



48/50EJ,EK,EW,EY024-048

50EJQ,EWQ024,028

Gas Heating/Electric Cooling

Electric Cooling and Heat Pump Units (50/60 Hz)

Wiring Diagrams

NOTE: This literature applies to units produced after 11/3/96
(software version 2.0 or greater)

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UNIT LABEL DIAGRAM					
Unit	Voltage	Label Diagram Type	Serial Number Effective	Label Diagram	Figure No.
48EJ,EW024-034	ALL	Component Arrangement	4596F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501531	2A
			0397F	48EJ500382	2B
		24-V Control Circuit	4596F	48EJ500387	3
	208/230-3-60	Power Schematic	2996F	48EJ500727	4
	460-3-60	Power Schematic	2996F	48EJ500727	4
	575-3-60	Power Schematic	2996F	48EJ500907	5
	380-3-60	Power Schematic	2996F	48EJ500908	6
48EK,EY024-034	ALL	Component Arrangement	4596F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501532	7A
			0397F	48EJ500728	7B
			2996F	48EJ500728	7C
		24-V Control Circuit	0897F	48EJ500729	8A
	208/230-3-60	24-V Control Circuit	4596F	48EJ500729	8B
		Power Schematic	2996F	48EJ500727	4
		Power Schematic	2996F	48EJ500727	4
		Power Schematic	2996F	48EJ500907	5
		Power Schematic	2996F	48EJ500908	6
		Power Schematic	2996F	48EJ500908	6
50EJ,EW024-034	ALL	Component Arrangement	4596F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501531	2A
			0397F	48EJ500382	2B
		24-V Control Circuit	4596F	48EJ500900	9
	208/230-3-60	Power Schematic	2996F	48EJ500727	4
	460-3-60	Power Schematic	2996F	48EJ500727	4
	575-3-60	Power Schematic	2996F	48EJ500907	5
	380-3-60	Power Schematic	2996F	48EJ500908	6
50EK,EY024-034	ALL	Component Arrangement	4596F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501532	7A
			0397F	48EJ500728	7B
			2996F	48EJ500728	7C
		24-V Control Circuit	0897F	48EJ500901	10A
	208/230-3-60	24-V Control Circuit	4596F	48EJ500901	10B
		Power Schematic	2996F	48EJ500727	4
		Power Schematic	2996F	48EJ500727	4
		Power Schematic	2996F	48EJ500907	5
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		Power Schematic	2996F	48EJ500908	6

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UNIT LABEL DIAGRAM (cont)					
Unit	Voltage	Label Diagram Type	Serial Number Effective	Label Diagram	Figure No.
48EJ,EW038-048	ALL	Component Arrangement	1597F	48EJ501527	11A
			4596F	48EJ500346	11B
		120-V Control Circuit	1597F	48EJ501531	2A
			0397F	48EJ500382	2B
	208/230-3-60	24-V Control Circuit	4596F	48EJ500387	3
			1597F	48EJ501533	12A
	460-3-60	Power Schematic	2996F	48EJ500726	12B
			1597F	48EJ501533	12A
	575-3-60	Power Schematic	2996F	48EJ500909	13
	380-3-60	Power Schematic	2996F	48EJ500910	14
48EK,EY038-048	ALL	Component Arrangement	2996F	48EJ500910	14
			1597F	48EJ501527	11A
		120-V Control Circuit	4596F	48EJ500346	11B
			1597F	48EJ501532	7A
	208/230-3-60	24-V Control Circuit	0397F	48EJ500728	7B
			2996F	48EJ500728	7C
	460-3-60	Power Schematic	4596F	48EJ500387	3
			1597F	48EJ501533	12A
	575-3-60	Power Schematic	2996F	48EJ500726	12B
	380-3-60	Power Schematic	2996F	48EJ500909	13
50EJ,EW038-048	ALL	Component Arrangement	2996F	48EJ500910	14
			1597F	48EJ501527	11A
		120-V Control Circuit	4596F	48EJ500346	11B
			1597F	48EJ501531	2A
	208/230-3-60	24-V Control Circuit	0397F	48EJ500382	2B
			4596F	48EJ500900	9
	460-3-60	Power Schematic	1597F	48EJ501533	12A
			2996F	48EJ500726	12B
	575-3-60	Power Schematic	1597F	48EJ501533	12A
	380-3-60	Power Schematic	2996F	48EJ500726	12B
50EK,EY038-048	ALL	Component Arrangement	2996F	48EJ500909	13
			2996F	48EJ500910	14
		120-V Control Circuit	2996F	48EJ500910	14
			1597F	48EJ501533	12A
	208/230-3-60	24-V Control Circuit	2996F	48EJ500726	12B
			0897F	48EJ500901	10A
	460-3-60	Power Schematic	4596F	48EJ500901	10B
			1597F	48EJ501533	12A
	575-3-60	Power Schematic	2996F	48EJ500726	12B
	380-3-60	Power Schematic	2996F	48EJ500909	13
50EJQ,EWQ024,028	ALL	Component Arrangement	2996F	48EJ500910	14
			4596F	48EJ500730	1
		120-V Control Circuit	1597F	48EJ501531	2A
			0397F	48EJ500382	2B
	208/230-3-60	24-V Control Circuit	4596F	48EJ501040	15
			2996F	48EJ500727	4
50EJQ,EWQ024,028	460-3-60	Power Schematic	2996F	48EJ500727	4
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*Power exhaust wiring is shown in the unit wiring diagrams. Refer to the power and control wiring diagrams for wiring information.

48/50EJ,EK,EW,EY Units

NOTE: Unit is shipped with default values that can be changed through Service Tool, CCN (Carrier Comfort Network) software, or using an accessory LID-2B.

COOLING, CONSTANT VOLUME (CV) UNITS — On power up, the control module will activate the initialization software. The initialization software reads each DIP (Dual In-Line Package) switch to determine the unit configuration. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for CV operation; sets maximum heat stages to 2; and sets maximum cool stages to 3. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation.

The TSTAT function performs a thermostat based control by monitoring Y1, Y2, W1, W2, and G inputs. These functions control stages: cool1, cool2, heat1, heat2, and the indoor fan, respectively. If the TSTAT function is not selected, the control module determines the occupancy state based on the system time schedules with a field-supplied sensor installed, or with remote occupied/unoccupied input. If Temperature Compensated Start is active, the unit will be controlled as in the Occupied mode.

Occupied or unoccupied comfort set points must be selected. The control module will set appropriate operating mode and fan control. The control module will turn on indoor fan if in Occupied mode or if the unit is in Unoccupied mode and the space temperature is outside of the unoccupied comfort set points (Unoccupied Heat or Unoccupied Cool). The control module will then monitor space temperature against comfort set points and control heating or cooling stages as required. If the system is in the Occupied mode, the economizer will operate as required. If the system is in Unoccupied mode, the system will perform nighttime free cool and IAQ (indoor air quality) pre-occupancy purge as required (when functions are enabled via software). Whenever the DX (direct expansion) cooling is requested, the outdoor fan will operate.

The control module will operate economizer, run diagnostics to monitor alarms/alerts at all times, and respond to CCN communications to perform any configured network POC (product outboard control) functions such as time/outdoor-air temperature broadcast and global occupancy broadcast. When the optional expansion I/O board is employed, it will: perform a periodic scan and maintain a database of expanded I/O points; perform Fire/Smoke control (power exhaust required); if in Occupied mode, perform IAQ control and monitor the fan, filter, demand limit, and field-applied status (with accessories).

If thermostats are used to energize the G input, the control module will turn on the indoor fan without delay and open the economizer dampers to minimum position. If thermostats are used to deenergize the G input, the control module will turn off the indoor fan without delay and close the economizer dampers.

When cooling, G must be energized before cooling can operate. The control module determines if outdoor conditions are suitable for economizer cooling using the standard outdoor air thermistor. For the economizer to function for outside air cooling: the enthalpy must be below the enthalpy set point; the outdoor-air temperature must be equal to or less than the High Outdoor Air Temperature Lockout (default is 18 C [65 F]); the SAT (supply-air temperature) thermistor must not be in alarm; and the outdoor air reading is available. When these conditions are satisfied, the control module will use economizer as the first stage of cooling.

When Y1 input is energized, the economizer will be modulated to maintain SAT at the defined set point. (The default is 13 C [55 F].) When SAT is above the set point, the economizer will be 100% open. When SAT is below the set point, the economizer will modulate between minimum and 100% open position. When Y2 is energized, the control module will turn on compressor no. 1 and continue to modulate the economizer as described above. If the Y2 remains energized and the SAT reading remains above the set point for 15 minutes, compressor no. 2 will turn on. If Y2 is deenergized at any time, only the last stage of compression that was energized will be turned off. If outdoor conditions are not suitable for economizer cooling, the economizer will go to minimum position and cycle compressors no. 1 and 2 based on demand from Y1 and Y2 respectively. The compressors will be locked out when the SAT temperature is too low (less than 4 C [40 F] for compressor no. 1 and less than 7 C [45 F] for compressor no. 2). After a compressor is locked out, it can restart after normal time-guard period.

The Time Guard® function maintains a minimum off time of 5 minutes, a minimum on time of 10 seconds, and a minimum delay before starting the second compressor of 10 seconds.

When heating, the heat stages respond to the demand from W1 and W2 of the thermostat input. Heating and cooling will be mutually locked out on demand on a first call basis. The heating and the cooling functions cannot operate simultaneously.

COOLING, VARIABLE AIR VOLUME (VAV) UNITS — On power up, the control module will activate the initialization software. The initialization software reads each DIP switch to determine the unit configuration. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for VAV operation; sets maximum heat stages to 1; and sets maximum cool stages to 6. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation. Power up takes a random time of 1 to 63 seconds plus 5 minutes the first time power is sent to the control board after a power outage.

The control module will determine if an interface (linkage) is active and if the unit will operate in a Digital Air Volume (DAV) mode. In a DAV system, the room terminals are equipped with microprocessor controls that give commands to the base unit module. If a linkage is active, the control module will replace local comfort set points, space and return air temperatures, and occupancy status with the linkage data supplied.

The control module will determine occupancy status from Time Schedules (if programmed), Remote Occupied/Unoccupied input, global occupancy schedules, or DAV. If temperature compensated start is active, the unit will be controlled as in the Occupied mode.

NOTE: The temperature compensated start is a period of time calculated to bring the unit on while in Unoccupied mode to reach the occupied set point when occupancy occurs.

The control module will set the appropriate operating mode and fan control. The control module will turn on the VFD (variable frequency drive) if Occupied mode is evident. If in Unoccupied mode and a valid return-air temperature reading is available (either from a sensor or DAV), the control module will monitor return-air temperature against unoccupied heat and cool set points. The control module will start the VFD whenever return-air temperature is outside of the set points (Unoccupied Heat or Unoccupied Cool). The VFD may also be started by nighttime thermostat via remote Occupied/Unoccupied input or by a temperature compensated start algorithm. When the VFD is running in a normal mode, the control module will start heating or cooling as required to maintain supply-air temperature at the supply air set point plus the reset (when enabled). The reset value is determined by SAT (supply-air temperature) reset and/or space temperature reset algorithms. The reset is only available when enabled through software.

When cooling, the control module will energize the power exhaust enable output to the external power exhaust controller (when power exhaust is used).

The control module will run continuous diagnostics for alarms/alerts; respond to CCN communications; perform any configured network POC (Product Outboard Control) functions such as time/outdoor air temperature broadcast and global broadcast; and perform Fire/Smoke control.

Heating, Constant Volume (CV) Units

48 SERIES UNITS — The gas heat units incorporate 2 separate systems to provide gas heat. Each system incorporates its own induced-draft motor, Integrated Gas Control (IGC) board, 2 stage gas valve, manifold, etc. The systems are operated in parallel; for example, when there is a call for first stage heat, both induced-draft motors operate, both gas valves are energized, and both IGC boards initiate spark.

All of the gas heating control is performed through the IGC boards (located in the heating section). The base module board serves only to initiate and terminate heating operation.

The base module board is powered by 24 vac. When the thermostat or room sensor calls for heating, power is sent from the base module board to W on each of the IGC boards. An LED (light-emitting diode) on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized, and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat set for fan auto., 45 seconds after ignition occurs, the indoor-fan motor will be energized and the outdoor-air dampers will open to their minimum position. If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and the outdoor-air dampers will be in the minimum position.

If the unit is controlled with a room sensor in the Unoccupied mode, the indoor fan will be energized through the IGC board with a 45-second delay and the outside-air dampers will move to the IAQ (Indoor Air Quality) position (generally closed in the Unoccupied mode). If IAQ is not enabled, dampers will move to the minimum position.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valves. When the thermostat is satisfied, W1 and W2 open and the gas valves close interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto., the indoor-fan motor will continue to operate for an additional 45 seconds then stop and the outdoor-air dampers will close. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

50 SERIES UNITS — The control module is powered by 24 vac. If the unit is controlled with a room sensor, the fan will run continuously in the Occupied mode, with the outside-air damper in the minimum position. If the unit is controlled through a room thermostat (with FAN set to AUTO), upon a call for heat the first stage of heat is energized, the indoor-fan motor will turn on, and the outdoor-air damper will move to the minimum position. Upon a call for additional heat (if the unit is equipped with a two-stage heater), the second stage of heat is energized. When the call for heat is satisfied, the heaters will deenergize. The indoor-fan motor will also deenergize (unless controlled by a room sensor) and the outdoor-air damper will move to the closed position.

If the unit is controlled with a room sensor the fan will not run in the Unoccupied mode. Upon a call for heat, the first stage of heat is energized, the indoor-fan motor will turn on, and the outdoor air damper will move to the Unoccupied

IAQ position (generally set to zero in the Unoccupied mode). The IAQ feature is enabled through system software. Upon a call for additional heat (if the unit is equipped with a two-stage heater), the second stage of heat is energized. When the call for heat is satisfied, the heaters and indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

Heating, Variable Air Volume (VAV) Units

48 SERIES UNITS — All of the gas heating control is performed through the integrated gas control (IGC) board. The base module board serves only to initiate and terminate heating operation.

NOTE: The unit is factory-configured for disabled occupied heating. DIP switch 5 is used to enable occupied heating (DIP switch 5 set to OPEN).

The base module board is powered by 24 vac. When there is a call for heating (either Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the base module board to W on each of the IGC boards and W2 of the main gas valve. A field-supplied heat interlock relay signals for the air terminals to open fully. In the Occupied mode the indoor-fan motor will be operating and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode the indoor-fan motor will be off, but will energize 45 seconds after the call for heat and the outdoor-air dampers will move to the IAQ Unoccupied position (generally set to closed in the Unoccupied mode). The duct pressure sensor will signal to the variable frequency drive to operate at full speed since all terminals have been driven open. An LED on the IGC board will be on during normal operation. A check is made to ensure that the rollout switches and limit switches are closed and the induced-draft motors are not running. The induced-draft motors are then energized and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, and the flame sensor.

If the call for heat lasted less than 1 minute, the heating cycle will not terminate until 1 minute after heat became active. When heating is satisfied, the power will be interrupted to the IGC board and W1 and W2 of the main gas valve. If the unit is controlled through a room sensor, the indoor fan will be operating in the Occupied mode and turned off after 45 seconds in the Unoccupied mode.

50 SERIES UNITS — The control board is powered by 24 vac. When there is a call for heating (from Morning Warm-Up, Unoccupied, or Occupied modes), power is sent from the control module to energize the first stage of electric heat. A field-supplied heat interlock relay signals for the air terminals to fully open. In the Occupied mode, the indoor-fan motor will operate continuously and the outdoor-air dampers will be in the minimum position. In the Unoccupied mode, the indoor-fan motor will be off, but will energize upon the call for heat. The outdoor-air dampers will move to the IAQ unoccupied position (generally set to zero in the Unoccupied mode). The duct pressure sensor will signal to the variable frequency drive to operate at full speed. When the call for heat is satisfied, the heaters will deenergize.

NOTE: The HIR (heat interlock relay) is not needed in a DAV system.

If the unit is in the Unoccupied mode, the indoor-fan motor will deenergize and the outdoor-air damper will move to the closed position (if open).

50EJQ,EWQ Units

NOTE: Unit is shipped with default values that can be changed through Service Tool or CCN software.

COOLING — On power up, the control module will activate the initialization software. The initialization software reads DIP switch no. 1 position to determine CV operation. Next, DIP switch no. 2 is read to determine if the control is TSTAT or sensor type operation. The initialization sequence: clears all alarms and alerts; re-maps the input/output database for CV operation; sets maximum heat stages to 2; and sets maximum cool stages to 3. The control module reads DIP switch no. 3 and determines if the unit will use expansion mode operation.

The TSTAT function performs a thermostat based control by monitoring Y1, Y2, W1, W2 and G inputs. These functions control stages: cool1, cool2, heat1, heat2, and the indoor fan respectively. If the TSTAT function is not selected, the control module determines the occupancy state based on the system time schedules or with remote occupied/unoccupied input. If Temperature Compensated Start is active, the unit will be controlled as in the Occupied mode.

Occupied or unoccupied comfort set points must be selected. Use of the space temperature offset input can also be configured. The control module will set appropriate operating mode and fan control. The control module will turn on indoor fan if in Occupied mode or if the unit is in Unoccupied mode and the space temperature is outside of the unoccupied comfort set points (Unoccupied Heat or Unoccupied Cool). The control module will then monitor space temperature against comfort set points and control heating or cooling stages as required. If the system is in the Occupied mode, the economizer will operate as required. If the system is in Unoccupied mode, the system will perform night-time free cool and IAQ (indoor air quality) pre-occupancy purge as required (when functions are enabled via software). Whenever the DX (direct expansion) cooling is requested, the outdoor fan will operate.

The control module will operate economizer, run diagnostics to monitor alarms/alerts at all times, and respond to CCN communications to perform any configured network POC (product outboard control) functions such as time/outdoor-air temperature broadcast and global occupancy broadcast. When the optional expansion I/O board is employed, it will: perform a periodic scan and maintain a database of expanded I/O points; perform Fire/Smoke control (power exhaust required); if in Occupied mode, perform IAQ control and monitor the fan, filter, demand limit, and field-applied status (with accessories)

If thermostats are used to energize the G input, the control module will turn on the indoor fan without delay and open the economizer dampers to minimum position. If thermostats are used to deenergize the G input, the control module will turn off the indoor fan without delay and close the economizer dampers.

When cooling, G must be energized before cooling can operate. The control module determines if outdoor conditions are suitable for economizer cooling using the standard outdoor air thermistor. For the economizer to function for outside air cooling: the enthalpy must be below the enthalpy set point; the outdoor-air temperature must be equal to or less than the High Outdoor Air Temperature Lockout (default is 65 F); the SAT (supply-air temperature) thermistor must not be in alarm, and the outdoor air reading is available. When these conditions are satisfied, the control module will use economizer as the first stage of cooling.

When Y1 input is energized, the economizer will be modulated to maintain SAT at the defined set point. (The default is 55 F.) When SAT is above the set point, the economizer will be 100% open. When SAT is below the set point, the economizer will modulate between minimum and 100% open position. When Y2 is energized, the control module will turn on compressor 1 and continue to modulate the economizer as described above. If the Y2 remains energized and the SAT reading remains above the set point for 15 minutes, compressor 2 will turn on. If Y2 is deenergized at any time, only the last stage of compression that was energized will be turned off. If outdoor conditions are not suitable for economizer cooling, the economizer will go to minimum position and cycle compressors 1 and 2 based on demand from Y1 and Y2 respectively. The compressors will be locked out when the SAT temperature is too low (less than 40 F for compressor 1 and less than 45 F for compressor 2). After a compressor is locked out, it can restart after normal time-guard period.

The Time Guard® function maintains a minimum off time of 5 minutes, a minimum on time of 10 seconds, and a minimum delay before starting the second compressor of 10 seconds.

HEATING — The control module is powered by 24 vac. If the unit is controlled with a room sensor, the fan will run continuously in the Occupied mode, with the outside-air damper in the minimum position. If the unit is controlled through a room thermostat (with FAN set to AUTO), upon a call for heat the first stage heat is energized, energizing heat relay (HR2) and reversing valve solenoids (RVS1 and 2). Compressor no. 1 and 2, indoor and outdoor-fan motors start. Upon a call for additional heat (if equipped with electric heaters), the second stage of heat is energized. When the call for heat is satisfied, the compressors, fan motors, and heaters will be deenergized and the outdoor-air damper will move to the closed position.

If the unit is controlled with a room sensor the fan will not run in the Unoccupied mode unless the space temperature is below the unoccupied heat set point or above the unoccupied cool set point. Upon a call for heat, the first stage of heat is energized, energizing heat relay (HR2) and reversing valve solenoids (RVS1 and 2). Compressor no. 1 and 2, indoor and outdoor-fan motors start, and the outdoor-air damper will move to the Unoccupied IAQ position (generally set to

zero in the Unoccupied mode). The IAQ feature is enabled through system software. Upon a call for additional heat (if equipped with electric heaters), the second stage of heat is energized. When the call for heat is satisfied, the compressors, fan motors, and heaters will be deenergized and the outdoor-air damper will move to the closed position.

DEFROST CYCLE — When the temperature of the outdoor coil drops below 28 F as sensed by the defrost thermostat (DFT1 or 2) and the defrost timer is at the end of a timed period (adjustable at 30 to 90 minutes) the defrost cycle will begin. The control board will deenergize the reversing valve solenoids (RVS1 and 2) and energize the electric heat. Also, the outdoor-fan motor will stop.

The unit will continue to defrost until the coil temperature as measured by DFT1 and 2 reaches 65 F or the duration of defrost cycle completes a 10-minute period.

During the defrost mode, if a circuit defrosts first, the RVS will oscillate between heating and cooling modes until defrost mode is complete. This will keep the head pressure on that circuit from getting too high.

At the end of the defrost cycle, the electric heaters will be deenergized, reversing valve solenoids will be energized, and the outdoor fan will start.

POWER EXHAUST OPERATION — The optional power exhaust packages are factory- or field-installed with vertical units and optionally installed in the return air ductwork for horizontal applications. The standard and optional modulating power exhaust are the 2 packages available. The modulating power exhaust package is equipped with a field-adjustable static pressure controller which will control up to 4 power exhaust stages to maintain a building static pressure. The blue sequencer located in the control box below the control board can be adjusted by removing the covers and adjusting the set point dial to the desired building pressure. The standard power exhaust package controls up to 2 stages of power exhaust to maintain building pressure. These power exhaust stages are staged according to a percentage of the economizer damper position. The default values are 25% for Stage 1 and 75% for Stage 2. This package has set points that are adjustable through software (such as Service Tool, Building Supervisor, or ComfortWorks™ software).

LEGEND

AHA — Adjustable Heat Anticipator
BP — Building Pressure
BPS — Bypass Switch
BR — Burner Relay
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
CCB — Control Circuit Breaker
CCH — Crankcase Heater
CCN — Carrier Comfort Network
CLG — Cooling
COM — Communication
COMP — Compressor Motor
COMPR — Compressor Motor
CR — Control Relay
CV — Constant Volume
D — Diode
DFT — Defrost Thermostat
DIP — Dual In-Line Package
DM — Damper Motor
DP — Duct Pressure
EC — Enthalpy Control
EQUIP — Equipment
FLA — Full Load Amps
FPT — Freeze Protection Thermostat
FU — Fuse
GND — Ground
GRD — Ground
GVR — Gas Valve Relay
HC — Heater Contactor
HIR — Heat Interlock Relay
HPS — High-Pressure Switch

HR — Heater Relay
HS — Hall Effect Sensor
HTG — Heating
I — Ignitor
IAQ — Indoor Air Quality
IDM — Induced-Draft Motor
IFC — Indoor-Fan Contactor
IFCB — Indoor Fan Circuit Breaker
IFM — Indoor-Fan Motor
IFR — Indoor-Fan Relay
IGC — Intergrated Gas Unit Controller
INC — Increasing
IP — Internal Protector
L — Light
LED — Light-Emitting Diode
LPS — Low-Pressure Switch
LS — Limit Switch
MGV — Main Gas Valve
MMSN — Motormaster
NC — Normally Closed
NEC — National Electrical Code
NO — Normally Open
OAQ — Outdoor Air Quality
OAT — Outdoor-Air Thermostat
OCC — Occupied
OD — Outside Diameter
OFC — Outdoor-Fan Contactor
OFM — Outdoor-Fan Motor
PEC — Power Exhaust Contactor
PEM — Power Exhaust Motor
PES — Power Exhaust Sequencer

PESC — Power Exhaust Sequencer Controller
PL — Plug Assembly
R — Relay
RAT — Return-Air Thermistor
RS — Rollout Switch
RVS — Reversing Valve Solenoid
SAT — Supply-Air Thermistor
SIO — Serial Input/Output
SPT — Space Temperature Sensor
SW — Switch
TB — Terminal Block
TC — Thermostat Cooling
TH — Thermostat Heating
TRAN — Transformer
UNOCC — Unoccupied
UL — Compressor Unloader
VAV — Variable Air Volume
VFD — Variable Frequency Drive

 Terminal (Marked)
 Terminal (Unmarked)
 Terminal Block
 Splice
 Factory Wiring
 Field Wiring
 To indicate common potential only, not to represent wiring

NOTE FOR FIG. 3, 8A, 8B, 9, 10A, 10B, AND 15

- 1 The red and violet wires are spliced together at the factory. The brown wire has a wire nut added at the factory.

