PUMP WITH DUAL FUEL

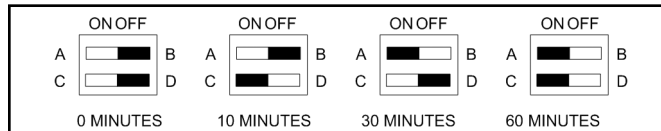
Dip Switch Settings

ZONES TO STAGE: If staging thermostats are not installed with the system, second stage (does not apply to auxiliary heat on heat pump applications) operation can be initiated when more than one zone is calling for conditioning. Four selections are available: one, two, three and four zones. Set to one, thermostat inputs or timed length of call control staging, for all other settings only the specified number of calling zones can trigger staging.

SWITCHES ARE SHOWN AS BLACK.

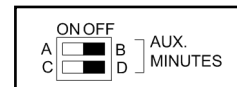


Factory Settings



AUX. MINUTES: With the control panel configured for ZONE 1 operation, auxiliary heat can only be controlled by time. Configured

for ANY ZONE operation, auxiliary heat can be controlled by time or by individual thermostats. For thermostat control of auxiliary heat, set all AUX. MINUTES switches to the OFF position and refer to the sequence of operation sections on the following pages for details. For timed control, set the AUX. MINUTES switches to the amount of time the first and second stage (where applicable) compressors are allowed to try and satisfy a call for heating before auxiliary heat will be activated. There are four selections available: 0, 10, 30 and 60 minutes. Set to zero, auxiliary heat can be controlled by the thermostat only. **SWITCHES ARE SHOWN AS BLACK.**



Factory Settings



DAS SENSOR CL-45/40: This switch controls the temperature at which the cooling equipment will cut out to prevent freezing the indoor coil. For a low limit temperature of 45°F, leave the switch in the ON position (45). For a low limit temperature of 40°F, move the switch to the OFF position (CL-40).



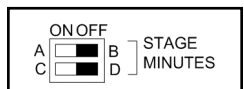
Factory Settings

The panel factory default is 45. Do not set this limit to 40 unless equipment issues develop requiring a lower temperature.

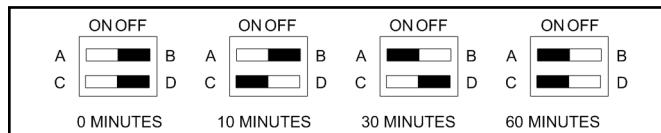
DAS SENSOR HT-140/160: This switch controls the temperature at which the heating equipment will cut out to prevent overheating. Set the high limit temperature that is appropriate for the equipment being used. The factory default is 160, use this option for gas heat. When using heat pumps and electric heat, set this switch to 140. For a high limit temperature of 140°F, move the switch to the ON position (140). For a high limit temperature of 160°F, leave the switch in the OFF position (HT-160).

IMPORTANT: The discharge air temperature sensor is required. If a short or open circuit is detected between the Discharge Air Sensor (DAS) terminals, the control panel will only respond to Zone 1 and the dampers will not close.

STAGE MINUTES: If staging thermostats are not installed and the # Zones to Stage is set to 1, staging can be controlled by the amount of time that any one zone must be calling for conditioning before initiating a second stage of heating or cooling (heat/cool systems) or second stage compressor (heat pump systems). Four selections are available: 0, 10, 30 and 60 minutes. Set to zero, thermostat inputs or “# of Zones Calling” control staging. **SWITCHES ARE SHOWN AS BLACK.**

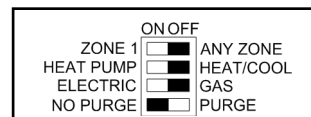


Factory Settings



ZONE 1/ANY ZONE: This switch determines how the control panel will control the mode of operation. In the ZONE 1 configuration, Zone

1 sets the mode of operation through the use of the O and B thermostat inputs. When the Zone 1 O terminal is energized, the system is in the cool mode and only cool calls will be satisfied. When the Zone 1 B terminal is energized, the system is in heat mode and only heat calls will be satisfied. If neither the Zone 1 O nor B terminal is energized, the system will not respond to cool or heat calls, but fan operation is unaffected. This configuration offers restricted control and is likely to be used in applications where mode control from Zone 1 is desired. In the ANY ZONE configuration, the control panel responds to each individual thermostat equally. One zone can call for cooling and another zone can call for heat. The system will respond to both needs, although it can not heat and cool at the same time. This offers control flexibility and is likely to be used in applications where the heating and cooling needs of the zones are completely independent. TALK WITH THE CUSTOMER TO DETERMINE WHICH CONTROL CONFIGURATION SHOULD BE USED. Refer to the **Sequence of Operation** section on the following pages for additional details.



Factory Settings

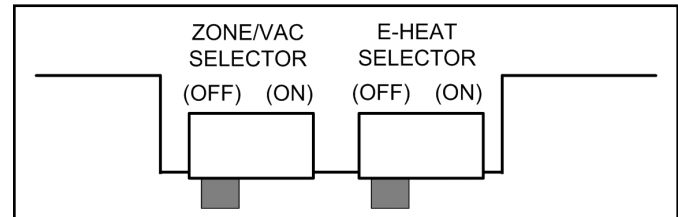
Dip Switch Settings (continued)

HEAT PUMP or HEAT/COOL: Sets the control for the heating and cooling system equipment. If a heat pump is to be used, set the switch to the ON position. When different equipment is used for heating and cooling (i.e. furnace and air conditioner), set the switch to the OFF position.

ELECTRIC/GAS: If electric heat is to be used, set the switch to the ON position. This will turn on the fan (G output terminal) with a heat call (W1 output terminal). If the switch is left in the OFF position, it is assumed that the heating equipment will control the fan operation. For Dual Fuel Heat Pump systems, leave this switch in the GAS position.

NO PURGE/PURGE: If the NO PURGE/PURGE switch is set to PURGE, the G terminal will remain energized for a one minute purge delay following the completion of a compressor call. If the NO PURGE/PURGE switch is set to NO PURGE, the G terminal will de-energize immediately following the completion of a compressor call. The NO PURGE setting is designed for use with systems where the furnace or air handler has a built in fan purge. The following chart details the zone panel fan output and damper hold times when a heating or cooling call is satisfied:

ZONE/VAC (VACATION) SELECTOR: This switch allows the homeowner to switch from normal operation (ZONE) to a VACATION mode. In VACATION mode (switch in the ON position), Zone 1 becomes the only zone from which a call for heating or cooling is recognized. Additionally, when in Vacation mode, damper outputs do not change – they remain in the open position. The Vacation LED will illuminate when the switch is in the VACATION position.



