INSTALLATION AND SERVICE MANUAL

FOR THE

XPRT5-TD32

PRESSURE AND DEFROST CONTROLLER

ALTECH CONTROLS

1545 Industrial Drive
Missouri City, Texas 77489
(713) 499-5697
FAX: (713) 499-5504

07-01-90

INSTALLATION AND SERVICE MANUAL

FOR THE

XPRT5-TD32

PRESSURE AND DEFROST CONTROLLER

ALTECH CONTROLS

1545 Industrial Drive
Missouri City, Texas 77489
(713) 499-5697
FAX: (713) 499-5504

07-01-90

TABLE OF CONTENTS

INTRODUCTION

Altech controls offers a family of XPRT Controllers which are microprocessor based and designed to control refrigeration applications ranging from single compressor systems to multiple suction parallel racks having up to 16 compressors. Condensor fan control and defrost control are available on certain models. All XPRT Controllers have remote communications capability and our XPRT1 has Altech's patented forced-time cycle control logic for energy saving suction pressure control. The following product matrix provides feature comparison of the XPRT family of controllers.

FEATURES	XPRT1	XPRT2	XPRT3			XPRT4		XPRT5
			STD	MPS	HVAC	TD12	HVAC	TD32
Compressors	1	4	6	8	–	8	–	16
Condenser Stages	1	–	6	6	–	6	–	12
Defrost Circuits	1	–	–	–	–	12	–	32
Temperature Controllers	1	–	–	–	–	12	–	32
Oil Failure/Auto Retry	1	–	–	–	–	Yes	–	Yes
Power Monitoring	–	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brownout Protection	–	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Remote Communications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
System Identifications	Yes	Yes	–	–	–	Yes	–	Yes
English Language Display Screens	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
History Log	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
#/Sensor	95	95	16	16	16	380	380	200
# of Sensors	5	7	16	16	16	32	32	64
Optimizer	–	2	3	3	–	12	–	32
Satellite Compressors	–	1	1	–	–	*	–	*
Defrost Termination	Yes	–	–	–	–	Yes	–	Yes
Run Time Logs	Yes	Yes	Yes	Yes	–	Yes	–	Yes
Liquid Level Alarm	–	Yes	Yes	Yes	–	Yes	–	Yes
Download from PC	Yes	Yes	–	–	–	Yes	Yes	Yes
Output Override	–	–	–	–	–	Yes	Yes	Yes
Condenser Multiple Set Point	–	–	–	–	–	Yes	–	Yes
Suction Manifolds	1	1	1	3	–	1	–	1, 2 or 3
Variable Speed Compressors	–	–	–	–	–	1	–	3
Variable Speed Fans	–	–	–	–	–	–	–	Yes
Alarm Dial Out	–	–	–	–	–	Yes	–	Yes
Remote Defrost Initialization	Yes	–	–	–	–	Yes	–	Yes
HVAC								
Main Zone/Back Room Zones	–	–	–	–	1/3	–	1/3	–
Machine Room Temp Control	–	–	–	–	Yes	–	Yes	–
Lighting Scheduler	–	–	–	–	–	–	12	–

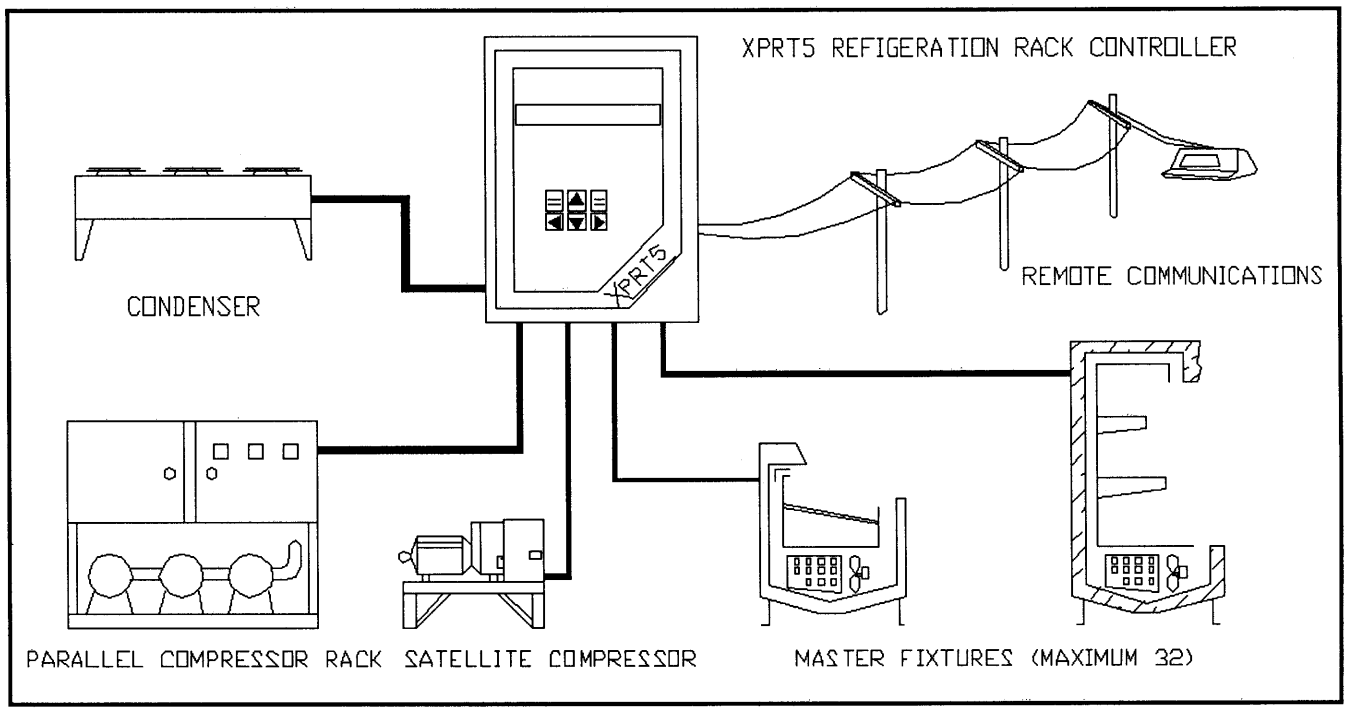
*Number determined by available temperature controllers

The XPRT family of controllers is covered by one or more of the following patents:

USA	4,531,376	Refrigerator Defrost Control
	4,535,602	Shift Logic Control Apparatus for Unequal Capacity Compressors in a Refrigeration Ssytem
	4,537,038	Method and Apparatus for Controlling Pressure in a Single Compressor Refrigeration System
	4,578,959	Method and Apparatus for Detecting and Controlling the Formation of Ice or Frost
	4,593,533	Method and Apparatus for Detecting and Controlling the Formation of Ice or Frost
	4,612,776	Method and Apparatus for Controlling Capacity of a Multi-Stage Cooling System
	4,628,700	Temperature Optimizer Control Apparatus and Method
	4,651,535	Pulse Controlled Solenoid Valve
	4,679,404	Temperature Responsive Compressor Pressure Control Apparatus and Method
	4,686,835	Solenoid Expansion Valve With Low Ambient Start-up
	4,697,431	Refrigeration System Having Periodic Flush Cycles
	4,735,060	Pulse Controlled Solenoid Valve with Food Detection
Canada	1,158,745	Method and Apparatus for Controlling Capacity of a Multi-Stage Cooling System
Australia	543,220	Method and Apparatus for Controlling Capacity of a Multi-Stage Cooling System
EPC	0,034,591	Method and Apparatus for Controlling Capacity of a Multi-Stage Cooling System
	0,082,144	Refrigeration Defrost Control
South Africa	4656/1980	

Other Patents Pending

SECTION A: GENERAL INFORMATION



The XPRT5-TD32 Multi-Pressure/Defrost Controller (TD32 indicates 32 temperature control circuits and 32 defrost control circuits) is a microprocessor based parallel refrigeration rack controller with the following features:

- History log for each sensor
- Compressor run time logs
- Defrost logs
- Oil failure logs
- Liquid level monitoring
- Ability to monitor rack power and voltage
- Manual initiation and termination of defrost
- "Easy-touch"™ four button display control
- Sensor type re-assignment
- Software overrides
- Remotely mounted control relays
- Option to factory configure controls
- One telephone modem for multiple XPRT controls
- Individual sensor/circuit names (16 characters)
- 40 character by 2 line English language display
- 24 VAC, Class 2 supply voltage

The XPRT5-TD32 performs the following:

- Controls up to sixteen parallel refrigeration compressors/unloaders based on 1 to 3 suction manifolds:
  - Suction pressure
  - Condensing pressure
  - Oil pressure
  - Defrost status
  - Power line voltage
  - Minimum compressor ON and OFF times
  - Rotary logic or user customized unequal logic
  - Selectable unloader timing
  - Up to 32 master case temperatures (OPTIMIZERS)
- Control an inverter on each manifold powering a standard compressor at variable speeds based on:
  - Manifold Suction pressure
  - Compressor oil pressure
  - Minimum compressor speed
- Control up to 12 condenser fans based on condensing pressure with 3 set points.
- Control defrost and temperature of up to 32 refrigeration or satellite circuits.
- Auto-dialed and local alarms

SECTION B: OPERATION

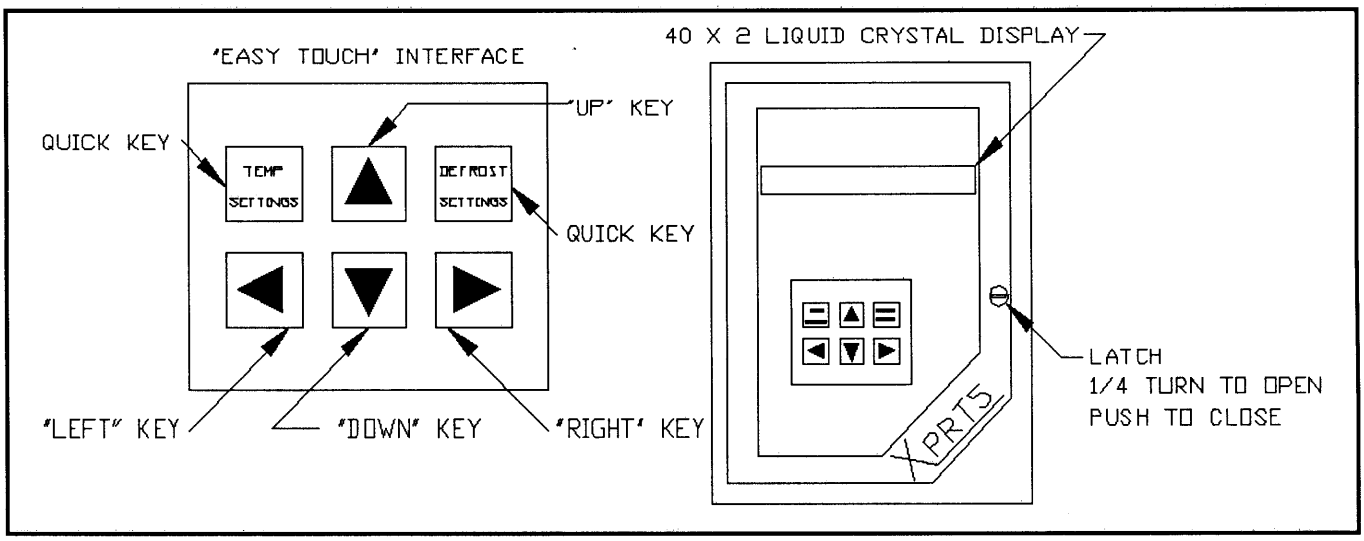


Figure B-1: XPRT5 Display and Keypad

DISPLAY AND KEYPAD

The XPRT5-TD32 is equipped with a 2 line by 40 character wide LCD display. Normally it displays the defrost status and the values of the temperature sensors of refrigeration circuits #1 – #8.

The amount of information that can be presented to the on-site user is too large to be displayed on a single "screen". Consequently, the XPRT5 has a series of information screens that can be visualized as being stacked below the main status screen (See **Figure B-2**). They are sequentially accessed by repetitive pressing of the "DOWN" key (See **Figure B-1**) when the blinking "< –" cursor on the display is in the far left position. If a previous screen is desired, pressing the "UP" key returns the display to a previous screen. A reference list of all the screens appears on **Pages B-4** through **B-10**.

QUICK KEYS

Because of the number of screens and wide range of values for each setting, "Quick Keys" provide faster access to the more commonly used screens by jumping directly to that screen and faster incrementing of settings by increasing the rate of change. Two quick keys are dedicated single keys while others are two keys pressed at the same time.

"TEMP SETTINGS" = > Temperature Setting screen
"DEFROST SETTINGS" = > Defrost Setting screen
"LEFT" & "UP" = > Main Status screen
"LEFT" & "DOWN" = > Password screen

While the "< –" cursor is next to a setting:

"UP" & "RIGHT" = > Speeds the rate of increase
"DOWN" & "RIGHT" = > Speeds the rate of decrease

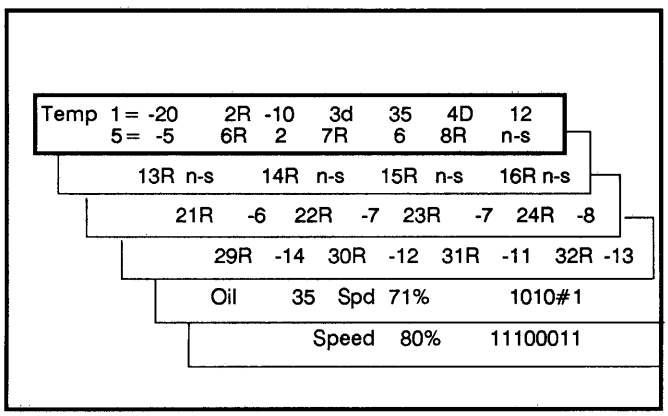


Figure B–2: Stacked Screens

CHANGING SETTINGS

The four direction keys (See **Figure B-1**) – UP, DOWN, LEFT & RIGHT – are also used to change XPRT5 settings, such as the Cutin setting. The settings which can be adjusted using the keypad are indicated on the sample screens in this document by a "<" beside the value. In order to change a setting, move the blinking "< –" cursor from the far left position to the position beside the setting to be changed by pressing the "RIGHT" or "LEFT" key. Next, to increase or decrease the value, press the "UP" or "DOWN" key. Once the setting has been changed to the value desired, the cursor must be moved back to the far left position using "LEFT" key before the other screens can be accessed. All the settings are maintained in non-volatile memory which is retained indefinitely. In the event of a power failure, history logs, time and date will be retained up to 6 hours. The clock must be reset if the power failure lasts longer than 6 hours.

DISPLAY CONTRAST ADJUSTMENT

The XPRT5 has a contrast adjustment potentiometer to maximize the clarity of the display for a particular viewing angle. The potentiometer is located on the top of the CPU40 Board (See **Figure B-3**). The potentiometer has a total rotation of 300 degrees. DO NOT FORCE BEYOND THE STOPS!

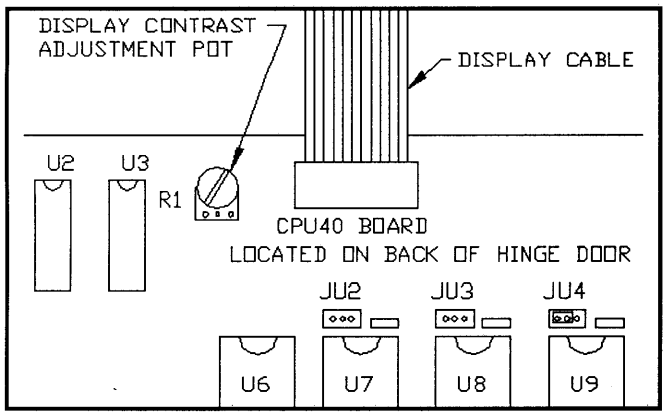


Figure B-3: Display / ContrastAdjustment

SUCTION PRESSURE CONTROL LOGIC

The XPRT5 controls up to 16 compressors (or unloaders) to maintain the suction pressure in up to three separate manifolds between the Cutin and Cutout settings while limiting the frequency of the cycling. The rate that the compressor capacity is increased is dependent on how far the suction pressure is above the Cutin setting. Each suction manifold group operates independently.

The compressors can be sequenced using either rotation logic or a user programmable logic which selects compressor/unloader combinations that provide different amounts of compressor capacity. In addition to the controlling of compressors to maintain the suction pressure between the Cutin and Cutout settings, the XPRT5 has special control logics for equipment protection. Compressors will be cycled off if a suction pressure falls below the suction limit (normally a vacuum). Additional compressors will not be added if the XPRT5 detects the condensing pressure approaching the maximum condensing pressure limit setting. All compressors will shut off if the condensing pressure exceeds the limit setting. ("HEAD LIMIT" in Configuration Screen C-1)

The XPRT5-TD32 also has the ability to control the first compressor on each manifold as a variable speed compressor. In between the incremental changes in compressor capacity, the XPRT5 continually adjusts the speed in order to maintain the suction pressure settings within the proper range. The XPRT5 provides a 0 - 10 VDC signal to the inverter with the 10 VDC signal being maximum speed. The control logic will shift the speed of the variable speed compressor to halfway between maximum and minimum speed settings when extra compressor capacity is sequenced on or off. (See **Appendix 1** for a complete description)

The XPRT5's logic also incorporates a special logic that "shifts" the compressor capacity down (thereby causing the RPM of the variable speed compressor to increase) if the compressor's oil pressure falls below a minimum setting.

OIL PRESSURE LOGIC

The XPRT5-TD32 has provisions for monitoring up to 12 individual compressor oil pressures and has logic to lock the compressor off if its oil pressure falls below a selectable valve for a predetermined period of time. The XPRT5-TD32 logic also allows a selectable number of retries before locking the compressor off. Once locked off, however, the XPRT requires an operator to manually enable the compressor.

CONDENSER FAN OPERATION

Up to 12 condenser fans can be controlled based on condensing pressure. The condenser fans are cycled on and off using either sequence logic (FIRST ON LAST OFF) or rotation logic (FIRST ON FIRST OFF). The XPRT5-TD32 has provisions for three different condenser fan pressure settings – normal refrigeration, hot gas type defrosts and heat reclaim.

REFRIGERATION TEMPERATURE CONTROL

The XPRT5 can control the temperature in up to 32 refrigeration circuits via the liquid line solenoid valve, a pilot operated EPR or a suction stop. Each circuit has a master temperature sensor and individual temperature/time delay settings.

DEFROST CONTROL

The XPRT5 can initiate up to six defrosts per day for each of the 32 refrigeration circuits. The defrosts are time initiated and can be either temperature or time terminated. The master circuit temperature sensor can be used for temperature termination, or a series of close-on-rise thermostats can be wired in with the master sensor to provide positive defrost in all fixtures. A drain time can also be added at the end of defrost.

OPTIMIZER CONTROL LOGIC

The XPRT5 can have up to 32 circuits defined as OPTIMIZER circuits. Optimizer circuits can be assigned to each suction manifold to control that manifold's cutin and cutout pressure settings. Increased suction pressure decreases compressor electrical consumption. All OPTIMIZER circuits must be at or below their respective ON settings before the suction Cutin and Cutout settings are allowed to be automatically set higher. If the temperature is 10°F warmer than its setting, that circuit is assumed to be in defrost.

Any circuit can be designated as an OPTIMIZER circuit on any manifold group. For all OPTIMIZER circuits, the master sensor temperature is compared to the respective circuit temperature setting.

Regardless of the temperature sensor's reading, the OPTIMIZER logic will not change the Cutin and Cutout settings beyond the maximum and minimum limits set by the operator.

STATUS AND CONFIGURATION SCREENS

The display screens are broken into two groups of screens: Status and Configuration. The Status Screens (See **Pages B-4 – B-7**) contain the following information and settings required by an on-site serviceman in order to service the compressor rack: history logs, suction setting, refrigeration circuit settings, defrost settings and alarm information.

The Configuration Screens (See **Pages B-8 – B-10**) are used for setting the basic configuration, time delays, alarm parameters, communication parameters and limits on settings for the XPRT5. Once they are set for a given installation, there will be very little need for an on-site serviceman to view these screens.

The Status and Configuration Screens can be protected by a user selected password in Screen C-8. The XPRT5 is shipped from the factory with the password set to "0 0 0". This allows the installer full access to all the screens during the initial setup. However, after the control is configured, a new password may be defined which restricts access to only those users who correctly enter the password.

NOTE: The following Screen Sections discuss three manifold groups. If the XPRT5-TD32/2 is used, only Manifolds 1 and 2 will appear in any screen. Similarly, if the XPRT5-TD32/1 is used, only Manifold 1 will appear in any screen.

XPRT5-TD32 STATUS SCREENS

Oil Pressure Failure (press ^ to clear)
1-HL < 3-FL<

S-0: OIL FAILURE STATUS

This screen is placed above the initial system temperature screen and shows the current status of the oil failure logic and the assignment of the oil pressure transducers to the various compressor outputs. Each of the "<" symbols shows the location where the cursor can be placed to implement some change in the control. If no compressors are being held off on low oil pressure, the second line of the display reads "none". Otherwise, the compressor outputs that are currently being held off are displayed. XPRT5 has 12 oil pressure transducers which can be assigned to any of the 16 compressor outputs. If the compressor's oil pressure transducer measures a loss of pressure for the delay period and is waiting for the HOLD OFF time to elapse prior to attempting to restart the compressor, "HL" is displayed next to the compressor number. If the oil logic has not sensed the proper differential oil pressure for the selected number of retries, "FL" is displayed next to the compressor number. Any compressor which is in the hold-off period or has failed can be manually reset by moving the cursor to that particular transducer location and pressing the "UP" key on the controller. If that compressor is being called into use by the controller, it should come on and go through the oil failure sequence again. If "Oil Failures" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Temp 1= -20	2R -10	3d	35	4D	12
5= -5	6R 2	7R	6	8R	n-s

S-1A: REFRIGERATION CIRCUIT STATUS

Temp 9R -5	10R 2	11R 6	12R n-s
13R n-s	14R n-s	15R n-s	16R n-s

S-1B: REFRIGERATION CIRCUIT STATUS

Temp 17R -10	18R -5	19R -5	20R -6
21R -6	22R -7	23R -7	24R -8

S-1C: REFRIGERATION CIRCUIT STATUS

Temp 25R -12	26R -13	27R -13	28R -12
29R -14	30R -12	31R -11	32R -13

S-1D: REFRIGERATION CIRCUIT STATUS

These four screens show a summary of the temperatures and states of the 32 refrigeration systems. The "=" indicates the temperature for that system has been satisfied and the refrigeration solenoid is closed. An "R" indicates the temperature is not satisfied and the refrigeration solenoid is open. A "D" indicates a refrigeration circuit is in defrost. If a drain time is specified after a defrost, a "d" indicates a circuit is in a drain period.

The number next to the system number is normally the master fixture discharge air temperature for that circuit. However, if thermostats are used to terminate defrost in conjunction with temperature control (as shown in wiring diagram **Figure C-4**), a temperature greater than 200°F will be displayed when the termination thermostats are made. In addition, if the sensor switching relay circuit shown in **Figure C-6** is used, the temperature displayed during defrost will be the coil temperature. If the controller detects an open circuit, the display will show an "n-s" indicating "no sensor" and the XPRT5-TD32 will bring on the refrigeration for that circuit. If both "System Temperatures" and "System Defrosts" are "Disabled" in Configuration Screen C-18, these screens will not appear.

Man#1< 24 Stage	1234567890123456
Oil 35 Spd 71%	1010#1

S-2A: VARIABLE SPEED RACK STATUS

Man#2< 13 Stage	1234567890123456
Vari-spd Disabled	1101101

S-2B: VARIABLE SPEED RACK STATUS

Man#3< 25 Stage	1234567890123456
Oil 30 Spd 80%	101

S-2C: VARIABLE SPEED RACK STATUS

Rack Status screens show the status of the compressor outputs. As the manifolds are selected, "Man#1", Man#2" or "Man#3", this screen displays which of the 16 outputs are assigned to each manifold and the current status of each. If a compressor is being held off due to oil failure, the "1" under that compressor output number alternates with a "#". In Screen S-2A, Compressor #5 shows this. A "0" displayed under the output number indicates the output is off.

The number to the right of the manifold number is the pressure of that manifold (See **Note**); "Oil" and the number to its right indicate the oil pressure.

"Spd 71%", as in Screen S-2A, indicates the current Variable Speed. If "Variable Speed" is "Disabled" in Configuration Screen C-18, all manifolds will read "Vari-spd Disabled" as shown in Screen S-2B. To individually disable the variable speed on a manifold, see Configuration Screen C-11.

NOTE: See Configuration Screen C-4 to set the units (psi, kpa, bar) in which pressure will be displayed. To toggle manifold pressure to alternate units, press "RIGHT" and "LEFT" keys simultaneously. This displays the evaporation temperature at the current manifold pressure for the refrigerant selected in Screen C-14.

Cond	194	Fans	123456789012	Liquid
	Speed	80%	11100011	20%

S-3: CONDENSER STATUS

The Condenser Status Screen shows the condensing pressure and the status for the selected number of fans. "Speed 80%" is the variable speed output for fan speed control. "Liquid" is the percentage of liquid in the receiver.

Input P28 of the Analog Extension Board from P9 of the XPRT5 IO Board is a switch input which is closed for Heat Reclaim. Heat Reclaim can also be selected through the serial communication. Once in heat reclaim, the unit remains there for a 5 minute interval before the switch closure is checked again or the serial command must be received (See **Figure C-5**). If "Condenser Fans" is "Disabled" in Configuration Screen C-18, this screen will not appear.

NOTE: Condensing pressure may be toggled to display alternate units by pressing "RIGHT" and "LEFT" keys simultaneously. This shows the equivalent condensing temperature at the current pressure for the refrigerant selected in Screen C-14.

Oil	Pressure	value	status
	P7<	35	2 on

S-4: OIL PRESSURE STATUS

This screen shows the oil pressure for the 12 oil pressure transducers (P7 – P18 on the Analog Extension Board from P9 of the XPRT5 IO Board) one at a time, the compressor output to which it is assigned and the status of that output. In the example, oil pressure transducer connected to P7 indicates 35 psig and can shutdown Compressor #2 which is currently running. If the oil transducer is not asssigned, the status will indicate "Not Assigned". The compressor output status can be "On", "Off", "Oil Hold Off" or "Oil Failure". If "Oil Failures" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Systems In Defrost/time remaining
1/15 3/45 6/2

S-5: DEFROST STATUS

This screen shows the current systems in defrost and the remaining time of each defrost. If "System Defrost" is "Disabled" in Configuration Screen C-18, this screen will not appear.

NORTH MLTDK MEAT	Tmp	On	Off	Dly	Opt
Sys# 1< Refg	-10	-10<	-12<	30<	Mn1

S-6: TEMPERATURE SETTINGS

This screen allows the system temperature control parameters to be set and shows the name, control state, current temperature and, if the probe is an optimizer, the manifold to which it is assigned. "Dly" keeps the delay from On/Off cycling too often. If "System Temperature" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Man#1<	Cutin	Cutout	Float	Cutin	Cutout
Psi	24<	18<		26	20

S-7: SUCTION PRESSURE SETTINGS

The compressor Cutin and Cutout values for each manifold are set in this screen. The values under "Float Cutin Cutout" represent the current operating point due to the optimizer logic. The optimizer cannot move the Cutin setting out of the range of Max and Min Cutin in the Configuration Screen C-1. If a change is made to the Cutin or Cutout setting, the floating values are set to match. The Manifold Cutout value displayed is the Cutout differential from the Cutin setting; therefore, changing the Cutout value changes the differential value. The unit type displayed under "Man#1" is the current pressure unit type selected in Screen C-4.

NOTE: To toggle from pressure to temperature units, press "RIGHT" and "LEFT" keys simultaneously. This displays all suction and condensing pressures in the equivalent vapor or condensing temperature for the refrigerant selected in Screen C-14.

Fans	Mode	Cutin	Cutout
	Normal<	145<	135<

S-8: CONDENSER FAN SETTINGS

The condenser Cutin and Cutout are set in this screen for each of the three modes – Normal, Hot Gas, Defrost and Heat Reclaim (See **Figure C-5**). If "Condenser Fans" is "Disabled" in Configuration Screen C-18, this screen will not appear.

NORTH MLTDK MEAT Tmp Term Time Left Drn
Sys# 1< Norm< No Defrost in Progress

S-9A: DEFROST INITIATION & STATUS

NORTH MLTDK MEAT Tmp Term Time Left Drn
Sys# 1< Norm< Wait Changing Defrost State

S-9B: DEFROST INITIATION & STATUS

NORTH MLTDK MEAT	Tmp	Term	Time Left	Drn
Sys# 1< Defrost	41	35	60	5

S-9C: DEFROST INITIATION & STATUS

This screen initiates a manual defrost. The example shows one screen as it changes when a Manual Defrost is initiated. By moving the cursor to select the desired system number, then moving to the right of the current state and pressing the "UP" key, the controller displays the message "Wait Changing Defrost State" as shown in Screen S-9B. After the state changes (Screen S-9C), the screen will reflect the new status and other information about the defrost. When a defrost is set in this manner, the defrost runs the full defrost length ("Term" – set in Screen S-11) and is not terminated when the temperature of the case reaches the termination value. "Drn" is the current set drain time that starts after defrost termination. Screen S-9A shows System 1 when no defrost is occuring. If "System Defrost" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Systems In Defrost/time remaining
1/15 3/45 6/2

S-10: DEFROST STATUS (REPEAT OF S-5)

This screen shows the status of the current systems in defrost. It is a repeat of Status Screen S-5. If "System Defrost" is "Disabled" in Configuration Screen C-18, this screen will not appear.

NORTH MLTDK MEAT Trm Lnth Drn Dfrst Type
Sys# 1< Norm 35< 60< 5<HtGs<Time<

S-11: DEFROST SETTINGS

This screen sets the defrost values for each of the systems. System 1 has been set to terminate defrost at 35°F. "Norm" indicates the current status of defrost for this system ("Def" and "Drain" are the other status possibilities). If defrost termination thermostats are used as shown in **Figure C-4**, set "Trm" to "ThmST" by raising ""Trm" temperature to just above 80°F. The type of defrost, "Dfrst", can be set for either "HtGs" or "Norm". When "HtGs" is specified, the XPRT5 will change the condenser fan control settings to the hot gas defrost settings. "Norm" should be used for electric or off-cycle defrosts. Presently, only "Time" initiated defrosts can be set. If "System Defrost" is "Disabled" in Configuration Screen C-18, this screen will not appear.

NORTH MLTDK MEAT Def # Time
Sys# 1< Norm 1<Totl 3 02<00<

S-12: DEFROST SCHEDULE

This screen sets the parameters related to the defrost type set in Screen S-11. Time defrost can have up to 6 starting times per day. The value under "Time" is displayed as "--:--" when that defrost number is inactive. The total number of active defrosts is also displayed. In the example, one of three active defrost times shown is set to 2:00 a.m. (02:00 hrs). If "System Defrost" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Defrost Sys# Acum(M) Lg# Time/Date
Log 1< 34 1< 14:34 03/04/89

S-13: DEFROST LOG

This screen displays a log of the termination time, "Time/Date", of the last 10 defrosts with the total accumulated defrost time, "Acum(M)", since last reset in Configuration Screen C-13. In this example, the log for System #1 shows the most recent defrost occurred at 2:34 p.m. To view the previous nine defrost times for this system, increase the number under "Lg#" from 1 to 10. To view the time and date that the accumulator was last reset, increase the "Lg#" to 11. "Lg#" changes to "Rset" to indicate this is the accumulator reset time.

The Defrost Accumulator can be reset in Configuration Screen C-13. If "System Defrost" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Alarm # Time On Delay Last Alarm
1 Low 21 30 17:23

S-14: ALARM STATUS LOG

This screen presents the status of the high and low alarms for each of the 64 sensor inputs. "Time On" indicates the length of time the sensor input has reached or exceeded the alarm set point. When "Time On" is greater than the "Delay" setting, the alarm is set and the time under "Last Alarm" changes. In the example, Sensor 1 has been below the Low Setting for 21 minutes. If it remains there for 31 minutes, the Alarm Relay will be set and the new time recorded in "Last Alarm". The Alarm Set Point and Delay Time are set in Configuration Screen C-7.

Current Alarms : Push -> To Reset Alarms
1H 3L

S-15: CURRENT ALARMS LOG

This screen shows the current active alarms. Press the "RIGHT" key to reset them.

Snsr# Log # Value Description
P33< 0< -10 NORTH MLTDK MEAT

S-16A: CURRENT SENSOR VALUE

Snsr# Log # 06:00 05:45 05:30 05:15
P33< 1< -10 -12 -11 -10

S-16B: SENSOR VALUE LOG

This is a dual function screen. If the log number is set to zero, the current value and the description of the sensor are displayed (Screen S-16A). When the log number is raised to "1", it shows the four most recent logged readings and the time. The Log # will then increment by four until all logs are displayed. There are 200 logged values for each sensor. The time increment between the logged values is set in Configuration Screen C-14.

Load# Days Hr Total Days Hr % ON
1< 1 3 2 4 50

S-17: COMPRESSOR RUN TIME LOG

This screen shows the total time each of the compressors have run and the total time since the last reset. In this example, Compressor #1 has been online for 1 day and 3 hours. Since the last run time reset, the compressor has been on 2 days and 4 hours or 50% of the time. The run time can be reset in Configuration Screen C-13.

