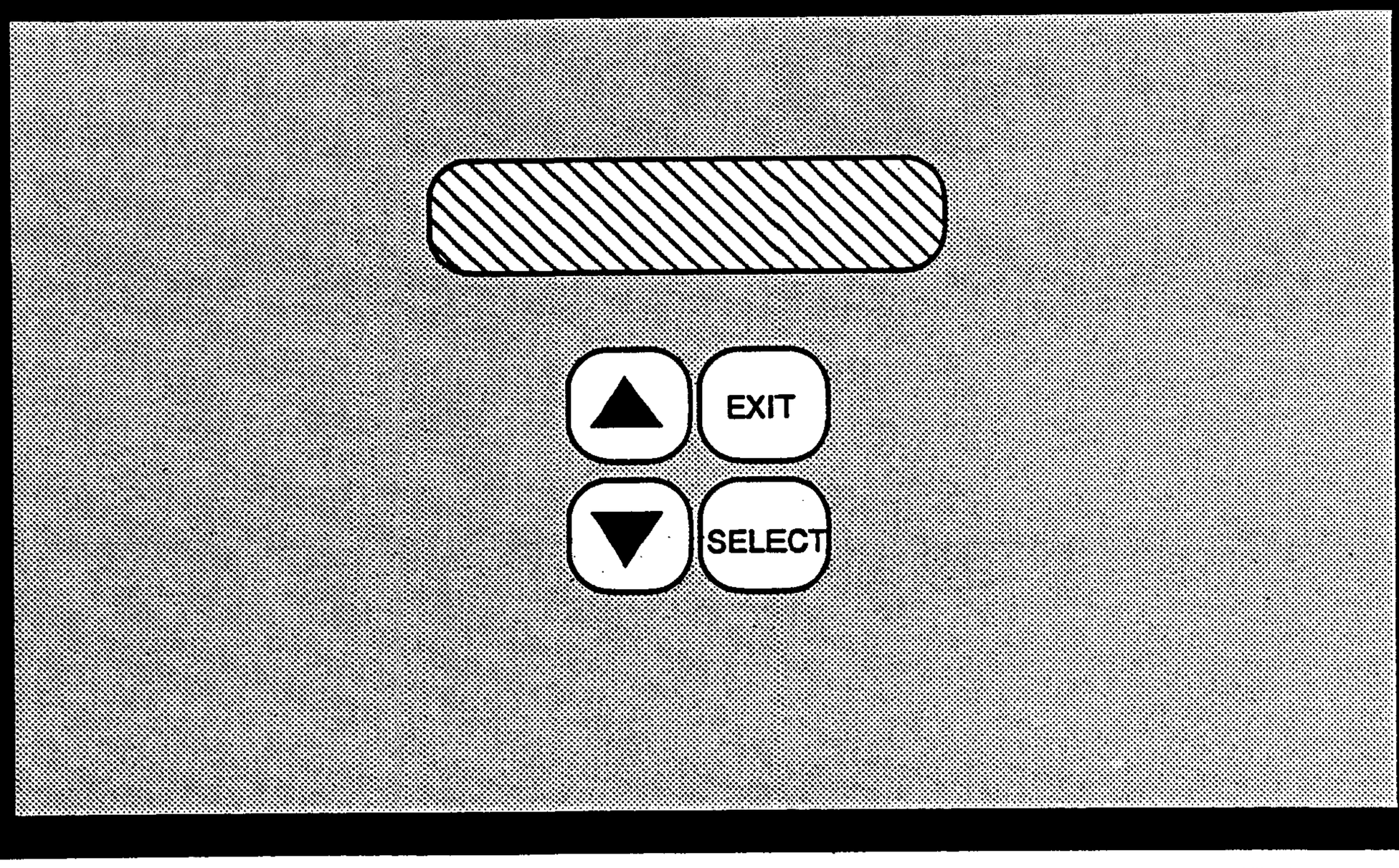
HUSSMANN®

Standalone Defrost Manager

Electronic Processor Controller



Installation & Operation Manual

P/N 365302
August, 1992

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IMPORTANT
KEEP IN STORE FOR FUTURE REFERENCE

Quality that sets industry standards

This merchandiser conforms to the
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CRS-S1-86

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INTRODUCTION

GENERAL

The Standalone Defrost Manager is an electronic clock used to provide defrost control for Hussmann's refrigeration systems. The Standalone Defrost Manager allows you to take advantage of Hussmann's **"defrost fail-safe system"** by interfacing to the Defrost Modules of the EPC-2000. The Defrost Manager can communicate with both the relay and fiber optic versions of the defrost module.

Other features of the Defrost Manager:

- Easy to follow menu structure
- Battery backed memory for program retention
- Remote communications capability
- Automatic daylight savings time adjustment
- Alarm output contacts
- Service feature for manually checking out defrost circuits.

The Standalone Defrost Manager, shown in Figure 1-1, contains a four button interface and a sixteen character vacuum fluorescent display. The display will remain ON for two hours after the last manual key entry. It will then perform a power down function (to extend the display life), but may be brought back up at any time by pressing any key.

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

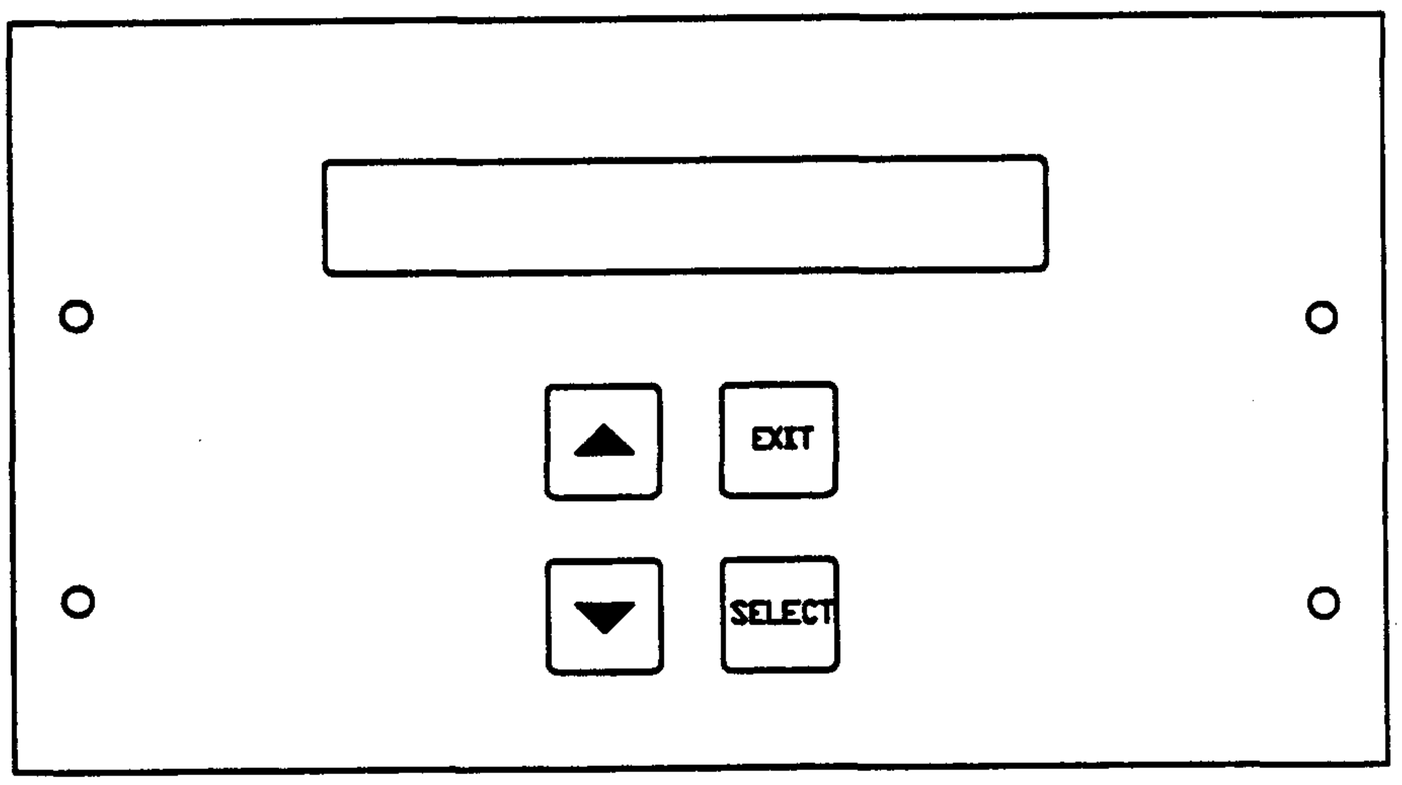


Figure 1-1

COMPONENTS

There are three basic components required for the Defrost Manager system.

	Part Number
Standalone Defrost Manager	0365107
Transformer	0332714
Power Plug	0334199

The components listed above for the Defrost Manager system can operate both types of defrost modules: relay or fiber optic. The relay version defrost module is used on the 208 volt control circuits. The fiber optic version defrost module is used on the Fibertronic panels which are a 120 volt control circuit. Based upon which system you have, the following components are necessary to interface with the Standalone Defrost Manager.

Fibertronic Rack (120 volt)	Part Number
Fiber Optic Defrost Module	0365106
Primary Communication Cable	0365101
Transformer Assembly	0365102
Secondary Communication Cable	0365104
Secondary Power Cable	0365105

208 volt control circuit	Part Number
Relay Version Defrost Module	0365100
Primary Communication Cable	0365101
Transformer Assembly	0365102
Secondary Communication Cable	0365104
Secondary Power Cable	0365105

Each defrost module controls eight defrost circuits. You can connect up to four modules to the Standalone Defrost Manager to yield a maximum of 32 defrost circuits. Figure 1-10 and 1-11 show a diagram of how these components can be used together.

Transformer and Power Plug

The transformer used to supply power to the Defrost Manager has a 240, 208, 120 volt multitap primary. The transformer has a Class 2 rating with a 24 VAC secondary. The power cable is the same cable used for the EPC family of processors and the Fibertronic Clock. Figure 1-2 shows the transformer and Figure 1-3 shows the Power Plug. This transformer and power plug should not be confused with the transformer assembly required to power the defrost modules.

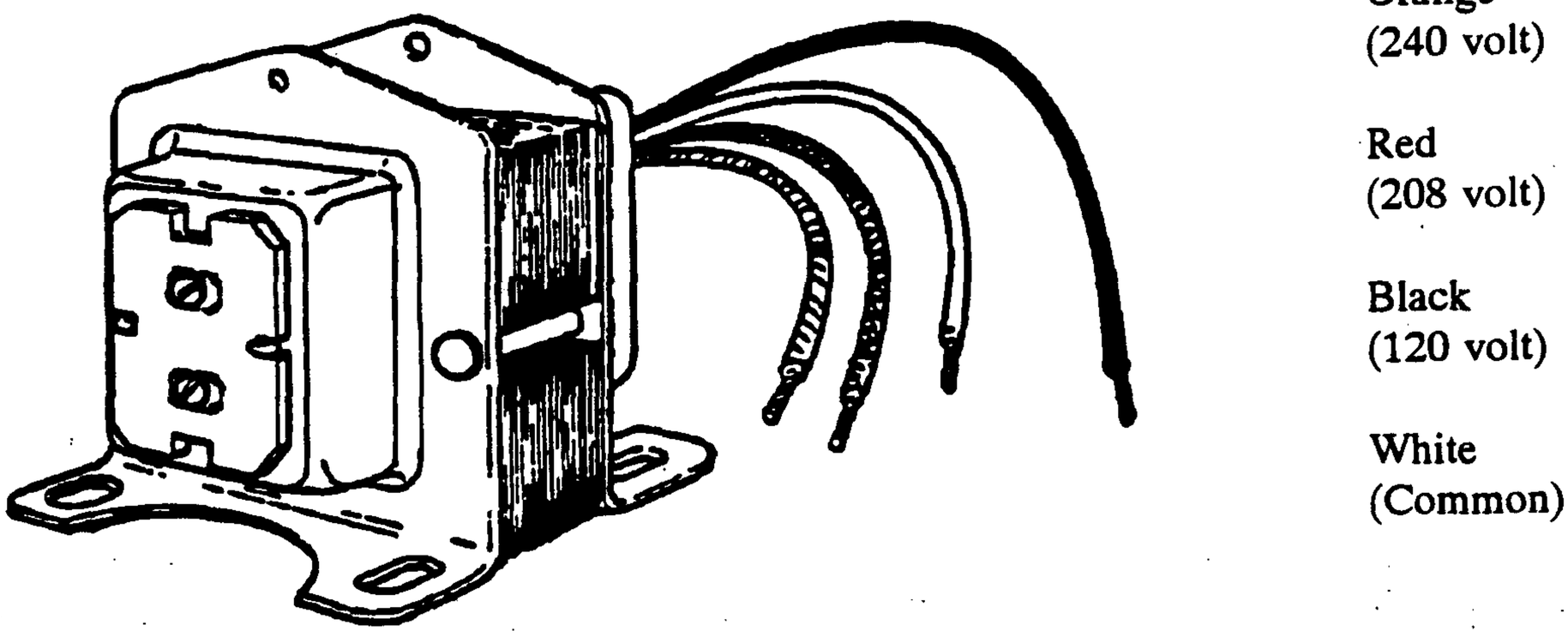


Figure 1-2. Control Transformer

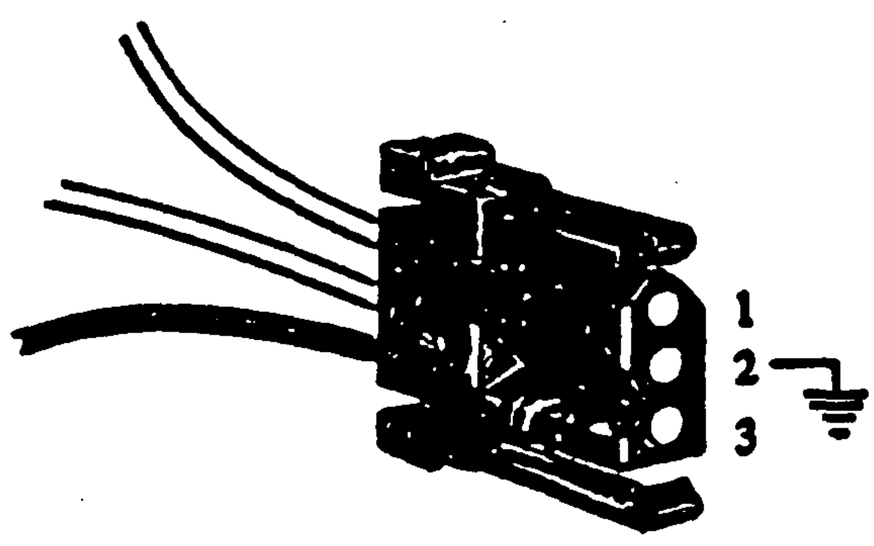


Figure 1-3. Power Plug Assembly

Fiber Optic Version Defrost Module

The fiber optic version defrost module shown in Figure 1-5 is used on Hussmann's Fibertronic systems. With this arrangement, the relay logic for energizing solenoids for a defrost are still contained in Hussmann's Defrost Branch Boards (P/N 340555). The defrost signal is sent from the Standalone Defrost Manager the Fiber Optic defrost module, which records the data for fail-safe backup before sending the signal on to the Defrost Branch Board.