E-HEAT SELECTOR: This feature can only be used with heat pump systems. When the EMERGENCY HEAT switch is in the ON position, any call for heat will be answered with auxiliary heat equipment outputs (W1 and W2). This feature enables the homeowner to activate the Emergency Heat mode when heat/cool thermostats are installed in all zones.

Dip Switch Settings	Mode	Purge		No Purge	
		Output	Damper Hold Time	Output	Damper Hold Time
Heat/Cool, Gas	Cooling	G ¹	1 minute	No G,	3-1/2 minutes
	Heating	No G	1 minute	No G,	3-1/2 minutes
Heat Pump, Gas	Compressor Cool or Heat	G ¹	1 minute	No G,	3-1/2 minutes
	Auxiliary Heat	No G	1 minute	No G,	3-1/2 minutes
Heat Pump or Heat/Cool, Elect.	Cooling	G ¹	1 minute	No G,	3-1/2 minutes
	Heating	G ¹	1 minute	No G,	3-1/2 minutes

¹The G terminal will remain energized for 1 minute.

LEDs

POWER – Blinks during normal operation. Starts to blink approximately 6 seconds after power up.

HEAT – Lights when equipment heating outputs are energized (LEDs next to equipment terminals show which outputs are on). This output will flash if the heating high temperature limit has been reached. If this LED is flashing while the cooling LED is on or flashing, then this indicates an open or short circuit in the DAS.

COOL – Lights when equipment cooling outputs are energized (LEDs next to equipment terminals show which outputs are on). This output will flash if the cooling low temperature limit has been reached. If this

LED is flashing while the heating LED is on or flashing, then this indicates an open or short circuit in the DAS.

FAN ON – Lights when equipment G terminal is energized.

VAC – Lights when ZONE/VAC switch is in VAC position.

E-HEAT – Lights when E-HEAT switch is ON.

ZONE 1 to ZONE 4 – Lights when the Normally Open (NO) damper terminal for that zone is energized (i.e. LEDs show which zones are NOT calling when the HVAC equipment is operating).

Sequence of Operation

When power is first applied, the green system power led will remain off for approximately 6 seconds. After 6 seconds, this LED will begin to flash indicating that the board is working normally. **Note that immediately after the board is powered, there is a four minute minimum off delay during which only the fan output will respond.**

When operating in the Heat mode, the heating equipment will not stop operating until all heat calls have been satisfied. Any existing cooling calls will then be satisfied. Equipment operation is only interrupted if an Emergency Heat call (heat pump applications only) exists or if an opposing mode call from another zone exists for 20 minutes. Similarly, cooling calls will be satisfied until all calls for cooling end or an opposing call from another zone exists for 20 minutes. The sequence of operation is dependent on the position of the ZONE 1 or ANY ZONE switch and the HEAT PUMP or HEAT/COOL switch. A Time Delay Override (TDO) button is available on the control panel to speed up the internal timer by a factor of 60 for system checkout.

Heat/Cool Changeover: When a call for heating or cooling exists and an opposing call is made from another zone, a 20 minute timer is activated. If the original call is not satisfied within that 20-minute time period, the call will be interrupted, turning the equipment off and allowing for the normal fan purge cycle and minimum equipment off time. The opposing call will then be answered. After 20 minutes, if the original call still exists, the opposing call will be interrupted and the original call can once again be recognized.

High/Low Limit Temperature: The high/low limit temperature settings are designed to prevent the heat exchanger from overheating or the cooling coil from freezing. The temperature sensor in the supply duct senses the discharge air temperature and interrupts the heating/cooling equipment (depending on the Heat and Cool temperatures set on the control panel) before overheating/freezing occurs. When a heating/cooling call is interrupted by the high/low temperature limit, the zone control panel turns the equipment off and energizes the G terminal (if not already energized). The Heating/Cooling LED on the control panel will flash during a high/low limit temperature interrupt. Once the temperature drops/rises 10°F, the equipment is turned back on if the call for conditioning still exists, and the Heating/Cooling LED will stop flashing.

IMPORTANT: Should a short or open circuit be detected across the Discharge Air Sensor (DAS) terminals, the zone system will respond only to Zone 1 and the dampers will not energize.

DAMPER OPERATION

The “NO” output will be energized and the “NC” output will be de-energized for any zone not calling for heating or cooling while the equipment output is energized and during the damper purge time delay. During equipment operation or during the damper purge time delay, should all zones stop calling for heating or cooling, the damper terminals will remain in the position they were in before all zones stopped calling.

Damper Purge Time Delay

When the PURGE/NO PURGE Selector is set to NO PURGE, the damper purge time delay is 3.5 minutes and begins when the equipment output(s) turn off. NO PURGE is the preferred method of purge control for Lennox furnaces and air conditioners. When the PURGE/NO PURGE Selector is set to PURGE, the damper purge time delay is one (1) minute.

CONTINUOUS FAN OPERATION

A call for Fan from any zone will initiate the G equipment output terminal. The normally open (NO) damper terminal at all zones not calling for continuous fan will be energized.

HEATING AND COOLING EQUIPMENT OPERATION

COOLING OPERATION

When a zone makes a call for Cooling, the Y1, G and O terminals will energize. The Y1 terminal de-energizes when (1) all zones stop calling for Cooling, (2) the call has exceeded the heat/cool changeover time limit while a heat call exists or (3) the call is interrupted by the low limit temperature setting. When the Y1 terminal is de-energized, a minimum off time delay of 4 minutes must elapse before it can be energized again. Should any call for Cooling not be satisfied in the time that is set on the STAGE dip switch bank, or should the “2S” terminal of any calling zone be energized, or should the number of zones calling for conditioning be greater or equal to the # Zones to Stage setting, the Y2 terminal will energize. For greater detail on how the system configuration DIP switch positions affect staging, see the system setup flowchart starting on page 20. When none of the conditions that initiated the Y2 terminal are present, the Y2 terminal will de-energize. Once de-energized, the Y2 terminal can not be energized again until a 4-minute minimum off time delay elapses. The O terminal remains energized until there is a Heat call.

