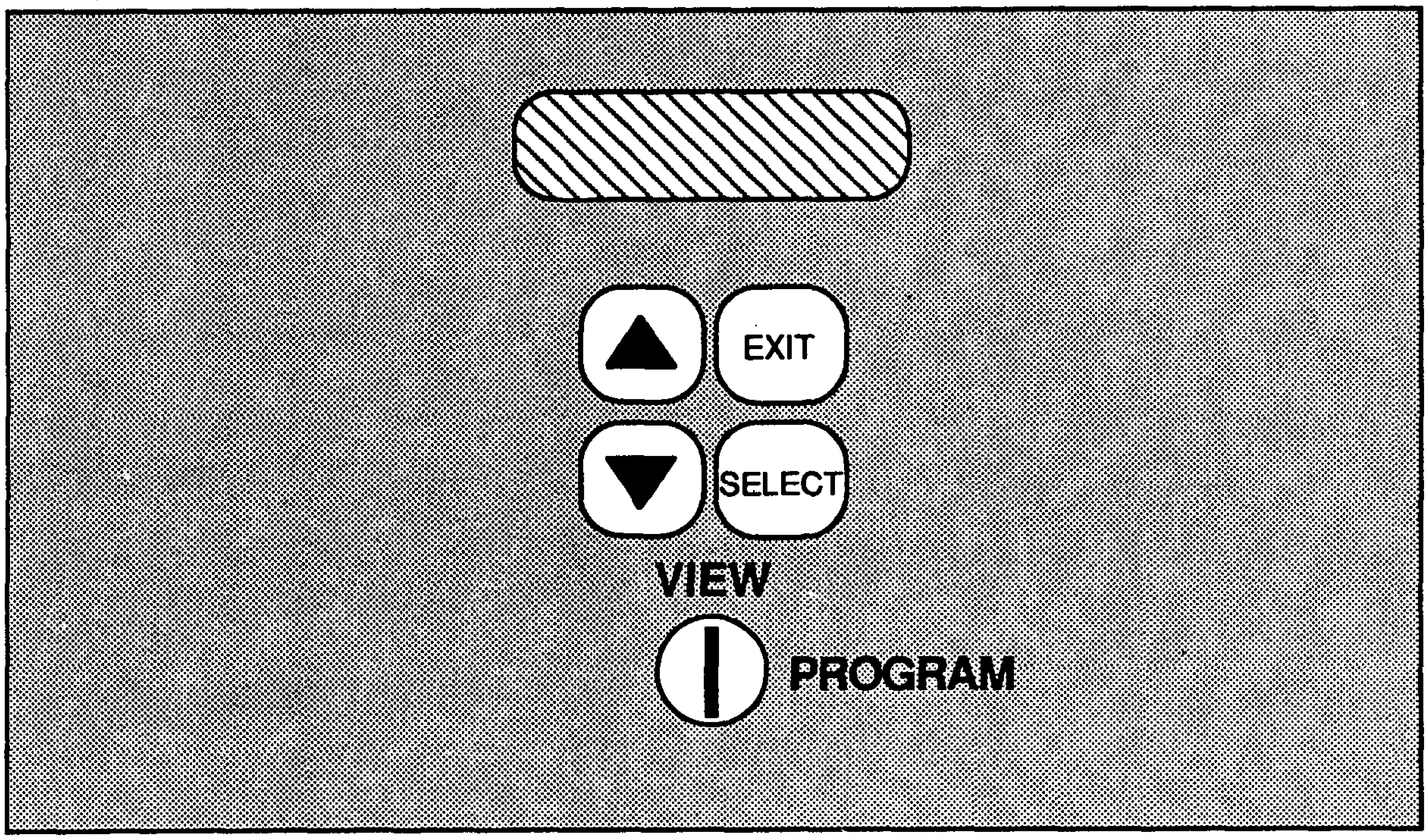
EPC-1000™



P/N 340675
EPC-1000
Installation Instruction
July, 1990

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WARRANTY

INTRODUCTION

PURPOSE

The EPC-1000™ refrigeration controller is designed for easier operation of the refrigeration rack. The EPC-1000 controller is distinguished by the simplicity of its front panel, which offers minimum yet versatile keys and functions (see Figure 1-1). The EPC-1000 will control up to 6 parallel compressors or 5 compressors and 1 satellite. It also supports a swing compressor setup. There is an alarm for exceptional conditions.

DISPLAY

The EPC-1000 has a vacuum fluorescent 10-character display, which is protected by a blue shielded filter. The display will remain ON for a period of two hours after the last manual entry. It will then perform a power down function (to extend the display life), but may be brought back up by operating any key.

NOTE: The display will not power down if the system is in alarm. Should an alarm occur after a power down the display will automatically come on to signal the alarm.

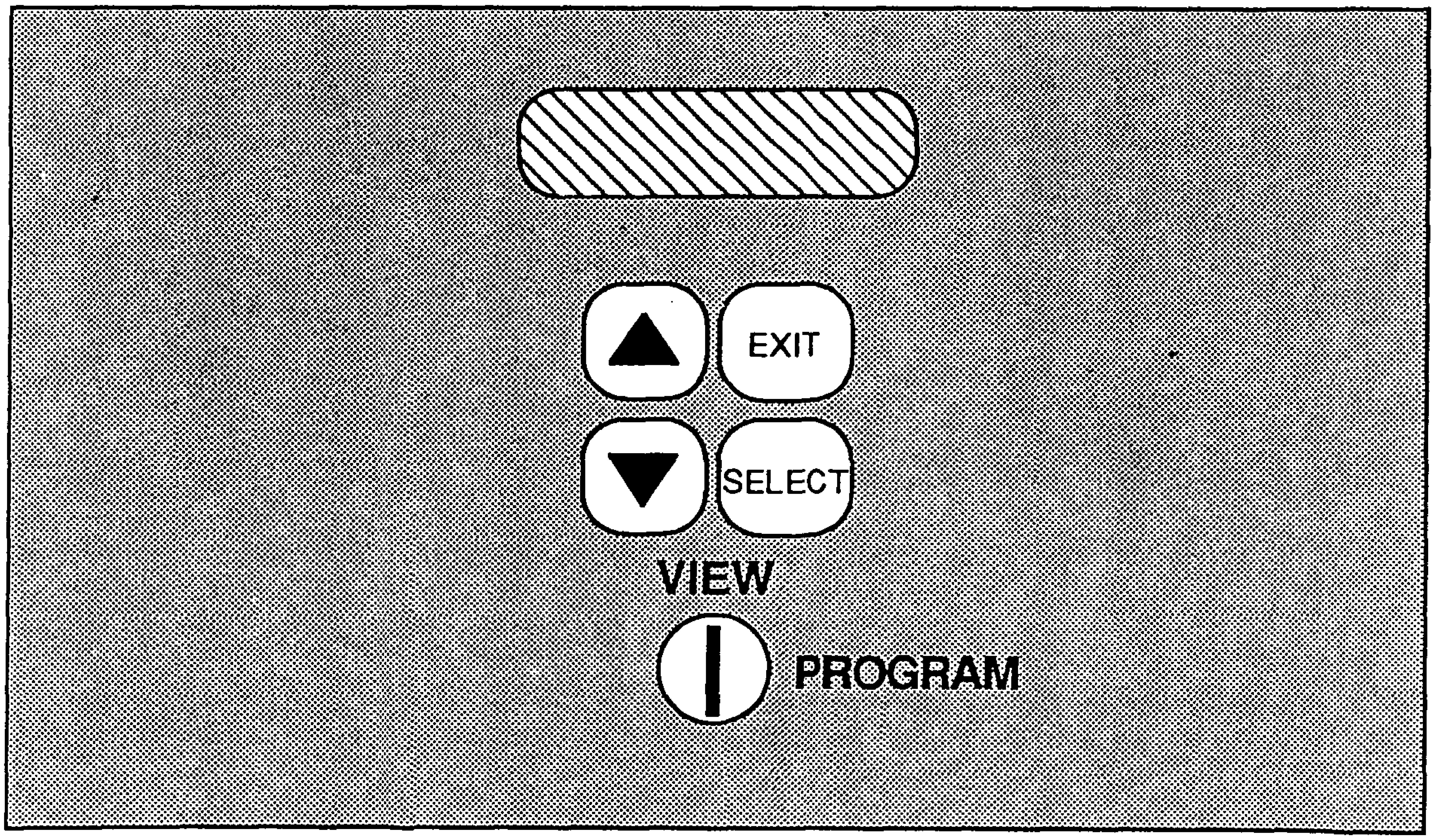


Figure 1-1. EPC-1000 Front View

INPUT/OUTPUT

The EPC-1000 is a self contained unit which combines the controller with input screw terminals and output plugs. The input section takes the suction and optional head pressure transducers and SPR (Suction Pressure Reset) case temperature sensor inputs to an identified screw down terminal strip. The strip is located on the left-hand side of the panel facing the front (See Figure 1-2). There are also inputs on the same strip for defrost monitoring and communication linking.

Control of the compressor contactors is accomplished through the output section located on the right-hand edge of the EPC-1000 facing the front. The connectors here are standard connectors.

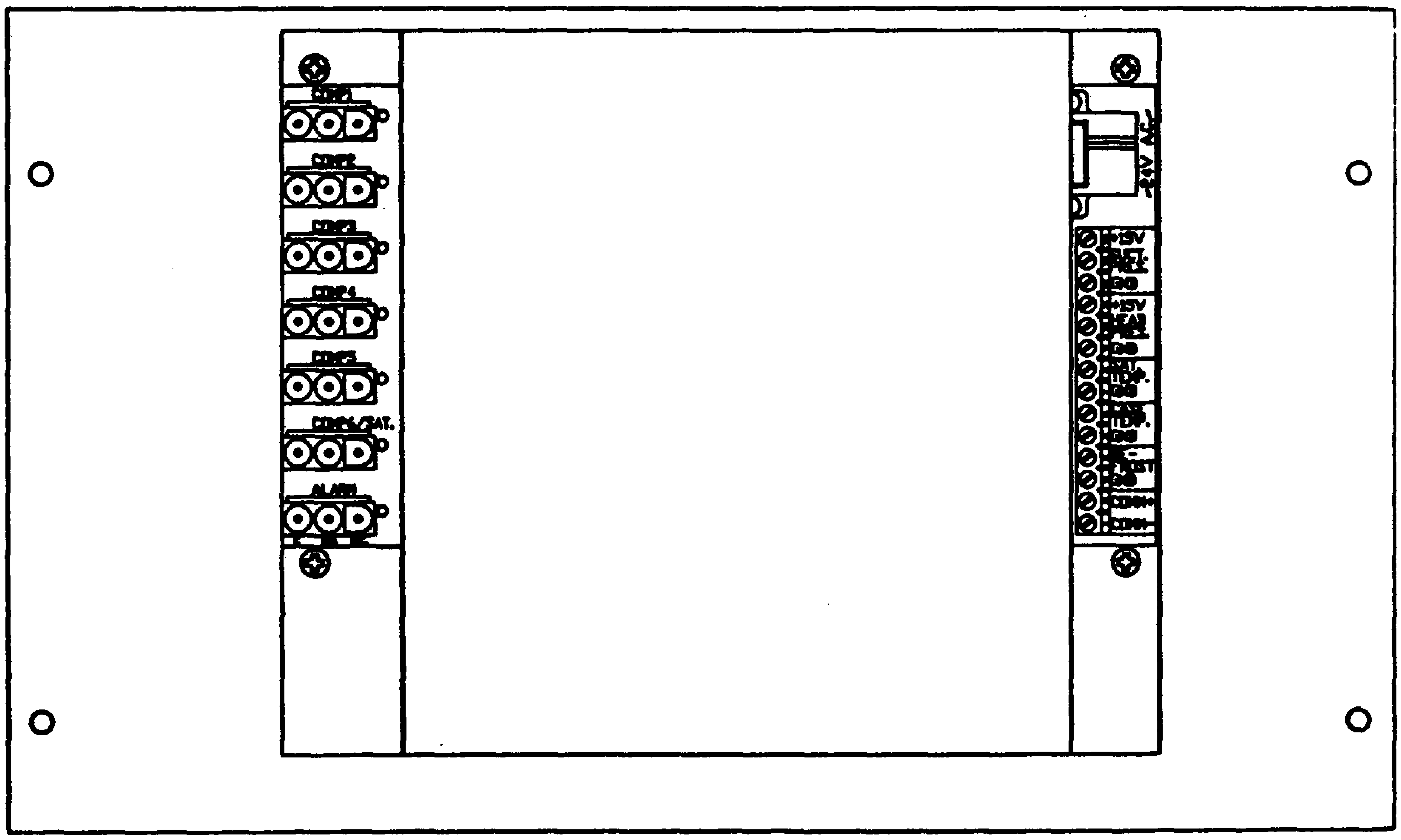


Figure 1-2. EPC-1000 Back Panel

COMPONENTS

Temperature Sensor
Pressure Transducer
Transformer
Control Circuit Plug Assemblies
Switchback/Alarm Plug Assembly (Parallel)
Alarm Plug Assembly (Series)
24V AC Power Plug Assembly

Temperature Sensor

The temperature probe is a fast response, non-polarized, resistive type sensor. See Figure 1-3.

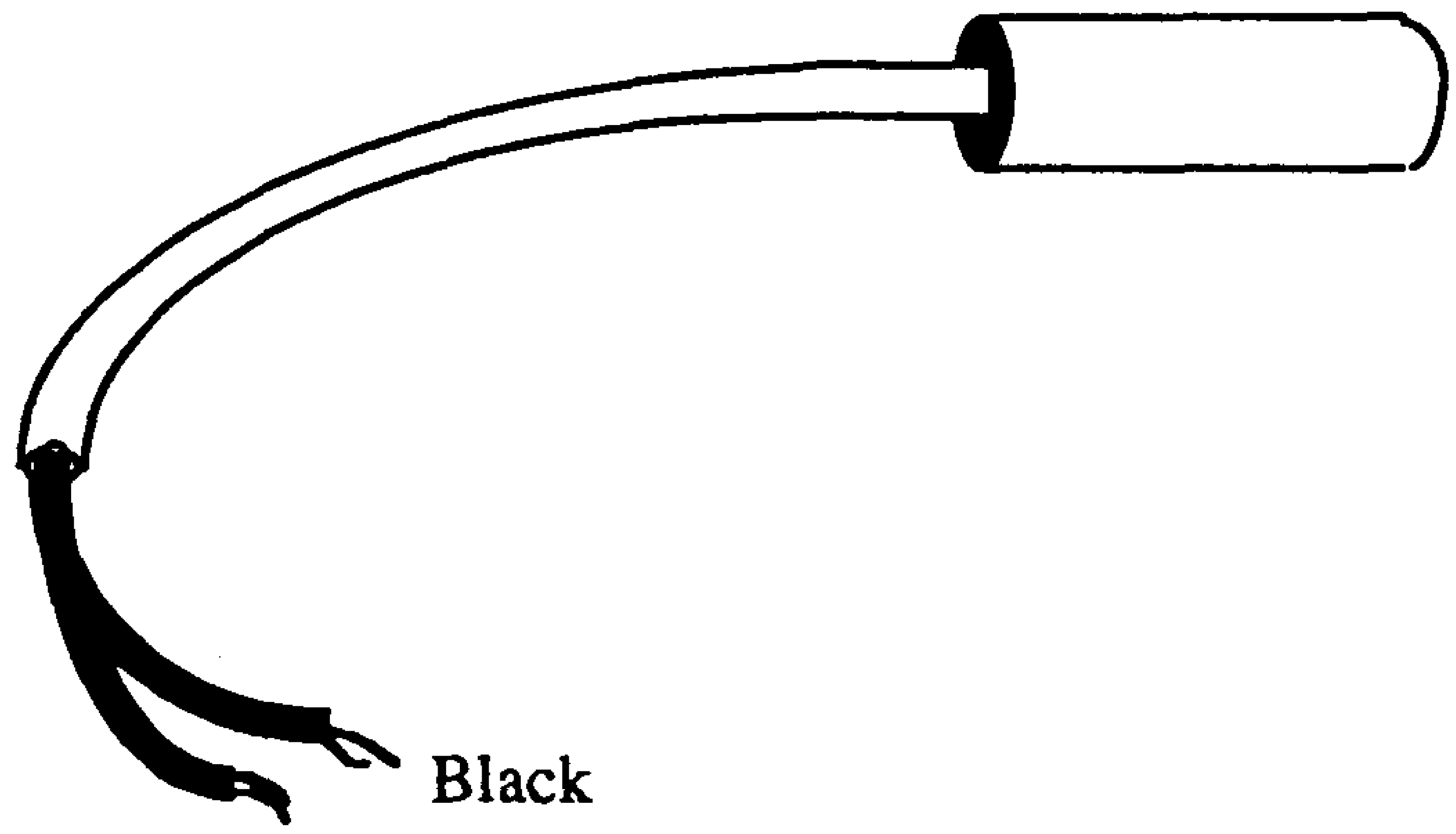


Figure 1-3. Temperature Sensor

Pressure Transducer

The pressure transducer provides an analog signal back to the processor proportional to the pressure detected. See Figure 1-4.

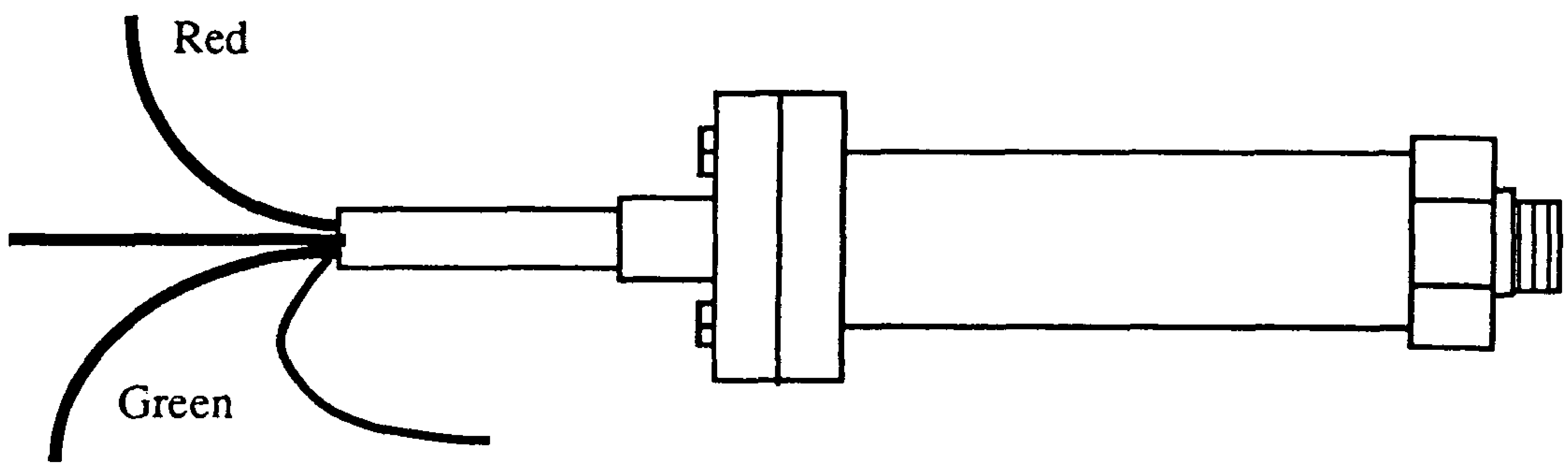


Figure 1-4. Typical Pressure Transducer

Transformer

The control transformer is the power source for the EPC-1000, providing conversion from power line voltages to 24V AC. See Figure 1-5. The transformer is connected to the processor assembly by the power plug assembly (Figure 1-9).