NOTES FOR FIG. 4, 12A, AND 12B

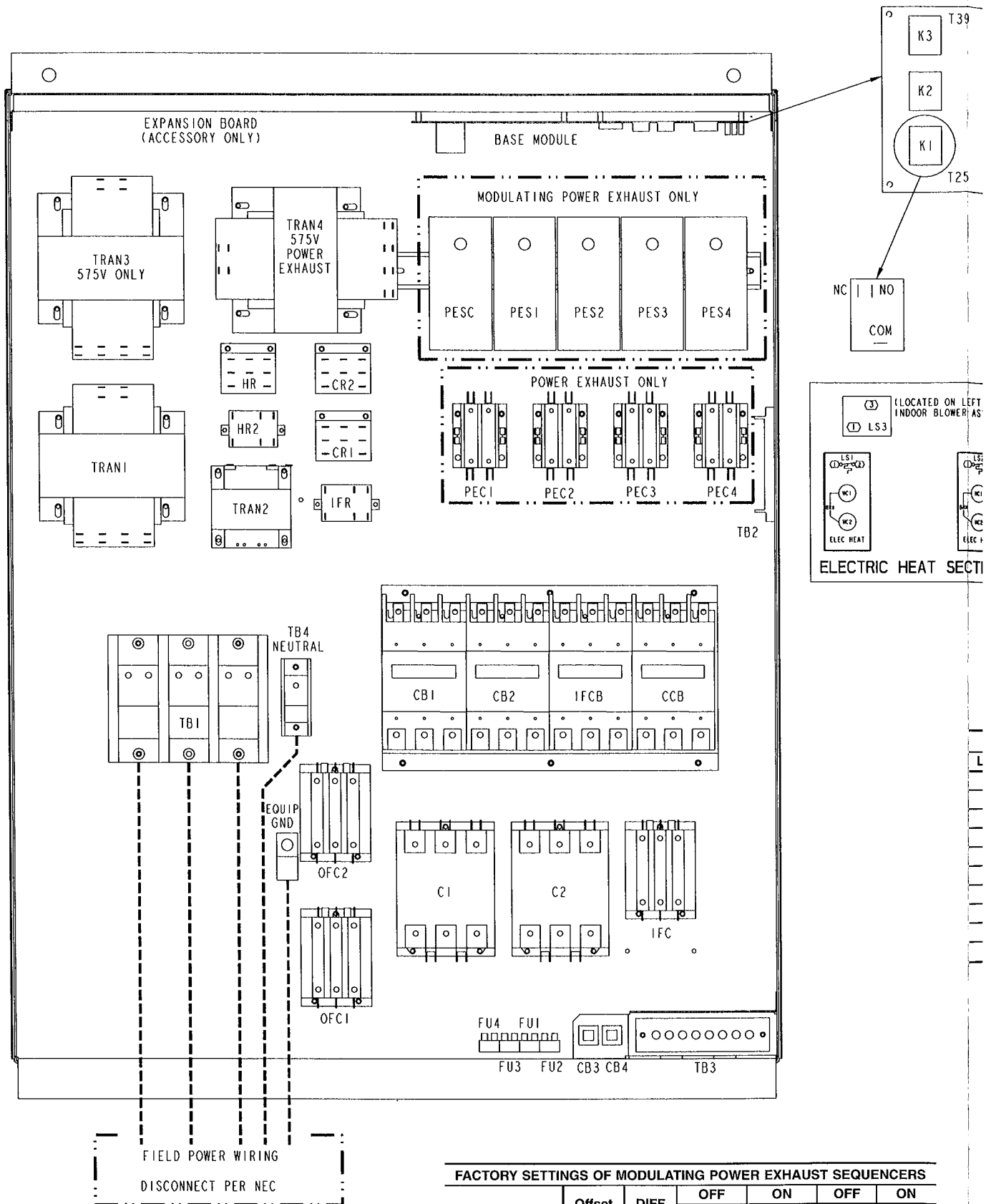
- 1 Connect TRAN1 to H4 for 460-v units. Connect to H3 for 230-v. If 208/230-v units are run with a 208-v power supply, connect to H2.
- 2 Connect TRAN2 to black lead for 460-v units. Connect to orange lead for 230-v. If 208/230-v units are run with a 208-v power supply, connect to red lead.
- 3 Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
- 4 If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
- 5 Compressors and/or fan motors are thermally protected.
- 6 Three-phase motors are protected against primary single phasing conditions.

NOTES FOR FIG. 5 AND 13

- 1 Connect TRAN1 to H4 for 575-v units.
- 2 Connect TRAN2 to black lead for 575-v units.
- 3 Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
- 4 If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
- 5 Compressors and/or fan motors are thermally protected.
- 6 Three-phase motors are protected against primary single phasing conditions.

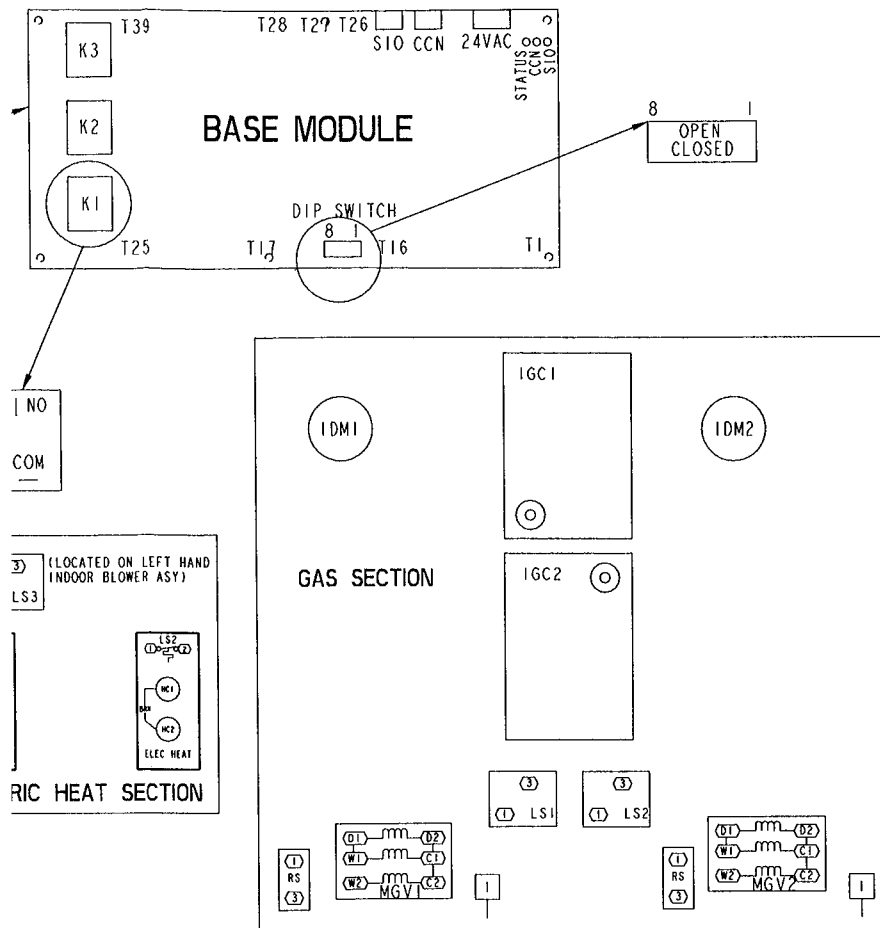
NOTES FOR FIG. 6 AND 14

- 1 Connect TRAN1 to H3 for 380-v and 400-v units.
- 2 Connect TRAN2 to orange lead for 380-v and 400-v units.
- 3 Circuit breaker Must Trip Amps are equal to or less than 156% FLA for CB1 and CB2. All others are 140%.
- 4 If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
- 5 Compressors and/or fan motors are thermally protected.
- 6 Three-phase motors are protected against primary single phasing conditions.



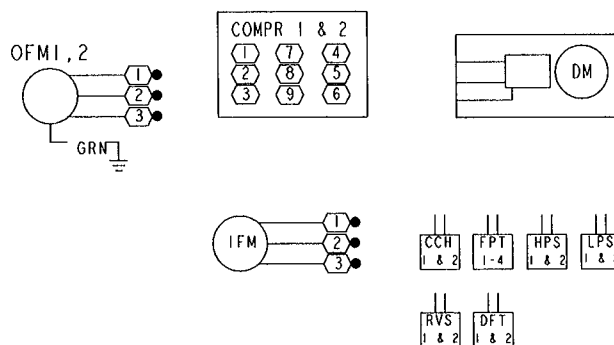
FACTORY SETTINGS OF MODULATING POWER EXHAUST SEQUENCERS						
	Offset	DIFF	OFF Voltage	ON Voltage	OFF Static	ON Static
Stage 1 (PES1)	50%	3%	6.0	6.3	0.00	0.04
Stage 2 (PES2)	55%	3%	6.5	6.8	0.06	0.10
Stage 3 (PES3)	60%	3%	7.0	7.3	0.12	0.16
Stage 4 (PES4)	64%	3%	7.4	7.7	0.18	0.22

Fig. 1 — Component Arrangement



VFD SET POINTS FOR SUPPLY AIR PRESSURE

Pressure in. wg	Control Output mA	VFD Set Point
0.00	4.00	0.0
0.25	4.80	3.0
0.50	5.60	6.0
0.75	6.40	9.0
1.00	7.20	12.0
1.25	8.00	15.0
1.50	8.80	18.0
1.75	9.60	21.0
2.00	10.40	24.0
2.25	11.20	27.0
2.50	12.00	30.0
2.75	12.80	33.0
3.00	13.60	36.0
3.25	14.40	39.0
3.50	15.20	42.0



ERROR CODE DESCRIPTION FOR CONTROL BOARD	
LED Blinks	Error Mode
2	Compressor 1 Safety
3	Compressor 2 Safety
4	Thermostat Failure
5	SAT Thermistor Failure
6	OAT Thermistor Failure
7	SPT Thermistor Failure
8	RAT Thermistor Failure
9	Loss of Communications with Expansion Board
10	Control Board Failure
11	Expansion I/O Board Failure

ERROR CODE DESCRIPTION FOR CONTROL BOARD	
LED Blinks	Error Mode
ON	Normal Operation
OFF	Hardware Failure
1	Fan On/Off Delay Modified
2	Limit Switch Fault
3	Flame Sense Fault
4	Four Consecutive Limit Switch Faults
5	Ignition Lockout Fault
6	Induced Draft Motor Fault
7	Rollout Switch Fault
8	Internal Control Fault

NOTE: When W1 is energized the burners will remain on for a minimum of 60 seconds. If more than one error mode exists they will be displayed on the LED in sequence.

BASE MODULE CONTROL BOARD DIP SWITCH ASSIGNMENTS (VERSION 2.0 SOFTWARE)

Setting	8	7	6	5	4	3	2	1
Open	Heat Pump	Gas Heat	Timeguard Override on	VAV Occupied Heat Enabled	Field Test On	Expansion I/O Board	VAV Space Sensor Installed	VAV
			In Conjunction with Field Test Set Minimum Damper Position On	CV Modulated Power Exhaust			CV CCH or Sensors Used	
Closed	Standard A/C Operation	Electric Heat	Timeguard Override Off	VAV Occupied Heat Disabled	Field Test Off	Base Control Board Only	VAV No Space Sensor	CV
				CV Constant Volume Power Exhaust			CV Thermostat	

JENCERS	
ON	
Static	
0.04	
0.10	
0.16	
0.22	

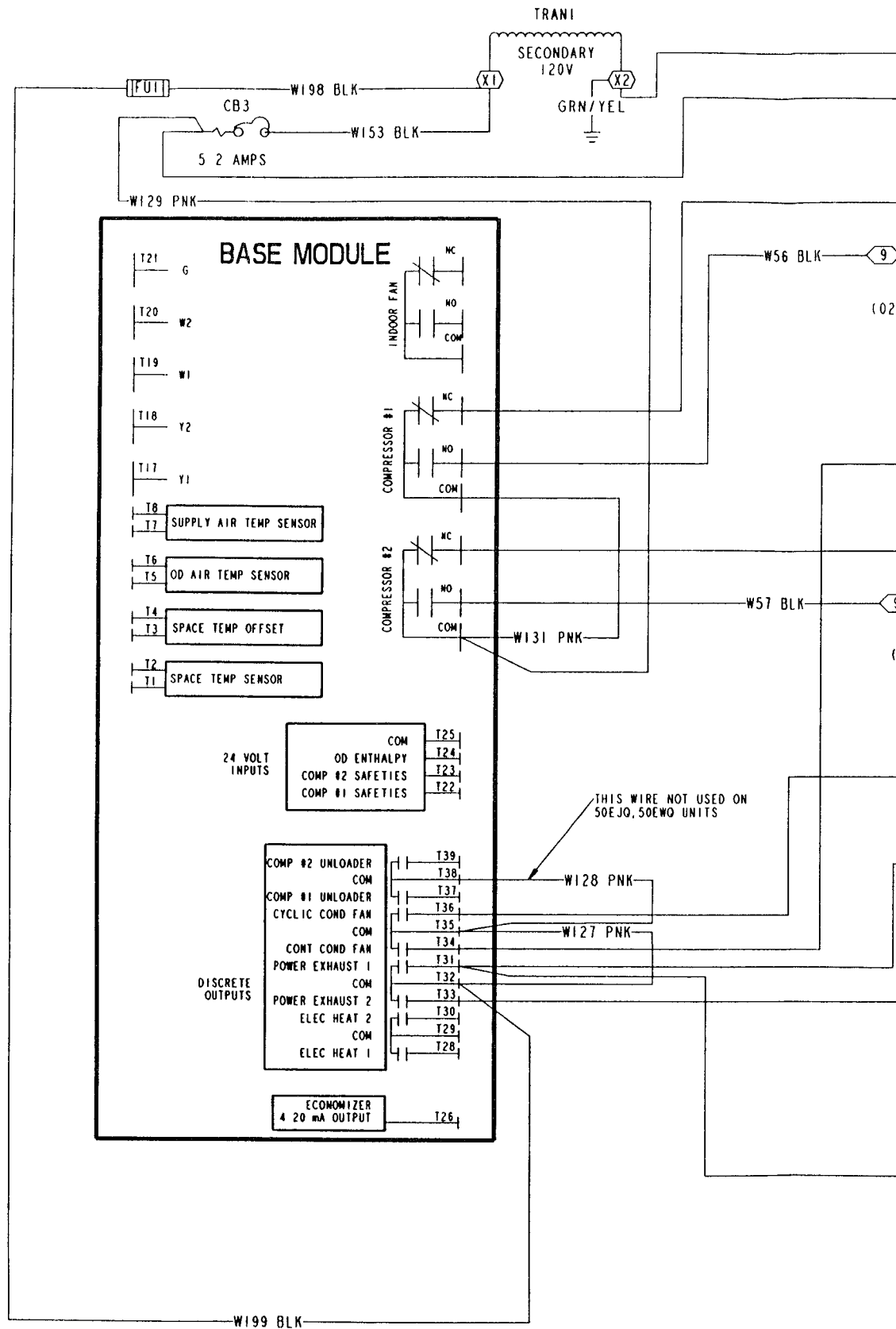
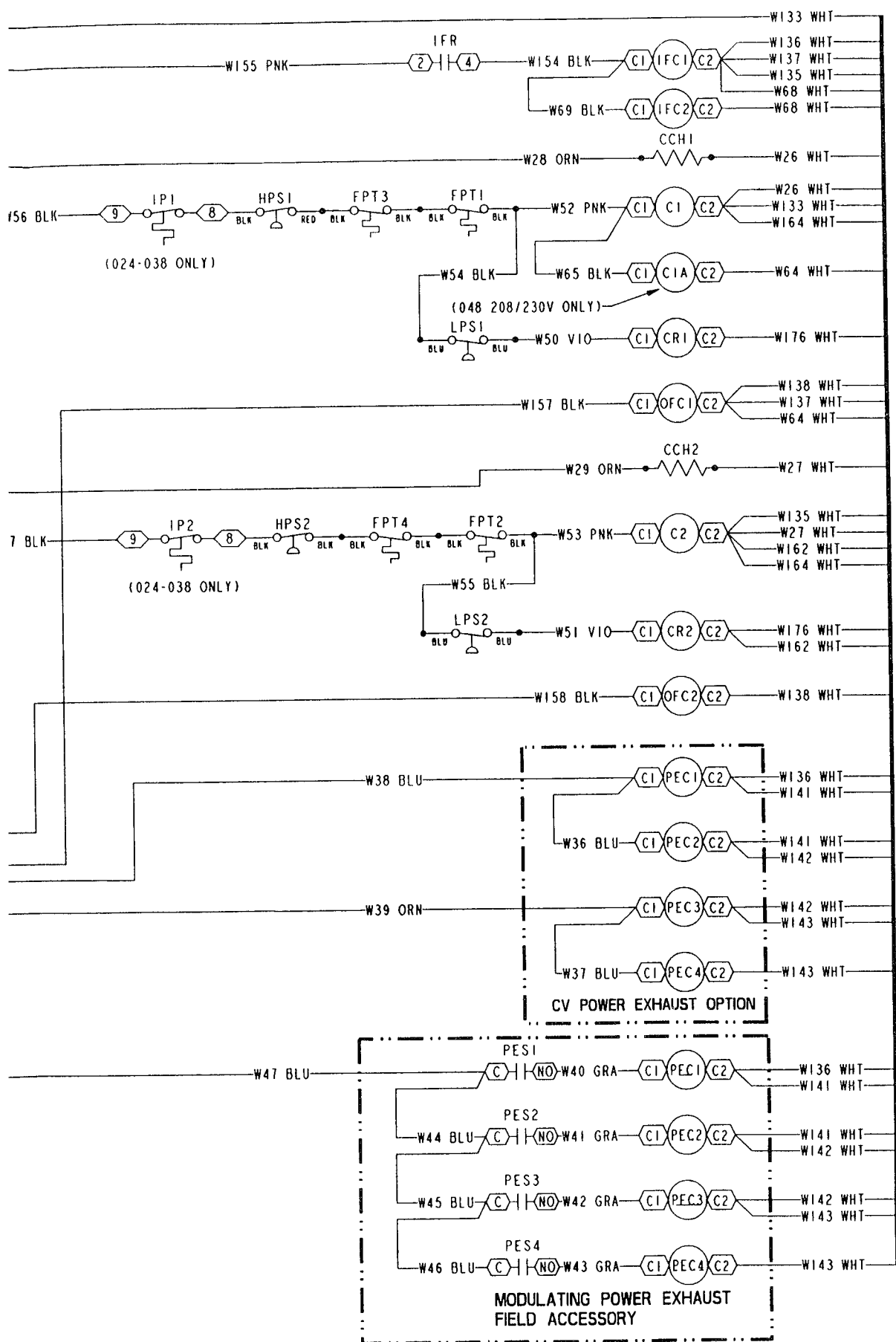


Fig. 2A — Control Circuit (120-v) — 48/50EJ,EW024-048



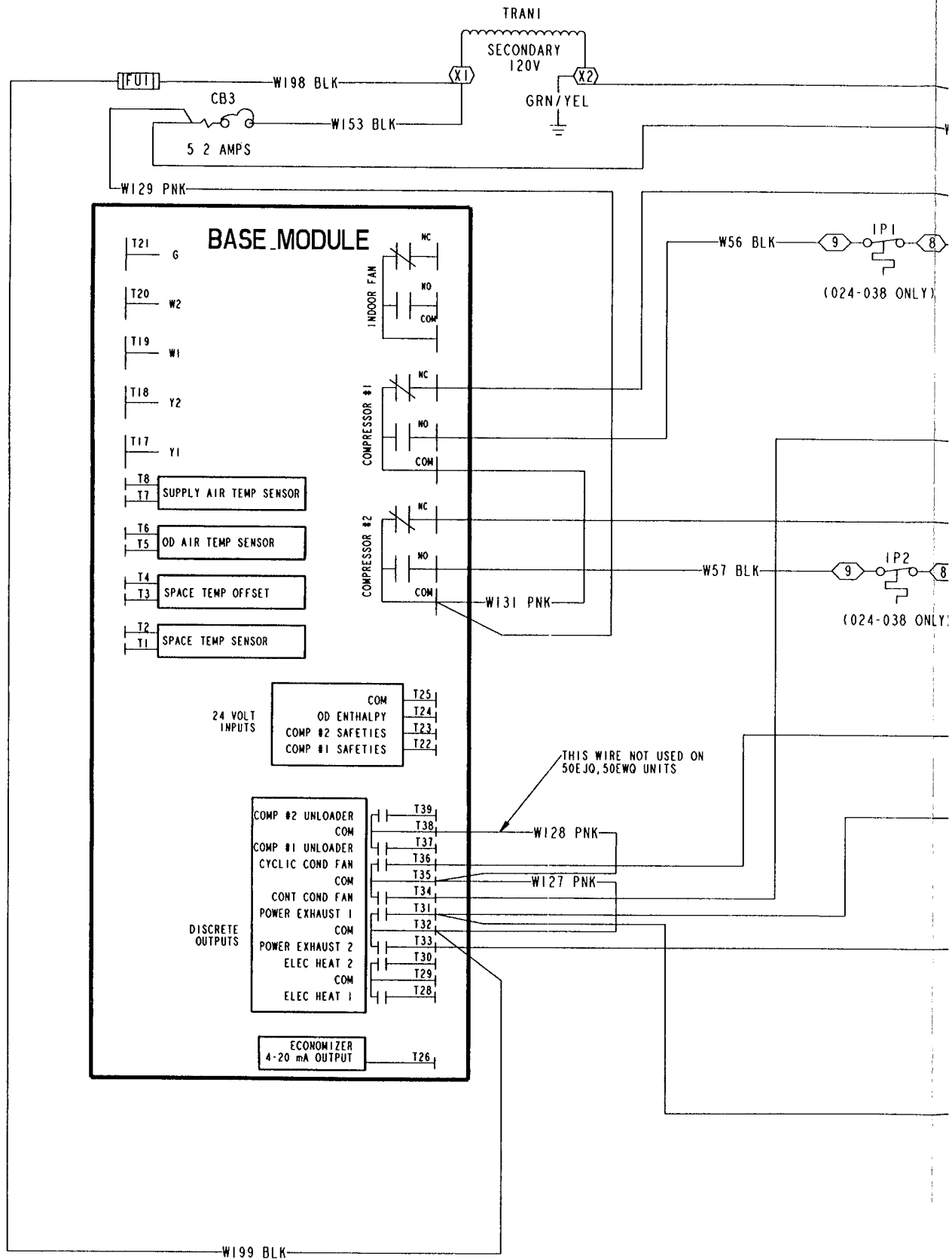
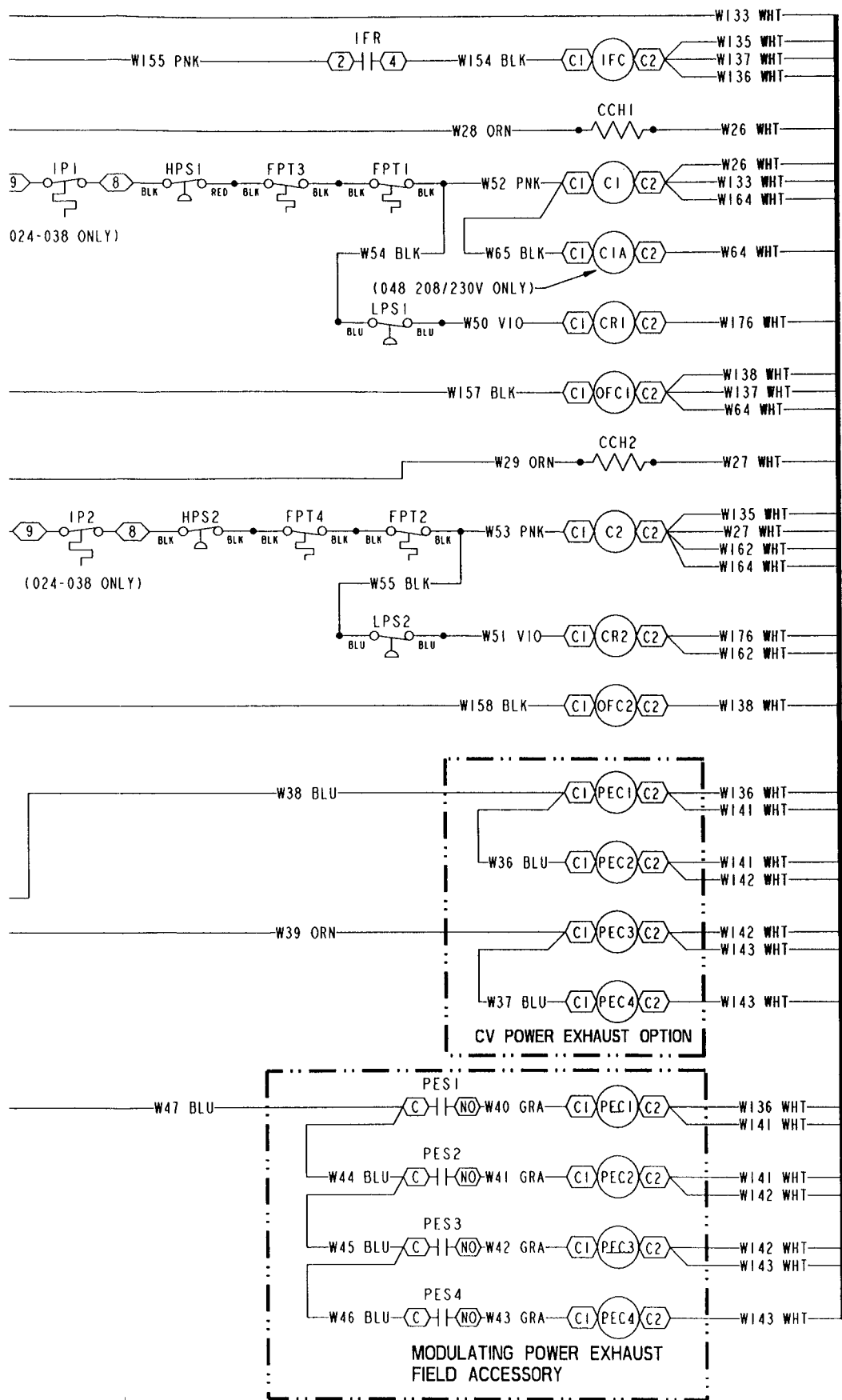