Energizing the gas solenoid valve for gas defrosts, when using the Fiber Optic version modules, is performed on the Defrost Branch Board. Refer to the Superplus Fibertronic Installation Manual (P/N 340272) for setting the Defrost Branch Board with gas defrost.

The temperature terminated defrost input is also located on the Defrost Branch Board.

Relay Version Defrost Module

The relay version defrost module, used on Hussmann's 208 Volt control circuit systems, is shown in Figure 1-4.

The relay version module incorporates a ninth relay, in addition to the eight defrost control circuit relays, which is used to energize a gas solenoid valve for gas defrost systems. The relay version module eliminates additional wiring required for gas defrost systems by automatically energizing the gas solenoid valve. This automatic action is accomplished by selecting the dip switch shown in Figure 1-4 to the 'ON' position if its corresponding relay is on a gas defrost circuit.

For each defrost circuit contained on a relay version module, there is a corresponding input pin for high temperature defrost termination. Typically, temperature activated switches are located on a particular display case for that defrost circuit. Once the temperature exceeds the switches setpoint, it will close sending a signal back the defrost module which then passes the signal on to the Standalone Defrost Manager where the defrost is terminated.

Commonalities between the Relay and Fiber Optic version modules

Each defrost module incorporates a status light to show a normal operating condition or that it is in 'fail-safe' backup. A light that is on constantly indicates a normal mode. If the light is blinking on and off at a one second interval, the module is in backup. If the light is blinking on and off at an approximately four second interval, there is no backup or communications with the Standalone Defrost Manager, and consequently no defrost control (refer to troubleshooting checklist). In addition to the status light, there are indicator lights for each defrost circuit to show whether that circuit is in defrost mode (light on) or refrigeration mode (light off).

Each module contains a four pin dip switch for setting the module's address. When more than one module is connected to the Standalone Defrost Manager, each module must have its own address so that the Standalone Defrost Manager can distinguish between the modules.

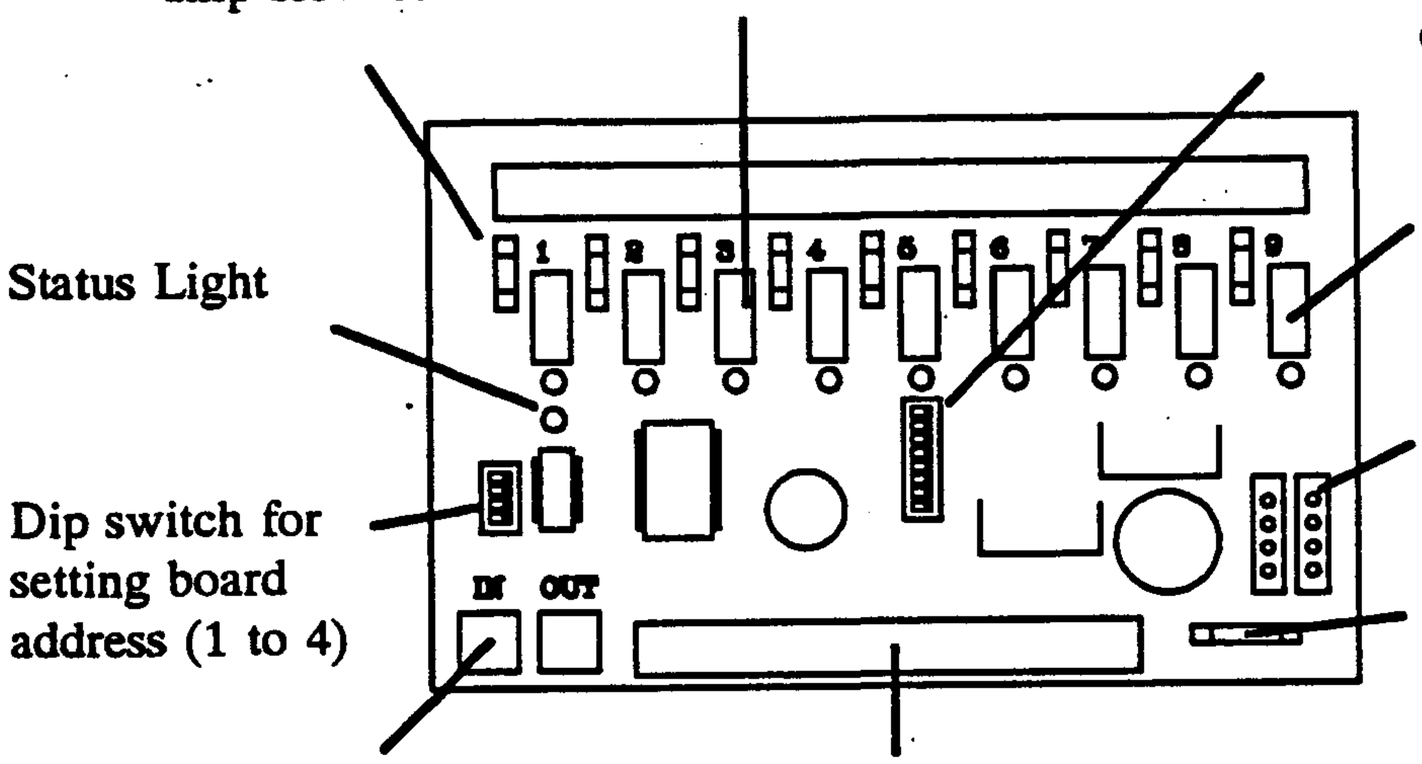


Figure 1-4. Relay Defrost Module.

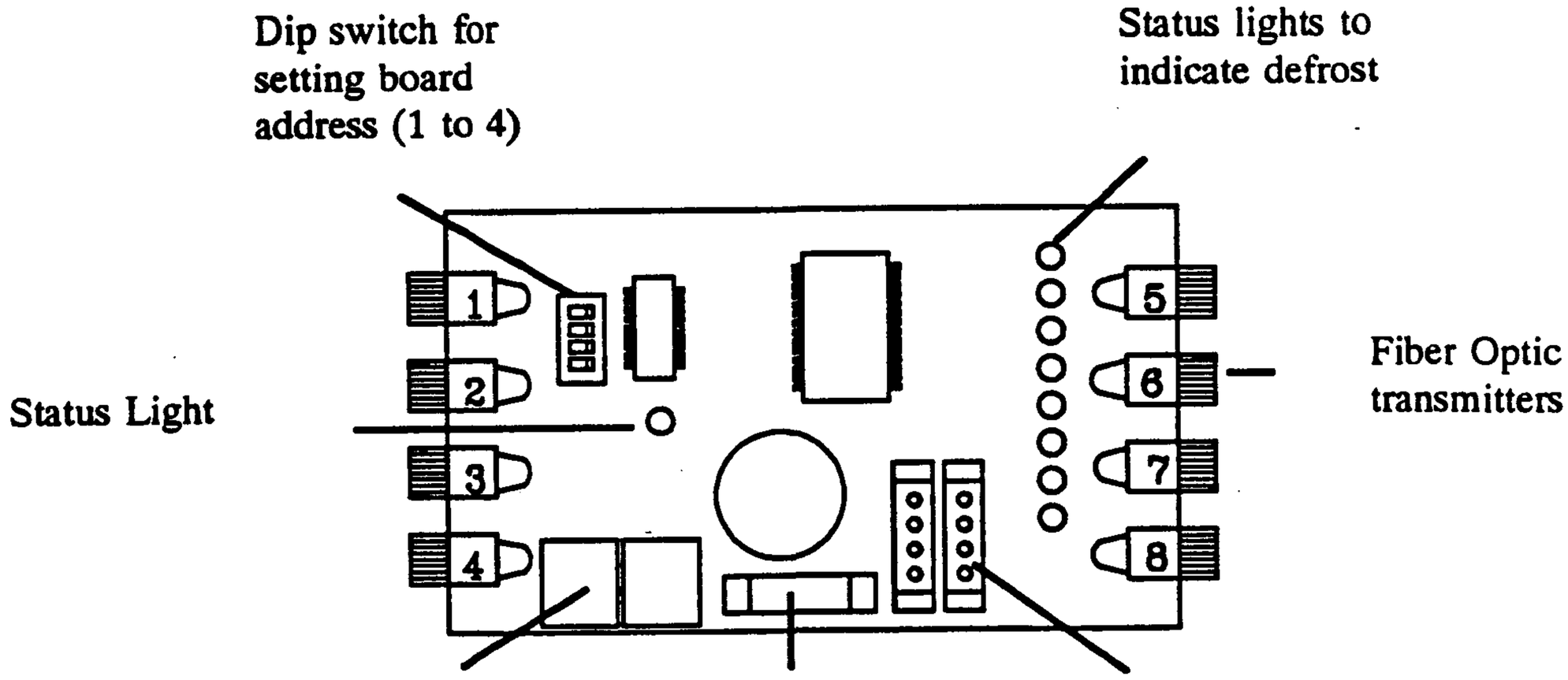


Figure 1-5. Fiber Optic Defrost Module.

Primary Communication Cable

The Primary Communication Cable (P/N 0365101) is used to connect the first defrost module to the Standalone Defrost Manager. The cable consists of a four conductor phone cable six feet in length. Each end of the cable is terminated with a six pin RJ11 phone connector.

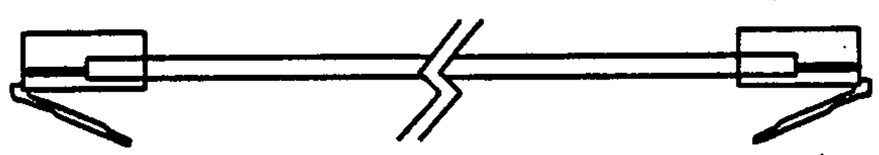


Figure 1-6. Primary Communication Cable

Transformer Assembly

The transformer assembly (P/N 0365102) is used to supply power to the defrost modules. The assembly consists of a 24 volt center-tap transformer and a power cable. The transformer has the capacity of supplying voltage for up to four defrost modules. The power cable plugs into the defrost module as shown in Figure 1-4 and 1-5.

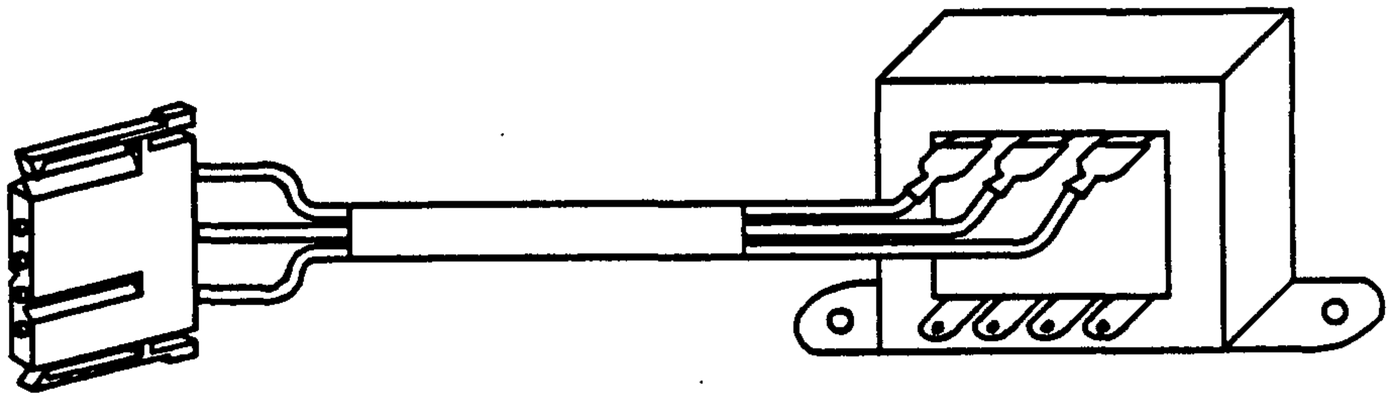


Figure 1-7. Transformer Assembly

Secondary Communication Cable

When more than one defrost module is used, the secondary communication cable (P/N 0365104) is used to chain each module together. As shown in Figure's 1-4 and 1-5, there are two communication plugs on each module. One plug is defined as "IN" and the other plug is defined as "OUT". The primary cable from the Standalone Defrost Manager is connected to the "IN" plug. The secondary cable is connected to the "OUT" plug of the first module and to the "IN" plug on the following module. The secondary cable differs from the primary communication cable in that the length is approximately six inches.

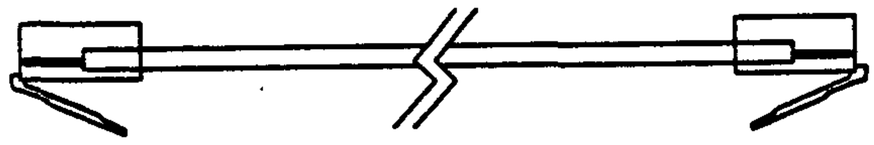


Figure 1-8. Secondary Communication Cable

Secondary Power Cable

The secondary power cable (P/N 0365105) is used to supply power from the first defrost module to additional modules. There are two power plugs located on each module. You can plug the power cable into either power plug. The power cable is approximately twelve inches in length.