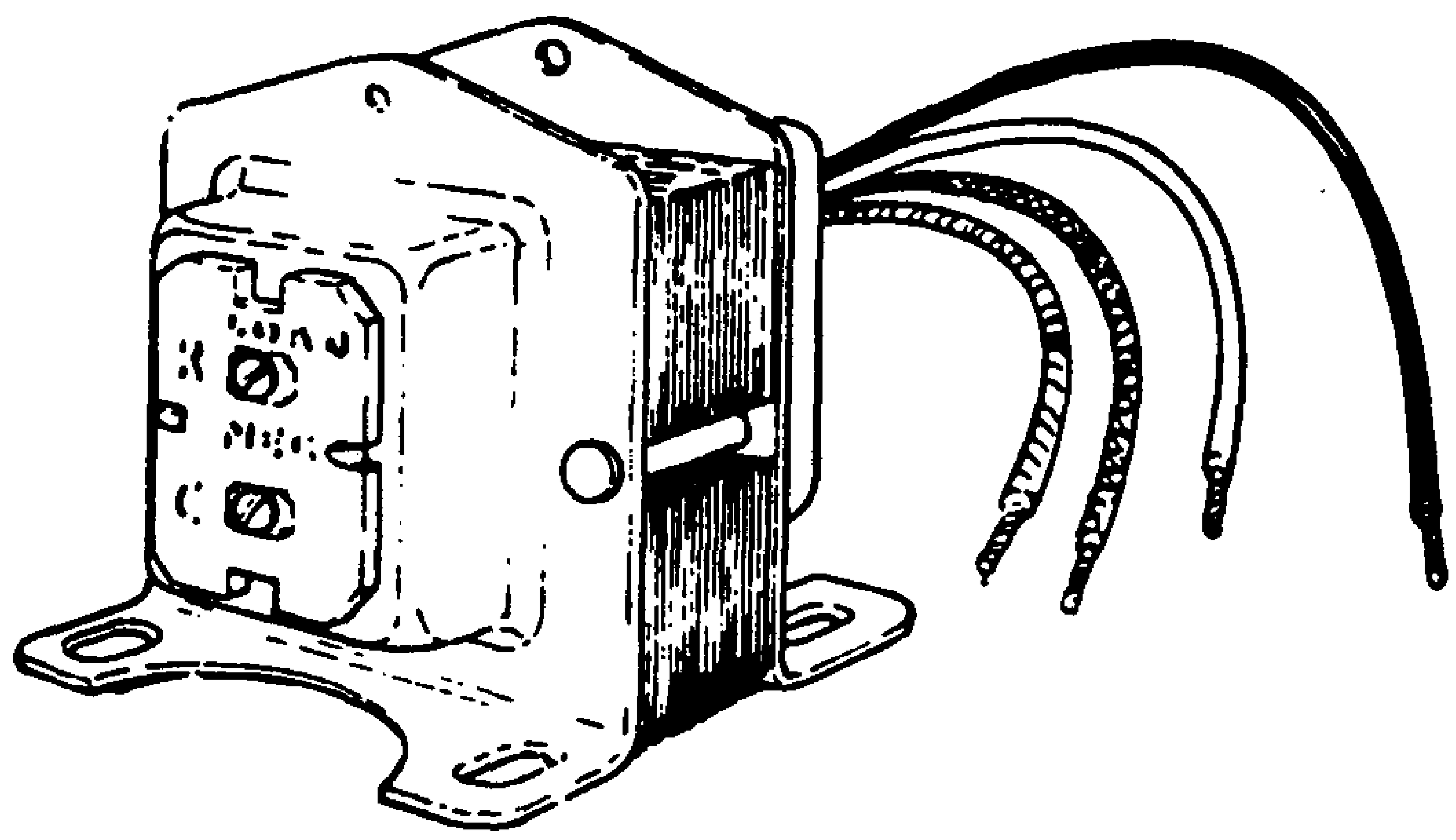


Figure 1-5. Control Transformer

Control Circuit Plug Assemblies

The control circuit plug assemblies connect the Super Plus™ control circuit to the relay block. See Figure 1-6.

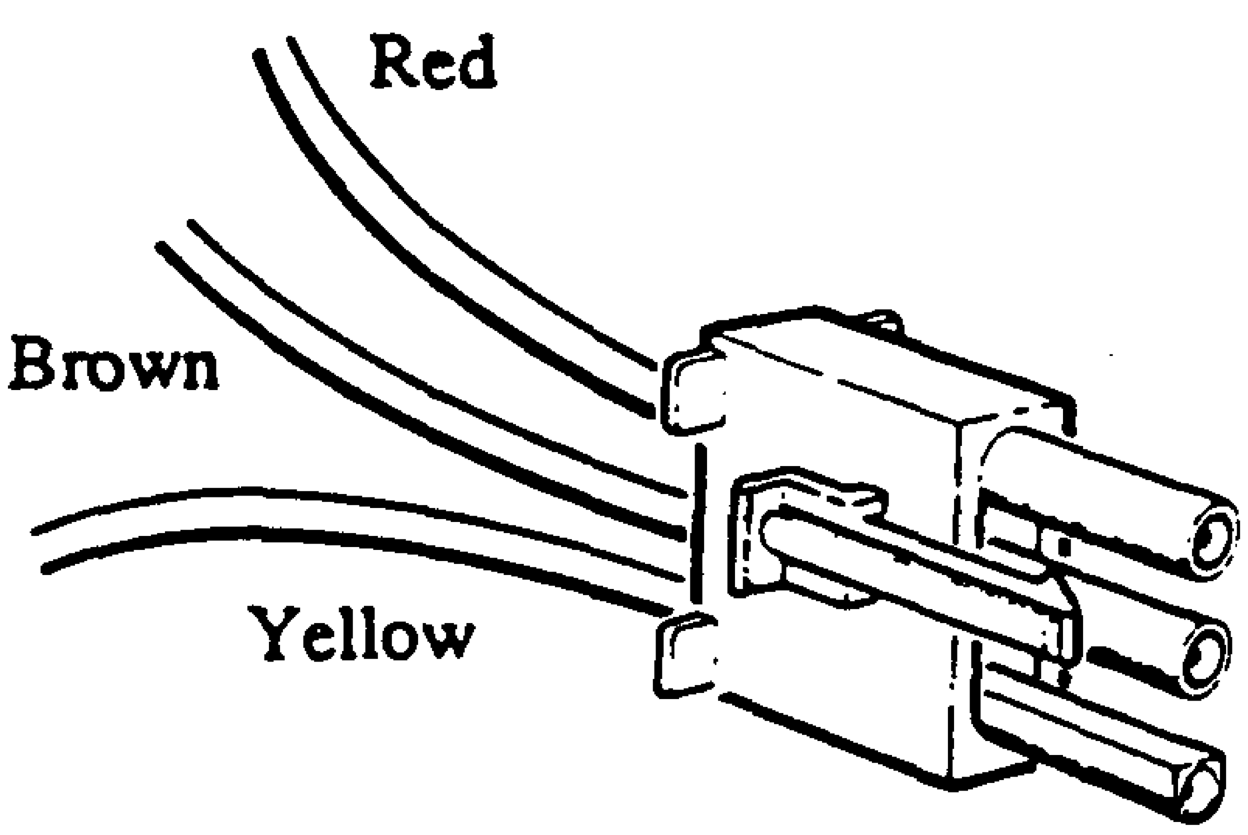


Figure 1-6. Compressor and Satellite Plug Assemblies

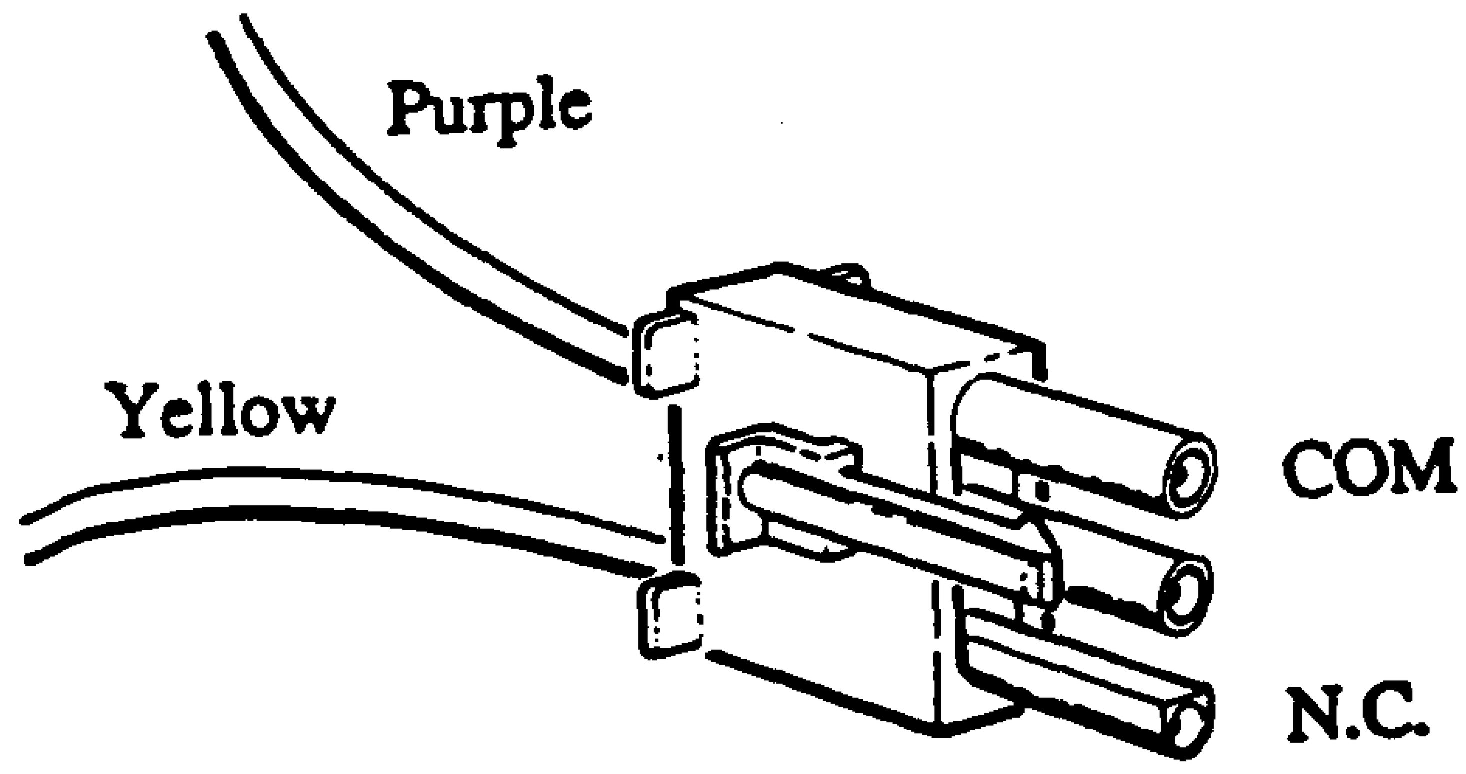


Figure 1-7. Switchback/Alarm Plug Assembly
(Used with the Alarm Relay for
Parallel Switchback)

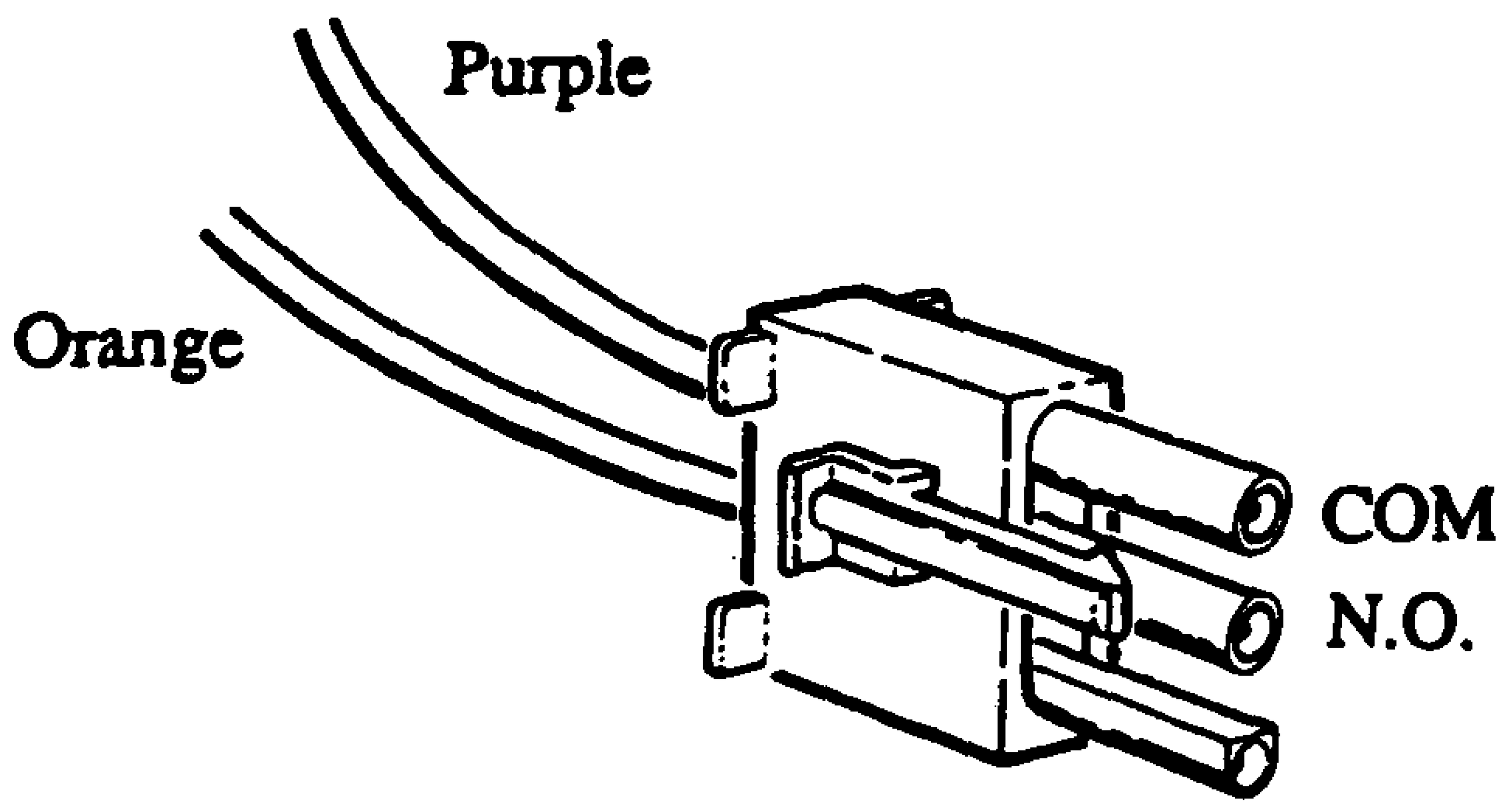


Figure 1-8. Alarm Plug Assembly
(Used with the Alarm Relay for
Series Switchback)

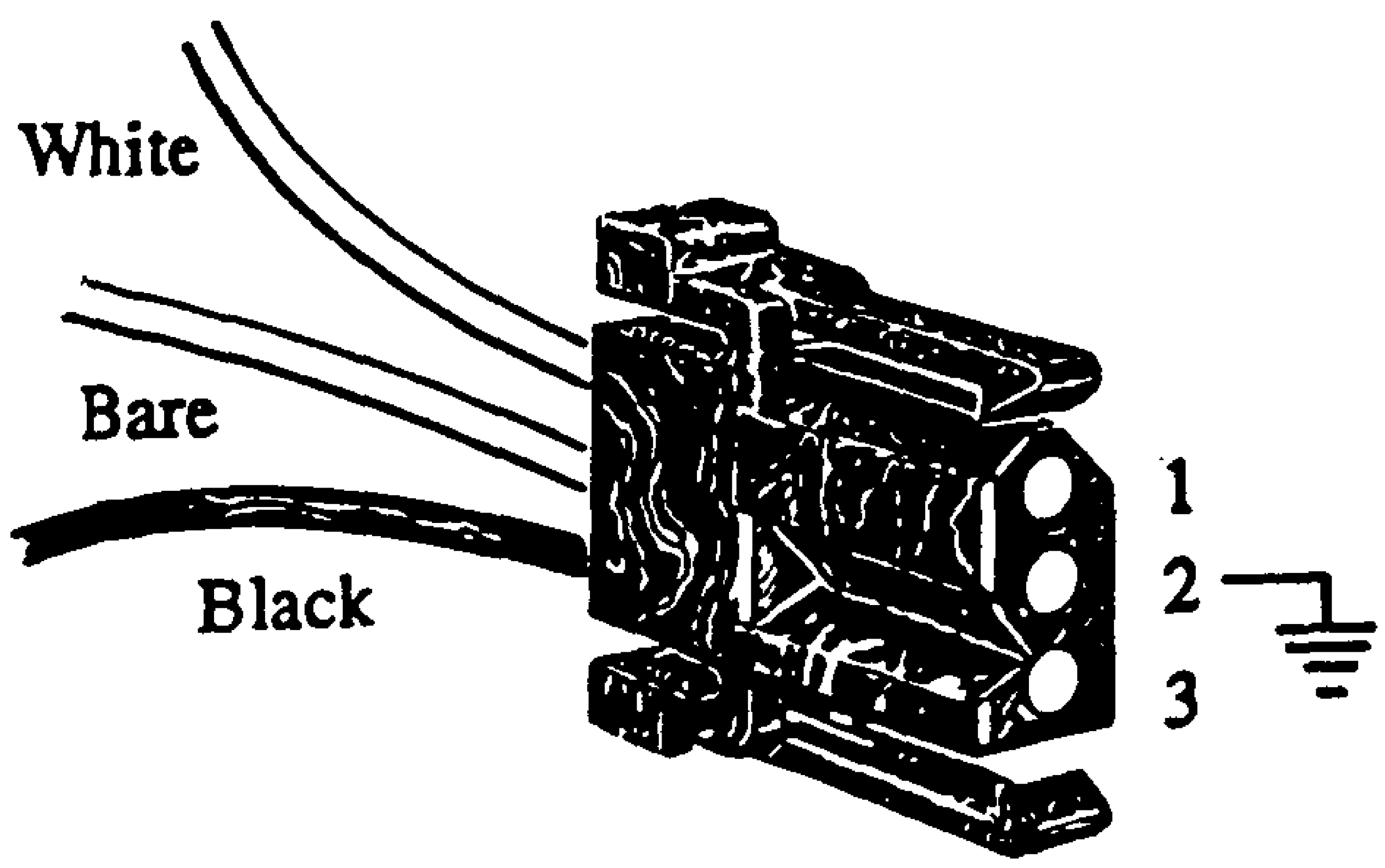


Figure 1-9. 24V AC Power Plug Assembly

INSTALLATION

GENERAL

This section covers factory installed EPC-1000 on Super Plus Systems.

NOTE: In order to minimize unit downtime, read these instructions carefully, understand the procedures and have all the necessary materials available.

This section will describe the wiring that was completed at the factory and the wiring that must be completed in the field. It also includes a start-up sequence for the EPC-1000.

Compressor and defrost control circuit wiring diagrams for panel wiring are located at the end of this section. Refer to Figure 4-1 for sensor connections to the EPC-1000.

FACTORY INSTALLED EPC-1000

The EPC-1000 is mounted on the left-hand door of the Super Plus System. The transformer is mounted inside the panel directly behind the EPC-1000. The pressure transducer has been mounted on the suction header. All wiring integral to the control panel is completed at the factory. This includes the 24V AC interconnect cables (except case satellite and suction pressure reset temperature sensors which must be field wired to the EPC-1000 terminal block in the refrigeration control panel).

The specific components are wired as follows:

Transformer

The transformer is a multi-tap transformer (Figure 1-5). The 120V AC primary connections are connected to terminals X1C (through fuse F10) and X21 in the control panel. The unused 208 and 240V AC primary wires have been insulated. The 24V AC is connected to the EPC-1000 via the 24V AC power plug assembly.

Parallel Switchback (Standard)

<u>Alarm Relay</u>

The alarm relay of the EPC-1000 is connected to terminal X1C and terminal 2 of the TDSB relay in the control panel via the alarm plug assembly (Figure 1-7).

<u>Compressor Control Relays</u>

The compressor control relays (COMP1–COMP6) on the relay board are connected to terminals 4#, 5#, and C# in the control panel via the compressor plug assembly (Figure 1-6). The "#" sign refers to the compressor number and the terminal block number. For example, compressor number 2 would wire into terminals 42, 52, and C2. Make sure the normally open (N.O.) contact is connected to 4#; the normally closed (N.C.) contact is connected to C#; and the common (COM) is connected to 5#.

Series Switchback (Optional)

<u>Alarm Relay</u>

The EPC-1000 Alarm relay is connected to terminals Y1 and Y2 in the control panel via the alarm plug assembly (Figure 1-8).

<u>Compressor Control Relays</u>

The compressor control relays (COMP1–COMP6) of the EPC-1000 are connected to terminals 4# and 5# in the standard Super Plus control panel. The control relay however are connected to C# and 5# of the specific compressor branch boards for the Super Plus with a Fibertronic control panel. Refer to the Super Plus Compressor wiring diagram enclosed for details.

The # sign refers to the compressor number and the respective control circuit connection points. For example compressor number 2 would wire into terminals 42 or C2 and 52 depending on the type of control panel. Make connections to 42 or C2 terminals, and the COM contact "Red Lead" connects to 52 terminal. For series switchback the N.O. terminal "Brown Lead" is not used and should not be connected to any point in the panel.

Defrost Input
The defrost input on the input terminal strip is connected to terminals 5 and 3 of the KR relay in the control panel using Belden 8760 cable.

Factory Installed Satellite Compressor
If a factory installed satellite is included, the compressor control relay (SAT) on the EPC-1000 is connected to terminal SR, SY, and B_ in the control panel via the compressor plug assembly. The blank "_" following the number designates the actual defrost system number determined from the store legend.

Temperature Sensor
The case temperature sensor (Figure 1-3), for satellite or suction pressure reset, is either factory installed or field installed based on the customer's preference. Mount the field installed sensor as shown in the case installation/service instructions for the particular case being controlled.

Attach the temperature sensor to Belden 8618 or equivalent cable. Extend the temperature sensor cable back to the Super Plus control panel. Do not allow the sensor cable to be grouped with high voltage wiring. Keep the sensor wiring segregated from the power wiring on long runs of adjacent cases where case raceways form a long duct prior to exiting into the floor conduits. Attach the cable wires to the terminals marked satellite temperature or suction pressure reset on the input terminal strip. Also attach the ground (drain) wire to the panel liner.

Pressure Transducer
The suction pressure transducer (Figure 1-4) is mounted on the suction header. Three-conductor cable (Belden 8618 or equivalent) is run to the input terminal strip. This cable is not to be run in conduit with high voltage wiring. It is a low voltage signal circuit and need not be in conduit. The Red wire is connected to the "+15V"; the Green wire to "GND", and the White wire to "SUCT PRES" on the input terminal strip marked suction pressure. If the pressure transducer has a braid type shield, the braid should be connected to the nearest EPC-1000 mounting screw — use a ring terminal.

START-UP

Complete the following sequence to start-up the Super Plus System:

Carefully check all wiring before start-up.