Fig. 2B — Control Circuit (120-v) — 48/50EJ,EW024-048, and 50EJQ,EWQ024



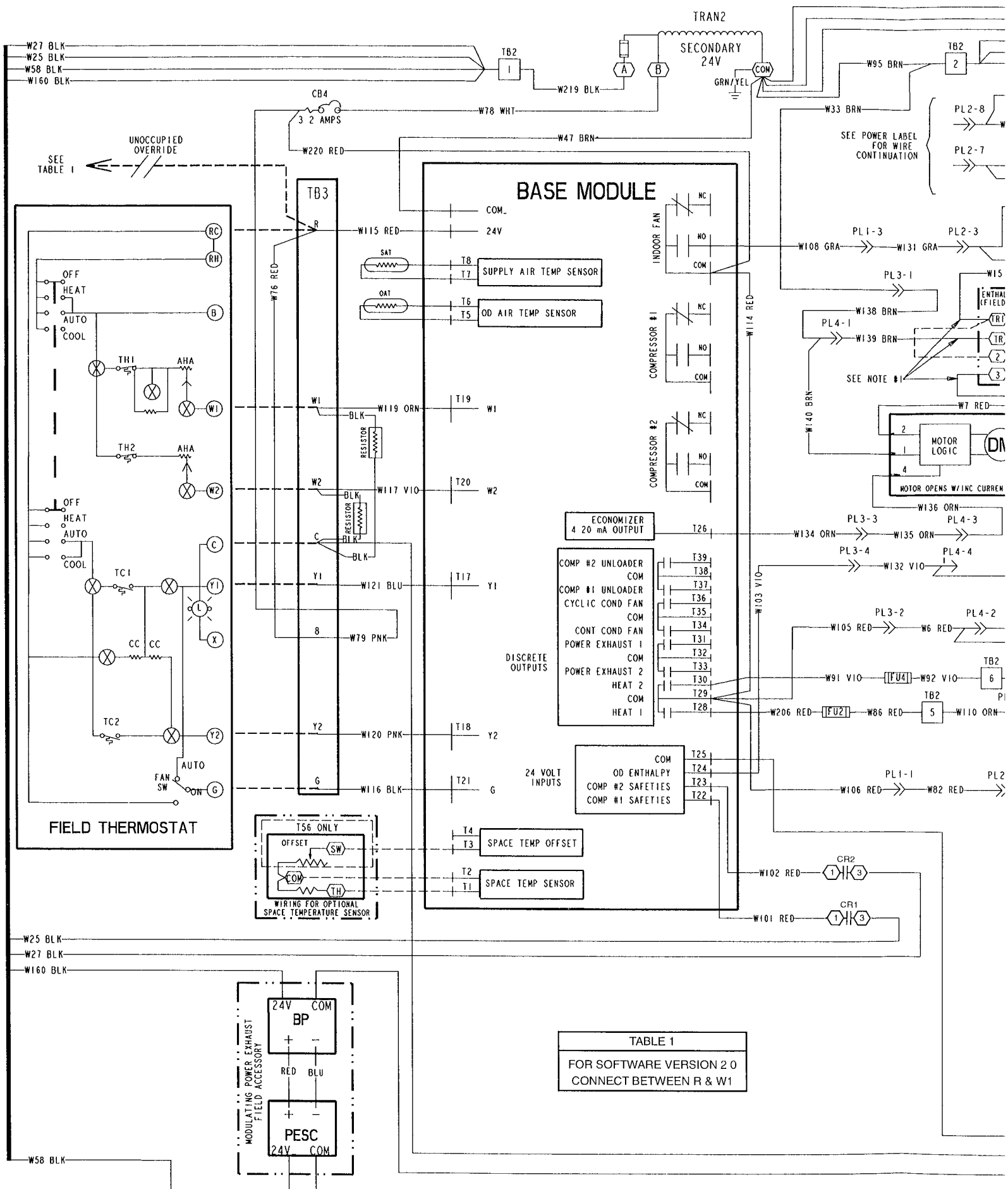
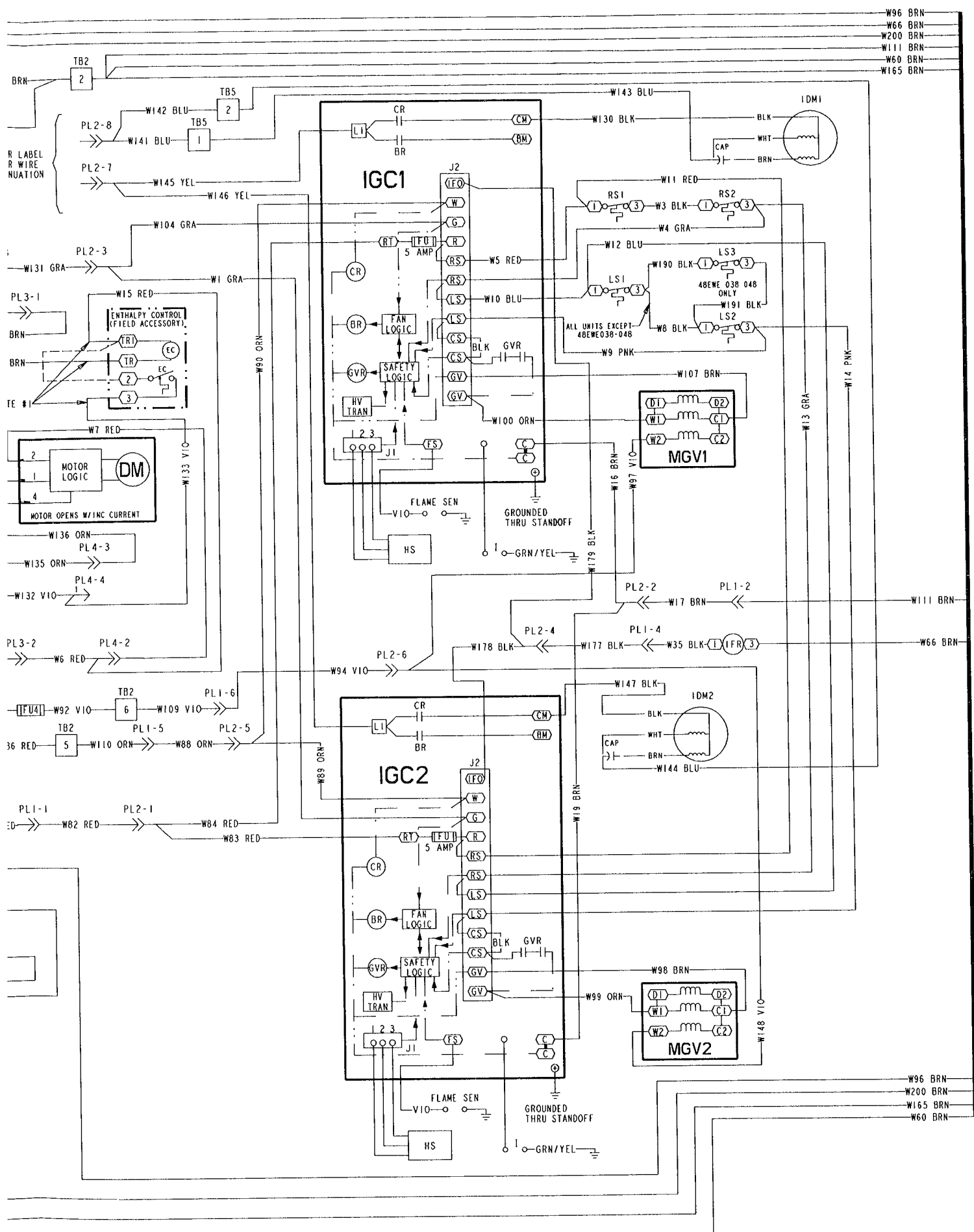


TABLE 1
FOR SOFTWARE VERSION 2.0 CONNECT BETWEEN R & W1

Fig. 3 — Control Circuit (24-v) -



rol Circuit (24-v) — 48EJ,EW024-048 Units

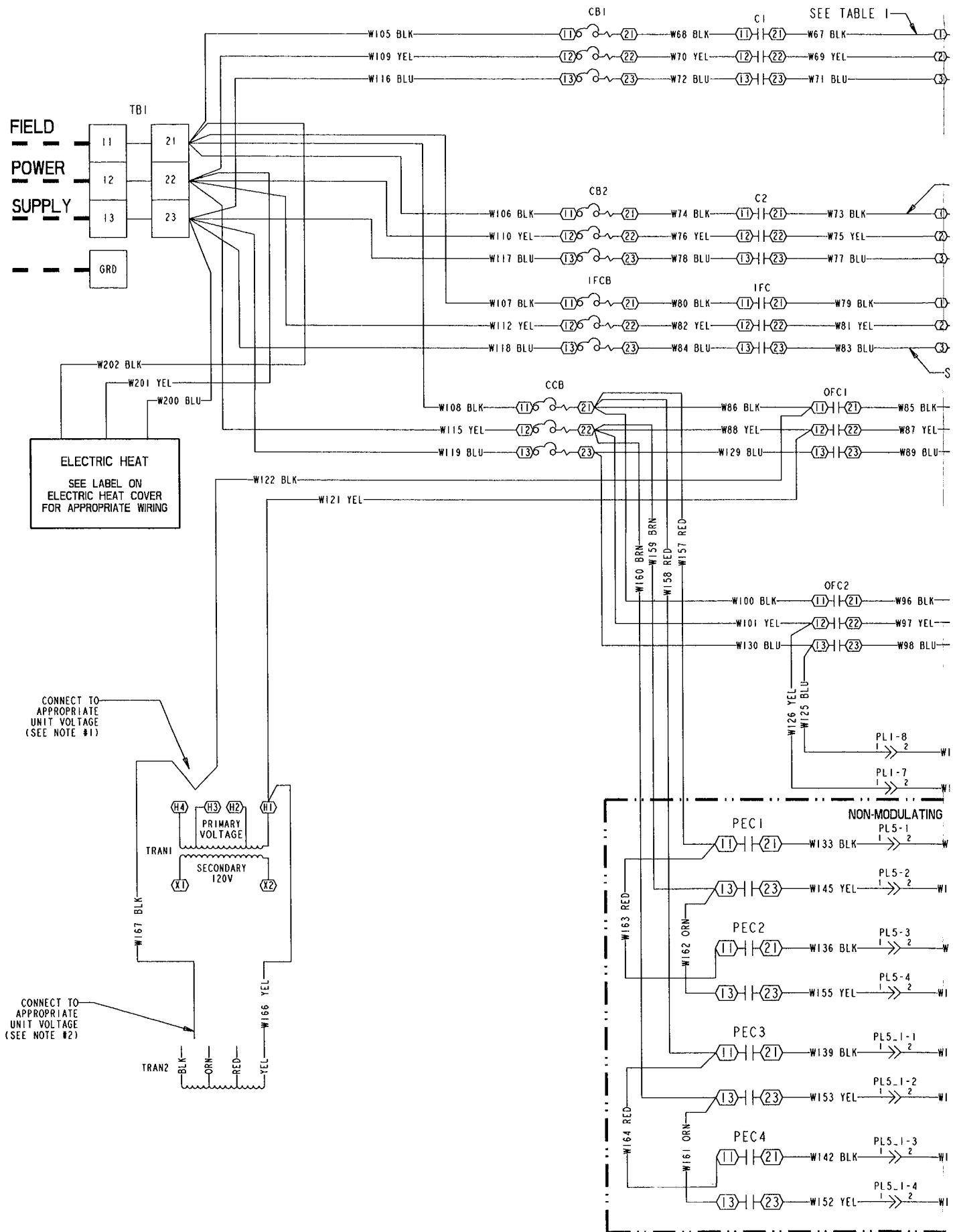


Fig. 4 — Power Schematic — 48/50EJ,EK,EW,EY024-034 and 50EJQ,EV

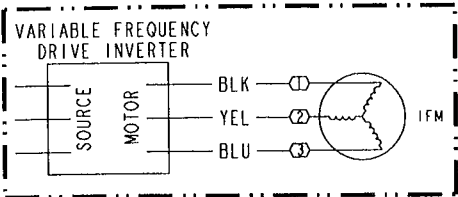
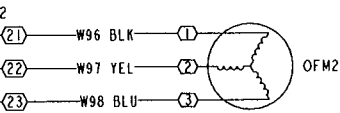
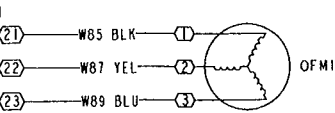
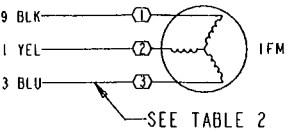
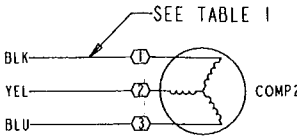
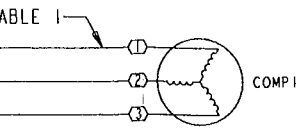
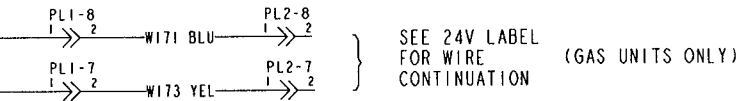


TABLE 1

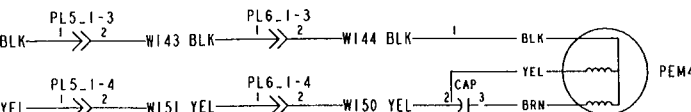
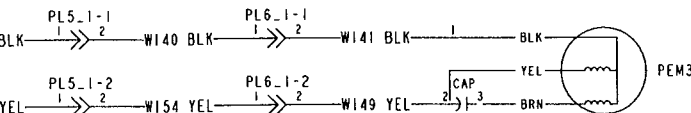
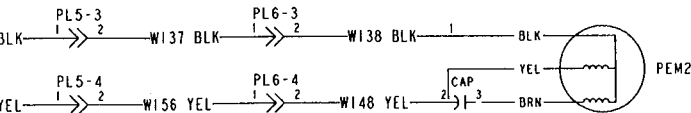
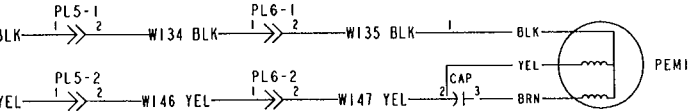
THE FOLLOWING COMPRESSORS HAVE TWO PARALLEL WIRES RUN FROM TB1 TO THE COMPRESSORS		
COMPRESSOR MODEL	VOLTAGE	WIRE QUANTITY
06D-537	208/230-3-60	2

TABLE 2

THE FOLLOWING FAN MOTORS HAVE TWO PARALLEL WIRES RUN FROM TB1 TO THE FAN MOTORS		
INDOOR MOTOR	VOLTAGE	WIRE QUANTITY
20 HP	208/230-3-60	2



NON-MODULATING OR MODULATING POWER EXHAUST



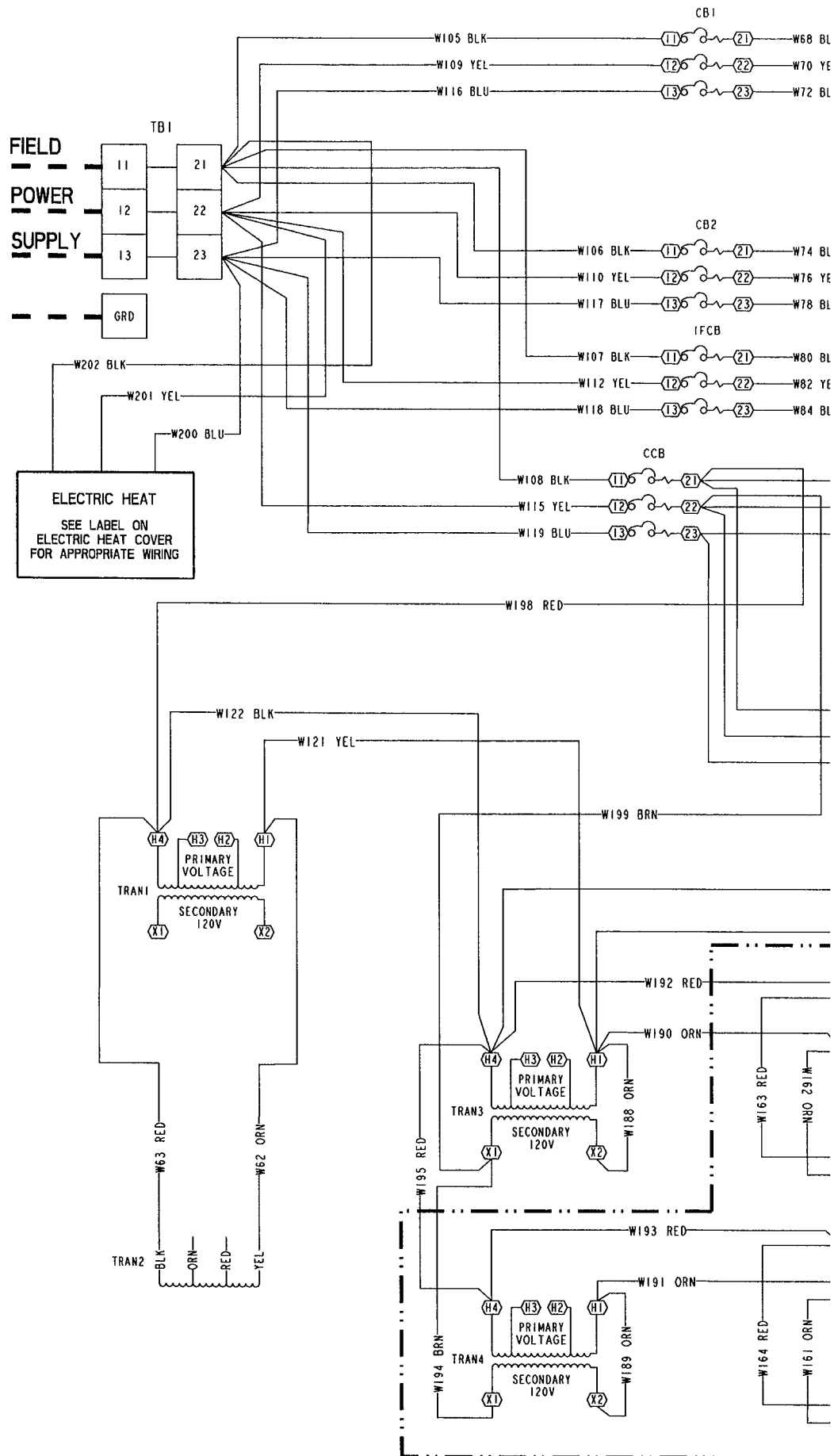


Fig. 5 — Power Schematic 48/50EJ,E

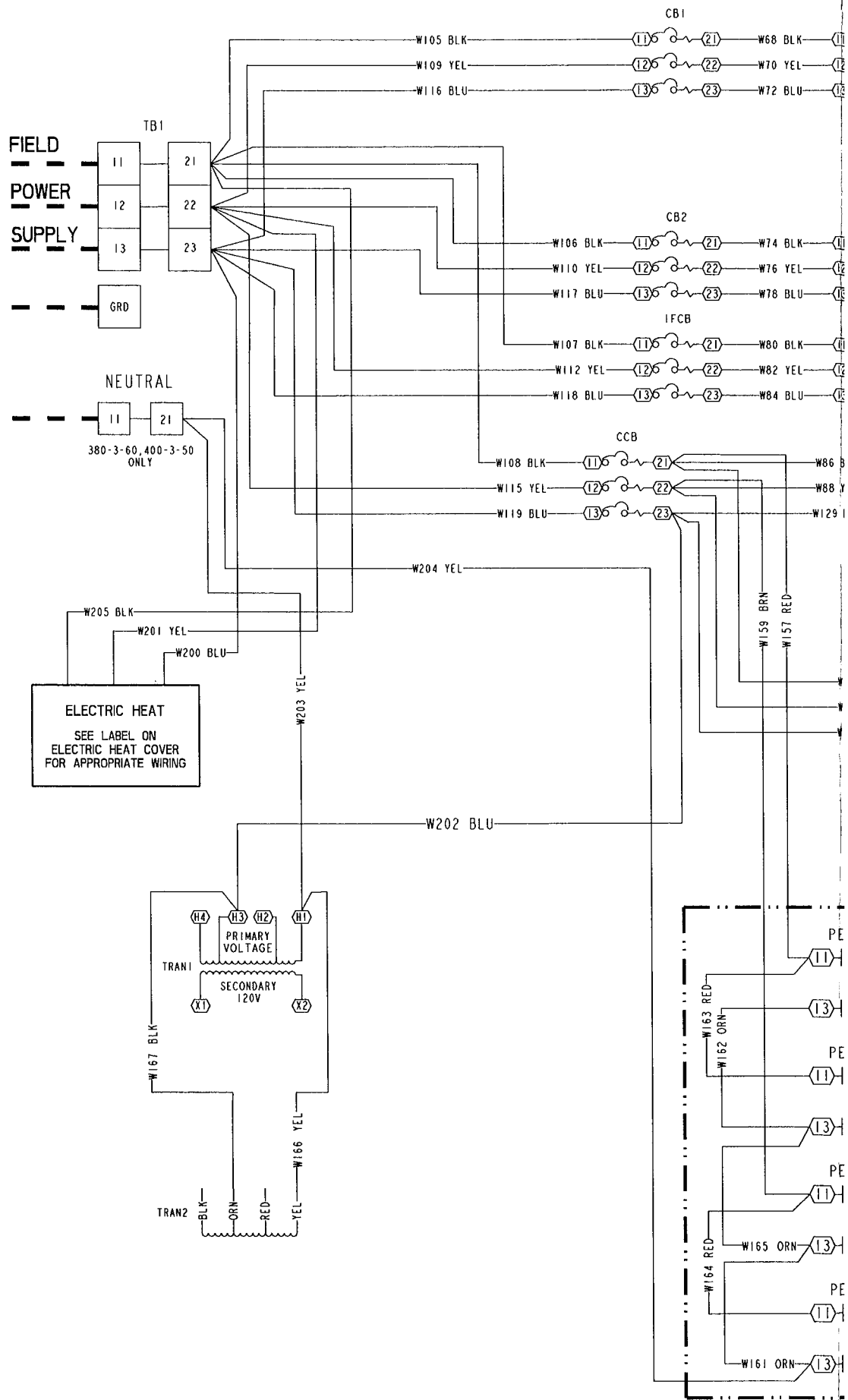
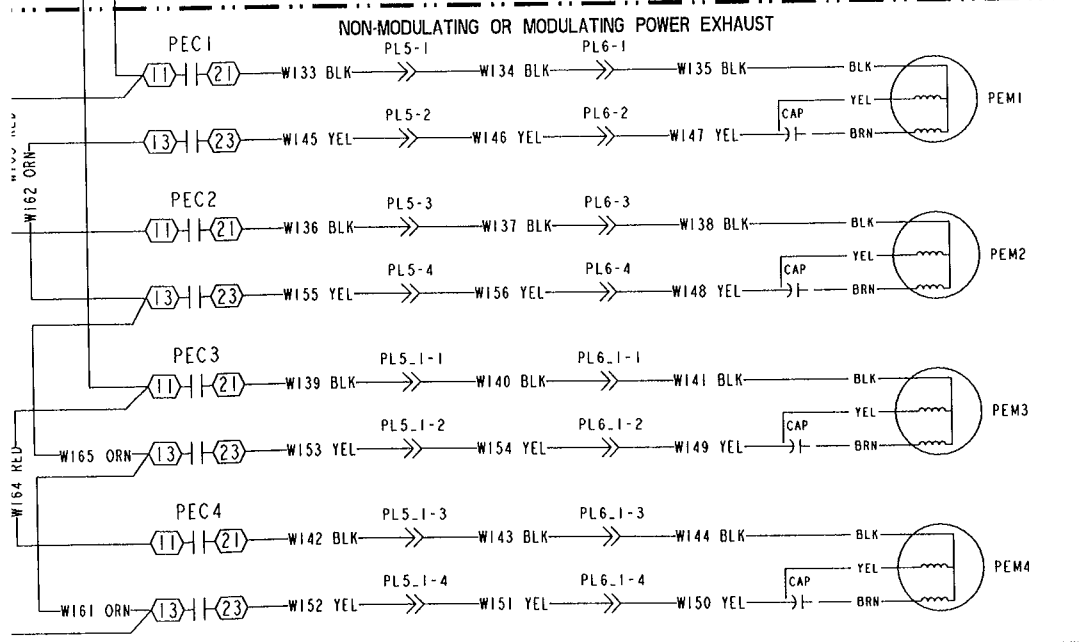
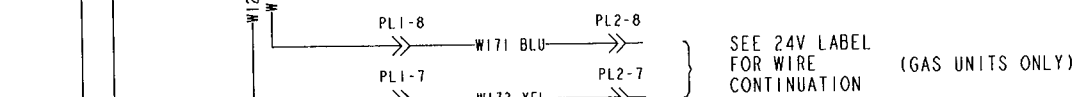
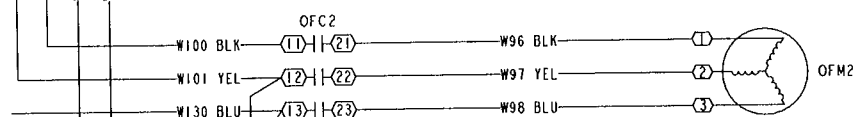
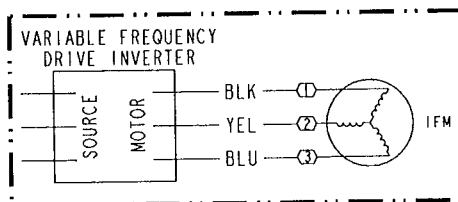