Oil Failure Log	Snsr	Out	Lg#	Time/Date
	P7<	1	1<	10:30 01/23/90

S-18: OIL FAILURE LOG

This is a log of the oil failures for the 12 oil pressure transducers. The times and dates of the last ten oil failures for each sensor are kept in this log. This example is the log for the oil pressure transducer connected to Sensor Input P7 and is controlling Output #1 (Compressor #1). It shows the last failure at 10:30 am on 01/23/90. If "Oil Failures" is "Disabled" in Configuration Screen C-18, this screen will not appear.

KWH	Power	Volts	Amps
12345	25	236	61

S-19A: KWH POWER STATUS

kwh	hr	kwh	Day	Demand
23	13<	315	1<	47

S-19B: KWH POWER LOG

Screen S-19A shows the accumulated rack KWH, current rack power (kw), minimum phase to phase voltage and the calculated amperage (The amperage displayed is the actual consumed current calculated from the power consumed and voltage. It will read less than the ampmeter reading by the power factor).

Screen S-19B shows the power logs for the previous 24 hours and for the last 31 days. The kwh to the left of "hr" is the accumulated kwh between noon and 1 p.m. (1300). The kwh to the left of "Day" is the accumulated kwh for the first day of the previous month. The value under "Demand" is the maximum power (kw) the controller has sensed since the last time the power logs were reset (Screen C-13). If "Power Monitoring" is "Disabled" in Configuration Screen C-18, these screens (S-19A & B) will not appear.

Password	Time	Date	Day
0< 0< 0<	06<34<	01<07<89<	Sat<

S-20: PASSWORD ENTRY

This screen allows password entry and setting the time and date. If the protected setting option was set in the configuration section, the first two numbers of the password must match the configuration password to allow a mechanic to make changes in the setting screens. All three entries must match the password in order to change the configuration screens.

XPRT5-TD32 CONFIGURATION SCREENS

Cutin:Max / Min	Pump Down	Head Limit
Mn#1 < 50 < 30 <	13 <	291 <

C-1: SUCTION LIMITS

This is the first of the configuration setting screens. The maximum and minimum Cutin pressures for each manifold are set here thus limiting the range of the Cutin setting in Screen S-7. These settings also limit the range in which the optimizer logic can control the Cutin pressure. There is only one Pump Down setting for the control, and it sets the suction pressure on each manifold at which all of the compressors are cycled. Exceeding the head limit also turns off the compressors.

NOTE: For those controls which have no high pressure transducer installed, the Head Limit will have to be set at 350 psi before any compressor will run.

Compressor Timer		Condenser Timer(sec)	
On 120 <	Off 25 <	On 60 <	Off 60 <

C-2: COMPRESSOR & FAN DELAY

This screen sets the compressor and condenser timers by fixing the number of seconds between the time the last compressor changed and the next compressor can be brought on or off, thereby reducing equipment cycling. If "Condenser Fans" is "Disabled" in C-18, only the compressor timer settings will be displayed.

Mn#	Cfg	Start	Comp/# Of Comp
1 <	Equal <	1 <	6 <

C-3A: COMPRESSOR CONFIGURATION

Mn#	Cfg	Start	Comp/# Of Comp	Set
2 <	Prgmble <	7 <	6 <	Stages <

C-3B: COMPRESSOR CONFIGURATION

Mn#	Cfg	Stg#	1234567890123456	Unloader
2	Prg	0 <	000000 <	No <

C-3C: COMPRESSOR CONFIGURATION

These screens set the compressor program logic for each manifold which can be programmed for equal or unequal compressors. "Start" and "# of Comp" must be set in both cases. Set "Start" at the compressor number of the first compressor for this manifold and "# of Comp" for the number of compressors used on this manifold. Compressors CANNOT BE OVERLAPPED from one manifold to another; therefore, all manifolds need to be checked and corrected when changing "Start" and "# of Comp" on any of the manifolds. For example, in Screen C-3B, if "Start" changed from 7 to 6, then in Screen C-3A, "# of Comp" must change from 6 to 5.

When "Equal" is selected under "Cfg" as shown in Screen C-3A, the XPRT5 rotates the compressors (FIRST ON FIRST OFF) which shares run time producing equal wear.

When "Prgmble" is selected under "Cfg" as shown in Screen C-3B, the prompt message "Set Stages" appears at the right side of the display as a reminder to set the Stage Configuration. Move the cursor to the far right of the screen and Screen C-3C appears. Now up to 24 stages may be programmed to the desired compressor configuration. "0" and "1" indicate off and on respectively under each output. If fewer than 24 stages are used, entering all zeroes ("0") on the next higher stage stops the controller. See **Section C, Unequal Compressor Programming Guide** for complete details. A short delay time may be selected under "Unloader" to provide the proper timing for unloader stages. Otherwise, select "No".

Fan Logic	Fan #	(Units)	Temp	Pres
SEQ <	6 <		°F <	Psi <

C-4: CONDENSER FAN CONFIGURATION

This screen programs the fan logic as either Sequential (FIRST ON LAST OFF) or Rotational (FIRST ON FIRST OFF). Up to 12 fans may be controlled. The standard unit types in which temperature (F/C) and pressure (psi/kpa/bar) are displayed are also set here.

Optimizer Time	Assignment	
60 <	Sys# 1 <	Man#1 <

C-5: OPTIMIZER CONFIGURATION

This screen enables the optimizer function on each of 32 system temperature probes. If a system uses the optimizer function, it must be assigned to the proper manifold; otherwise, it is assigned "none". When all the optimizers assigned to a particular manifold fall below the "System On" temperature (Screen S-6), the suction pressure increases approximately .5 psi. Similarly, if any ONE optimizer rises above the "System On" temperature, the suction pressure decreases approximately .5 psi. The manifold optimizer logic is independent for each manifold. "Time" is the time in seconds between consecutive sampling of the probes.

Relay Type	Compressors	Condensers
	NC <	NC <

C-6: RELAY CONFIGURATION

This screen sets the output relay logic as normally open (NO) or normally closed (NC) contacts on the CRX8i Boards for both compressors and condensers. If "Condenser Fans" is "Disabled" in C-18, the Condenser relay logic is not displayed and cannot be set.

Alarm #	Set Point	Delay (min)
1 Low<	3	30

C-7: ALARM DEFINITION

This screen sets high and low alarm points for all sensors. The alarm time is not incremented on temperature circuits (P33 – P64) during defrost. When the sensor input is below (above) the "Set Point" of a low (high) alarm setting for longer than the "Delay" time (minutes), the alarm is set by closing the relay contact (See **Figures B–4** and **C–14**). If "Delay" is set to zero, the alarm is disabled. Oil failure alarms are set in Screen C-15.

Set Password	Diagnostic	Settings
0< 0< 0<	0< 0	Unprotctd<

C-8: SET PASSWORD

This screen allows password selection for restricted access to the configuration screens and protection of the settings above the configuration screens. All controllers are shipped from the factory with the "Set Password" at "0 0 0". This permits full access to all screens of the control after a power-up. To enable the password protection feature, change the "Set Password" as desired, then RECORD THE PASSWORD for future reference.

Unit #	Baud Rate	Bits	Port
2<	1200<	8<	RS422<

C-9: COMMUNICATION PARAMETERS

This screen sets the communication parameters. Currently, a total of 48 units can communicate on a network through one modem and phone line using Altech's XCOM program. Each unit is assigned a unique "Unit #" for XCOM identification. In case of duplicate unit numbers, neither unit can be contacted. The "Baud Rate" is the communication speed and may be set to 300, 600, 1200, 2400, 4800, or 9600. Altech recommends 1200 or 2400 baud depending upon the modem and noise characteristics of the line. "Bits" can be set to 7 or 8, but 8 bit data words are recommended. If P15 of the XPRT5 IO Board is used, "RS422" is selected for "Port". If P11 is used, select "RS232". RS422 handles the maximum number of controllers XCOM will support. For systems with ten or fewer controllers, Altech suggests using RS232.

KWH Multiplier	Voltage	Low Voltage
20<	75 to 275v<	ZERO<

C-10: POWER MONITOR CONFIGURATION

This screen sets the power monitoring parameters. If no PEV Power Transducer is installed, select "Off" under "KWH Multiplier". Otherwise, the multiplier is set to the KWH multiplication factor. As shown in Screen C-10, for 100:5 current transformers, the "KWH Multiplier" is set to 20. See **Section C, KWH Multiplier Section** for complete details. "Voltage" is the range for the voltage reading. "Low Voltage" is the minimum phase to phase voltage below which the compressors will be turned off for low voltage or phase loss protection. If "Power Monitoring" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Man#	Slope	Rate	Min-Spd	Oil dP	Tm-out
1<	Off< Up 2<	Dwn 2<	50%<	P7< 7	30<

C-11: VARIABLE SPEED COMPRESSOR CONTROL PARAMETERS

This screen sets the variable speed operating parameters for each manifold. The slope, Rate Up and Rate Down affect the variable speed output response to the suction line changes. These settings are selected from 1 – 9 representing percentage of the total output range. To disable the variable speed logic, set "Slope" to "Off". If disabled in this manner, the message "Vari-spd Disabled" will appear in Screen S-2 (See Screen S-2B) for the appropriate manifold(s).

"Min-Spd" is the slowest speed at which the variable speed output will run the compressor. "dp" is the differential oil pressure which the control tries to maintain. If the oil pressure drops below the "dp" setting for the time out ("Tm-Out") period, the compressor capacity of the manifold changes so that the variable speed compressor runs faster. "Oil" denotes the input on the Analog Extension Board (P7 – P18) attached to P9 of the XPRT5 IO Board for the variable speed compressor.

Variable Speed Fan	Slope	Rate	Min-Spd
4<	Up 1<	Dwn 1<	5%<

C-12: VARIABLE SPEED FAN CONTROL PARAMETERS

This screen sets the operating parameters for the variable speed fan control. "Slope", "Rate Up" and "Down" must be selected to give the response to controlling head pressure. These settings are selected from 1 – 9 representing percentage of the total output range. "Min-Spd" is the slowest speed at which the variable speed fan runs. To disable the variable speed fan control, set "Slope" to "Off". If "Condenser Fans" is "Disabled" in C-18, this screen will not appear.

Reset Accumulators
1< Push –> to reset Run Time

C-13: CLEAR ACCUMULATORS

This screen allows the run time, defrost and the power accumulators to be individually reset. Selecting 1 and pressing "RIGHT" resets the Run Time displayed in Screen S–17. Selecting 2 and pressing "RIGHT" resets the Accumulated KWH displayed in Screen S–19A. Selecting 3 and pressing "RIGHT" resets the Accumulated Defrost Times displayed in Screen S–13.

Set log interval (min)	Refrigerant
15<	R502<

C-14: SET LOG INTERVAL

This screen sets the Log interval and selects the refrigerant type for the system.

NOTE: By pressing the "RIGHT" and "LEFT" keys simultaneously, all sensors selected to be high or low pressure type inputs will display in all screens the equivalent evaporation temperature for the refrigerant selected.

Oil Fail'r Set'g	dP	Dly	Hld	Rtry	Snsr	Output
	5<	35<	5<	3<	P7<	none<

C-15: OIL FAILURE CONFIGURATION

This screen sets the oil failure system parameters as follows:

"dP" is the minimum oil pressure (8 – 30) that must be maintained;
"Dly" is the time (15 – 240 sec, incremented by 5) that the compressor may operate when its oil pressure is below the dP setting
"Hld" is the time (1 – 45 min) that the compressor is held off before it is allowed to restart
"Rtry" is the number of times (0 – 5) the compressor is allowed to restart before it is marked as failed
"Snsr" selects oil pressure inputs P7 – P18
"Output" assigns the compressor output as "none" or "1" – "16" for the selected sensor.

If "Oil Failures" is "Disabled" in Configuration Screen C-18, this screen will not appear.

Sensor #	Type	Description
P1<	Low Pres<	- - - - - - - - - - - - - - - -

C-16: SENSOR CONFIGURATION & NAME

This screen allows the sensor type to be programmed as "Temperature," "Low Pressure", "High Pressure", "Oil Pressure", "Humidity," "Voltage," "Liquid Level" "Dew Point" or "Switch" and a 16 character description to be assigned to the sensor. Non-standard types of sensors may be selected for all 64 locations. For example, if P1 were changed from "Low Pressure" to "Temperature", the XPRT5 would expect a TM-1 temperature sensor to be installed on location P1 and the temperature settings would be the basis for controlling the 16 compressors. Any of the sensors P33 – P64 can be set to "Low Pressure" and control a satellite compressor using pressure settings in Screen S-6 instead of temperature settings. If the sensor type is "Oil Pres", then that transducer must be a differential oil pressure transducer (DPTX).

Output Ovrd	L1	L2	L3	L4	L5	L6	L7	L8
Port# P18	au<	of<	on<	au<	au<	au<	au<	au<

C-17: OVERRIDE STATUS

This screen selects the state of each of the 8 output lines in the 5 output ports of the XPRT5 IO Board. Ports P18 and P19 are compressor outputs, and Ports P20 and P21 control the condenser fans and the alarm relay. P22 connects to up to 2 Digital Expansion Boards which connect to CRX8i Boards for refrigeration and defrost (See **Figure C-15**). **P22a, b, e** and **f** control the refrigeration relays, and **P22c, d, g** and **h** control the defrost relays. L1 – L8 represent the 8 output lines of the port and may be set as override on – "on", override off – "of" or in automatic – "au". When in automatic, the output is set by the controller.

Control function and display selection	
1< Condenser Fans	Enabled<

C-18: CONTROL FUNCTIONS

This screen enables or disables the following six functions:

1) Condenser Fans
2) System Temperature
3) System Defrost
4) Oil Failures
5) Power Monitoring
6) Variable speed

COMPRESSOR AND FAN RELAY OPERATION

Although a variety of relay boards is available, the CRX8i Relay Board is recommended for both compressors (unloaders) or condenser fans (See **Figures C-10** and **C-14**). However, it is possible to use the CRX8 Relay Board in place of the CRX8i Relay Board. The CRX8i has isolated Form-C contacts where the CRX8 has one common for all eight sets of contacts.

CRX8i Relay Boards have jumpers which allow individual selection of the LED operation (Direct acting or reverse acting). See **Figure B-5** for details.

It is also possible to use the CRX4 (See **Figure B-4**) or CRX1 Relay Boards. The CRX4 Relay Board has four relays. Each of the four relays is individually addressable from Position 1 to 8 (Position 9 is not used with the XPRT5). The output which controls a particular relay is set by the jumper plug as shown in **Figure B-4**. USE A NEEDLE NOSE PLIERS TO POSITION THE JUMPER! If all the CRX relays are not being used, position the selector pin as shown in **Figure B-4**.

Each "NO/NC" Selector Jumper on the CRX4 (See **Figure B-4**) should be set to indicate which set of contacts will be closed when the Override switch is put into the OVRD position. The board is shipped from the factory in the "NC" position (NC contact closed) which causes the relay to be de-energized when selected, the relay will be energized by the override switch.

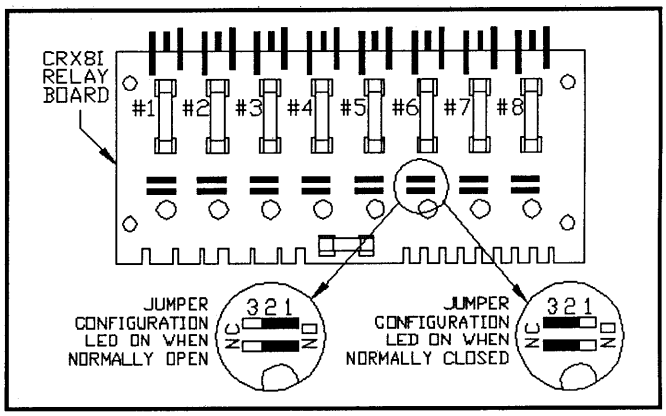
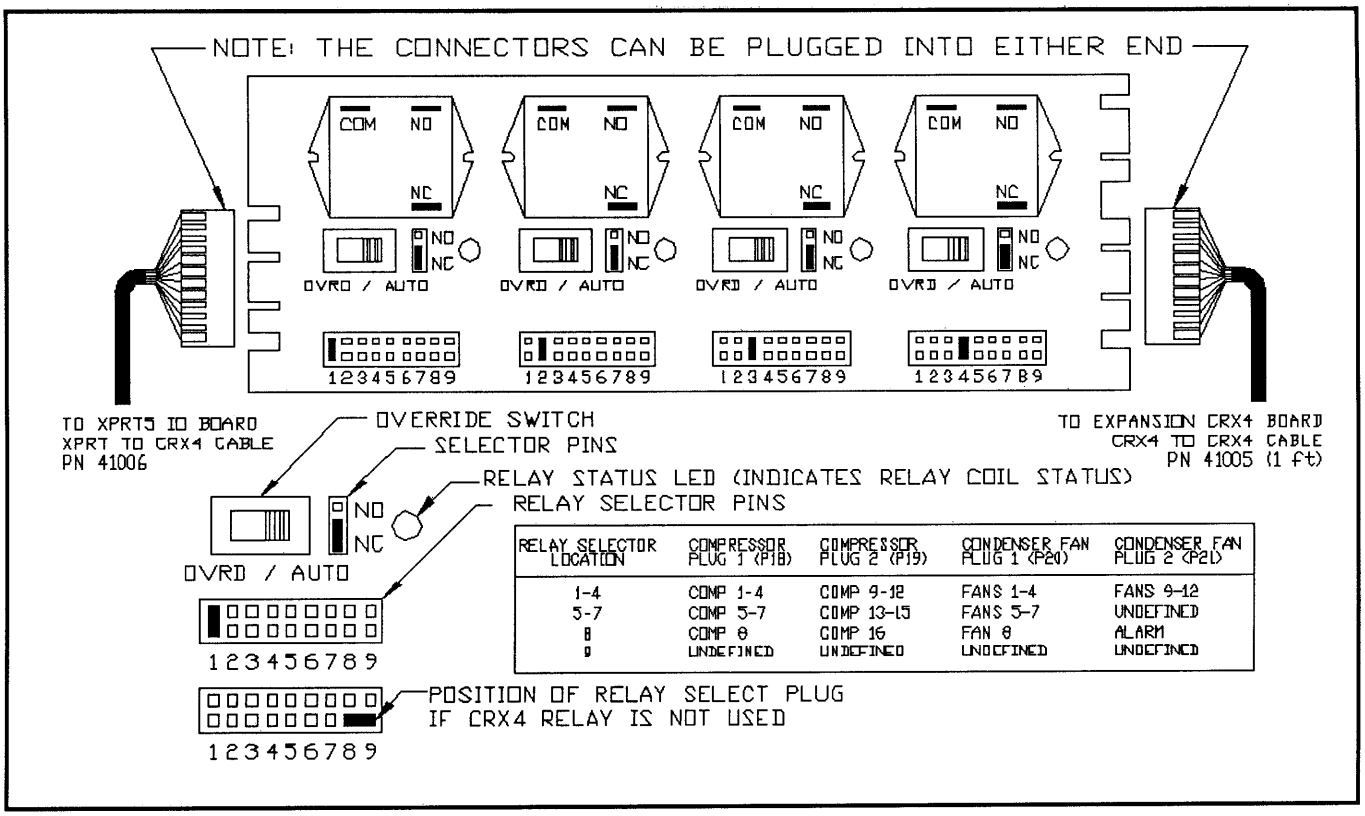


FIGURE B-5: CRX8i Jumper Selection

The Status LED's located on the CRX4 Relay Board reflect the status of the relay coil. The LED is lit when the coil is energized. If the NC contacts are used for control, the Status LED's will be the reverse of the controlled device.



RELAY SELECTOR LOCATION	COMPRESSOR PLUG 1 (P18)	COMPRESSOR PLUG 2 (P19)	CONDENSER FAN PLUG 1 (P20)	CONDENSER FAN PLUG 2 (P21)
1-4	COMP 1-4	COMP 9-12	FANS 1-4	FANS 9-12
5-7	COMP 5-7	COMP 13-15	FANS 5-7	UNDEFINED
8	COMP 8	COMP 16	FAN 8	ALARM
9	UNDEFINED	UNDEFINED	UNDEFINED	UNDEFINED

FIGURE B-4: Compressor and Fan Operation Using CRX4

The CRX1 Relay Board has a single relay. It can be programmed to operate from any one of the 8 outputs depending on which one of the dip switches is closed. **Figure B-6** shows relay action on the first output. Only one switch should be in the ON position! The CRX1 can be daisy chained from another relay board such as a CRX4 or another CRX1. The Status LED reflects the coil status. The LED is lit when the coil is energized. If the NC set of contacts are used for control, then the Status LED will be reverse that of the controlled device.

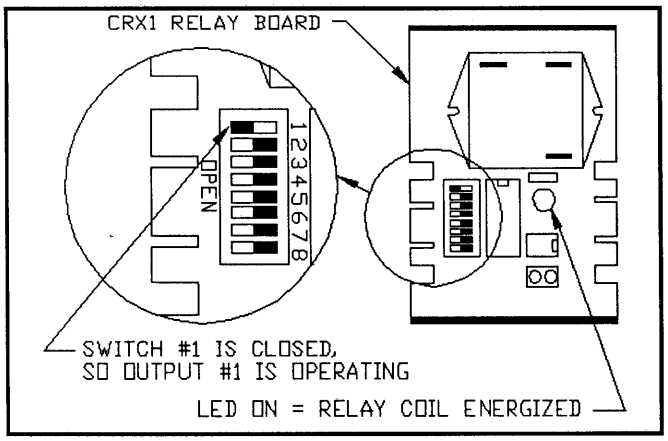


FIGURE B-6: CRX1 Using First Output

REFRIGERATION AND DEFROST RELAYS

The XPRT5-TD32 is designed to use up to two Digital Expansion Boards each driving up to 4 CRX8i Relay Boards (one Digital Expansion Board can control up to 16 Refrigeration/Defrost circuits) for controlling the liquid line solenoid and hot gas valves or electric defrost contactor for a total of 32 circuits. The refrigeration control relays use a Normally Closed contact and have a reverse acting Status LED. The Status LED is lit when the circuit is being refrigerated. The defrost control relays use a Normally Open contact and have a direct acting Status LED.

Figure B–7 shows two CRX8i Boards controlling the Refrigeration circuits and two CRX8i Boards controlling the Defrost circuits. The Digital Expansion Board has an additional relay used to energize a head pressure valve or liquid line differential valve when a hot gas defrost is in progress. For all 32 ciruits to be used, two Digital Expansion Boards are required. The Hot Gas Defrost Relays must be wired in parallel (See **Figure C–15, Refrigeration and Defrost Wiring Diagram**).

SENSOR SWITCHING RELAYS

The Sensor Switching Relays are used to switch the master sensor from an air sensor used for temperature control to a coil mounted sensor for defrost termination when the evaporator fans are turned off during a hot gas or electric defrost. This is the case on many closed refrigeration fixtures such as reach-ins or walk-ins. These relays do not need to be used and the extra sensor wire does not need to be run if defrost termination thermostats are used as shown in the installation wiring diagram **Figure C-6**.

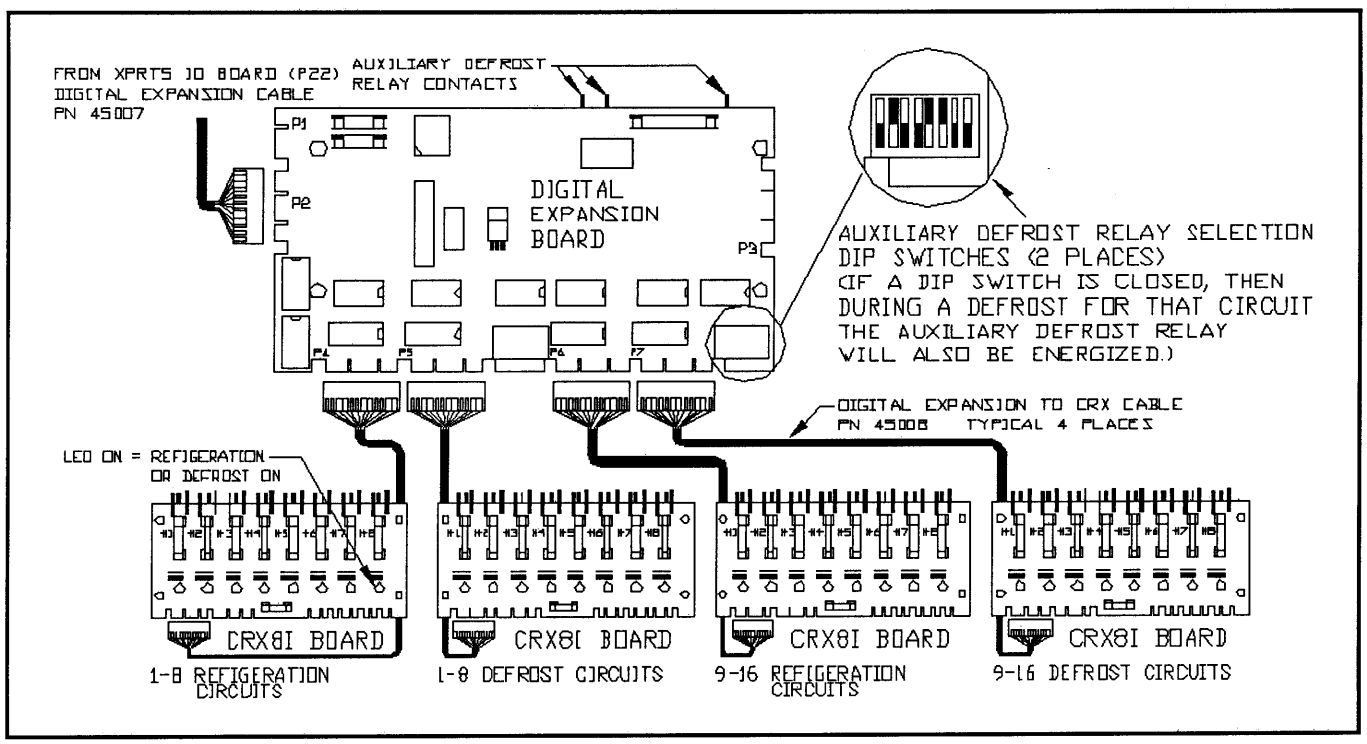


FIGURE B-7: Digital Expansion Board – Auxiliary Defrost Relay

SECTION C: INSTALLATION

CONTROLLER MOUNTING AND WIRING

The XPRT5 enclosure is designed to mount directly to the refrigeration rack. Select a location, mount and wire as follows:

- Locate at eye level, if possible.
- Locate where condensation from refrigeration lines will not drip onto it.
- Avoid locations in shadow (affects viewing of the display).
- Mount using the four mounting holes provided in the mounting flanges – DO NOT DRILL HOLES INSIDE THE ENCLOSURE!
- Mount and wire the transformer in accordance with all applicable codes.
- Wire as shown in **Figure C-1** (If the XPRT5 is mounted on a wall, verify that the enclosure is grounded).

CAUTION

- Installer must be a trained and experienced serviceman.
- Before performing any installation or service work on the line voltage components, remove power.
- Before performing any installation or service work on the XPRT5, disconnect the 24 VAC power.
- Failure to follow proper procedures could result in damage to the XPRT5.
- Always perform a complete check-out when the installation is complete.

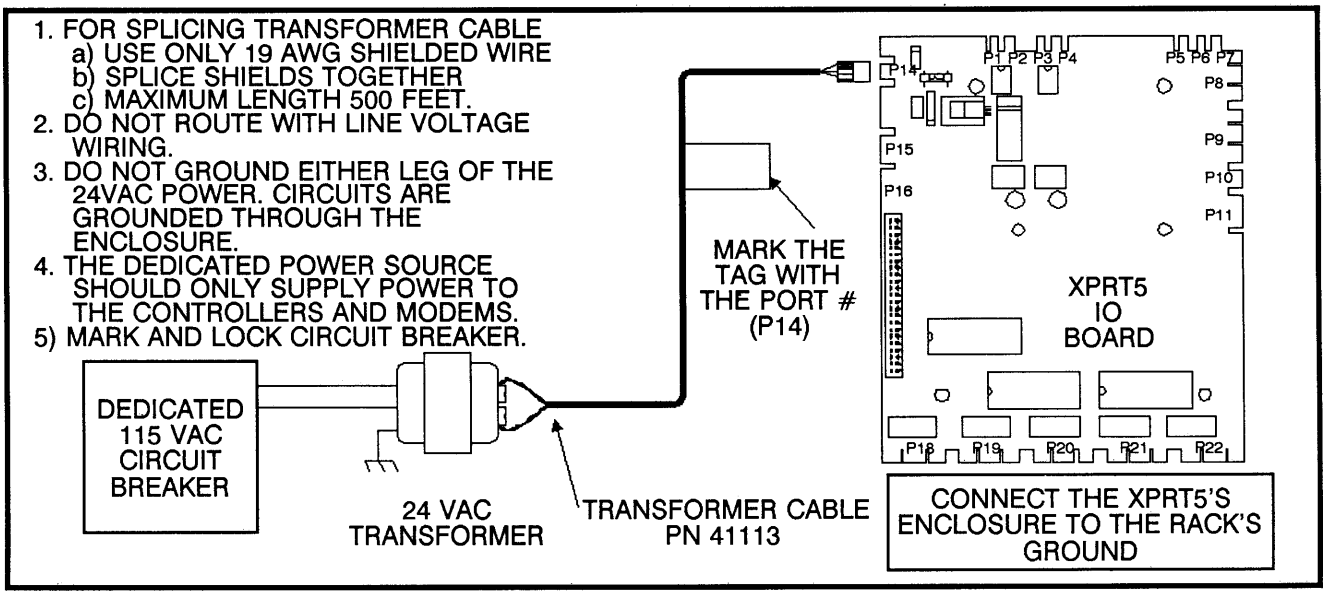


Figure C-1: Controller Mounting and Wiring

PRESSURE TRANSDUCER MOUNTING

Mount the pressure transducer into a 1/8" female pipe thread fitting. Position the transducer so it will not trap oil and is protected from excessive temperature.

- Locate suction pressure transducers where NO condensation or frost will form on the transducer's fitting.
- Install the high pressure transducer away from the compressor and discharge line so the temperature of the transducer's fitting will not exceed 150°F.
- Wrench only on the bottom part of transducer fittings! (See **Figure C-2**).
- A hand valve is not required for servicing. The transducer has a built-in flow restriction that allows removal of the top half of the transducer fitting with pressure on the system – the top half of the fittings (which includes the transducer) should be HAND TIGHTENED ONLY!

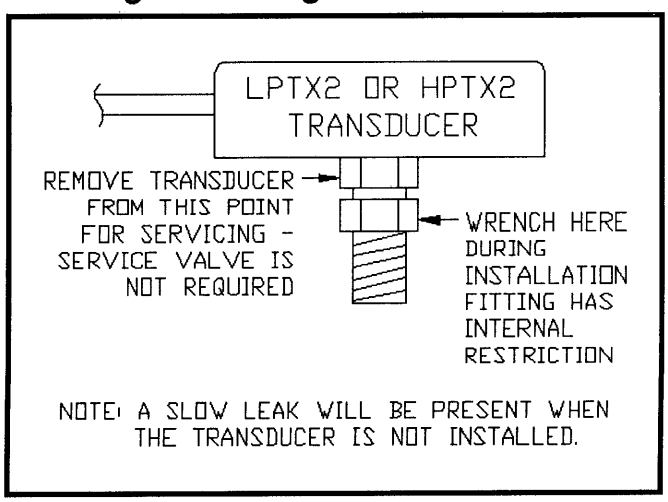


Figure C-2: Pressure Transducer

- Confirm which transducers are to be installed on the Analog Extention Board connected to P9 of the XPRT5 IO Board and verify that the proper type of transducer is installed in that location. See **Table C-1**.

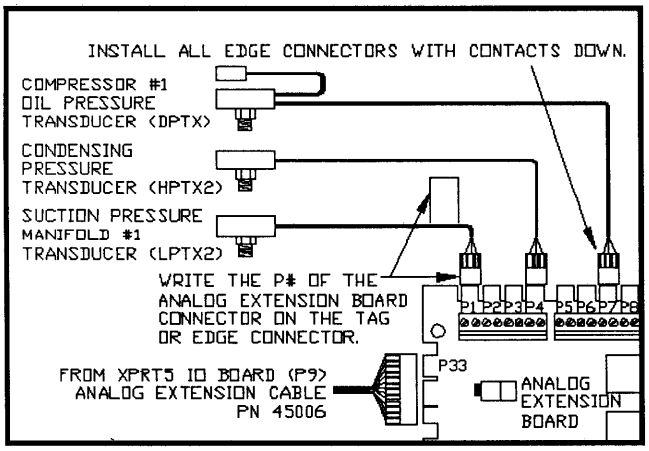


Figure C-3: Pressure Transducer Wiring

PRESSURE TRANSDUCER WIRING

The HPTX2, LPTX2 and DPTX pressure transducers should be connected to the Analog Extention Board as shown in **Figure C-3**. (See **Section F: Specifications, DPTX Oil Pressure Transducer** for compressor connections.) The 8 foot cable length for each transducer should be adequate to connect the transducer plugs directly to the Analog Extention Board without splicing.

- If a longer cable is required, splice with 22AWG stranded 4 conductor shielded cable. BE SURE TO SPLICE THE SHIELDS TOGETHER!
- To reduce the chance of mixing cables or plugging cables onto the wrong connector, Altech recommends that the Analog Extention Board's connector number be written on the edge connector or tag as shown in **Figure C-3** (example: "P1", "P2", etc.).

TM-1 TEMPERATURE SENSORS

The XPRT5 uses TM-1 thermistor sensors for measuring fixture temperature. Connect the sensors to the Analog Extention Board connected to P8 of the XPRT5 Analog Extention Board as shown in **Figure C-4**.