1. Turn off the individual compressor branch switches. Unplug the 24V AC power plug assembly from the side of the EPC-1000 .
2. Close the Super Plus System main disconnect.
3. Close the Super Plus System control circuit breaker.
4. Using a digital multimeter, verify 24V AC secondary supply across terminals 1 and 3 of the power plug assembly (Figure 1-9).
5. If the power supply is 21–30V AC, connect power plug assembly into the 24V AC connection on side of processor assembly. When the EPC-1000 is first powered up, the initial display will read HUSSMANN CORPORATION EPC-1000 COPYRIGHT 1989.

CHECKOUT PROCEDURE

NOTE: To complete the remaining steps of the start-up procedure, you must be familiar with Section 3, Operation.

1. Check EPC-1000 factory setup. Factory setup can be viewed using the CONFIGURATION MENU (Page 3-12).
2. Turn on the compressor branch switches.
3. Observe that the EPC-1000 begins to sequence compressors.
4. Verify that the suction pressure and any case temperature probes are operating correctly. Recalibrate if necessary, see Page 3-19.
5. Force all connected compressors and satellites individually ON and OFF within the MAINTENANCE MENU (Page 3-7).
6. Place the rack in switchback and alarm by unplugging the 24V AC power plug assembly from the side of the EPC-1000 to check that the low pressure controls and satellite thermostats are operational and adjusted.
7. Reconnect the EPC-1000.
8. Place a KOOLGAS system into defrost and observe that the EPC-1000 defrost screen in the STATUS MENU shows ON (Page 3-5). Terminate the defrost and verify that the status screen changes to OFF.
9. Return the EPC-1000 to controlling the rack.

If any problems are detected, go to Section 4, Service (Troubleshooting).

OPERATION

KEYPAD FUNCTIONAL DESCRIPTION

The EPC-1000 operation is simple; yet, it is powerful enough to display current information, log prior history, log alarms and set control limits.

The panel keys are "Scroll Up", "Scroll Down", "Exit" and "Select". See Figure 3-1.

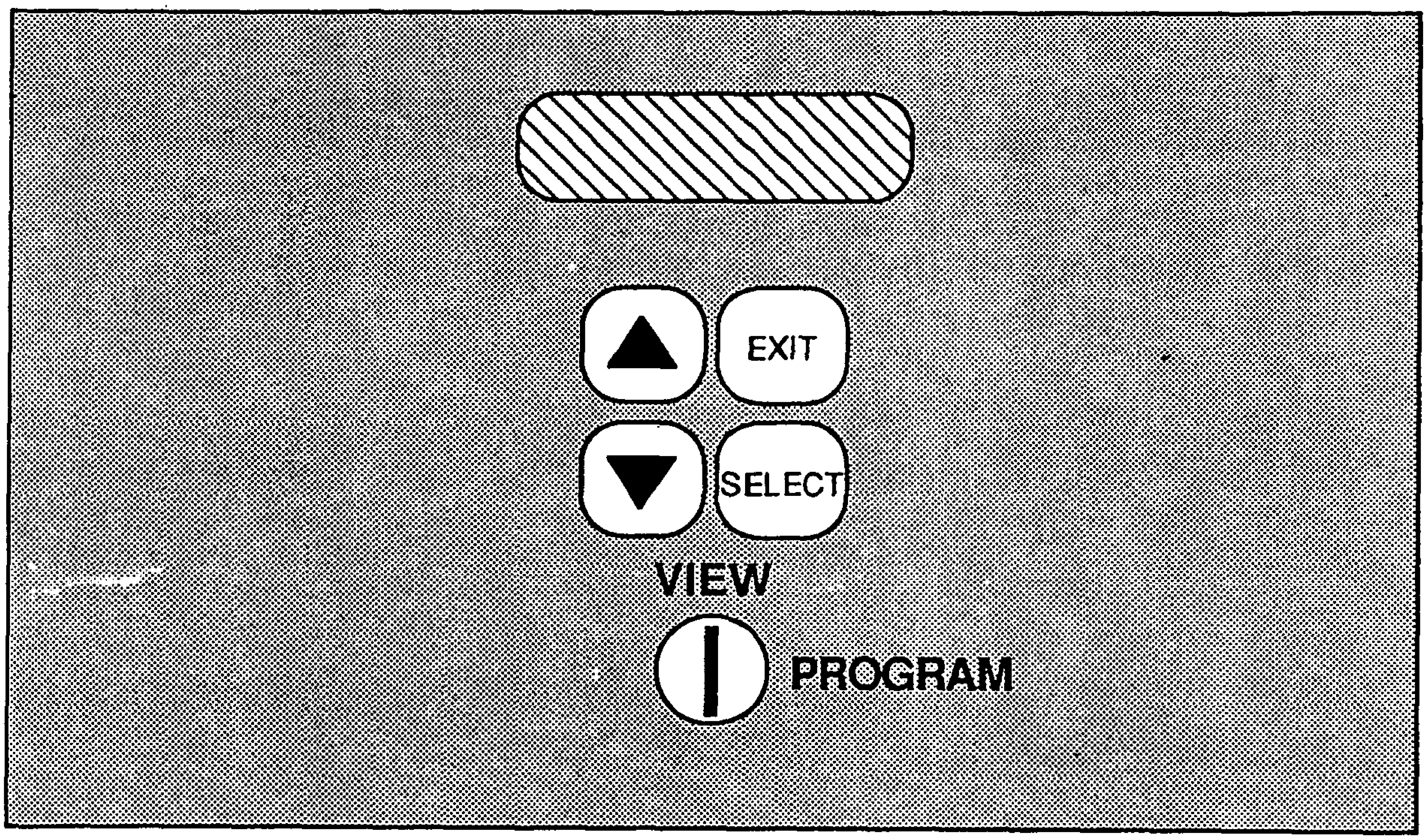


Figure 3-1. EPC-1000 Faceplate

"Scroll Up/Scroll Down" Keys

The scroll up and down arrow keys allow the user to move to the next screen (scroll down) or to the previous screen (scroll up). These keys are also used to change values and to return to menus from submenus (exit would take the user back to the main display).

When the last screen of a menu is reached the controller will revolve back to the top of that menu.

"Exit" Key

This key allows the user to return to the main display from a menu or a submenu.

"Select" Key

The select key has numerous functions depending on where the user is within the menu selections. Select allows the user to:

1. enter a menu.
2. enter a submenu.
3. return to a menu from a submenu (exit would take the user back to the main display).
4. change values (when the choices are fewer than 5).
5. store final value in memory (when choices are greater than 5).

VIEW/PROGRAM

There are two key positions: VIEW and PROGRAM. When the key is turned to the PROGRAM position the user can change the values. When the key is in the VIEW position the user can not change the values. (NOTE: There is one exception to this rule. If the user turns the key to PROGRAM, makes changes to the values within a menu and then turns the key to VIEW while still in that menu, he or she can continue to change values within that menu. Once the user exits that menu, however, the key must be turned to PROGRAM to make further changes).

CAUTION: THE KEY CAN BE REMOVED IN EITHER THE VIEW OR PROGRAM MODE. IF THE KEY IS REMOVED IN THE PROGRAM MODE DATA CAN BE CHANGED AT ANYTIME.

NOTE: Two keys are supplied with each EPC-1000. They are in the envelope taped to the back of the unit. The keys should be removed and kept in a secure place.

Figure 3-2. Key Positions

POWERING UP THE SYSTEM

Power Up Display

When the system is first powered up the display will read: HUSSMANN CORPORATION EPC-1000 COPYRIGHT 1989.

Default Displays

Following the power up display the EPC-1000 will alternate between its two default displays: SUCTION XX (current suction pressure) and SUCT SP XX (Suction Set Point). If the SPR (Suction Pressure Reset) option is installed the SPR SP XX will replace the SUCT SP XX screen. See Figure 3-3.

NOTE: To prevent the displays from alternating:

- Hold the Exit key to view only the SUCTION XX screen, or
- Hold the Select key to view only the SUCT SP XX (or SPR SP XX) screen.

When you release the key (Exit or Select) the displays will again alternate.

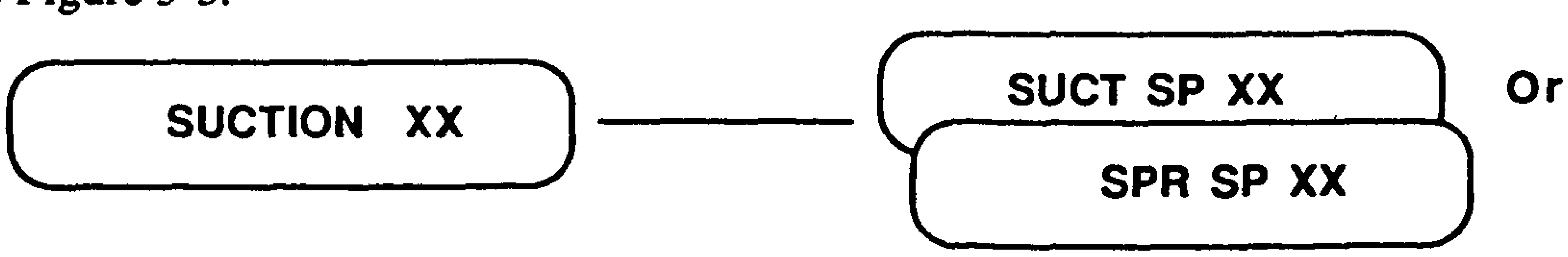


Figure 3-3. Default Display

If the head pressure option is installed a third default display, HEAD P XX, will appear. See Figure 3-4.

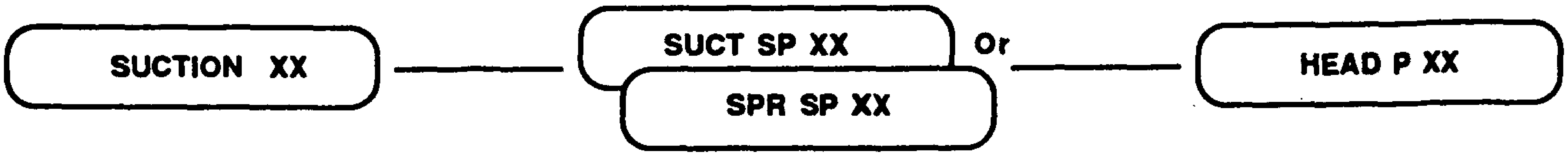


Figure. 3-4. Default Display with Head Pressure Option

Alarm Display

If the controller is in alarm an alarm display will also appear. The display will not power down if the system is in alarm. Should an alarm occur after a power down, the display will automatically come on to signal the alarm. The maximum number of default displays is three screens. So if the head pressure option is installed, the alarm display will replace the SUCT SP or SPR SP display and the following (Figure 3-5) will appear.

Figure 3-5. Default Display in Alarm with Head Pressure Option

If the head pressure option is NOT installed these screens (Figure 3-6) will appear.

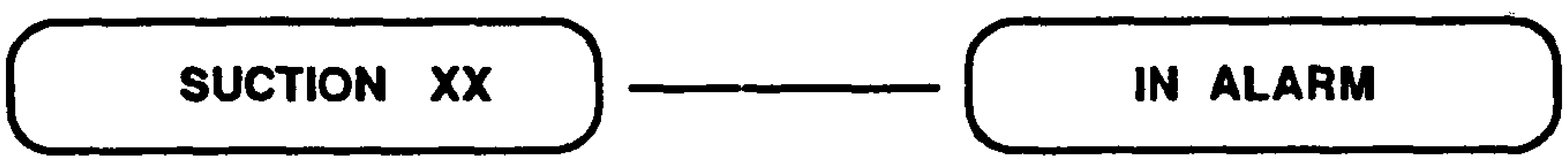


Figure 3-6. Default Display in Alarm

The EPC-1000 may be linked to an external alarm system such as a bell. <u>The EPC-1000 alarm alone is a silent display.</u>

NOTE: When the controller is in alarm, it immediately goes to mechanical switchback. To view, force or clear an alarm, scroll to the alarm menu and press select to enter the menu.

MAIN DISPLAY

This display allows the user to access eight menus. The menus and their descriptions are shown below.

DESCRIPTION	PRESS THIS KEY	THIS WILL DISPLAY
Displays (view only) controller status information	▼	STATUS
Displays last three alarm logs, and allows the user to clear and/or set alarms	▼	ALARM
Exercises compressors' ON/OFF function, and allows the user to reset controller	▼	MAINT
Displays and allows the user to change the controller's set points	▼	SYSTEM
Displays and allows the user to reset the controller's configuration	▼	CONFIG
Displays and allows the user to reset compressor RUN times	▼	RUN METER
Displays and allows the user to reset sensor data log time	▼	DATA LOG
Displays and calibrates sensors	▼	CALIBRATE

STATUS MENU

This menu is view only. To change the set points shown, the user must enter the System menu.

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the Status menu, scroll to the STATUS display and press select.	▼	STATUS
"•" means compressor is OFF. When a compressor is ON its number appears. "S" means satellite is ON. See Note Below.	SELECT	ON S 1 • 3 • 5
Head pressure*	▼	HEAD P XXX
Suction pressure set point	▼	SUCT SP XX
Suction pressure high limit alarm set point	▼	SUCT HI XX
Suction pressure low limit alarm set point	▼	SUCT LO XX
SPR (Suction Pressure Reset) set point*	▼	SPR SP XX
Monitored SPR case temperature*	▼	CAS T XX
Monitored SPR case set point*	▼	CAS SP XX
Actual satellite temperature*	▼	SAT T XX
Satellite temperature set point*	▼	SAT SP XX
Satellite temperature alarm high limit*	▼	SAT HI XX
Satellite temperature alarm low limit*	▼	SAT LO XX
Monitoring defrost	▼	DEFRST OFF
Software version	▼	VER X.XX

Pressing the down scroll key again will take you back to the top of the menu. You may leave the menu at any time by pressing the exit key.

*This screen only appears if the option is installed.

NOTE: The satellite and compressors 1, 3 and 5 are ON; compressors 2 and 4 are OFF. **The letter "S" and the number "5" look alike.** Watch the position of the character to determine which is which.

ALARM MENU

The system keeps the <u>most recent three</u> alarm logs, after the last power up. The table at the end of this section summarizes the different types of alarms.

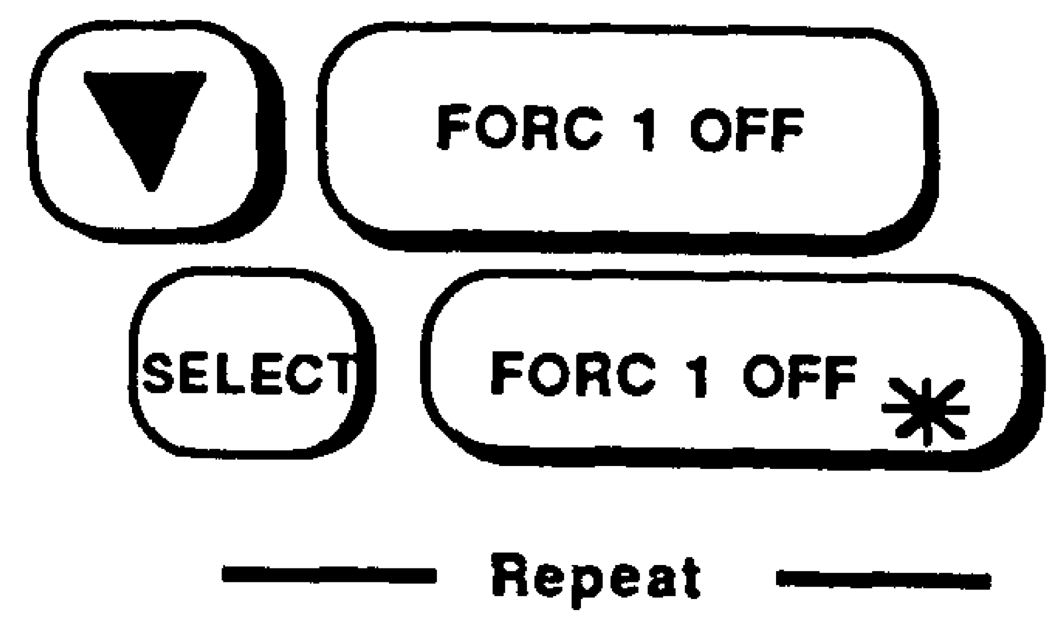
DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the Alarm menu, scroll to the ALARM display and press select.	▼	ALARM
If IN Alarm To clear an alarm: press select to show display, press select again to toggle to yes and to activate the change indicator (blinking light), then press down scroll to set the command and move to the next screen. NOTE: AL CLEARED will appear for a second before the display moves to the next screen.	SELECT	CLR/SET ALARM
	SELECT	CLR AL NO
	SELECT	CLR AL YES *
	▼	1ST ALARM
	—Or If NOT In Alarm—	
If NOT In Alarm To set an alarm (for testing or maintenance): press select to show display, press select again to toggle to yes and to activate the change indictor (blinking light), then press down scroll to set the command and to move to the next screen. NOTE: ALARM ON will appear for a second before the display moves to the next screen.	SELECT	CLR/SET ALARM
	SELECT	SET AL NO
	SELECT	SET AL YES *
To View Alarm Logs The 1st alarm is the most recent alarm.	▼	1ST ALARM
To view the cause of this alarm press select.	SELECT	FORCED ALM
To see how long ago this alarm took place, press select again. The screen shows time of alarm, relative to present time. Format: D=Days HR= Hours . Minutes	SELECT	D 0 HR 0.06
Press down scroll to view the next alarm. If there is no second alarm the word empty will appear.	▼	2ND ALARM
	SELECT	POWER UP
	SELECT	D 0 HR 0.10
Press down scroll to view the 3rd most recent alarm.	▼	3RD ALARM
Pressing down scroll key again will scroll the screen around to the top of the menu. You may leave the menu at any time by pressing the exit key.	SELECT	EMPTY
	SELECT	D 0 HR 0.00

MAINTENANCE MENU

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the Maintenance menu, scroll to the MAINT display and press select.	▼	MAINT
To Kill Force Present only if Compressors have been forced ON or OFF. To kill the forced condition press select to activate the change indicator (blinking light), then press down scroll to set the command and move to the next screen.	SELECT	KILL FORCE
	SELECT	KILL FORCE *
NOTE: The select key will toggle the light (change indicator) on and off.		
To Sequence Compressors Press select to activate the change indicator. Then press down scroll to set the sequencing action.	▼	SEQ COMPS
	SELECT	SEQ COMPS *
A screen will appear for each of the compressors as it turns on. (Press any key to stop the sequencing.)	▼	SEQ ...1 ↓ END OF SEQ
Once sequencing is complete, press down scroll to move to the next screen.		SEQ COMP
To Force On Compressors Press select to activate the change indicator, then press down scroll to set the force action and move to the next screen.	▼	FORCE 1 ON
Repeat for each compressor you wish to force on. If you do not wish to force on a compressor, scroll down without activating the blinking light.	SELECT	FORCE 1 ON *
		—— Repeat ——
To Force On a Satellite (Optional) Press select to activate the change indicator, then press down scroll to set the force action and move to the next screen.	▼	FRC SAT ON
	SELECT	FRC SAT ON *

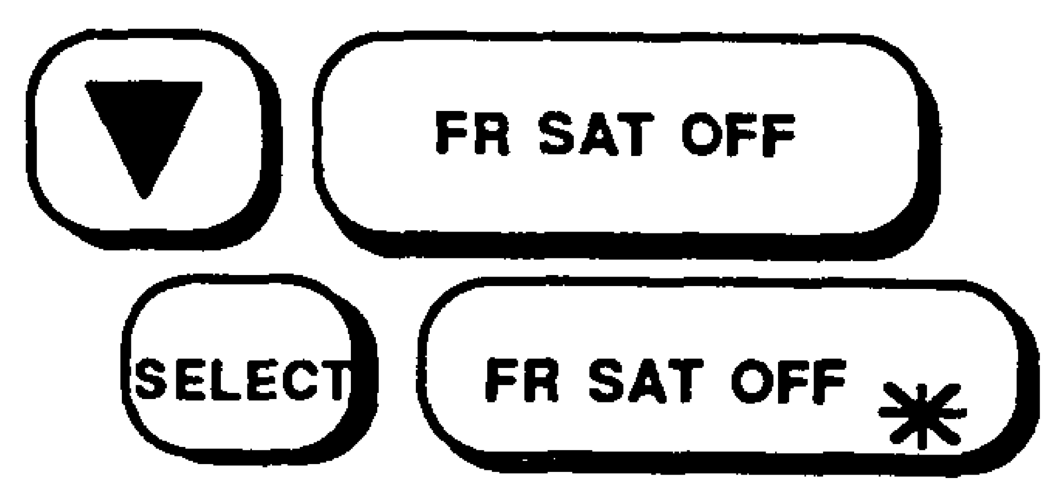
DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY

To Force Off a Compressor
Press select to activate the change indicator then press down scroll to set the force action and move to the next screen.



Repeat for each compressor you wish to force off. If you do not wish to force off a compressor, scroll down without activating the blinking light.