Fan Purge Time Delay

If the PURGE/NO PURGE jumper is in the PURGE position, the G terminal will remain energized for one minute after the Y1 (and Y2) terminal is de-energized. If the jumper is in the NO PURGE position, the G terminal will de-energize immediately.

Sequence of Operation (continued)

HEATING OPERATION – HEAT/COOL SYSTEMS

When a zone makes a call for Heat, the W1 and B output terminals will energize. The G terminal will also energize if the ELECTRIC/GAS switch is in the ELECTRIC position. The W1 terminal de-energizes when (1) all zones stop calling for Heat, (2) the call has exceeded the heat/cool changeover time limit while a cooling call exists or (3) the call is interrupted by the high limit setting. When the W1 terminal is de-energized, a minimum off time delay of 4 minutes must elapse before it can be energized again. Should any call for Heat not be satisfied in the time that is set on the STAGE dip switch bank, or should the “2S” terminal of any calling zone be energized, or the number of zones calling for conditioning matches or exceeds the # Zones to stage setting, the W2 terminal will energize in addition to the W1 terminal. For greater detail on how the system configuration DIP switch positions affect staging, see the system setup flowchart starting on page 20. When none of the conditions that initiate the W2 terminal are present, the W2 terminal will de-energize. Once de-energized, the W2 terminal has a 4 minute minimum off time. The B terminal remains energized until there is a Cool call.

Fan Purge Time Delay

If the ELECTRIC/GAS selector is in the ELECT position and the PURGE/NO PURGE selector is in the PURGE position, the G terminal will remain energized for one minute after the W terminal is de-energized. The NO PURGE setting is the preferred purge control setting for Lennox equipment. Lennox equipment includes controls which sequence the indoor fan off after a call for heat has been satisfied.

If the ELEC/GAS selector is in the GAS position, the G terminal does not turn on during purge regardless of the position of the PURGE or NO PURGE selector. Lennox furnaces will control the purge through the furnace control board cool down feature. The cool down time is often adjustable at the furnace control board up to 3.5 minutes. NO PURGE is the preferred method of purge when this zone panel is applied to Lennox equipment.

HEATING OPERATION – HEAT PUMP SYSTEMS

When a zone makes a call for Heat, the Y1, G and B output terminals will energize. The Y1 terminal de-energizes when (1) all zones stop calling for Heat, (2) the call has exceeded the heat/cool changeover time limit while a cooling call exists or (3) the call is interrupted by the high limit setting. When the Y1 terminal is de-energized, a minimum off time delay of 4 minutes must elapse before it can be energized again. Should any call for Heat not be satisfied in the time that is set on the STAGE dip switch bank, or should the “2S” terminal of any calling zone be energized, or should the number of zones calling for heat match or exceed the # Zones to Stage setting, the Y2 terminal will energize. For greater detail on how the system configuration DIP switches positions affect staging, see the system setup flowchart starting on page 20. When none of the conditions that initiate the Y2 terminal are present, the Y2 terminal will de-energize. Once de-energized, the Y2 terminal can not be energized again until a 4-minute minimum off time delay elapses. The B terminal remains energized until there is a Cool call.

AUXILIARY HEAT OPERATION – HEAT PUMP SYSTEMS

Auxiliary Heat can be controlled by time or by the thermostats.

Thermostat Control (Heat Pump thermostats in all zones): If the Y and W thermostat input terminals at any zone are energized concurrently (assuming the heat pump is on in the Heat mode of operation), the W1 output terminal will energize immediately. This is thermostat control.

Time Control (Heat/Cool thermostats in all zones): If it is desired to have the auxiliary heat come on after a specific amount of time, set the appropriate AUX switch(es) to ON. Should any call for Heat exist longer than the time that is set on the STAGE MINUTES plus the AUX MINUTES dip switch bank, the W1 equipment output terminal energizes. (NOTE: When using time controlled auxiliary heat, DO NOT USE heat pump thermostats, heat / cool thermostats must be used when staging the auxiliary heat by time.)

The W1 terminal immediately de-energizes when both of the above two conditions no longer exist.

Sequence of Operation (continued)

Fan Purge Time Delay

After the Y1, Y2 and/or W1 terminals turn off, the G terminal, if the ELEC/GAS switch is in the ELEC position, will remain on for one (1) minute if the PURGE/No Purge switch is set to Purge. The G terminal will immediately turn off, if on, when the switch set to No Purge.

Dual Fuel

Your control panel acts as a dual fuel system when the HEAT PUMP/HEAT COOL switch is set to the HEAT PUMP position and the ELECTRIC/GAS switch is set to the GAS position. The dual fuel system is set up so that when the auxiliary heat comes on, the compressor outputs (Y1 and Y2) turn off before the W1 output is turned on. The dual fuel mode effects auxiliary heat operation only.

To lock out the heat pump at low ambient conditions (below the system balance point) and service heat calls with the furnace, use the SignatureStat or Elite heat pump dual fuel compatible thermostats with outdoor temperature sensors on all thermostats (see thermostat selection guide on page 5). Each thermostat must have its own outdoor temperature sensor. To set the SignatureStat or Elite stat to use the balance points for dual fuel control, in the thermostats menu go to: menu, installer settings, system setup, add on – comp = off. When the thermostat is properly set up, it will send the appropriate signals to the LZP-4. When the outdoor temperature is between the low and high balance points, first stage heating demands are serviced through the heat pump and second stage heating demands are serviced through the gas furnace. Below the low balance point, all heat demands are serviced through the gas furnace. Above the high balance point, all heating demands are serviced with the heat pump. If using a two-stage furnace with a dual fuel application, set the furnace to stage on its own (W2 timed); do not connect W2 from the LZP-4 to W2 on the furnace control board. If both W1 and W2 are connected between the zone panel and the furnace, only second stage furnace will be used when servicing a gas heat call.

If you choose not to use the SignatureStat or Elite thermostats dual fuel feature or wish to use a standard heat pump thermostat to control the dual fuel system, the furnace will turn on with an auxiliary heat call after the condensing unit stops regardless of the outdoor temperature. This auxiliary heat call will be serviced with a W1 furnace call, and an emergency call will be serviced with a W1+W2 furnace call. See **Table 5** on page 8 for detailed thermostat call and equipment output information.