- The TM-1 sensors are NOT polarity sensitive.
- DO NOT SPLICE THE SENSOR WIRE INSIDE A REFRIGERATED FIXTURE!
- Only shielded cable should be used for extending the sensor wiring. The maximum recommended length is 250 ft.
- DO NOT ROUTE WITH LINE VOLTAGE WIRING!
- Altech recommends writing the sensor location on the gray ID tag located near the edge connector (example: 1st meat case, center ice cream, etc.).
- To reduce the chance of mixing cables or plugging cables into the wrong connector, Altech recommends writing the Analog Extention Board's connector number directly on the edge connector (example: "P1", "P2", etc.).
- See **Table C-3** for System Number and Program Reference Number.

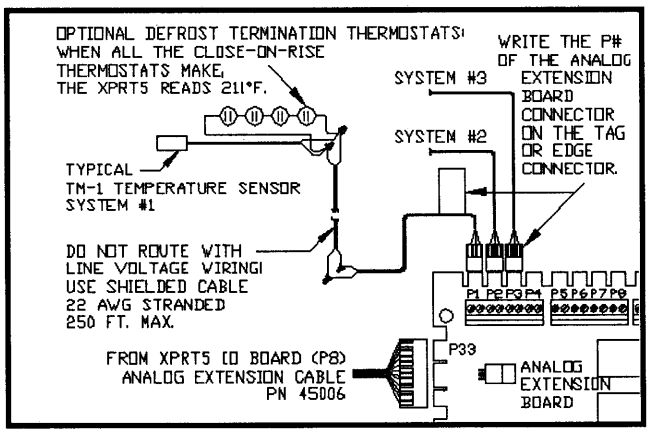


Figure C-4: TM-1 Wiring

DEFROST TERMINATION THERMOSTATS

If individual defrost termination thermostats are required in each fixture, as is the situation for some reach-in freezers, they can be wired as shown in **Figure C-4**. In operation, the XPRT5 will indicate a 211°F temperature when all thermostats are made. When this termination method is used, select "ThmSt" in the Defrost Termination Screen S-9 (See **Page B-5** of this manual). This causes the defrost to terminate only when all the termination thermostats are closed (211°F indicated) or if the indicated temperature is greater than 125°F.

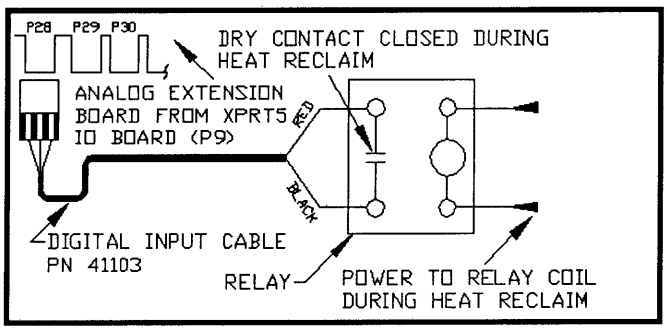


Figure C-5: Heat Reclaim Wiring

HEAT RECLAIM WIRING

XPRT5 controls the condenser fans at the heat reclaim set point when the switch input (P28 of the Analog Extension Board from P9 of the XPRT5 IO Board) is closed (**Figure C-5**). Once in heat reclaim, the unit remains there for a 5 minute interval before testing the switch input again.

Table C-1: Standard Connector Assignments for Analog Extension Board Connected to XPRT5 IO Board/P9

ANA EXT PORT #	DESCRIPTION	XDCR TYPE	ANA EXT PORT #	DESCRIPTION	
P1	Suction Pressure Manifold #1	LPTX2	P19	Miscellaneous Monitoring[1,2,3]	
P2	Suction Pressure Manifold #2	LPTX2	P20	Miscellaneous Monitoring[1,2,3]	
P3	Suction Pressure Manifold #3	LPTX2	P21	Miscellaneous Monitoring[1,2,3]	
P4	Condensing Pressure	HPTX2	P22	Miscellaneous Monitoring[1,2,3]	
P5	Spare Condensing Pressure	HPTX2	P23	Miscellaneous Monitoring[1,2,3]	
P6	Spare Condensing Pressure	HPTX2	P24	Miscellaneous Monitoring[1,2,3]	
P7	Oil Pressure Compressor #1	DPTX	P25	Miscellaneous Monitoring[1,2,3]	
P8	Oil Pressure Compressor #2	DPTX	P26	Miscellaneous Monitoring[1,2,3]	
P9	Oil Pressure Compressor #3	DPTX	P27	Miscellaneous Monitoring[1,2,3]	
P10	Oil Pressure Compressor #4	DPTX	P28	Heat Reclaim	
P11	Oil Pressure Compressor #5	DPTX	P29	Liquid Level Adaptor	
P12	Oil Pressure Compressor #6	DPTX	P30	Power Monitor Voltage	
P13	Oil Pressure Compressor #7	DPTX	P31	Humidity/Dew Point	Dew Point Sensor
P14	Oil Pressure Compressor #8	DPTX	P32	Temp/Dew Point	Dew Point Sensor
P15	Oil Pressure Compressor #9	DPTX	P33	XPRT5 IO Board/P9	
P16	Oil Pressure Compressor #10	DPTX	P34	Counter Input	Power Monitor
P17	Oil Pressure Compressor #11	DPTX	P35	Counter Input	Power Monitor
P18	Oil Pressure Compressor #12	DPTX	P36	XPRT5 IO Board/P9	

NOTES:

1) Port Number is the same as Program Reference Number.

2) May monitor Compressor Head Temperature or Suction Line Temperature, etc. – user's discretion. Attach appropriate transducer for the function.

3) Connectors not in use are available for user's discretion.

Table C-2: Standard Connector Assignments for Digital Expansion Board

(See **Figures B-7, C-15** and **C-17**)

CONNECTOR	DESCRIPTION	CONNECTOR	DESCRIPTION
P1	External 24VAC (if required)[1]	P5	Defrost Outputs #1–8
P2	XPRT5 IO Board/P22	P6	Refrigeration Outputs #9–16
P3	Successive Digital Expansion Board	P7	Defrost Outputs #9–16
P4	Refrigeration Outputs #1–8		

NOTES:

1) If more power is required to drive the refrigeration and defrost relays, the board should be configured to accept an external power transformer.

Table C-3: Standard Connector Assignments for Analog Extension Board Connected to XPRT5 IO Board/P8

ANA EXT PORT #	MASTER TM-1 FIXTURE	PROGRAM REFERENCE #	ANA EXT PORT #	MASTER TM-1 FIXTURE	PROGRAM REFERENCE #
P1	System #1	P33	P19	System #19	P51
P2	System #2	P34	P20	System #20	P52
P3	System #3	P35	P21	System #21	P53
P4	System #4	P36	P22	System #22	P54
P5	System #5	P37	P23	System #23	P55
P6	System #6	P38	P24	System #24	P56
P7	System #7	P39	P25	System #25	P57
P8	System #8	P40	P26	System #26	P58
P9	System #9	P41	P27	System #27	P59
P10	System #10	P42	P28	System #28	P60
P11	System #11	P43	P29	System #29	P61
P12	System #12	P44	P30	System #30	P62
P13	System #13	P45	P31	System #31	P63
P14	System #14	P46	P32	System #32	P64
P15	System #15	P47	P33	XPRT5 IO Board/P8	
P16	System #16	P48	P34		
P17	System #17	P49	P35		
P18	System #18	P50	P36	XPRT5 IO Board/P8	

Table C-4: Standard Connector Assignments for XPRT5 IO Board

(See **Figure C-17**)

CONNECTOR	DESCRIPTION	CONNECTOR	DESCRIPTION
P1	Var Spd Comp Output Manifold #1	P12	DC Supplies
P2	Var Spd Comp Output Manifold #2	P13	
P3	Var Spd Comp Output Manifold #3	P14	24 VAC Input
P4	Var Spd Condenser Fan Output	P15	RS422 Network Communication
P5	Power Monitor KWH Input	P16	CPU Board
P6	Counter Input	P17	Not Applicable
P7	Counter Input	P18	Compressor Outputs (#1–#8)
P8	System Temperatures Analog Extension Board (See **Table C-3**)	P19	Compressor Outputs (#9–#16)
P9	Rack Analog Extension Board (See **Table C-1**)	P20	Condenser Fan Outputs (#1–#8)
P10	RS232 Local Printer	P21	Condenser Fan Outputs (#9–#16)/ Alarm Output
P11	RS232 Network Communication	P22	Refrigeration/Defrost Outputs (Systems #1–#32) Digital Expansion Board (See **Table C-2**)

NOTES:

1) Connectors not in use are available for user's discretion.

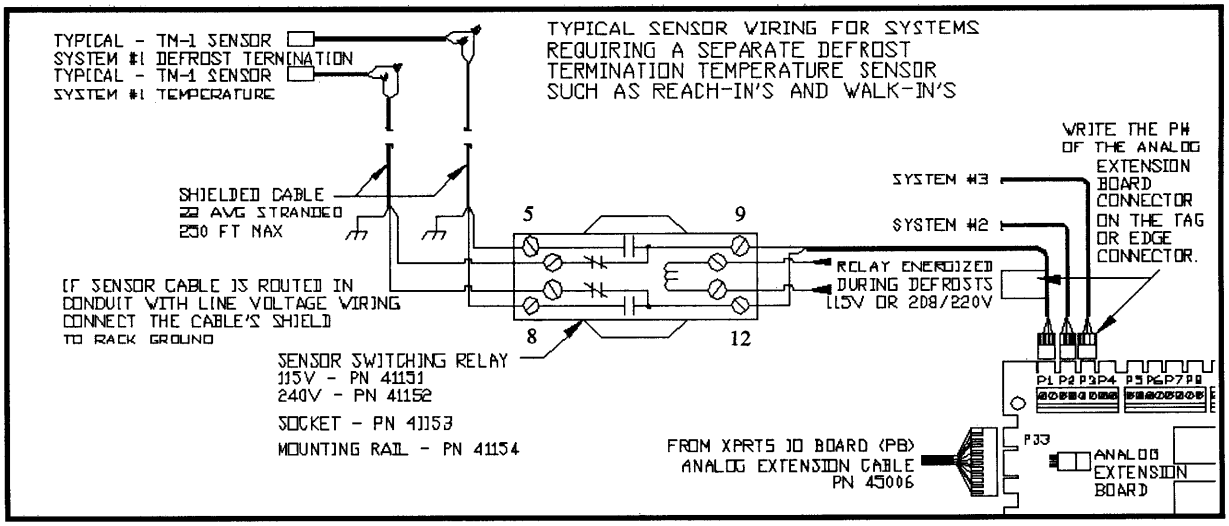


Figure C-6: TM-1 Switching during Defrosts

TM-1 SWITCHING DURING DEFROSTS

Discharge air temperature is not a satisfactory temperature to terminate defrost if a fixture has it's evaporator fans shut off during defrost. In this situation, two sensors can be installed – one in the discharge air and the other attached to the coil. The circuit shown in **Figure C-6** will switch from the discharge air sensor to the coil mounted sensor when a defrost is initiated.

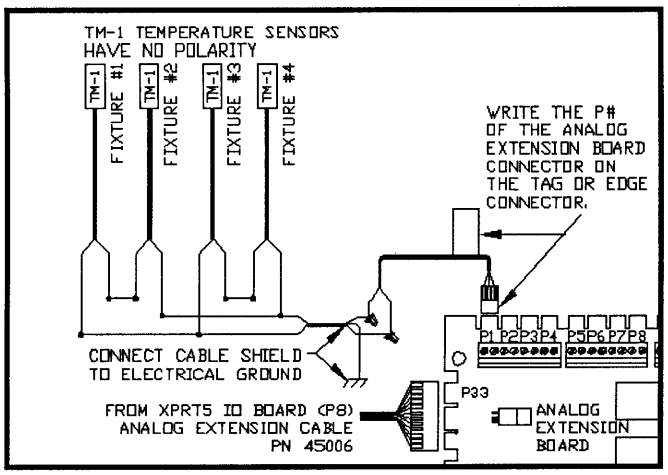


Figure C-7: Averaging Four TM-1 Sensors

AVERAGING FOUR TM-1 SENSORS

To have one of the XPRT5's temperature inputs represent the average of four TM-1 sensors, wire the sensors to the XPRT5 exactly as shown in **Figure C-7**. This wiring method will only work with exactly four sensors – 2, 3, 5 or more sensors will NOT work!

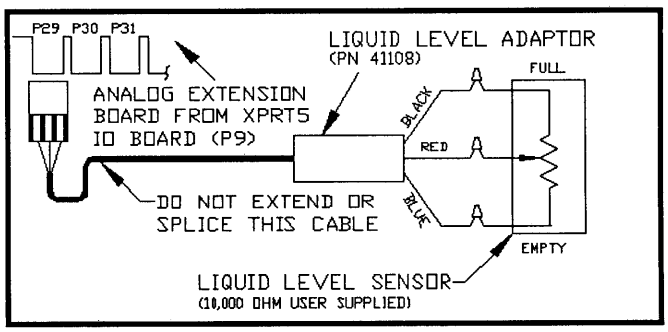


Figure C-8: Liquid Level Installation

LIQUID LEVEL INSTALLATION

A user-supplied liquid level sensor can be wired to the XPRT5's Liquid Level Adaptor Cable to provide remote sensing of the liquid level in the receiver. The liquid level sensor must be wired from the adaptor cable shown in **Figure C-8** to the Analog Extention Board connected to P9 of the XPRT5 IO Board.

- The liquid level sensor is user-supplied. Note the tank diameter when ordering.
- The liquid level sensor must be a 10,000 ohm potentiometer.
  One source for a horizontal tank liquid level sensor is:
  Rochester Gauges, Inc.; P.O. Box 29242; Dallas, Texas 75229; (214) 241-2161; Model No. M7845 (Side mounted flange with 2 1/2" bolt circle)
- The Liquid Level Adaptor Cable is supplied with a 10 foot cable and SHOULD NOT BE SPLICED. If the distance between the liquid level sensor and the Analog Extention Board is greater than 10 feet, extend the wires between the sensor and the Liquid Level Adaptor.

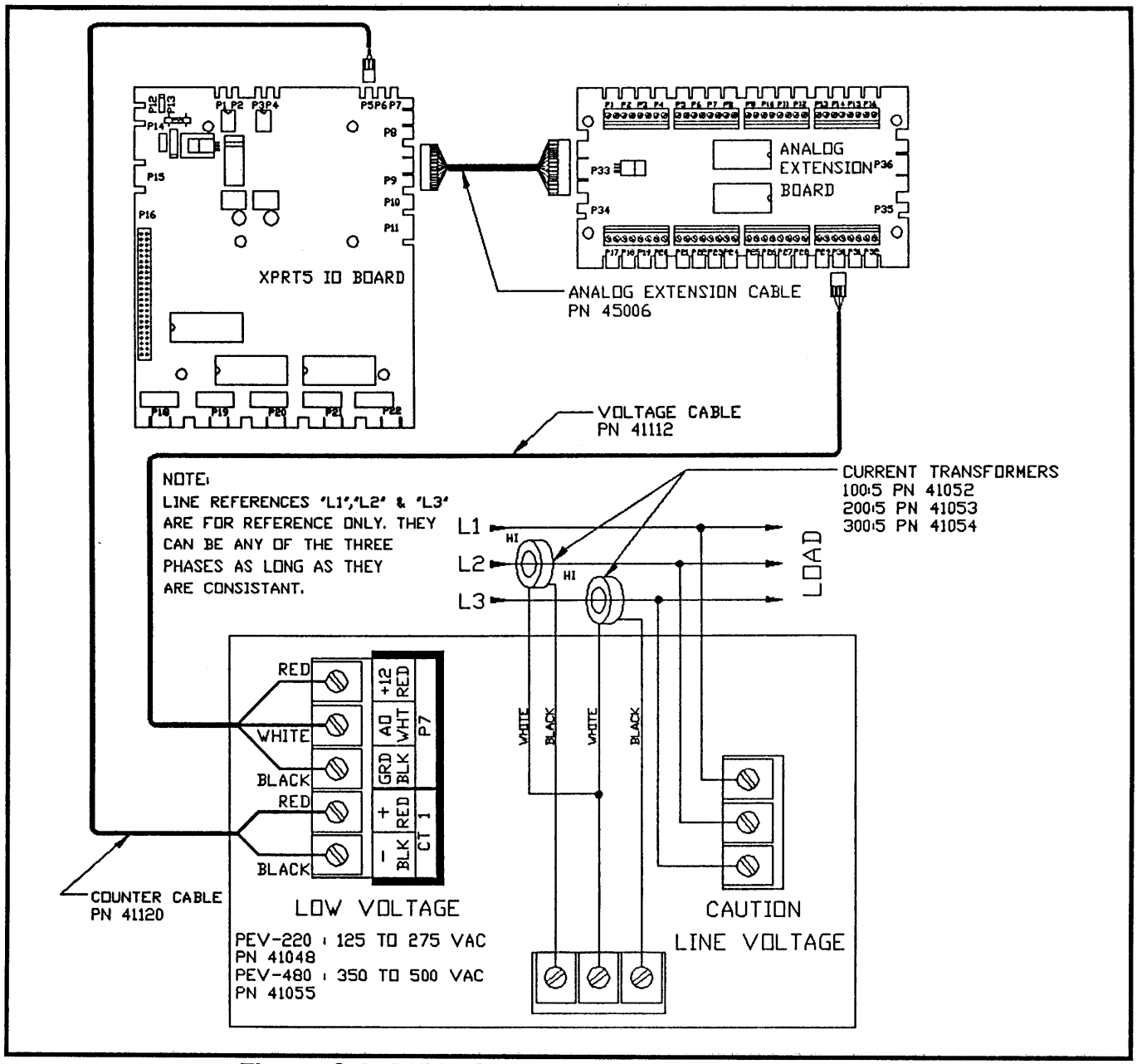


Figure C-9: PEV POWER MONITOR INSTALLATION

PEV POWER MONITOR INSTALLATION

Install and wire PEV Power Monitor as exactly shown in **Figure C-9**.

- Confirm that the PEV model is correct for the line voltage (208/240 or 440/480).
- IMPORTANT: Install each of the current transformers with it's marked "HI" side toward the incoming power.
- Connect the current transformer to the PEV BEFORE passing current through the current transformer.
- Incorrect installation of the current transformer on the PEV will cause the indicated power to be too low.
- Adhere to all applicable state and local codes.

KWH MULTIPLIER SELECTION

The Power Monitor Configuration Screen C-10 requires the entry of a "KWH MULTIPLIER". This value matches the current transformers to the XPRT5's power measuring software. The correct KWH multiplier for each size current transformer is:

Ratio Multiplier	KWH Multiplier
100:5	20
200:5	40
300:5	60

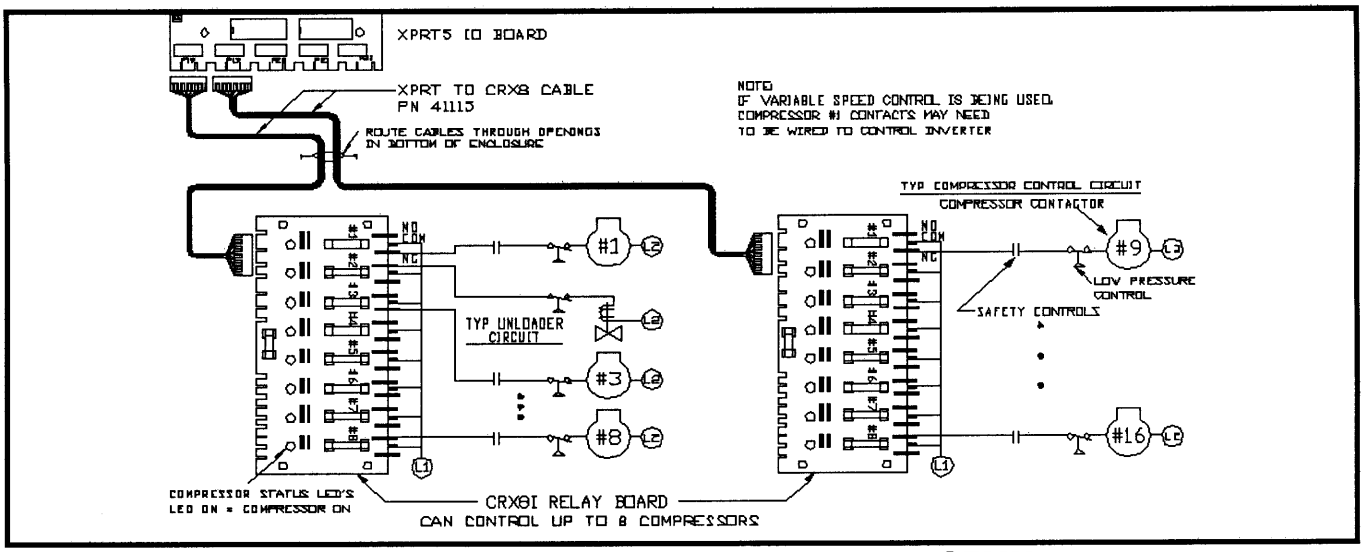


Figure C-10: Compressor Wiring using CRX8i

COMPRESSOR WIRING

The compressors are controlled by using one of the CRX relay boards (CRX1, CRX4 CRX8i or CRX8). A typical method for wiring the compressors with a CRX8i is shown in **Figure C-10**. The CRX8 could also be used if the common connector were routed to L1. A typical method for wiring the CRX4 is shown in **Figure C-11**. If the XPRT5 is being installed on an existing refrigeration rack, Altech recommends removing the low pressure controls from the control circuit or setting the Cutout at 0 psi level. Either action should preclude the old controls from interfering with normal XPRT5 operation.

Field splicing of the CRX cables is acceptable but not recommended. Custom length cables can be ordered from Altech in 25 foot increments. The maximum total length of cable between the XPRT5 and the CRX board is 100 feet.

- The two edge connectors on the CRX boards are the same allowing the CRX cable to be plugged into either end. The same is true for the CRX connection cables.
- Remove power from all circuits before wiring.
- Adhere to all applicable state and local codes.
- The wiring diagrams (**Figures C-10 and C-11**) assume that the compressor will be configured for NC contacts in the Configuration Screens.
- A typical method for wiring an unloader is shown in **Figure C-10**. Note that it uses the Normally Open (NO) contacts.

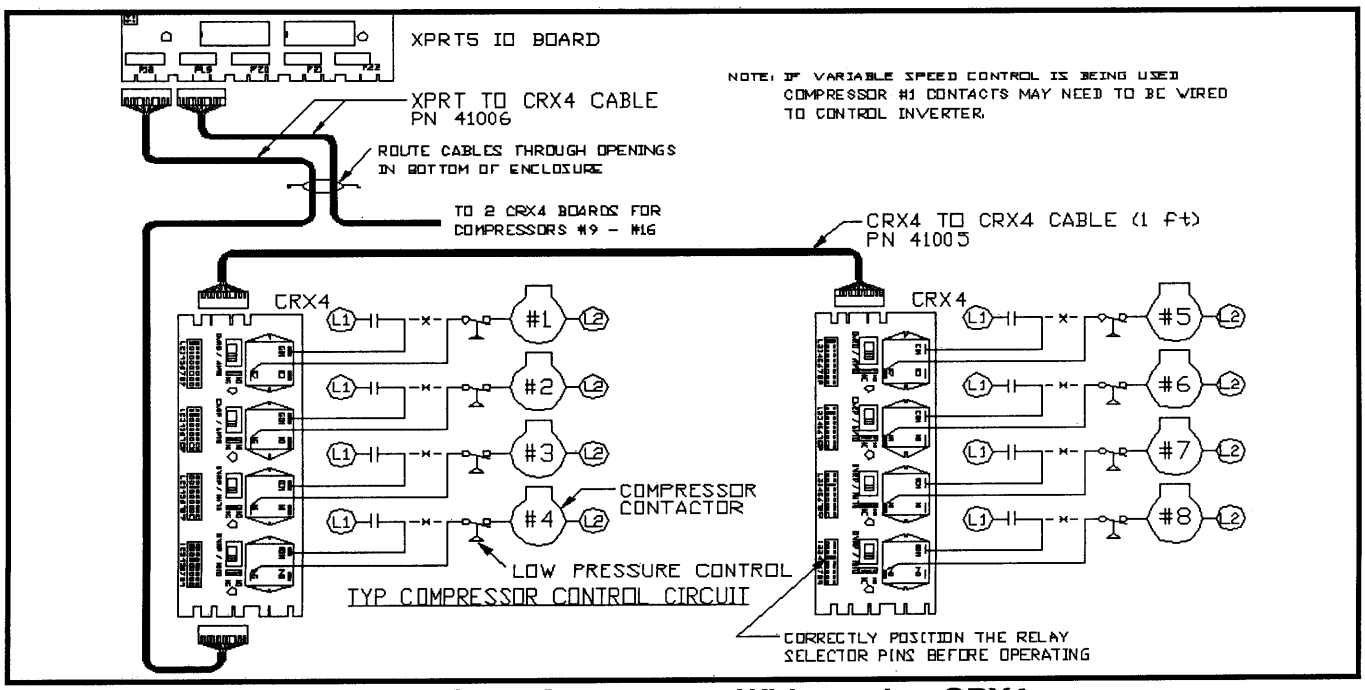


Figure C-11: Compressor Wiring using CRX4

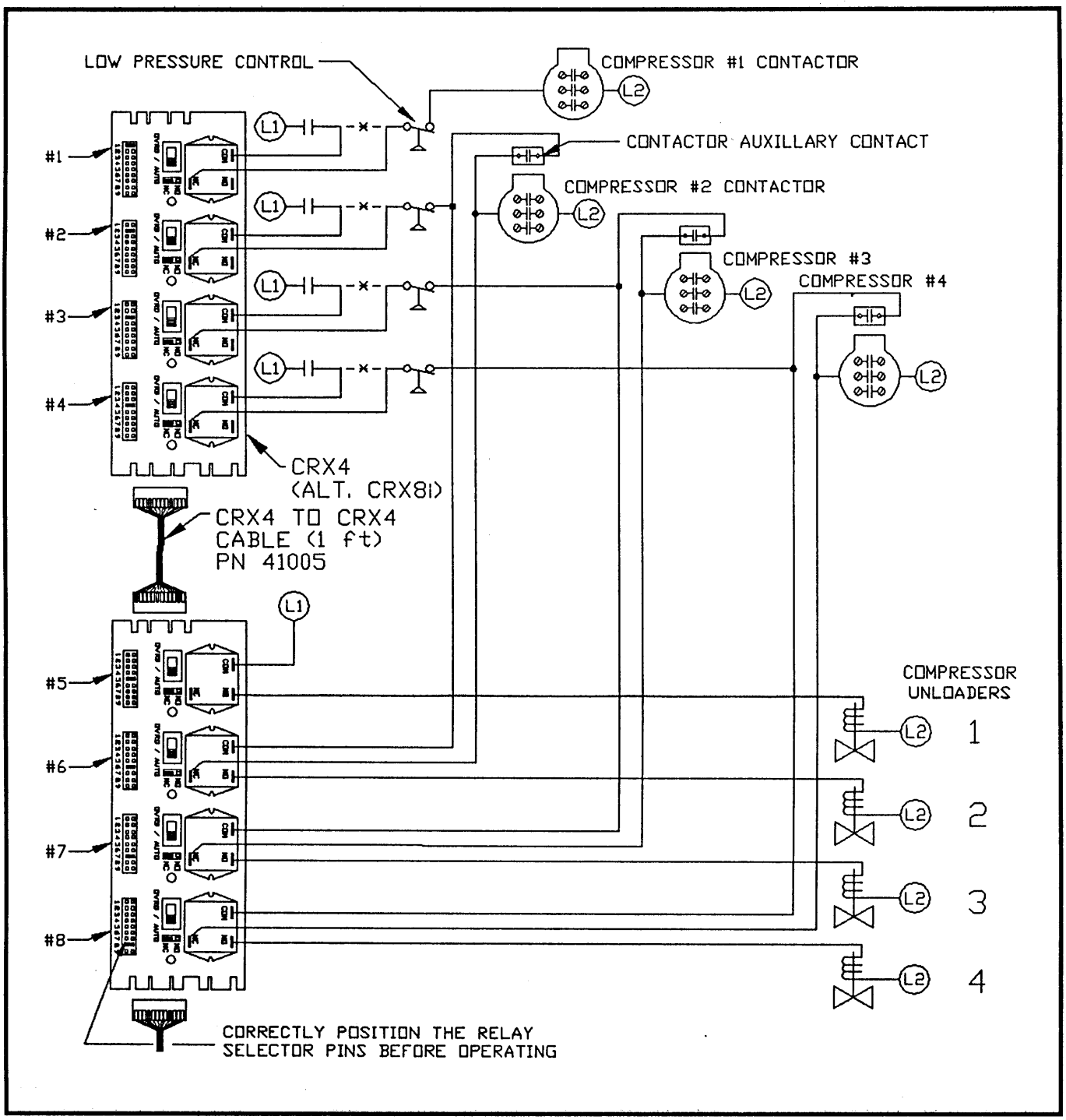


Figure C-12: Latched Compressor Wiring

LATCHED COMPRESSOR WIRING

Compressors equipped with unloaders to be latched on when the load requires, then allow the unloaders to cycle in order to maintain the proper suction pressure use an 8 step Sequence Logic (FIRST ON LAST OFF) for control of 4 compressors and 4 unloaders (shown In **Figure C-12**) and described below.

Compressor #1 and Unloader #1 are controlled directly by their respective output relays (#1 and #5). Each of the other compressors (#2, #3 and #4) is latched on when its respective unloader (Relay #6, #7 or #8) is turned on. After the compressors are latched on, these relays will only cycle the unloader. Each of the compressors is turned off when its respectlve compressor enable relay (#2, #3 or #4) is turned off.

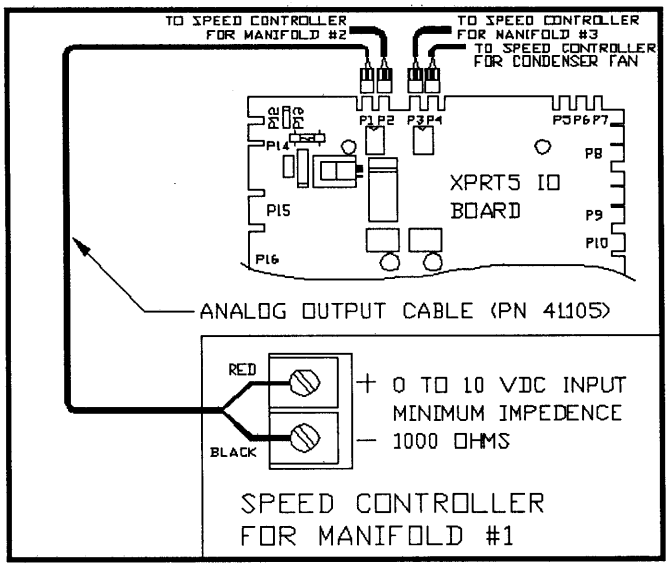


Figure C-13: Variable Speed Wiring

VARIABLE SPEED WIRING

The XPRT5 can control 3 inverters which are driving a standard compressor at variable speeds for each manifold being controlled. The variable speed compressor ON/OFF status must be controlled by the first compressor output relay for each manifold. The inverter is in turn controlled by a 0-10 VDC voltage provided from the XPRT5 IO Board P1, P2 or P3 for Manifold 1, 2 or 3 as shown in **Figure C-13**.

- The inverter must accept a 0-10 VDC signal (10 VDC = maximum speed).

CONDENSER FAN WIRING

A typical method of controlling the condenser fans is using the CRX8i Relay Board wired as shown in **Figure C-14**. If the XPRT5 is being installed on an existing condenser, Altech recommends removing the existing temperature or pressure controls from the control circuit or setting them at a safety level which would preclude them from interfering with XPRT5 operation. A CRX4 or CRX8 could be used in place of the CRX8i Relay Board.

- Field splicing of the CRX cables is acceptable but not recommended. Custom length cables can be ordered from Altech in 25 foot increments. The maximum total length of cable between the XPRT5 and the CRX board is 100 feet.
- The two edge connectors on the CRX boards are the same allowing the CRX cable to be plugged into either end.
- Remove power from all circuits before wiring.
- Adhere to all applicable state and local codes.

VARIABLE SPEED CONDENSER FAN WIRING

The XPRT5 can control an inverter which is driving one or more condenser fans at variable speeds. The fan ON/OFF status must be controlled by the first fan output. A 0-10 VDC voltage from P4 on the XPRT5 IO Board (See **Figure C-13**) provides the speed control for the inverter.

LOCAL ALARM INSTALLATION

Figure C-14 also shows the typical wiring for a local alarm. The local alarm can be a light or an automatic dialer instead of a bell as shown in **Figure C-14**.

- The XPRT5 also has the ability to auto-dial alarms to a alarm printer if equipped with a telephone modem. (See **Figure C-16**)
- Since the alarm relay uses the NC contact, a loss of power to the XPRT5 will trigger an alarm.
- Isolated alarm contacts are available on the CRX8i Board. If a CRX8i is not installed, a CRX1 Relay Board may be connected to the XPRT5 IO Board at P21 for this purpose. Configure the CRX1 switch for Output #8.
- The installation of the Silence Timer is optional but recommended. Suggested vendor for a 12 hour timer (with NC contacts) is Mark Time #90002 (Mfg: Rhodes 203/673-3281). A stocking distributor for this timer is Minarik – (818) 507-6500.