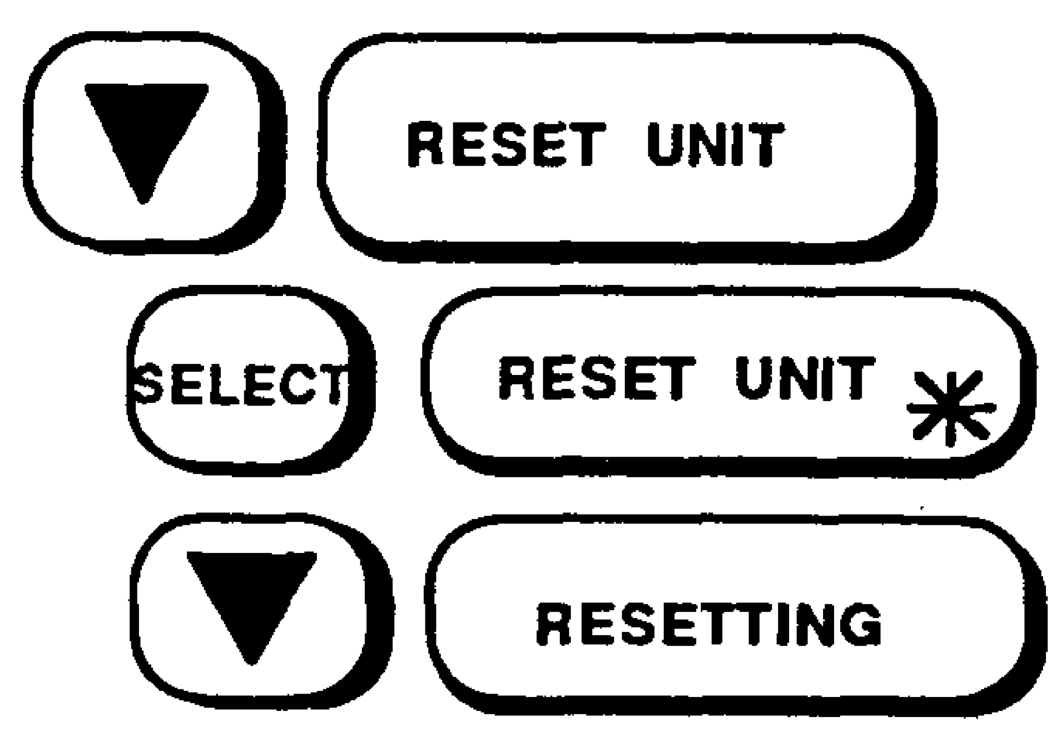
To Force Off a Satellite
Press select to activate the change indicator, then press down scroll to set the force action and move to the next screen.



NOTE: If the same compressor is being forced ON and OFF, the compressor will stay forced ON. The force ON overrides the force OFF.

A FORCE ON/OFF condition will last for 30 minutes; the compressor will then automatically return to its original state. The KILL FORCE will immediately cancel a FORCE ON or OFF.

To Reset
This will clear all alarm and data logs. It has the same consequence as turning the power off and back on. The controller will return to the power display and then to the default screens. Resetting the controller gives you a known starting point for logged entries.



To reset, press select to activate the change indicator, then press down scroll to activate the reset and move to the next screen.

Pressing the down scroll key again will scroll the screen around to the top of the menu. You may leave the menu at any time by pressing the exit key.

SYSTEM MENU

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the System menu, scroll to the SYSTEM display and press select.	▼	SYSTEM
To Change Suction Pressure Set Point Press select to activate the change indicator.	SELECT	SUC SP XX
Use up/down keys to scroll within range. The set point range is limited to +10 – -5 psi of the default set point (see Page 3-12 Suction Default Setting).	SELECT	SUC SP XX *
	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	SUC SP XX
Press down scroll to move to the next screen.		
To Change Suction High Limit Alarm Press select to activate the change indicator.	▼	SUC HI XX
Use up/down keys to scroll within range. The lowest setting is limited to 8 psi above the suction pressure set point.	SELECT	SUC HI XX*
	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	SUC HI XX
Press down scroll to move to the next screen.		
To Change Suction Low Limit Alarm Press select to activate the change indicator.	▼	SUC LO XX
Use up/down keys to scroll within range. The highest setting is limited to 2 psi below the suction set point.	SELECT	SUC LO XX*
	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	SUC LO XX
Press down scroll to move to the next screen.		

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To Change Case Temperature Set Point Press select to activate the change indicator.	▼	CAS SP XX
Use up/down keys to scroll within range. Set point range is limited to -40–120°F.	SELECT	CAS SP XX *
Press select to finalize value selection and store final value in memory.	▲▼	Scroll to new value
Press down scroll to move to the next screen.	SELECT	CAS SP XX
To Change Satellite Temperature Set Point Press select to activate the change indicator.	▼	SAT SP XX
Use up/down keys to scroll within range. Set point range is limited to -40–120°F.	SELECT	SAT SP XX *
Press select to finalize value selection and store final value in memory.	▲▼	Scroll to new value
Press down scroll to move to the next screen.	SELECT	SAT SP XX
To Change Satellite High Limit Alarm Press select to activate the change indicator.	▼	SAT HI XX
Use up/down keys to scroll within range. Set point is limited to 1°F above the case temperature set point to 120°F.	SELECT	SAT HI XX *
Press select to finalize value selection and store final value in memory.	▲▼	Scroll to new value
Press down scroll to move to the next screen.	SELECT	SAT HI XX
To Change Satellite Low Limit Alarm Press select to activate the change indicator.	▼	SAT LO XX
Use up/down keys to scroll within range. The set point range is -40–1°F below the case temperature set point.	SELECT	SAT LO XX *
Press select to finalize value selection and store final value in memory.	▲▼	Scroll to new value
Press down scroll to move to the next screen.	SELECT	SAT LO XX

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To Change Data Log Time		
Press select to activate the change indicator.	▼	LOG MIN XXX
Use up/down keys to scroll within range. The range is 0–120 minutes. NOTE: <u>If 0 is selected the logging function will be disabled</u>.	SELECT	LOG MIN XXX*
Press select to finalize value selection and store final value in memory.	▲▼	Scroll to new value
Press down scroll to move to the next screen.	SELECT	LOG MIN XXX
To Change Baud Number	▼	BAUD 1200
There are four (4) Baud Numbers available: 1200, 2400, 4800 and 9600. Press select to change from one to the next.	SELECT	BAUD 2400
Press down scroll to store final value in memory and move to the next screen.	SELECT	BAUD 4800
	SELECT	BAUD 9600
To Change Station Number	▼	STA NO XXX
Press select to activate the change indicator.	SELECT	STA NO XXX*
Use scroll up/down keys to scroll within range. The range is 1–255.	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	STA NO XXX
Press down scroll to move to the next screen.		
Pressing the down scroll key again will scroll the screen around to the top of the menu. You may leave the menu at any time by pressing the exit key.		

CONFIGURATION MENU

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the Configuration menu, scroll to the CONFIG display and press select.	▼	CONFIG
NOTE: The suction pressure transducer input signal must be disconnected before you can reconfigure the EPC-1000. Other-wise the message "DENY" will appear.	SELECT	REFRIG R22
To Change Refrigerant There are three (3) refrigerant choices: R12, R22 and R502. Press select to change from one to the next.	SELECT	REFRIG R12
	SELECT	REFRIG R502
Press down scroll to store final value in memory and move to the next screen.	▼	SU DFA XX
To Change Suction Default Setting Press select to activate the change indicator.	SELECT	SU DFA XX *
Use up/down keys to scroll within range.	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	SU DFA XX
Press down scroll to move to the next screen.	▼	MM COMP X
To Change Mixmatch Press select to activate the change indicator.	SELECT	MM COMP X *
Use up/down keys to scroll within range. (If no mixmatch, enter 0.)	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	MM COMP X
Press down scroll to move to the next screen.		

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To View Mixmatch Table	▼	MM-TBE NO
Press select to toggle screen to YES.	SELECT	MM-TBE YES
Press down scroll to activate yes selection.	▼	STEP SZ X
To Change Step Size		
Press select to activate change indicator.	SELECT	STEP SZ X *
Use up/down key to scroll within range.	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	STEP SZ X
Press down scroll to move to the next screen.	▼	STEP 1 X
To Change ON/OFF Pattern		
Press select to activate the change indicator.	SELECT	STEP 1 X *
Use up/down keys to scroll to the proper value (consult your Field Engineer for value).	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	STEP 1 X
Press down scroll to move to the next screen.		
Repeat until all steps are filled in.		
To Choose Round Robin Compressors		
First select 0 for Mixmatch compressors above, otherwise this screen will not appear.	▼	RR COMP X
Press select to activate the change indicator.	SELECT	RR COMP X *
Use up/down keys to input proper Round Robin compressors.	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	RR COMP X
Press down scroll to move to the next screen.		

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To Set Compressor Sequence First select 0 for Mixmatch compressors above, otherwise this screen will not appear.	▼	SEQ COM X
Press select to activate change indicator.	SELECT	SEQ COM X*
Use up/down keys to input proper sequential compressors. Total of compressors for Round Robin and Mixmatch must not exceed 6; 5 if a satellite is to be installed.	▲▼	Scroll to new value
Press select to finalize value selection and store final value in memory.	SELECT	SEQ COM X
Press down scroll to move to the next screen.		
To Install SPR Option NOTE: This option is sold separately. The optional case probe has to be installed for SPR to function. Configuring the SPR when the option has not been installed will trigger an alarm.	▼	SPR NO
Press select to toggle screen to YES.	SELECT	SPR YES
Press down scroll to activate yes selection.		
To Choose Warehouse or Supermarket NOTE: The compressor operation time of the WAREHOUSE choice is three (3) times that of the SUPERMARKET choice. In WAREHOUSE mode, all compressors can be off any length of time without causing an all compressors off alarm.	▼	WAREHOUSE
Press select to toggle between the two choices.	SELECT	SUPERMKT
Press the down scroll to activate your choice and move to the next screen.		

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To Select Satellite Compressor (Optional) Press select to toggle screen to YES.	▼	SAT NO
Press down scroll to activate your choice.	SELECT	SAT YES
To Change Satellite Differential Press select to activate the change indicator.	▼	SAT DIF X
Use the up/down keys to scroll within range. The range is 1–3°F.	SELECT	SAT DIF X *
Press select to finalize value selection and store final value in memory.	▲▼	Scroll to new value
Press down scroll to move to the next screen.	SELECT	SAT DIF X
To Install Head Pressure Option NOTE: This option is sold separately. Configuring the head pressure option when it has not been installed will trigger an alarm.	▼	DSP HD NO
Press select to toggle screen to YES.	SELECT	DSP HD YES
Press down scroll to activate your choice.		
To Choose N.O. or N.C. Press select key to toggle between N.O. (normally open) and N.C. (normally closed).	▼	C RLY N.O.
NOTE: N.O. mode means the relay contacts close when relay is energized which turns ON the respective compressor. (This setting will not affect the optional satellite. The satellite relay always works in N.O. mode.)	SELECT	C RLY N.C.
Press down scroll to activate your choice and move to the next screen.		

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY

To Clear Memory
Press select to toggle the screen to YES.

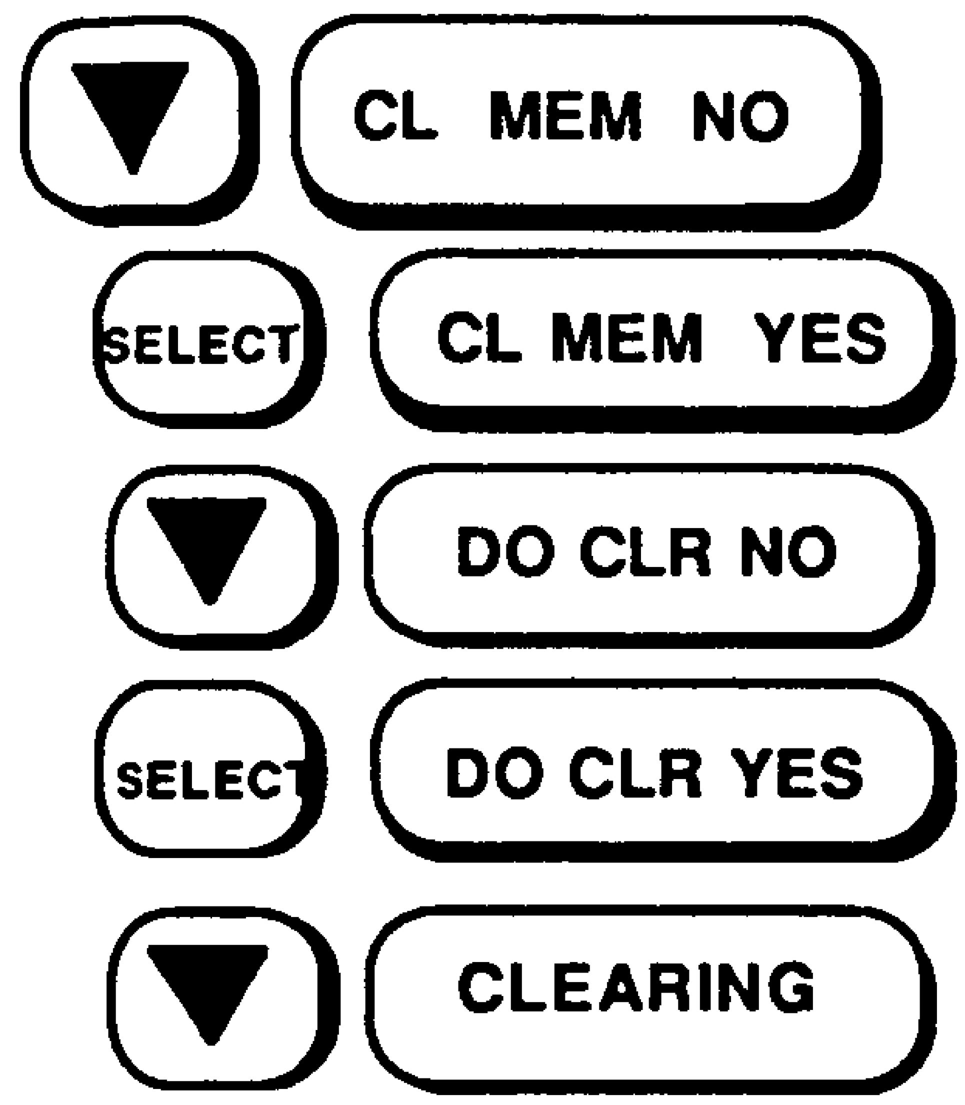
CAUTION: CLEARING MEMORY WILL ERASE ALL CONFIGURATION DATA PREVIOUSLY ENTERED, EXCEPT FOR SENSOR CALIBRATION DATA. YOU MUST RECONFIGURE THE UNIT.

Press down scroll to activate your choice and move to the next screen.

Press select to confirm the fact that you wish to clear the memory.

Press down scroll to activate your selection. The screen will read CLEARING for a second and then return to the top of the Configuration menu.

You may leave the menu at any time by pressing the exit key.



RUN METER MENU

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the Run Meter menu, scroll to the RUN METER display and press select.	▼	RUN METER
A screen will show for each compressor installed. The first number on the left is the compressor number.	SELECT	1 XXXX HR
Press the down scroll to move to the next screen.	▼	2 XXXX HR
If a satellite is installed this screen will show.	▼	SA XXXX HR
NOTE: Meter readings are in hours; rollover occurs at 65000 hours. The time shown is the compressor's total run time since last clearing.		
To Clear Run Meter Whenever a compressor is installed or replaced, its run time should be cleared, so that it reads 0 HR.	▼	CLR 1 METR
Press select to activate change indicator.	SELECT	CLR 1 METR *
Press down scroll to finalize your selection and move to the next screen. CLEAR DONE will display for a second. Repeat for each compressor you wish to clear.	▼	CLR 2 METR
		Repeat
If a satellite is installed this screen will appear. Follow the same steps to clear the satellite.	▼	CL SA METR
Pressing the down scroll key again will scroll the screen around to the top of the menu. You may leave the menu at any time by pressing the exit key.		

DATA LOG MENU

Each log contains six screens. If the elapsed time after the period length setting in the System menu has not been reached the screen will read "- - - -." (See Page 3-11 to change data log time.) The displays below assume the log time was set at 5 minutes. **NOTE:** If log time was set at 0 minutes, NOT ACTIVE will display and this menu cannot be accessed.

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the Data log menu, scroll to the DATA LOG display and press select.	▼	DATA LOG
	SELECT	SUCT P LOG
To View Suction Pressure Log Press select to enter the Suction Pressure submenu.	SELECT	— 5M XX
Use down scroll to view the next 5 logs.	▼	— 10M XX
		Each Log Contains 6 Screens
Press select to leave the submenu and return to the Data log menu.	SELECT	SUCT P LOG
To View Head Pressure Log (optional)	▼	HEAD P LOG
Press select to enter the Head Pressure submenu.	SELECT	—5M XXX
Use down scroll to view the next 5 logs.	▼	—10M XXX
		Each Log Contains 6 Screens
Press select to leave the submenu and return to the Data log menu.	SELECT	HEAD P LOG
To View Satellite Temperature Log (optional)	▼	SAT T LOG
Press select to enter the Satellite Temperature submenu.	SELECT	—5M XX
Use down scroll to view the next 5 logs.	▼	—10M XX
		Each Log Contains 6 Screens
Press select to leave the submenu and return to the Data log menu.	SELECT	SAT T LOG

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To View Case Temperature Log (optional) Press select to enter the Case Temperature submenu.	▼	CASE T LOG
Use down scroll to view the next 5 logs.	SELECT	—5M XX
Press select to leave the submenu and return to the Data log menu.	▼	—10M XX
		Each Log Contains 6 Screens
Pressing the down scroll again will scroll the screen around to the top of the menu. You may leave the Data log menu at any time by pressing the exit key.	SELECT	CASE T LOG

CALIBRATION MENU

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To enter the Calibration menu, scroll to the CALIBRATE display and press select.	▼	CALIBRATE
To Recalibrate Suction Reading To enter the Suction Sensor submenu, press select.	SELECT	SUCT SENSR
Use an external pressure gauge next to the suction pressure sensor to obtain the actual reading.	SELECT	SUCTION X
Press select to activate the change indicator.	SELECT	SUCTION X*
Use the up/down scroll keys to change the suction value shown.	▲▼	Scroll to new value
Press select to finalize the new reading and store it in memory; CAL DONE will display for a second.	SELECT	SUCTION X
Press down scroll to move to the next screen.		

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To Recalibrate Optional Head Pressure Sensor Reading		
This screen will only display if the option is installed. To enter the Head Sensor submenu, press select.	▼	HEAD P XXX
Use an external pressure gauge next to the discharge pressure sensor to obtain the actual reading.	SELECT	HEAD P XXX*
Press select to activate the change indicator.	▲▼	Scroll to new value
Use the up/down scroll keys to change the Head Sensor value shown.	SELECT	HEAD P XXX
Press select to finalize the new reading and store it in memory; CAL DONE will display for a second.		
Press down scroll to move to the next screen.		
To Recalibrate Optional Case Sensor Reading		
This screen will only display if the option is installed. To enter the Case Sensor submenu, press select.	▼	CASE XX
Use an external temperature indicator next to the probe tip to obtain the actual reading.	SELECT	CASE XX *
Press select to activate the change indicator.	▲▼	Scroll to new value
Use the up/down scroll keys to change the Case Sensor value shown.	SELECT	CASE XX
Press select to finalize the new reading and store it in memory; CAL DONE will display for a second.		
Press down scroll to move to the next screen.		

DESCRIPTION OF FUNCTION	PRESS THIS KEY	THIS WILL DISPLAY
To Recalibrate Optional Satellite Sensor Reading		
This screen will only display if a satellite is installed. To enter the Satellite Sensor submenu, press select.	▼	SAT XX
Use an external temperature indicator next to the probe tip to obtain the actual reading.	SELECT	SAT XX *
Press select to activate the change indicator.	▲▼	Scroll to new value
Use the up/down scroll keys to change the satellite sensor value shown.	SELECT	SAT XX
Press select to finalize the new reading and store it in memory; CAL DONE will display for a second.		
Press down scroll to move to the next screen.		
To Reset Factory Calibration		
The RST CAL OF display allows you to reset the calibration offset.		
CAUTION: IF YOU DO THIS THE CALIBRATIONS ABOVE WILL BE REPLACED WITH THE VALUES USED WHEN THE UNIT WAS SHIPPED FROM THE FACTORY.	▼	RST CAL OF
	SELECT	CONFIRM
To reset Calibration offset, press select.	SELECT	
Pressing the down scroll key again will scroll the screen around to the top of the menu. You may leave the menu at any time by pressing the exit key.		

EPC-1000 ALARMS TABLE

ALARM LOG MESSAGE	EPC-1000 ACTIONS	POSSIBLE CAUSE	SOLUTION
Suction pressure is too HIGH	Rack alarm will occur if the suction pressure reading stays above the alarm limit set point for 30 minutes.	-Rack suction HI -Compressor turned OFF or failure -EPC-1000 suction transducer error -Wrong transducer calibration	-Check for rack problem -Turn OFF alarm and reset processor -Check transducer for correct operation -Recalibrate transducer
Suction pressure is too LOW	Rack alarm will occur if the suction pressure reading stays below the alarm limit set point for 30 minutes.	-Rack suction LO -Compressor locked ON -EPC-1000 suction transducer error -LOW on refrigerant -Wrong transducer calibration	-Check for rack problem -Turn OFF alarm and reset processor -Check transducer for correct operation -Recalibrate transducer
Satellite HIGH limit reached	Rack alarm will occur if case temperature stays above alarm set point for 90 minutes.	-Control circuit switch OFF -Low pressure control adjusted too HIGH -Compressor failure -Defrost clock failure -Improper expansion valve setting -EPC-1000 temperature sensor error -Wrong sensor calibration	-Check for case and rack problem -Check sensor for correct operation -Turn OFF alarm and reset processor -Recalibrate sensor
Satellite LOW limit reached	Rack alarm will occur if case temperature stays below alarm set point for 30 minutes.	-Compressor locked ON -Case thermostat adjusted below EPC-1000 -Sat LO alarm set point -EPC-1000 temperature sensor error -Wrong sensor calibration	-Check for rack problem -Check case thermostat set point -Check EPC-1000 sensor probe for correct operation -Turn OFF alarm and reset processor -Recalibrate sensor

EPC-1000 ALARMS TABLE (cont.)