EMERGENCY HEAT OPERATION – HEAT PUMP SYSTEMS

There is no Emergency Heat operation when the HEAT PUMP or HEAT/COOL switch is set for HEAT/COOL. When set for HEAT PUMP operation, an Emergency Heat call is recognized by a thermostat calling explicitly for Emergency Heat or by a zone calling for heat with the E-HEAT SELECTOR switch set to Emergency Heat. A thermostat can explicitly call for Emergency Heat only when the Zone 1 or Any Zone Selector switch is in the Any Zone position and the Auxiliary Heat Timer DIP switches are set to zero, which requires the use of heat pump thermostats in all zones.

When a call for Emergency Heat is recognized, the Y terminal will de-energize (if energized), after which the B and W terminals (and G terminal if set to ELECTRIC) will energize. Immediately, the W terminal will de-energize when (1) all zones stop calling for emergency heat, (2) the call has exceeded the heat/cool changeover time limit while a cooling call exists or (3) the call is interrupted by the high limit setting. When the W terminal is de-energized, it has a 4 minute minimum off time if set to GAS or no minimum off time if set to ELECTRIC.

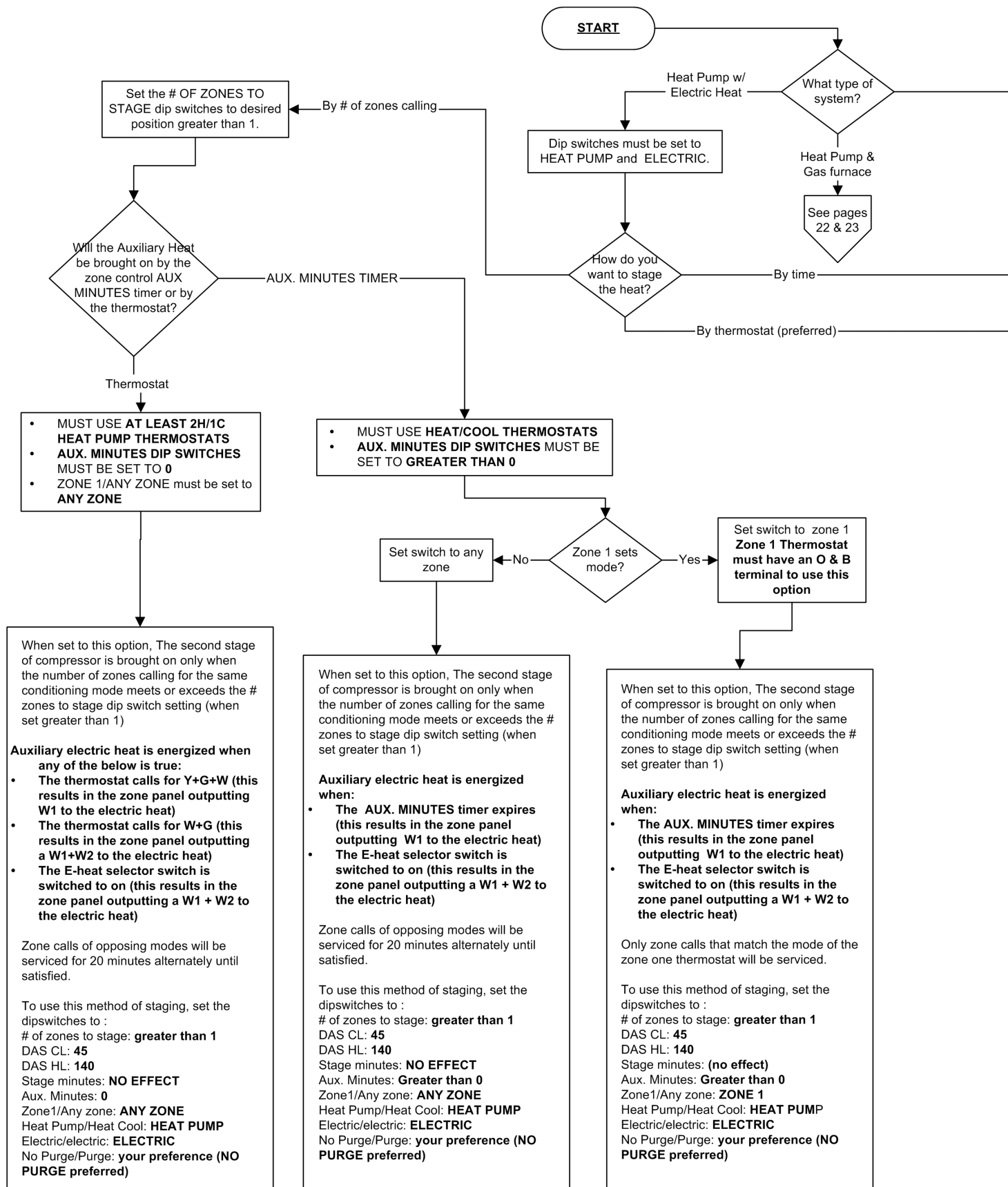
Fan Purge Time Delay

After the W1 and W2 terminals turn off, the G terminal, if the ELEC/GAS switch is in the ELEC position, will remain on for one (1) minute if the PURGE or No Purge Selector switch is set to Purge. The G terminal will immediately turn off, if on, when the switch set to No Purge.