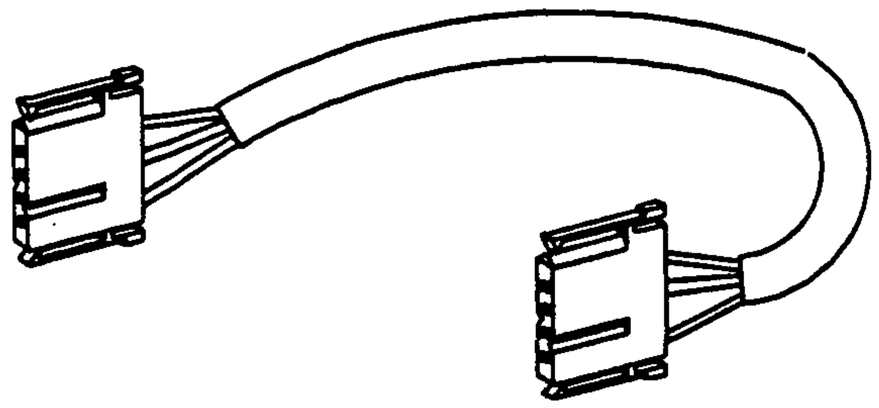


Figure 1-9. Secondary Power Cable

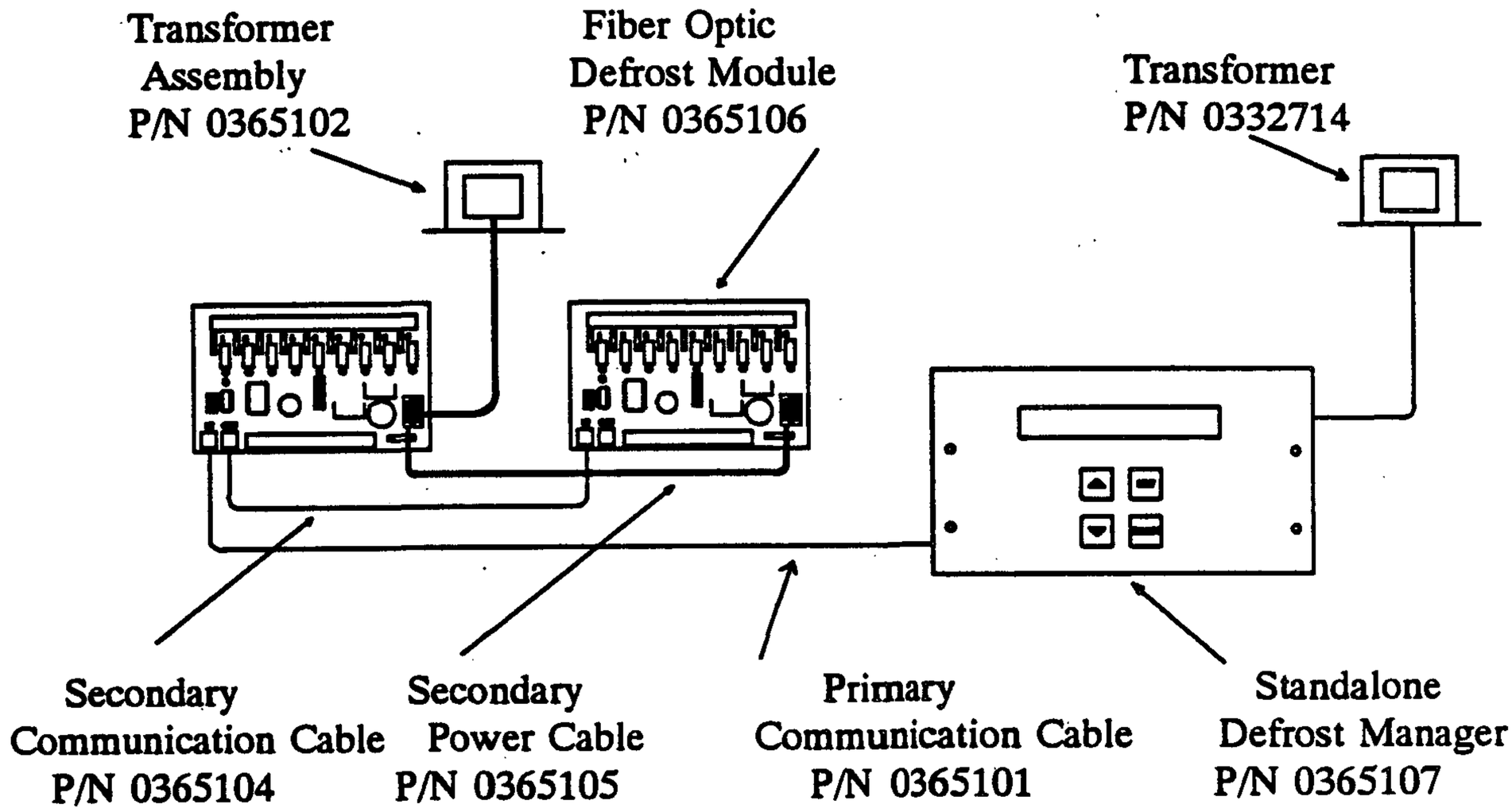


Figure 1-10. 208 volt system components.

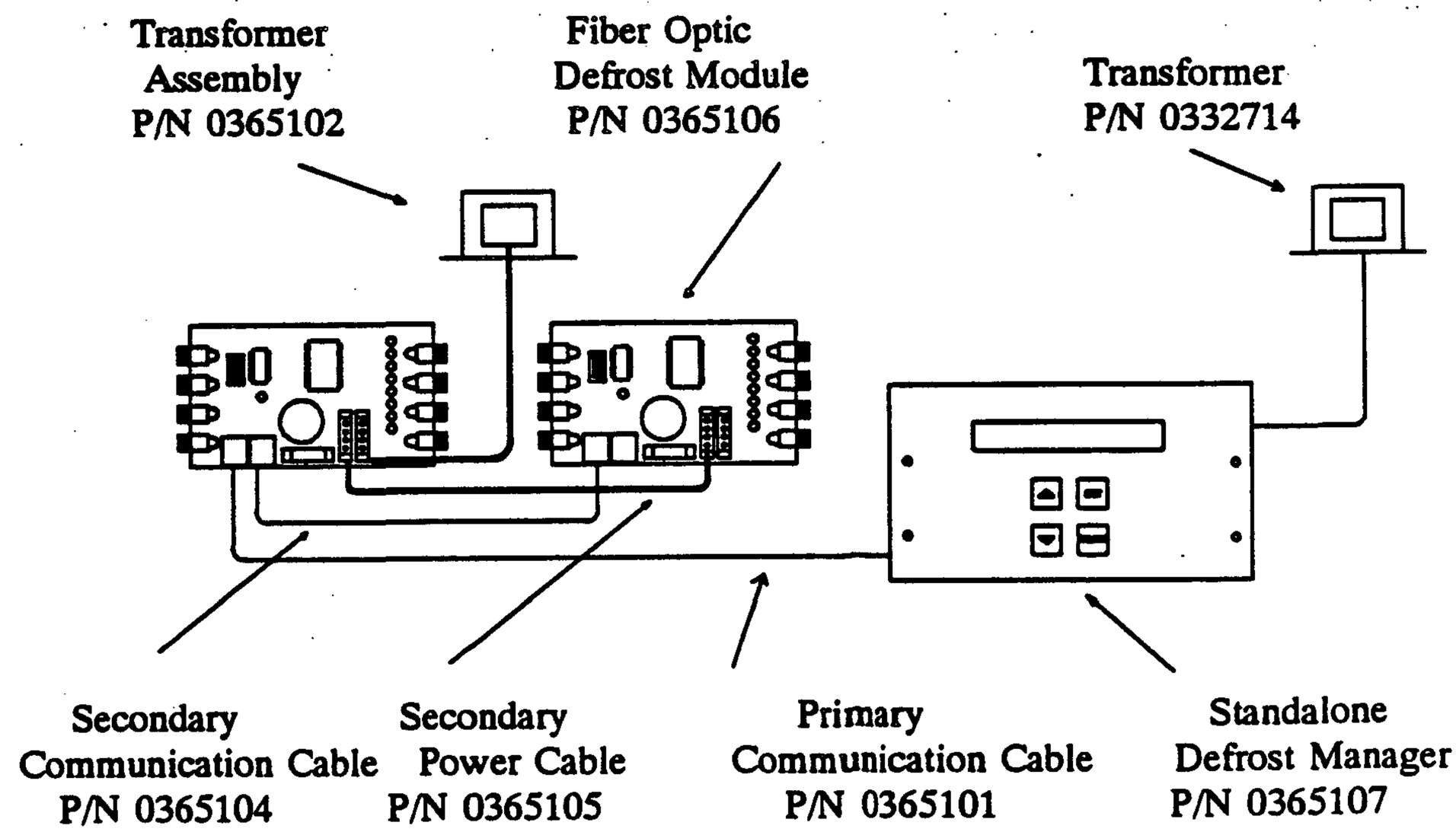


Figure 1-11. 120 volt system components.

INSTALLATION

GENERAL

This section will cover the factory installations for the Standalone Defrost Manager and the relay and fiber optic defrost modules.

FACTORY INSTALLED STANDALONE DEFROST MANAGER

There are four connections that need to be made to the Defrost Manager:

(1) Power cable from transformer
(2) Primary communication cable to defrost module
(3) Alarm output (optional)
(4) Communications cable (optional)

Figure 2-1 shows the location of the connections points to the Defrost Manager.

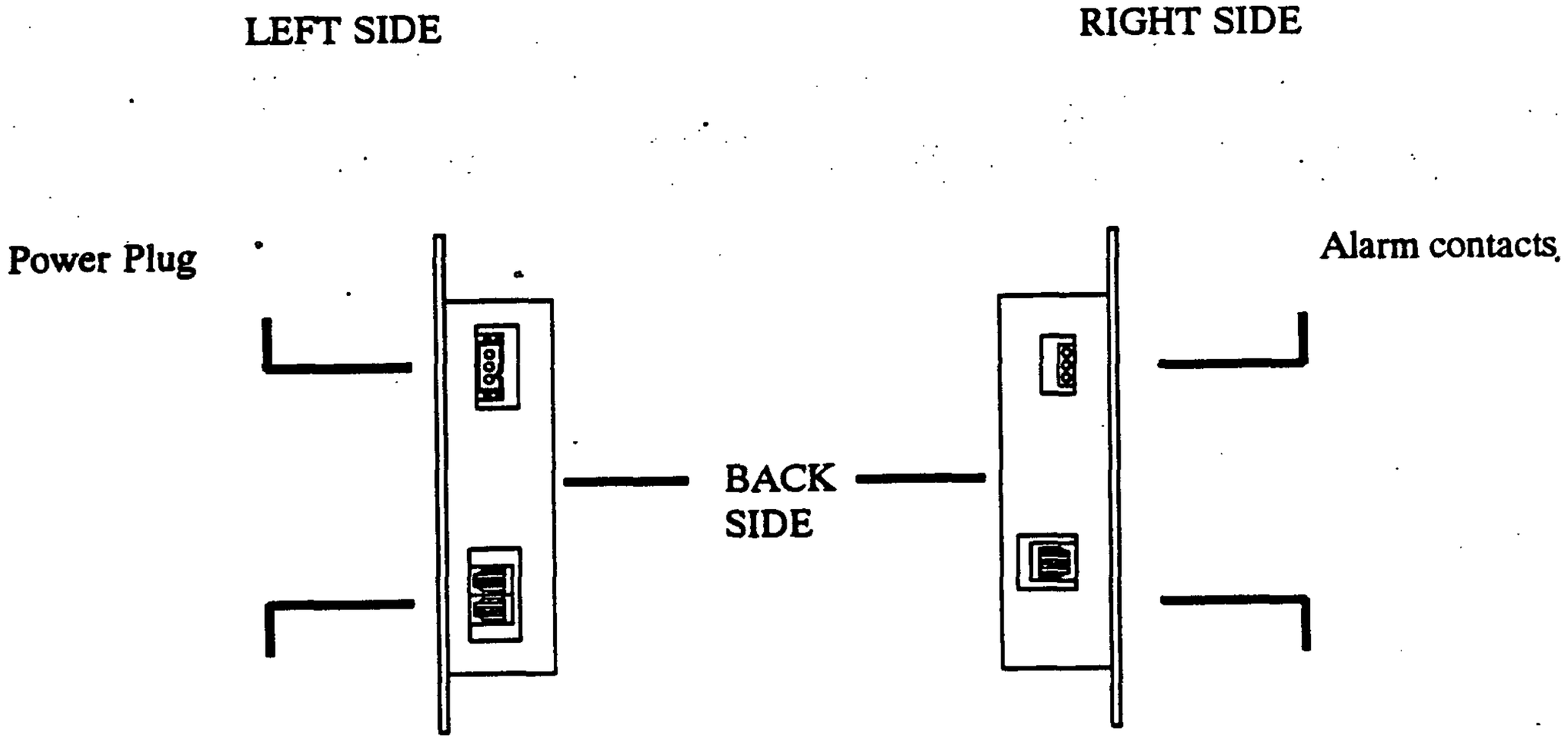


Figure 2-1

Transformer and Power Plug

The transformer primary has a multitap primary to accommodate most control circuits. Figure 1-2 shows the transformer and identifies the four primary leads that can be used.

IMPORTANT: The bare ground wire from the power plug must be attached to the panel liner as close to the transformer as possible. You may attach the bare ground wire to the mounting screw of the transformer. This provides the maximum protection against electrical noise.

Alarm Output

The alarm output from the Defrost Manager has a normally open and a normally closed output set of contacts. It is suggested that the normally closed set of contacts be used to signal an external device. The reason for this is if the Defrost Manager should lose power, the alarm relay will return to its denergized state. Figure 2-3 shows a view from the side of the Defrost Manager looking into the alarm connector. For descriptions of the type of alarms refer to Section 3 of this manual.