ALARM LOG MESSAGE	EPC-1000 ACTIONS	POSSIBLE CAUSE	SOLUTION
All Compressors OFF (Supermarket version only)	Rack alarm will occur if the EPC-1000 intelligently turns OFF all compressors for more than 60 minutes continuously. The EPC-1000 operates on a suction pressure rate and distance algorithm, thus under unusual system operational conditions all compressors could cycle off.	-Rack load reduced -Wrong EPC-1000 suction set point -EPC-1000 suction pressure transducer error	-Check rack and case operation for problems -Check EPC-1000 suction pressure set point -Check EPC-1000 transducer -Turn off alarm and reset processor
Defrost over 1 hour (Supermarket version only)	Rack alarm will occur if the EPC-1000 senses that the rack is in Koolgas defrost for more than 60 minutes.	-Defrost clock failed in Koolgas defrost -Several overlapping Koolgas defrosts -Panel KR relay failure -EPC-1000 error in reading KR relay status	-Check rack Koolgas defrost system for problems -Check EPC-1000 defrost inputs for correct operation -Turn OFF alarm and reset processor
Time of last power up reset	Alarm will occur if power supply fails.	-Processor Reset -Rack control circuit turned off -Primary fuse/transformer failure	-Check primary power -Check transformer and fuse -Check processor, restore power

SERVICE

CHECKOUT AND TROUBLESHOOTING PROCEDURE

This section is designed to assist in troubleshooting the EPC-1000. A step by step checkout procedure is included to isolate the cause of the malfunction.

RECORDING INFORMATION

Upon arrival at the refrigeration rack, make a record of the following information for future reference.

A. Rack model and serial number
B. EPC-1000 model and serial number
C. EPC-1000 options installed on the rack

Record the following applicable settings and present readings.

From Default screens:
- Suction pressure __________psi

If optional Head Pressure*:
- Head Pressure __________psi

From STATUS menu:
- Suction set point __________psi
- High alarm set point __________psi
- Low alarm set point __________psi

If optional Suction Pressure Reset (SPR)*:
- SPR set point __________psi
- SPR case temp. __________ °F
- SPR case temp. set point __________ °F

If optional Satellite*:
- Satellite temp. __________°F
- Satellite temp. set point __________°F
- Satellite temp. high alarm limit __________°F
- Satellite temperature low alarm limit __________°F

- Koolgas defrost ON/OFF
- Software version __________

*Screen only appears if the option is installed.

APPARENT MALFUNCTIONS

If there are indications of recurrent problems, proceed with this instruction and verify the complete EPC-1000 operation or identify the rack component failure.

Check the alarm log for a history of rack alarms. Note the day and time of the most recent alarm.

Based on your observations, proceed to Table 4-2 to determine the most likely cause. Proceed in order through the checkout procedures listed for the observation until the fault is isolated.

WARNING

Several parts of this checkout procedure have to be performed with the power applied to the rack control circuit and the EPC-1000.

Use caution when probing any voltage.

NOTE: When performing continuity and resistance checks in this procedure, make sure the circuit being tested is disconnected from any other circuits or unplugged from the EPC-1000.

Compressor Control Circuit Test

By use of the MAINTENANCE menu, force ON each of the parallel compressors and Satellite (if installed) on the rack. Next, force OFF each of the compressors forced on above.

After completing any compressor forcing function, go to the KILL FORCE screen in the MAINTENANCE menu and press SELECT. All compressors will turn OFF, then slowly cycle ON depending on the suction pressure requirements.

If one or more compressors do not respond then perform the following checks.

Verify that all control wiring and safety controls are correctly wired and set. Refer to Super Plus wiring diagrams.

Compressor Will Not Turn ON

Using the MAINTENANCE menu, force ON the suspect compressor.

Using an AC voltmeter, measure the voltage from the common connection 5# or B_ terminal in the Super Plus control panel for the suspect compressor to X2 of the control circuit. Full control circuit voltage should be measured at this time, 120, 208, or 240V AC for example. (See Super Plus Wiring Diagrams.)

If the proper voltage is not measured, unplug the compressor plug assembly from the EPC-1000 relay and check continuity with an ohmmeter between the COM and N.O. positions of the relay plug socket. See Figure 4-1. There should be 0 ohms resistance between these contacts.

If continuity does not exist replace the EPC-1000.

If there was continuity, next verify continuity of the compressor control plug assembly. See Figure 1-6. The compressor should be running if the above steps check OK. Recheck the control circuit and all safety controls. Retest.

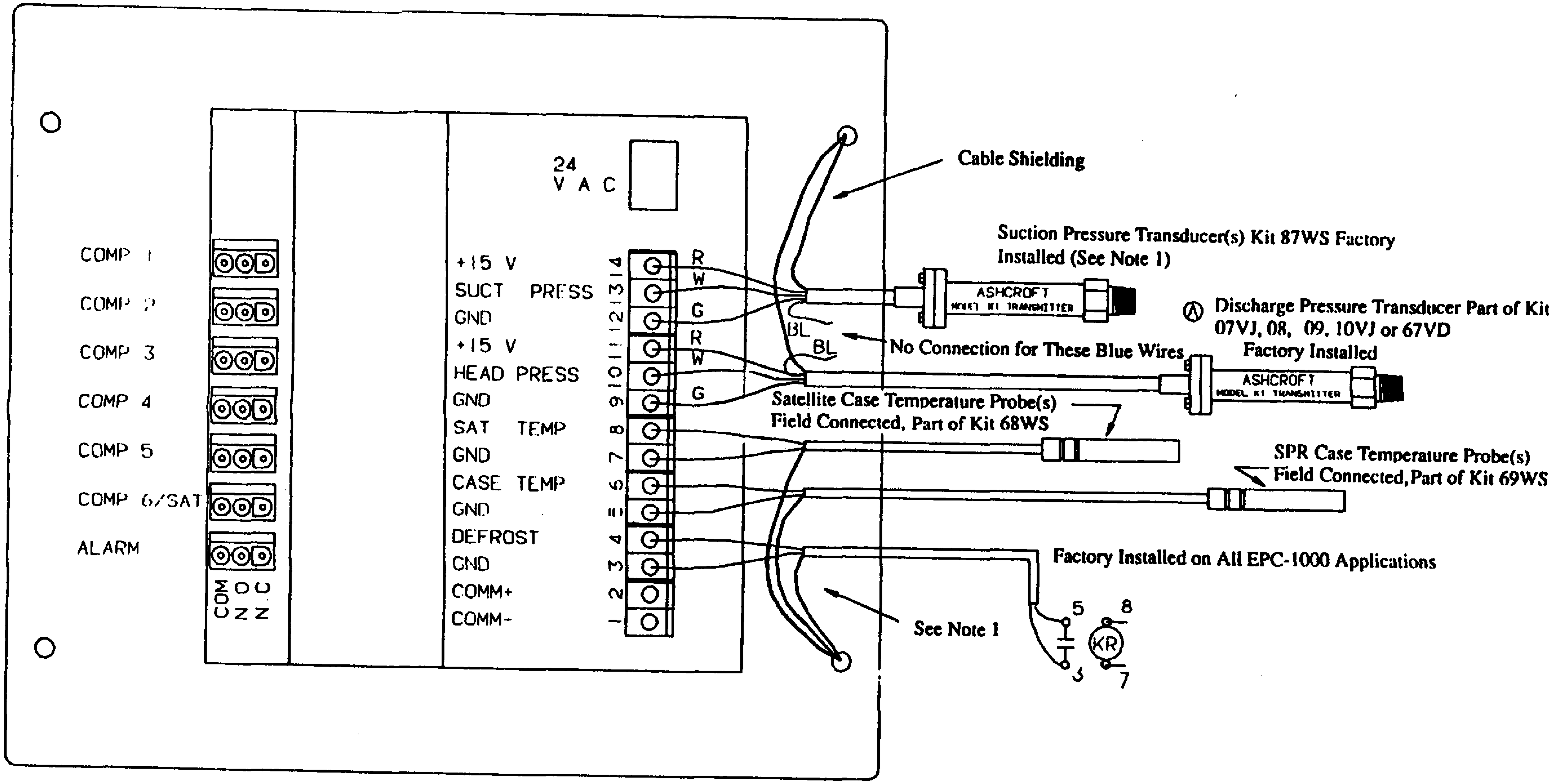
Compressor Will Not Turn OFF

Using the MAINTENANCE menu, force the suspect compressor OFF.

Unplug the appropriate compressor plug assembly from the EPC-1000 relay and check continuity with the ohmmeter between the COM and N.O. positions of the relay plug socket. See Figure 4-1. There should be an open circuit between these contacts.

If continuity exists between COM and N.O. above replace the EPC-1000.

If an open circuit exists, check the compressor control plug assembly and control panel wiring for shorts. Make sure all power to the rack is turned off.



NOTES:

1. Ground required cables to the bolt that fastens the EPC-1000 to the Super Plus left-hand (facing unit) door.
2. Sockets for compressors 1 through 6/satellite are to be wired using premanufactured control relay plug assembly 0334197 and for alarm socket use assembly 0334198.
3. If an unloader is controlled by the EPC-1000 then the very next socket to the right of that compressor socket is to be used for the unloader control. Label the plug assembly using the "unloader" sticker No. 0336160 as if it was a compressor. Unloader cable assembly 0334197 is to be plugged into the respective socket of the processor.

Figure 4-1. Rear View of EPC-1000

Switchback Mode Test

If the Super Plus system appears to be stuck in either the auto mode (under EPC-1000 control) or the switchback mode (under mechanical pressure control), perform the following steps.

Stuck in Automatic (EPC-1000)

Force switchback and alarm by disconnecting the 24V AC input to the EPC-1000. Then check for continuity through the COM and N.C. contacts of the alarm relay. See Figure 4-1. Replace the EPC-1000 if an open is measured.

Check the alarm plug assembly, see Figure 4-1, for continuity and proper connections in the Super Plus control panel. The problem is in the control panel if no faults are located above.

Stuck in Switchback and Alarm (Mechanical Pressure Controls)

Follow the instructions on Page 3-6 to clear the alarm. Measure the continuity through the N.C. and COM contacts of the alarm relay. An open circuit should be measured.

Carefully check the alarm plug assembly, see Figure 4-1, for continuity and proper connections in the Super Plus control panel. The problem exists in the control panel if no faults have been located above.

Alarm Test

To check the EPC-1000 alarm relay, a comparison between the display and the alarm relay status must be made. To cause the EPC-1000 to signal an alarm follow instructions on Page 3-6 "If NOT In Alarm." Complete the following steps for an observed EPC-1000 alarm failure.

EPC-1000 Alarm Relay Will Not Signal Rack Alarm

Observe the default screens to see if the EPC is signaling alarm. If an alarm is signaled, but the rack is not in alarm, use an ohmmeter to verify that there is an open circuit between the COM and N.O. contacts of the alarm relay. If an open was measured, then there is a wiring problem in the Super Plus panel control circuits preventing the signaling of the rack alarm. If continuity exists replace the EPC-1000.

Power Supply Test

The EPC-1000 is supplied with power by a multitap primary transformer. The primary taps are: 120/208/240V AC with a secondary output of 24V AC at full load. Acceptable secondary voltage limit is 21–30V AC.

Using an AC voltmeter, verify the power transformer primary and secondary voltages. Replace the transformer if voltages measured are outside the specified range. If primary voltage is 0V AC, check panel fuse (F10) and replace if blown.

Unplug the 24V AC power plug from the processor and verify the secondary voltages across pins 1 and 3 (see Figure 1-9). If voltage is less than 21V AC, replace the power plug assembly. If the voltage is within the specified range but the EPC fails to operate when the 24V AC power plug is connected, replace the EPC-1000. Good continuity from pin 2 to ground (panel or box assembly liner) must exist.

Suction Pressure Transducer And Cable Test

The suction pressure transducer used by the EPC-1000 is a 0–100 psi sealed part. See Figure 4-1. The output voltage range is 1 to 6V DC maximum.

Using a DC voltmeter, place the positive probe on +15V and the negative probe on COMMON of the suction pressure terminals on the input terminal strip. See Figure 4-1. If the voltage is greater than 15.25V DC, replace the processor. If the voltage measured is less than 14.5V DC, go to the input terminal strip and cable continuity tests. Replace the processor if no faults are found in continuity checks.

If the transducer is operating properly, measure the voltage from IN to COMMON.

The positive probe should be on IN. The measured voltage will be proportional to the rack suction pressure. To determine the rack suction pressure, use the following equation.
Suction Pressure = (Vin - 1) X 20 +/- 2 psi

Using a gage manifold, measure the rack suction pressure.

If the EPC-1000 readout does not match gage pressure, then compare the calculated suction pressure to gage pressure. Replace the processor if the problem is not found in the input terminal strip or cable assembly. Replace the EPC-1000 if the calculated pressure and the gage pressure match, but the EPC-1000 display does not match.

If the display matches the calculated suction pressure but is not within 2 psi of gage, replace the transducer.

Temperature Sensor Checkout
The same temperature sensor (Figure 1-3) is used for all EPC-1000 temperature inputs. Testing and verification of all sensors will be identical except for the location of the sensor connection on the terminal strip.

General Check
The most fundamental checkout of the temperature sensor is to place an accurately calibrated thermometer in the air stream near the sensor bulb and make a direct comparison between the reading of the thermometer and the reading on the EPC-1000.

If the readings are within three (3) degrees, the sensor and other components are probably OK. If the readings are unacceptable, then the following items need to be checked to find the problem.

Sensor Mounting
Check to see that the entire sensor is in the air stream. Clamping the sensor to the metal wall of a flue can allow the metal wall temperature to adversely affect the temperature reading.
For cases with single air curtain passages, this has not been a problem. However, clamping the sensor onto the sheet metal divider between two-temperature air curtains can affect the temperature of the sensor. Make sure the entire sensor is within and sensing the air stream you want to measure.

Resistance Check
Remove the EPC-1000 temperature sensor cable from the input terminal strip in the machine room. Using an accurate ohmmeter, measure the resistance of the sensor with the cable leads removed from the input terminal strip. Polarity of the ohmmeter leads will not change the measurement.

Compare the ohmmeter reading to Table 4-1 on the next page to find the equivalent temperature value. If the resistance equivalent temperature is more than three (3) degrees from the actual thermometer measurements, check the sensor and cable installation. Replace the sensor if installation is found to be correct. If the problem still exists, replace the EPC-1000.

Table 4-1.
EPC-1000 Probe Checkout Table

Temp. °F	Resistance Ohms	Temp. °F	Resistance Ohms	Temp. °F	Resistance Ohms	Temp. °F	Resistance Ohms
-40	1584	-10	1694	20	1808	50	1927
-39	1588	-9	1697	21	1811	51	1931
-38	1591	-8	1701	22	1815	52	1935
-37	1595	-7	1705	23	1819	53	1939
-36	1598	-6	1708	24	1823	54	1943
-35	1602	-5	1712	25	1827	55	1947
-34	1606	-4	1716	26	1831	56	1951
-33	1609	-3	1720	27	1835	57	1955
-32	1613	-2	1724	28	1839	58	1959
-31	1616	-1	1727	29	1843	59	1963
-30	1620	0	1731	30	1847	60	1967
-29	1624	1	1735	31	1851	61	1971
-28	1627	2	1738	32	1855	62	1975
-27	1631	3	1742	33	1859	63	1980
-26	1635	4	1746	34	1863	64	1984
-25	1638	5	1750	35	1866	65	1988
-24	1642	6	1754	36	1870	66	1992
-23	1646	7	1758	37	1874	67	1996
-22	1649	8	1761	38	1878	68	2000
-21	1653	9	1765	39	1882	69	2004
-20	1657	10	1769	40	1886	70	2008
-19	1660	11	1773	41	1890	71	2012
-18	1664	12	1777	42	1894	72	2017
-17	1668	13	1781	43	1898	73	2021
-16	1671	14	1784	44	1902	74	2025
-15	1675	15	1788	45	1906	75	2029
-14	1679	16	1792	46	1910	76	2034
-13	1682	17	1796	47	1914	77	2038
-12	1686	18	1800	48	1918	78	2042
-11	1690	19	1804	49	1922	79	2046
						80	2050

Koolgas Defrost Status Relay Input Test

<u>Koolgas Relay</u>

To check the operation of the Koolgas status input, place a system in Koolgas defrost. Observe the STATUS menu. The defrost screen should show ON. Using a DC voltmeter, measure the voltage between the system's defrost input terminals on the input terminal strip. The voltage measured should be 0–0.1V DC. If the voltage is greater than this value, check the KR relay in the control panel. Insure the proper terminals are connected.

If no voltage was measured in the above step, and the STATUS menu continually shows OFF, replace the EPC-1000.

Next, take the system out of Koolgas defrost. The STATUS menu screen should now read OFF. Again using a DC voltmeter, measure voltage across the defrost input terminals on the input terminal strip. The voltage measured should be 13.8–14.5V DC.

If the STATUS screen continues to show ON and the measured voltage is 0.1V DC or less when a system is not in defrost, check the KR relay in the control panel to insure the proper terminals are connected and that the KR relay is de-energized.

If the STATUS menu screen shows defrost ON when no system is in Koolgas defrost and the measured voltage across the defrost input is 13.8–14.5V DC, replace the EPC-1000.

TABLE 4-2. TROUBLESHOOTING CHECKOUT PROCEDURES

OBSERVATION	PROBABLE CAUSE	CHECKOUT PROCEDURE	PAGE 4-
Display Blank and will not come up	-Power failure -Fuse failure -Transformer failure -24V AC Power Cable failure -Processor failure	-Power Supply Test	4
Displayed Suction Pressure does not match gauge	-Improper calibration -Transducer failure -Wrong transducer calibration -Input Terminal Strip failure -Processor failure	-Calibrate Suction Sensor -Suction Pressure Transducer and Cable Test	4
Autual Case Temperature does not match displayed temperature	-Temperature Sensor failure -Wrong sensor calibration -Processor failure	-Temperature Sensor Checkout -Recalibrate sensor	5
EPC-1000 "Compressors ON" indication does not match actual compressor status	-Panel wiring -Processor failure	-Compressor Control Circuit Test	1
Actual defrost status does not match EPC-1000 indication	-Panel wiring/Terminal Strip -Processor failure	-Koolgas Relay Input Test	6

TABLE 4-2. TROUBLESHOOTING CHECKOUT PROCEDURES (cont.)

OBSERVATION	PROBABLE CAUSE	CHECKOUT PROCEDURE	PAGE 4-
Rack in alarm, EPC-1000 not in alarm	-Wrong plug in EPC alarm output -Panel wiring -Relay failure -Processor failure	-Confirm proper plug assembly for desired series or parallel switchback -Compressor Control Circuit Test, first step -Alarm Relay Stuck in Alarm	 1 4
EPC-1000 in alarm, but rack not in alarm	-Panel wiring -Relay failure -Processor failure	-Compressor Control Circuit Test, first step -Alarm Relay Will Not Signal Alarm	1 4
Rack and EPC-1000 in alarm, but alarm will not reset	-Panel wiring -Relay failure -Processor failure	-Compressor Control Circuit Test, first stept -Alarm Relay Stuck In Alarm	1 4

REPLACEMENT PARTS LIST

ITEM	PART NUMBER	DESCRIPTION
1.	0340226	EPC-10002 Compressor Processor
		EPC-10003 Compressor Processor
		EPC-10004 Compressor Processor
		EPC-10005 Compressor Processor
		EPC-10006 Compressor Processor
2.	0334493	Satellite Probe EPC-1000
		SPR Probe EPC-1000
3.	0335183	Transducer
4.	0332714	Transformer
5.	0334199	24V AC Cable
6.	0334198	Switchback Plug Assembly (Parallel Switchback System)
7.	0334196	Alarm Plug Assembly (Series Switchback System)
8.	0334197	Compressor Plug Assembly

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- Recalibrate Sensor Reading—3-20
- Set Point—3-10