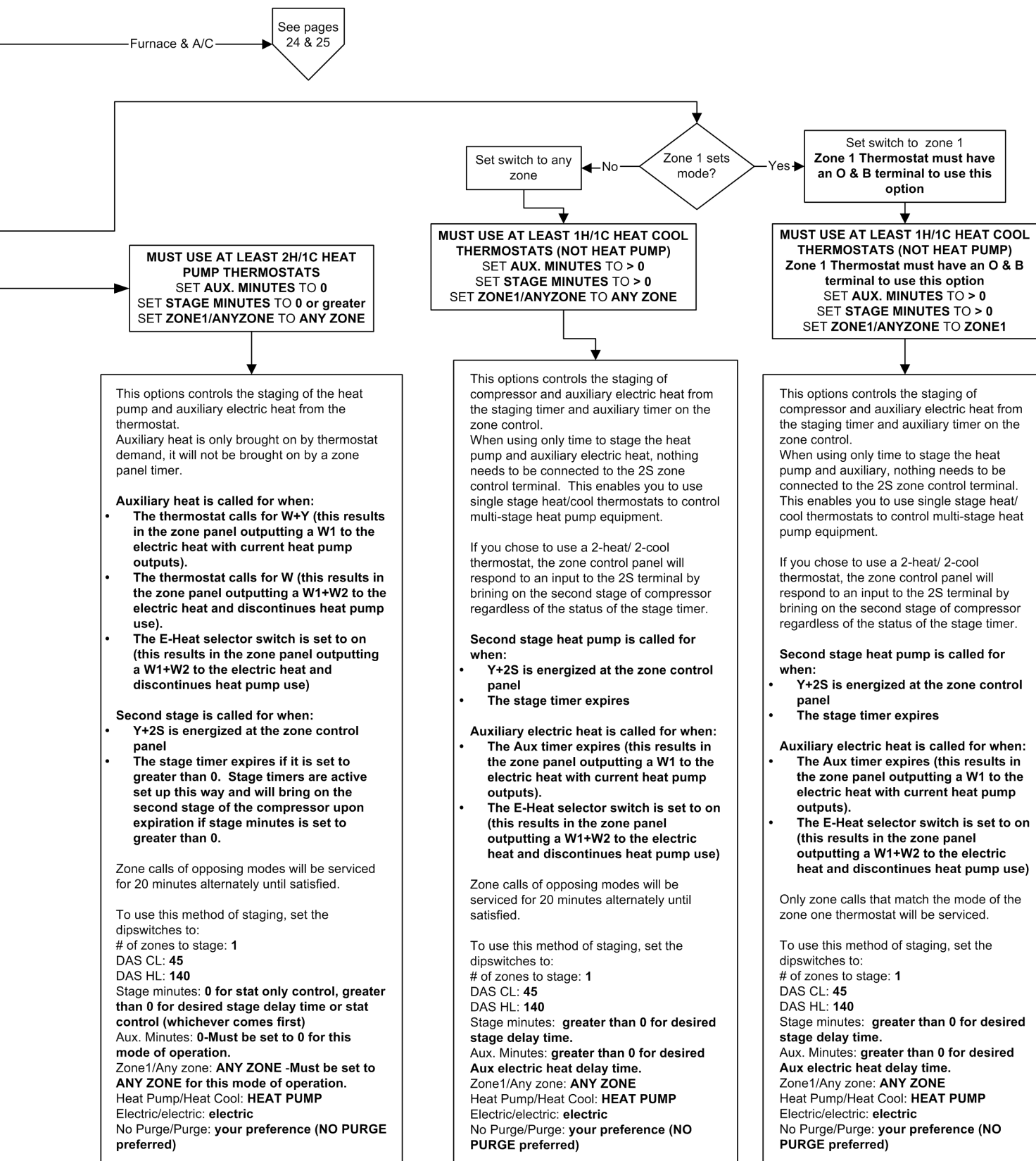
With the ELEC/GAS switch in the GAS position, the G terminal is not turned on during purge regardless of the position of the PURGE/NO PURGE switch.

To aid in setting the system configuration DIP switches correctly, use the system setup flowcharts on the following pages.