Fig. 6 — Power Schematic — 48/50EJ,EK,EW,EY



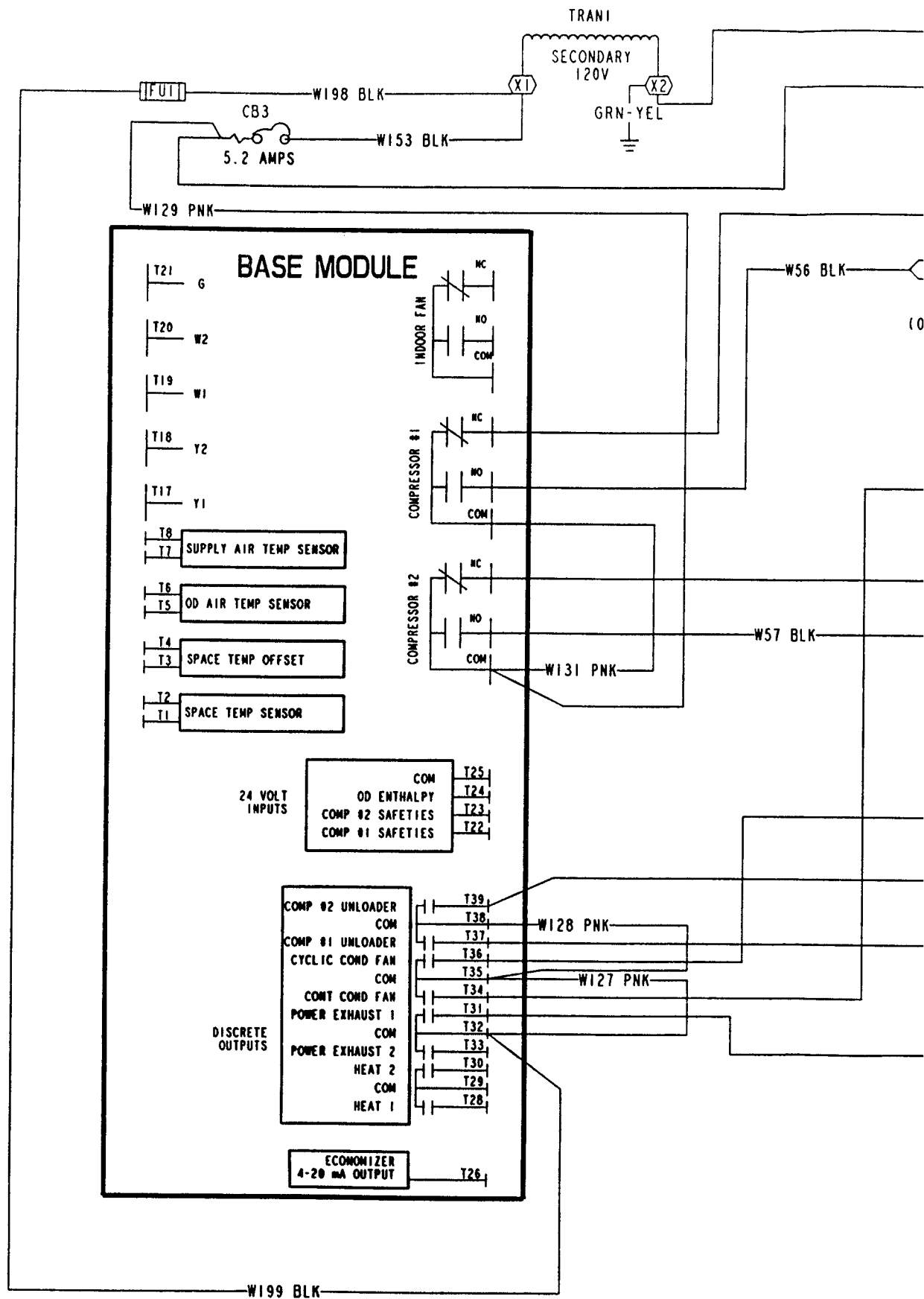
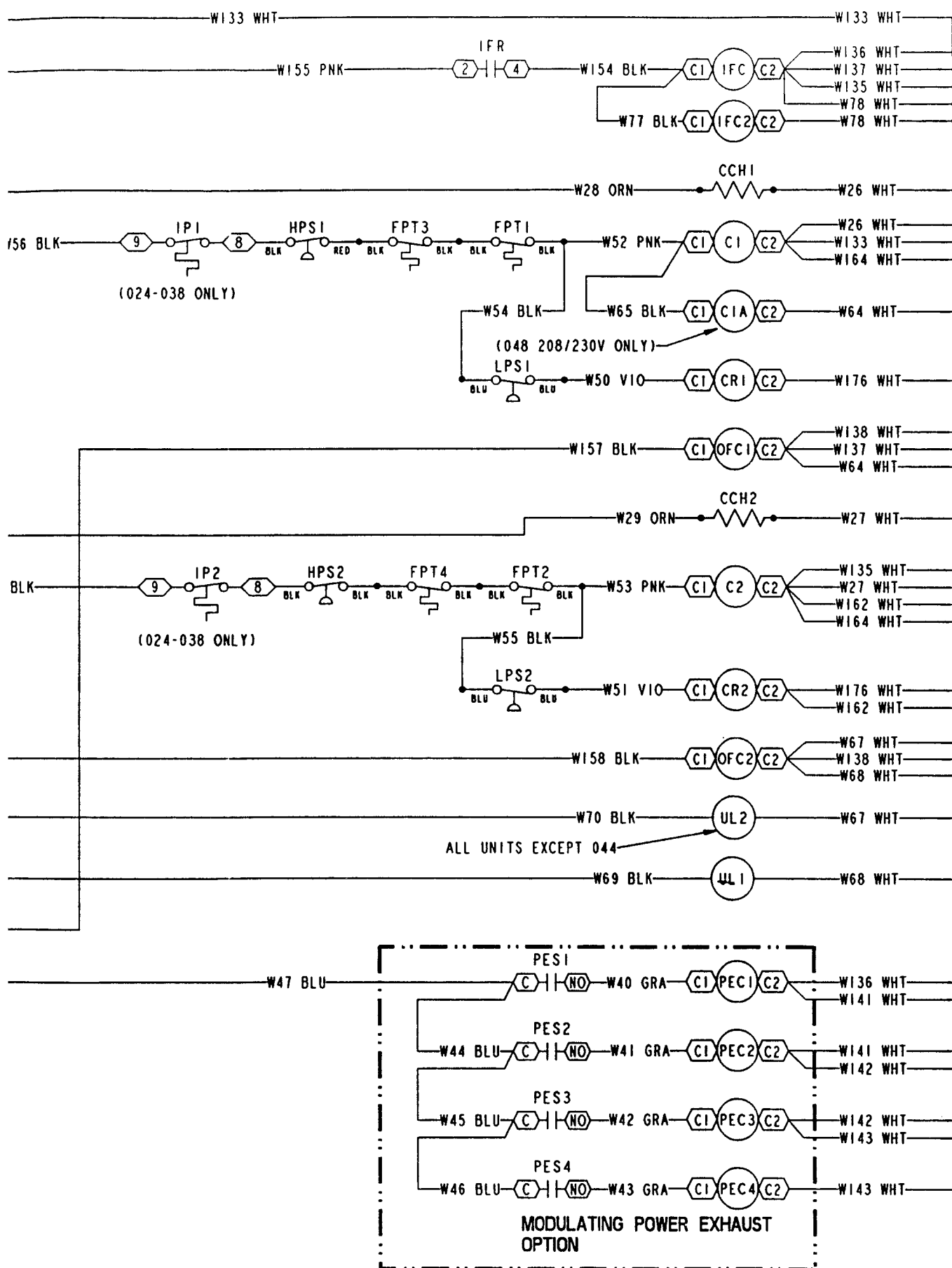


Fig. 7A — Control Circuit (120-v) — 48/50EK,EY024-04



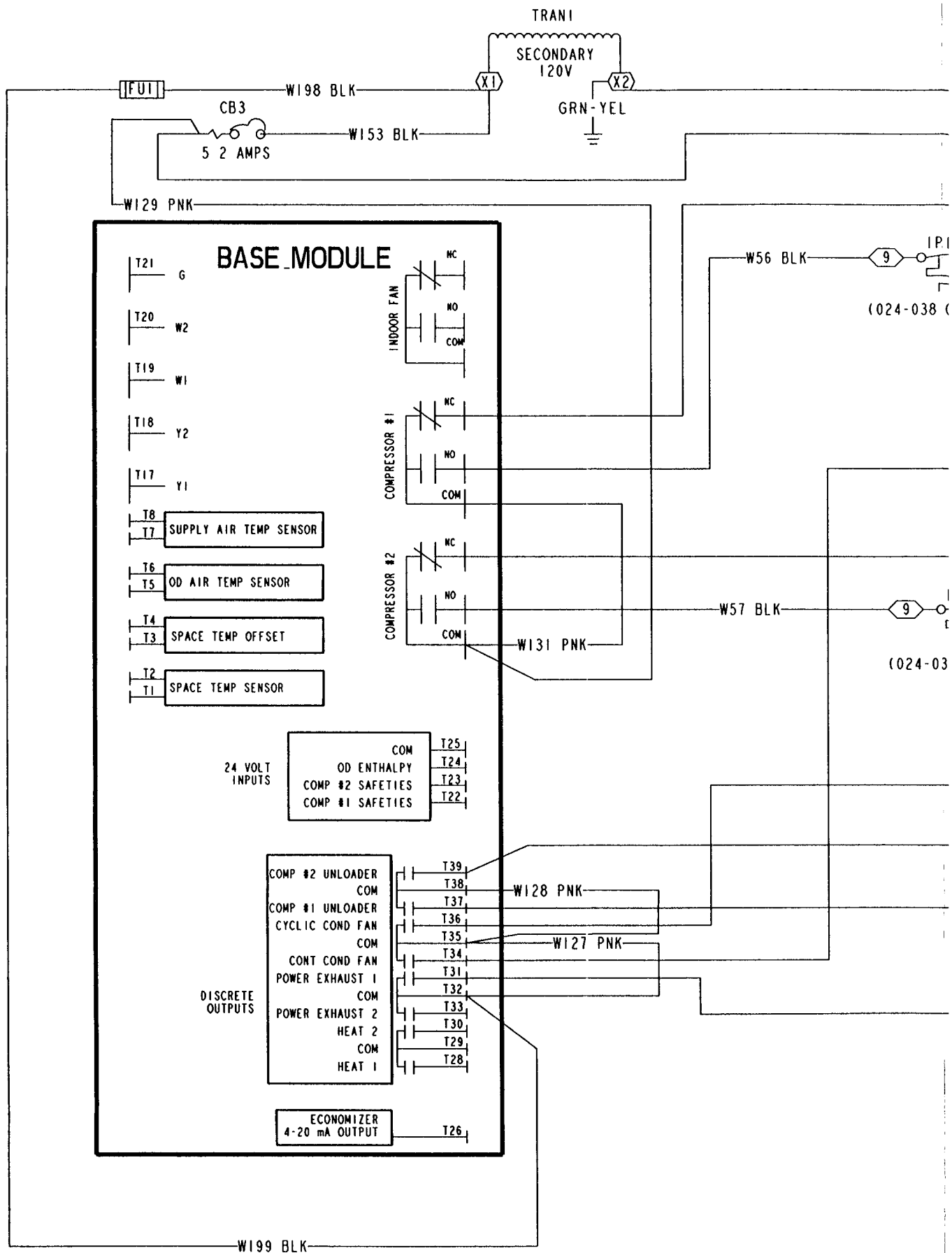
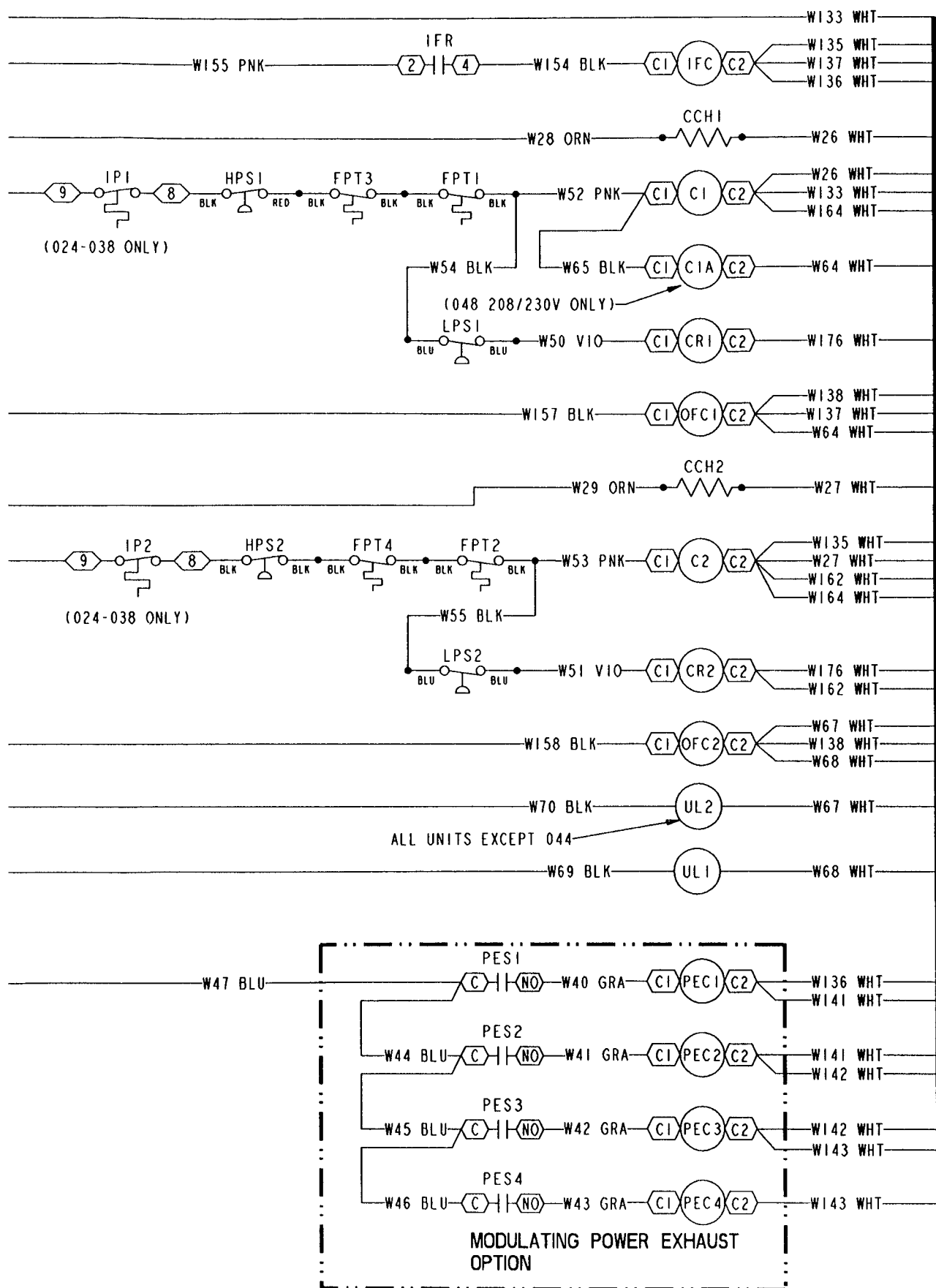


Fig. 7B — Control Circuit (120-v) — 48/50EK, EY024-048 Un



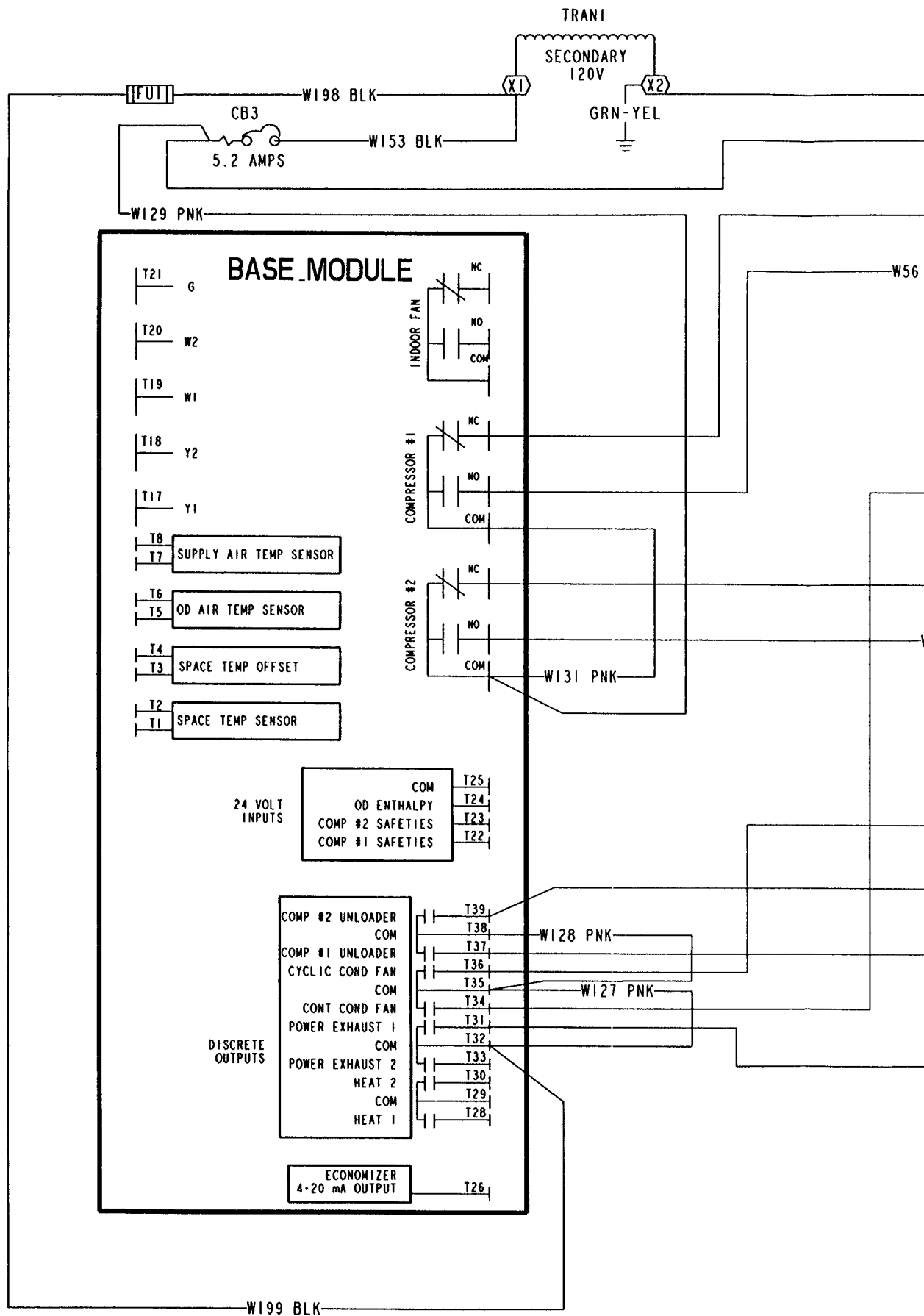
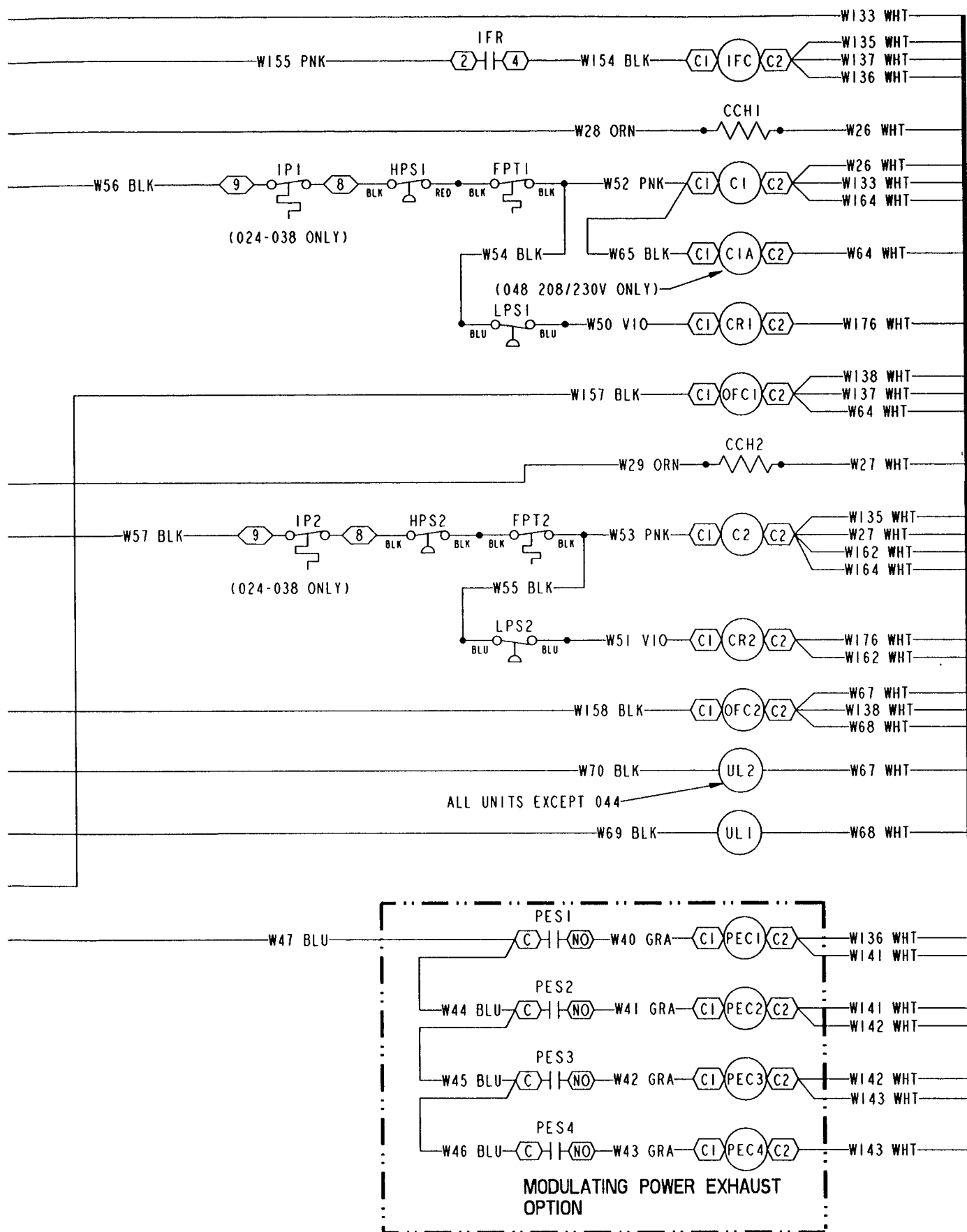
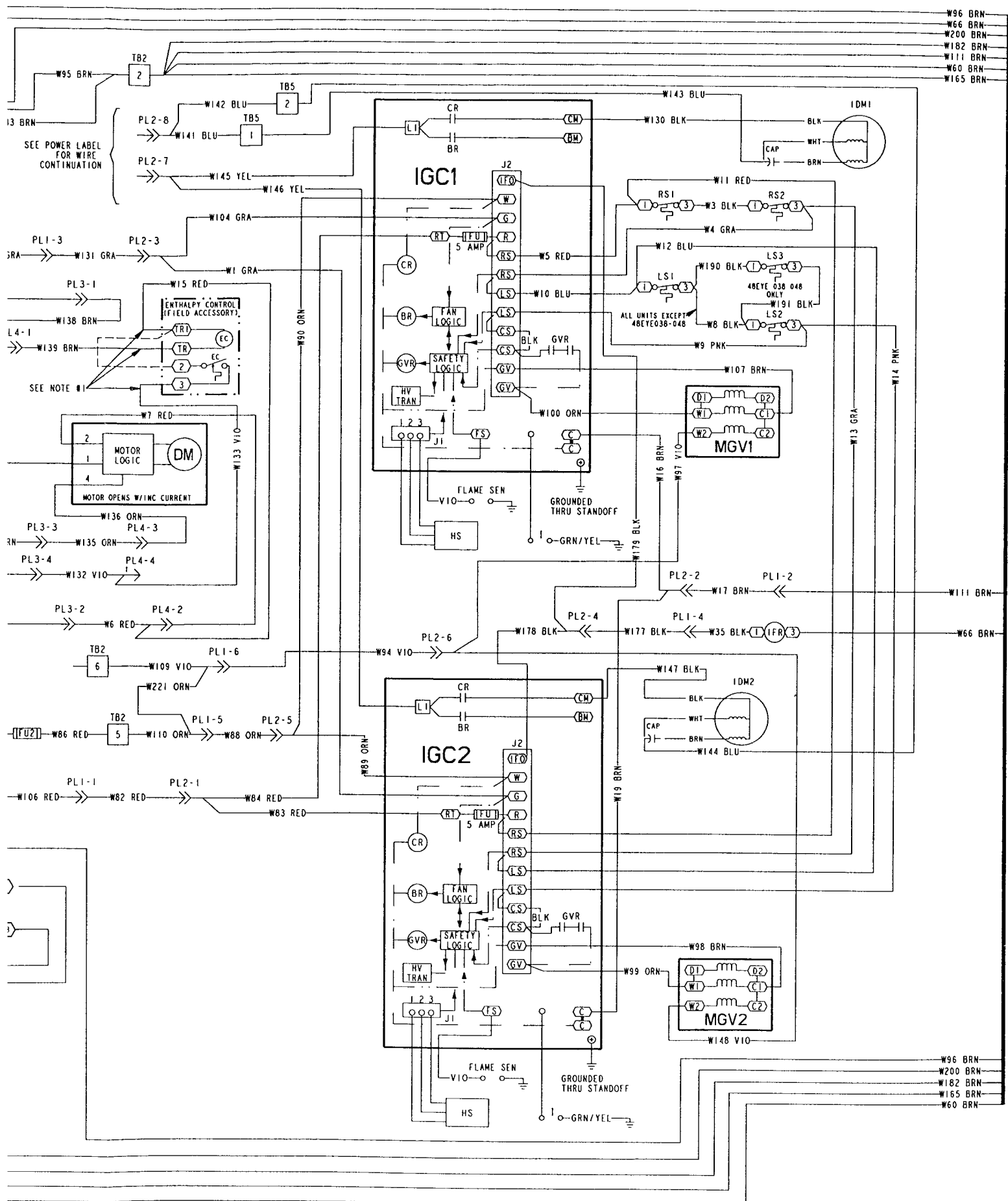
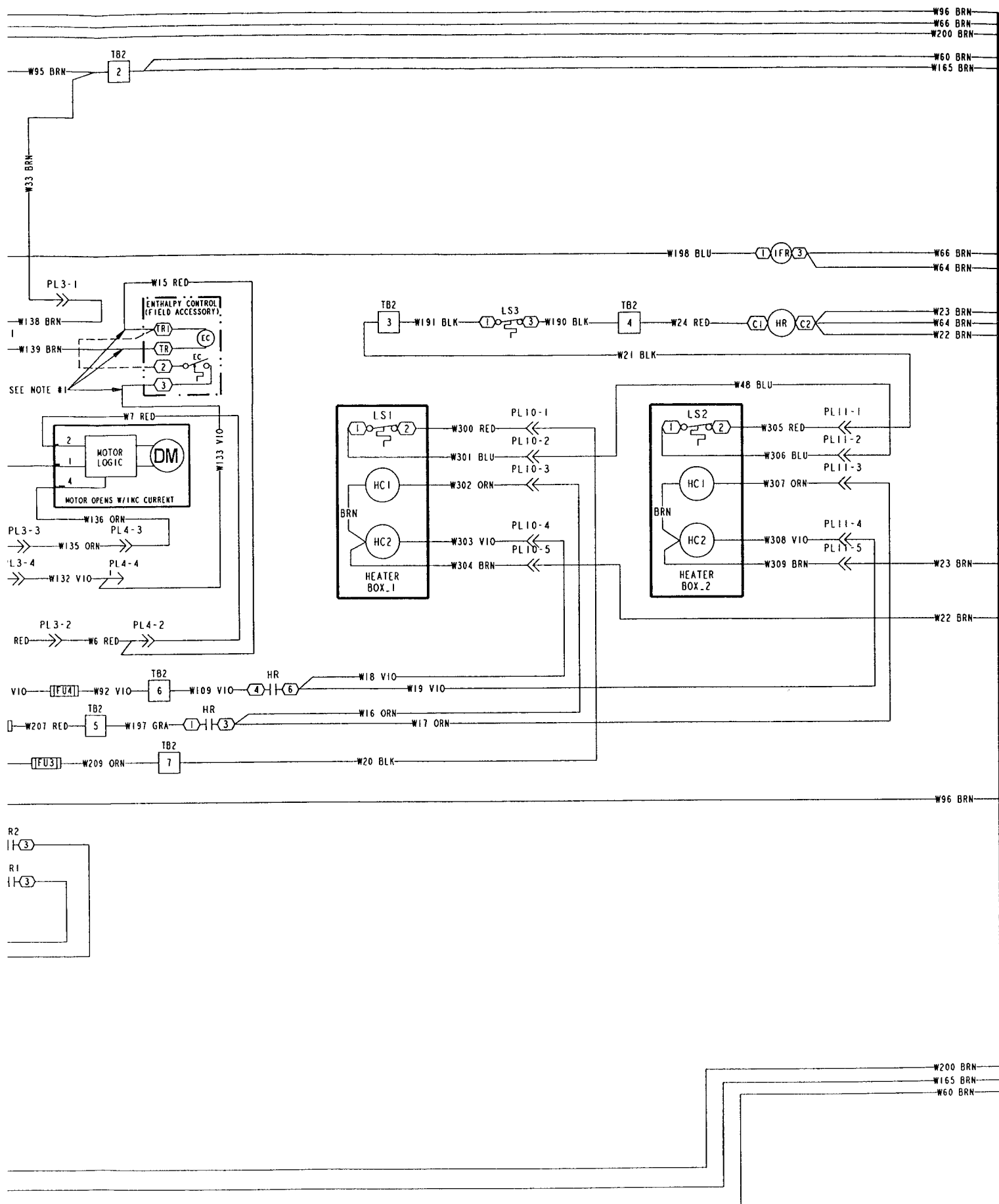
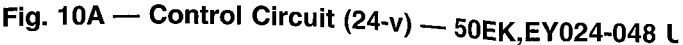