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- Temperature Sensor—4-4
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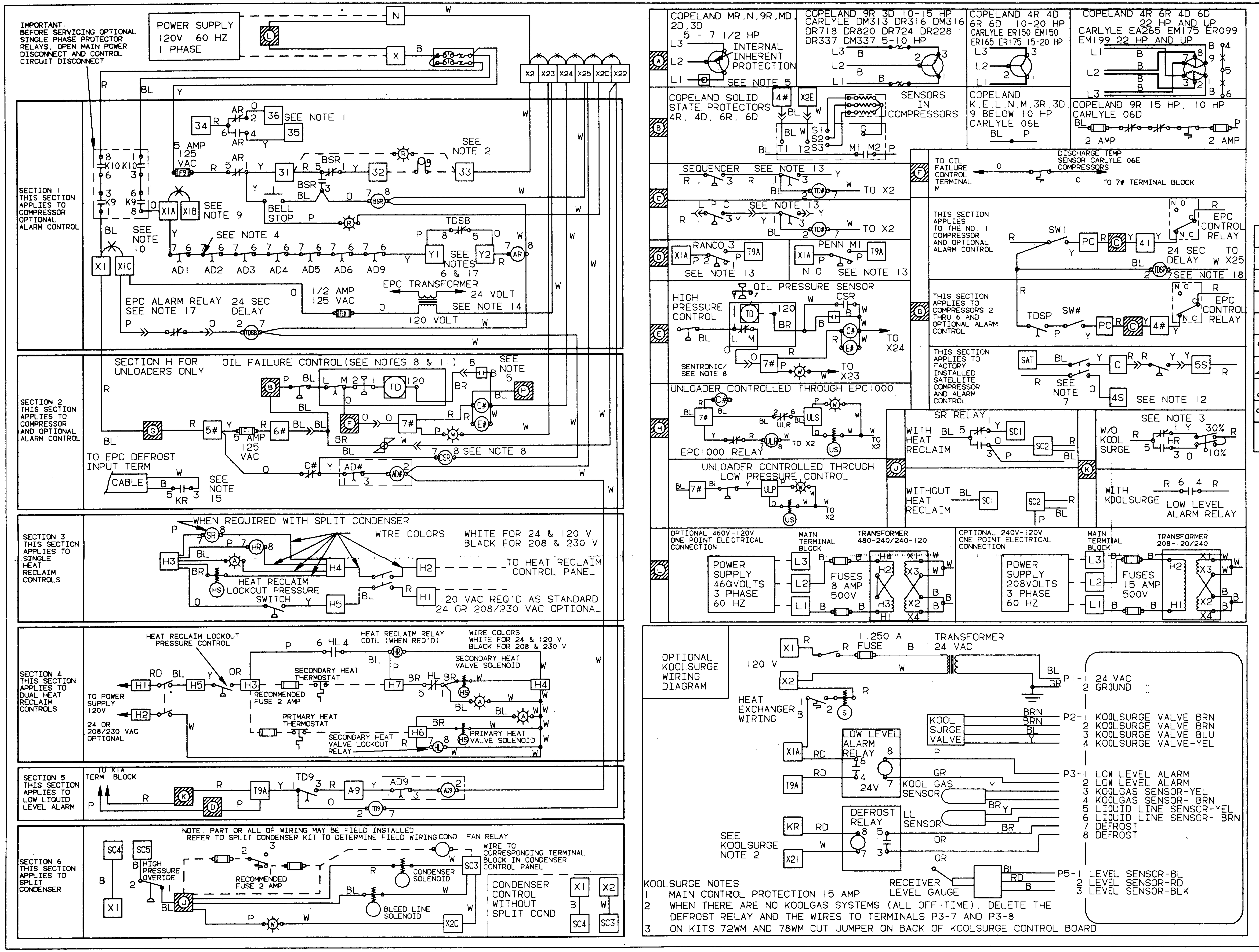

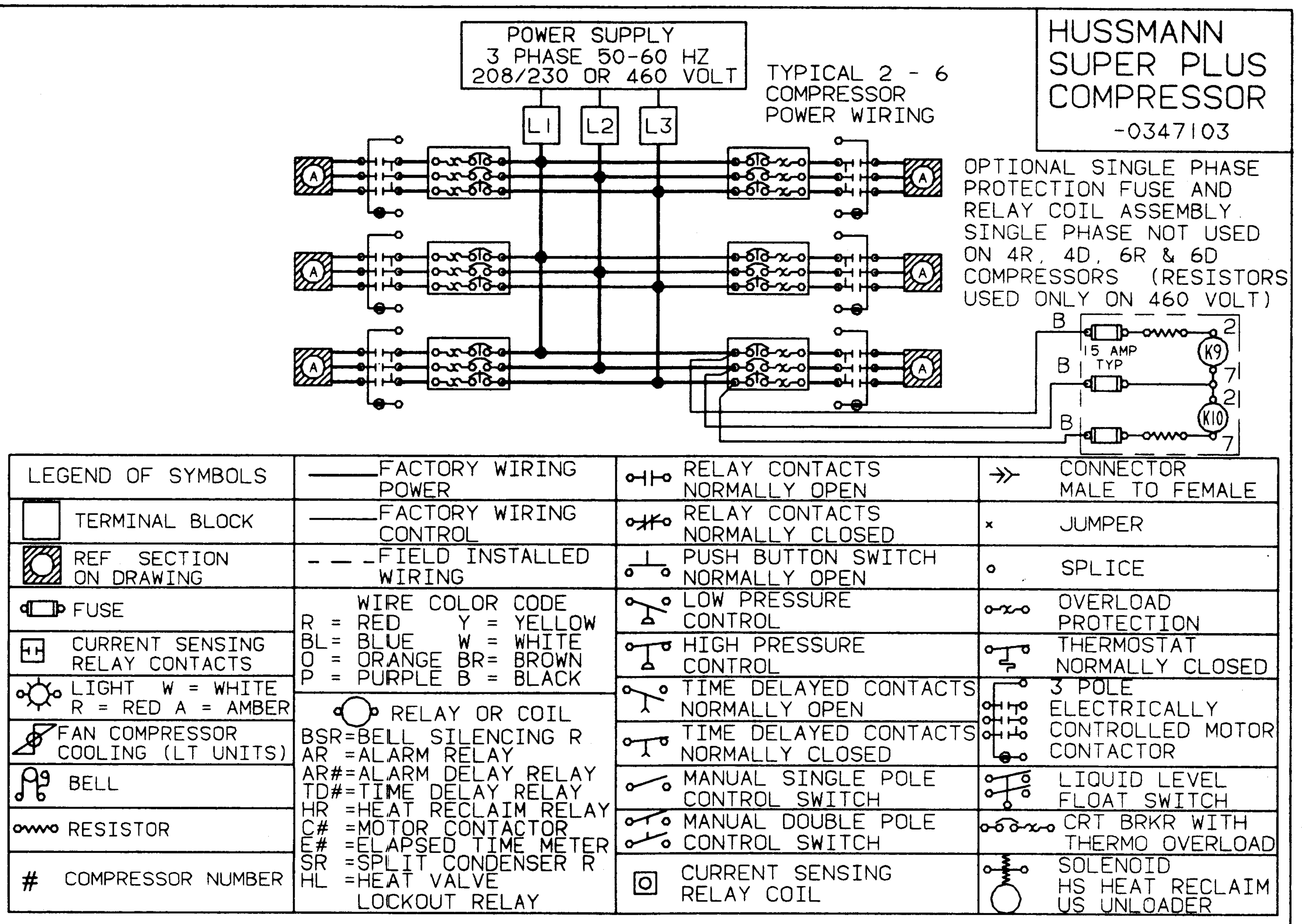

NOTES:

1. Terminals 34, 35 and 36 are provided for use with remote alarm systems. Contacts between terminals 34 and 35 (Hussmann Remote Alarm) open on alarm. Contacts between terminals 34 and 36 close on alarm. See wiring diagram included with remote alarm system for proper connections. Only one alarm system can connect to these terminals. Maximum load 10 amps.

2. The remote alarm bell and light are field wired between terminals 31, 32 and 33. The alarm bell connected between terminals 32 and 33 must be U.L. Listed. The bell must be a Jenkins Model No.1005 or equivalent. Maximum load on terminals 32 and 33 is 125 VA. 125 VAC.

3. HR coil for HR contacts located in heat reclaim section of diagram. Low liquid level alarm: Alarm set point 10% receiver level during heat reclaim, 30% at all other times. (HR relay used only when heat reclaim is used with low liquid level alarm.)

4. Alarm time delays are shown for a 6 compressor unit. (One alarm delay for each compressor plus AD9 delay.)

5. Current sensing relay sensor will be positioned to sense the current flow of the L1 line to the compressor. The contacts are wired into the control circuits as shown. On 460 volt units the lead must be looped through the relay 2 times. Current sensing relays are options.

6. For remote satellite with alarm connectioms, wire between Y1 and Y2.

7. A. For satellites with Koolgas defrost connect [SAT] to S_ terminal on corresponding satellite defrost circuit.
   B. For satellites with off-time defrost, connect [SAT] to T_ terminal (for high end) or to B_ terminal (for low end) on corresponding defrost circuit.

8. For Copeland Sentronic oil failure control see Block "E" insert diagram. CSR relay required only when current sensing relay is used with Sentronic.

9. Terminal XIB provided for defrost control circuit connection.

10. When not using single phase protector, wire the Blue wire from XI and Orange wire from XIA directly to circuit breaker.

11. For compressors without oil failure control, splice Blue wire from high pressure control to Orange wire going to #7 terminal block. Cap off Brown wire.

12. 4# terminal required only for compressors with solid state protection. See Detail Block B.

13. When 2 high suction pressure controls are used, wire in parallel.

14. Wire 24 volt secondary to the three-pin power input plug. Connect the Red and Black leads of the cable to transformer secondary terminals. Using a Crimp Stakeon, screw the drain wire to the liner near the transformer.

15. When the rack is equipped with Koolgas defrost systems, using Belden 8760 cable, connect one end to KR relay terminals 5 and 3. Connect the other ends to the "Defrost" screw terminals of the EPC terminal strip. Connect the cable drain wire to the bolt that fastens the EPC-1000 to Super Plus left-hand (facing unit) door.

17. EPC-1000 compressor and alarm control circuit connections are made using cable assemblies.

18. TDSP is the Time Delay Compressor Split Relay for when the rack goes into Switchback to prevent all the compressors from coming on at once. Wire TDSP contacts 4 and 3 between the second and third compressors on racks with 3 and 4 compressors, or between the third and fourth compressors on racks with 5 and 6 compressors. No TDSP is used for 2 compressor racks. TDSP is not used if individual time delays are wired in the Switchback circuit as shown in Detail Block C.

19. All relays shown in nonenergized position.

20. For split suction header racks which have 2 EPC-1000s installed, connect the KR relay contacts per note 15 to the EPC-1000 controlling the left side of the suction header. Do not connect any cables to the defrost terminals of the EPC-1000 controlling the right side of the suction header.

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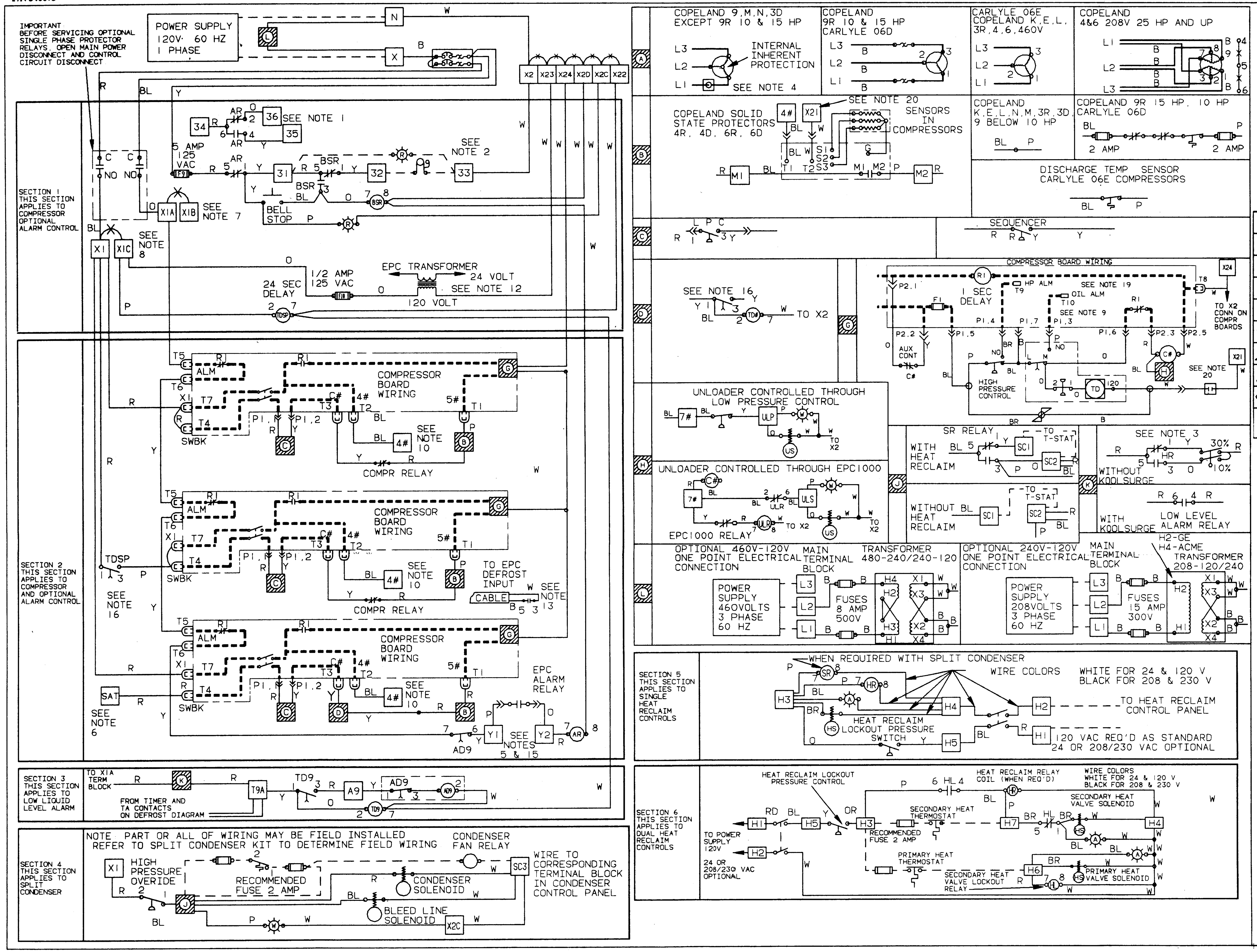

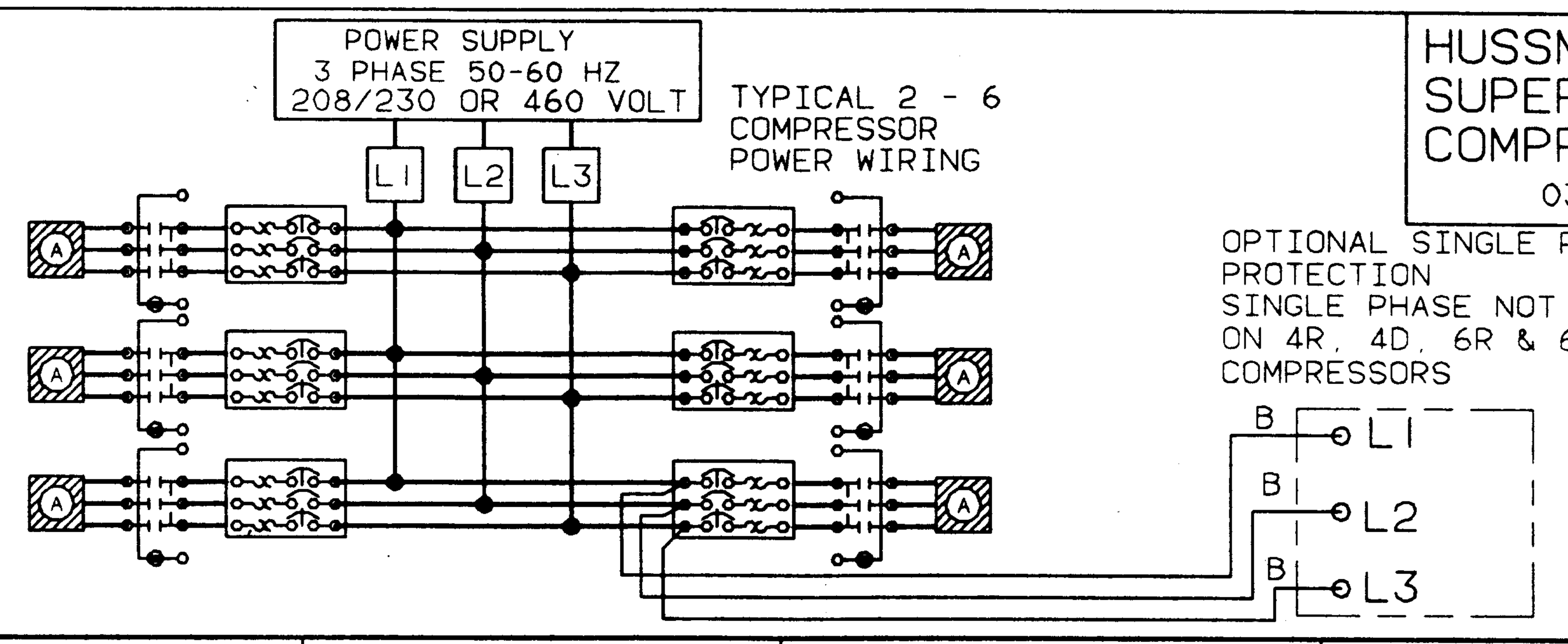

HUSSMANN SUPER PLUS COMPRESSOR

0347104

LEGEND OF SYMBOLS

- TERMINAL BLOCK
- REF SECTION ON DRAWING
- FUSE
- CURRENT SENSING RELAY CONTACTS
- LIGHT W = WHITE R = RED A = AMBER
- FAN COMPRENSOR COOLING (LT UNITS)
- BELL
- RESISTOR
- # COMPRESSOR NUMBER
- FACTORY WIRING POWER
- FACTORY WIRING CONTROL
- FIELD INSTALLED WIRING
- WIRE COLOR CODE: R = RED, Y = YELLOW, BL = BLUE, W = WHITE, O = ORANGE, BR = BROWN, P = PURPLE, B = BLACK
- RELAY OR COIL
- BSR = BELL SILENCING R
- AR = ALARM RELAY
- AR# = ALARM DELAY RELAY
- TD# = TIME DELAY RELAY
- HR = HEAT RECLAIM RELAY
- C# = MOTOR CONTACTOR
- E# = ELAPSED TIME METER
- SR = SPLIT CONDENSER R
- HL = HEAT VALVE LOCKOUT RELAY
- LR = LOCKOUT RELAY
- RELAY CONTACTS NORMALLY OPEN
- RELAY CONTACTS NORMALLY CLOSED
- PUSH BUTTON SWITCH NORMALLY OPEN
- LOW PRESSURE CONTROL
- HIGH PRESSURE CONTROL
- TIME DELAYED CONTACTS NORMALLY OPEN
- TIME DELAYED CONTACTS NORMALLY CLOSED
- MANUAL SINGLE POLE CONTROL SWITCH
- MANUAL DOUBLE POLE CONTROL SWITCH
- CURRENT SENSING RELAY COIL
- CONNECTOR MALE TO FEMALE
- JUMPER
- SPLICE
- OVERLOAD PROTECTION
- THERMOSTAT NORMALLY CLOSED
- 3 POLE ELECTRICALLY CONTROLLED MOTOR CONTACTOR
- LIQUID LEVEL FLOAT SWITCH
- CRT BRKR WITH THERMO OVERLOAD
- SOLENOID HS HEAT RECLAIM US UNLOADER
- CONNECTOR-MALE ON PC BOARD
- WIRE CONNECTOR FEMALE

NOTES:

1. Terminals 34, 35 and 36 are provided for use with remote alarm systems. Contacts between terminals 34 and 35 (Hussmann Remote Alarm) open on alarm. Contacts between terminals 34 and 36 close on alarm. See wiring diagram included with remote alarm system for proper connections. Only one alarm system can connect to these terminals. Maximum load 10 amps.
2. The remote alarm bell and light are field wired between terminals 31, 32 and 33. The alarm bell connected between terminals 32 and 33 must be UL listed. The bell must be a Jenkins Model No.1005 or equivalent. Maximum load on terminals 32 and 33 is 125 VA. 125 VAC.
3. HR coil for HR contacts located in heat reclaim section of diagram. Low liquid level alarm: alarm set point 10% receiver level during heat reclaim, 30% at all other times. (HR relay used only when heat reclaim is used with low liquid level alarm.)
4. Current sensing relay sensor will be positioned to sense the current flow of the L1 line to the compressor. The contacts are wired into the control circuits as shown. On 460 volt units the lead must be looped through the relay 2 times. Current sensing relays are options.
5. For remote satellite with alarm connections, wire between Y1 and Y2.
6. A. For satellites with Koolgas defrost connect [SAT] to S_ terminal on corresponding satellite defrost circuit.
   B. For satellites with off-time defrost, connect [SAT] to T_ terminal (for high end) or to B_ terminal (for low end) on corresponding defrost circuit.
7. Terminal X1B provided for defrost control circuit connection.
8. When not using single phase protector, wire the Blue wire from X1 and Orange wire from X1A directly to circuit breaker.
9. For compressors without oil failure control, splice Blue wire from high pressure control to Orange wire on compressor harness.
10. 4# terminal required only for compressors with solid state protection. See Detail Block B.
11. When 2 high suction pressure controls are used, wire in parallel.
12. Wire 24 volt secondary to the three-pin power input plug. Connect the Red and Black leads of the cable to transformer secondary terminals. Using a Crimp Stakeon, screw the drain wire to the liner near the transformer.
13. When the rack is equipped with Koolgas defrost systems, using Belden 8760 cable, connect one end to KR relay terminals 5 and 3. Connect the other ends to the "Defrost" screw terminals of the EPC. Connect the cable drain wire to the bolt that fastens the EPC-1000 to Super Plus left-hand (facing unit) door.
15. EPC-1000 compressor alarm connections are made using cable assemblies. The plug end of the cable inserts into the EPC-1000 alarm plug. The other end to the appropriate control circuit branch wiring.
16. TDSP is the Time Delay Compressor Split Relay for when the rack goes into Switchback to prevent all the compressors from coming on at once. Wire TDSP contacts 4 and 3 between the second and third compressors on racks with 3 and 4 compressors, or between the third and fourth compressors on racks with 5 and 6 compressors. No TDSP is used for 2 compressor racks. TDSP is not used if individual time delays are wired in the Switchback circuit as shown in Detail Block C.
17. All relays shown in nonenergized position.
19. For compressors without alarm terminal on oil failure control, cut and cap Purple wire on harness.
20. Splice White wire from solid state protector to White wires on fan, oil failure control and compressor harness.