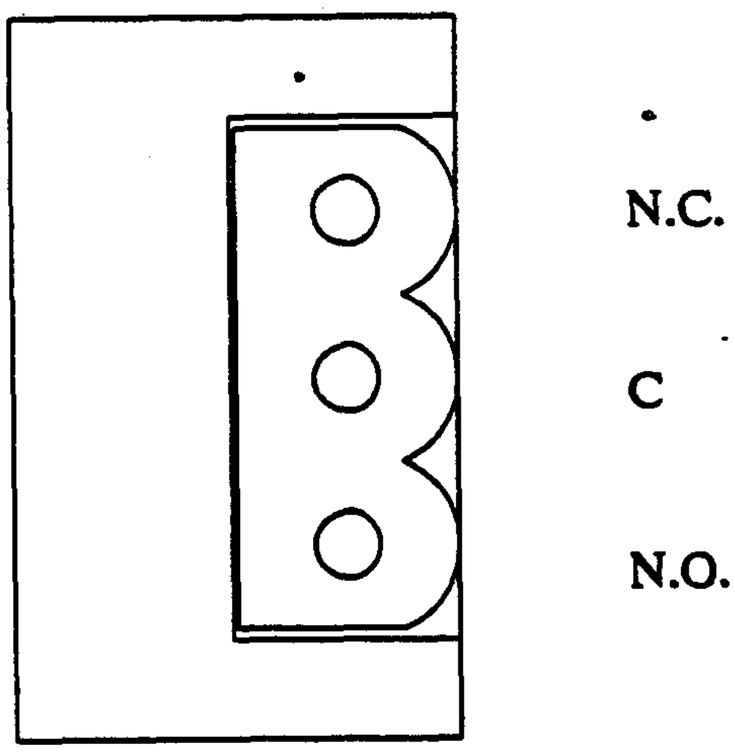


Figure 2-3

Interfacing to the Alarm Board

The Defrost Manager's alarm output can be tied into Hussmann's Alarm Board (P/N 0318194) as shown in Figure 2-4. When the Defrost Manager goes into Alarm (see Page 3-9 for descriptions of alarms) the alarm output is denergized which will close the normally closed set of contacts. This closure will provide a 120 volt signal to the A9 input of the Alarm Board which will start a 3 minute time delay before alarming.

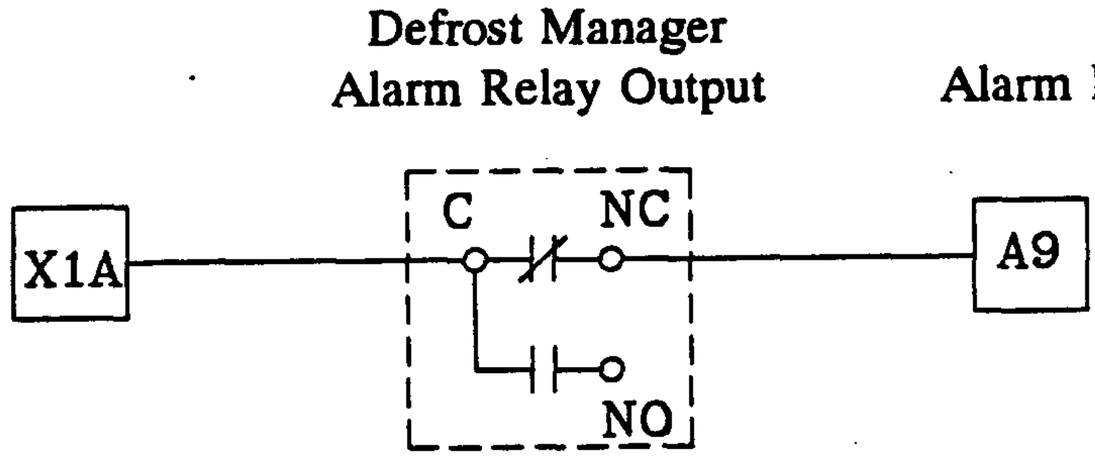


Figure 2-4

COMPAK Communications Cable

The Defrost Manager has two RJ11 phone connectors to tie in the communications network of COMPAK. Either phone connector can be used. The communications cable consists of a four pin flat phone cable terminated with a RJ11 six pin phone connector.

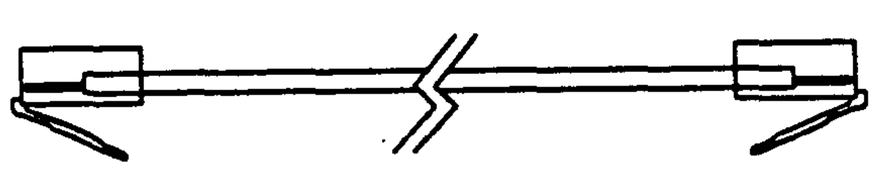


Figure 2-5

FACTORY INSTALLED DEFROST MODULES

The defrost module(s) (relay or fiber optic version) and its transformer are mounted inside the panel directly behind the Standalone Defrost Manager. The primary cable has been installed to connect the Standalone Defrost Manager and defrost module(s) together. If more than one defrost module is installed in the rack, the secondary communication cables and power cable are also installed. The defrost module(s) board address is preset at the factory.

Defrost Module Transformer Assembly

The transformer has a primary tap for both 120 volt and 208 volt circuits. Figure 2-6 shows how to wire the primary for both a 120 volt and 208 volt control circuit. For the 208 volt wiring the middle two pins of the transformer have been wired together.

NOTE: The middle ground wire of the secondary should be connected to the panel liner to provide the maximum protection against electrical noise.

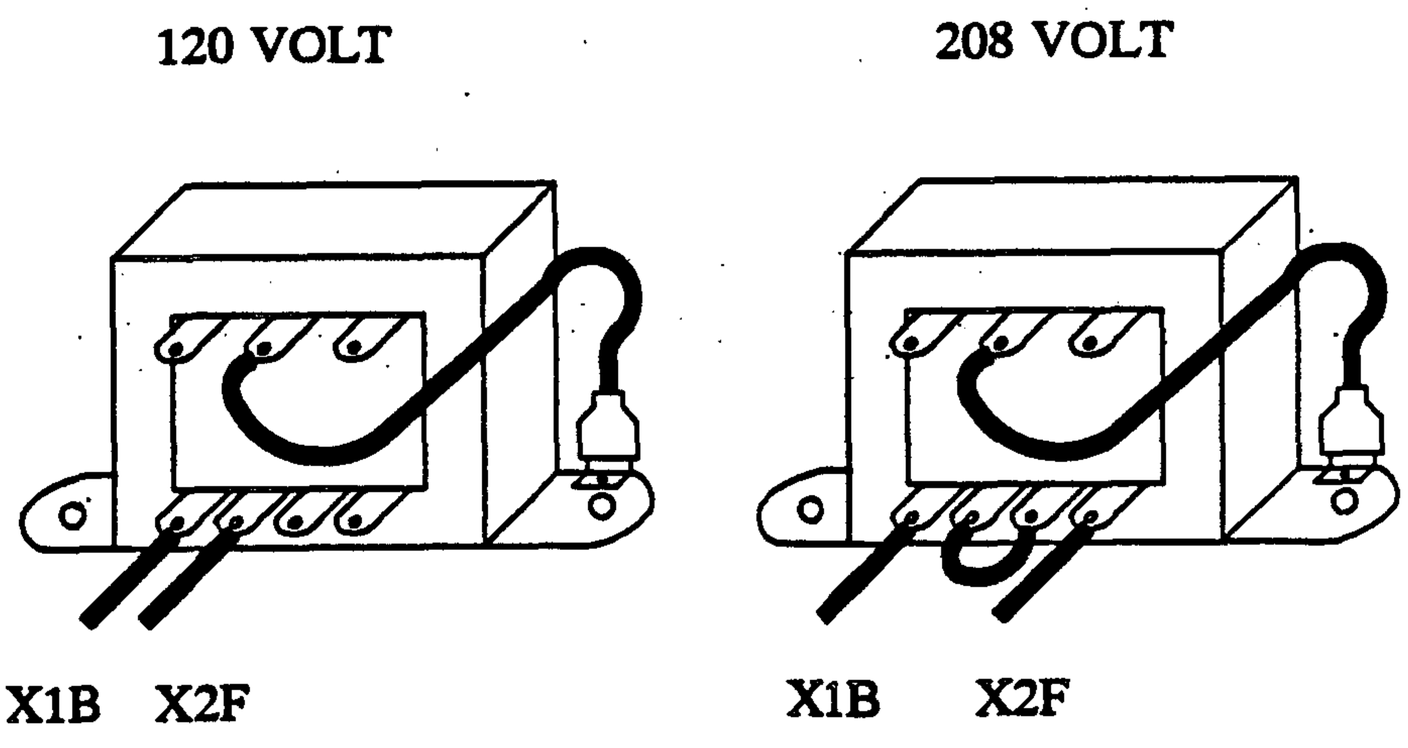


Figure 2-6. Transformer Configurations

Fiber Optic Version Defrost Module
The fiber optic transmitters on the module are connected to the branch defrost circuit boards through fiber optic cable, MITSUBISHI SHV-4001. The insulation jacket of the fiber optic cable should be stripped back 1/8 inch to expose the clear plastic core.

CAUTION: The end of the plastic core should have a clean-cut look. It should not be crushed or squeezed at the end

To install the fiber optic cable, loosen the plastic screw collar on the module to insert the fiber cable. The plastic screw collar should be hand tightened on the optical transmitter. For proper wiring and configuration of the defrost circuit board, refer to the Superplus Fibertronic Installation and Service Manual P/N 340272.

Relay Version Defrost Module
There are three areas of concern for wiring the relay version modules:

(1) Connections to the SPDT relay for each defrost circuit.
(2) Connections to the 9th relay for gas defrost circuits.
(3) Connections when high temperature termination of defrost is used.

Gas Defrost Circuits
Figure 2-7 shows a typical gas defrost circuit which incorporates an EPR solenoid for use during the refrigeration cycle. The EPR solenoid (ES) is energized off the normally closed set of contacts from the defrost module relay. During defrost, the ES is denergized and the normally open set of contacts closes to energize the Koolgas.solenoid (KG). The ES solenoid closes the suction line to the Suction Manifold and the KG koolgas solenoid opens the Koolgas line to the Evaporator. The ninth relay on the defrost module is used to energize the Koolgas Relay (KR). The KR energizes the main liquid line solenoid which creates a pressure differential to allow the Koolgas vapor to flow backward through the evaporator. All gas defrost circuits must energize the KR relay. The eight position dip switch located on the defrost module automatically energizes the ninth relay when a gas defrost is started. The wiring of the KR relay to the ninth relay is factory installed.

Offtime Defrost Circuits
When offtime or electric defrost circuits are used, the ninth relay is not needed. Figure 2-8 shows a typical electric defrost circuit which activates a defrost contactor when entering defrost.

Temperature Termination of Defrost
Figure 2-9 shows a temperature activated switch connected to the number 1 defrost circuit on the defrost module. Each defrost circuit contains its own input. The switch should be a dry contact only input. **NO VOLTAGE SHOULD BE PRESENT AT THESE INPUTS.**

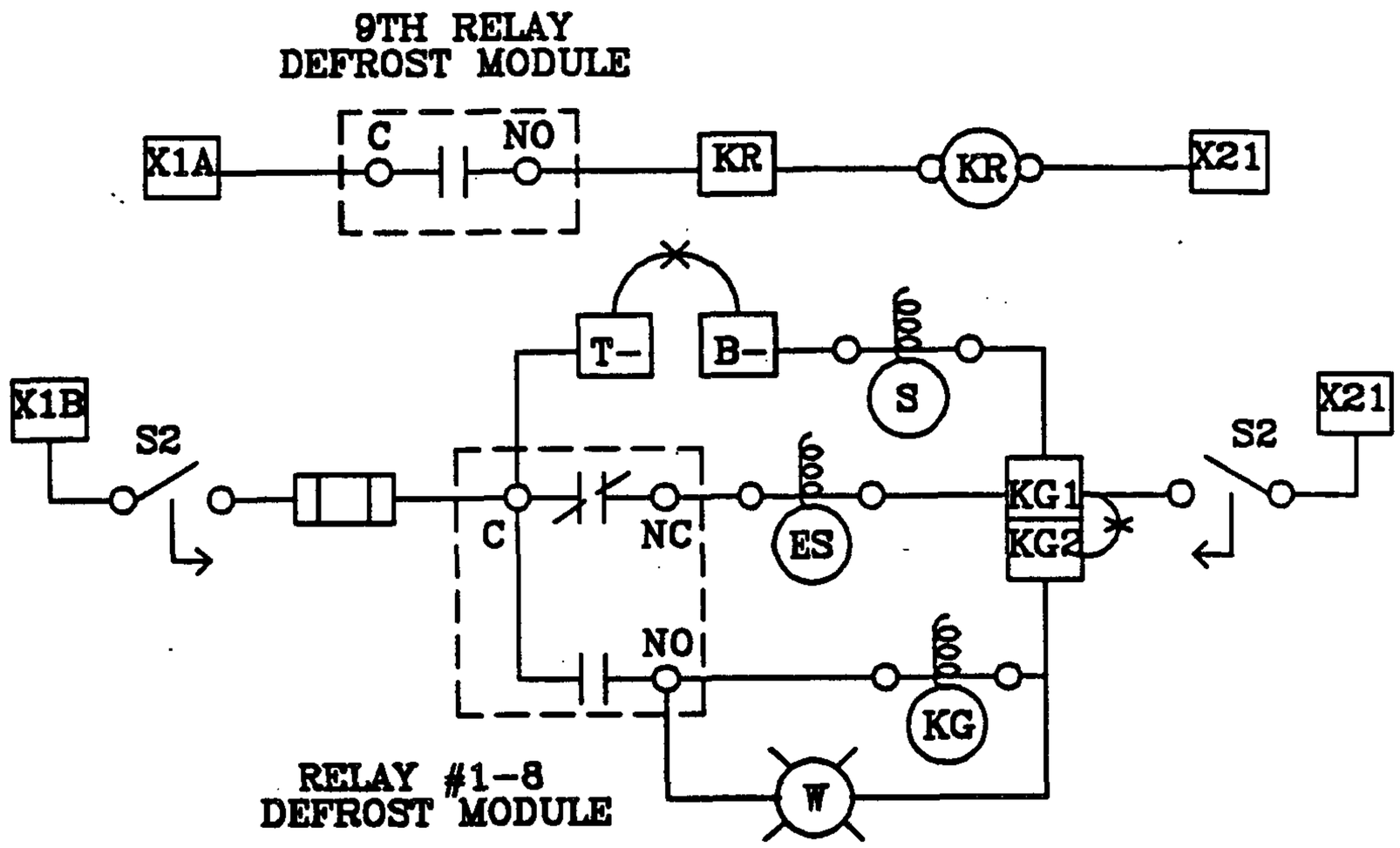


Figure 2-7. Gas defrost circuit.