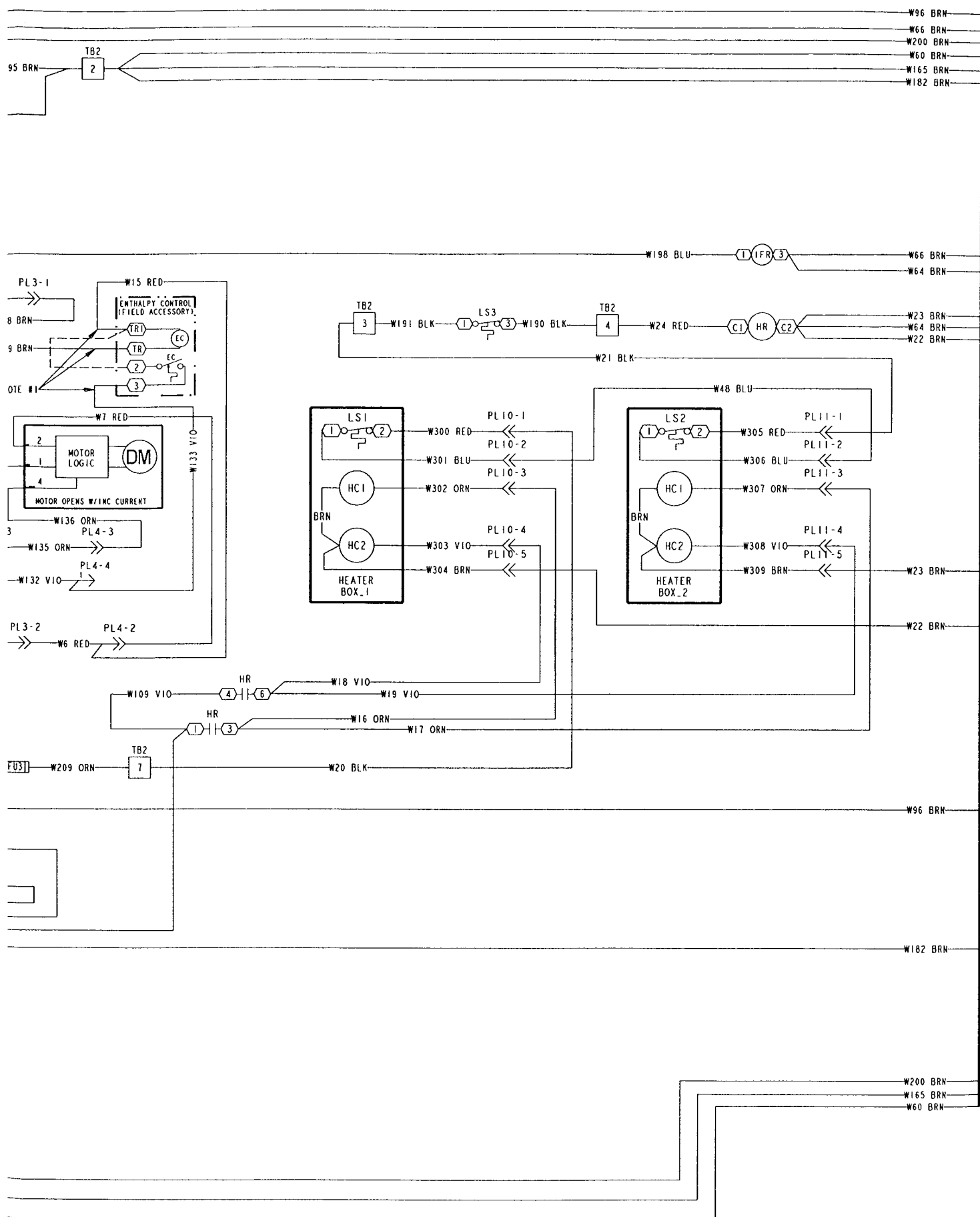
Fig. 7C — Control Circuit (120-v) — 48/50EK,EY024-0.

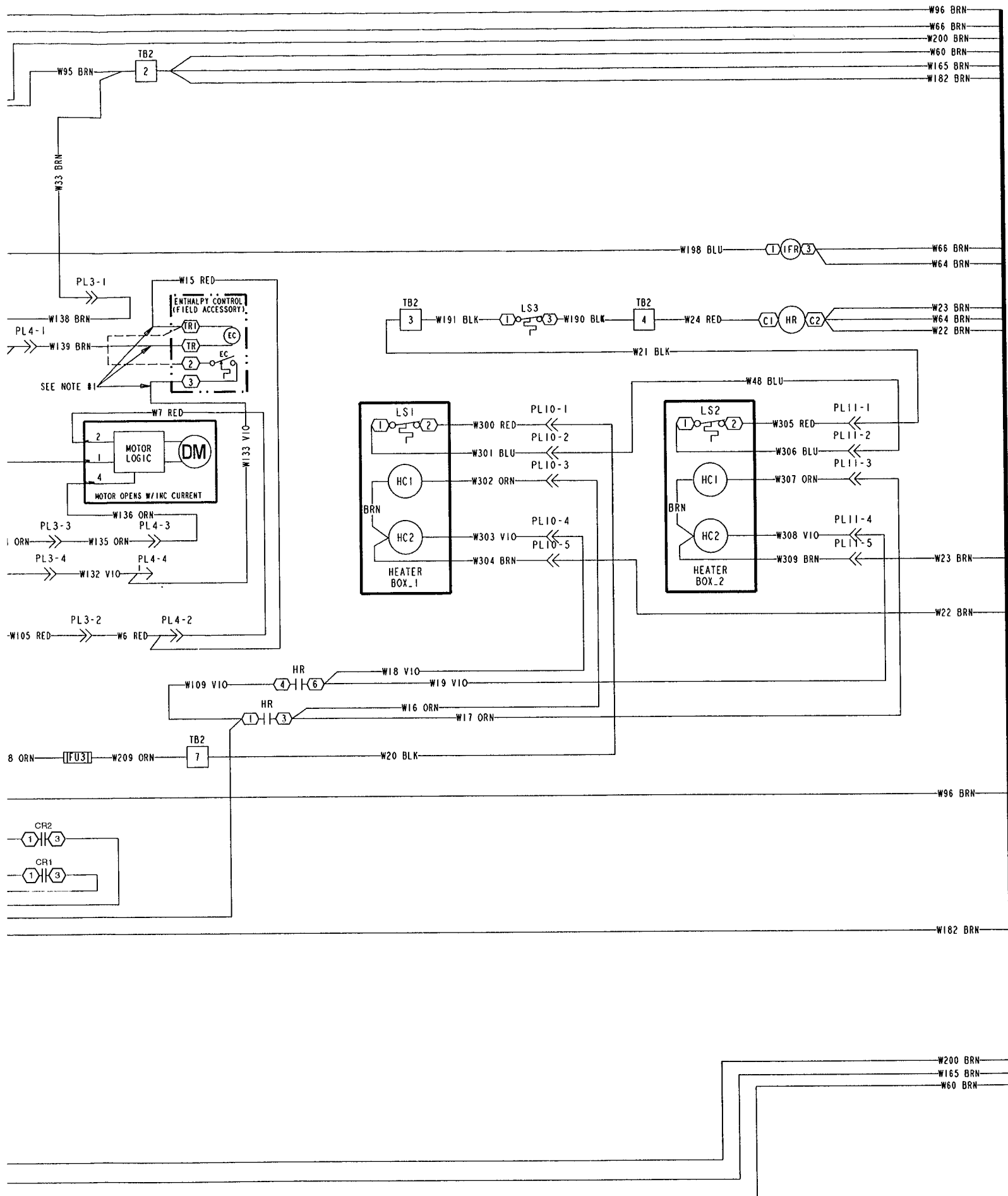












024-048 Units with Unit Serial Numbers 4596F to 0797F

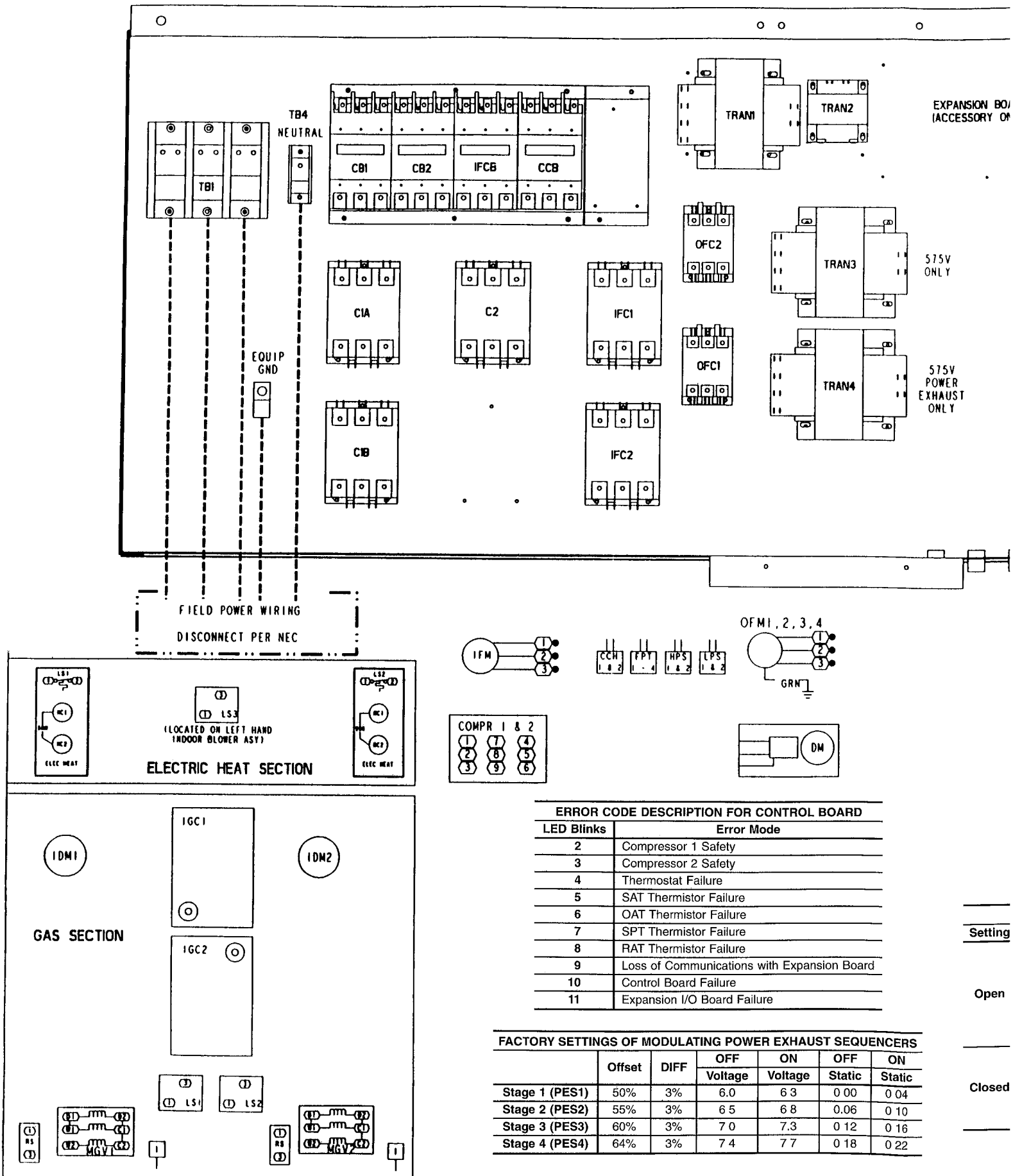
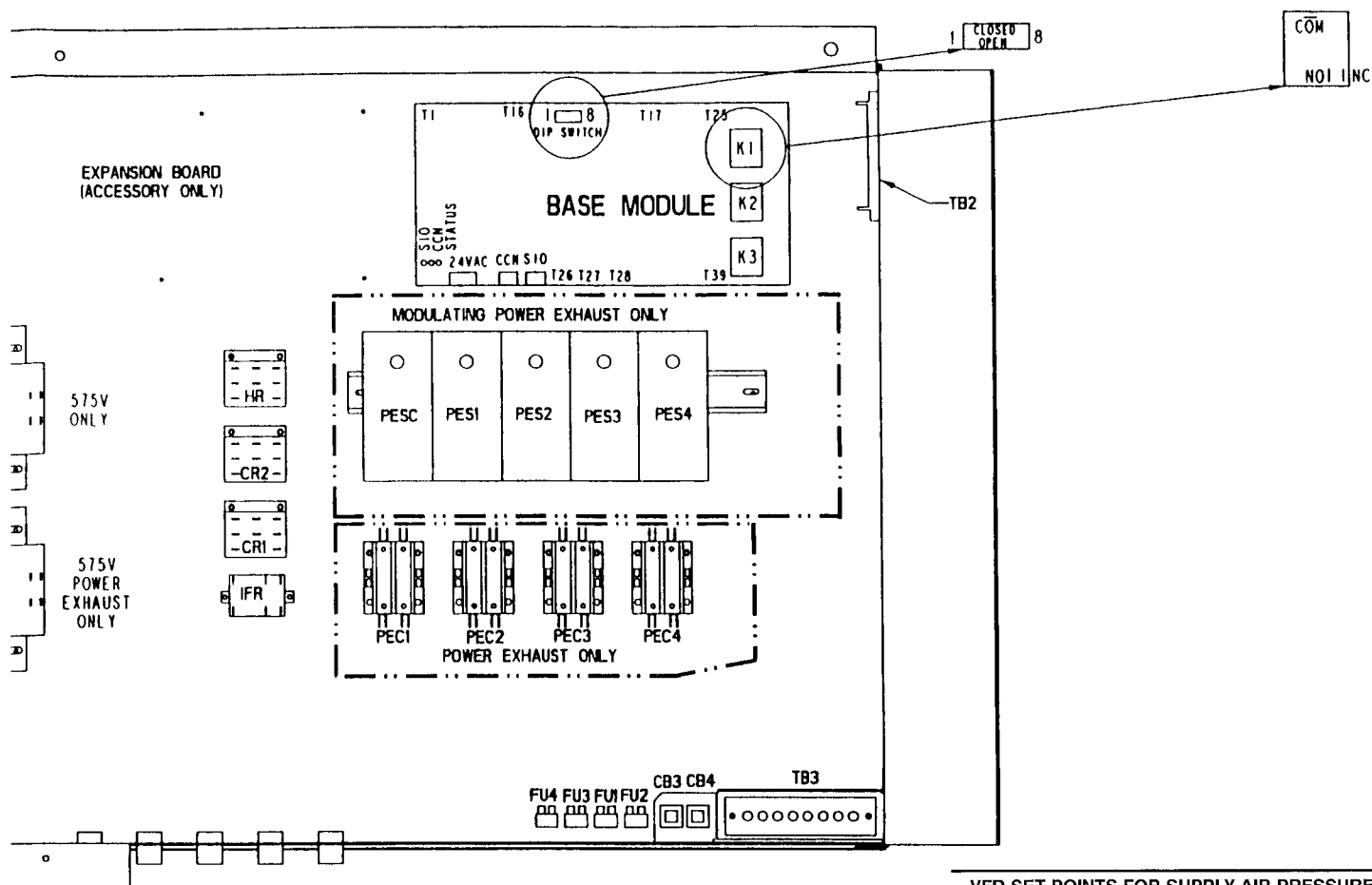


Fig. 11A — Component Arrangement, 48/50EJ,EK,EW,EY03



ERROR CODE DESCRIPTION FOR IGC CONTROL BOARD

LED Blinks	Error Mode
ON	Normal Operation
OFF	Hardware Failure
1	Fan On/Off Delay Modified
2	Limit Switch Fault
3	Flame Sense Fault
4	Four Consecutive Limit Switch Faults
5	Ignition Lockout Fault
6	Induced Draft Motor Fault
7	Rollout Switch Fault
8	Internal Control Fault

NOTE: When W1 is energized the burners will remain on for a minimum of 60 seconds. If more than one error mode exists they will be displayed on the LED in sequence

VFD SET POINTS FOR SUPPLY AIR PRESSURE

Pressure in. wg	Control Output mA	VFD Set Point
0.00	4.00	0.0
0.25	4.80	3.0
0.50	5.60	6.0
0.75	6.40	9.0
1.00	7.20	12.0
1.25	8.00	15.0
1.50	8.80	18.0
1.75	9.60	21.0
2.00	10.40	24.0
2.25	11.20	27.0
2.50	12.00	30.0
2.75	12.80	33.0
3.00	13.60	36.0
3.25	14.40	39.0
3.50	15.20	42.0

BASE MODULE CONTROL BOARD DIP SWITCH ASSIGNMENTS (VERSION 2.0 SOFTWARE)

Setting	1	2	3	4	5	6	7	8
Open	VAV	VAV Space Sensor Installed	Expansion I/O Board	Field Test On	VAV Occupied Heat Enabled	Timeguard Override on	Gas Heat	Heat Pump Operation
		CV CCN or Sensors Used			CV Modulated Power Exhaust	In Conjunction with Field Test Set Minimum Damper Position On		
Closed	CV	VAV No Space Sensor	Base Control Board Only	Field Test Off	VAV Occupied Heat Disabled	Timeguard Override Off	Electric Heat	Standard A/C Operation
		CV Thermostat			CV Constant Volume Power Exhaust			

VCERS
ON
Static
0.04
0.10
0.16
0.22

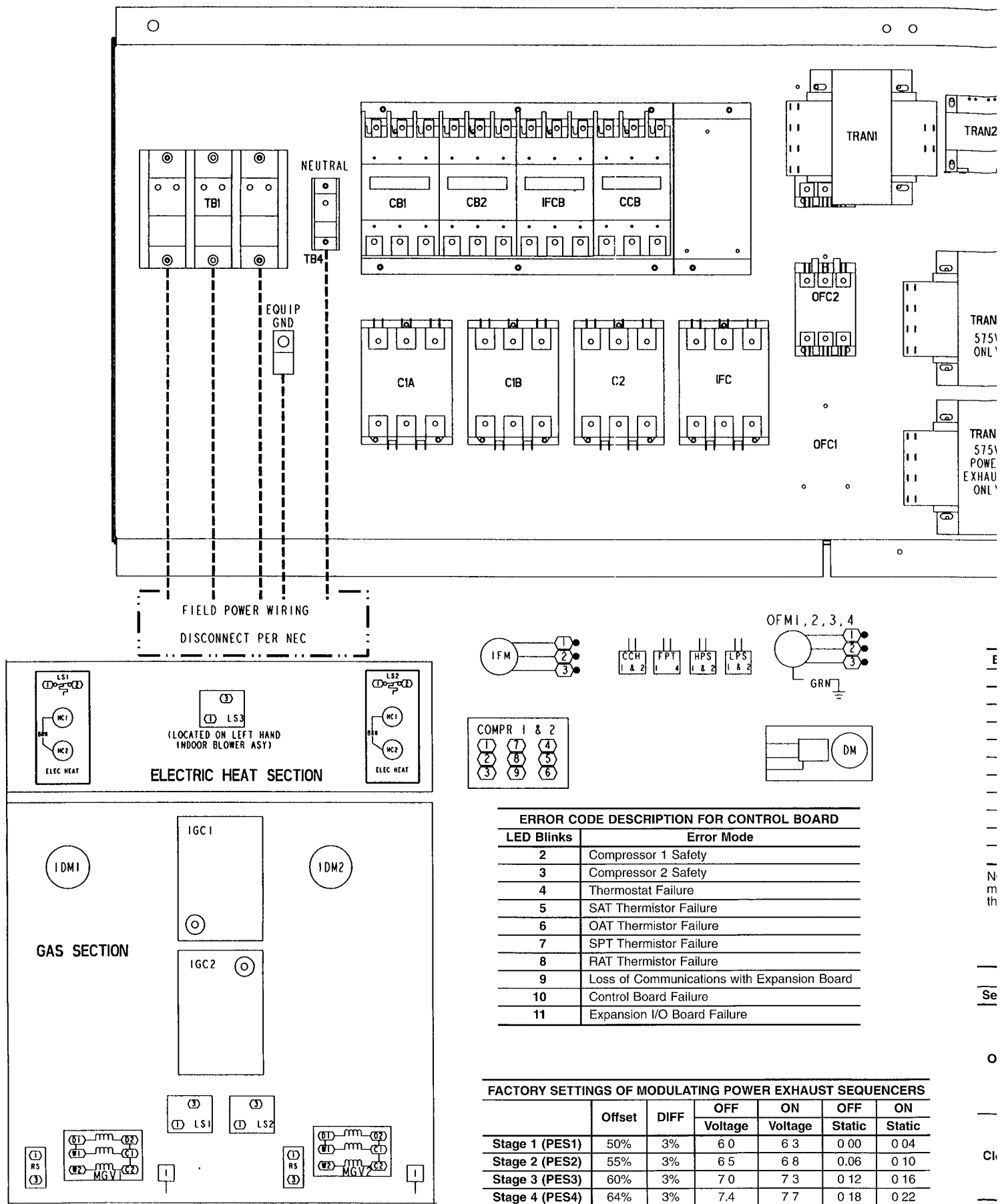
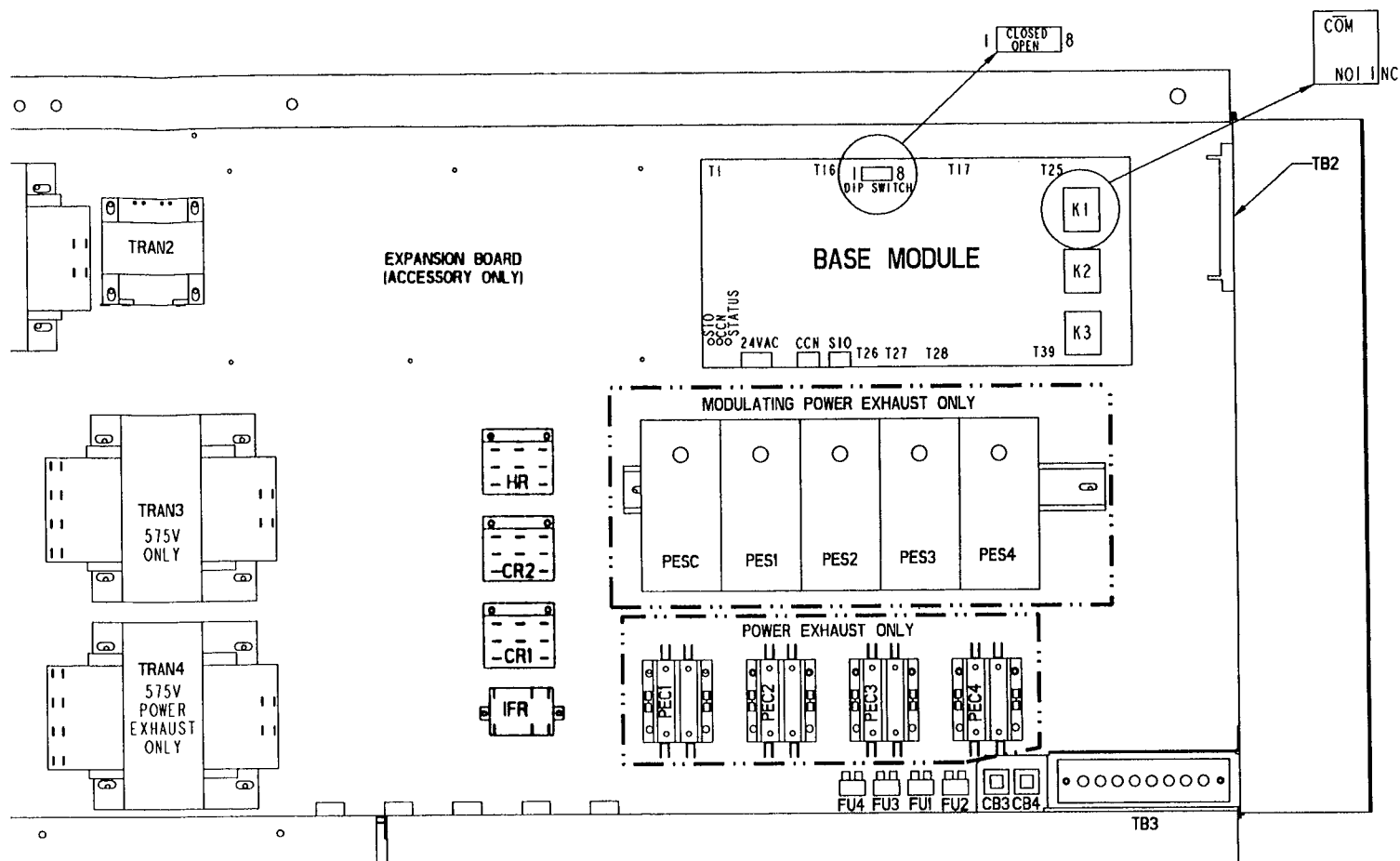


Fig. 11B — Component Arrangement, 48/50EJ,EK,EW



ERROR CODE DESCRIPTION FOR IGC CONTROL BOARD

LED Blinks	Error Mode
ON	Normal Operation
OFF	Hardware Failure
1	Fan On/Off Delay Modified
2	Limit Switch Fault
3	Flame Sense Fault
4	Four Consecutive Limit Switch Faults
5	Ignition Lockout Fault
6	Induced Draft Motor Fault
7	Rollout Switch Fault
8	Internal Control Fault

NOTE: When W1 is energized the burners will remain on for a minimum of 60 seconds. If more than one error mode exists they will be displayed on the LED in sequence.