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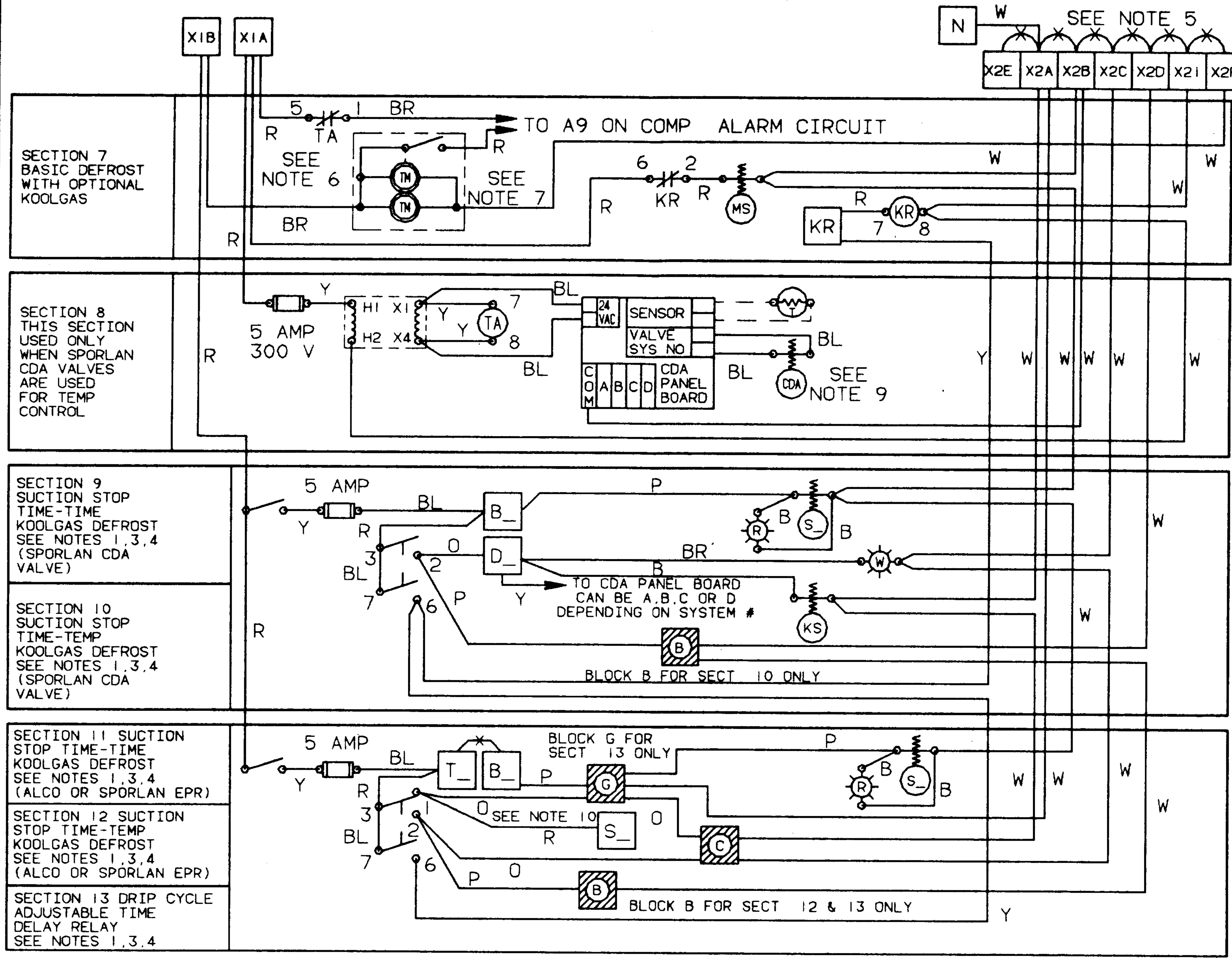

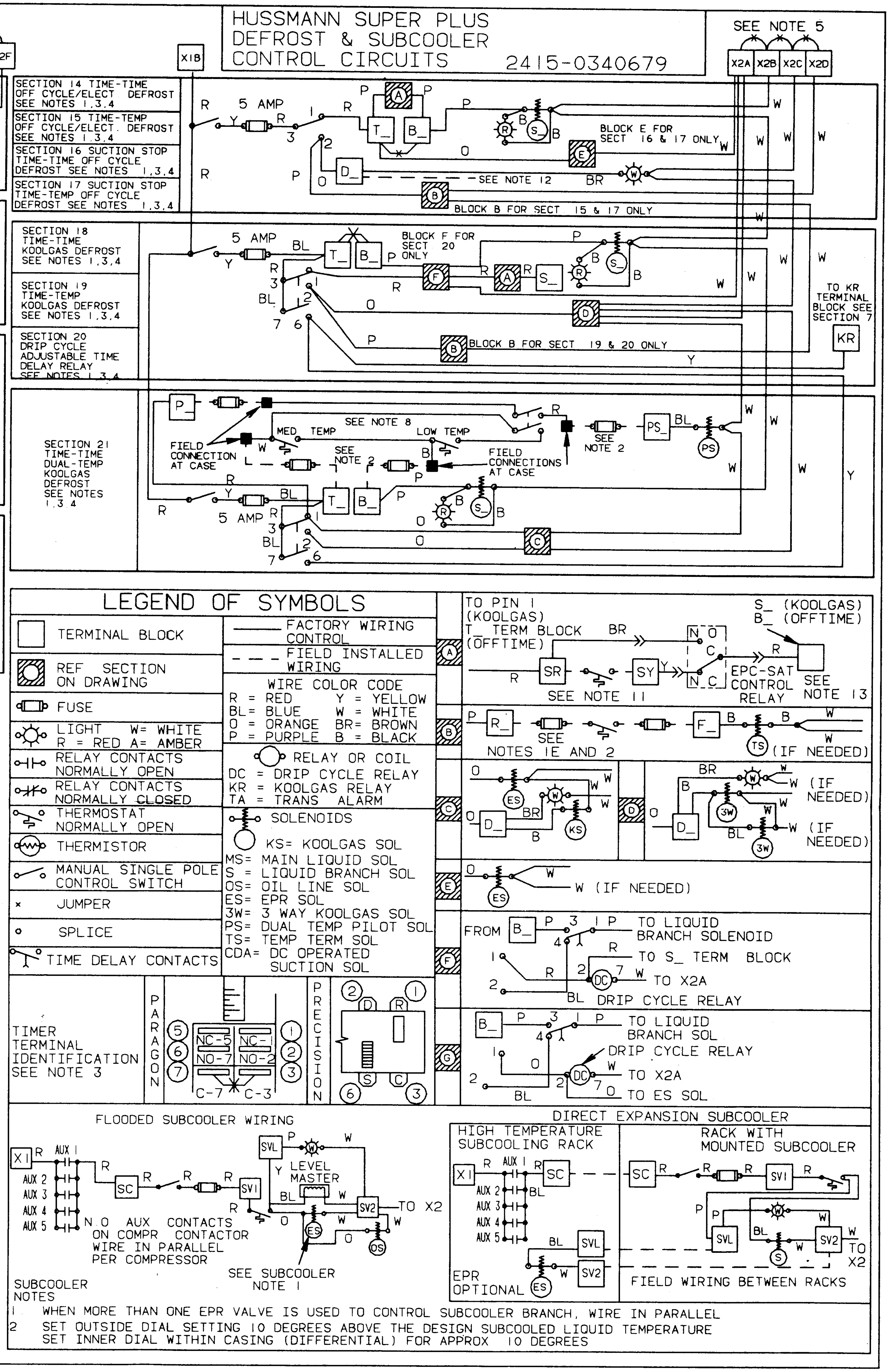

NOTES:

1. Defrost control wiring:
   A. Shown are typical defrost system wiring diagrams. There may be multiples of one type or combinations of types up to a total of 24 systems.
   B. The "_" designations in various symbols indicate the actual defrost system number determined from the store legend.
   C. Refrigeration thermostats—when required remove jumper and field wire to the B_ and T_ terminals of the appropriate defrost system. Minimum thermostat rating 125VA. For optional EPC satellite temperature control see Detail Block A.
   D. Two (2) 3-way reversing valves (3W) may be required to provide the necessary refrigeration capacity for some applications and will be wired in parallel as shown in Detail Block D.
   E. Defrost termination thermostat—minimum rating 125 VA pilot duty only. See Detail Block B.
   F. Optional system solenoid valve shown. For branches without this option omit Purple wire to "B" terminal and White wire to X2.
   G. When C Block (temperature termination defrost) is not used, associated Purple and White wires are omitted.
   H. When F Block (ES solenoid) is not used, associated Orange and White wires are omitted.
2. Thermostat fusing—Thermostat lines may be protected, as required by NEC or local codes, by field installed fuses.
3. Defrost timers—Wiring of the timers is such that:
   A. Circled numbers in the timer terminal identification blocks are only for diagram reference.
   B. Refrigeration cycle—Contacts 3 to 1 are closed during refrigeration.
   C. Defrost cycle—Precision Timer 3 to 2 and 3 to 6 are closed during defrost. Paragon Timer 3 to 2 and 7 to 6 are closed during defrost.
   D. Timers are wired from left to right to the system number sequence.
   E. Paragon Timers—3 is jumped to 7 for Koolgas applications only.
4. For unit cooler defrost wiring see separate wiring diagram.
5. All X2_ series terminal blocks in the control panel must be jumped together.
6. TA contacts used only when CDA valves are furnished.
7. Optional Paragon Timer does not have second motor or alarm contacts.
8. Low- and medium-temperature thermostats and double pole single throw switch located in case.
9. Each CDA panel board will handle up to 4 fused systems. One thermistor (located in case or unit cooler) for each system. Rotary switch common to each system.
10. S_ terminal required only for satellites.
11. Satellite backup thermostat must be set 3° higher than EPC-1000 satellite temperature set point.
12. Wire to corresponding terminal block in electric defrost panel. For electric defrost refer to wiring diagram 0256534.
13. Terminals SR, SY and B are connected to the EPC-1000 compressor relay, output compressor/satellite, using a cable and plug assembly.

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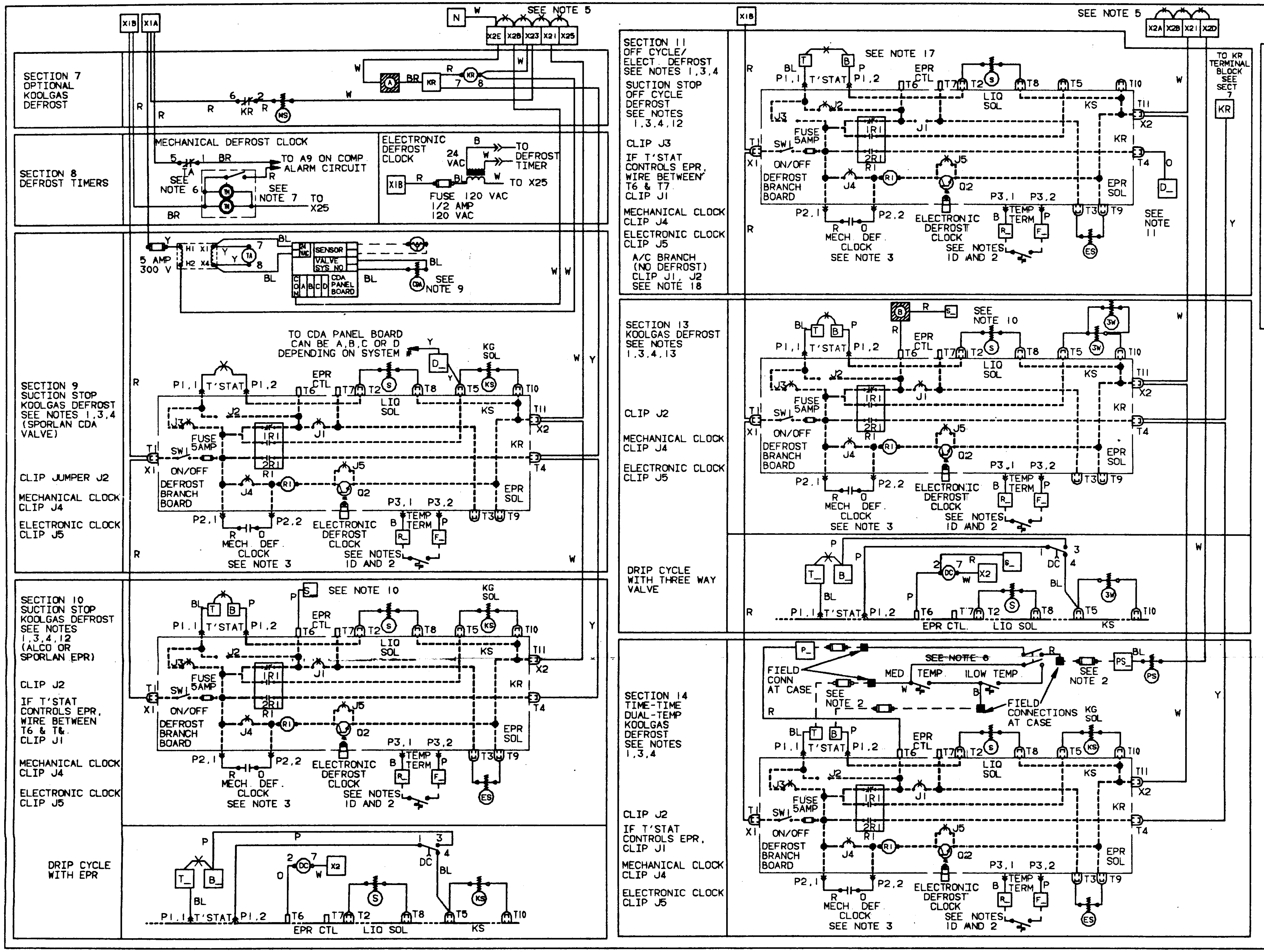
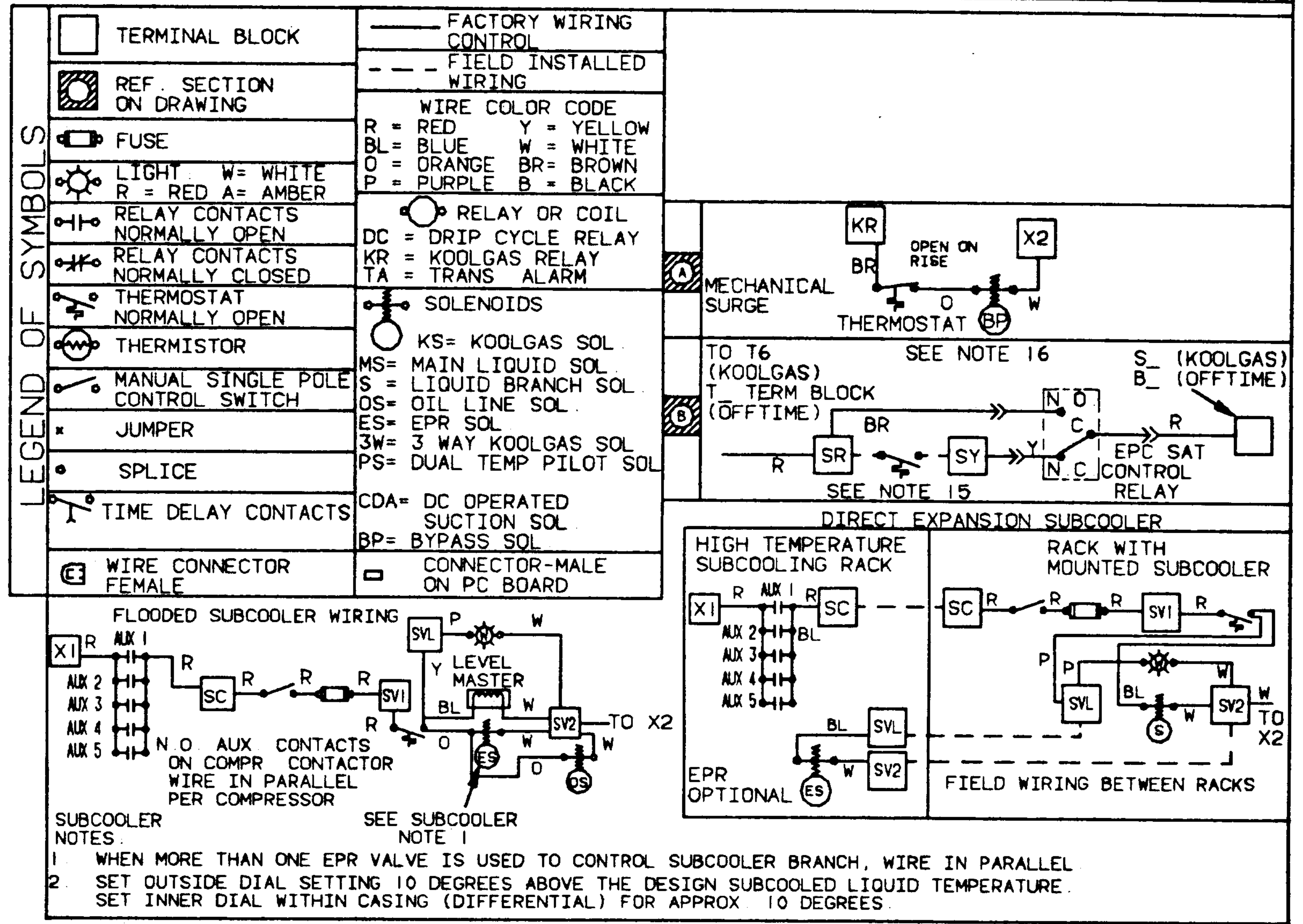
HUSSMANN SUPER PLUS DEFROST & SUBCOOLER CONTROL CIRCUITS
2415 0340621 D





NOTES:

1. Defrost Control Wiring:
   A. Shown are typical defrost system wiring diagrams. There may be multiples of one type or combinations of types up to a total of 24 systems.
   B. The "_" designations in various symbols indicate the actual defrost system number determined from the store legend.
   C. Refrigeration thermostats—when required remove jumper and field wire to the B_ and T_ terminals of the appropriate defrost system. Minimum thermostat rating 125 VA.
   D. ~~Defrost termination thermostat—minimum rating 125 VA pilot duty only.~~
   E. ~~Optional system solenoid valve shown. For branches without this option omit wires between T2 and T8.~~
   F. When temperature termination defrost is not used, R and F terminal blocks and associated Purple and Blue wires are omitted.
2. Thermostat fusing—Thermostat lines may be protected, as required by NEC or local codes, by field installed fuses.
3. Mechanical Defrost Timers:
   A. Defrost timer is wired to N.O. contacts (S and C on Precision, 3 and 2 on Paragon). These contacts close on defrost.
   B. Timers are wired from left to right to the system number sequence.
4. For unit cooler defrost wiring see separate wiring diagram.
5. All X2_ series terminal blocks in the control panel must be jumped together.
6. TA contacts used only when CDA valves are furnished.
7. Optional Paragon Timer does not have second motor or alarm contacts.
8. Low- and medium-temperature thermostats and double pole single throw switch located in case.
9. Each CDA panel board will handle up to 4 fused systems. One thermistor (located in case or unit cooler) for each system. Rotary switch common to each system.
10. S_ terminal required only for satellites.
11. Wire to corresponding terminal block in electric defrost panel. (D block required for electric defrost only.) For electric defrost refer to wiring diagram 0256534.
12. For control of ES solenoid through a T-stat, wire T-stat between T6 and T7 on defrost board.
13. Two (2) 3-way reversing valves (3W) may be required to provide the necessary refrigeration capacity for some applications and will be wired in parallel as shown.
14. When ES solenoid is not used, wires between T3 and T9 are omitted.
15. Satellite backup thermostat must be set 3° higher than EPC-1000 satellite temperature set point.
16. Terminals SR, SY and B are connected to the EPC compressor outputs using a cable and plug assembly. Relay board compressor socket S7 is for satellite 1 and S8 for satellite 2 (EPC-2000 only).
17. When satellite is controlled through EPC remove jumper and wire according to Detail Block B.
18. For A/C branch (no defrost) omit timer connections.
19. For field installed defrost timer wire defrost clock connectors P2-1 and P2-2 to terminal blocks N.O._.