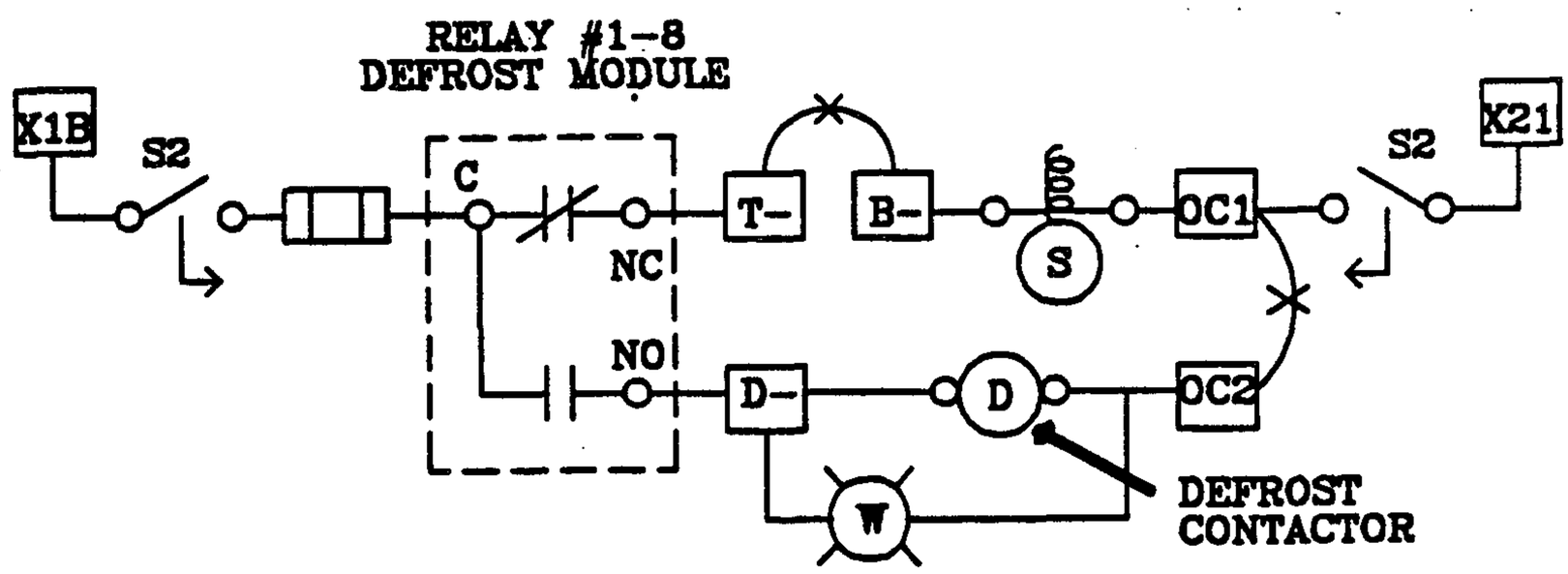


Figure 2-8. Offtime defrost circuit.

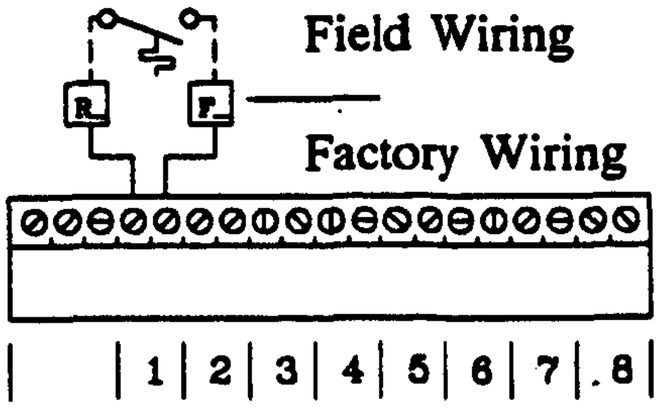


Figure 2-9. Temperature termination input

Defrost Module Dip Switch Settings

Each defrost module has its own address so that the Standalone Defrost Manager can distinguish between which module it is communicating. Figure 2-10 shows the different dip switch settings for each module address. These settings are printed on the defrost module for your convenience.

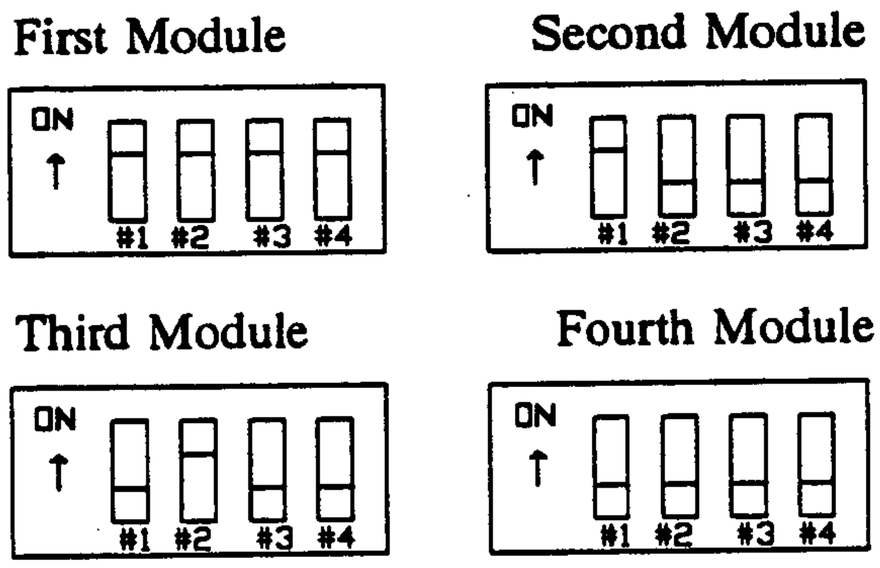


Figure 2-10

When the relay version defrost module is used with gas defrosts an eight pin dip switch must be properly set. This dip switch is used to automatically energize the liquid line solenoid valve needed for gas defrosts. In Figure 2-11 defrost circuits 1 through 4 have been configured as gas defrost circuits. The rule to remember is that if a defrost circuit needs a gas defrost, the corresponding dip switch must be on. When the Standalone Defrost Manager energizes any one of these outputs, the ninth relay will automatically be energized.

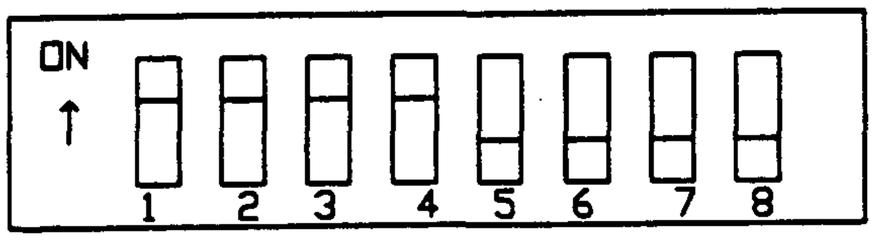


Figure 2-11

STARTUP

Carefully check all wiring before startup. Check that the wiring of defrost circuits to the defrost modules are properly inserted and that no loose strands of wire are present at the terminals blocks of the defrost module. Check that the communication cables and power cables are properly seated into their respective plugs.

Complete the following sequence to startup the Super Plus System:

1. Unplug the 24 VAC power plug assembly from the side of the Standalone Defrost Manager processor assembly and the 24 VAC center tap power plug assembly from the defrost module.

2. Refer to the STARTUP procedure for the Super Plus System in the Installation Instruction Manual P/N 340272.

3. Using a digital voltmeter, verify that 24 VAC is present at both power plug assemblies (Standalone Defrost Manager transformer and the defrost module transformer). If the power supply is between 21 and 30 VAC, only connect the power plug assembly to the Standalone Defrost Manager.

CAUTION: It is advisable to program the defrost circuit information into the Standalone Defrost Manager before applying power to the defrost modules. Defrost information already in the Standalone Defrost Manager may cause defrosts to start occurring.

4. Activate the defrost control of the Standalone Defrost Manager by installing the number of defrost circuits that are wired to the defrost modules. See the section on OPERATION for details.

5. Program the defrost information for each defrost circuit. See the section on OPERATION for details.

6. Connect the power plug assembly to the defrost module. The primary and secondary communication cable and the secondary power cable should already be installed.

7. Once the status indicator light on the defrost modules stop blinking you have established communications between the Standalone Defrost Manager and the defrost modules. At this point you may need to remove any alarms from the alarm log that may have occurred in the startup procedure. Typically defrost backup alarms will occur during this startup.

CHECKOUT PROCEDURE

Once the Startup procedure has been properly completed, the Standalone Defrost Manager provides a checkout function which allows each defrost circuit to be manually forced into defrost. See the section on OPERATION for details on how to manually force a system in and out of defrost. If any system does not respond, refer to the TROUBLESHOOTING section in this manual.

OPERATION

GENERAL

This section covers the different messages you could see on the Defrost Manager. The Defrost Manager is organized into menus and submenus to make it easy for customer interaction with the control. We will first look at the keypad interface and discuss the steps for programming setpoints.

Keypad Interface

The Defrost Manager contains a four button interface: UP arrow, DOWN arrow, SELECT key, and EXIT key.

UP Arrow	Used to scroll through menus and change setpoints.
DOWN Arrow	Used to scroll through menus and change setpoints.
SELECT	This key is used to enter menus and to initiate programming sequences. **All programming procedures will begin by pressing the SELECT key.**
EXIT	This key is used to exit a submenu and return to the previous level of menus. It can also be used to terminate a programming sequence. Remember, if you are unsure about what you are doing, press the EXIT key to return to normal.

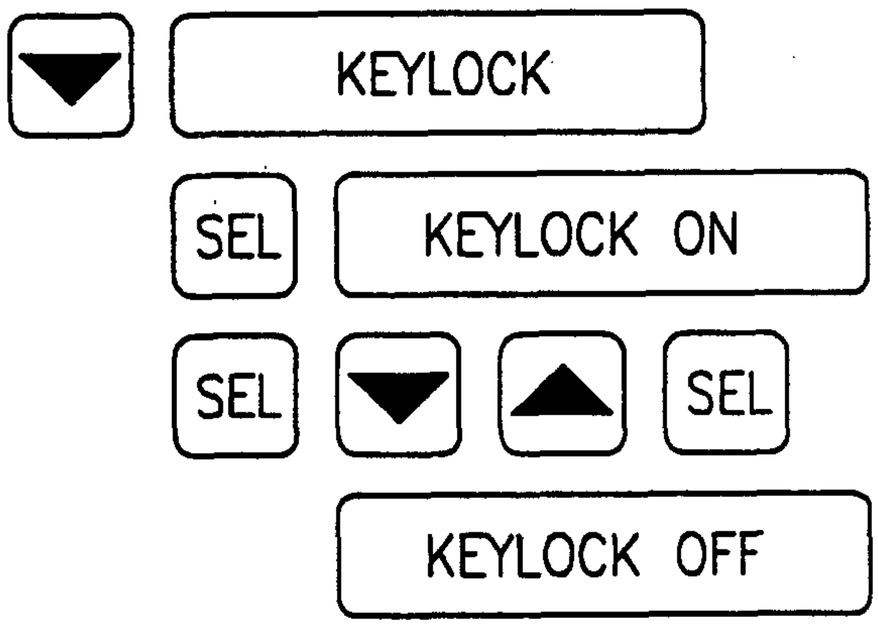
Programming Sequence

All programming sequences follow a simple procedure. Before any programming sequence can begin, the Defrost Manager must be "unlocked" to program new setting into memory. The next section describes how to lock and unlock the Defrost Manager for programming. Here is a step-by-step procedure used to program a setting.

1. Use the UP and DOWN arrow keys to scroll to the setting that you wish to change.
2. Press the SELECT key to start the programming sequence. The setting you are about to change will begin to flash on and off.
   In some cases, the SELECT key will need to be pressed a second time. The discussion of the menu screens will indicate when this is necessary.
3. Use the UP and DOWN arrow to change the setting. Again, in some cases, to change the setting will only require pressing the SELECT key a second time. The following discussion on the menu screens will indicate when this is necessary.
4. Press the SELECT key to complete the programming sequence.

Keylock Menu

The keylock menu is used to prevent accidental programming of defrost parameters. To program defrost settings the keylock protection must be turned off. If no key strokes have been detected after 30 minutes, the Defrost Manager will turn the protection back on. In situations where you can't start a programming sequence, that is no settings begin to flash, the keylock protection is on and you will need to turn if off.



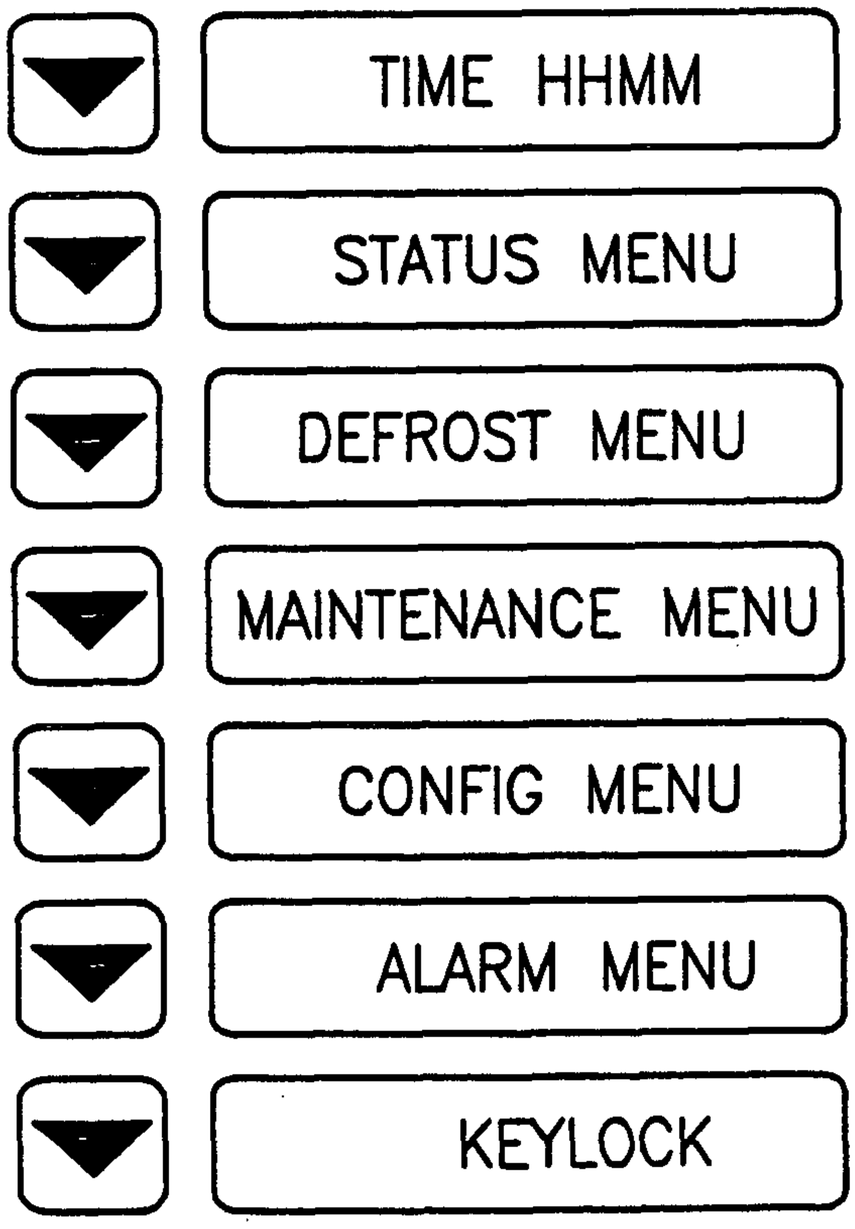
If the display shows that the keylock is ON, then programming will be prohibited.