VFD SET POINTS FOR SUPPLY AIR PRESSURE

Pressure in. wg	Control Output mA	VFD Set Point
0.00	4.00	0.0
0.25	4.80	3.0
0.50	5.60	6.0
0.75	6.40	9.0
1.00	7.20	12.0
1.25	8.00	15.0
1.50	8.80	18.0
1.75	9.60	21.0
2.00	10.40	24.0
2.25	11.20	27.0
2.50	12.00	30.0
2.75	12.80	33.0
3.00	13.60	36.0
3.25	14.40	39.0
3.50	15.20	42.0

BASE MODULE CONTROL BOARD DIP SWITCH ASSIGNMENTS (VERSION 2.0 SOFTWARE)

Setting	1	2	3	4	5	6	7	8
Open	VAV	VAV Space Sensor Installed	Expansion I/O Board	Field Test On	VAV Occupied Heat Enabled	Timeguard Override on	Gas Heat	Heat Pump Operation
		CV CEN or Sensors Used			CV Modulated Power Exhaust	In Conjunction with Field Test Set Minimum Damper Position On		
Closed	CV	VAV No Space Sensor	Base Control Board Only	Field Test Off	VAV Occupied Heat Disabled	Timeguard Override Off	Electric Heat	Standard A/C Operation
		CV Thermostat			CV Constant Volume Power Exhaust			

ENCERS
ON
Static
0.04
0.10
0.16
0.22

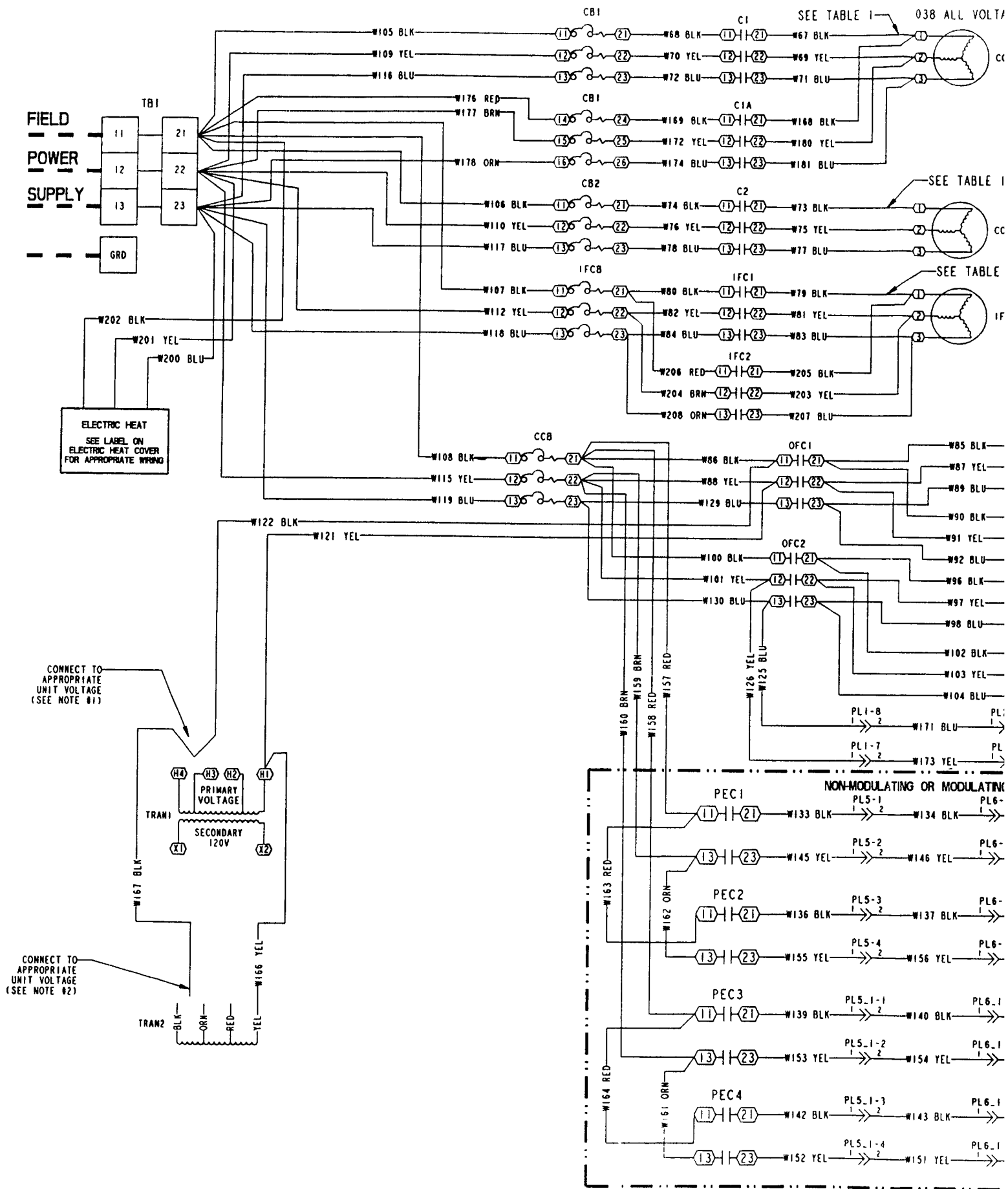
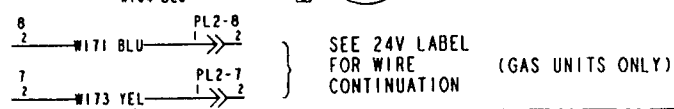
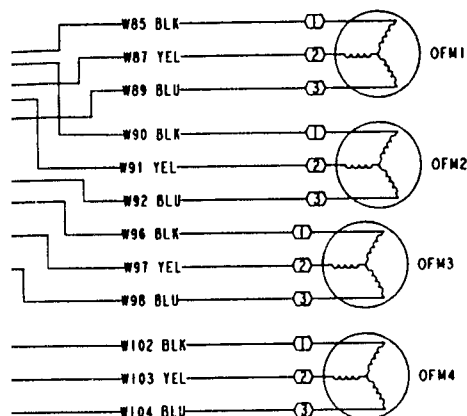
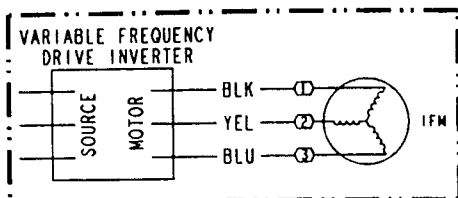
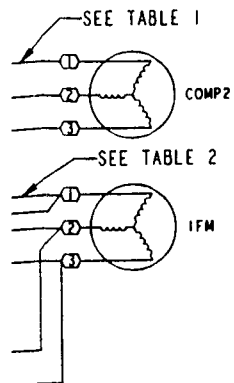
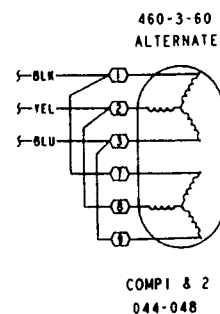
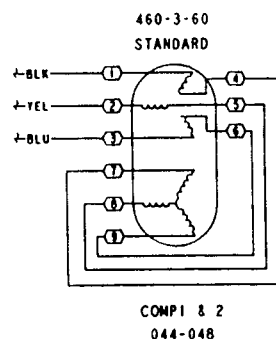
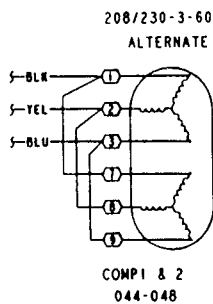
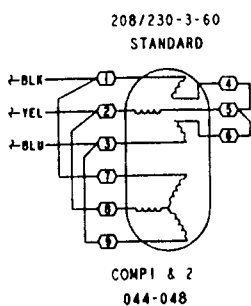
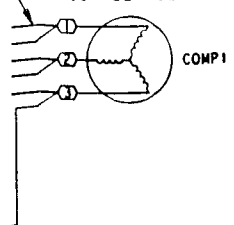


Fig. 12A — Power Schematic — 48/50EJ,EK,EW,EY038-048; 208/230-3-60 ai

038 ALL VOLTAGES



ULATING OR MODULATING POWER EXHAUST

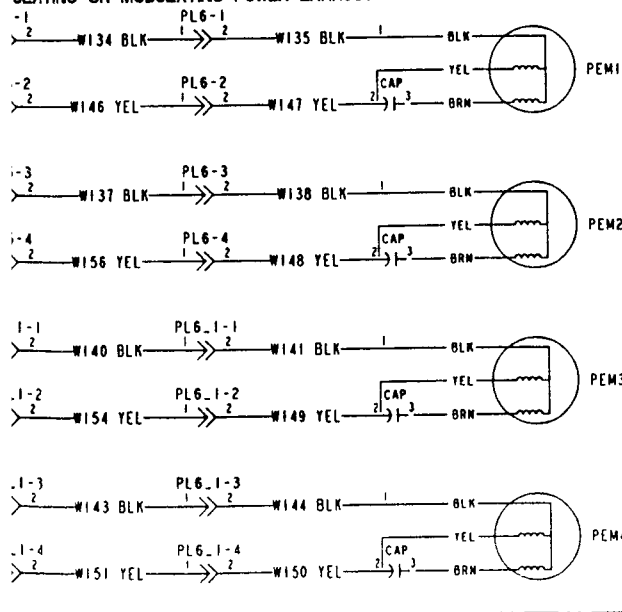


TABLE 1

THE FOLLOWING COMPRESSORS HAVE
TWO PARALLEL WIRES RUN FROM
TB1 TO THE COMPRESSORS

COMPRESSOR MODEL	VOLTAGE	WIRE QUANTITY
06D-537	208/230-3-60	2
06E-250	208/230-3-60	2
06E-265	208/230-3-60	2

TABLE 2

THE FOLLOWING FAN MOTORS HAVE
TWO PARALLEL WIRES RUN FROM
TB1 TO THE FAN MOTORS

INDOOR MOTOR	VOLTAGE	WIRE QUANTITY
20 HP	208/230-3-60	2
25 HP	208/230-3-60	2
30 HP	208/230-3-60	2

8; 208/230-3-60 and 460-3-60 Units with Unit Serial Numbers 1597F and Later

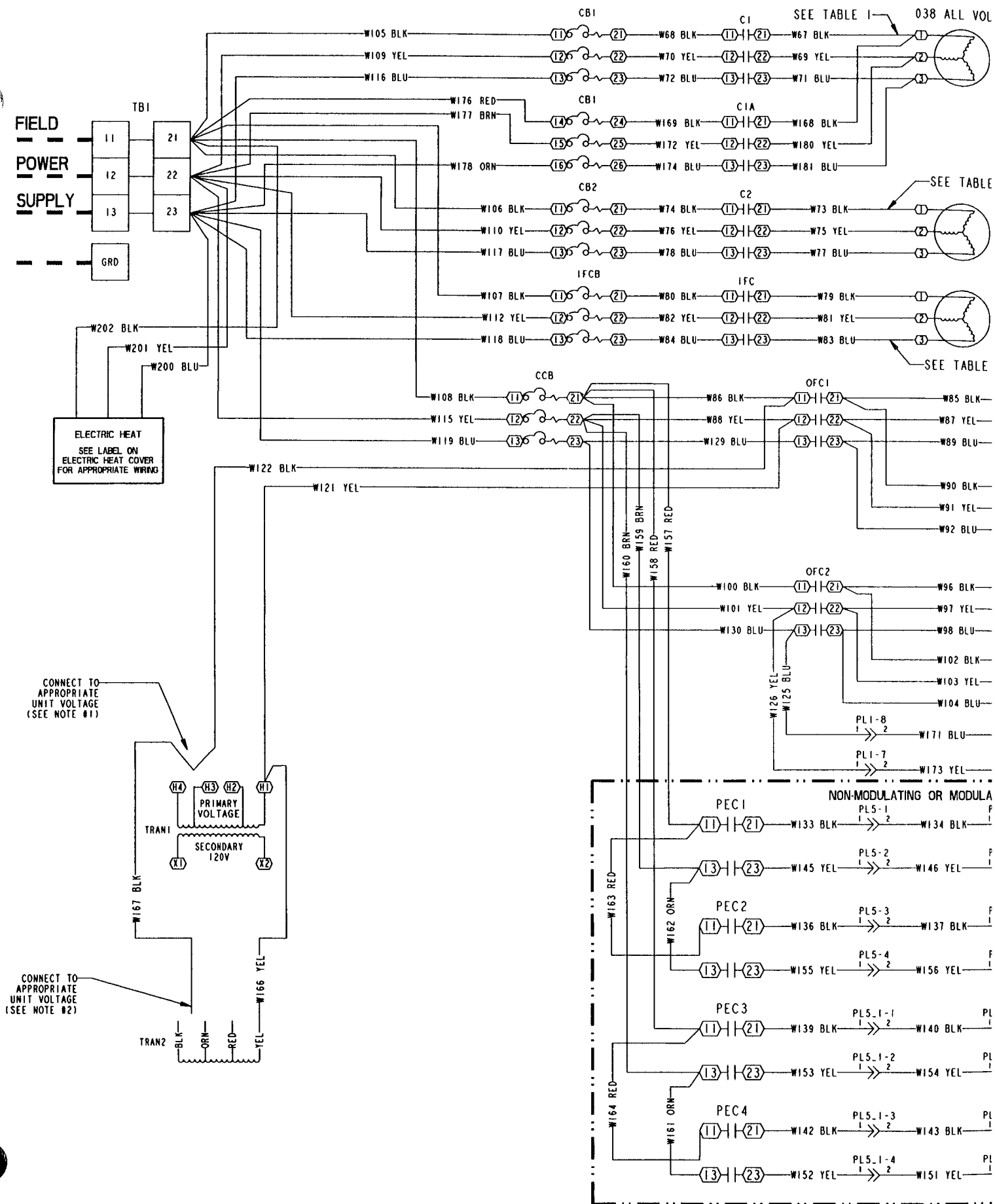
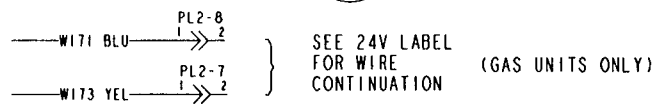
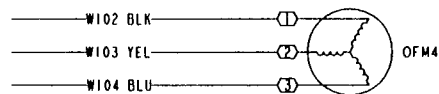
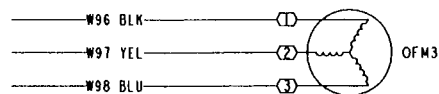
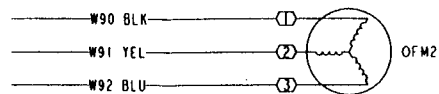
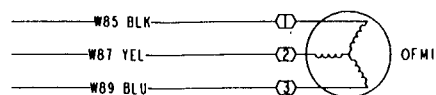
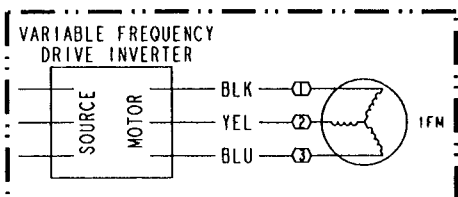
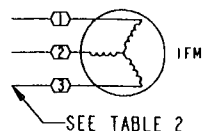
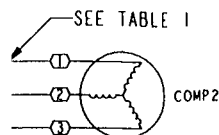
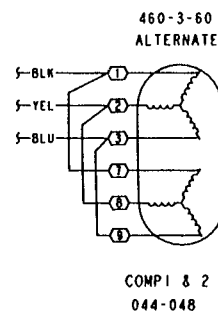
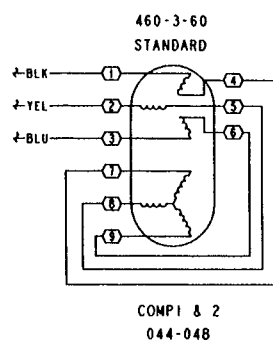
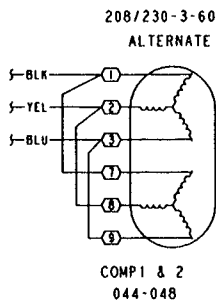
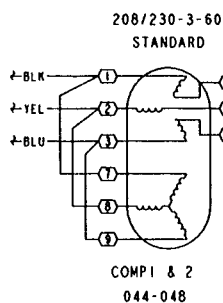
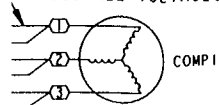


Fig. 12B — Power Schematic — 48/50EJ,EK,EW,EY038-048; 208/230-3-60 and 46

038 ALL VOLTAGES



ATING OR MODULATING POWER EXHAUST

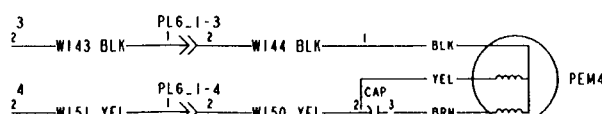
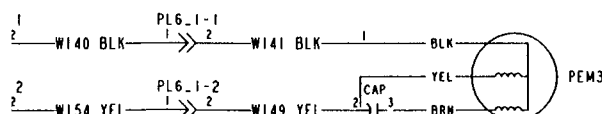
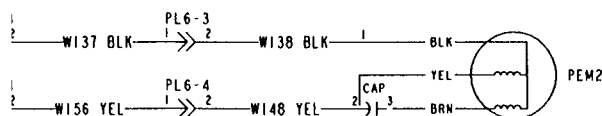
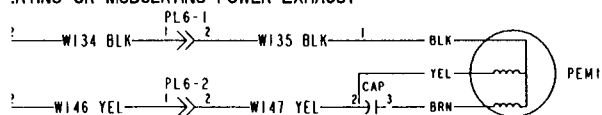