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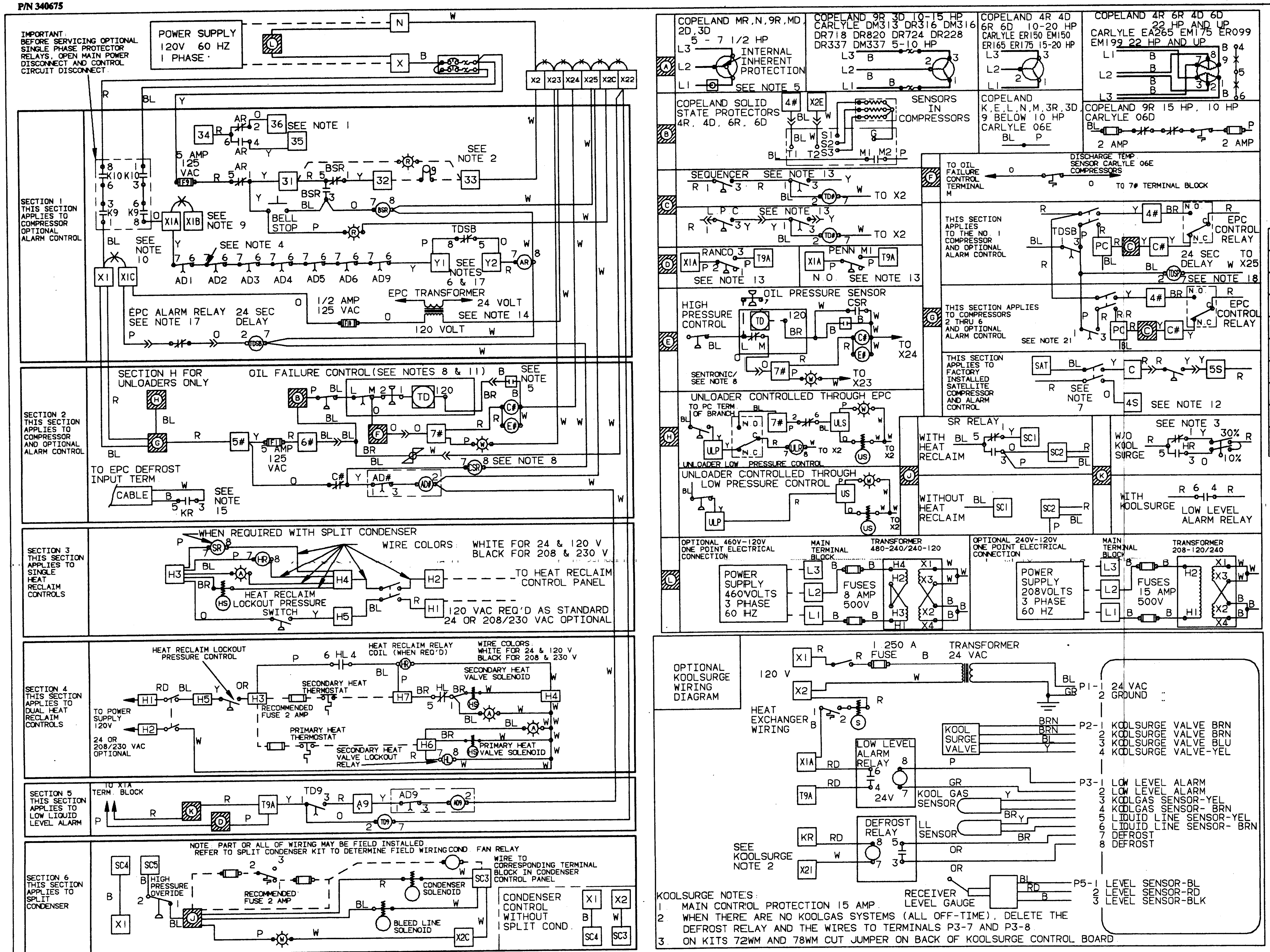

HUSSMANN SUPER PLUS COMPRESSOR

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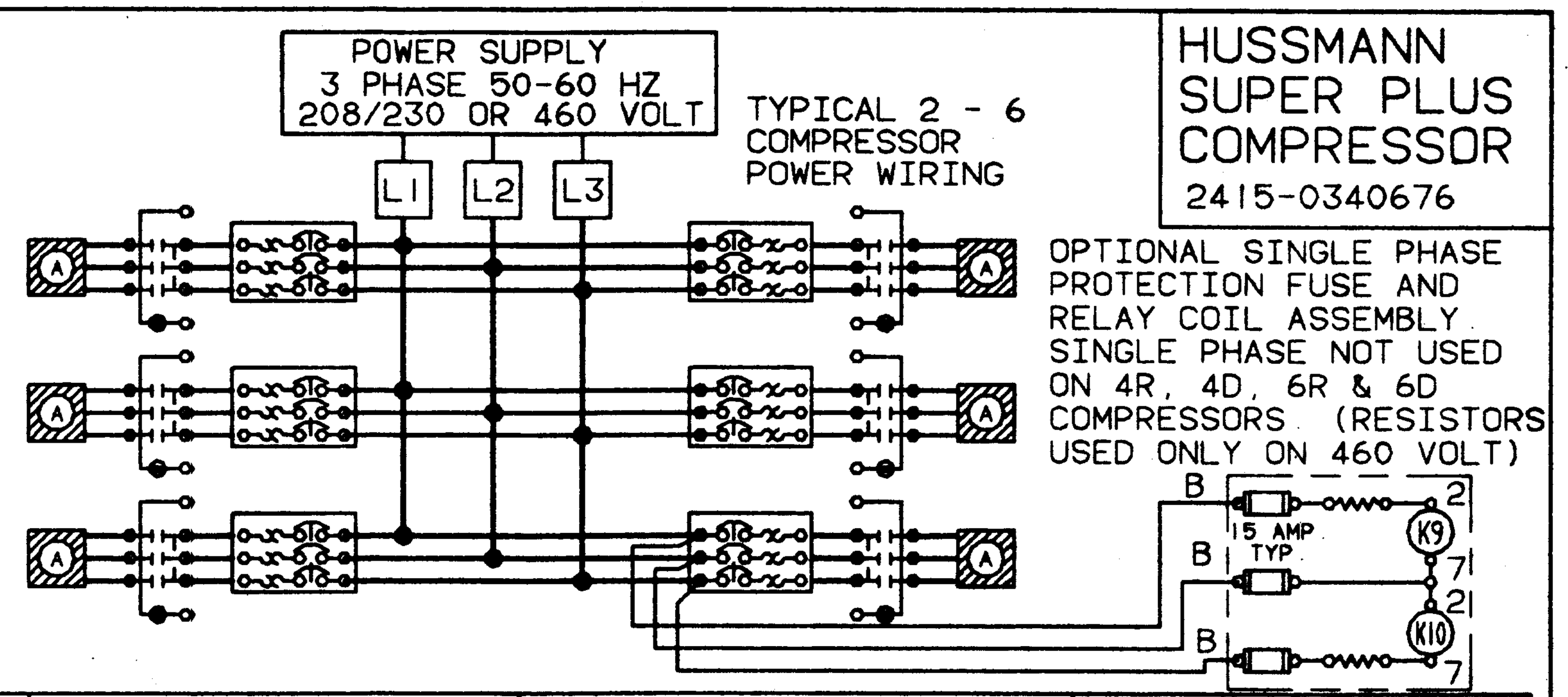


LEGEND OF SYMBOLS

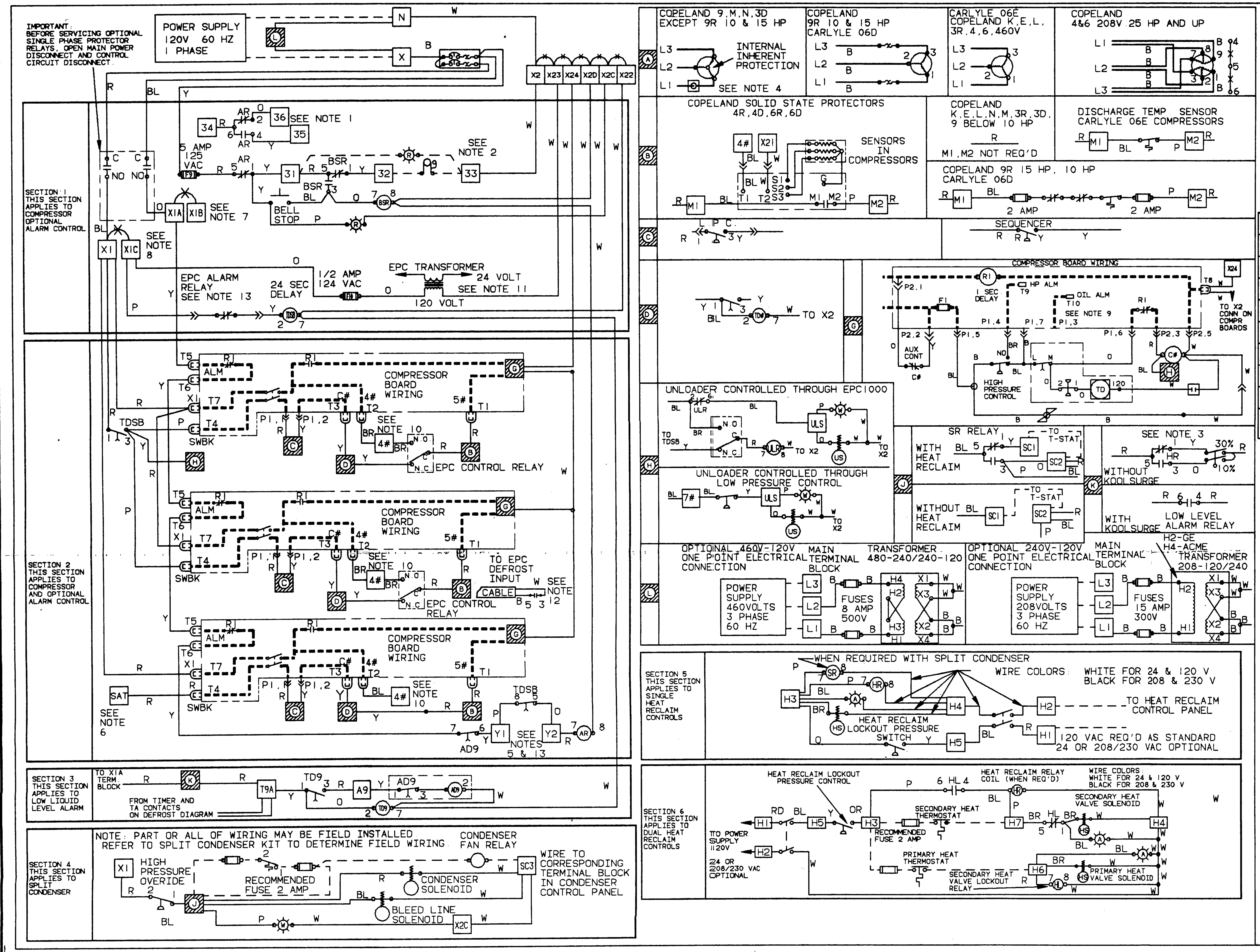
- TERMINAL BLOCK
- REF SECTION ON DRAWING
- FUSE
- CURRENT SENSING RELAY CONTACTS
- LIGHT W = WHITE R = RED A = AMBER
- FAN COMPRESSOR COOLING (LT UNITS)
- BELL
- RESISTOR
- # COMPRESSOR NUMBER
- FACTORY WIRING POWER
- FACTORY WIRING CONTROL
- FIELD INSTALLED WIRING
- WIRE COLOR CODE: R = RED, Y = YELLOW, BL = BLUE, W = WHITE, O = ORANGE, BR = BROWN, P = PURPLE, B = BLACK
- RELAY OR COIL: BSR = BELL SILENCING R, AR = ALARM RELAY, AR# = ALARM DELAY RELAY, TD# = TIME DELAY RELAY, HR = HEAT RECLAIM RELAY, C# = MOTOR CONTACTOR, E# = ELAPSED TIME METER, SR = SPLIT CONDENSER R, HL = HEAT VALVE LOCKOUT RELAY
- RELAY CONTACTS NORMALLY OPEN
- RELAY CONTACTS NORMALLY CLOSED
- PUSH BUTTON SWITCH NORMALLY OPEN
- LOW PRESSURE CONTROL
- HIGH PRESSURE CONTROL
- TIME DELAYED CONTACTS NORMALLY OPEN
- TIME DELAYED CONTACTS NORMALLY CLOSED
- MANUAL SINGLE POLE CONTROL SWITCH
- MANUAL DOUBLE POLE CONTROL SWITCH
- CURRENT SENSING RELAY COIL
- CONNECTOR MALE TO FEMALE
- JUMPER
- SPLICE
- OVERLOAD PROTECTION
- THERMOSTAT NORMALLY CLOSED
- 3 POLE ELECTRICALLY CONTROLLED MOTOR CONTACTOR
- LIQUID LEVEL FLOAT SWITCH
- CRT BRKR WITH THERMO OVERLOAD
- SOLENOID HS HEAT RECLAIM US UNLOADER

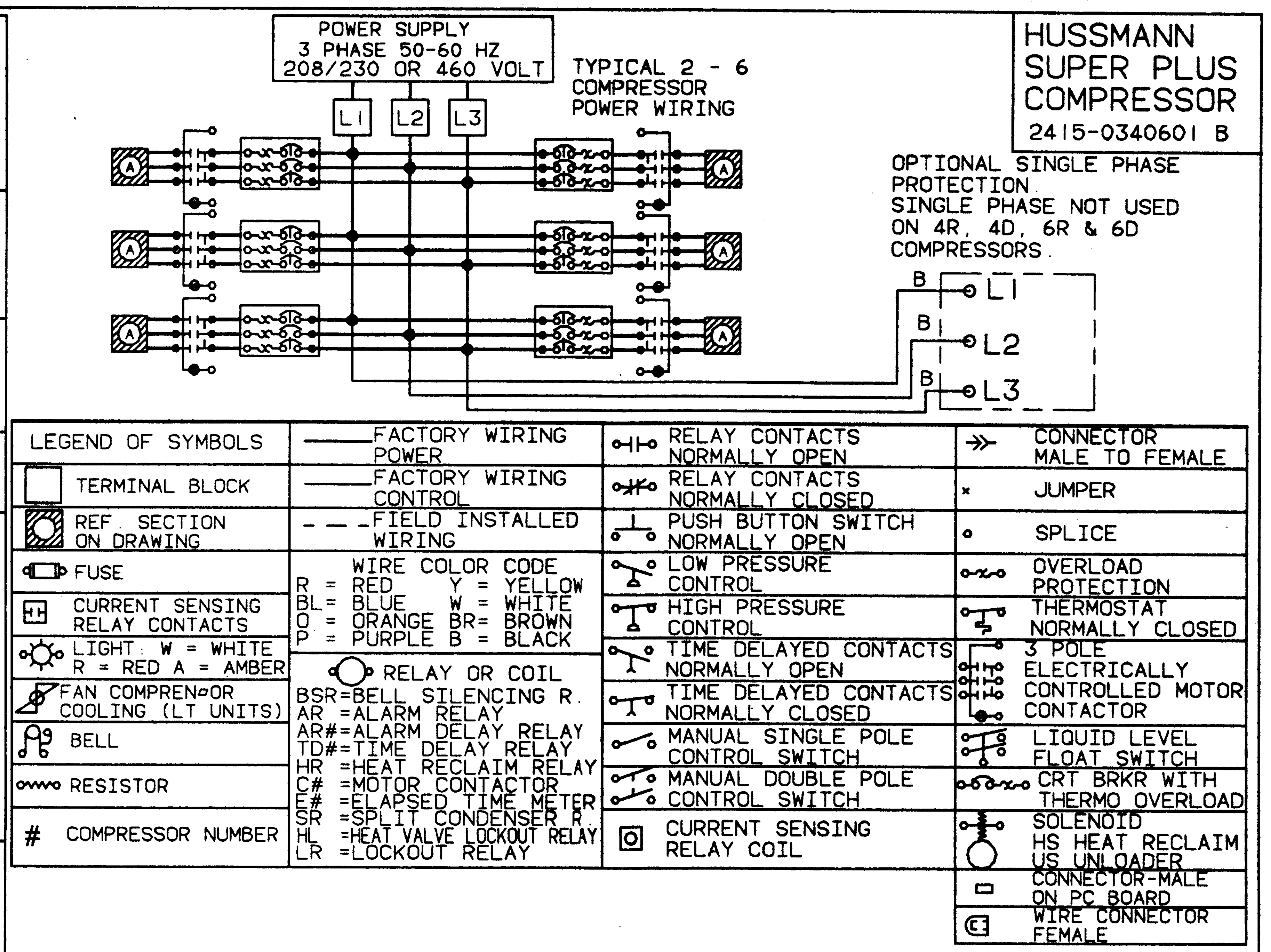
NOTES:

1. Terminals 34, 35 and 36 are provided for use with remote alarm systems. Contacts between terminals 34 and 35 (Hussmann Remote Alarm) open on alarm. Contacts between terminals 34 and 36 close on alarm. See wiring diagram included with remote alarm system for proper connections. Only one alarm system can connect ~~to these terminals~~. Maximum load 10 amps.
2. The remote alarm bell and light are field wired between terminals 31, 32 and 33. The alarm bell connected between terminals 32 and 33 must be UL listed. The bell must be a Jenkins Model No. 1005 or equivalent. Maximum load on terminals 32 and 33 is 125 VA. 125 VAC.
3. HR coil for HR contacts located in heat reclaim section of diagram. Low liquid level alarm: Alarm set point 10% receiver level during heat reclaim, 30% at all other times. (HR relay used only when heat reclaim is used with low liquid level alarm.)
4. Alarm time delays are shown for a six (6) compressor unit. (One alarm delay for each compressor plus AD9 delay.)
5. Current sensing relay sensor will be positioned to sense the current flow of the L1 line to the compressor. The contacts are wired into the control circuits as shown. On 460 volt units the lead must be looped through the relay two (2) times. Current sensing relays are options.
6. For remote satellite with alarm connections, wire between Y1 and Y2.
7. A. For satellites with Koolgas defrost connect [SAT] to S_ terminal on corresponding satellite defrost circuit.
   B. For satellites with off-time defrost, connect [SAT] to T_ terminal (for high end) or to B_ terminal (for low end) on corresponding defrost circuit.
8. For Copeland Sentronic oil failure control see Detail Block E insert diagram. CSR relay required only when current sensing relay is used with Sentronic.
9. Terminal XIB provided for defrost control circuit connection.
10. When not using single phase protector, wire the Blue wire from XI and Orange wire from XIA directly to circuit breaker.
11. For compressors without oil failure control, splice Blue wire from high pressure control to Orange wire going to #7 terminal block. Cap off Brown wire.
12. 4# terminal required only for compressors with solid state protection. See Detail Block B.
13. When 2 high suction pressure controls are used, wire in parallel.
14. Wire 24 volt secondary to the three-pin power input plug. Connect the Red and Black leads of the cable to transformer secondary terminals. Using a Crimp Stakeon, screw the drain wire to the liner near the transformer.
15. When the rack is equipped with Koolgas defrost systems, using Belden 8760 cable, connect one end to KR relay terminals 5 and 3. Connect the other ends to the "Defrost" screw terminals of the EPC terminal strip. Connect the drain wire to the bolt that fastens the EPC-1000 to Super Plus left-hand (facing unit) door.
17. EPC-1000 compressor and alarm control circuit connections are made using cable assemblies.
18. TDSP is the Time Delay Compressor Split Relay for when the rack goes into Switchback to prevent all the compressors from coming on at once. Wire TDSP contacts 4 and 3 between the second and third compressors on racks with 3 and 4 compressors, or between the third and fourth compressors on racks with 5 and 6 compressors. No TDSP is used for 2 compressor racks. TDSP is not used if individual time delays are wired in the Switchback circuit as shown in Detail Block C.
19. All relays shown in nonenergized position.
20. For split suction header racks which have (2) EPC-1000s installed, connect the KR relay contacts per note 15 to the EPC-1000 controlling the left side of the suction header. Do not connect any cables to the defrost terminals of the EPC-1000 controlling the right side of the suction header.
21. When an unloader is not used remove PC terminal block and Blue wire, wire directly from switch to block C.

HUSSMANN SUPER PLUS COMPRESSOR

2415-0340601 B





NOTES:

1. Terminals 34, 35 and 36 are provided for use with remote alarm systems. Contacts between terminals 34 and 35 (Hussmann Remote Alarm) open on alarm. contacts between terminals 34 and 36 close on alarm. See wiring diagram included with remote alarm system for proper connections. Only one alarm system can connect to these terminals. Maximum load 10 amps.

2. The remote alarm bell and light are field wired between terminals 31, 32 and 33. The alarm bell connected between terminals 32 and 33 must be UL listed. The bell must be a Jenkins Model No.1005 or equivalent. Maximum load on terminals 32 and 33 is 125 VA. 125 VAC.

3. HR coil for HR contacts located in heat reclaim section of diagram. Low liquid level alarm: Alarm set point 10% receiver level during heat reclaim, 30% at all other times. (HR relay used only when heat reclaim is used with low liquid level alarm.)

4. Current sensing relay sensor will be positioned to sense the current flow of the L1 line to the compressor. The contacts are wired into the control circuits as shown. On 460 volt units the lead must be looped through the relay 2 times. Current sensing relays are options.

5. For remote satellite with alarm connections, wire between Y1 and Y2.

6. A. For satellites with Koolgas defrost connect [SAT] to S_ terminal on corresponding satellite defrost circuit.
   B. For satellites with off-time defrost, connect [SAT] to T_ terminal (for high end) or to B_ terminal (for low end) on corresponding defrost circuit.

7. Terminal XIB provided for defrost control circuit connection.

8. When not using single phase protector, wire the Blue wire from X1 and Orange wire from X1A directly to circuit breaker.

9. For compressors without oil failure control splice Blue wire from high pressure control to Orange wire on compressor harness.

10. 4# terminal required only for compressors with solid state protection. See Detail Block B.

11. Wire 24 volt secondary to the three-pin power input plug. Connect the Red and Black leads of the cable to transformer secondary terminals. Using a Crimp Stakeon, screw the drain wire to the liner near the transformer.

12. When the rack is equipped with Koolgas defrost systems, using Belden 8760 cable, connect one end to KR relay terminals 5 and 3. Connect the other ends to the "Defrost" screw terminals of the EPC. Connect the drain wire to the liner.

13. EPC-1000 compressor alarm connections are made using cable assemblies. The plug end of the cable inserts into the EPC-1000 alarm plug. The other end to the appropriate control circuit branch wiring. Alarm contacts close immediately on loss of power and after a 30 minute delay on low and high pressure.

14. Wire T4 of each compressor board to a N.O. contact of the TDSB or TDSP relay. TDSB: compressor 1 across 1 and 3. TSP1: Compressor 2 across 1 and 3, compressor 3 across 8 and 6. TSP2: Compressor 4 across 1 and 3, Compressor 5 across 8 and 6. TSP3: compressor 6 across 1 and 3. TSP relays are not used if individual time relays are wired in the switchback circuit as shown in Detail Block D.

15. All relays shown in nonenergized position.

20. Splice White wire from solid state protector to White wires on fan, oil failure control and compressor harness.