To turn the keylock off, follow the programming sequence.

This display indicates that the programming security is off. Defrost parameters can now be programmed.

DISPLAY SCREENS

The first level of menu screens for the Defrost Manager contains entry points into various submenus.



The time display is the default screen.

The status menu contains current operating conditions.

The defrost menu contains all program setting of defrost parameters for the defrost circuits.

The maintenance menu allows servicemen to troubleshoot problems or to force circuits in and out of defrost

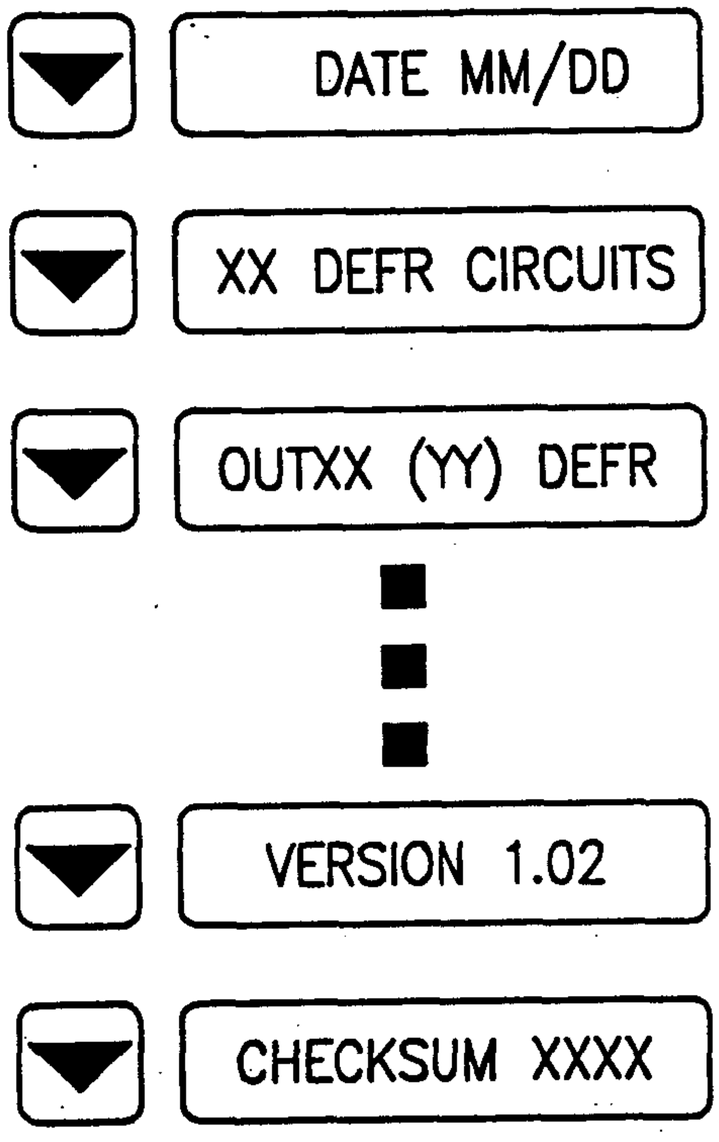
The configuration menu contains programmable settings necessary for the control to operate.

The alarm menu contains a log of alarm activity.

The keylock menu allows for programming to be enabled or disabled.

Status Menu

The following screens are contained in the status menu. Access to this menu can be obtained by scrolling until the display reads "STATUS MENU" and then pressing the SEL key.



This screen displays the current date.

This screen shows how many defrost circuits are being controlled.

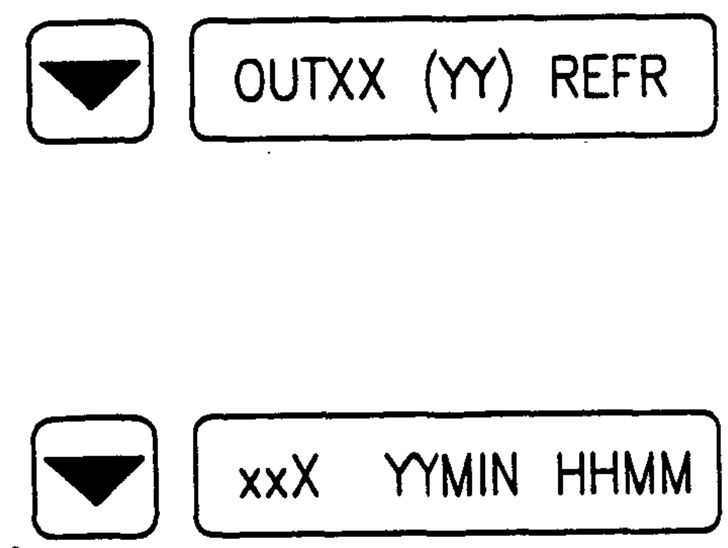
The next series of screens shows circuits that are currently in defrost. Here we see that Output XX is currently in defrost. The (YY) indicates the physical store system number. Pressing the DOWN arrow will allow you to view more circuits that are in defrost. If no circuits are in defrost these screens will not show and the display will go automatically to the software version screen.

Current software version

The checksum screen allows you to verify the integrity of the control's software.

Defrost Menu

The defrost menu contains all the parameters needed to defrost a circuit. The defrost menu is divided into a main menu and a sub menu. The main menu allows you to scroll through and view the primary defrost parameters for each circuit: defrost length, number of defrost per day, and the starting time of the first defrost. The sub menu contains all programmable settings.



The main menu contains two screens for each defrost circuit installed. The first screen shows the output number XX, the store assignment number YY, and the status:

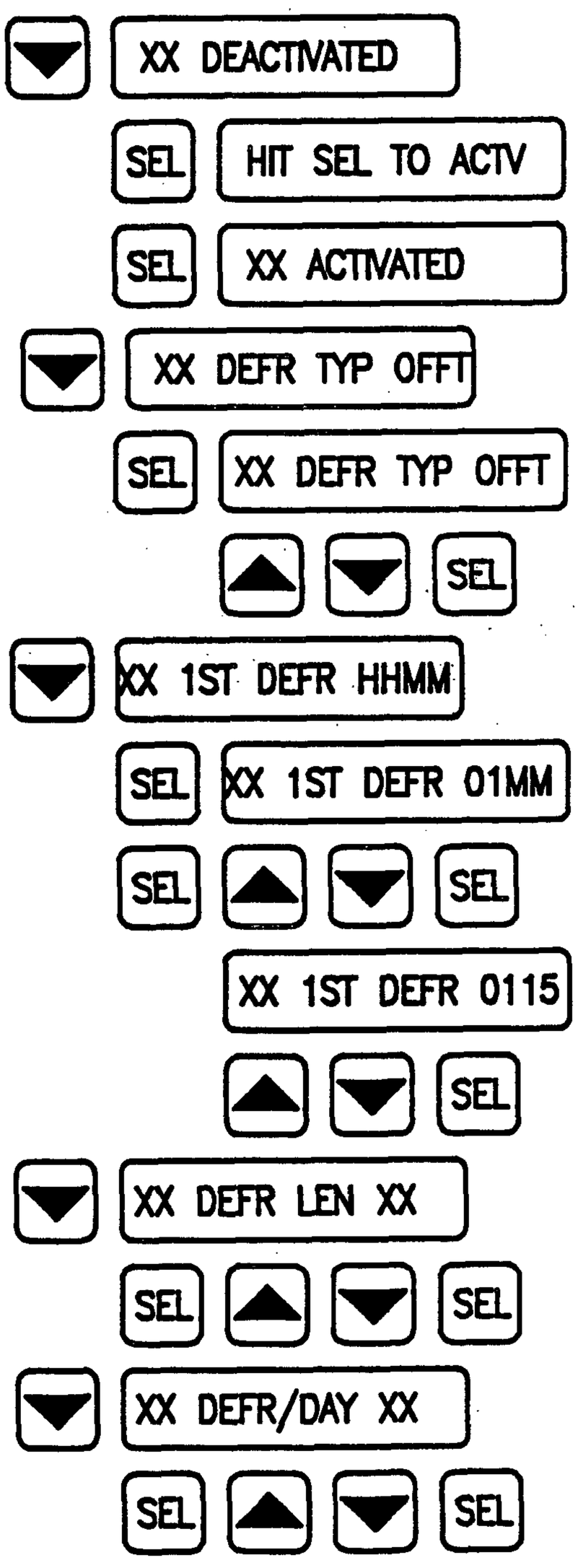
REFR - circuit in refrigeration
DEFR - circuit in defrost
DATV - circuit is deactivated

The second line gives a brief description of the circuits defrost parameters:

xxX - number of defrost per day
YY min - length of each defrost
HHMM - start time of first defrost

Defrost SubMenu

The defrost submenu contains all programmable defrost settings for a defrost circuit. Access to this submenu can be obtained by using the UP and DOWN arrow to scroll to the defrost circuit you wish to program and then pressing the SEL key.



Each circuit can be activated or deactivated. A circuit must be activated in order to have defrost control for that system.

The Defrost Manager will ask you to confirm each time you activate or deactivate a circuit.

You can change the type of defrost. Defrost types possible: offtime, electric or gas. The programming sequence starts with pres-sing the SEL key. Use the UP and DOWN arrows to change the setting. Press the SEL key again to complete the programming sequence.

Defrost start times are always on the quarter hour and are displayed in military time.

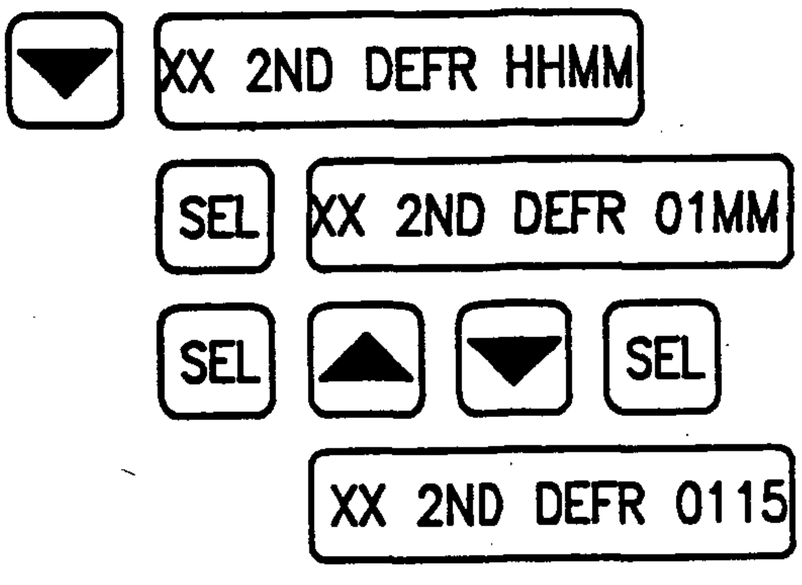
To change the start time, press the SEL key and the starting hours, HH, will begin to flash. Use the UP and DOWN arrow to change the time and then press the SEL key to begin changing the start minutes, MM and follow the same key stroke sequence.

Remember, start times are in quarter hour increments only: :00,:15,:30,:45

The defrost length is the same for all defrosts programmed for this circuit. You can program the duration in one minute increments from 1 to 240 minutes.

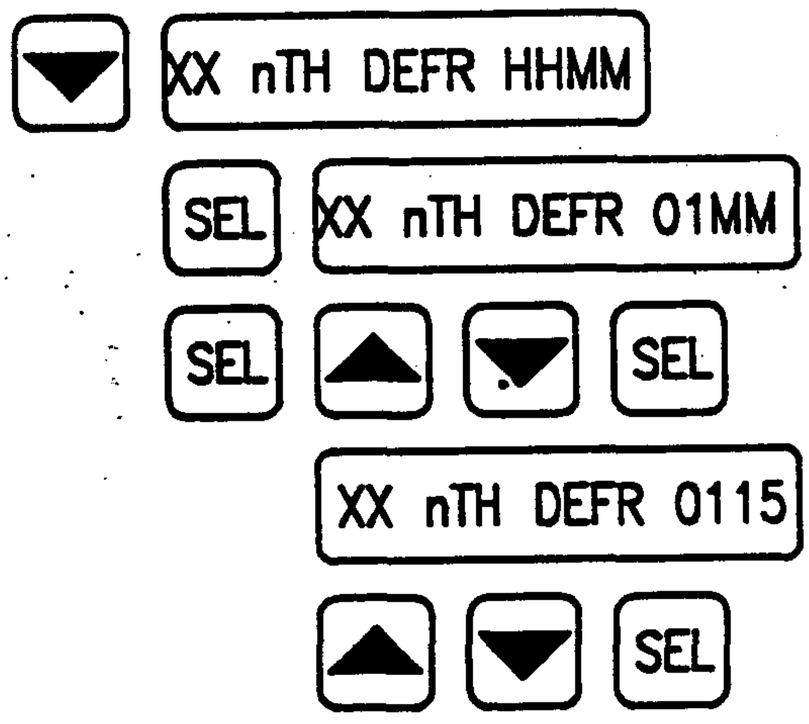
You can program up to 12 defrosts per day for each circuit.

Defrost submenu continued:

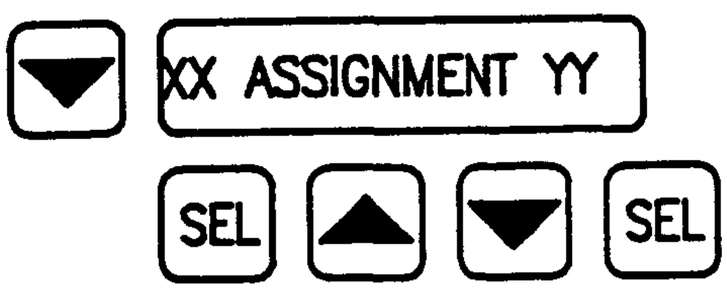


Once the start time, duration, and number of defrost per day have been programmed, the Defrost Manager will automatically allocate defrosts for the remainder of the day.