TABLE 1

THE FOLLOWING COMPRESSORS HAVE TWO PARALLEL WIRES RUN FROM TB1 TO THE COMPRESSORS

COMPRESSOR MODEL	VOLTAGE	WIRE QUANTITY
06D-537	208/230-3-60	2
06E-250	208/230-3-60	2
06E-265	208/230-3-60	2

TABLE 2

THE FOLLOWING FAN MOTORS HAVE TWO PARALLEL WIRES RUN FROM TB1 TO THE FAN MOTORS

INDOOR MOTOR	VOLTAGE	WIRE QUANTITY
20 HP	208/230-3-60	2
25 HP	208/230-3-60	2
30 HP	208/230-3-60	2

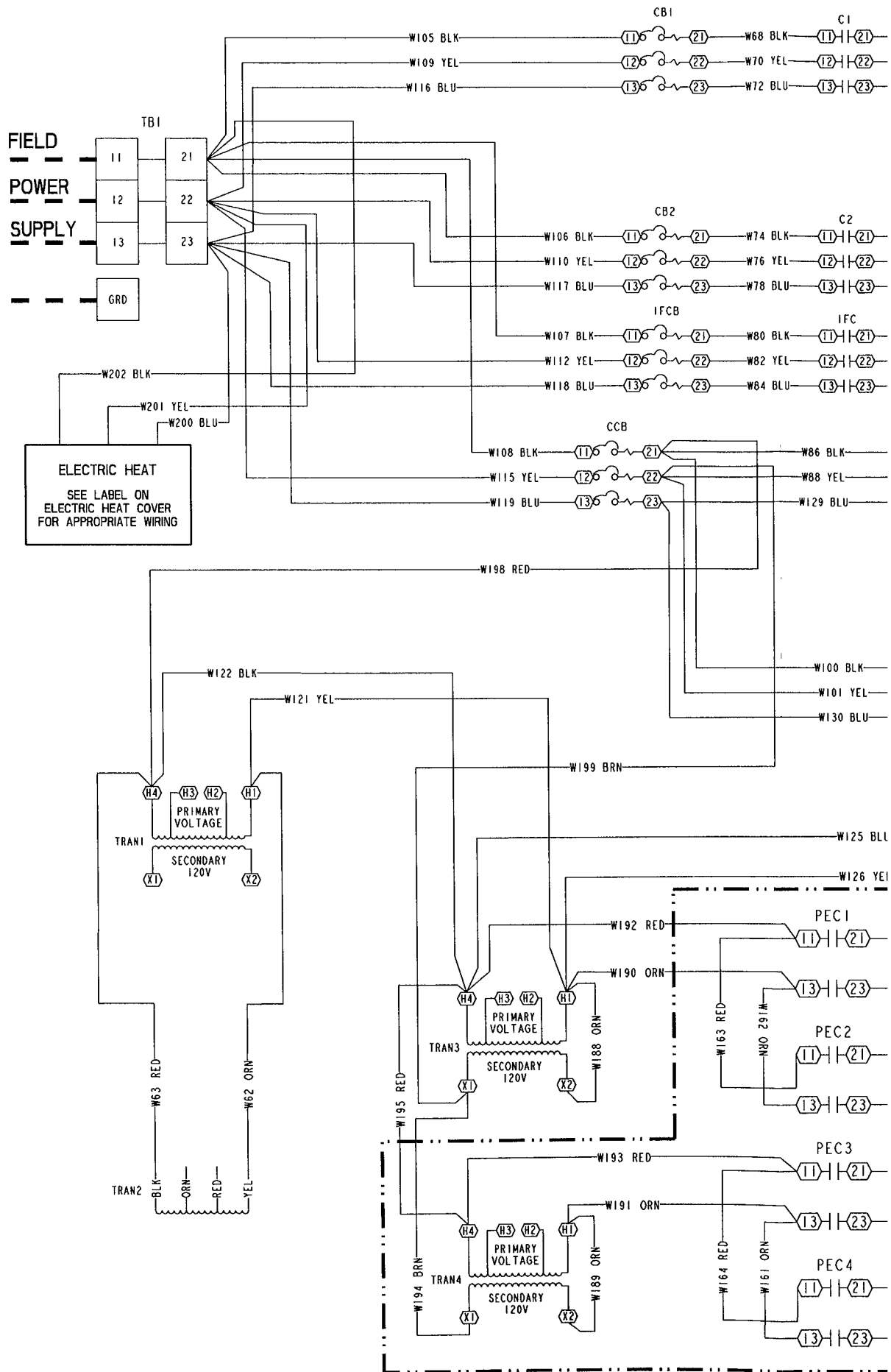
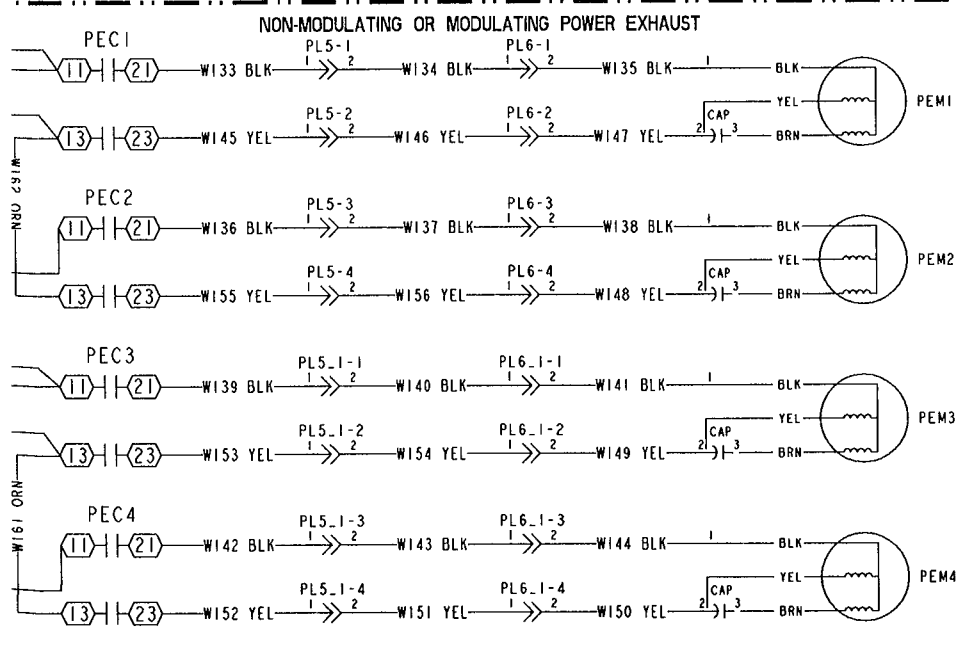
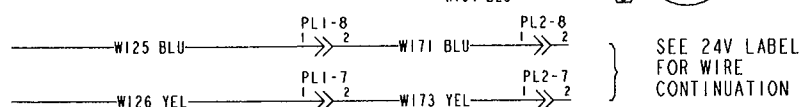
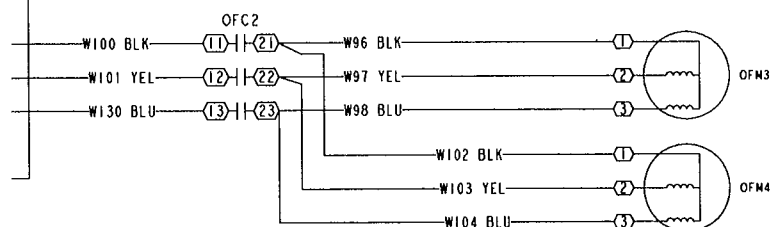
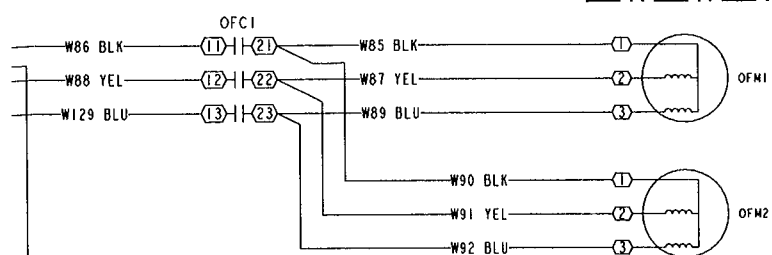
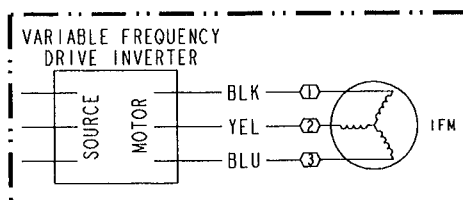
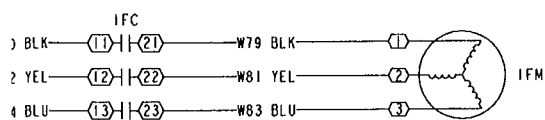
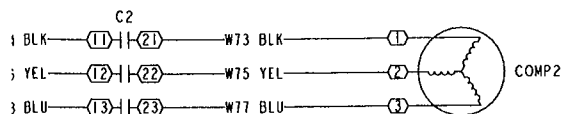
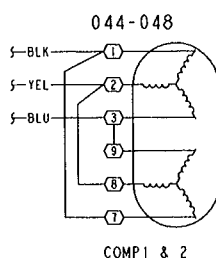
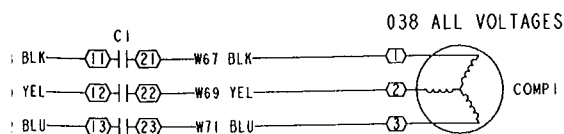


Fig. 13 — Power Schematic — 48/50



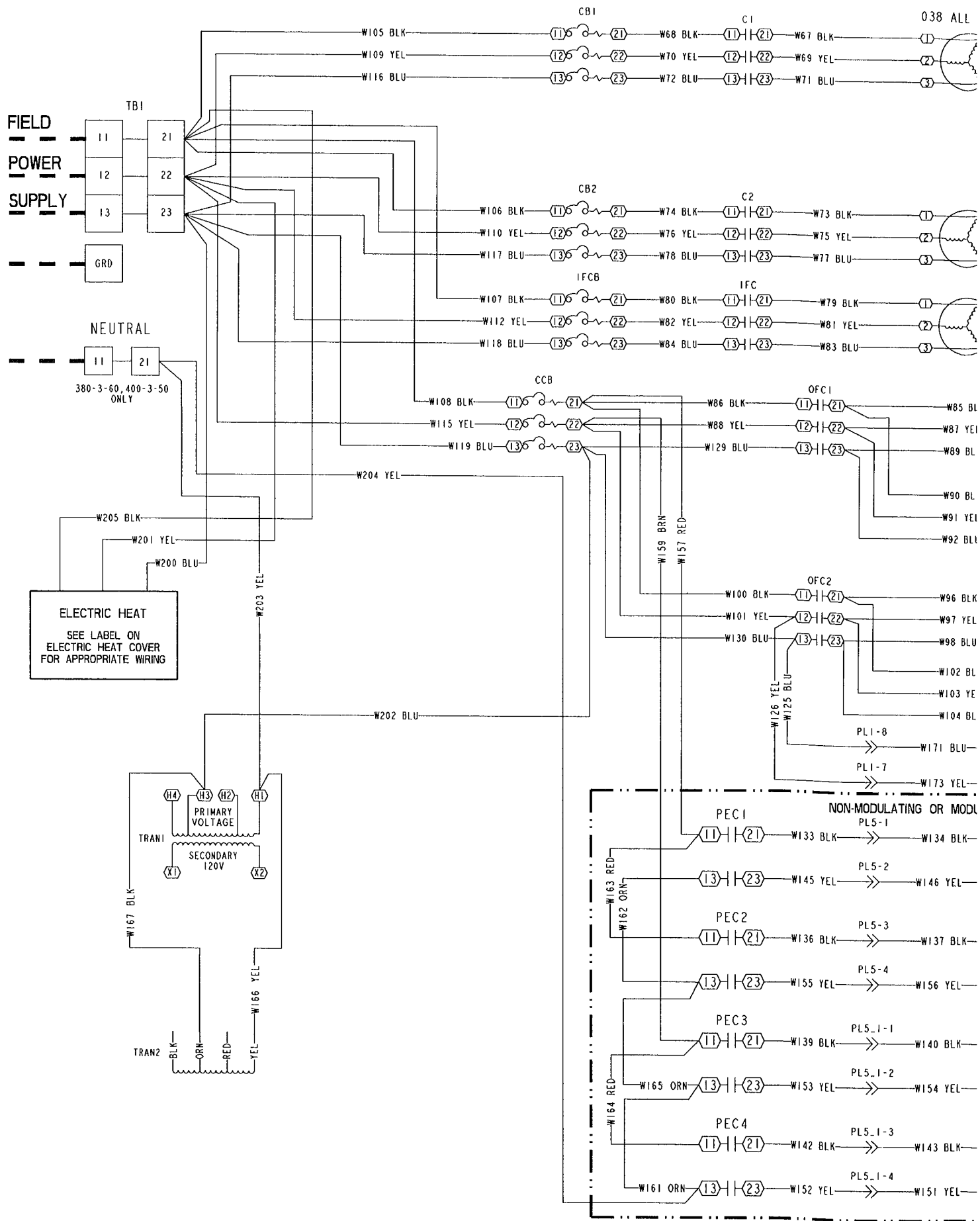


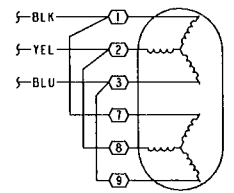
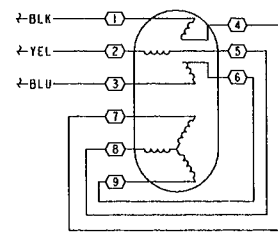
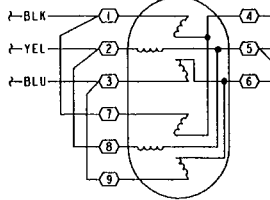
Fig. 14 — Power Schematic — 48/50EJ,EK,EW,EY038

038 ALL VOLTAGES

380-3-60
STANDARD

400-3-50
STANDARD

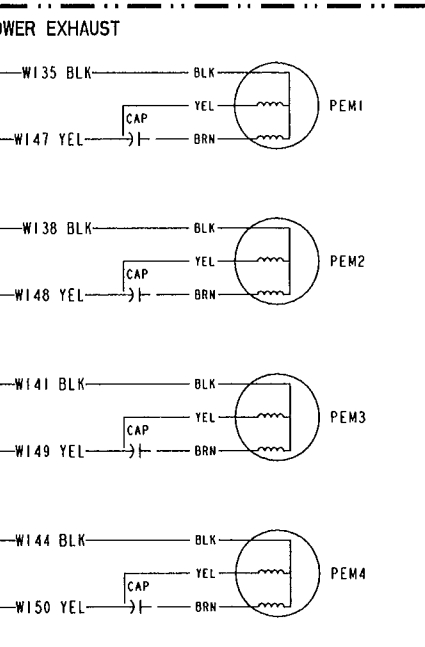
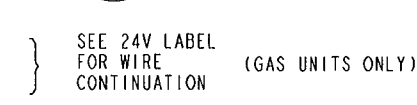
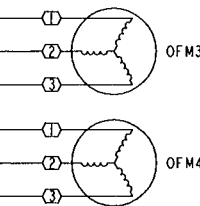
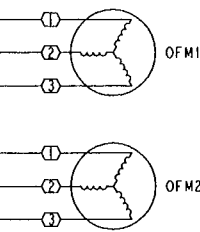
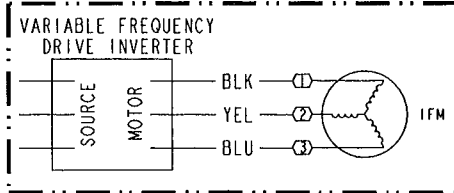
400-3-50
ALTERNATE



COMP1 & 2
044-048

COMP1 & 2
044-048

COMP1 & 2
044-048



1, EK, EW, EY038-048; 380-3-60 and 400-3-50 Units

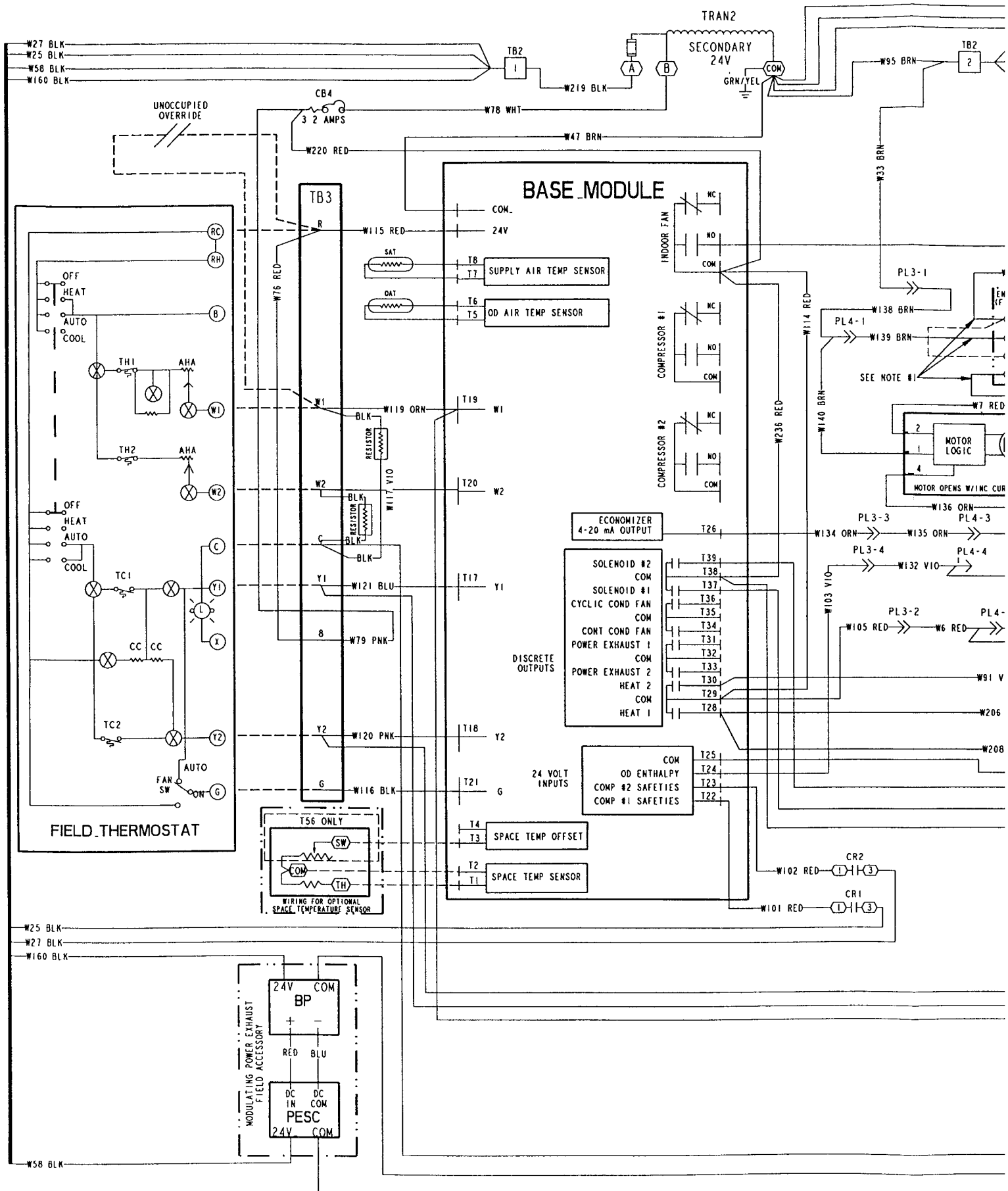
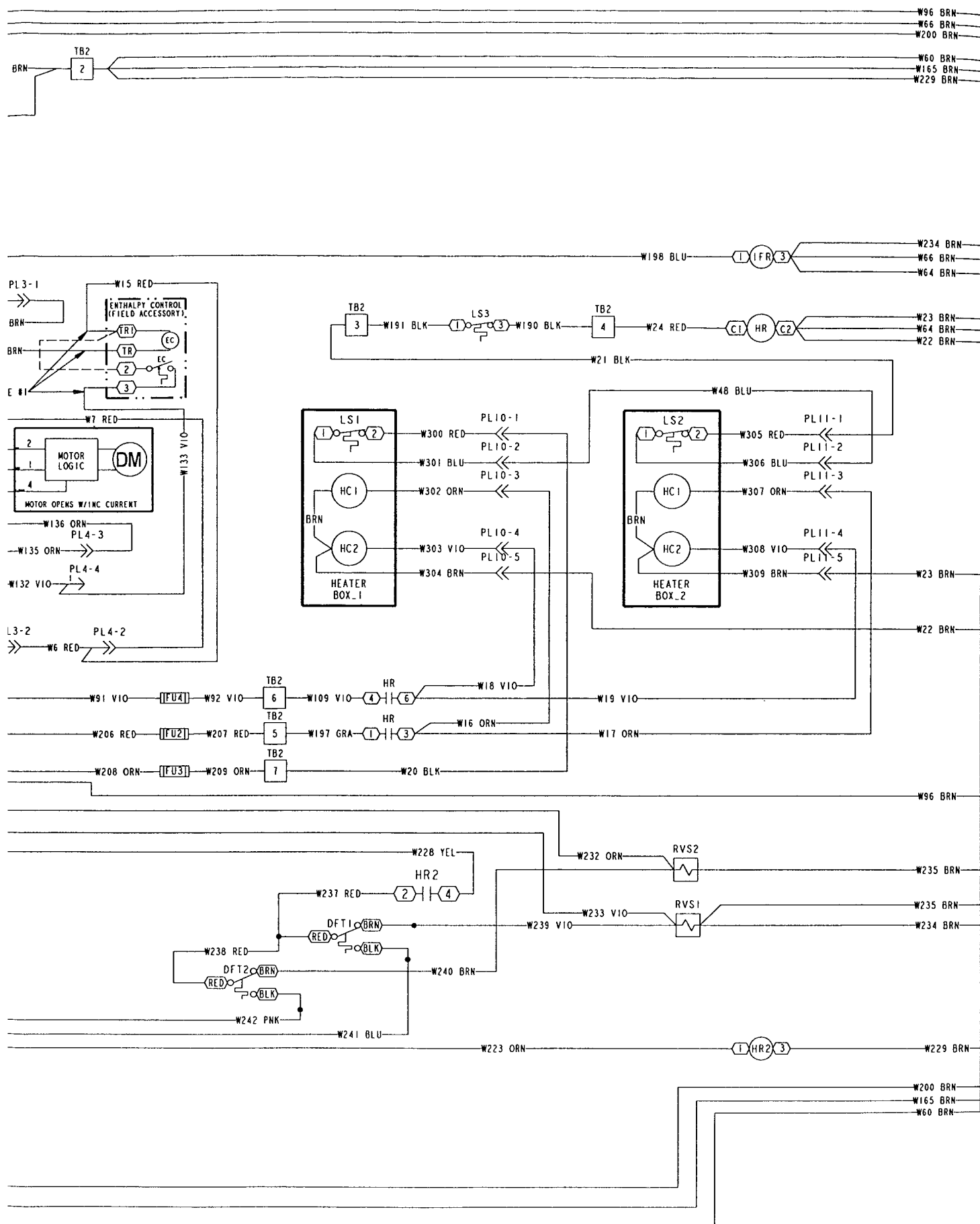
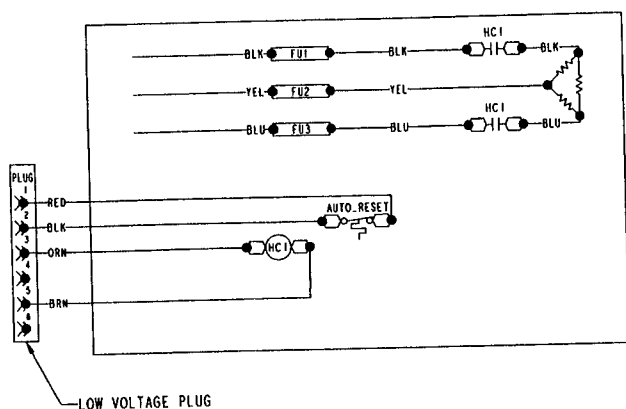
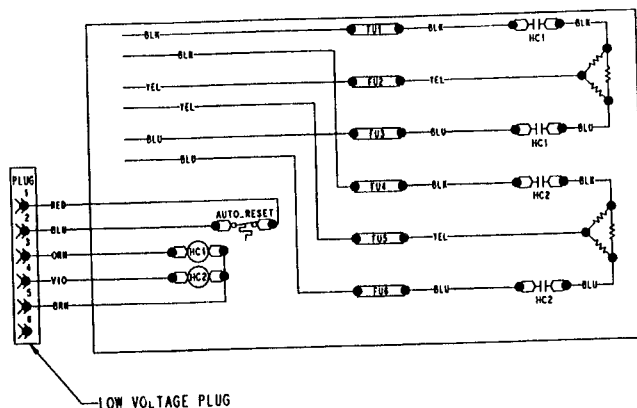


Fig. 15 — Control Circuit (2)

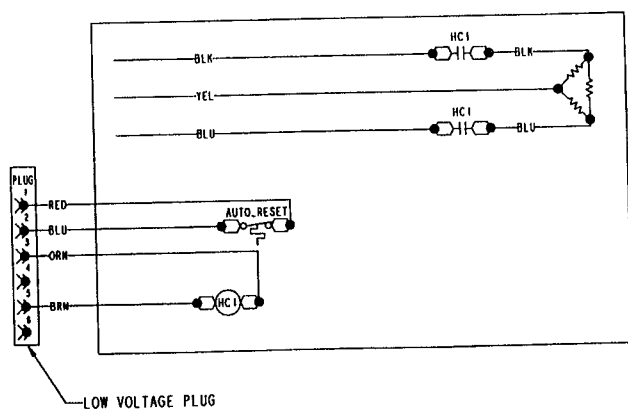




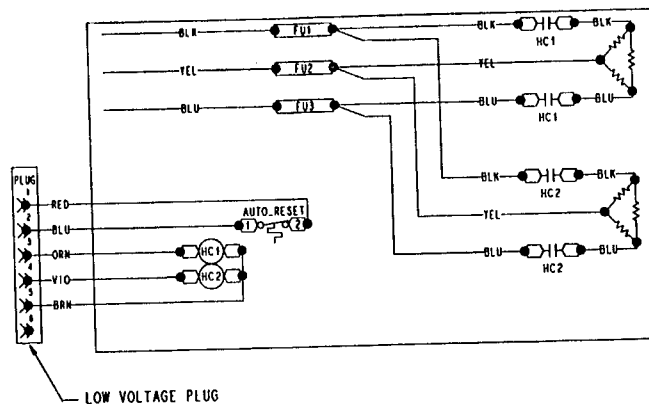
CRHEATER124A00
(240 V, 18 kW*)



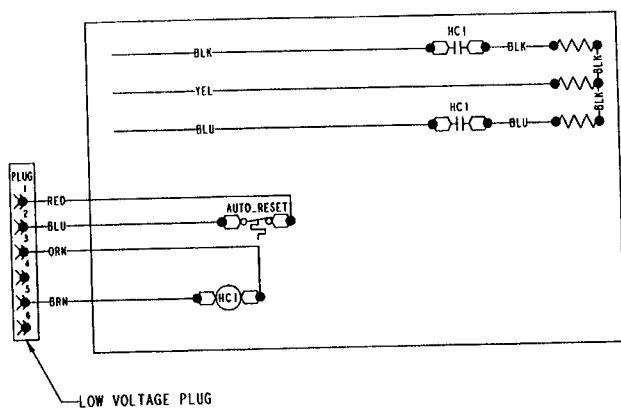
CRHEATER125A00
(240 V, 36 kW†)



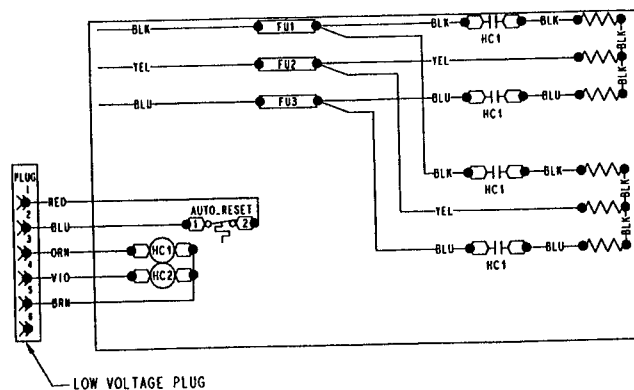
CRHEATER126A00
(380 V, 400 V, and 480 V, 18 kW*)



CRHEATER127A00
(380 V, 400 V, and 480 V, 36 kW†)



CRHEATER128A00
(600 V, 18 kW*)



CRHEATER129A00
(600 V, 36 kW†)