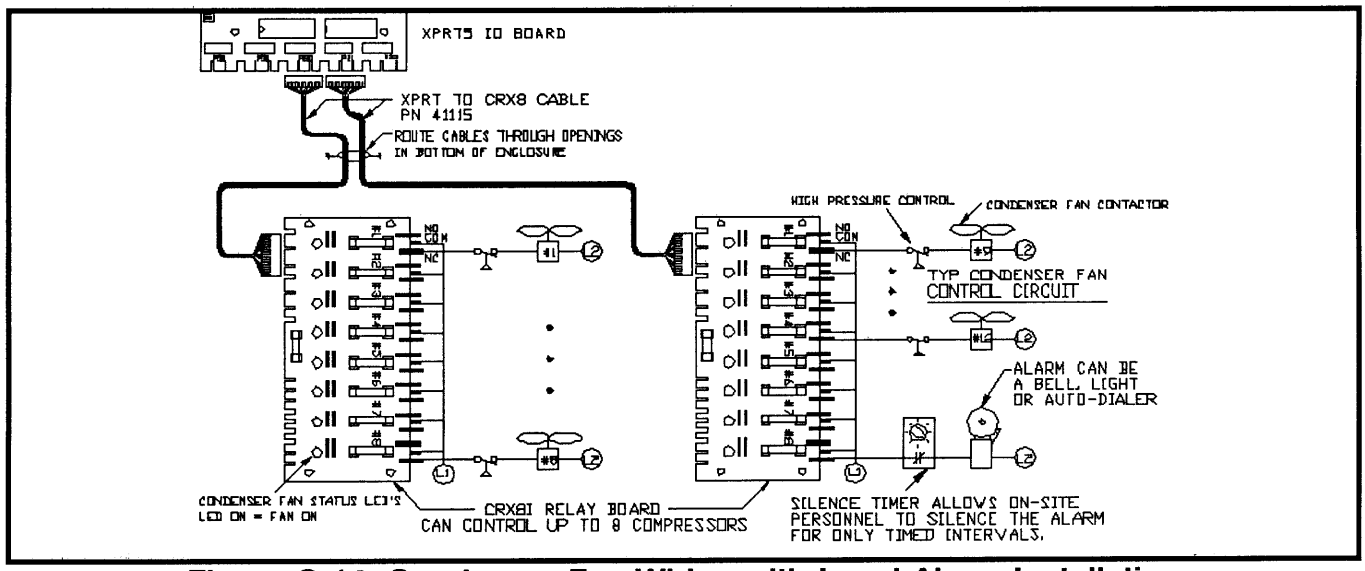


Figure C-14: Condenser Fan Wiring with Local Alarm Installation

REFRIGERATION AND DEFROST WIRING

A typical method for controlling liquid line solenoids and defrost valves is using the Digital Expansion Boards and CRX8i Boards as shown in **Figure C-15**. If the XPRT5 is being installed as a retrofit, Altech recommends removing the existing defrost clock to preclude it from interfering with XPRT5 operation. The CRX8 Relay Board can be used in place of the CRX8 if circuit isolation is unnecessary. Other types of refrigeration control can be used instead of liquid line solenoids, such as pilot operated EPR's or suction solenoids. The actual wiring to the CRX8i or CRX8 Board will need to be adjusted to match the control methods to be used on the rack.

- Field splicing of the CRX cable is acceptable but not recommended. Custom length cables can be ordered from Altech in 25 foot increments. The maximum total length of the CRX cable is 100 feet.
- Remove power from all circuits before wiring.
- Adhere to all applicable state and local codes.
- The XPRT5 to Digital Expansion and Digital Expansion to CRX8i cables must be installed as shown in **Figure C-15** for the circuits to be controlled correctly. For output assignments, See **Table C-2.**

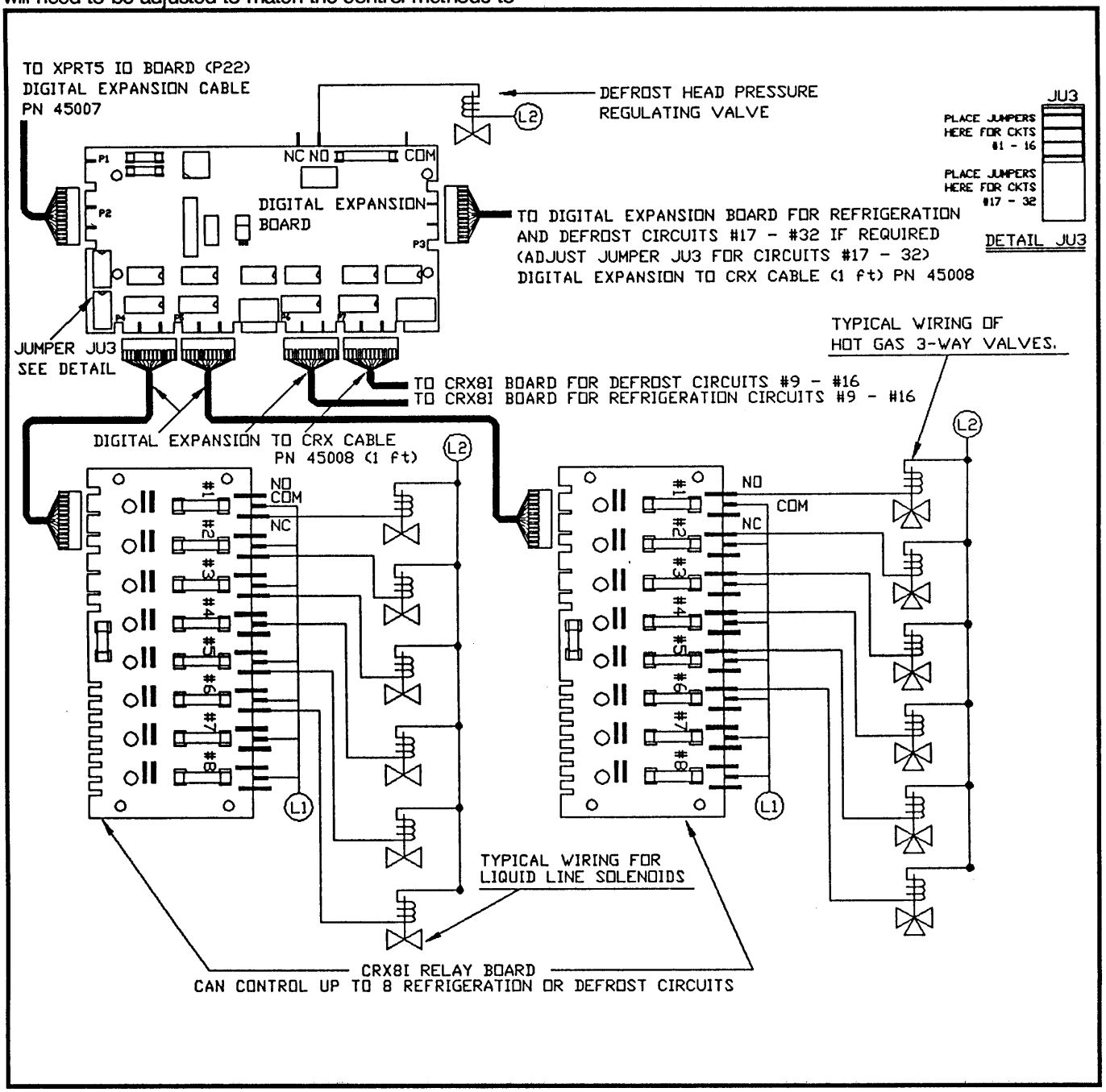


Figure C-15: Refrigeration and Defrost Wiring

UN-EQUAL COMPRESSOR PROGRAMMING GUIDE

Mn#	Cfg	Start	Comp/#	Of Comp
1	<Equal	< 1	<	6<

Screen C-3A

Mn#	Cfg	Start	Comp/#	Of Comp	Set
2	<Prgmble	< 7	<	6<	Stages

Screen C-3B

Mn#	Cfg	Stg#	1234567890123456	Unloader
2	Prg	0<	000000 <	No<

Screen C-3C

Example C-1: CompressorConfiguration Screens

If "Prgmble" is selected under "Cfg", the XPRT5 must be programmed by the user to designate which compressors will operate at each of the twenty-four capacity stages. The higher stage must represent an increased refrigeration capacity. The values programmed under "Start Comp" and "#of Comp" in **Example C-1: Screen C-3B** represent the first compressor for the currently selected manifold and the total number of compressors assigned to that manifold.

To program the stages for a given manifold, move the cursor toward "Set Stages" to make **Example C-1: Screen C-3C** appear. Now select the stage number to be programmed and step to the right turning on or off various compressors desired for this stage by selecting a 1 or 0 under the number representing the compressor's output. Move the cursor back to the left under "Stage #" and select the next higher stage and repeat the process until the desired number of stages have been programmed. The next higher stage, if less than 24 stages are being used, should be programmed with all compressors shut off indicating it is not part of the programmed stages.

NOTES:

- The first compressor on each manifold is the variable speed compressor when variable speed control is used. (See **Example C-2**)
- The value under "Unloader" is the time in seconds that this stage will come on and go off. This time can be shorter than the time normally allowed by the Compressor Times set in Configuration Screen C-2. It is intended to be a stage only to de-energize an unloader from the next lower Stage. (See **Example C-3**)
- When the cursor is moved away from the far left position to change or review the compressor configuration or capacity steps, all the compressors will be turned OFF. They will stay off until you leave the screen.

Example C-2: Programmable Configuration – Compressor #1 is Variable Speed

Output #1 = 10.0 HP Compressor (Variable Speed)
Output #2 = 10.0 HP Compressor
Output #3 = 5.0 HP Compressor

Man #1

Stage #	1234567890123456	Unloader
0	000	No
1	100	No
2	101	No
3	110	No
4	111	No
5	000	No

NOTE: Typically the compressor manufacturers do not want their compressors to operate slower than 50% of normal RPM. In order to have full range control, the variable speed compressor size should be twice the largest difference between the other compressor sizes.

Example C-3: Programmable Configuration – Using Unloaders

Output #1 = 5.0 HP Compressor
Output #2 = 50% Unloader (5 HP Compressor)
Output #3 = 7.5 HP Compressor

Man #2

Stage #	1234567890123456	Unloader	HP
0	000	No	0.0
1	100	No	2.5
2	110	15	5.0
3	001	No	7.5
4	101	No	10.0
5	111	15	12.5
6	000	No	0.0

SYSTEM START-UP PROCEDURE

1) Before applying power to the XPRT5, it is best to mark each edge connector attached to P18, P19, P20, P21 and P22 with its respective connector number. Next, removal of the CRX cables from the XPRT5 IO Board will prevent incorrect operation of compressors, fans or valves during the configuration and set-up stage. Normally, the relay contacts are selected to allow compressors and fans to operate and circuits to refrigerate when power is removed from the CRX boards. If remote communications are to be used, connect the control to the network now.

2) On the following pages are the settings forms to fill out before inputing settings. Altech recommends copies of these forms be placed in the pocket inside the control cabinet in the control room for future reference when changing chips or CPU Boards.

3) The fastest, most convenient way to input settings, sensor names and the defrost schedule into the XPRT5 is with an IBM PC using the Altech communication software. The settings can be loaded directly into the EEPROM (E Squared PROM) by the computer on site or remotely through a modem.

   Alternately, the chip can be set up on a demonstration XPRT5 at the user's home office, and the programmed chip inserted into the job site's XPRT5. Observe the chip insertion and removal procedure in the Service Section of this manual! Only the time and date will not be transferred using this procedure. The memory chip is placed in location U6 on the CPU40 Board (See **Figure E-1**).

   - The Revision level on the TD32 Software (Chips U7 and U8) must be compatible between the two controllers in order for this procedure to work reliably. See **Section E, Memory Chip Field Replacement Procedure** for additional information.
   - For the user's convenience, Altech can supply a factory configured XPRT5-TD32, if the user will send in the completed TD32 Settings and Configuration Forms. Be sure to include instructions on how Altech is to mark the XPRT5.

4) Apply power to the XPRT5. Go through all the Configuration Screens starting with C-1, modifying as required. In Screen C-18, "Disable" the control functions not being used. Refer to **Pages B-8** through **B-10** in this manual for screen explanations. If unequal sized compressors are being controlled, refer to the **Unequal Compressor Programming Guide** in this section for instructions. If the control is connected to the XCOM network, all configuration can be done remotely except setting the relay types in Screen C-6 and the communication parameters in Screen C-9.

5) Go through all the Status Screens starting at S-0 (if oil failure logic is enabled), adjusting the settings as required for the application. Set the time and date in Screen S-20. Refer to **Pages B-4** through **B-7** in this manual for screen explanations. If the control is connected to the XCOM network, all the settings can be entered remotely.

6) Review all the Status Screens starting at S-0 (if oil failure logic is enabled), verify all the pressure, temperature and other sensor readings to secure their accuracy and that each sensor location is correct.

7) Remove the 24 VAC power at P14 to power down the XPRT5, then reconnect the CRX cables to the XPRT5 IO Board at P18 – P22. Reconnect power at P14, then compare the status of the compressors, condenser fans, refrigeration and defrost outputs on the Status Screens to the actual operation of the contactors and solenoids. If the status displayed on the XPRT5 does not agree with the actual operation of the contactor or solenoid, make appropriate changes in the configuration of the XPRT5 or CRX Relay wiring to correct the problem.

8) After one hour of operation, review the operation of the system by looking at the pressures and fixture temperatures in the history logs. Adjust the settings as required.

9) Review the operation the next day on site or via the telecommunications. Adjust as required.

If the XPRT5-TD32 is not operating optimally, please call Altech at the number on the title page of this manual.

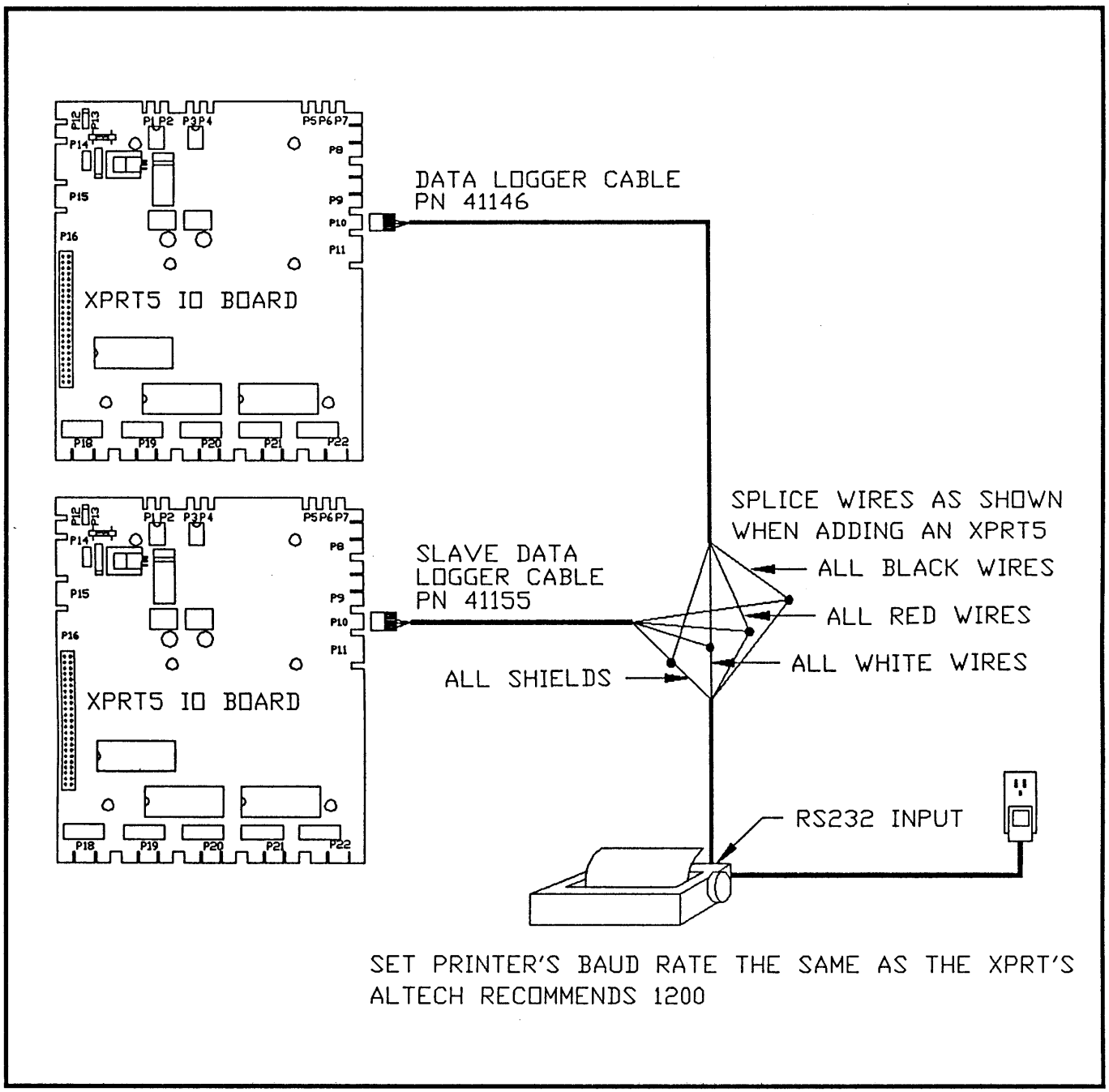


Figure C-16: Local Alarm Printer Wiring

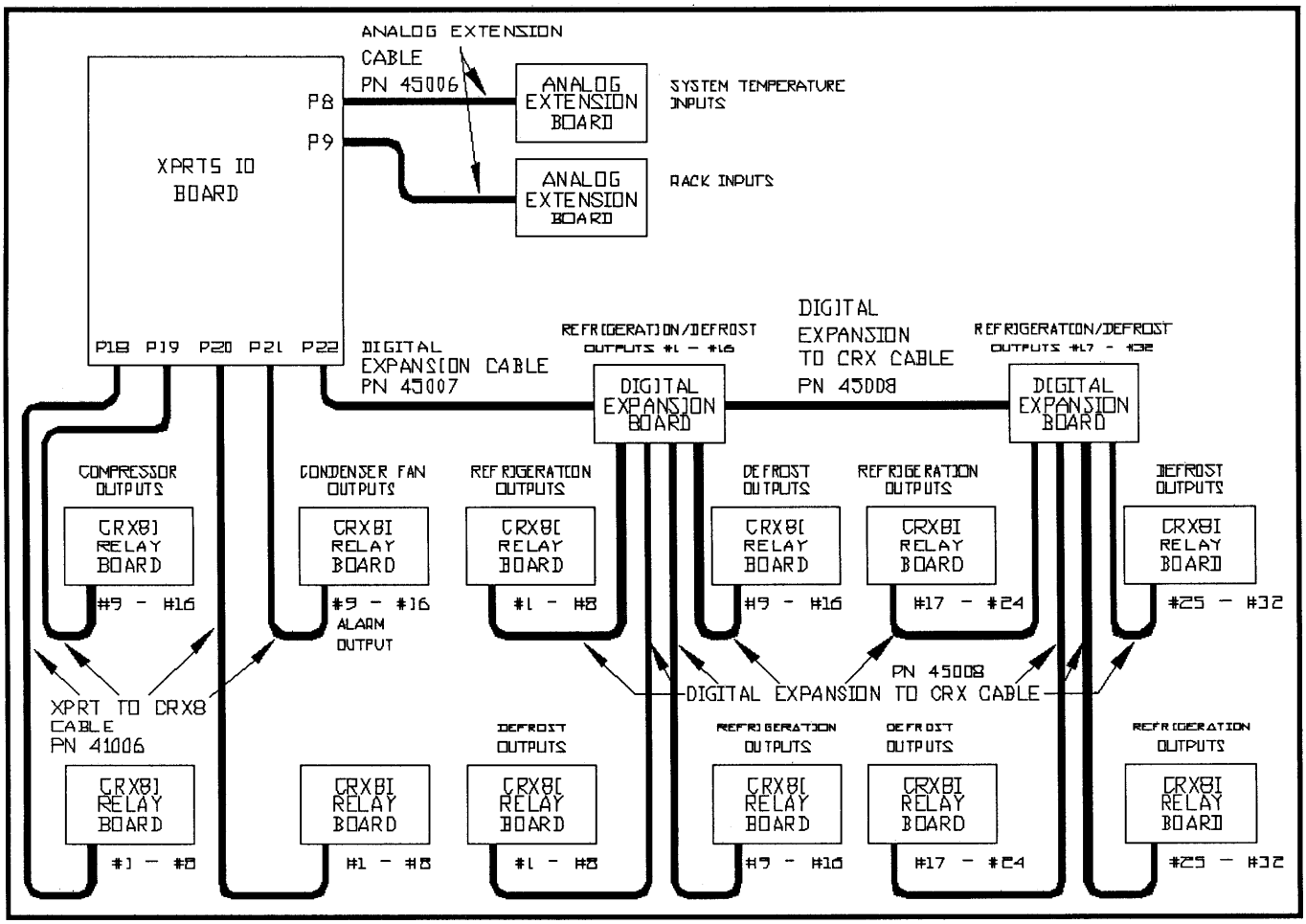


Figure C-17: XPRT5 Wiring

XPRT5-TD32 CONFIGURATION AND SETTINGS

SYSTEM NAME:_____ **UNIT #:**_____ **BAUD:**_____

CONTROL FUNCTIONS:
1. Condenser Fans: Yes No
2. System Temps: Yes No
3. System Defrost: Yes No
4. Oil Failures: Yes No
5. Power Monitor: Yes No
6. Variable Speed: Yes No

COMPRESSOR:
Pump Down:_____ High Head:_____
Turn-On Time:_____ Turn-Off Time:_____
Optimizer Time Out:_____ Contacts: NO_____ NC_____

MANIFOLD # 1: Control: Rotation____ Prog_____
CutIn:_____Psi Cutin: Max_____ Min:_____ Cut Out:_____
Start Compressor#:_____ # of Compressors:_____

VARIABLE SPEED SETTINGS: Min:_____%
Slope:_____ Rate Up:_____ Rate Down:_____
Delta Oil Pressure:_____ Probe #:_____ Timeout:_____sec

MANIFOLD # 2: Control: Rotation____ Prog_____
CutIn:_____Psi Cutin: Max_____ Min:_____ Cut Out:_____
Start Compressor#:_____ # of Compressors:_____

VARIABLE SPEED SETTINGS: Min:_____%
Slope:_____ Rate Up:_____ Rate Down:_____
Delta Oil Pressure:_____ Probe #:_____ Timeout:_____sec

MANIFOLD # 3: Control: Rotation____ Prog_____
CutIn:_____Psi Cutin: Max_____ Min:_____ Cut Out:_____
Start Compressor#:_____ # of Compressors:_____

VARIABLE SPEED SETTINGS: Min:_____%
Slope:_____ Rate Up:_____ Rate Down:_____
Delta Oil Pressure:_____ Probe #:_____ Timeout:_____sec

OIL FAILURE: Delta-P:_____ Delay:_____sec Hold:_____min Retrys:_____
Comp Assignment P7:_____ P8:_____ P9:_____ P10:_____ P11:_____ P12:_____
P13:_____ P14:_____ P15:_____ P16:_____ P17:_____ P18:_____

CONDENSER: Normal HotGas Ht-Rclm SEQ____ ROT_____ Fans: NO___ NC___
Cutin (Psi): _____ _____ _____ Turn-On Time:_____sec
Cutout: _____ _____ _____ Turn-Off Time:_____sec
Variable Speed Slope:_____ Rate Up:_____ Rate Down:_____
Min Speed:_____

MISC
Log Interval:_____ **Refrigerant:**_____

Temp Units: °F____ °C_____ **Password:**_____
Press Units: PSI____ Bar____ KPa_____ **Settings Protected:** Yes____ No____

POWER MONITOR:
Multiplier:_____
Voltage:_____to_____ Low Volt: _____VAC

XPRT5-TD32 CONFIGURATION AND SETTINGS

SYSTEM NAME:_____ **UNIT #:**_____

PROGRAMMABLE LOGIC CONFIGURATION

Manifold#																		Unload	
	Compressors																		
Stage #	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6		Time	HP
0																			
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			
18																			
19																			
20																			
21																			
22																			
23																			
24																			

COMPRESSOR OUTPUTS:

	Manifold #	Description		Manifold#	Description
P18 - 1:			P19 - 1:		
2:			2:		
3:			3:		
4:			4:		
5:			5:		
6:			6:		
7:			7:		
8:			8:		

XPRT5-TD32 CONFIGURATION AND SETTINGS

SYSTEM NAME:_____ **UNIT #:**_____

		Temperature						Defrost					
Sys#	Name	On	Off	Dly	Trm	Lth	Drn	#1	#2	#3	#4	#5	#6
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													
31													
32													

XPRT5-TD32 CONFIGURATION AND SETTINGS

SYSTEM NAME:_____ **UNIT #:**_____

FROM ANALOG EXTENSION BOARD CONNECTED TO XPRT5 IO BOARD/P9

	SENSOR CONFIGURATION		ALARMS			
Snsr	Type	Name(16 characters)	LoSet	Dly(mins)	HiSet	Dly(mins)
P1						
P2						
P3						
P4						
P5						
P6						
P7						
P8						
P9						
P10						
P11						
P12						
P13						
P14						
P15						
P16						
P17						
P18						
P19						
P20						
P21						
P22						
P23						
P24						
P25						
P26						
P27						
P28						
P29						
P30						
P31						
P32						

XPRT5-TD32 CONFIGURATION AND SETTINGS

SYSTEM NAME:_____ **UNIT #:**_____

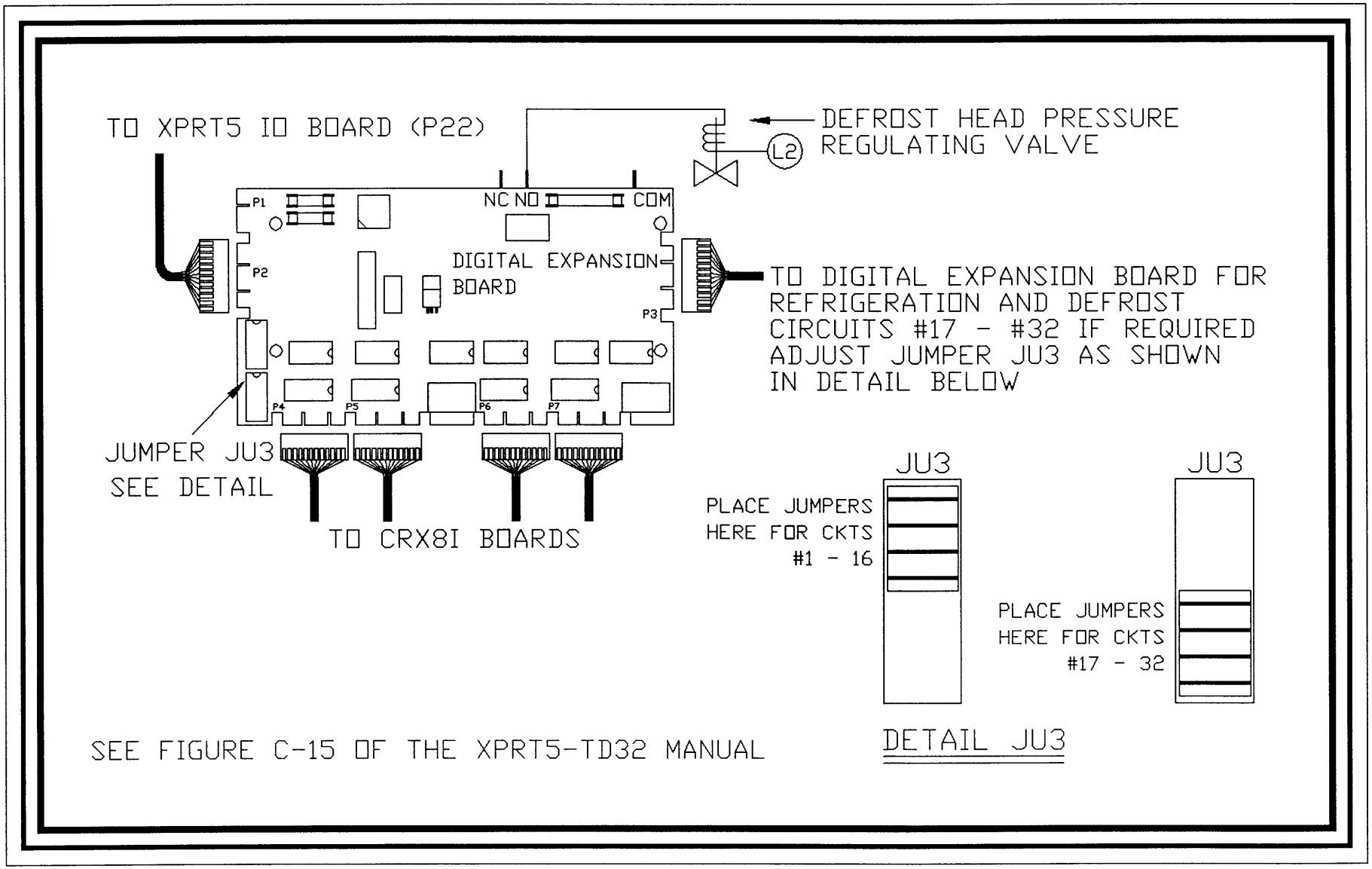
FROM ANALOG EXTENSION BOARD CONNECTED TO XPRT5 IO BOARD/P8

	SENSOR CONFIGURATION		ALARMS			
Snsr	Type	Name(16 characters)	LoSet	Dly(mins)	HiSet	Dly(mins)
P33						
P34						
P35						
P36						
P37						
P38						
P39						
P40						
P41						
P42						
P43						
P44						
P45						
P46						
P47						
P48						
P49						
P50						
P51						
P52						
P53						
P54						
P55						
P56						
P57						
P58						
P59						
P60						
P61						
P62						
P63						
P64						

DIALOUT SETTINGS: Site Description (16 character):_____

Redial Interval:_____min

#	Phone#	Ena		LF	
1	_____	Yes	No	Yes	No
2	_____	Yes	No	Yes	No
3	_____	Yes	No	Yes	No
4	_____	Yes	No	Yes	No



SEE FIGURE C-15 OF THE XPRT5-TD32 MANUAL

AT THIS TIME:

XCOM.EXE Version 4.09 or under, communicate with XPRT's 1, 2, 3 and 4 ONLY.

X5COM.EXE Versions 5.00 and 5.01 communicate with XPRT5's ONLY.

X52COM.EXE Version 5.20 communicates with XPRT's 4 and 5.

- For the purposes of this document, the program is referred to as "**XCOM**" regardless of the version number.

  When following installation instructions, check the original XCOM Disk for the current file name and version number of the XCOM Program.

- When copying the XCOM Program, the file name may be changed, if desired, as follows:

  C:\>copy A:X52COM.* XCOM.* <ENTER>

SECTION D: COMMUNICATIONS

INTRODUCTION

The XPRT family of controllers uses a common communication protocol which networks up to 48 controllers with a single modem. Altech's XCOM communication software for IBM or compatible personal computers communicates remotely with each XPRT controller on the network. XCOM's modem commands are standard Hayes commands. The following XPRT controllers may be networked in any combination provided each is assigned a unique UNIT NUMBER (1 - 48) on the network:

- XPRT1 – Single Compressor Pressure/Defrost Controller
- XPRT2 – Parallel Compressor Rack Pressure Controller
- XPRT3-STD – Parallel Compressor Rack Pressure Controller
- XPRT3-MPS – Multiple Suction Rack Pressure Controller
- XPRT3-HVAC – Supermarket Environment Controller
- XPRT4-TD12 – Rack Pressure/Defrost Controller
- XPRT4-HVAC – Supermarket Environment Controller
- XPRT4 Data Logger – Data Logger and Alarm Processor
- XPRT5-TD32 – Rack Pressure/Defrost Controller for up to 3 Suction Manifolds

Functions which may be performed remotely through XCOM are:

- Review pressures, temperatures, liquid level, etc.
- Change settings
- Review and change defrost parameters
- Review alarm logs
- Review sensor history logs
- Auto-dial alarms to an alarm printer (XPRT4-TD12 and XPRT5-TD32 only)

XCOM uses menu-driven full screen presentation of status, settings and log information for all units except the XPRT3. In this case, XCOM duplicates the front panel display of the XPRT3 on the screen and the XPRT3 keypad by using the computer keyboard's arrow keys.

MAKING A BACKUP OF THE XCOM DISK

Before installing the XCOM program, make a backup disk. XCOM is available on either a 5 1/4" or 3 1/2" disk. Be sure the original XCOM disk fits your disk drive. Altech recommends labeling the backup disk with the program name, version number and date. Store the original in a safe place, and install or run XCOM from the backup disk.

1. Place the **original XCOM disk** in drive **A**. Place **a blank formatted disk** in drive **B**.
2. At the prompt C:\>, change to the B drive.
   C:\>B: <ENTER>
3. At the prompt B:\>, copy files from drive A to drive B.
   B:\> copy A:*.* <ENTER>

   Now all files on the XCOM disk will be copied onto the blank. During diskcopy, if the error message, "Error reading drive A", appears, when A is the drive containing your XCOM disk, DO NOT IGNORE IT. Contact your Altech representative before continuing the installation; the error message may indicate a defect on the XCOM disk or on the drive.
4. At the prompt B:\>, return to the hard drive C.
   B:\>C: <ENTER>

   Now DOS has returned to the hard drive, and the original XCOM disk and the backup copy may be removed. LABEL THE BACKUP DISK IMMEDIATELY.

INSTALLING XCOM ON THE HARD DISK

Depending on the version being used, XCOM requires up to 1M byte of space on a hard disk. Use the DOS **CHKDSK** command to verify that the hard disk drive has enough space. The following procedure assumes that XCOM will be installed on drive C; however, XCOM may be installed on any drive with enough space.