Each defrost time can be altered. The start time of subsequent defrosts however must begin on the quarter hour. Don't forget to program in military time.



The starting time for each defrost can be viewed as well as manually programmed to a specific time.

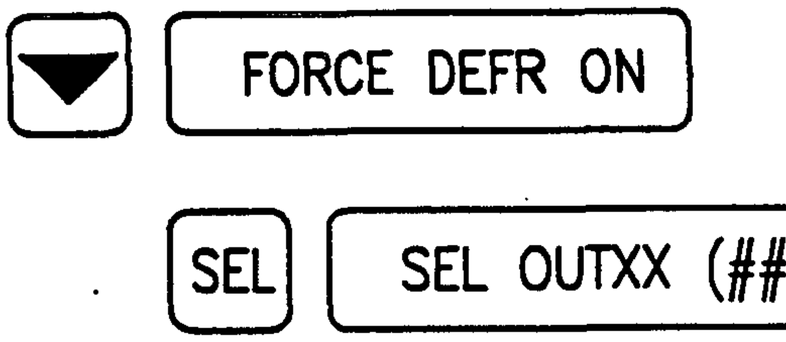


The reassignment screen allows you to relate one of the defrost outputs, on the defrost module, to a physical store system number. The reassignment number is for the customer convenience of placing a store system number with a defrost module output

The assignment number can range from 1 to 99.

Maintenance Menu

The maintenance menu allows the serviceman a convenient tool in troubleshooting potential problems. This is accomplished by manually forcing defrost circuits in and out of defrost. By manually forcing defrosts, the serviceman can better isolate the problem.



You can force a circuit into defrost.

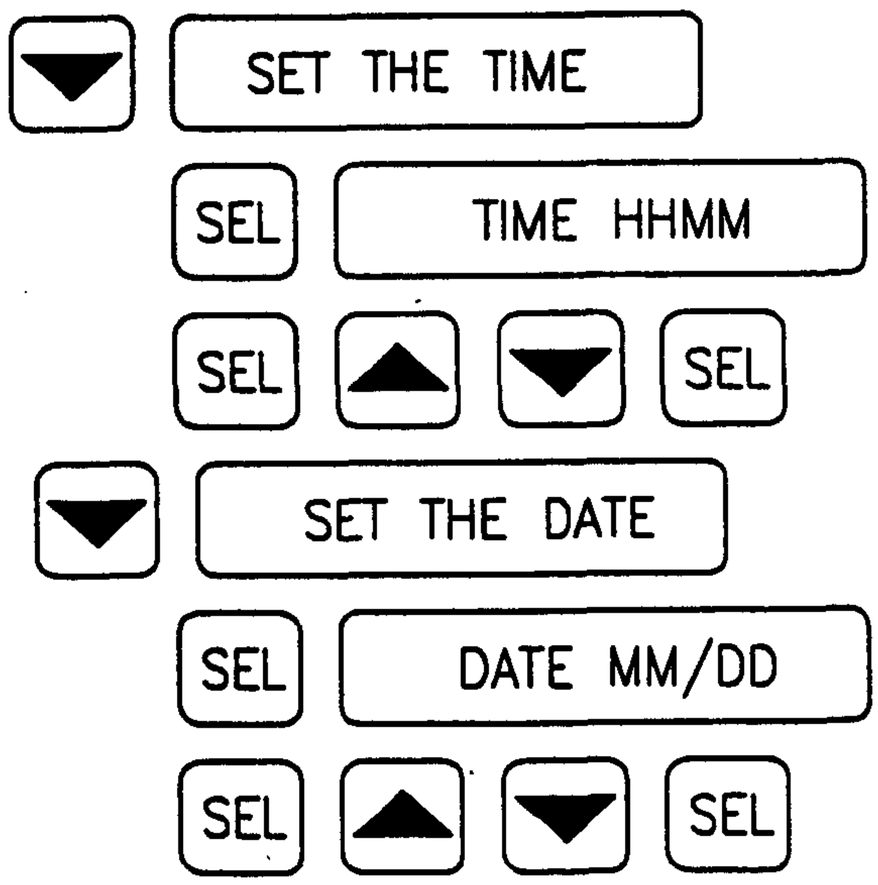
The defrost manager will display both the defrost module output number as well as the physical store assignment number.

XX denotes the defrost module output.
denotes the store assignment number.

You can also force a circuit out of defrost.

Configuration Menu

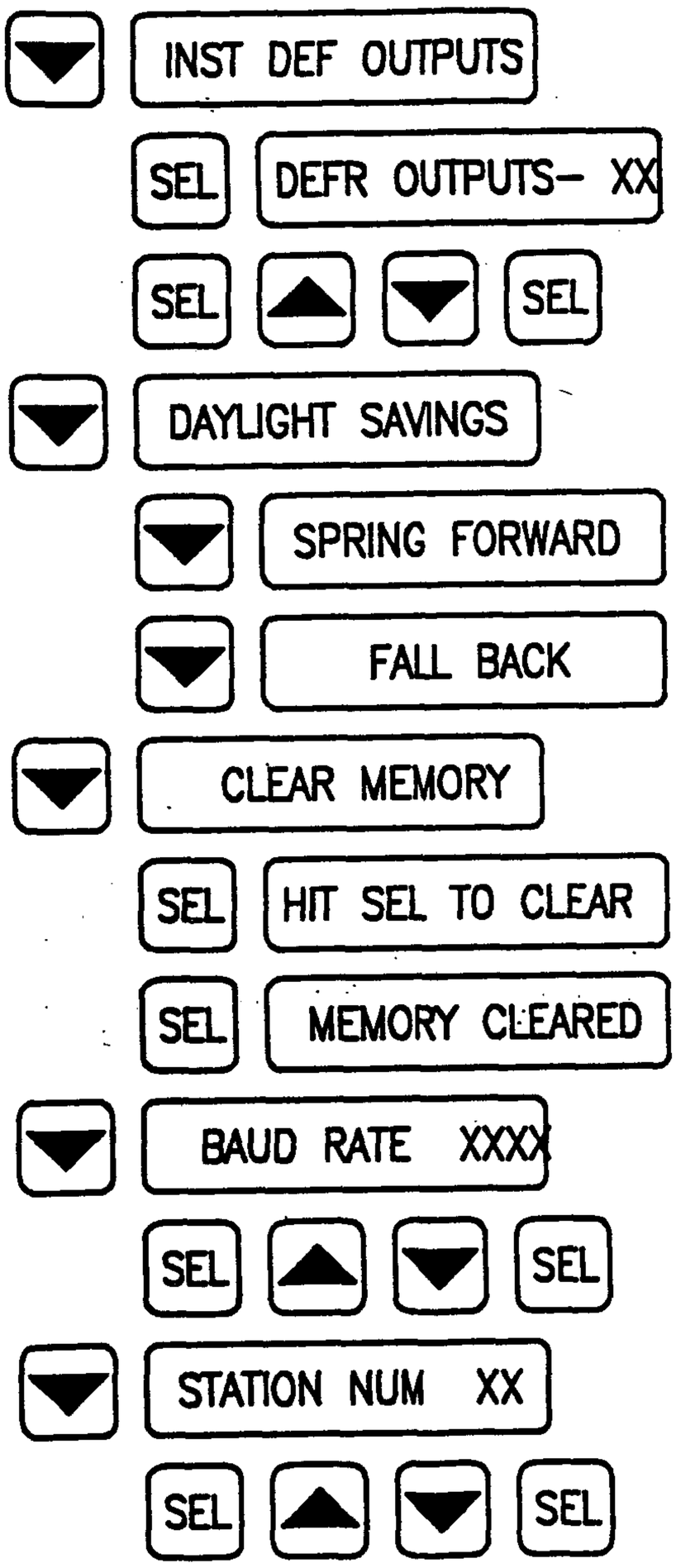
The configuration menu contains screens for setting the clock, installing defrost circuits, communication parameters and daylight savings information.



You can change the current time

You can also change the current date

The configuration menu screens continued:



You can install up to 32 defrost circuits. The number of circuits installed does not have to match to number of circuits exactly contained on the defrost modules. For example, it you need twelve defrost circuits, you will require 2 defrost modules for a total of sixteen possible circuits. You only need to install twelve circuits. The remaining four circuits will not be used.

The Defrost Manager contains an automatic daylight savings routine. Once the time and date for the spring and fall adjustment have been programmed, the Defrost Manager will automatically adjust the time one hour. Refer to page 3-8 for more details on how to program the daylight savings parameters.

There is a memory clear routine which will remove all defrost settings. **Caution: you should use extreme caution when using this routine. All defrost settings will be lost.**

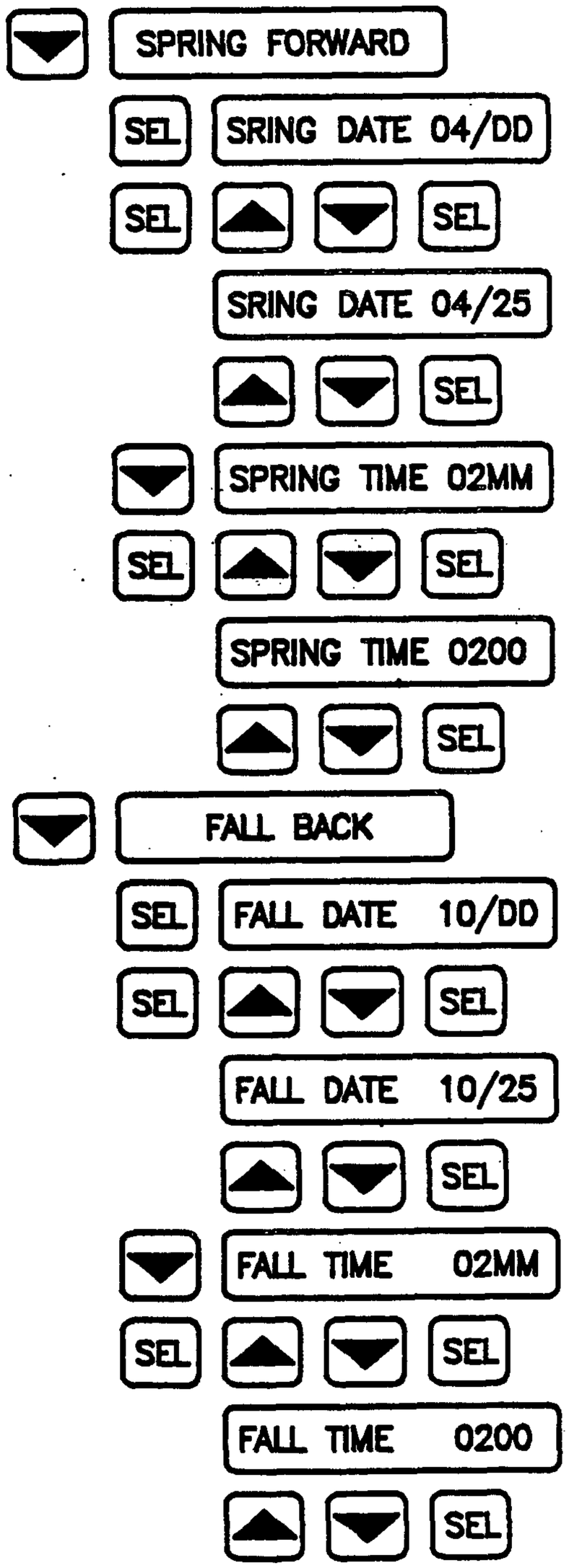
The baud rate is used for remote communications under Hussmann's COMPAK communications software. The programmable settings are: 1200, 2400, 4800, and 9600.

The station number is also used with communications. It allows each control to be assigned a station number by which it can be identified by the communications program. The range of station numbers are 1 to 99.

Station Numbers
Each device or electronic control on the COMPAK communications link (i.e. EPC-2000, EPC-1000, Fibertronic Defrost Clock, Standalone Defrost Manager, etc.) must have its own station number. There cannot be duplicate station numbers on the communications link.

Daylight Savings

The Defrost Manager will automatically adjust the spring and fall times for daylight savings by one hour. All you need to do is program the time and date that the adjustment is to take place and the Defrost Manager will do the rest. If you do not wish to have the daylight savings adjustment, program the time and date values at 00. Remember, the date on which daylight savings occurs will change from year to year. The Defrost Manager will not automatically change the date occurrence from one year to the next.



To program the spring date of daylight savings press the SEL key to begin the programming sequence. Change the settings by pressing the UP and DOWN keys and then pressing the SEL key again. Repeat this procedure until both the starting month and day have been programmed in.

The spring time of daylight savings can be programmed in the same manner that you programmed the spring date.

The fall date and time for daylight savings can also be programmed into the Defrost Manager. Follow the same programming sequence for the spring date and time.

Alarm Menu

The alarm menu contains the last ten occurrences of alarms including the date and time of the occupance. Each alarm entry consists of two screens.

The first screen describes what type of alarm occurred. The XX indicates which alarm you are currently on. Alarm 1 is the most recent.

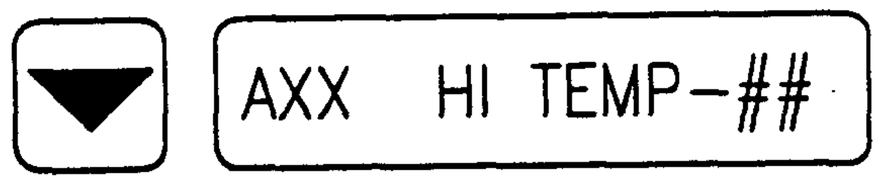
The second screen show the time and date at which the alarm occurred. Press the SEL key to view the time stamp for the alarm.

There are four types of alarms:

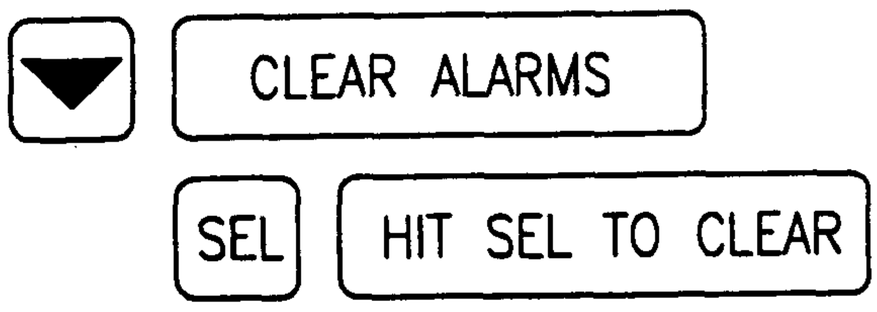
Indicates that a loss of power occurred.