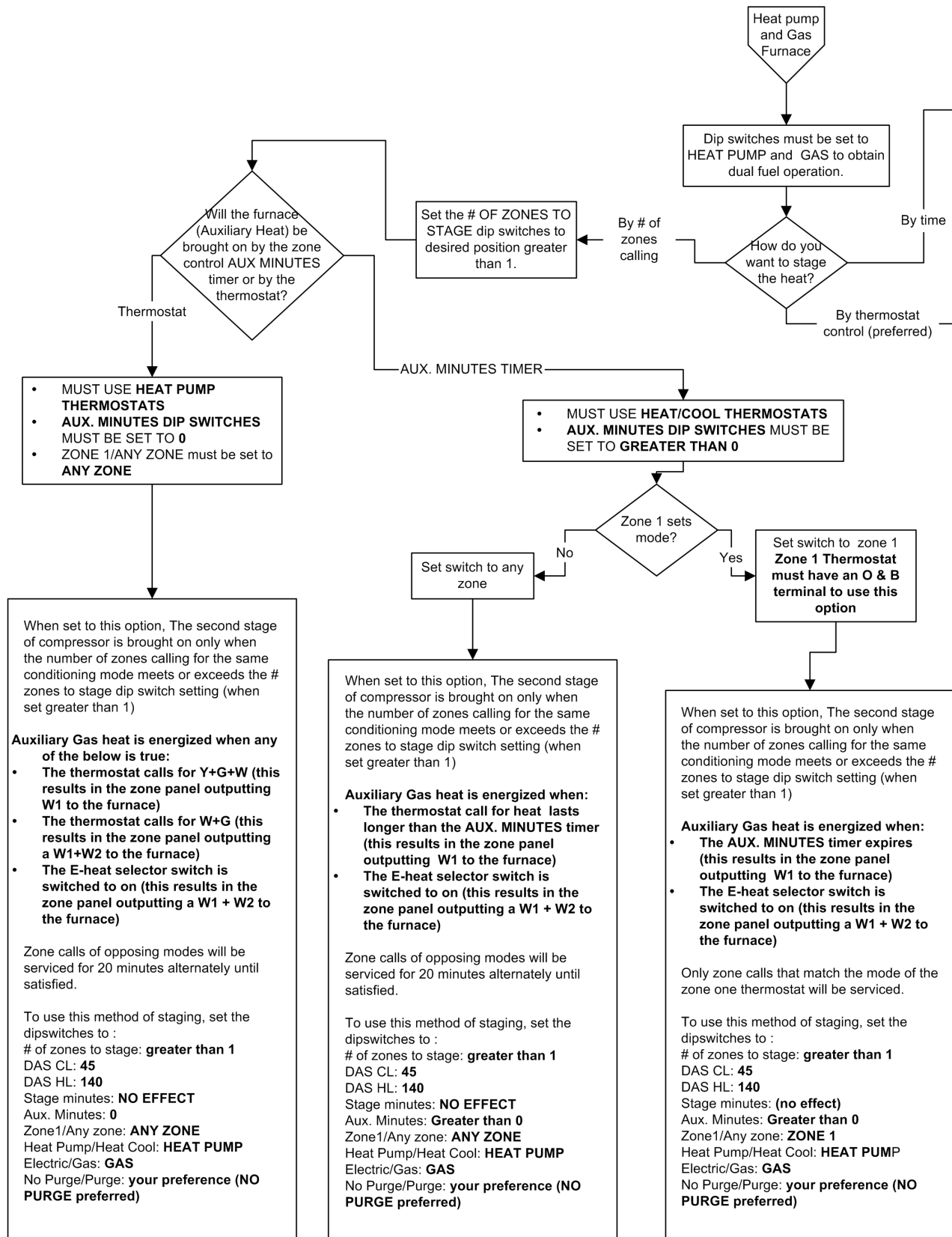
System Setup Flowchart



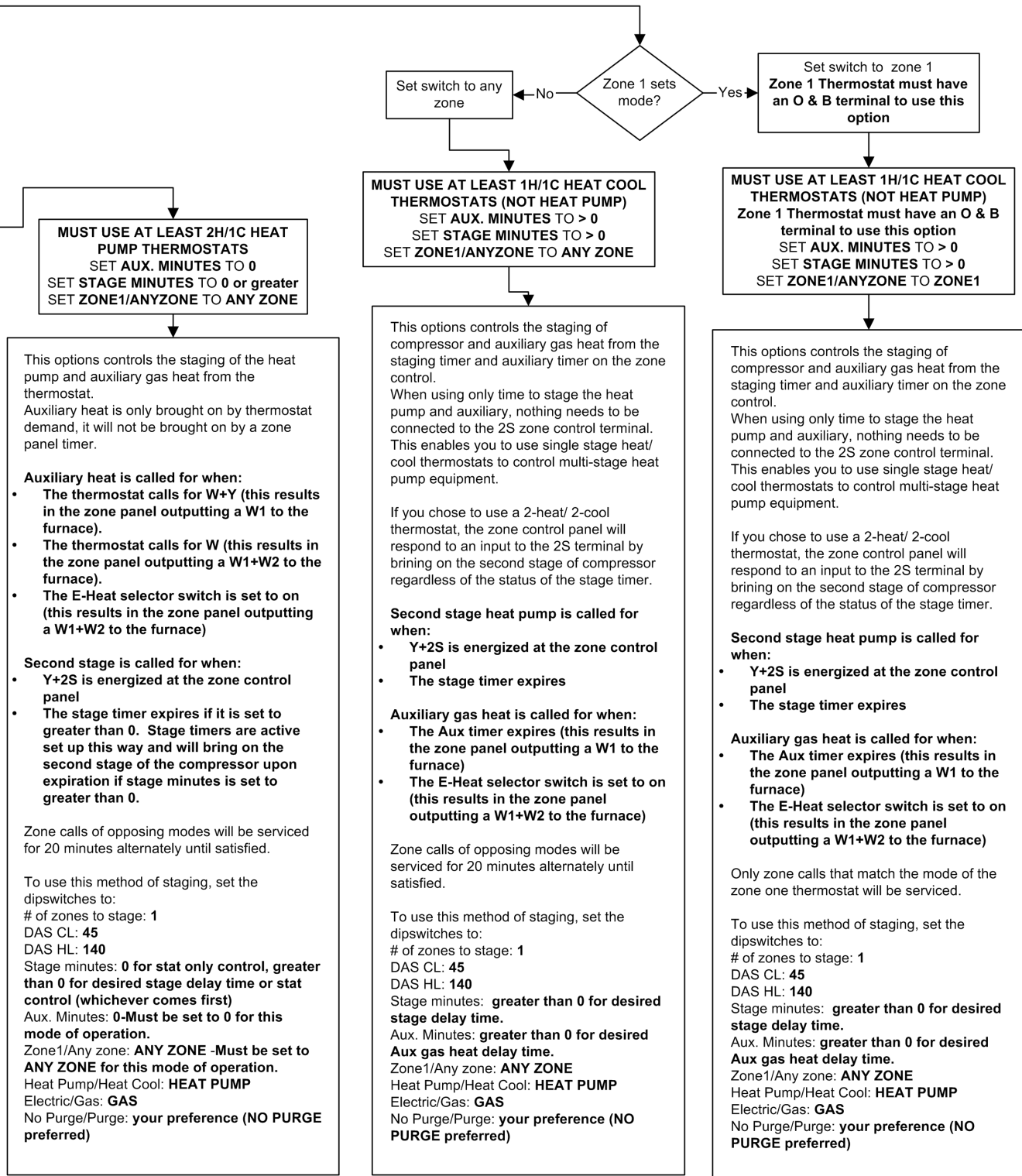
System Setup Flowchart (continued)



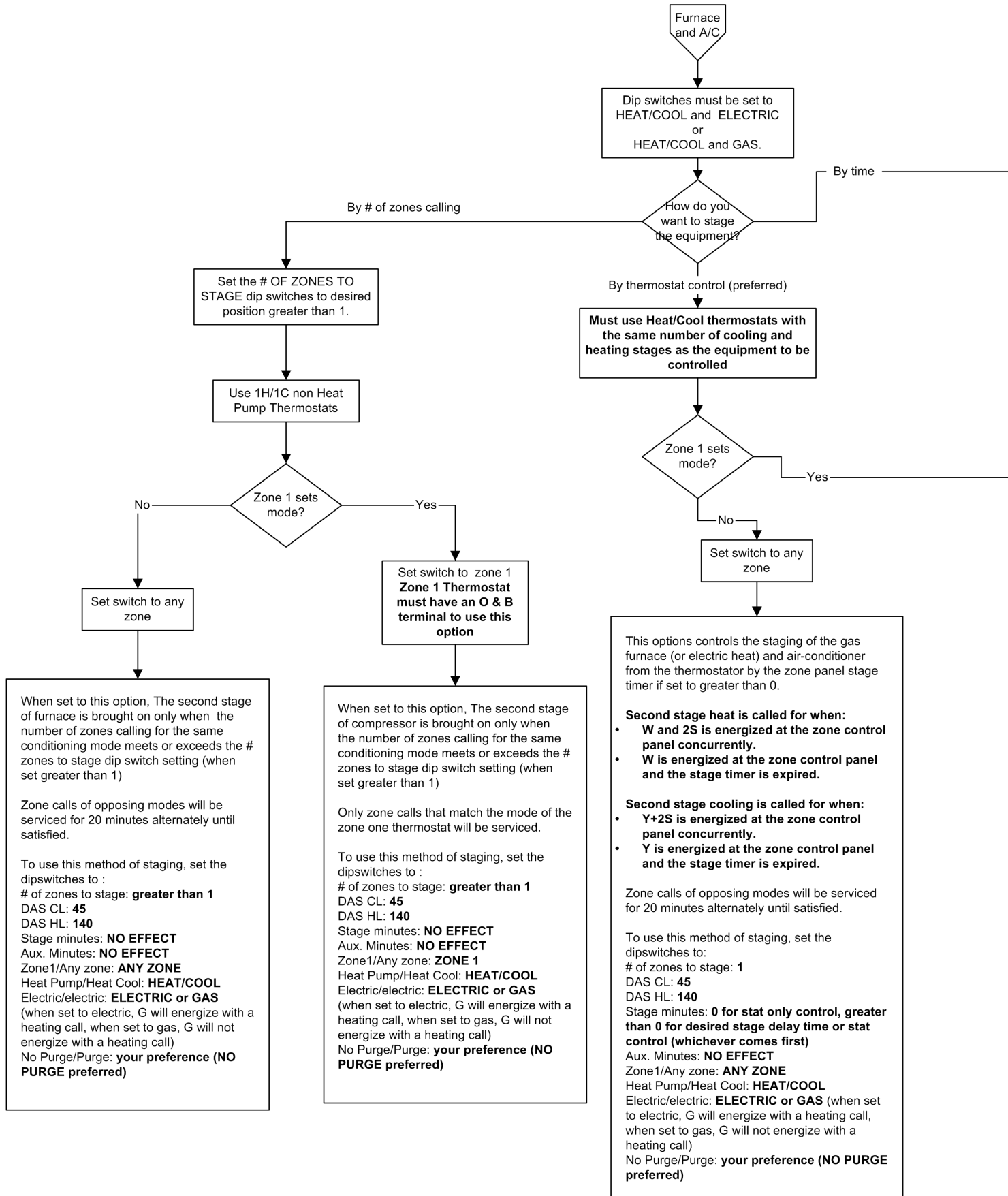
System Setup Flowchart (continued)