FIRST TIME INSTALLATION

The files to be copied are as follows:

- The XCOM program is in the file **XCOM.EXE**.
- The file **DEFAULT.DAT** contains initial communication parameters such as baud rate, com line, etc. If any of these parameters are not correct for your setup, they may be changed when the program is executed. (See **Change Communication Parameters**)
- The file **PHONE1.DAT** contains a list of phone numbers for speed dialing. Initially, it is an empty file, but is required to run the program.

DEFAULT.DAT and PHONE1.DAT are necessary to run the program. If, for any reason, these files are not found by XCOM when it is run, XCOM will build these files. DEFAULT.DAT contains the initial communication parameters as stated above, and PHONE1.DAT will be empty.

1. At the prompt C:\>, create a directory for XCOM.

   C:\>md \xcom <ENTER>

2. Change to the new directory.

   C:\>cd xcom <ENTER>

3. Place the **backup XCOM disk** in drive **A** and copy files into the new directory.

   C:\>copy A:*.* <ENTER>

   During diskcopy, if the error message, "Error reading drive A", appears, when A is the drive containing your XCOM disk, DO NOT IGNORE IT. Contact your Altech representative before continuing the installation; the error message may indicate a defect on the source disk or on the drive.

UPGRADE INSTALLATION

If XCOM has been previously installed and this is an upgrade, you may want to install XCOM .EXE ONLY in order to preserve your phone list in PHONE1.DAT and communication parameters in DEFAULT.DAT.

1. Change to the XCOM directory.

   C:\>cd xcom <ENTER>

2. Place **the backup XCOM disk** in drive **A** and copy XCOM.EXE into the directory. The new version will overwrite the old version.

   C:\>copy A:XCOM.EXE <ENTER>

During diskcopy, if the error message, "Error reading drive A", appears, when A is the drive containing your XCOM disk, DO NOT IGNORE IT. Contact your Altech representative before continuing the installation; the error message may indicate a defect on the source disk or on the drive.

3. If you want to initialize (erase) your phone list, you may want to copy PHONE1.DAT.

   C:\>copy A:PHONE1.DAT <ENTER>

   During diskcopy, if the error message, "Error reading drive A", appears, when A is the drive containing your XCOM disk, DO NOT IGNORE IT. Contact your Altech representative before continuing the installation; the error message may indicate a defect on the source disk or on the drive.

   OR

   Erase PHONE1.DAT in DOS, and XCOM will build an empty file when it runs.

Now XCOM is installed on the hard disk.

STARTING XCOM

At the prompt C:\>, type "XCOM" <ENTER>, and the XCOM Main Menu (**Figure D-1**) appears.

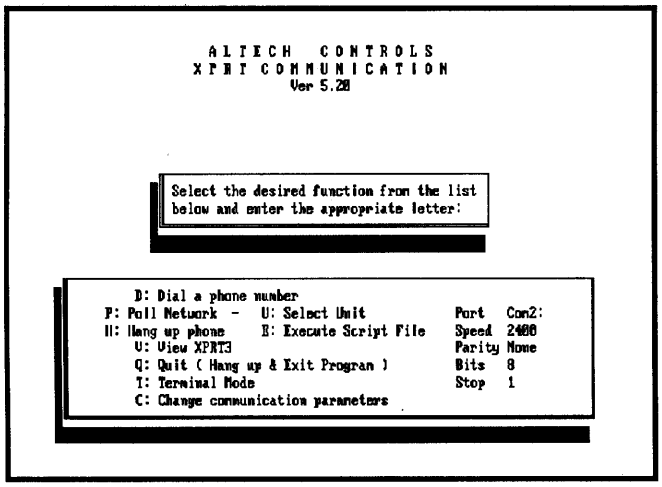


Figure D-1: XCOM Main Menu

When this screen first appears, check the communications parameters. XCOM waits for a one-letter menu option. If the Port is not correct, go to the **Change Communication Parameters Screen**. All option explanations follow.

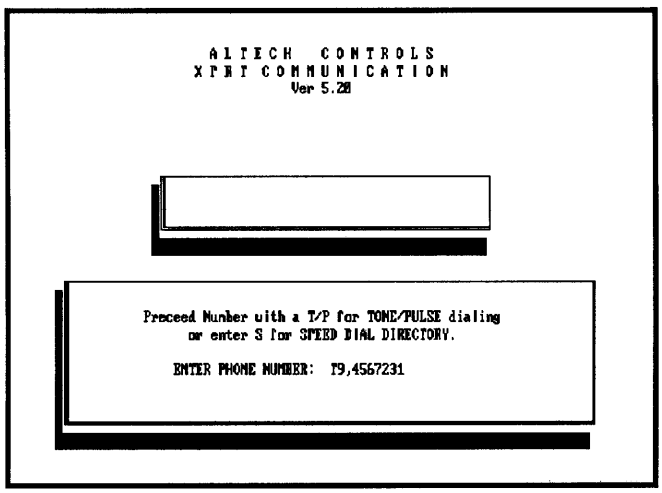


Figure D-2: Dialing Screen

D: Dial a Phone Number

To use the functions of XCOM, an XPRT network must be contacted through a modem or direct connection. Selecting "D" from the XCOM Main Menu (**Figure D-1**) presents the Dialing Screen (**Figure D-2**). A phone mumber may be entered directly at the cursor position or "S" may be entered to bring up the Speed Dial Directory. The Speed Dial Directory is a list of up to 200 phone numbers (See **Figure D-5**). When a phone number is saved to the directory, its communication parameters are saved with it.

Direct Dialing and Assigning a Phone Number to the Speed Dial Directory

Before dialing a phone number directly, verify that the communications parameters displayed in the XCOM Main Menu (**Figure D-1**) are correct for the network being contacted. If not, return to the XCOM Main Menu (**Figure D-1**) by pressing <ENTER> twice, and type "C" to go to the **Change Communication Parameters Screen**. See below for complete details.

Once the communication parameters are correct, enter a phone number preceded by a "T", for tone dialing (touch tone), or "P", for pulse dialing (rotary) and followed by pressing <ENTER>. Hyphens ("-") may be used to separate parts of a number but are not necessary. Commas (",") may be used to insert a two second delay in dialing (See **Figure D-2**) sometimes necessary for accessing outside lines or long distance. Up to 20 characters, including the tone/pulse character and commas, may be entered for a phone number allowing long distance or international dialing.

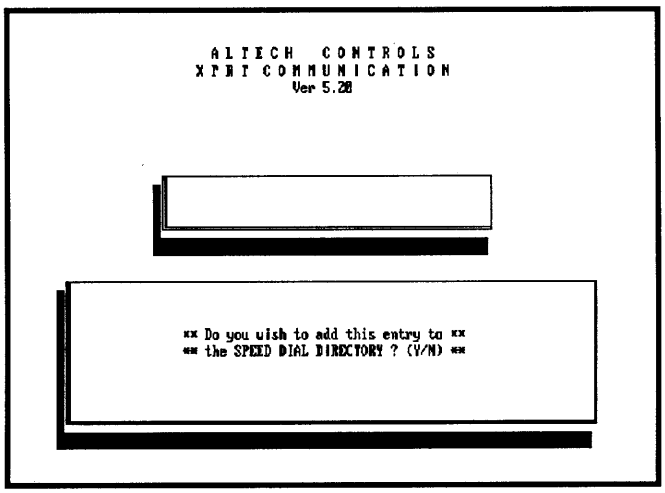


Figure D-3: Dialing Screen - Request to Save

Before sending the phone number to the modem, XCOM asks if the phone number should be saved to the Speed Dial Directory (**Figure D-3**). For frequently called or multi-character numbers, it is advisable to do so. Type "Y" to add the number; otherwise, type "N". When a number is not saved to the Speed Dial Directory, the phone number and its communication parameters are sent directly to the modem.

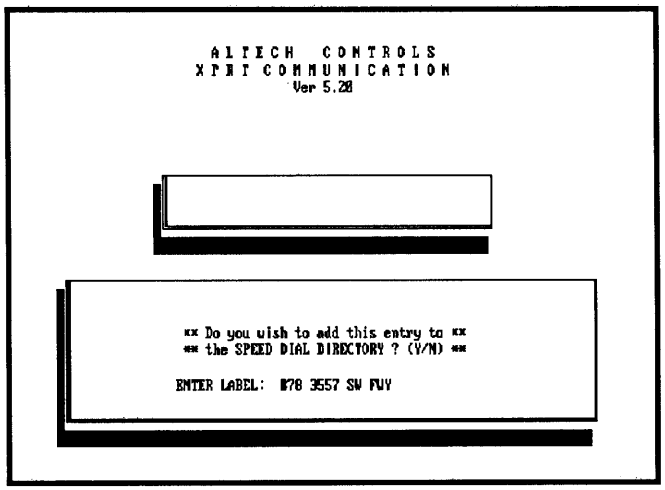


Figure D-4: Dialing Screen Request for Label Description

When a number is added to the Speed Dial Directory, XCOM prompts for a label description (**Figure D-4**) for the phone number. Enter up to 18 characters for a description, then press <ENTER>. Pressing <ENTER> without the label description and selecting a directory ID number (see below) deletes that speed dial entry from the list.

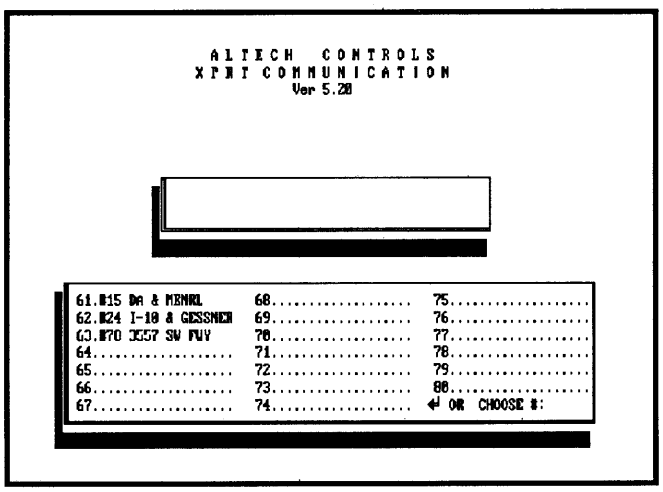


Figure D-5: Dialing Screen - Request for Directory ID Number

Next, the Speed Dial Directory appears (**Figure D-5**). Pressing <ENTER> pages through the directory (1 - 200), 20 numbers at a time. Scrolling through all 200 listings without assigning a speed dial number to the phone number results in the following: the error message, "NOT A VALID ENTRY", appears; no action is taken to save the Speed Dial Directory; the XCOM Main Menu (**Figure D-1**) reappears. Entering a directory ID number (1 - 200) next to "CHOOSE #" and pressing <ENTER> assigns the phone number and its communication parameters to that directory ID number. In **Figure D-5**, the label description of the new phone number has been assigned to directory ID number 63. Next, the message "SAVING THE SPEED DIAL DIRECTORY TO DISK" appears, then the phone number and its communication parameters are sent to the modem.

Pressing <ENTER> with no label description entry and selecting a directory ID number deletes a speed dial entry from the list. Selecting a directory ID number with an existing label description assigns the new phone number to that ID number and deletes the old entry from the list.

Speed Dialing

Entering "S" in the Dialing Screen (**Figure D-2**) brings up the Speed Dial Directory Screen (**Figure D-5**). Entering a directory ID number (1 - 200) next to "CHOOSE #" and pressing <ENTER> sends the phone number and its communication parameters to the modem. The directory ID number must have a label description to be a valid entry. Otherwise, the error message, "NOT A VALID ENTRY", appears, no action is taken and the XCOM Main Menu (**Figure D-1**) reappears.

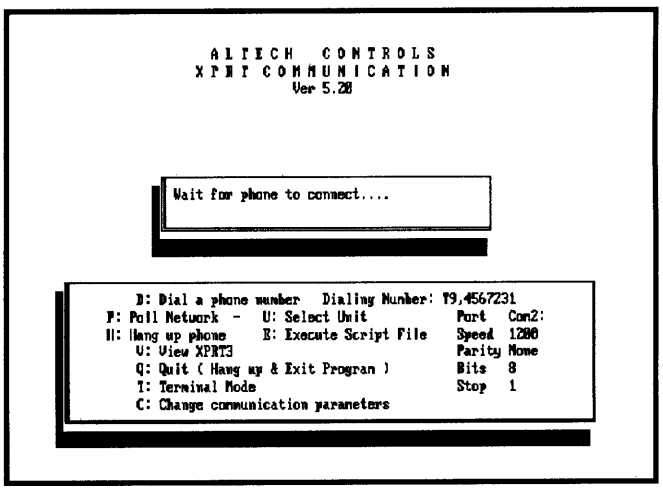


Figure D-6: XCOM Main Menu Dialing in Progress

Once a phone number is sent to the modem and dialed, the XCOM Main Menu returns and the number being dialed appears next to "**D: Dial a phone number**" (**Figure D-6**). When a connection has been made, a message appears in the lower right corner of the XCOM Main Menu indicating that the connection has been made (usually "CONNECT" and a number), or an error message appears indicating the error from the network being called.

H: Hang Up Phone

To end the communication session with an XPRT network for any reason, press "H" to hang up the phone. The message, "HANGING UP THE PHONE", appears in place of the XCOM Main Menu. Then the XCOM Main Menu (**Figure D-1**) reappears.

Q: Quit (Hang Up & Exit Program)

To end a communication session with an XPRT network by hanging up the phone and return to DOS, select "Q" from the XCOM Main Menu. If the communication session was ended by selecting "H" previously, "Q" returns to DOS thus terminating the XCOM session.

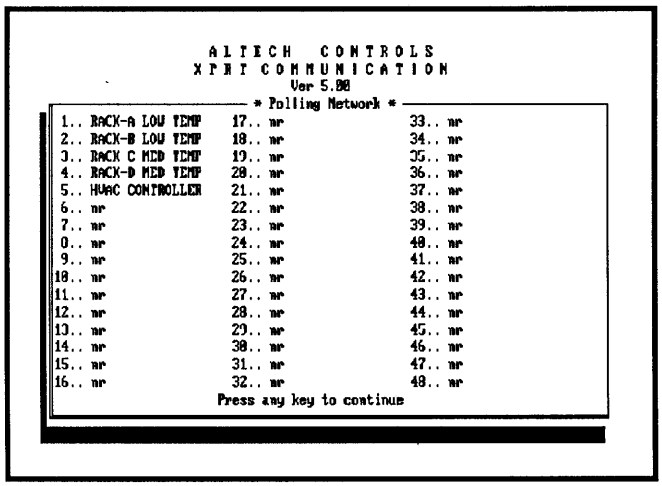


Figure D-7: Polling Network Screen

P: Poll Network

Selecting "P" brings up the Polling Network Screen (**Figure D-7**) to view a list of all XPRT1, 2, 4 or 5 Controllers (XPRT3's are excluded) on the network by its user selected 16 digit name. The "nr" indicates no response to that unit number. An "nc" indicates an unrecognizable response such as two controllers having been assigned the same unit number causing neither to be contacted. An asterisk ("*") appearing as the 16th character in the unit name indicates an alarm for that unit. Some early versions of XPRT1 do not have this indicator and, if on the network, would need to be checked individually.

U: Select Unit

See **XPRT5 OPERATIONS** section of this chapter, **Figure D-11**: **XCOM Main Menu - Select Unit**.

V: View XPRT3

To communicate with an XPRT3 on the network, select "V". This brings up the XPRT3 Menu and a duplication of the LCD display on the XPRT3. From this menu a unit may be selected for viewing and changing

T: Terminal Mode

To communicate with terminal devices such as modems, select "T" for full duplex terminal mode communication. The screen clears, and the keys pressed will be sent directly to the device, then echoed back to the screen for display. If the device returns information, those characters will appear on the screen. To exit the terminal mode communication, press <ESC>.

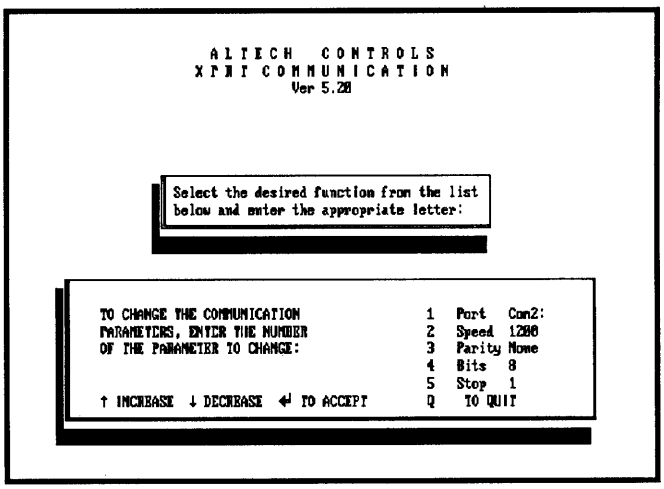


Figure D-8: Change Communication Parameters Screen

C: Change Communication Parameters

To change communication parameters to match the device being called, select "C", and the Change Communication Parameters Screen (**Figure D-8**) appears. Select the parameter to be changed by entering the number to the left of the parameter. The number flashes indicating this parameter may now be changed by pressing the <UP> or <DOWN> key. When the correct value for that parameter is displayed, press <ENTER> to accept the new value. The following is a list of options for each parameter:

Port - COM1: COM2:

This is strictly a characteristic of the user's computer. It is the computer's communication port wired to the modem and, once set, should not be changed unless the computer's hardware is changed.

ALL OTHER PARAMETERS MUST MATCH THE DEVICE BEING CALLED.

Speed - 110 150 300 600 1200 2400 4800 9600

This is the rate (Baud Rate) at which transmissions are sent and received. Altech recomends 1200 or 2400 baud depending on the modem and noise characteristics of the phone line.

Parity - None Odd None Even

This is used as a means to check for transmission errors by adding a bit forcing transmission of bits into an odd or even pattern. When "8" is selected for bits (see **Bits - 7 8**), select "None" for parity. Altech recommends "None".

Bits - 7 8

This is the number of bits used to transmit a character. Altech recommends 8 bits.

Stop - 1 2

This indicates the number of bits used to signal the end of a transmitted character. The value is usually 1.

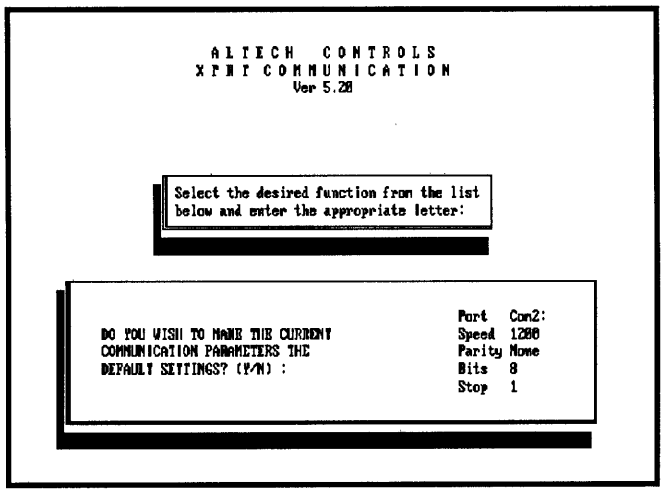


Figure D-9: Change Communication Parameters Screen - Default Request

Once all parameters are correct for the device being called, enter "Q", and **Figure D-9** appears, asking if these settings should be saved to the disk as the default for future use whenever XCOM is used. "Y" saves these settings to the disk. "N" uses these parameters for this session only or until they are changed again within this session.

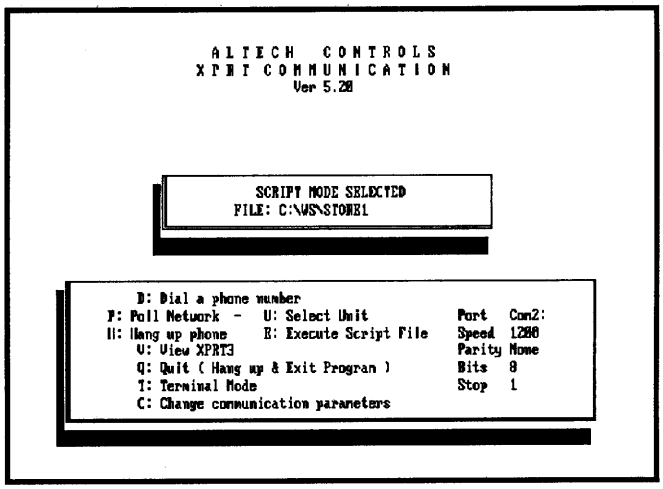


Figure D-10: XCOM Main Menu - Script File Execution Window

E: Execute Script File

A script file is a list of XCOM commands for automatic execution. (See the **Script File** section of this chapter for script file creation.) To run a script file, select "E", and the Script File Execution Window (**Figure D-10**) appears. Enter the file name (with or without the ".SCR" extension), and press <ENTER>. If a script file is not stored in the same directory as the XCOM program, the path must be entered as well, e.g. "C:\WS\STORE1". The display will automatically change as commands from the script file are executed. Depending on the final command of the script file, the XCOM program may be terminated or return to one of the XCOM screens.

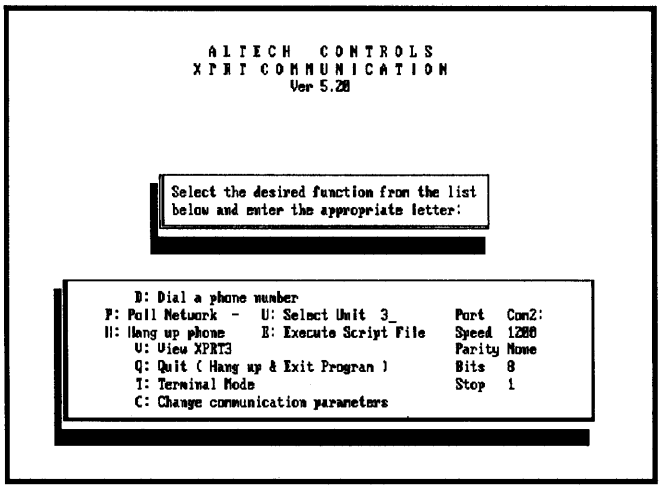


Figure D-11: XCOM Main Menu - Select Unit

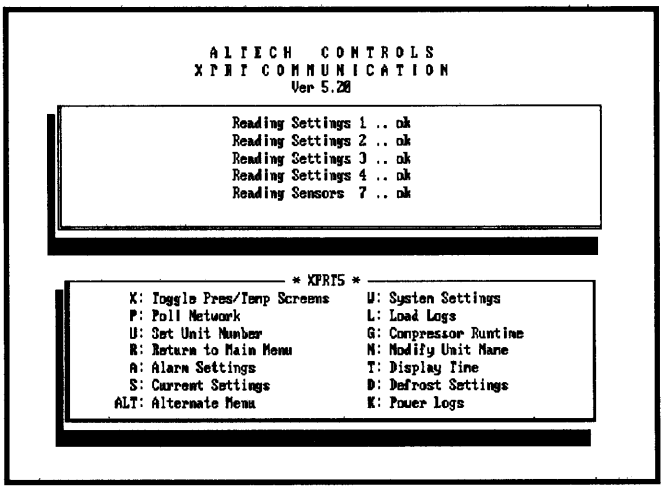


Figure D-12: Sign-On XPRT5 General Status Screen

To access any XPRT Controller on the network, select "U" from the XCOM Main Menu (**Figure D-11**). The XCOM program prompts the user to enter the unique UNIT NUMBER (1 - 48) for that controller. Entry of a valid unit number and pressing <ENTER> initiates communication with that controller. The type of XPRT unit (XPRT1, XPRT2, XPRT4 or XPRT5) determines the General Status Screen which appears. In this chapter, the XPRT5 General Status Screen (**Figure D-12**) is discussed.

Entry of an invalid unit number displays the error message, "UNIT NOT RESPONDING". Select "U" again and enter another unit number. An invalid unit number is either a number from 1 to 48 which has no controller assigned to it or any number above 48 or below 1.

For XPRT5-TD32/3, all Manifolds will appear in the following screens.

For XPRT5-TD32/2, only Manifolds #1 and #2 will appear in the following screens.

For XPRT5-TD32/1, only Manifold #1 will appear in the following screens.

Before using the features of the XCOM program, this Sign-On Screen appears in the upper section of the display. "Reading Settings 1" through 4 remain on the display throughout the read-in period. The last line shows "Reading Settings 5" and 6, then becomes "Reading Sensors 1" through 63. The setting readings are the configuration settings from the unit as they are loaded into the program for communication. The sensor readings load the sensor names two at a time; therefore, only odd sensor numbers are displayed.

Should any error occur in transmission, the error message "COMMUNICATIONS ERROR - ABORT" appears, and the XCOM Main Menu (**Figure D-1**) returns.

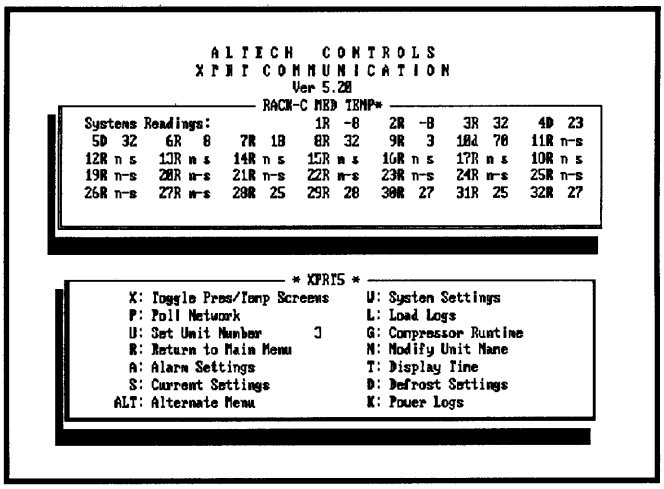


Figure D-13: XPRT5 General Status Screen Current System Settings (Temperature)

After the read-in is complete, the XPRT5 General Status Screen (**Figure D-13**) appears. "RACK–C MED TEMP" at the top of the upper section is the 16 digit user assigned name of the controller unit selected when in the XCOM Main Menu. The upper section of the display shows the defrost status and the current system readings for the 32 refrigeration circuits. The number denotes the refigeration circuit. The next character indicates the defrost status of that system as follows:

D: Defrost
d: Drain Cycle
R: Calling for Refrigeration
=: Condition has been Satisfied

The following characters are the current system readings displayed in the units appropriate for that sensor type. System 1 above is configured as a temperature sensor, therefore the units are displayed in Fahrenheit or centigrade. System 5 above is configured as a pressure sensor, therefore the units are displayed in psi, kpa or bar. An "n-s" indicates that NO SENSOR is being read for that circuit.

The lower section of the XPRT5 General Status Screen (**Figure D-13**) lists the menu options for accessing data from the XPRT5-TD32 Controller.

"XPRT5" at the top of the lower section indicates the XPRT type of the controller of the unit selected. Each menu option is discussed briefly below.

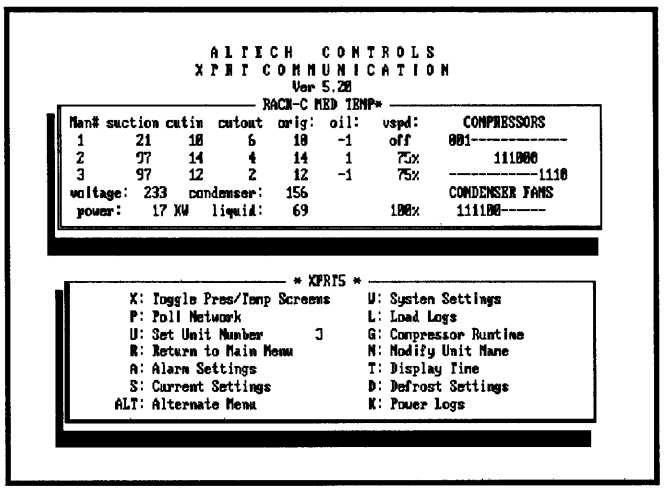


Figure D-14: XPRT5 General Status Screen Current Pressure Settings

X: Toggle Pres/Temp Screens

Selecting "X" toggles the upper section of the screen from current system readings (temperature – **Figure D-13**) to current pressure readings for all manifolds (**Figure D-14**). The compressor and condenser fan status (ON = 1 or OFF = 0) is also displayed. The message "ALARM" flashes on the screen when an alarm is active. Selecting "X" again returns the screen to the current system readings (temperature – **Figure D-13**).

P: Poll Network

Selecting "P" permits the user to poll the network from the XPRT5 General Status Screen (**Figure D-13**) without returning to the XCOM Main Menu (**Figure D-1**). See **XCOM OPERATIONS - P: Poll Network** for complete details.

U: Set Unit Number

Selecting "U" permits the user to access a different controller on the network from the XPRT5 General Status Screen (**Figure D-13**) without returning to the XCOM Main Menu (**Figure D-1**). The program prompts the user to enter the unique UNIT NUMBER (1 - 48) for a different controller. Entry of a valid unit number and pressing <ENTER> initiates communication with that controller.

R: Return to Main Menu

Selecting "R" returns to the XCOM Main Menu (**Figure D-1**) from the XPRT5 General Status Screen (**Figure D-13**).

A: Alarm Settings

Selecting "A" brings up the Alarm Settings Screen to view and change alarm settings. See **ALARM SETTINGS SCREEN** below for complete explanation.

S: Current Settings

Selecting "S" brings up the Current Settings Screen to view and change settings for compressors, condenser fans and time delays. See **CURRENT SETTINGS SCREEN** below for complete explaination.

W: System Settings

Selecting "W" brings up the System Settings Screen to view and change the 32 systems and their time delay settings. See **SYSTEM SETTINGS SCREEN** below for complete explaination.

L: Load Logs

Selecting "L" brings up the Logs Screen to view and save history logs. See **LOAD LOGS SCREEN** below for complete explaination.

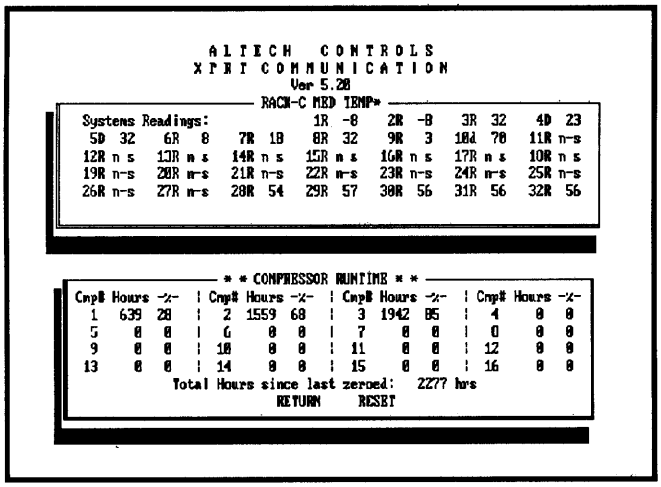


Figure D-15: XPRT5 General Status Screen with Compressor Run Times

G: Compressor Run Time

Selecting "G" loads and displays the Compressor Run Time Logs into the lower section of the XPRT5 General Status Screen (**Figure D-15**). The time displayed is the time that compressor has run since the log was last reset. The percentage displayed is the percentage of time that compressor has run since the log was last reset.

Selecting RESET in the menu bar or pressing the <ALT> and "R" keys simultaneously resets the run times to zero.

Select "Return" in the menu bar or pressing "R" returns to the XPRT5 General Status Screen (**Figure D-13**).

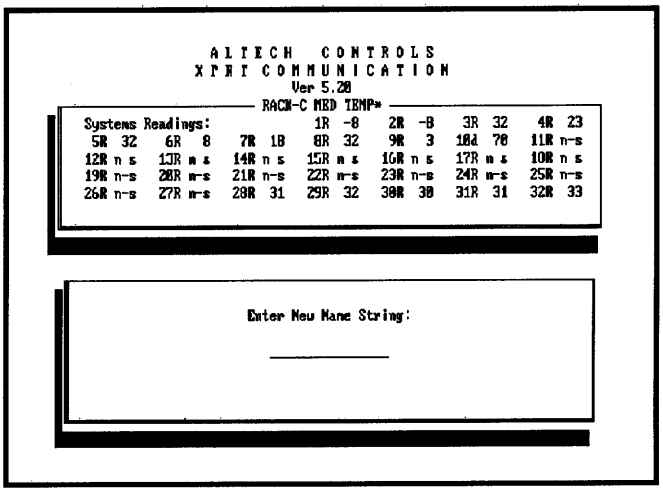


Figure D-16: XPRT5 General Status Screen with Name Screen

N: Modify Unit Name

Selecting "N" brings the Name Screen into the lower section of the XPRT5 General Status Screen (**Figure D-16**). The 16 digit user assigned name may be changed here. For example, "RACK-C MED TEMP" could be changed to "ICE CREAM" and that would appear at the top of the upper section of this screen and wherever the unit names appear, such as in the Polling Network Screen (**Figure D-7**). When <ENTER> is pressed or the 16th character of the name has been entered, the new name is loaded and the menu returns to the screen.

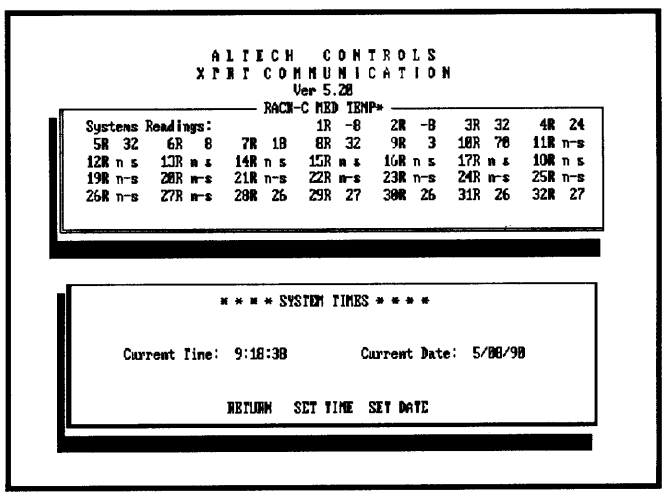


Figure D-17: XPRT5 General Status Screen with System Times Screen

T: Display Time

Selecting "T" brings the System Times Screen into the lower section of the XPRT5 General Status Screen

(**Figure D-17**) to view and change time and date settings for **ALL CONTROLLERS ON THE NETWORK**.