*Two heater assemblies total 36 kW

†Two heater assemblies total 72 kW

Fig. 17 — Accessory Heat Package Wiring Schematic

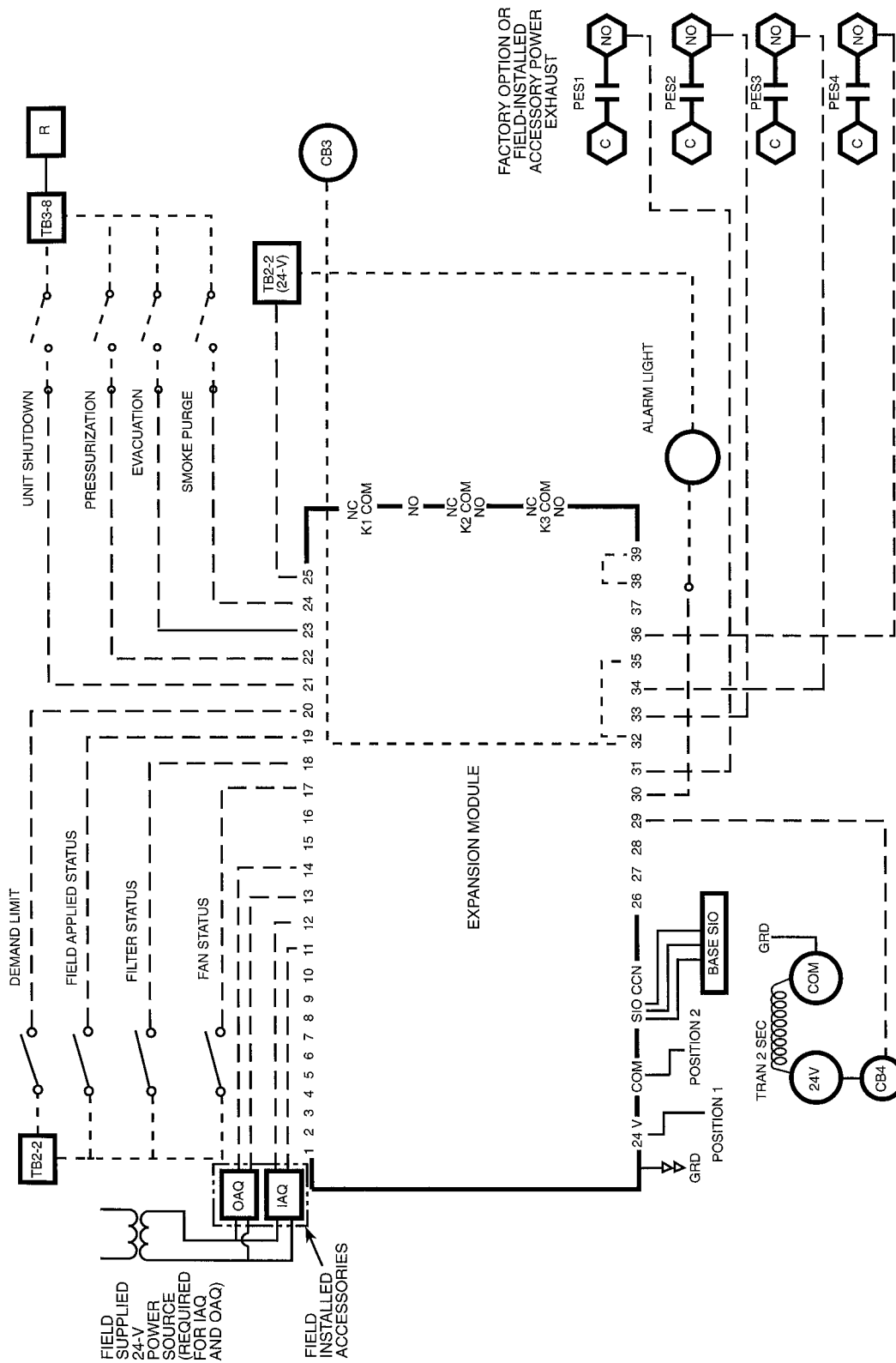


Fig. 18 — Expansion Board Wiring

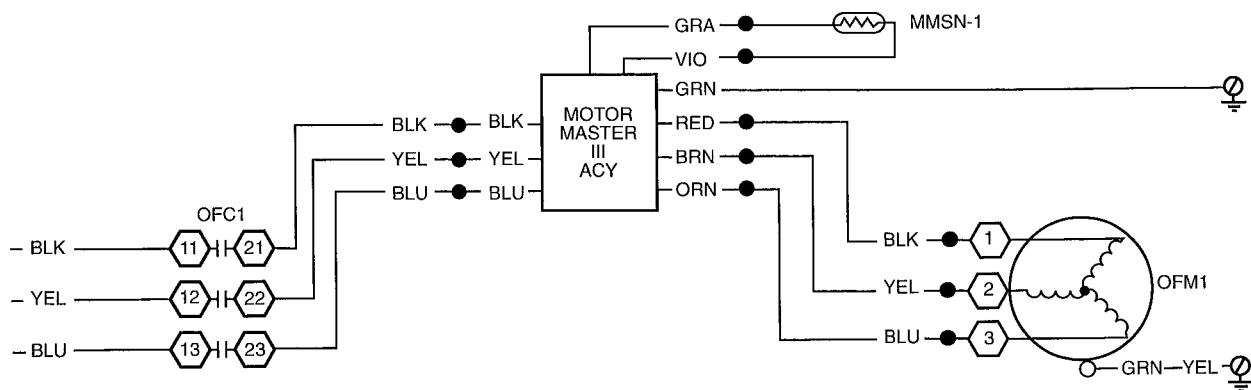


Fig. 19 — Motormaster® III Device Wiring, 48/50EJ,EK,EW,EY024-034 — All Units Except 575-v Units

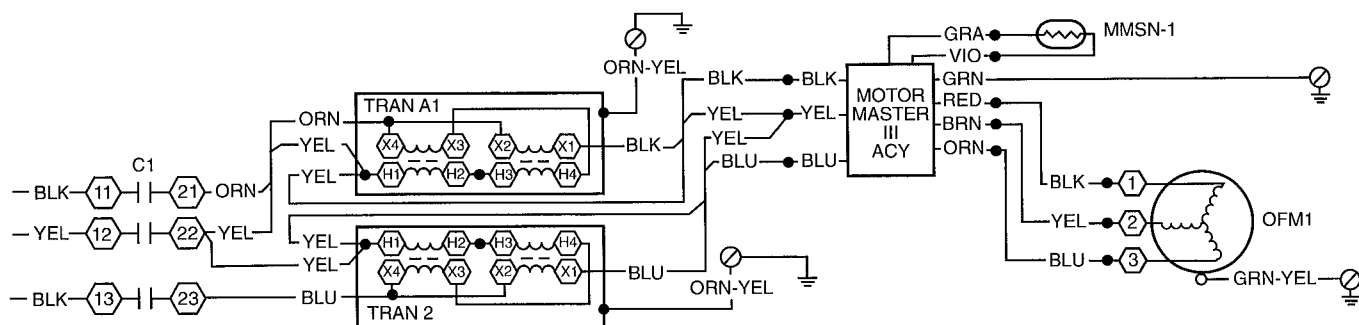
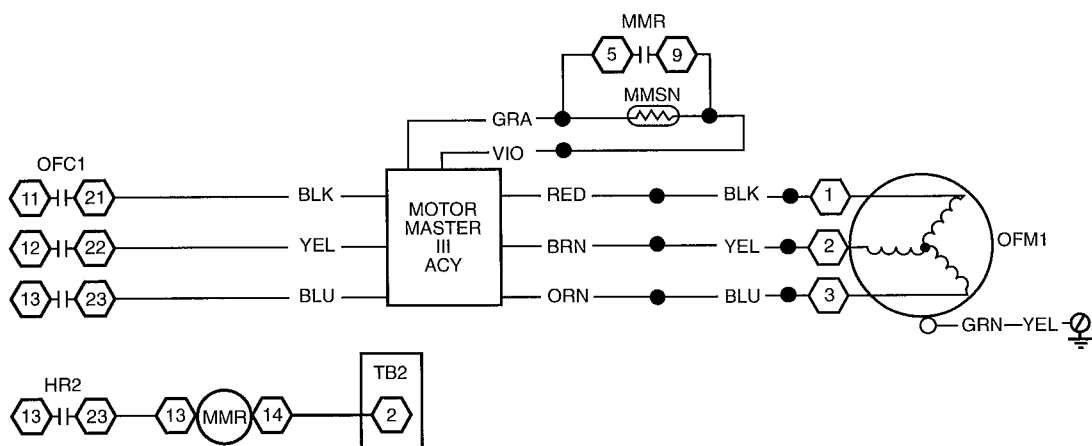


Fig. 20 — Motormaster III Device Wiring, 48/50EJ,EK,EW,EY024-034 — 575-3-60 Units



NOTE: Motormaster Relay part no is HN61KZ024 with HY07RB030 socket

Fig. 21 — Motormaster III Device Wiring, 50EJQ,EWQ024 and 028

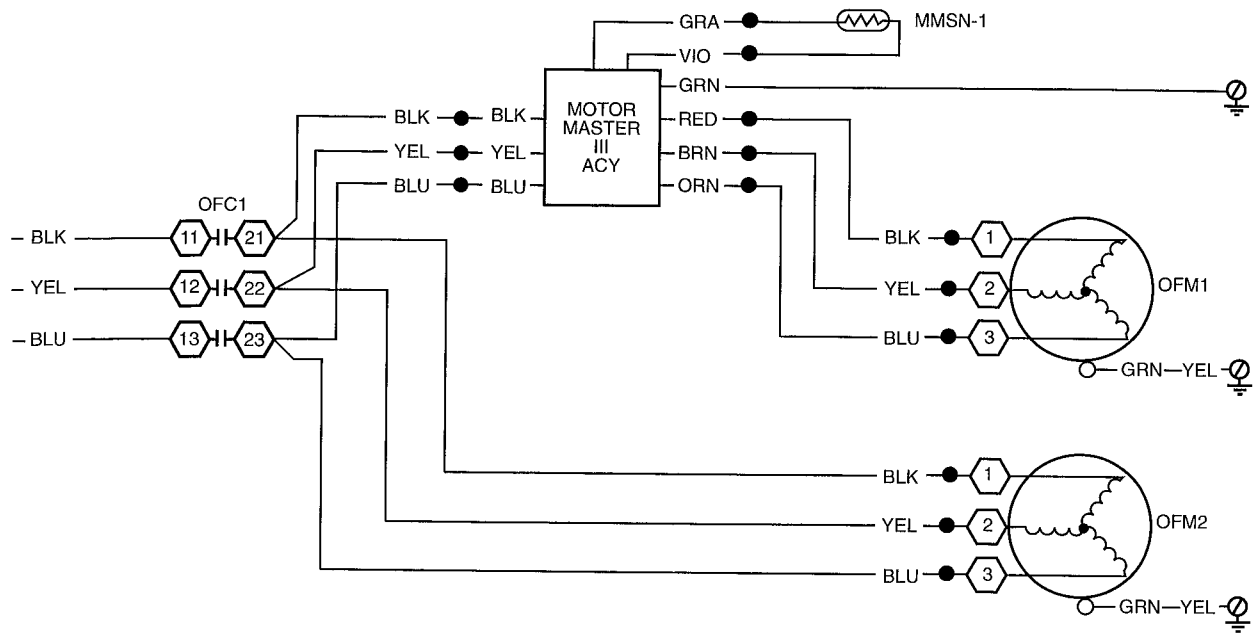


Fig. 22 — Motormaster® III Device Wiring, 48/50EJ,EK,EW,EY038-044 — All Units Except 575-v Units

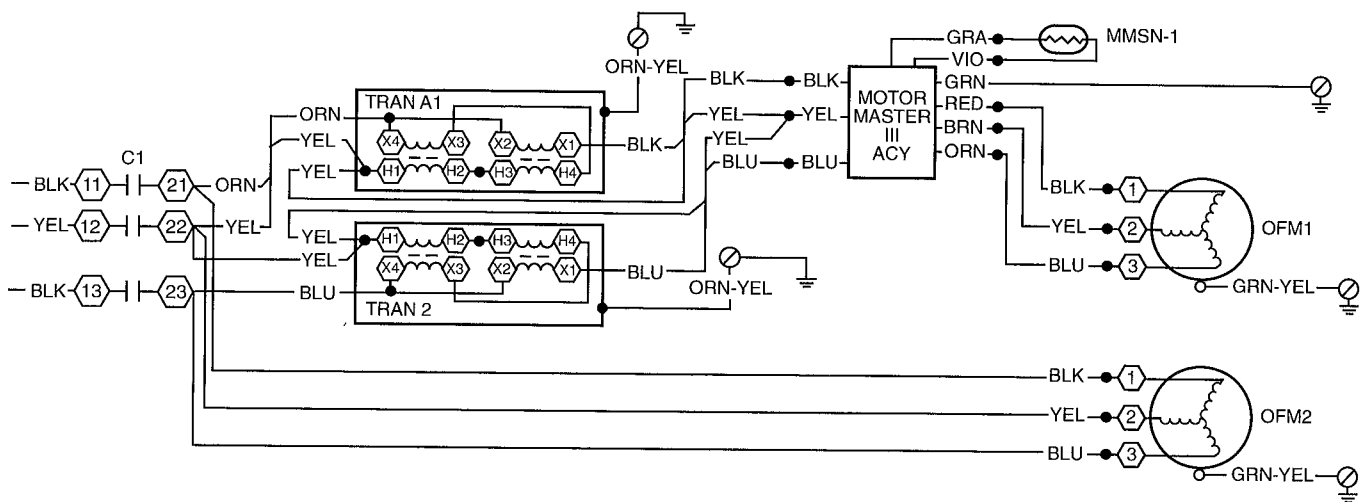


Fig. 23 — Motormaster III Device Wiring, 48/50EJ,EK,EW,EY038-044 — 575-3-60 Units

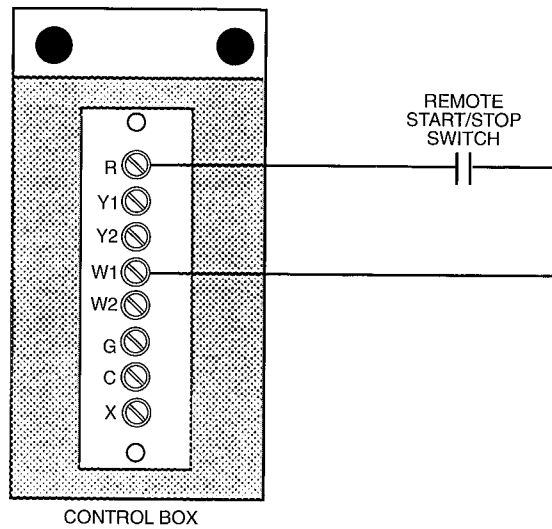


Fig. 26 — Field Control Remote Start/Stop Wiring

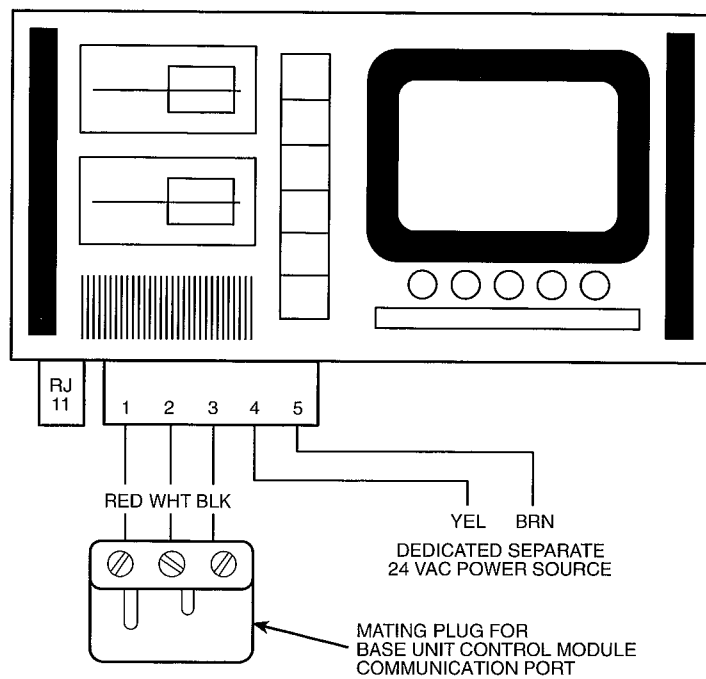


Fig. 27 — LID-2B Wiring

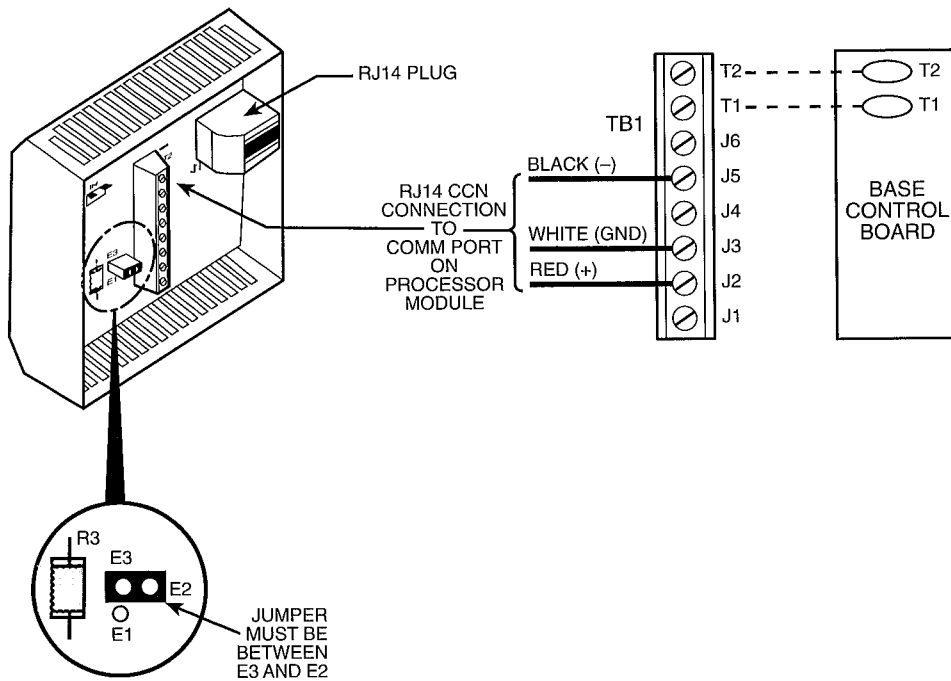


Fig. 28 — Space Temperature Sensor (T-55) Wiring

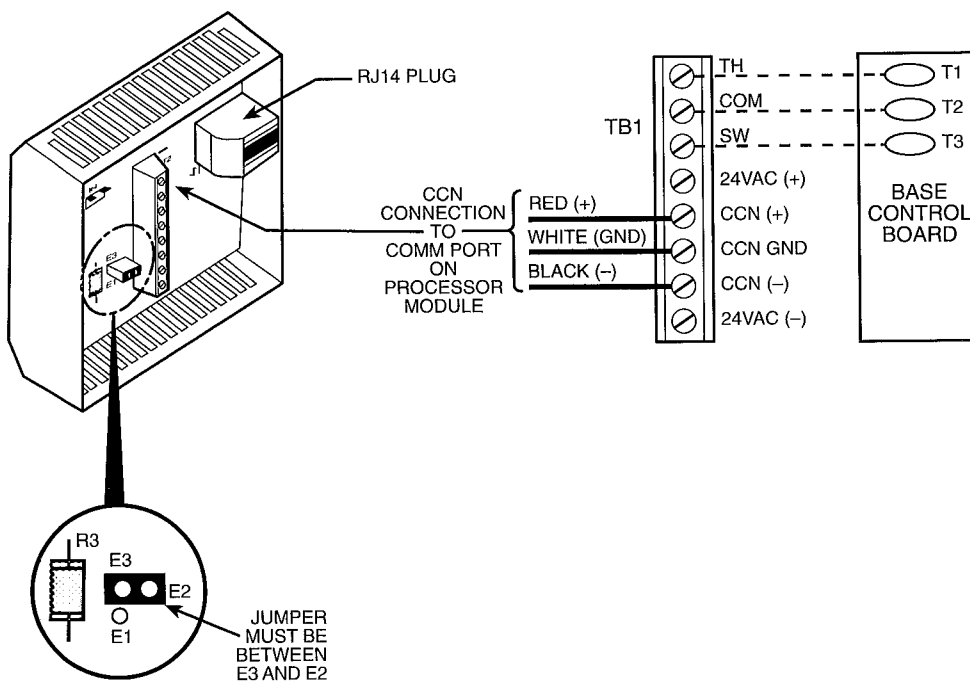


Fig. 29 — Space Temperature Sensor (T-56) Wiring

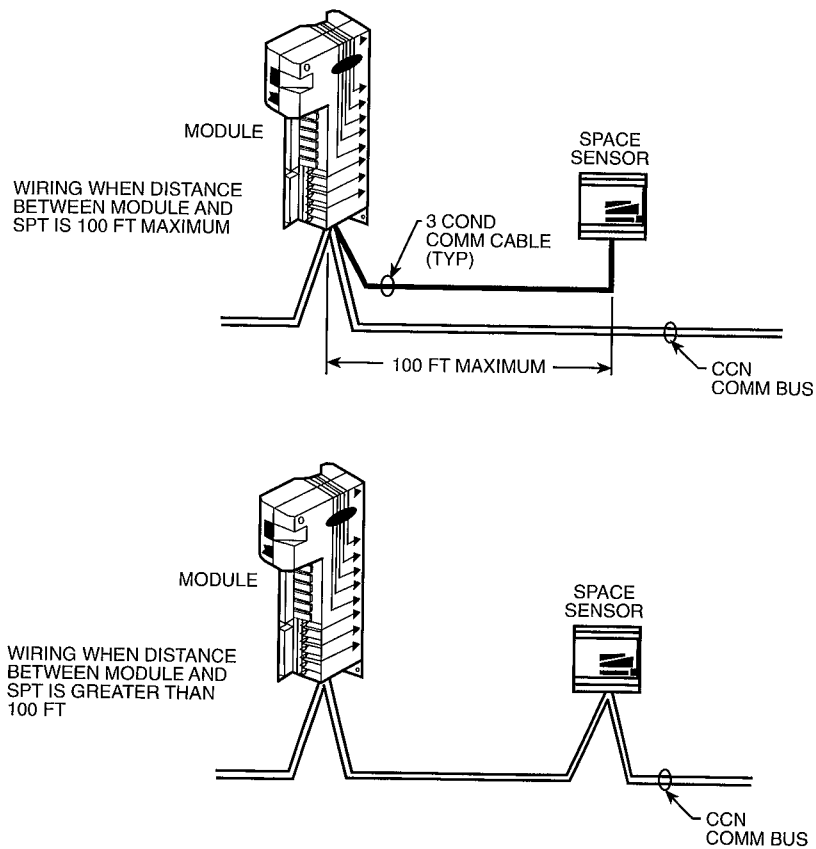


Fig. 30 — Connecting the T-56 Sensor to the CCN Communication Bus

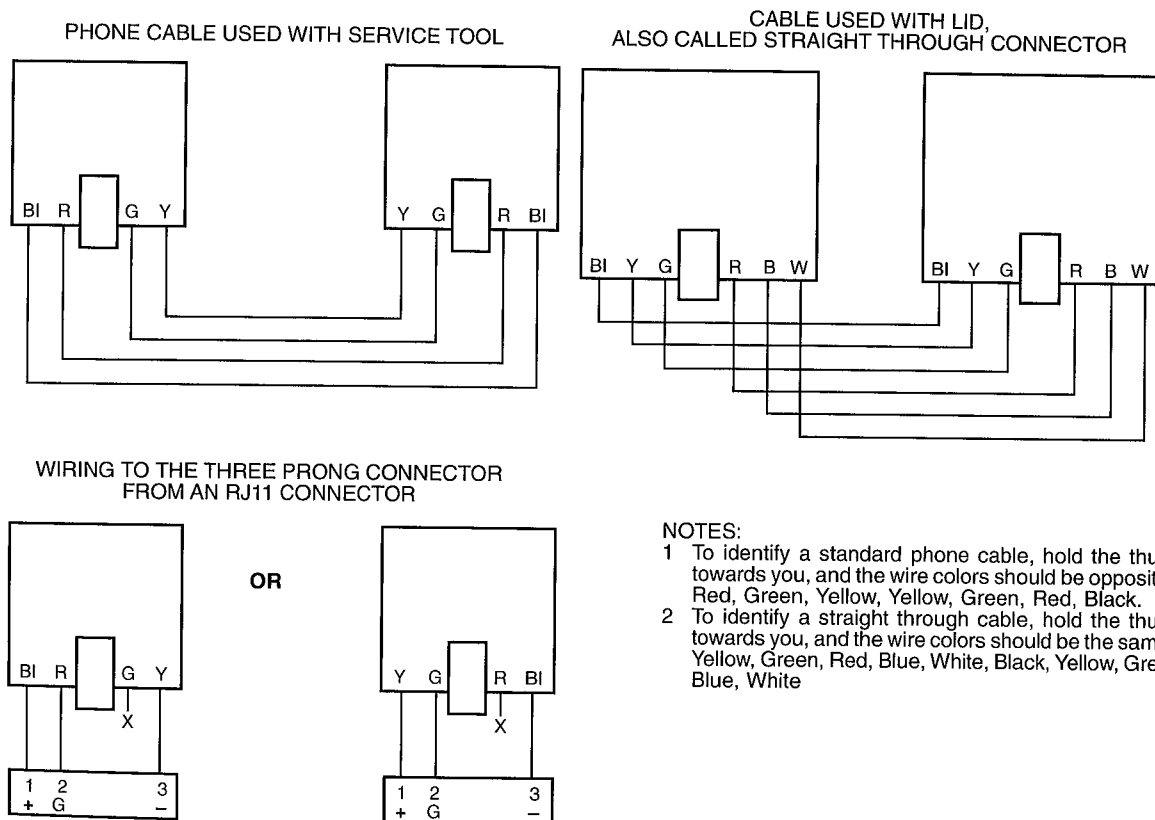
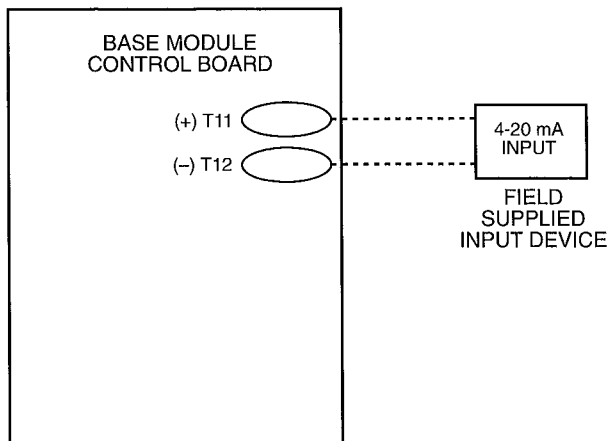


Fig. 31 — Service Tool Wiring



mA INPUT	DEGREES F RESET
4	0 00
5	1.25
6	2 50
7	3 75
8	5 00
9	6 25
10	7 50
11	8 75
12	10.00
13	11 25
14	12.50
15	13 75
16	15.00
17	16 25
18	17 50
19	18 75
20	20.00

NOTE: The 4 to 20 mA input is a field-supplied non-Carrier EMS (Energy Management System) device.

Fig. 32 — Supply Wiring Temperature Reset