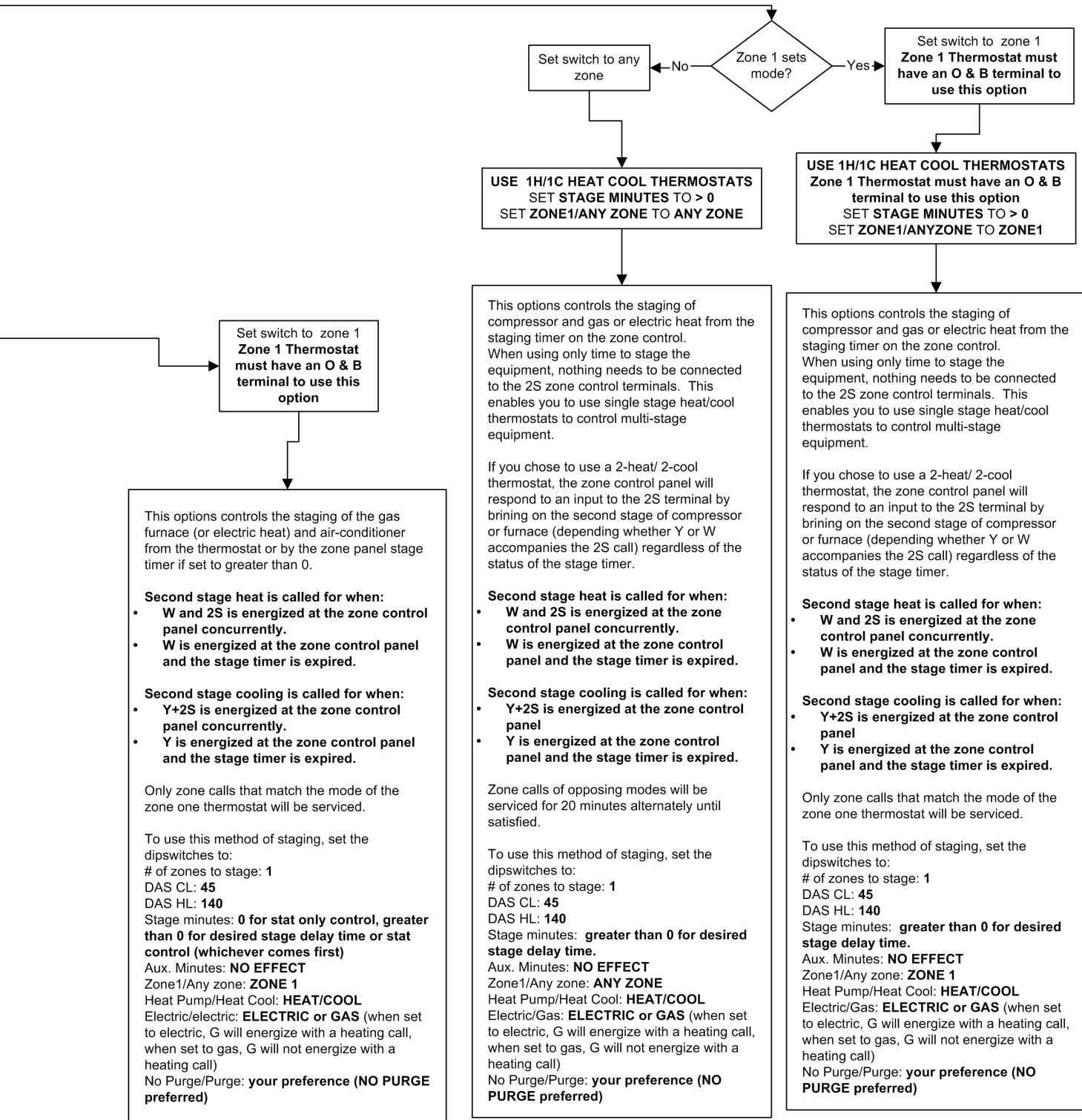
System Setup Flowchart (continued)



System Setup Flowchart (continued)



System Setup Flowchart (continued)