Select "Return" in the menu bar or pressing "R" returns to the XPRT5 General Status Screen (**Figure D-13**).

To change the system time, select "SET TIME" in the menu bar. The prompt "Enter new time:" appears on the screen, and the program waits for the time to be entered (as HH:MM:SS) and <ENTER> to be pressed. If a value for seconds is not entered, seconds are set to zero.

To change the system date, select "SET DATE" in the menu bar. The prompt "Enter new date:" appears on the screen, and the program waits for the date to be entered (as MM/DD/YY) and <ENTER> to be pressed. If a field is omitted, the original setting is retained. For example, entering "/12" would change the date only to the 12th, retaining the month and year (From 5/08/90 to 5/12/90).

D: Defrost Settings

Selecting "D" brings up the Defrost Settings Screen to view and change the defrost times, configuration and settings for all 32 refrigeration circuits. See **DEFROST SETTINGS SCREEN** below for complete explanation.

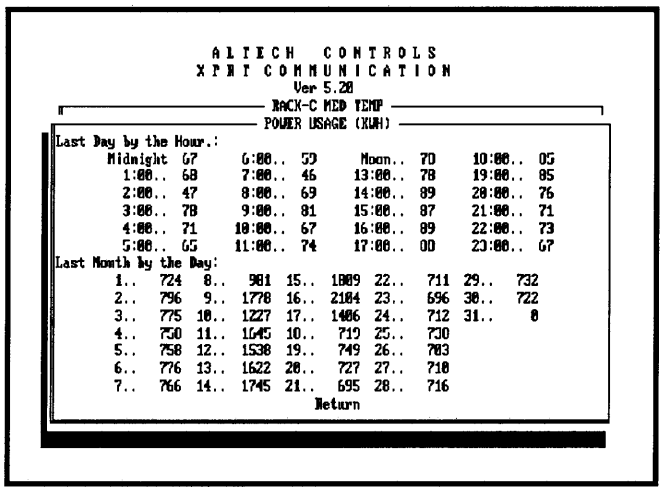


Figure D-18: XPRT5 General Status Screen with Power Logs Screen Overlay

K: Power Logs

Selecting "K" brings the Power Logs Screen over the XPRT5 General Status Screen (**Figure D-18**) to view the power consumption for the last 24 hours by the hour and for the last 31 days by the day. For example, at 10:15 am on 5-25-90, Last Day Readings from midnight through 9:00 are from 5-25-90 and all others are from 5-24-90; Last Month Readings from 1 through 24 are from May and all others are from April.

Selecting "RETURN" in the menu bar removes the Power Logs Screen, and the XPRT5 General Status Screen (**Figure D-13**) reappears.

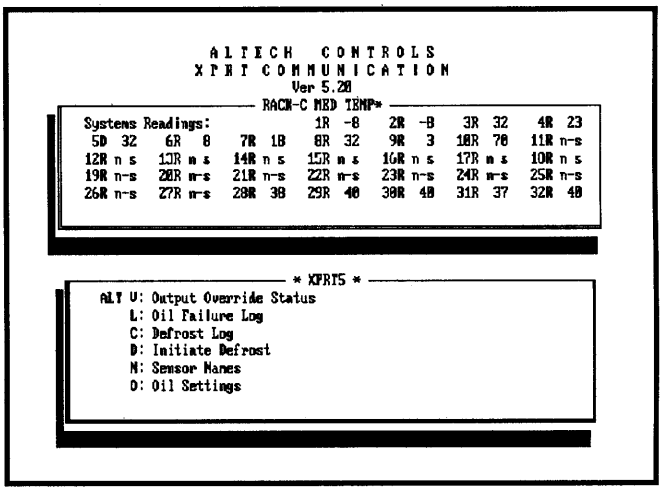


Figure D-19: XPRT5 General Status Screen Alternate Menu

ALT: Alternate Menu

Holding the <ALT> key presents additional menu items (**Figure D-19**). To select any of these, <ALT> and letter key MUST BE PRESSED SIMULTANEOUSLY.

ALT V: Output Override Status

Selecting <ALT> and "V" brings up the Output Override Status Screen to view and change the override status for each output. See **OUTPUT OVERRIDE STATUS SCREEN** below for complete explaination.

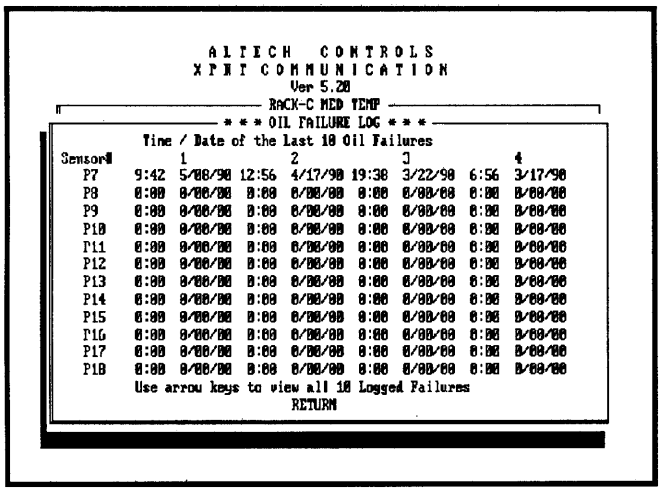


Figure D-20: XPRT5 General Status Screen with Oil Failure Log Screen Overlay

ALT L: Oil Failure Log

Selecting <ALT> and "L" first runs a read-in for the oil failure logs. "Reading Oil Failure Logs 1" through 12 appear on the display. Next the Oil Failure Log Screen (**Figure D-20**) pops up to view the time and date of the last 10 oil failures for each of the 12 oil pressure probes. To display all 10 failure listings, use the <RIGHT> and <LEFT> cursor keys. The P#'s are the connector numbers for the oil pressure probes from the Analog Extension Board, attached to the XPRT5 IO Board/P9 (See **Table C-1**).

Selecting "RETURN" in the menu bar removes the Oil Failure Log Screen, and the XPRT5 General Status Screen (**Figure D-13**) reappears.

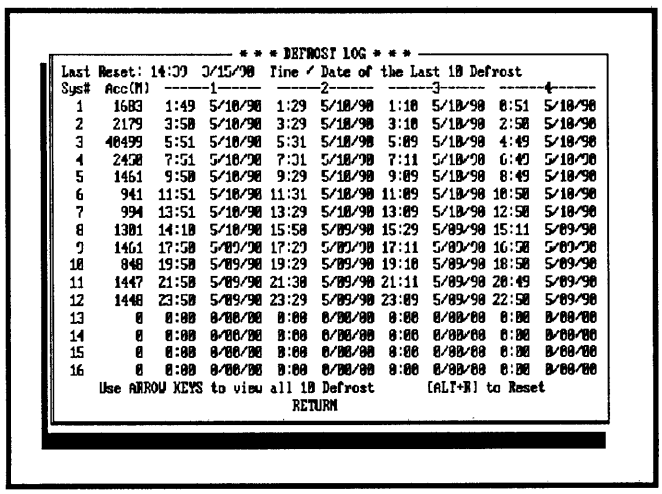


Figure D-21: Defrost Log Screen

ALT C: Defrost Log

Selecting <ALT> and "C" first runs a read-in for the defrost logs. "Reading Defrost Logs 1" through 12 appear on the display, then the numbers change throughout the read-in period until all 32 systems are read. Next the Defrost Log Screen (**Figure D-21**) pops up to view the the time and date of the last 10 defrosts for each of the 32 refrigeration circuits. To display all 10 defrost logs, use the <RIGHT> and <LEFT> cursor keys. To display all 32 system listings, use the <UP> and <DOWN> cursor keys. The time under "Acc (M)" is the time in minutes the system has been in defrost since the accumulator was last reset. The times and dates shown are the TERMINATION TIMES of the last 10 defrosts for each system.

Press the <ALT> and "R" keys simultaneously to reset the defrost time accumulators to zero.

Selecting "Return" in the menu bar removes the Defrost Log Screen, and the XPRT5 General Status Screen (**Figure D-13**) reappears.

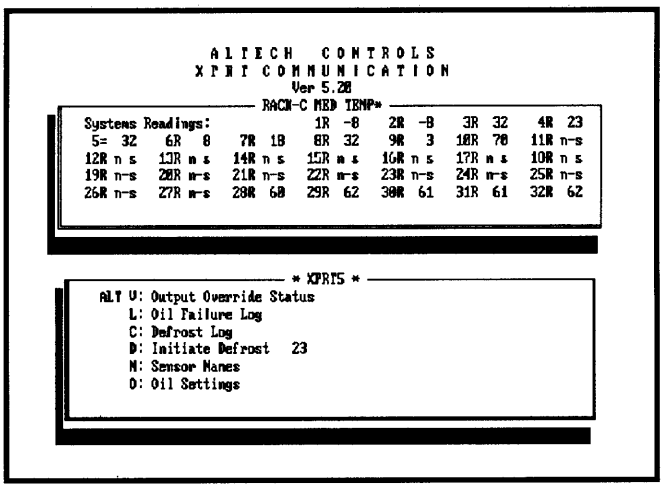


Figure D-22: Initiating Defrost in the XPRT5 General Status Screen

ALT D: Initiate Defrost

Selecting <ALT> and "D" from the XPRT5 General Status Screen (**Figure D-22**) prompts the user to enter a refrigeration circuit number (1 - 32). Entry of a valid number and <ENTER> cycles the circuit to the next stage.

In the screen above, Circuit 23 is in refrigeration ("R") and will go into defrost changing the "R" to "D". If a circuit, which is in defrost ("D"), had been selected, it would step into a drain cycle ("d"). If a circuit, which is in a drain cycle ("d"), had been selected, it would first step through the satisfied condition ("=") before entering the refrigeration mode ("R"). All changes will appear on the upper section of the display next to the appropriate circuit number.

ALT N: Sensor Names

Selecting <ALT> and "N" brings up the Sensor Names Screen to view information and change names of the 64 sensors. See **SENSOR NAMES SCREEN** below for complete explanation.

ALT O: Oil Settings

Selecting <ALT> and "O" brings up the Oil Pressure Screen to view and change oil pressure parameters. See **OIL PRESSURE SCREEN** below for complete explanation.

MENU BAR

The following screens have a menu bar with several options at the bottom of the display. To access any option, use the <RIGHT> and <LEFT> cursor keys to highlight the option, then press <ENTER>, or press the key shown here enclosed in brackets, "[ ]", for that option.

Menu Bar Options Common to Many Screens

RETURN [R] in any screen removes that screen, and the XPRT5 General Status Screen (**Figure D-13**) reappears.

CHANGE [C] in any screen places the cursor in its starting position in the screen and places the message "Press ESC key to exit" above "CHANGE". From there, the cursor may be moved around using the cursor control keys (<UP>, <DOWN>, <RIGHT>, <LEFT>). To change a value, position the cursor to the left of that value, type in the new value and move the cursor to the next value to be changed. Moving the cursor to the next position or pressing <ENTER> accepts the last change. Once all changes are made, press <ESC> to exit the **CHANGE** mode, and the cursor jumps back to "RETURN".

TO UNIT [U] in any screen saves the current values displayed on the screen to the XPRT5-TD32 Controller. When the operation is complete, the cursor jumps back to "RETURN". If the "TO UNIT" option is not executed, changes that were made on the screen during the **CHANGE** mode **WILL BE ABANDONED.**

LOAD [L] imports an existing list of values appropriate for that screen from a disk file by prompting for a file name. When "Name:_____" appears, type in a file name (e.g. Rack22) and press <ENTER>. When no extension is given, the program assumes the default extension for the type of file appropriate to that screen (default extensions are given below in the specific screen explanations). If an invalid file name is entered, the error message "FILE NOT FOUND" appears, and the cursor jumps back to "RETURN".

A file may be selected from the directory by typing in one of the following:

- "*." and the specific file extension (check the specific screen explanation),
- "*." and any extension,
- filename and ".*" (as in any DOS file command).

A directory box will appear on the right side of the screen. To access a file in the list, use the <UP> and <DOWN> keys. Pressing <ENTER> on a highlighted file loads it. Pressing <ENTER> with no entry in the "Name" blank exits the **LOAD** mode with no action.

SAVE [S] writes the displayed settings to a disk file by prompting for a file name. When "Name:_____" appears, type in a file name (e.g. Rack22) and press <ENTER>. File names may be no longer than 8 characters (as with any DOS file name). When no extension is given, the program assumes the default extension for the type of file appropriate to that screen (default extensions are given below in the specific screen explanations). If the file already exists, the prompt "Overwrite [filename] (Y/N)" appears. In the case of **SCRIPT FILE EXECUTION**, existing files will be overwritten with no warning issued. Pressing <ENTER> with no entry in the "Name" blank exits the **SAVE** mode with no action. For the user's convenience, Altech recommends keeping a notebook by file name with all values listed.

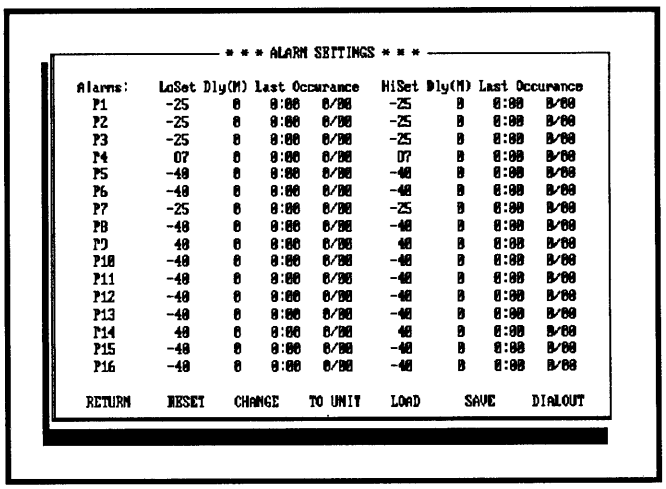


Figure D-23: Alarm Settings Screen

ALARM SETTINGS SCREEN

Before the alarm settings (**Figure D-23**) appear on the display, a read-in, "Reading Alarm Settings 1" through 8, appears on the display. The P#'s are the program reference numbers of the 64 sensors from the Analog Extension Boards, attached to the XPRT5 IO Board/P8 and P9 (See **Tables C-1 and C-3**). The values under "LoSet" and "HiSet" are the minimum and maximum alarm settings for each sensor. If a sensor reading falls below or rises above the minimum or maximum setting for the delay time, "Dly(M)" listed in minutes, the alarm will be activated.

To disable the alarm set the delay time, "Dly(M)", to "0". The time and date that the alarm was last tripped appears under "Last Occurance". An asterisk ("*")

beside a sensor's P# indicates an active alarm. To display all 64 sensors, use the <UP> and <DOWN> cursor keys.

Menu Options for Alarm Settings

RETURN [R] as stated above.

RESET <ALT> + [R] turns off all active alarms.

CHANGE [C] as stated above. The starting position for the cursor is to the left of the "LoSet" value for P1.

TO UNIT [U] as stated above.

LOAD [L] as stated above. When no extension is given, the program assumes the extension ".AL5" for this screen.

SAVE [S] as stated above. When no extension is given, the program assumes the extension ".AL5".

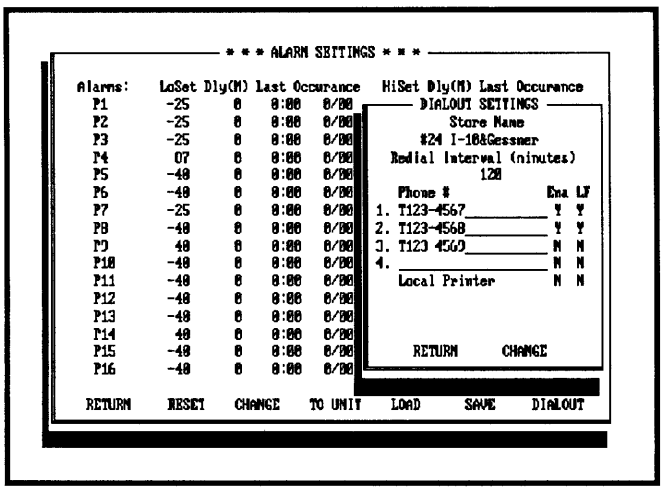


Figure D-24: Alarm Settings Screen with Dialout Settings Window

DIALOUT [D] first reads in the settings ("Reading Dialout Settings 1" and 2 appear in the window) then brings up the Dialout Settings Window (**Figure D-24**). The user may specify up to 4 phone numbers that have an alarm printer attached.

The store name, a 16 character site description, e.g. "#24 I-10 & Gessner", the XPRT5's unit name, e.g. "RACK-C MED TEMP", time and date are sent with the alarm information. Alarm information may be a probe identifier, e.g. "P11", the alarm identifier, e.g. "HIGH", and a sensor name, e.g. "Low Temp #1". Alarm information may be a compressor failure notification or other alarm identifier.

Messages are sent to each phone number which is enabled ("Ena" lists "Y") when an alarm is first triggered. If the alarm has not been manually reset (See **RESET** above) within the Redial Interval (in minutes), the alarm will be resent to all enabled phone numbers. To disable a phone number, list an "N" under "Ena". Enter a "Y" under "LF" (Line Feed) if the printer does not add a line feed after a carriage return or if an additional line feed is desired. Otherwise, enter an "N" under "LF".

CHANGE [C] inside the window allows the user to change the window's information. The starting position for the cursor is by the site description. The Redial Interval must start at 15 minutes or the alarm dialout feature is "Disabled". After pressing <ESC> to exit the **CHANGE** mode inside the window, if any changes have been made in this window, the message, "To Save Updated Settings To Unit, Enter Y" appears. Pressing "Y" sends changes made in this window to the controller. Otherwise, changes made in this window **WILL BE ABANDONED.**

Messages are sent with the same communication parameters (baud rate, number of bits, stop bits and parity) as used for dialing into the system from the XCOM Main Menu (**Figure D-1**).

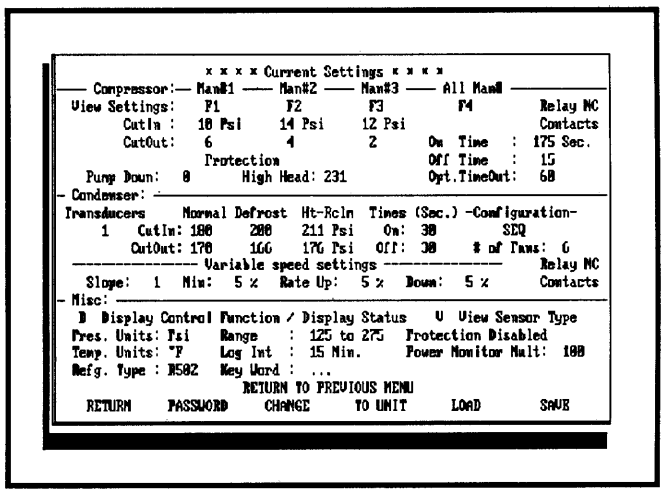


Figure D-25: Current Settings Screen

CURRENT SETTINGS SCREEN

When the current settings first appear on the display, several characters are highlighted indicating additional screens are available for viewing and changing. Descriptions of categories are found in **SECTION B: OPERATIONS, SETTINGS SCREENS AND CONFIGURATION SCREENS**. Below are screen option and menu option descriptions for the Current Settings Screen.

Screen Options for Current Settings

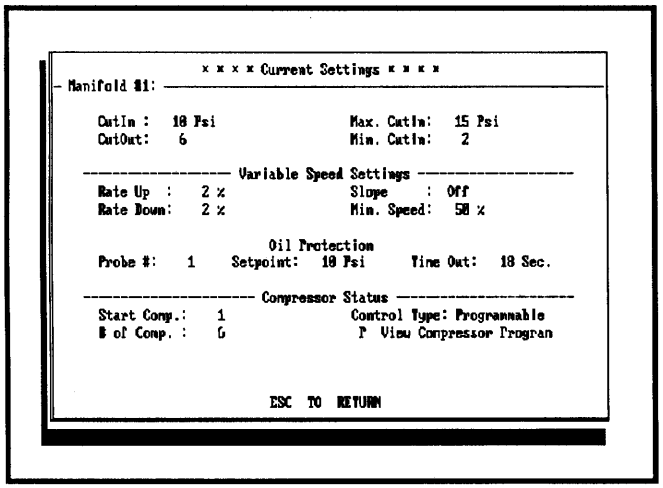


Figure D-26: Current Settings Screen for Manifold #1

<F1>, <F2> and <F3>: Current Settings Screen for Each Manifold

Each key brings up the current settings for Manifold #1 (**Figure D-26**), #2 or #3 respectively for viewing or changing when in the **CHANGE** mode. Pressing <ESC> removes this screen and returns to the Current Settings Screen (**Figure D-25**).

When the control type is "Programmable", the user may select [P], which is highlighted on the display, to view the Compressor Stage Program Window (**Figure D-27** below).

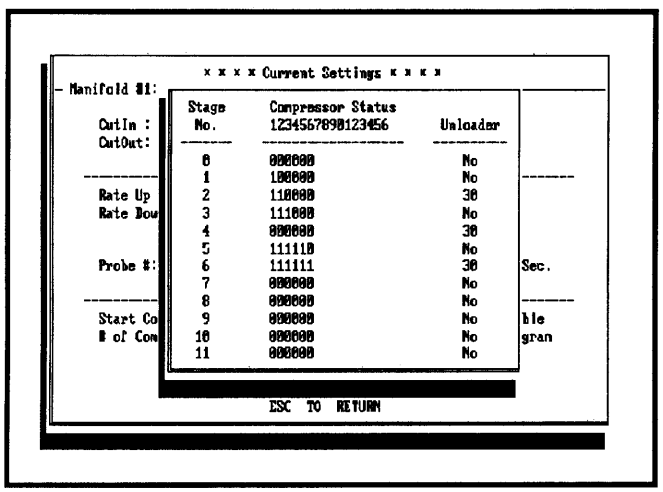


Figure D-27: Current Settings Screen for Manifold #1 with Compressor Stage Program Window

Using the <UP> and <DOWN> keys allows viewing or changing when in the **CHANGE** mode of all 24 stages (Stage No. 0 - 23). Pressing <ESC> removes this window and returns to the Current Settings Screen (**Figure D-26**) for the specified manifold.

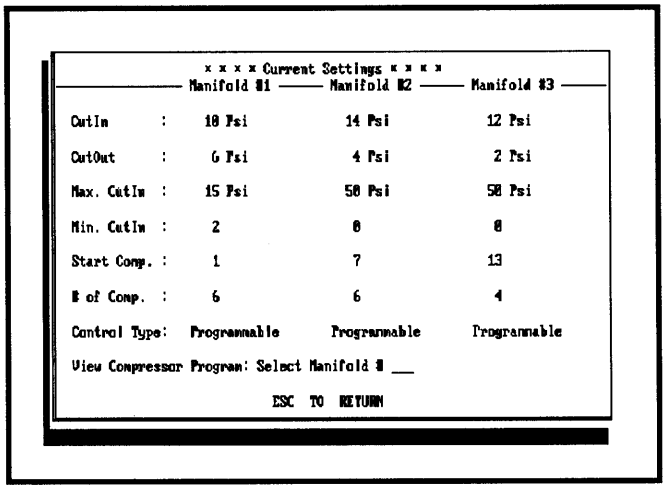


Figure D-28: Current Settings Screen for All Manifolds

<F4>: Current Settings Screen for All Manifolds

This key brings up the current settings for all manifolds (**Figure D-28**) for viewing or changing when in the **CHANGE** mode. Some additional settings are available in this screen that are unavailable in **Figures D-25** and **D-26**. Pressing <ESC> removes this screen and returns to the Current Settings Screen (**Figure D-25**).

When the control type is "Programmable", the user may view the Compressor Stage Program Window from this screen by entering the number of the manifold regardless of the cursor position, and the window in **Figure D-27** pops into view. Using the <UP> and <DOWN> keys in the window allows viewing of all 24 stages (Stage No. 0 - 23). To access this window when in the **CHANGE** mode however, the cursor MUST be positioned over the blank by "Select Manifold #", then enter the number of the manifold desired. The window pops up and is available for changes. Pressing <ESC> removes this window and returns to the Current Settings Screen for all manifolds (**Figure D-28**).

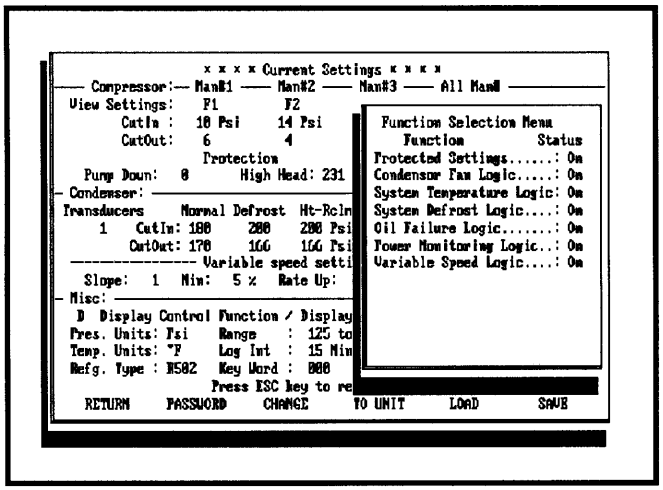


Figure D-29: Current Settings Screen with Function Selection Menu Window

[D]: Function Selection Menu Window

The status of each control function may be viewed or changed when in the **CHANGE** mode in this window (**Figure D-29**). Pressing <ESC> removes this window and returns to the Current Settings Screen (**Figure D-25**).

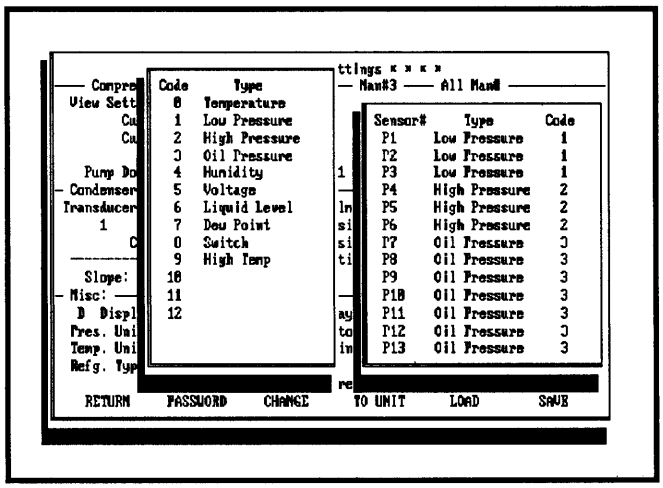


Figure D-30: Current Settings Screen with Sensor Type Selection Menu and Sensor Type Codes Windows

[V]: Sensor Type Selection Menu and Sensor Type Codes Windows

The type for each of the 64 sensors is viewed in the right window and the code for each type is displayed in the left window (**Figure D-30**). To view all 64 sensors (P1 - P64) in the right window, use the <UP> and <DOWN> keys. Pressing <ESC> removes these windows and returns to the Current Settings Screen (**Figure D-25**).

Menu Options for Current Settings

RETURN [R] as stated above. When the cursor is moved to this option, the help message "RETURN TO PREVIOUS MENU" appears.

PASSWORD [P] asks the user for the password code before allowing access to all settings for change. As the cursor is moved to this option, the help message changes to "QUALIFY THE PASSWORD". Once PASSWORD has been selected, "ENTER PASSWORD:_____" appears. Type in the three digit code (e.g. "000") and press <ENTER>. If the numbers entered match the password stored in the controller, the message "PASSWORD ACCEPTED" appears in the lower right corner of the screen and remains there until the RETURN option is executed. If the password does not match, the entry is ignored, the cursor jumps back to "RETURN", and the user is allowed to change only "CutIn" and "CutOut" settings for all manifolds when in the **CHANGE** mode. All other settings are **PASSWORD PROTECTED** and not available for change. Altech recommends entering the password before entering the **CHANGE** mode.

CHANGE [C] permits the user to change settings. All settings are available only if the correct password has been accepted. As the cursor is moved to this option, the help message changes to "MAKE CHANGES IN THE SETTINGS". CHANGE operates as stated above. The starting position for the cursor is to the left of the "CutIn" value for Manifold #1. The message placed above "CHANGE" is "Press ESC to return to menu".

All screen options mentioned above (F1, F2, F3, F4, P, D, V) are available from within the **CHANGE** mode. Values may be changed from within the manifold screens (F1 - F4) by the same method as stated above. Pressing <ESC> removes any of these screens and returns to the Current Settings Screen (**Figure D-25**).

To access the Compressor Stage Program Window (Figure D-27) from inside the Current Settings Screen for Manifold #1 <F1>, #2 <F2> or #3 <F3> (**Figure D-26**) during the **CHANGE** mode, place the cursor on the highlighted "P", type "p" and press <ENTER>. This window may also be accessed from inside the Current Settings Screen for All Manifolds <F4> (**Figure D-28**) by positioning the cursor over the blank, typing in the number of the manifold and pressing <ENTER>. The starting position for the cursor is next to the compressor

status for Stage 0. Entries under "Compressor Status" and "Unloader" may be changed. <HOME> or <PAGE UP> place the cursor in the starting position. <END> or <PAGE DOWN> place the cursor next to the compressor status for Stage 23. Pressing <ESC> removes this window and returns to the previous screen.

To access the Function Selection Menu Window (Figure D-29) from the Current Settings Screen **(Figure D-25)** during the **CHANGE** mode, place the cursor on the highlighted "D", type "d" and press <ENTER>. The starting position for the cursor is next to the status for "Protected Settings" and may be moved using the <UP> and <DOWN> keys only. To enter an "ON" status for any function, type "ON", "1" or "N". To enter an "OFF" status for any function, type "OFF", "0" or "F". Pressing <ESC> removes this window and returns to the Current Settings Screen **(Figure D-25)**.

To access the Sensor Type Selection Menu and Sensor Type Code Windows (Figure D-30) from the Current Settings Screen **(Figure D-25)** during the **CHANGE** mode, place the cursor on the highlighted "V", type "v" and press <ENTER>. The starting position for the cursor is next to the "Code" for P1 and may be moved by using the <UP> and <DOWN> keys. To change a code, place the cursor next to the left of that code, and enter the new code number for the sensor type desired (refer to the Sensor Code Window on the left); the description automatically changes. Pressing <ESC> removes these windows and returns to the Current Settings Screen **(Figure D-25)**.

Once a value has been changed in any screen or window, the new value will appear in all screens thereafter.

After all changes are made in all screen and window options, press <ESC> to exit the **CHANGE** mode, and the cursor jumps back to "RETURN".

TO UNIT [U] as stated above. As the cursor is moved to this option, the help message changes to "SAVE SETTINGS TO THE SELECTED UNIT".

LOAD [L] as stated above. When no extension is given, the program assumes the extension ".ST5".

SAVE [S] as stated above. When no extension is given, the program assumes the extension ".ST5".

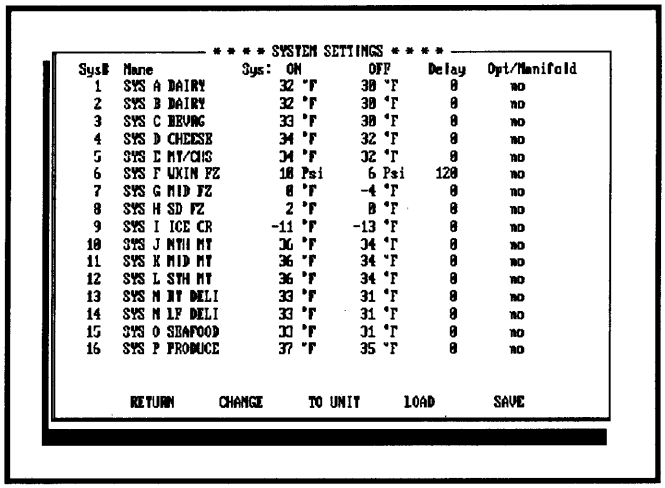


Figure D-31: System Settings Screen

SYSTEM SETTINGS SCREEN

Before the system settings **(Figure D-31)** appear on the display, a read-in, "Reading System Settings 1" and 2, appears on the display. The 32 systems are listed by number, "Sys#", and user defined name, "Name", with their time delay settings. Descriptions of other categories are found in **SECTION B: OPERATIONS, SETTINGS SCREENS AND CONFIGURATION SCREENS**. Below are menu option descriptions.

Menu Options for System Settings

RETURN [R] as stated above.

CHANGE [C] as stated above. The starting position for the cursor is to the left of the "ON" value for System 1.

TO UNIT [U] as stated above.

LOAD [L] as stated above. When no extension is given, the program assumes the extension ".SM5" for this screen.

SAVE [S] as stated above. When no extension is given, the program assumes the extension ".SM5".