Indicates the time that power was reapplied. The Power Up and Power Down alarms will always occur back to back. By taking the time difference between the two you can determine how long power was down.

The Defrost Manager lost communications with the Defrost Module. When this alarm occurs, the defrost module is operating in the 'fail-safe' mode.



A high temperature condition was found on defrost circuit ##. See the paragraph below for a description of the high temperature condition.



The "Backup Mode" and "Hi Temp" alarms will trigger the alarm output relay. The alarm output can be removed by entering the alarm menu and pressing the EXIT key to leave the menu. Upon leaving the Alarm menu this screen will be displayed. Pressing the SEL key will notify the Defrost Manager to remove the alarm. Before canceling the alarm, the Defrost Manager will ask for a confirmation. Press the SEL key a second time to confirm the alarm cancellation.

High Temperature Alarm
When the Defrost Manager is communicating with a relay version defrost module, a temperature termination of defrost input can be fed back to the Manager. When a circuit is in a refrigeration mode and the Defrost Manager sees a termination input to the module, this is an indication that something is wrong with that particular circuit and the Manager will output an alarm.

Programming Errors and Warnings
The Defrost Manager will automatically check the defrost schedule you program in for a circuit. The error checking is primarily concerned with gas defrosts and the overlapping of defrost time. The Defrost Manager error checking routine limits the number of gas defrost occurring at any one time to three. The Defrost Manager will allow an unlimited number of offtime and electric defrosts occurring at the same time.

CAUTION: Even though the Defrost Manager will allow overlapping gas defrosts, it is suggested to avoid these overlaps if possible. It is recommended that no more than 25 percent of the rack load be in a gas defrost at any one time.

The error checking routine also includes a warning message which informs you when gas defrosts are scheduled within 15 minutes of each other. This warning message should not be confused with the gas overlap error. Gas defrost warnings will be accepted by the Defrost Manager.

GAS OVERLAP ERR OUTPUT XX YY ZZ	If three defrost circuits with overlapping gas defrost times have been programmed into the Defrost Manager and an attempt to program a fourth defrost circuit with the same overlapping schedule, the Manager will display that the overlap error has occurred and it will show the circuits that you are in conflict with.
GAS DEFR WARNING OUTPUT XX	When a gas defrost warning occurs, this message will be displayed. The Defrost Manger will inform you which circuit the warning has taken place with.

In both cases, an overlap error or a program warning, the Defrost Manager will display one screen which informs you of the conflict and then display a second screen to show you which systems the conflict has occurred.

SERVICE

GENERAL

This section is designed to assist the serviceman in troubleshooting the Standalone Defrost Manager. A step-by-step procedure is included to isolate the malfunction.

RECORDING INFORMATION

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

A. Rack model and serial number
B. EPC-2000/1000 model and serial number
C. EPC-2000/1000 options installed on the rack
D. Standalone Defrost Manager model and serial number

Record the following settings and readings as shown in the DEFROST menu of the Defrost Manager.

Systems in Defrost	OUT ____(____)	DEFR
Systems forced into Defrost (Blinking Status)	OUT ____(____)	*DEFR*
Systems forced out of Defrost (Blinking Status)	OUT ____(____)	*REFR*
Systems Deactivated	OUT ____(____)	DATV

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

APPARENT MALFUNCTIONS

Based upon your observations and recordings of the above settings, proceed to the Troubleshooting Checkout Procedures Page to determine the most likely cause. Proceed in order through the checkout procedures listed until the fault is isolated.

Defrost Circuit Test

This test is designed to verify the Defrost Manager's ability to send a signal to the defrost module for the required system output.

NOTE: When troubleshooting the Fibertronic Rack, power must be applied to the Defrost branch board (P/N 340555) located across top of control panel to perform this test.

1. Enter the Maintenance menu. Using the arrow keys, scroll down to the FORCE A DEFROST screen and press the 'SEL' key.
2. Force the output under consideration into a defrost. Refer to page 3-6 of the manual for instructions on manually forcing a defrost.

STEPS 3 THROUGH 5 USED FOR RELAY VERSION DEFROST MODULES.

3. Observe that the corresponding indicator light on the defrost module board for the defrost circuit forced into defrost, is lit.

   a. If the indicator light is lit, verify that the relay is energized properly, that is the Normally closed contacts are now open.
   b. If the indicator light is not lit, check that the defrost communications cable is properly installed.

4. If the proper output relay is energized and the corresponding defrost solenoids, contacts, etc. are not active, refer to Section 2 of this manual, Installation instructions, and check that electrical wiring is installed correctly.
5. If the indicator light does not come on perform the **Module Setup Test** on page 4-3.

STEPS 6 THROUGH 8 USED FOR FIBER OPTIC DEFROST MODULES

6. Observe that the corresponding indicator light on the defrost module board for the defrost circuit forced into defrost is lit.

   a. If the indicator light is lit, verify that the defrost branch board DEFROST light is also lit.
   b. If the indicator light is not lit, check that the defrost communications cable is properly installed.

7. If the proper defrost branch board is energized, refer to the Superplus Fibertronic Installation manual P/N 0340272 and begin checking that the wiring is correct.
8. If the indicator light does not come on perform the **Module Setup Test** on page 4-3.

Module Setup Test

This test is used to verify that the correct number of defrost modules are recognized by the Defrost Manager. This test can be used for both the relay and fiber optic version defrost modules.

1. A maximum of four defrost modules can be connected to one Defrost Manager. Verify that no more that four modules are connected.
2. Make sure that each module has been assigned its own address and that no two modules have the same address. Refer to Figure 4-1 for proper dip switch settings.
3. Enter the Configuration menu and verify that the correct number of defrost circuits are installed. Refer to page 3-6 and 3-7 for instructions.
4. If all cables are properly installed and the correct settings have been verified, cycle power to both transformers (the Defrost Manager and defrost modules transformer).

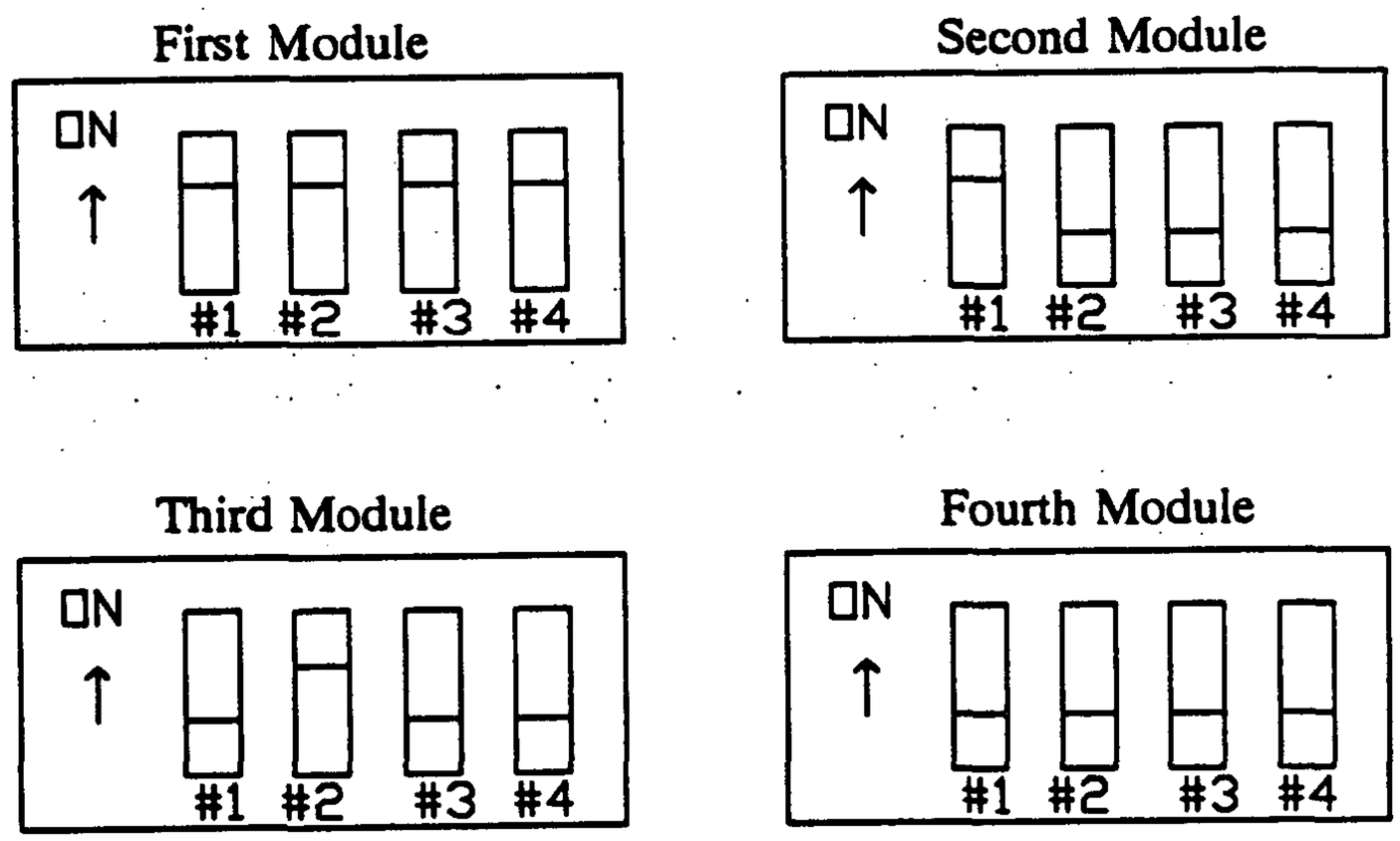


Figure 4-1. Defrost Module Dip Switch Settings.

Gas Defrost Test

This test is used to verify that the ninth relay on the relay version defrost module has been configured correctly for gas defrosts.

1. Verify that the outputs on the defrost module have been configured correctly for those defrost circuits with gas type defrosts. Go to the DEFROST menu in the Defrost Manager and check each defrost circuit that have been programmed as gas defrosts. Verify that the eight pin dip switch located on the defrost module corresponds with those circuits with gas defrosts. The dip switch, shown in Figure 4-2, indicates a dip switch in the ON position as being a gas defrost circuit. When the dip switch is in the ON position, the ninth relay will automatically be energized. Verify that all dip switch settings are correct.
2. Enter the Maintenance menu of the Defrost Manager. Using the arrow keys, scroll down to the FORCE A DEFROST screen and press the 'SEL' key.
3. Force an output that has been configured for a gas defrost into a defrost. Refer to page 3-6 of the manual for instructions on manually forcing a defrost.
4. Observe that the corresponding lights on the defrost module board for the defrost circuit forced into defrost and the ninth relay, are lit.

   a. If the indicator lights for both are lit, verify that the ninth relay is actually energized and performing the action necessary. Check that the normally open set of contacts, NO, are closed. If the contacts are closed go to step 5. If the contacts are not closed, verify that the defrost module is operating correctly by performing the **Module Setup Test** and the **Cable Test.**
   b. If the indicator lights are not lit, perform the **Module Setup Test** and the **Cable Test.**

5. Verify that the ninth relay has been properly wired to the gas solenoid valve. Refer to section 2 of this manual for details.

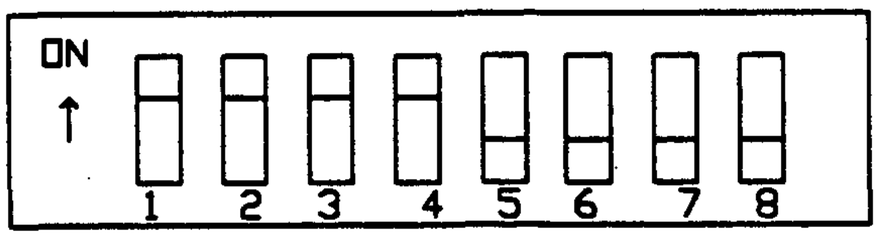


Figure 4-2. Dip Switch Settings

Cable Test

This test is used to verify that the correct cables have been installed for defrost control.

1. Verify that the primary communication cable has been installed between the Defrost Manager and the first defrost module.
2. Verify that the secondary communication cable has been installed between the remaining defrost modules.

Transformer Test

This test is used to verify that the proper power has been applied to the defrost modules. This test requires a digital voltmeter set to read AC Volts.

1. Remove the primary power cable (cable connected to the defrost module transformer) and measure between the two outside pins of the four pin connector. The voltage present should be between:

   20 < and < 30 VAC

2. Replace the primary power cable and remove the secondary cable from the each defrost module to verify that power has been transferred to each module. The voltage present should be between:

   20 < and < 30 VAC

Circuit Program Test

This test is designed to verify that the correct defrost parameters have been programmed into the Defrost Manager. Refer to Section 3 on OPERATIONS to aid you in this test.

1. Enter the DEFROST menu and scroll to the defrost circuit under consideration.
3. Verify that the defrost circuit is ACTIVE (ACTV).
4. Verify the following settings:

Defrost Type	_____
Number of Defrosts	_____
Defrost Length	_____
Start Time of 1st Defrost	_____
" 2nd Defrost	_____
" 3rd Defrost	_____
" nth Defrost	_____

5. Reprogram the defrost parameters for the defrost circuit under consideration.

STANDALONE DEFROST MANAGER - TROUBLESHOOTING CHECKOUT PROCEDURES

OBSERVATIONS	PROBABLE CAUSE	CHECKOUT PROCEDURE	PAGE
System missed or misses scheduled defrost	- Defrost circuit has been deactivated in the Defrost Manager - Temperature termination input preventing defrost - Total rack power outage - Defrost parameters programmed incorrectly	- Defrost circuit test - Circuit program test	4-2 4-4
Defrost module in backup	- Loss of power to Defrost Manager - Communications cable failure - Loss of power to defrost module - Defrost module address is set incorrectly	 - Cable test - Transformer test - Module setup test	 4-3 4-3 4-2
Liquid line solenoid not energized during gas defrost	- 9th relay on module not configured for gas defrost - 9th relay on module not wired	- Gas Defrost Test	4-4