Troubleshooting

DETECTING HVAC SYSTEM PROBLEMS	
Symptom	Possible Solution
Condensing unit receiving signal but will not turn on.	Pressure switch open. Consult condensing unit manual for possible cause.
	Compressor is off due to internal overload protector. Consult condensing unit manual for possible cause.
	Condenser control board anti short cycle timer is not yet expired. Most anti short cycle timers are 5 minutes or less, if the unit does not start after 5 minutes consult the condensing unit manual for possible causes.
Furnace tripped the primary limit, but the zone panel does not indicate that the discharge air limit has been exceeded.	A high static condition exists. Move the sensor further down stream to sense air that has mixed more thoroughly. Be sure not to place the sensor past the take offs. High static pressure must be corrected.
	Bypass tap is too close to inlet of air handler. Adjust bypass tap in the return air duct so that is further away from the furnace. This will give the air more of a chance to be tempered with room return air before entering the air handler again.
Air handler receiving signal but will not turn on.	Limit on furnace open. Check position of DAS in the plenum and move further down stream if possible. High static pressure must be corrected.
	DAS limit jumper needs to be moved to a lower setting.
	Trouble shoot air handler – see air handler documentation.
DETECTING HEATING, COOLING AND FAN PROBLEMS	
Symptom	Possible Solution
Nothing comes on.	No power to control panel. Green “Normal Flashing” LED should be blinking. If not, apply power to 24VAC inputs of control panel. Check fuse.
Heat will not come on.	Single transformer system. Install jumper between RC and RH at HVAC Equipment outputs of control panel.
	Interlock switch on furnace is open – close access doors.
	Thermostat is not calling for heat. Check voltage at the thermostat W input on the control panel.
	Thermostat is power robbing or mechanical. Only use line powered electronic thermostat with a C terminal.
	Zone panel set up to for Zone 1 mode control and Zone 1 B terminal is not energized. Check ZONE 1/ANY ZONE dip switch and check for voltage at Zone 1 B terminal.
	An open or short in the DAS sensor has been detected. Install or repair the sensor.

Troubleshooting (continued)

DETECTING HEATING, COOLING AND FAN PROBLEMS (continued)	
Symptom	Possible Solution
Cooling will not come on.	Single transformer system. Install jumper between RC and RH at HVAC equipment outputs of control panel.
	Thermostat is not calling for cooling. Check voltage at the thermostat Y input on the control panel.
	Thermostat could be invoking a timed off delay.
	Zone panel could be invoking a timed off delay.
	Thermostat is power robbing or mechanical. Only use line powered electronic thermostat with a C terminal.
	Zone panel set up to for Zone 1 mode control and Zone 1 O terminal is not energized. Check ZONE 1/ANY ZONE dip switch and check for voltage at Zone 1 O terminal.
	An open or short in the DAS sensor has been detected. Install or repair the sensor.
Emergency Heat will not come on.	Emergency Heat (E-HEAT SELECTOR) slide switch not set to ON.
	Heat Pump thermostats used with zone panel set to ZONE 1 or AUX MINUTES set to a value other than 0 minutes. If heat pump thermostats are used in all zones, set AUX MINUTES to 0 and set ZONE 1/ANY ZONE switch to ANY ZONE. If heat pump thermostats are not used, emergency heat can only be energized with the E-HEAT SELECTOR switch set to ON.
Fan will not come on.	Check if G is energized at the zone panel.
	Check if G is energized at the thermostat.
	Check if G is energized at the air handler.
Dampers do not position on a call for heating, cooling or fan. Heat, cooling or fan will not come on when the Zone 2, 3 or 4 thermostat is calling.	System requires the Discharge Air sensor. If DAS is not installed, only Zone 1 calls will be recognized and dampers will not operate. Disconnect power to the control panel, install the DAS and restore power to the control panel.
	ZONE 1/ANY ZONE switch set to ZONE 1. This allows only heat calls when Zone 1 is in heat mode, and only cooling calls when Zone 1 is in cool mode.
Fan immediately comes on with heat call.	ELEC/GAS jumper set to ELEC – change setting to GAS.
After a cool call, the fan stops then starts right away only to stop a short while later.	HVAC system has built in duct purge. Set PURGE/NO PURGE jumper on control panel to NO PURGE.
Both the HEAT and COOL LED are blinking.	An open or short in the DAS sensor has been detected. Install or repair the sensor.

Troubleshooting (continued)

DETECTING HEATING, COOLING AND FAN PROBLEMS (continued)

Symptom	Possible Solution
Fan is running but no heat and the HEAT LED is blinking. Dampers reposition while the fan is on.	Discharge air temperature exceeds set limit. Allow discharge air to cool 10° below set limit and allow timed off delay to expire.
Fan is running but no cooling and the COOL LED is blinking. Dampers reposition while the fan is on.	Discharge air temperature dropped below set limit. Allow discharge air to warm 10° above set limit and allow timed off delay to expire.

DETECTING DAMPER PROBLEMS

Symptom	Possible Solution
Damper opens when it should be closed.	DAS shorted or open causing the panel to only respond to zone 1 inputs while not closing any dampers.
	Damper wired incorrectly. Spring open power close dampers should be connected between NO and C terminals.
Damper will not close.	DAS shorted or open causing the panel to only respond to zone 1 inputs while not closing any dampers.
	Damper motor faulty.

CHECKING THERMOSTAT VOLTAGES

Using a digital voltmeter (DVM) measure the AC voltage supplied at the R and C terminals of the Thermostat inputs on the control panel for the zone in question. This voltage should be same as the voltage supplied to the control panel 24VAC terminals. Make a call for heat, cooling or fan. Measure the voltage across the terminal that should be energized (i.e. W for heat, Y for cooling, etc.) and the C terminal. This should be the same voltage as there is between the R and C terminals. Measure the voltage across a terminal that should NOT be energized and the C terminal; this voltage should be zero.

DISCHARGE AIR SENSOR CHECKOUT

The discharge air sensor is a temperature dependent resistor; the higher the temperature, the lower the resistance. In order to confirm the sensor is working, both sensor leads must be disconnected from the zone panel board. Using a digital voltmeter (DVM) set to read resistance, touch the leads from the sensor to the probes of the DVM. Take care not to create a parallel resistance path through your body by touching both probes with your fingers or a faulty reading will be obtained. At 77F, the resistance of the sensor will be 10K ohm. If the sensor is cooler than 77F, the resistance will be higher, if it is warmer, the resistance will be lower. After reading the resistance at room temperature, warm the tip of the sensor by holding it in the palm of your hand, and take another resistance reading. This reading should be noticeable lower than the room temperature reading.

<u>Temperature (°F)</u>	<u>Resistance (ohms)</u>
65	13476
70	11884
75	10501
80	9298
85	8249
90	7333

The zone panel is well equipped to monitor the operation of the probe and determine if a failure has occurred.

The probe should be considered an integral (but replaceable) part of the zone panel. The zone panel will indicate if the probe is operating improperly and needs to be replaced.