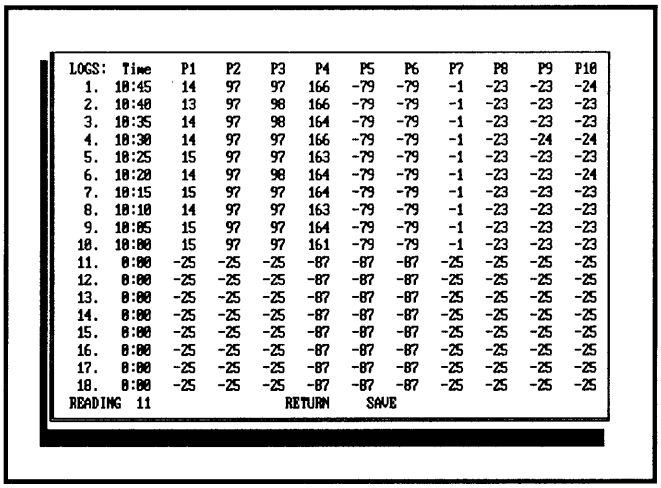


Figure D-32: Load Logs Screen

LOAD LOGS SCREEN

When the Logs Screen appears, the message "READING 0" appears in the lower left corner of the screen. As each of the 200 entries ("LOGS:") for all 64 sensors ("P1" - "P64") is read, the time, logs and total capacity appear on the screen for viewing, and the "READING" number changes from 1 to 200. The total capacity, "CAP", is found to the far right of the sensors. In other screens, such as Current Settings/Compressor Stage Window (**Figure D-27**), the compressors are shown as a 16-bit binary number, with "0" representing a compressor which is off and "1" representing one which is on. In this screen, "CAP" lists a decimal representation of that 16-bit binary number.

Binary Representation of Compressor Status 1234567890123456	Decimal Representaion of Compressor Status CAP
111101	47

The user may move around the screen at any time by using the <RIGHT> and <LEFT> keys to scroll through the sensors, and the <UP>, <DOWN>, <PAGE UP>, <PAGE DOWN>, <HOME> and <END> keys to scroll through the 200 log entries. <END> moves directly to the 200th log line, and <HOME> returns to the first log line. Moving around the screen before all 200 logs have been read causes a momentary pause in reading. When the screen position has stablized, the reading continues.

Logs are stored from the most recent to the oldest. Therefore, as new logs are taken, the oldest (201st) will drop off, all others will move up one position (from 1 to 2, 2 to 3, etc.) and the newest log will enter the number "1" position. The log interval is set in the Current Settings Screen (**Figure D-25**).

Menu Options for Logs

Due to the nature of this screen, the cursor keys do not work in the menu bar. Menu options must be accessed through the keyboard with the letter keys.

RETURN [R] as stated above.

SAVE [S] as stated above. When no extension is given, the program assumes the extension ".LG5". Additionally, a **SAVE** may be executed at any time while logs are being read in or after all logs have been read in, but only the values of those logs which have been read in will be valid. All other entries will be saved as the default settings for "0:00" time (see **Figure D-32: Load Logs Screen, line 18**).

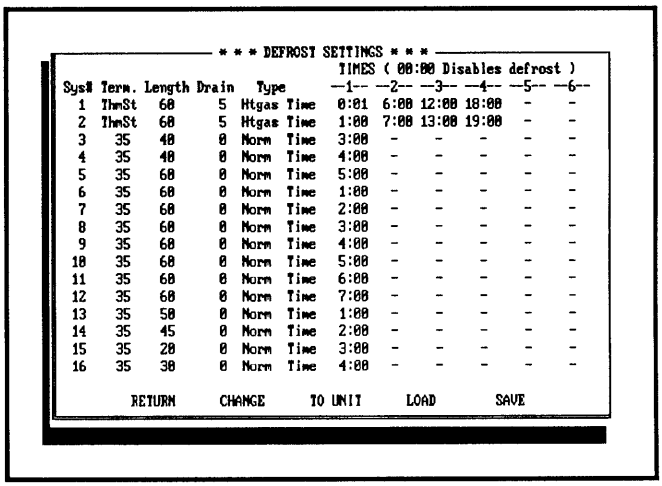


Figure D-33: Defrost Settings Screen

DEFROST SETTINGS SCREEN

Before the defrost settings (**Figure D-33**) appear on the display, a read-in, "Reading Defrost Settings 1" through 8, appears on the display. All 32 refrigeration circuits may be viewed by using the <UP> and <DOWN> keys. Descriptions of categories are found in **SECTION B: OPERATIONS, SETTINGS SCREENS AND CONFIGURATION SCREENS.**

Menu Options for Defrost Settings

RETURN [R] as stated above.

CHANGE [C] as stated above. The starting position for the cursor is to the left of the "Term." value for refrigeration circuit 1. In this screen, <HOME> places the cursor under the value for "Term." in the current line, and <END> places the cursor by the hours for Time 1 in the current line.

Under "Term.", any temperature may be entered. A temperature over 80, "t" or "ThmSt" will enter "ThmSt" for a thermostat controlled termination time. Any number of minutes may be entered under "Length" and "Drain". "Type" may be "Norm" or "HtGs". Hours and minutes must be entered separately under "TIMES". Hours may not exceed "23", and minutes may not exceed "59". To disable a defrost, set the time to "00:00".

TO UNIT [U] as stated above.

LOAD [L] as stated above. When no extension is given, the program assumes the extension ".DF5" for this screen.

SAVE [S] as stated above. When no extension is given, the program assumes the extension ".DF5".

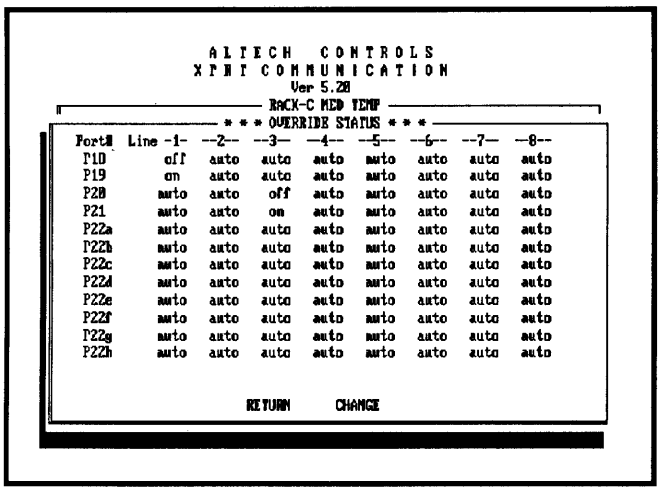


Figure D-34: Output Override Status Screen

OUTPUT OVERRIDE STATUS SCREEN

Before the override status for the outputs (**Figure D-34**) appear on the display, a read-in, "Reading Override Array", appears on the display. The P#'s, "Port#", refer to connectors on the XPRT5 IO Board and Digital Expansion Boards which are assigned as follows (See **Figures C-10 and C-14**):

P18:	Compressors 1 - 8
P19:	Compressors 9 - 16
P20:	Condensers 1 - 8
P21/Lines 1 - 4:	Condensers 9 - 12
P21/Lines 5 - 7:	Not Assigned
P21/Line 8:	Alarm
P22a:	Refrigeration Relays 1 - 8
P22b:	Refrigeration Relays 9 - 16
P22c:	Defrost Relays 1 - 8
P22d:	Defrost Relays 9 - 16
P22e:	Refrigeration Relays 17 - 24
P22f:	Refrigeration Relays 25 - 32
P22g:	Defrost Relays 17 - 24
P22h:	Defrost Relays 25 - 32

For additional information about these ports, see **SECTION B: OPERATIONS, SETTINGS SCREENS AND CONFIGURATION SCREENS** and **SECTION C: INSTALLATION.**

Menu Options for Override Status

RETURN [R] as stated above.

CHANGE [C] as stated above. The starting position for the cursor is to the left of the first output value for P18. In this screen, <HOME> places the cursor by the first output value for P18, and <END> places the cursor by the first output value for P22h. To enter an "ON" status for any output, type "on" or "N". To enter an "OFF" status for any output, type "off" or "F". To enter an "AUTO" status for any output, type "auto" or "A". After pressing <ESC> to exit the **CHANGE** mode, if any changes have been made in this screen, the message, "To Save Updated Settings To Unit, Enter Y" appears. Pressing "Y" sends the changes to the controller. Otherwise, changes made in this screen **WILL BE ABANDONED.**

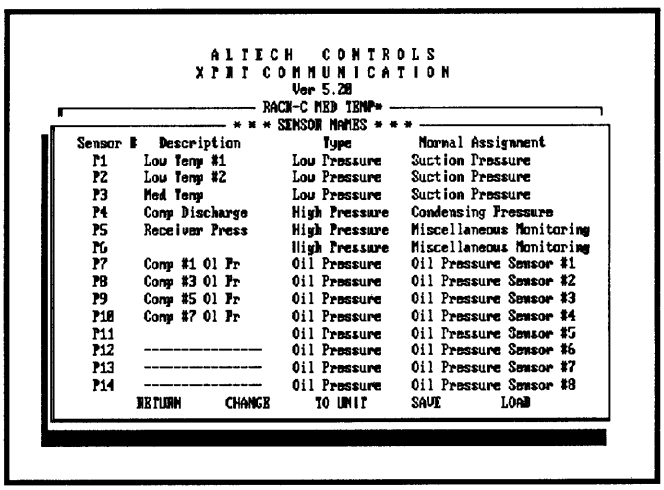


Figure D-35: Sensor Names Screen

SENSOR NAMES SCREEN

The P#'s, "Sensor #", in **Figure D-35** are the program reference numbers of the 64 sensors from the Analog Extension Boards, attached to the XPRT5 IO Board/P8 and P9 (See **Tables C-1 and C-3**). Use the <UP> and <DOWN> keys to view all 64 sensors.

Menu Options for Sensor Names

RETURN [R] as stated above.

CHANGE [C] as stated above. In this screen, the message "Press ESC key to exit" replaces the menu bar. The starting position for the cursor is at the 16 character description for P1. <HOME> places the cursor in its starting position, and <END> places the cursor at the 16 character description for P64. The description is the only changeable item in this screen, therefore the <RIGHT> and <LEFT> keys are not used to move about the screen.

TO UNIT [U] as stated above.

SAVE [S] as stated above. When no extension is given, the program assumes the extension ".NM5".

LOAD [L] as stated above except for directory selection of a file and exiting this mode. When no extension is given, the program assumes the extension ".NM5" for this screen. When "Name:_____" appears and <ENTER> is pressed with nothing typed, a directory box will appear on the right side of the screen. To access the file list, use the <UP> and <DOWN> keys. The highlighted file name automatically appears in the "Name" blank as scrolling occurrs. Pressing <ENTER> loads the highlighted file. Pressing <ESC> at any time exits the **LOAD** mode with no action.

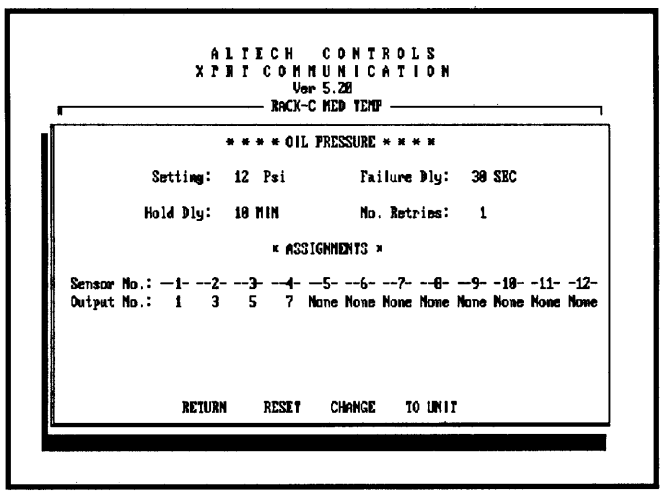


Figure D-36: Oil Pressure Screen

OIL PRESSURE SCREEN

The oil pressure parameters which may be viewed and changed in this screen are breifly described below.

Setting: the minimum oil pressure (8 - 30) that must be maintained

Failure Dly: the time (15 - 240 sec, incremented by 5) which the compressor may operate when its oil pressure is below the "Setting" value

Hold Dly: the time (1 - 45 min) which the compressor is held off before it is allowed to restart

No. Retries: the number of times (0 - 5) the compressor is allowed to restart before it is marked as failed

Sensor No.: the number (1 - 12) of the oil pressure probe corresponding to the connector number (P7 - P18) from the Analog Extension Board attached to the XPRT5 IO Board/P9 (See **Table C-1**); this category is not changeable

Output No.: the number (1 - 16) of the compressor assigned to the sensor probe listed directly above. If an oil pressure probe is not used for oil failure, enter "none" or "0".

Menu Options for Oil Pressure

RETURN [R] as stated above.

RESET <ALT> + [R] restarts a compressor which has been shut off due to oil failure. The prompt "Enter Sensor to reset:__" appears above the menu bar. Type in the Sensor Number (1 - 12) of the oil pressure transducer (found over the Output Number of the compressor), and press <ENTER> to restart it. Pressing <ENTER> with no number typed exits this option with no action.

CHANGE [C] as stated above. The starting position for the cursor is to the left of the value for "Setting". In this screen, <HOME> places the cursor in its starting position, and <END> places the cursor by the output number for Sensor No. 12. See parameter descriptions above for the range of entries for each parameter.

TO UNIT [U] as stated above.

SCRIPT FILE

A script file contains a list of commands for XCOM to execute automatically. It provides the same utility in XCOM as a batch file provides in DOS. A script file may be the most efficient method to accomplish frequently used, routine operations. The user can start a script file operation then go about his other tasks until XCOM has completed routine jobs such as copying logs to files from several units or sites.

Several simple rules must be followed in storing, creating and executing a script file.

File Storage

- Script files are easiest to access when they are stored in the same directory with the XCOM program. When executing a script file which is not stored in the same directory as the XCOM program, the path must be entered as well, e.g. "C:\wordstar\<filename>.SCR".
- SCRIPT FILES MUST BE SAVED WITH THE "**.SCR**" EXTENSION.
- Script files must be in ASCII format for XCOM use. Most word processors have a SAVE feature to store a file in ASCII format if the normal SAVE operation in that program does not. Refer to the word processor's reference manual to discover this process. DOS's EDLIN creates files in ASCII format.

File Creation

DS3	{Dial - from the Speed dial directory – the 3rd listing}
U1	{select Unit - number 1}
LSA:FZR1	{Load logs - Save to filename A:FZR1}
RU2	{Return - select Unit - number 2}
LSA:FZR2	{Load logs - Save to filename A:FZR2}
RRH	{Return from load log screen – Return from XPRT5 General Status Screen – Hang up the phone}
(or **RRQ**)	{Return from load log screen – Return from XPRT5 General Status Screen –Hang up the phone & Quit XCOM}

Example D-1: Script File (Refer to the appropriate screens)

- A script file starts from the XCOM Main Menu (**Figure D-1**).
- Alpha-numeric keyboard characters must be entered one after the other (i.e. insert NO SPACES to separate commands) on a single line using <ENTER> ONLY when it would be used within XCOM to complete an operation.
- A script file MUST NOT include comments. In Example D-1, the bracketed "{}" comments are for instruction purposes ONLY.
- ONLY XPRT1 Controllers can insert printer control characters.

DOS Command Line Execution

- A script file may be executed from a DOS command line once inside the directory where XCOM is stored.

  C:\>cd xcom <ENTER>

  C:\XCOM\>XCOM <**filename**>.SCR <ENTER>

- The ".SCR" extension MUST be included in the command statement. This calls XCOM and starts the script file. This may be useful for 24 hour log observation or other operations which must be monitored around the clock.

SECTION E: SERVICING

GENERAL SYSTEM CHECKOUT

1. Before Attempting to Service:

Review all sections of this manual to become familiar with the operation, specifications, and application requirements of the XPRT5 controller.

2. Is the Power at the Correct Level?

The supply voltage on the XPRT5 IO Board at P14 should be between 22 and 26 VAC.

3. Is the Fuse Blown?

The XPRT5 IO Board requires a 5Amp 32V fuse (F1). Exchange only with exact replacement: Littelfuse #303 005 – 7AG 3Amp 32V.

4. Determine If the Problem Is in the Hardware, Application or System:

One clue is to compare the indicated compressor, condenser fan, liquid line and defrost valve positions with their respective statuses indicated on the display. When the displayed status and the actual status agree, the problem is probably because of mis-application, improper configuration or incorrect settings. If the statuses disagree, hardware problems are indicated.

Another clue is to compare the indicated system pressures and fixture temperatures from the display with actual pressures and temperatures. As above, when these agree, the problem is likely due to mis-application, improper configuration or incorrect settings. If they disagree, the problem may lie in the hardware.

5. Mis-Application, Improper Configuration or Incorrect Settings Type Problems:

Some screens to check are:

Oil Failures in S-0
Compressor Cutin Setting in S-7
Suction Head Limit in C-1
Compressor Turn-On Time in C-2
Compressor Configuration in C-3
Relay Contact Type in C-6
Low Voltage Protection in C-10
Variable Speed Settings in C-11
Override Status in C-17
Disabled Functions in C-18

6. Some Typical Hardware Problems:

a. Check connectors!

- Verify that cable connectors are properly seated in their headers and that Pin 1 of the cable connector is in the Pin 1 position of the header for the following cables:

CPU40 (P1) to Display (header-right side of board)
CPU40 (P2) to XPRT5 IO (P16)

b. The actual compressor status does not match the status displayed on the screen:

- Confirm that the compressor and/or condenser fan relays are wired correctly to operate from normally open (NO) or normally closed (NC) contacts on the board (See **Section C** of this manual). Check that the Relay Configuration Screen C-6 agrees.

- Check that the P# is written on each CRX Relay Cable's Connector and that each is in its correct location on the XPRT5 IO Board (See **Table C-4**). Next, to isolate a faulty cable, temporarily replace each, one at a time, with a known good cable. If the cables are all right, temporarily replace each CRX Relay Board, one at a time, until the defective part is isolated.

c. Pressure and temperature readings are incorrect:

- Disconnect all transducers and temperature sensors, then reconnect them one at a time to determine if they are still reading incorrectly.

- If only one pressure transducer or temperature sensor is incorrect, try that item at another location of the same type. If the item is faulty, it will

not work in the new location and must be replaced. Transducers can not be re-calibrated in the field. Pressure transducers should be returned without their cables cut off for warranty credit. If the transducer or sensor works, the problem is elsewhere in the XPRT5.

- The TM-1 thermistor temperature sensor will read approximately 3000 ohms at 77°F. Its resistance will increase in a non-linear manner with a decrease in temperature. Its resistance at 32°F will be approximately 10,000 ohms. Other readings indicate the TM-1 is faulty and requires replacement.

d. Problems within the XPRT5:

- Use the swapping method to determine if the CPU40 Board (located on door) or the XPRT5 IO Board (located in the bottom of the XPRT5 enclosure) is defective (See the **CPU40** and **XPRT5 IO Board Field Replacement Procedures** which follow). Each board can be swapped, one at a time, with a known good board to determine if the problem follows the circuit board or stays with the original XPRT5. The XPRT5 IO Board has the power supply, the analog to digital circuitry, the relay driving circuits and the analog output voltage circuit. All other functions are performed by the CPU40 Board.

7. Trouble Diagnosing the Problem?

Contact Altech at the number on the title page of this manual. If a modem is connected, we may contact the problem XPRT5 directly through our communications software. Before calling us, please have the following information available:

- The modem's telephone number
- The communication parameters:

  Unit #
  Baud rate

- The password
- The date code of the XPRT5's control program. (Found on the memory chips located at U7 and U8 of the CPU40 Board.)

8. If a Part is Defective:

Contact Altech to arrange for a replacement. When returning a part, be sure to follow the **Defective Part Replacement Procedure** later in this section.

SERVICE PART NUMBERS

Service part numbers correspond to new part numbers but are preceded by an "R". These parts may be re-manufactured. The following are supplied only as repair parts:

45017	CPU40 Circuit Board (with TD32 Software installed)
45018	XPRT5 IO Circuit Board (mounted on aluminum plate)
42029	LCD Display (40 Character by 2 line)
45016	TD32 Software EPROM set (for insertion at U7 & U8 on the CPU40)

NOTE: The following **Field Replacement Procedures** require removing the power from the XPRT5 for approximately 5 minutes while the boards or chips are being replaced. No special jumpering is required if the compressor operation is not critical during the shutdown period of 5 minutes. For critical applications, the **Override Protection Procedure** below will maintain compressor operation. Otherwise, all compressor outputs will be energized, if normally closed (NC) contacts are used, or de-energized, if normally open (NO) contacts are used.

OVERRIDE PROTECTION PROCEDURE

To maintain refrigeration during the shutdown period of 5 minutes, observe the compressors that are currently running and override the system to maintain those compressors' operation.

1. If the compressor contactors are powered from the NC contacts on the CRX Board, remove the control lines from those relays for any compressor that will be off during the shutdown period.
2. If the compressors are powered from the NO contacts on the CRX Board, remove the control lines from the NO contact. Place them onto the NC contact ONLY FOR THOSE COMPRESSORS WHICH NEED TO CONTINUE OPERATION during the shutdown period.

CPU40 FIELD REPLACEMENT PROCEDURE

1. Remove 24 VAC power from the XPRT5 by disconnecting the edge connector at P14 on the XPRT5 IO Board. This will remove power to all the CRX Relay Boards as well.

2. Be sure all cables are properly identified with the P# on the connector or tag. Then remove all the XPRT to CRX Relay Cables connected to the Board at locations P18 – P22.

3. Remove the 60 conductor flat ribbon cable connector from it's mating connector (P16) on the XPRT5 IO Board (left side). CAUTION: Pull evenly so as not to bend the pins when the connector releases from the board.

4. Remove the 14 conductor flat ribbon cable connector from its mating connector on the Display Board (right side).

5. Remove the 4 screws holding the CPU40 Board to the hinged door.

6. Attach the new CPU40 Board to the hinged door by loosely installing two diagonally opposed corner screws. Adjust the board's position, aligning the other two mounting holes before inserting their mounting screws. The board may bow slightly when the mounting screws are tightened.

7. Reinstall both the 60 and 14 conductor flat ribbon cables to their respective connectors (see Steps 3 & 4 above).

8. Restore 24VAC power to the XPRT4 by replacing the connector at P14 on the XPRT5 IO Board.

9. The XPRT5 should be operating correctly.

10. Configuration Settings can be retained from the old CPU40 if the EPROMs are compatible – that is, the old U6 memory chip compatible with the new U7 and U8 memory chips. Check the paperwork from the new CPU40 Board for compatibility eligibility.

    a. If the old U6 memory chip is compatible, gently and carefully swap the U6 chips according to the guidelines in the **Memory Chip Field Replacement Procedure** later in this section. Keep in mind, this is not a difficult task, but it is a delicate one!

       Restore power to the XPRT5 (see Step 8 above).

       If the display shows System Temperatures after a minute or so, the program is running properly and the previous Configuration Settings have been retained.

    b. If the memory chips are incompatible, your Configuration Settings must be reinstalled.

       1) Retrieve your **Configuration and Settings Forms** from the pocket inside the control cabinet in the control room.

2) Press the "DOWN" key until the display reads "Initializing EEPROM". Release the "DOWN" key.

3) Wait 2 minutes or so until the display reads "Complete". Screen S-1 will appear and settings may be reinstalled. Refer to your **Configuration and Settings Forms** and **Section B** of this manual for screen explanations.

11. Verify all the settings.

12. Remove 24 VAC power from the XPRT5 (see Step 1 above). Reconnect all the CRX Relay Cables to their correct location on the XPRT5 IO Board (note the P# on each cable's connector or tag).

13. If the **Override Protection Procedure** was followed, restore the CRX Boards to thier original wiring to remove the override protection.

14. Restore power to the XPRT5 (see Step 8 above). If the controller is not operating properly, please call Altech at the number on the title page of this manual.

15. Carefully pack the old CPU40 Board. Be sure the memory chips you are not using are placed in their correct sockets at U6, U7 and U8 on the board being returned. Follow the **Memory Chip Field Replacement Procedure** for seating them in their sockets. Use the same package in which the new CPU40 Board was shipped and return it to Altech for credit as soon a possible within 30 days.

XPRT5 IO FIELD REPLACEMENT PROCEDURE

1. Remove 24 VAC power from the XPRT5 by disconnecting the edge connector at P14 on the XPRT5 IO Board. This will remove power to all the CRX Relay Boards as well.

2. Remove the 60 conductor flat ribbon cable connector from it's mating connector (P16) on the XPRT5 IO Board (left side). CAUTION: Pull evenly so as not to bend the pins when the connector releases from the board.

3. Be sure all cables are properly identified with the P# on the connector or tag. Then remove all cables from the XPRT5 IO Board.

4. Remove the 4 large screws holding the ALUMINUM MOUNTING PANEL to the bottom of the XPRT5 enclosure.

5. Replace the old XPRT5 IO assembly with the new assembly.

6. Reinstall the 60 conductor cable and all other cables except P14 to their correct positions (note the P# on the connector or tag).

7. Restore 24VAC power to the XPRT5 by replacing the connector at P14 on the XPRT5 IO Board. The control's display should show the top screen of your software within 10 seconds. The time, date and all the settings should not be affected by this board change.

8. If the **Override Protection Procedure** was followed, restore the CRX Boards to thier original wiring to remove the override protection.

9. Restore power to the XPRT5 (see Step 7 above). If the controller is not operating properly, please call Altech at the number on the title page of this manual.

10. Carefully pack the old XPRT5 IO Board using the same package in which the new XPRT5 IO Board was shipped and return it to Altech for credit as soon a possible within 30 days.

MEMORY CHIP FIELD REPLACEMENT PROCEDURE

There are three memory chips, U6, U7 and U8, mounted in sockets on the CPU40 Board which define the personality of the controller. The memory chips at locations U7 and U8 (See **Figure E-1**) store the program which the CPU40 runs. Periodically the program will change to improve operation or add features. These program changes can be added to existing controllers by changing the memory chips at U7 and U8. The label on each EPROM chip has the name of the program stored within (XPRT5-TD32 A or B), the location (U7 or U8) and the revision date. The later the date, the more current the revision.

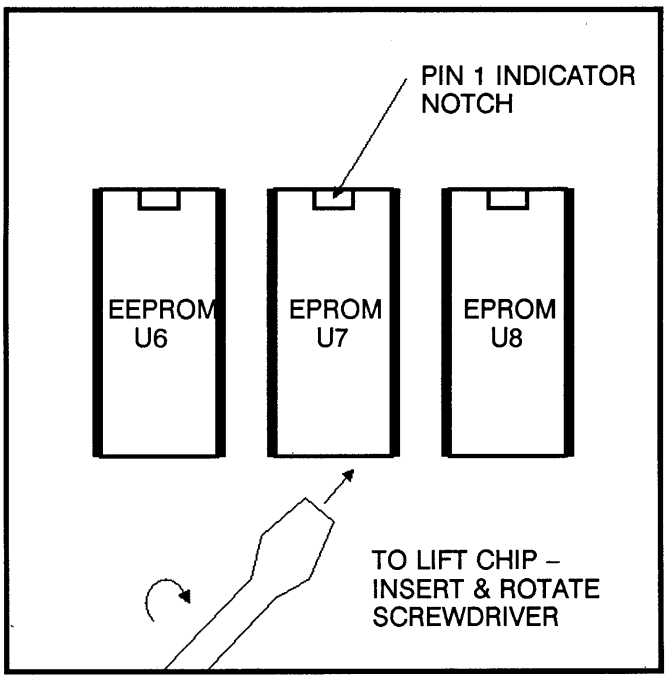


Figure E-1: Memory Chip Location

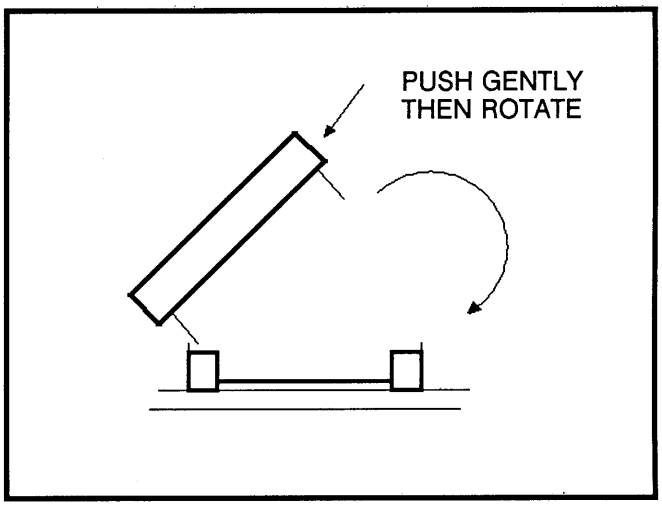


Figure E-2: Seating Chip in Socket

The third memory chip located at U6 (See **Figure E-1**) is an EEPROM (E Squared PROM). It stores the settings, schedules, configuration, communication parameters and sensor names entered by the user of the XPRT5 controller. Since this chip does not need power to retain the stored values, it may be moved from one XPRT5-TD32 to another XPRT5-TD32 with a compatible revision level to transfer the settings. Check the paperwork from the new memory chips for compatibility eligibility. This feature is also very useful when starting up a controller lacking communications. See **Section C, System Start-Up Procedure**.

Please keep in mind, chip removal and replacement are not a difficult tasks, but they are delicate ones!

1. Remove 24 VAC power from the XPRT5 by disconnecting the edge connector at P14 on the XPRT5 IO Board. This will remove power to all the CRX Relay Boards as well.

2. The legs of the memory chip are slightly wider than the socket holes to ensure contact when installed. Therefore, care must be taken when placing the chip into or out of its socket to avoid breaking or bending the legs. Also, it is best to remove and install one location at a time to avoid incorrect placement on the CPU40 Board.

a. To remove a chip from its socket:

   Gently and evenly pry the chip from its socket, insert a screwdriver under the chip. Use a single rotating motion to lift the chip. Repeat this action, alternating at the top and bottom of the chip, until the chip is free.

b. To seat a chip into its socket:

   1) Place the chip over the socket with the Pin 1 Indicator notch (see **Figure E-1**) at the top.

   2) Line up the legs of the left side of the chip with the holes on the left side of the socket. Be sure the bottom leg is aligned with the bottom socket hole for correct Pin-to-Pin location.

   3) Very gently press the legs against the side of the socket so the legs on the right side will insert easily. (See **Figure E-2**)

   4) Lower the right side onto the socket with a slight rotating motion.

   5) After verifying that all legs are in the proper socket holes, gently and evenly press the chip into the socket.

3. If chips are being changed as part of the **CPU40 Field Replacement Procedure** return to that procedure at this time.

4. Restore 24VAC power to the XPRT5 by replacing the connector at P14 on the XPRT5 IO Board. Verify that the XPRT5 is running properly.

5. If the **Override Protection Procedure** was followed:

   a. Remove 24VAC power from the XPRT5 (see Step 1 above).

   b. Restore the CRX Boards to thier original wiring to remove the override protection.

   c. Restore power to the XPRT5 (see Step 4 above). If the controller is not operating properly, please call Altech at the number on the title page of this manual.

6. Carefully pack the old chips. Use the same package in which the new chips were shipped and return them to Altech for credit as soon as possible within 30 days.

DEFECTIVE PART REPLACEMENT PROCEDURE

When ordering parts from Altech for warranty or non-warranty service, the procedure below must be followed to assure expeditious handling.

1. Call Altech at the number on the title page of this manual. Request a RETURN MATERIAL ORDER (RMO) number. Please have the following information ready:

   - Original Purchaser
   - Model Number (Part Number)
   - Store Name & Address
   - Billing & Shipping Address
   - Service Company involved
   - Date of installation
   - Name & Phone Number of an individual for Altech to contact
   - Purchase Order Number

2. After Altech authorizes a return, for warranty or non-warranty items, Altech must receive the defective part within **30 DAYS** from the date of shipment of the replacement part. Otherwise, an invoice will be generated at the new price for that part. An **RMO TAG** must be attached to each item returned for warranty or service replacement.

   - Please include a brief but detailed description of the problem or your major complaint with the defective part. "Defective" or "Bad" is not enough information to properly repair the item.

ORDERING INFORMATION

The XPRT5-TD32 Controller is ordered as separate components. To use any of the controller's software features, the appropriate transducers, sensors, relay boards and cables must be ordered. See the **Installation Section** for details on which parts are required for a specific installation.

FOR A TYPICAL SYSTEM with 3 suction groups and 16 compressor outputs, order the following:

Qty	Part Number	Description
1	45000	XPRT5-TD32/3 Pressure/ Defrost Controller
3	41069	LPTX2 Low Pressure Transducer – Suction Pressure
1	45003	Analog Extension Board
1	45006	Analog Extension Cable (8 ft)
2	41133	CRX8i Relay Board
2	41115	XPRT to CRX8 Cable (8 ft)
1	40058	24 Volt Class 2 Transformer 120/208/240VAC/40VA
1	41113	Transformer Connect Cable (8 ft)

TO ADD 12 OUTPUTS FOR CONDENSER FAN CONTROL WITH ONE VARIABLE SPEED STAGE:

1	41070	HPTX2 High Pressure Transducer
2	41133	CRX8i Relay Board
2	41115	XPRT to CRX8 Cable (8 ft)
1	41105	Analog Output Cable (8 ft)

TO ADD 32 DEFROST CIRCUITS, 32 OPTIMIZERS AND 32 TEMPERATURE CONTROLLERS FOR LIQUID LINE SOLENOIDS:

1	45003	Analog Extension Board
1	45006	Analog Extension Cable
32	41061	TM-1 Temperature Sensor
2	45004	Digital Expansion Board
8	41133	CRX8i Relay Board
1	45007	Digital Expansion Cable (8 ft)
9	45008	Digital Expansion to CRX Cable (1 ft)

TO ADD 3 VARIABLE SPEED CONTROLS WITH OIL FAILURE PROTECTION:

3	45005	DPTX Differential Oil Pressure Transducer
3	41105	Analog Output Cable (8 ft)

TO ADD POWER MONITOR & BROWNOUT PROTECTION (440 VOLT):

1	41055	XPRT Power Monitor 440V-480V
2	41054	Current Transformer 300:5
1	41112	Power Monitor Voltage Cable (8 ft)
1	41120	Power Monitor Counter Cable (8 ft)

TO ADD REMOTE COMMUNICATIONS:

1	45009	XPRT5 Communications Diskette
	FOR RS422 NETWORK	
1	41066	Modem to Network Interface – RS422 to RS232C
1	41086	RS422 Network Connection Cable (10 ft)
1	41110	Network Cable – 4-wire, shielded (100 ft)
1	41111	Network Crimping Plugs (Bag of 25)
	FOR RS232 NETWORK	
1	41011	RS232 Network Connection Cable (10 ft)
1	41047	RS232 Expansion Communication Cable (8 ft)

Note: Section D: Communications is part of XPRT5 Installation and Service Manual

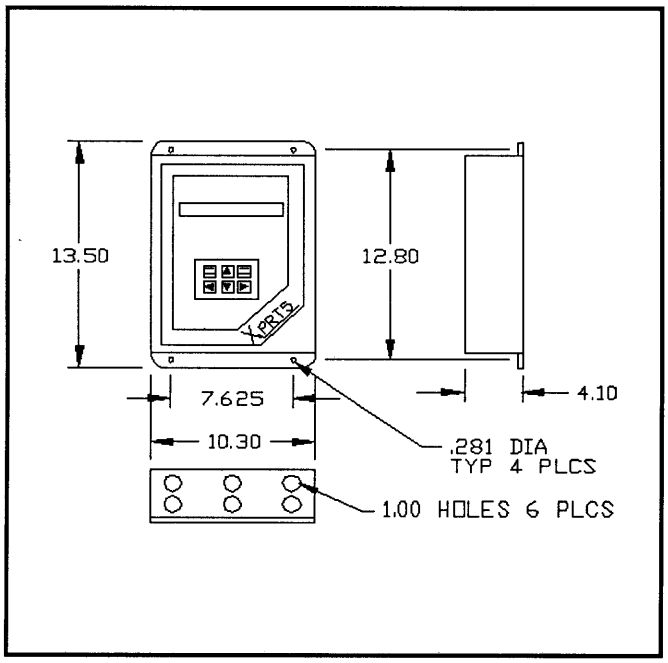
COMPONENTS AND ACCESSORIES:

Part Number	Description
45001	XPRT5 - TD32/1 – 1 Suction Group
45002	XPRT5 - TD32/2 – 2 Suction Groups
45003	Analog Extension Board
45004	Digital Expansion Board
41140	Dew Point Sensor
41135	CRX1 Alarm Relay Board
41004	CRX4 Relay Board
41116	CRX8 Relay Board
41133	CRX8i Relay Board – each circuit individually fused
41069	LPTX2 Low Pressure Transducer – Suction Pressure
41070	HPTX2 High Pressure Transducer – Head Pressure
45005	DPTX Differential Oil Pressure Transducer
41061	TM-1 Temperature Sensor
41048	XPRT Power Monitor 220V-240V
41055	XPRT Power Monitor 440V-480V
41052	Current Transformer 100:5
41053	Current Transformer 200:5
41054	Current Transformer 300:5
40058	24 Volt Class 2 Transformer 120/208/240VAC/40VA
45009	XPRT5 Communications Diskette (5 1/4")
45010	XPRT5 Communications Diskette (3 1/2")
41126	Modem 1200 Baud
41006	XPRT to CRX4 Cable (8 ft)
41005	CRX4 to CRX4 Cable (1 ft)
41039	CRX4 to CRX4 Cable (8 ft)
41115	XPRT to CRX8 Cable (8 ft)
41113	Transformer Connect Cable (8 ft)
41112	Power Monitor Voltage Cable (8 ft)
41120	Power Monitor Counter Cable (8 ft)
41105	Analog Output Cable – Variable Speed Output (8 ft)
41108	XPRT2, 4 & 5 Liquid Level Adaptor
41103	Digital Input Cable (8 ft)
40211	TM-1 Sensor Cable – shielded pair (100 ft)
45006	Analog Extension Cable (8 ft)
45007	Digital Expansion Cable (8 ft)
45008	Digital Expansion to CRX Cable (1 ft)
41086	RS422 Network Connection Cable (10 ft)
41066	Modem to Network Interface – RS-422 to RS-232C
41110	Network Cable – 4-wire, shielded (100 ft)
41111	Network Crimping Plugs (Bag of 25)
45011	Installation & Service Manual for the XPRT5-TD32 Pressure and Defrost Controller

SECTION F: SPECIFICATIONS

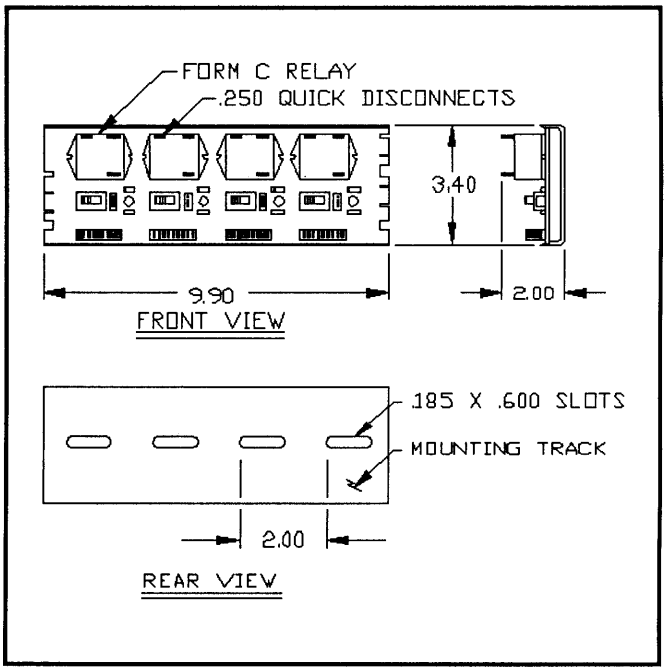
XPRT5 CONTROLLER SPECIFICATIONS

Ambient Temperature:	35 to 125°F
Ambient Humidity:	0 to 90% RH
Controller Input Voltage:	22-26 VAC
Controller Power:	50 VA
Communication Ports:	1 RS422 1 RS232
Weight:	8.0 lbs
Enclosure:	NEMA 1



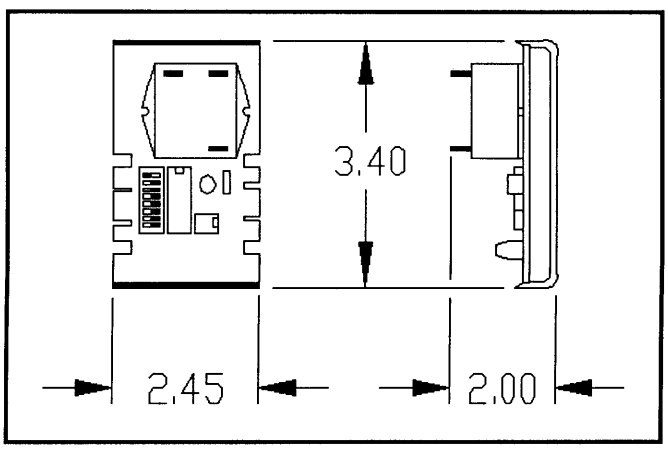
CRX4 RELAY BOARD SPECIFICATIONS

Ambient Temperature:	45 to 125°F
Ambient Humidity:	0 to 90% RH
Weight:	0.5 lb
Number of Relays:	4 Each
Contact Arrangement:	1 Form C per Relay
UL Contact Rating (NC):	10 Amp Inductive Load @ 240V 1/2 HP @ 240 VAC



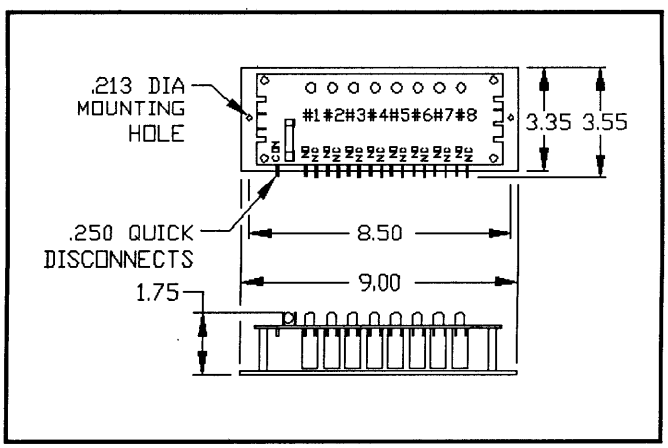
CRX1 RELAY BOARD SPECIFICATIONS

Ambient Temperature:	45 to 125°F
Ambient Humidity:	0 to 90% RH
Weight:	0.2 lb
Number of Relays:	1 Each
Contact Arrangement:	1 Form C per Relay
UL Contact Rating (NC):	10 Amp Inductive Load @ 240V 1/2 HP @ 240 VAC



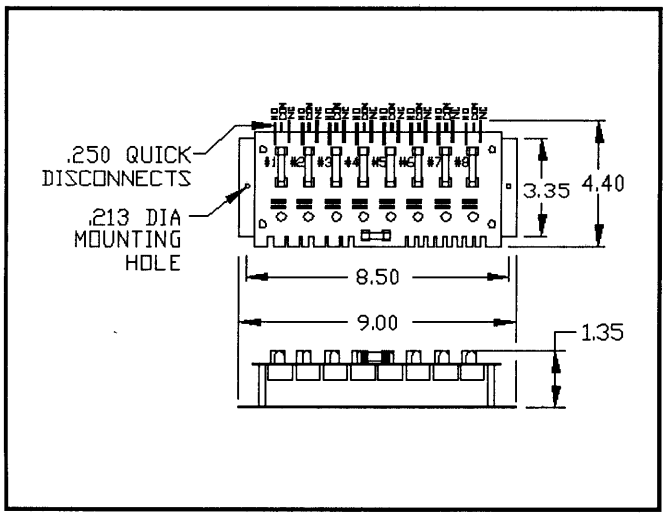
CRX8 RELAY BOARD SPECIFICATIONS

Ambient Temperature:	45 to 125°F
Ambient Humidity:	0 to 90% RH
Weight:	1.5 lbs
Number of Relays:	8 Each
Contact Arrangement:	1 Form C per Relay
Contact Rating:	50 VA @ 240 VAC Pilot Duty
Fuse Size:	5 A Common for 8 Relays



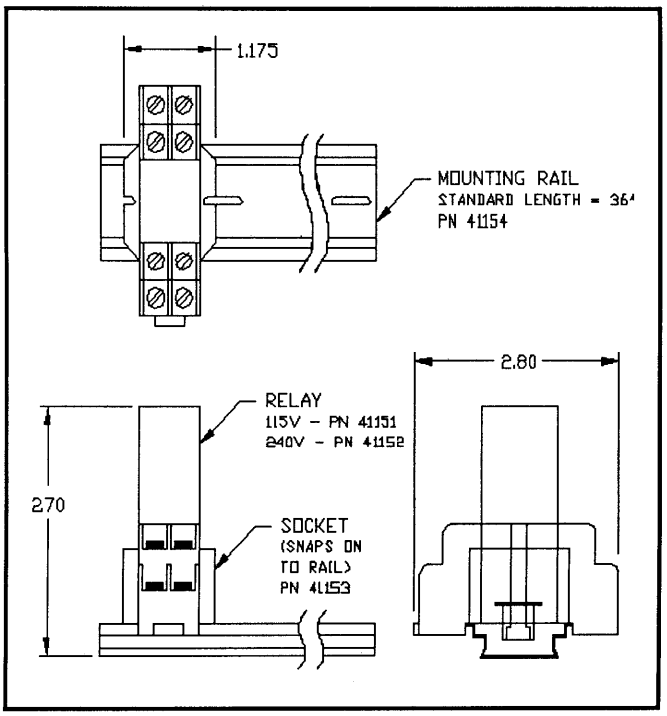
CRX8i RELAY BOARD SPECIFICATIONS

Ambient Temperature:	45 to 125°F
Ambient Humidity:	0 to 90% RH
Weight:	1.5 lbs
Number of Relays:	8 Each
Contact Arrangement:	1 Form C per Relay
Contact Rating:	50 VA @ 240 VAC Pilot Duty
Fuse Size:	1 A per Relay



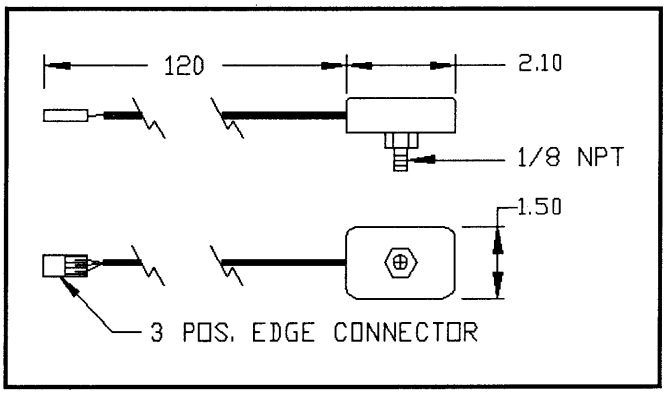
SENSOR SWITCHING RELAY

Ambient Temperature:	45 to 125°F
Ambient Humidity:	0 to 90% RH
Weight:	0.1 lb
Contact Arrangement:	2 Form C per relay
UL Contact Rating (NC):	5 Amp Inductive Load @ 240V 1/2 HP @ 240 VAC



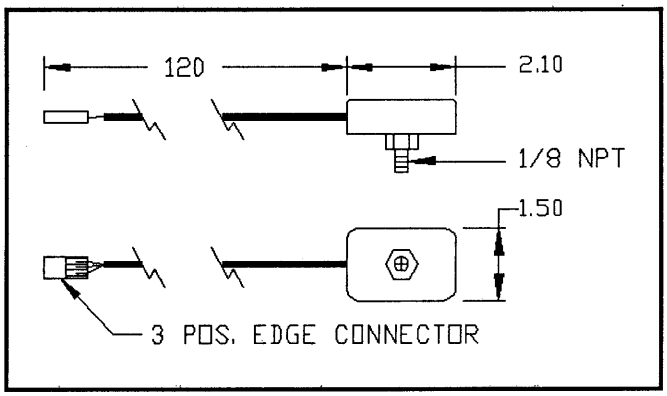
LPTX2 LOW PRESSURE TRANSDUCER SPECIFICATIONS

Measurement Range:	0 to 100 PSIG
Maximum Pressure:	200 PSIG
Operating Ambient:	35 to 115°F
Ambient Humidity:	0 to 95% RH
Fitting Material:	Brass
Weight:	0.6 lb
Leads:	22 AWG Shielded PVC (300 V)
Refrigerants:	R12, R22 and R502



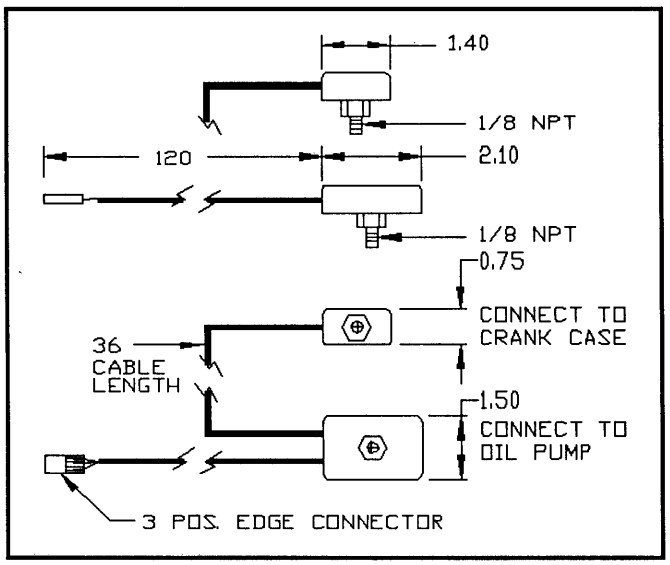
HPTX2 HIGH PRESSURE TRANSDUCER SPECIFICATIONS

Measurement Range:	0 to 350 PSIG
Maximum Pressure:	450 PSIG
Operating Ambient:	35 to 115°F
Ambient Humidity:	0 to 95% RH
Fitting Material:	Brass
Weight:	0.6 lb
Leads:	22 AWG Shielded PVC (300 V)
Refrigerants:	R12, R22 and R502



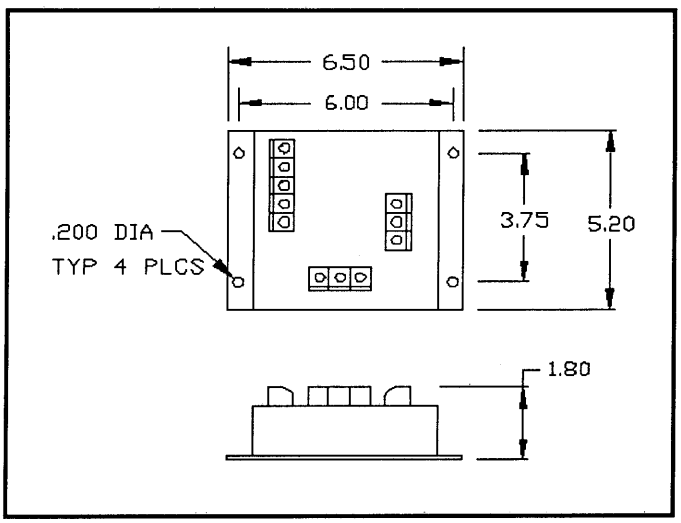
DPTX OIL PRESSURE TRANSDUCER SPECIFICATIONS

Measurement Range:	0 to 100 PSIG
Maximum Pressure:	200 PSIG
Operating Ambient:	35 to 115°F
Ambient Humidity:	0 to 95% RH
Fitting Material:	Brass
Weight:	0.6 lb
Leads:	22 AWG Shielded PVC (300 V)
Refrigerants:	R12, R22 and R502



PEV POWER/ENERGY/VOLTAGE MONITOR SPECIFICATIONS

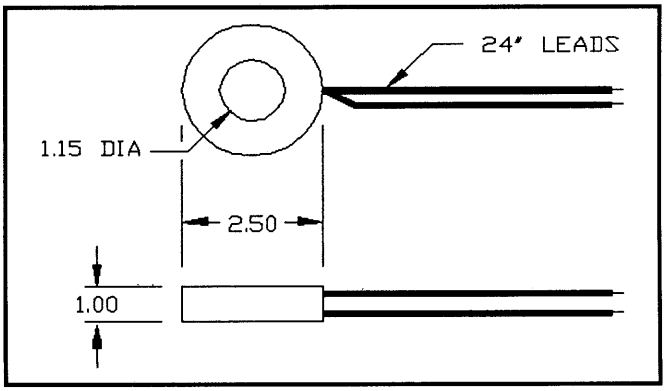
Ambient Temperature:	–60 to 125°F
Weight:	1.5 lbs
Sensed Voltage:	125 to 275 VAC (PEV220) 350 to 500 VAC (PEV440)



CURRENT TRANSFORMER SPECIFICATIONS

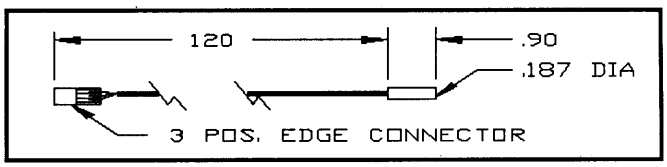
Insulation Voltage Class 600 VAC

Current Ratio: 100:5
200:5
300:5



TM-1 TEMPERATURE SENSOR SPECIFICATIONS

Ambient Temperature:	–60 to 180°F
Ambient Humidity:	0 to 100% RH
Tube Material:	Brass
Weight:	0.1 lb
Leads:	24 AWG PVC (300V)
Sensor Type:	Thermistor (3K-OHMS @77°F)
Range:	–40 to 180°F



CABLE CHANGES

To simplify and clarify cable usage, Altech has implemented the following cable changes:

Part Number 41160 Accessory Board Connector Cable (8 ft) replaces the following cables:

Part Number	Description
41006	XPRT to CRX4 Cable (8 ft)
41039	CRX4 to CRX4 Cable (8 ft)
41115	XPRT to CRX8 Cable (8 ft)
41118	XPRT to CRX25 Cable (8 ft)
45007	Digital Expansion Cable (8 ft)

Part Number 41159 Accessory Board Connector Cable (1 ft) replaces the following cables:

Part Number	Description
41005	CRX4 to CRX4 Cable (1 ft)
45008	Digital Expansion to CRX8i Cable (1 ft)

For further information contact the factory for the sales representative nearest you.

ALTECH CONTROLS

1545 Industrial Drive
Missouri City, Texas 77489
(713) 499–5697
(713) 499–5504 – FAX

01-17-92

APPENDIX 1: XPRT VARIABLE SPEED TECHNICAL DESCRIPTION

The variable speed control in the XPRT Controllers is developed around the Proportional/Integral (or PI) strategy common in the process control industry. The PI control strategy takes the product of an error signal and the "Slope" setting, adds the accumulation of the product of error values (previous and current) and the "Rate" settings to produce the output voltage to control the variable speed compressor. The "Slope" and "Rate" settings change the effect of the proportional and integral function on the control strategy respectively. The error calibration (ec) is a unit that is approximately .5 psi. The unit calibration of the Slope is in rpm/ec, and the Rate settings are in rpm/ec/delta-t. An example of this follows.

If the cutin setting were at 20 psi and the suction pressure at 30, there would be a net pressure error of 10 psi or, to the variable speed calculation, the error signal would be a value of 20.

If P represents the proportional error and A the accumulated integral error, then the following equations represent the variable speed output.

$$V = G*(P + A) \qquad \text{Eq.1}$$

where: V is the variable speed control voltage, and
G is an instrument gain converting rpm to volts

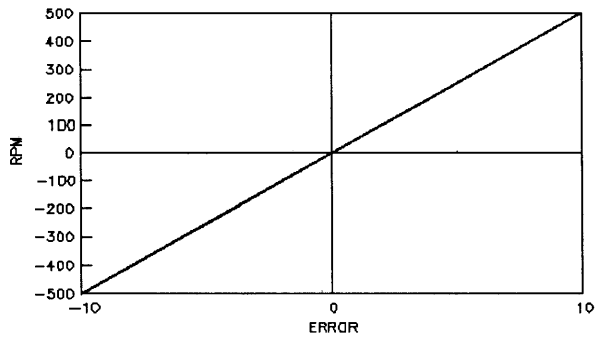


Figure 1a: Variable Speed - Slope

P = S * err **Eq. 2**

where: S is the variable speed Slope setting, and err is the error as described above

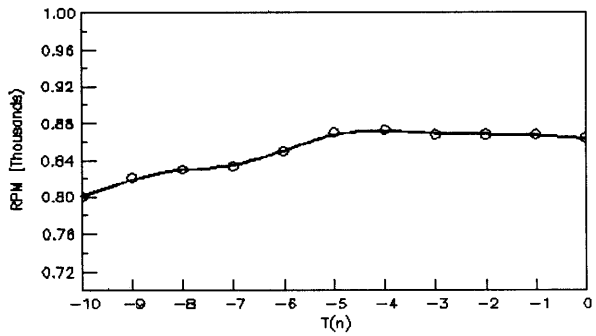


Figure 1b: Variable Speed - Integral

A(n) = A(n-1) + (R * err * dt) **Eq. 3**

where: A(n-1) is the previous accumuated integral error, R is the Rate setting, and dt is a delta time (approximately 2 seconds)

vspeed (Minimum %) 50%								
COMP# HP	1 7.5	2 10.0	3 15	4 20	Fixed 47.5	Variable 5	Total 52.5	CAPACITY HP
STEP#								STEP#
0	OFF	OFF	OFF	OFF	0.0	0	0.0	0
1	OFF	50%	OFF	OFF	5.0	5	10.0	1
2	ON	50%	OFF	OFF	12.5	5	17.5	2
3	OFF	50%	ON	OFF	20.0	5	25.0	3
4	OFF	50%	OFF	ON	25.0	5	30.0	4
5	ON	50%	ON	OFF	27.5	5	32.5	5
6	ON	50%	OFF	ON	32.5	5	37.5	6
7	OFF	50%	ON	ON	40.0	5	45.0	7
8	ON	50%	ON	ON	47.5	5	52.5	8

Table 1: Variable Speed - 10Hp Compressor Configuration

vspeed (Minimum %) 50%								
COMP# HP	1 7.5	2 10	3 15	4 20.0	Fixed 42.5	Variable 10	Total 52.5	CAPACITY HP
STEP#								STEP#
0	OFF	OFF	OFF	OFF	0.0	0	0.0	0
1	OFF	OFF	OFF	50%	10.0	10	20.0	1
2	ON	OFF	OFF	50%	17.5	10	27.5	2
3	OFF	ON	OFF	50%	20.0	10	30.0	3
4	OFF	OFF	ON	50%	25.0	10	35.0	4
5	ON	ON	OFF	50%	27.5	10	37.5	5
6	ON	OFF	ON	50%	32.5	10	42.5	6
7	OFF	ON	ON	50%	35.0	10	45.0	7
8	ON	ON	ON	50%	42.5	10	52.5	8

Table 2: Variable Speed - 20Hp Compressor Configuration

The capacity of a compressor rack is programmable and is dependent on the sizes of the compressors used. An example is shown in **Tables 1** and **2** using 7.5, 10, 15, and 20 horsepower compressors. **Table 1** is calculated for the variable speed on the 10 Hp compressor with a 50% minimum speed. You will notice that there is no overlapping of the capacity from one step to the next. For example, the maximum capacity at step #1 is 10 Hp and the minimum capacity at step #2 is 12.5 Hp. Other gaps exist in the capacity between steps 2 and 3, 6 and 7, and 7 and 8. On the other hand, **Table 2** shows the compressors configured with the variable speed on the 20

Hp compressor. Each step in this configuration overlaps the next so the rack can meet any capacity demand from 10 to 52.5 horsepower. A graphical representation of the data is shown in **Figures 2a** and **2b**.

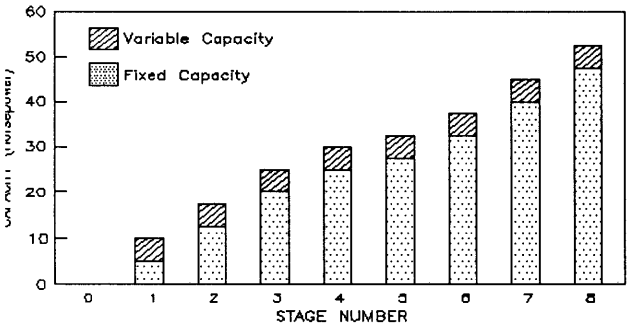


Figure 2a: Programmable - 10Hp Compressor Configuration

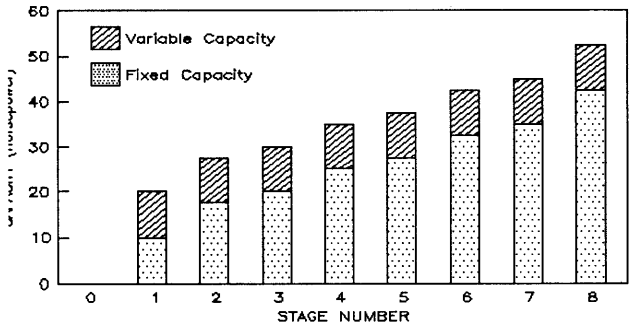


Figure 2b: Programmable - 20Hp Compressor Configuration

The capacity demand from the refrigeration systems connected to the rack continually changes with time as the load on each system changes. The object of the control strategy is to make the capacity of the rack match the demand of the systems so the suction pressure can be maintained. If the control cannot react quickly enough to a sudden change in demand, the suction pressure will have wide variations. At the same time, the compressors capacity will be unstable if the control over reacts to capacity changes. The selection of the Slope and Rate functions allow the control to react to capacity changes in the desired fashion. The settings for the control strategy will have to be adjusted depending on the percent of the rack capacity that is variable. So there is no one setting of the variable speed parameters that will meet all compressor configurations.

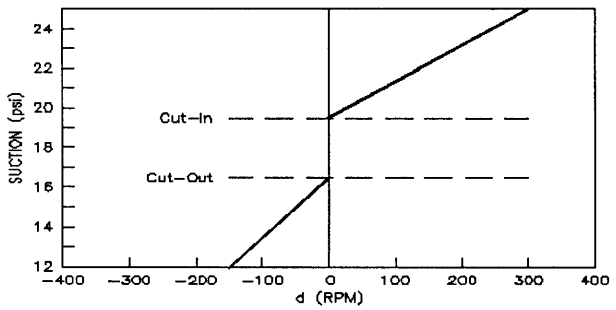


Figure 3a: Variable Speed - Rate Up/Rate Down

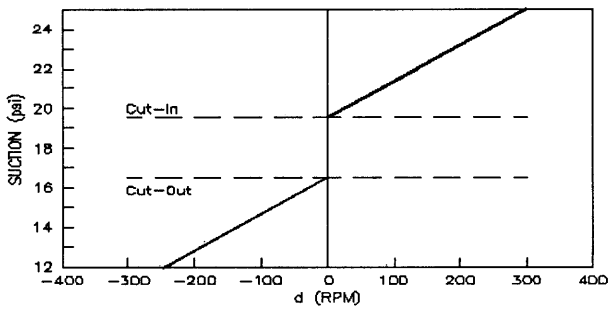


Figure 3b: Variable Speed - Slope

The control has a range of suction pressure between the cutin and cutout settings that is considered to be within the control setpoint. The control strategy allows the cutin and cutout settings to be closer to each other than most other controls (2 to 6 psi vs 10 to 20 psi). This allows the compressors to operate at a higher average suction pressure thus conserving energy by increasing the coefficient of performance. The functional relationship between the variable speed settings and the cutin and cutout settings is shown in **Figures 3a** and **3b.** The adjustable Slope function is the same above the cutin setting as it is below the cutout setting with a dead band between the two. The Rate adjustment in the integral control has two settings, one effective above cutin and the other below cutout. By having lower Rate value above cutin and a higher value below cutout, the control will react more quickly to decreasing demand than to increasing demand thus conserving energy. **Figures 4** and **5** show a typical response to a step function in demand. The demand goes from 80% of capacity to 40%. **Figures 4a** and **5a** show a good response to this demand change. **Figures 4b** and **5b** result when the Rate is set to high and the control over compensates for the change in demand which then reflects in the suction pressure. If the Rate is too low and the Slope is too high, the reaction in **Figures 4c** and **5c** shows a slow response to the demand change and a long recovery time of the suction pressure.

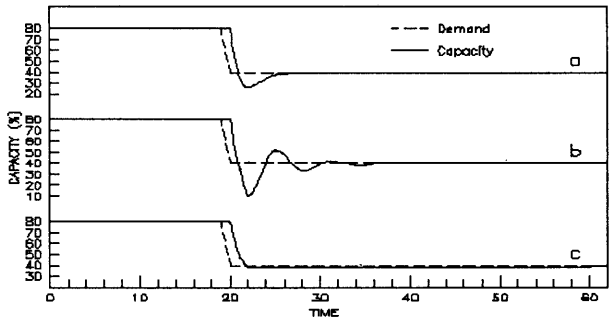


Figure 4: Programmable - Compressor Capacity Response

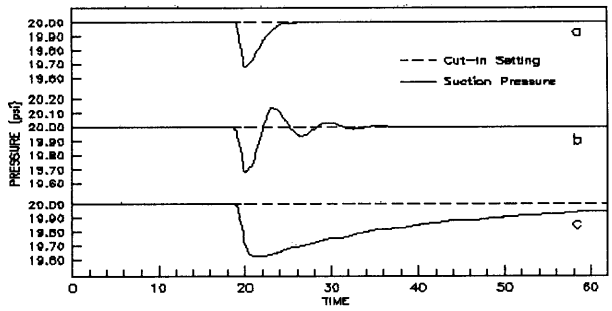


Figure 5: Programmable - Rack Suction Pressure Response

LIMITED WARRANTY

ALTECH CONTROLS CORPORATION warrants to the original purchaser or distributor our products to be free from defects in material and workmanship under normal use and service for a period of twelve months from date of shipment from the factory. Our obligation shall be limited to repairing or replacing at our discretion, F.O.B. factory, any part or portion of any product of our manufacture which upon examination we judge to be defective. The warranty stated does not include the cost of labor incurred in the handling, removing or installing of any equipment or component thereof, or loss of refrigerant. Furthermore, the warranty does not apply to any material that has been subjected to improper installation, application, misuse, neglect, alteration or accident. Removal of original serial number or date code shall release ALTECH from all obligations. ALTECH assumes no liability for product failure beyond repairing or replacing our product. If the product was damaged in transit, the perchaser must file a claim with the carrier.

The warranties are expressly in lieu of all other warranties, express or implied, and all other obligations or liabilities on our part. The obligation to repair or replace parts judged to be defective in material or workmanship states our entire liability whether based on tort, contract or warranty. We neither assume nor authorize any person to assume for us any other liability in connection with our products.

THE WARRANTIES AND REMEDIES SET FORTH HEREIN ABOVE ARE EXCLUSIVE AND NO OTHER WARRANTY TO REMEDY OF ANY KIND, WHETHER STATUTORY, WRITTEN, ORAL, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY.

ALTECH will make good faith effort for prompt correction or other adjustment with respect to any product deemed defective within warranty. For service, write or call ALTECH at address below and describe the nature of the defect.

Altech Controls
1545 Industrial Drive
Missouri City, Texas 77489
Attn: Customer Service Co-ordinator

Phone: (713) 499-5697
Fax: (713) 499-5504

Product design and specifications are subject to change without notification.